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The Scottish Coastal Observatory 1997-2013

Part 3 - Appendices

Scottish Marine and Freshwater Science Vol 7 No 26

E Bresnan, K Cook, J Hindson, S Hughes, J-P Lacaze, P Walsham, L Webster and W R Turrell

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Marine Scotland is the directorate of the Scottish Government responsible for the integrated management of Scotland's seas. Marine Scotland Science (formerly Fisheries Research Services) provides expert scientific and technical advice on marine and fisheries issues. Scottish Marine and Freshwater Science is a series of reports that publishes results of research and monitoring carried out by Marine Scotland Science. It also publishes the results of marine and freshwater scientific work carried out by Marine Scotland under external commission. These reports are not subject to formal external peer-review.

This report presents the results of marine and freshwater scientific work carried out by Marine Scotland Science.

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Summary

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Peer Reviewed Publications

Siemering B, Bresnan E, Painter SC, Daniels CJ, Inall M, Davidson K (2016) Phytoplankton Distribution in Relation to Environmental Drivers on the North West European Shelf Sea. PLoS ONE 11(10): e0164482. doi:10.1371/journal.pone.0164482.

Eckford-Soper, L.K., Bresnan, E., Lacaze, J-P., Green, D.H. (2016) The competitive dynamics of toxic *Alexandrium fundyense* and non-toxic *Alexandrium tamarense* from Scottish waters. Harmful Algae, 53, 135 – 144.

Bresnan, E., Cook, K., Hughes, S., Hay, S., Smith, K., Walsham, P., Webster, L. (2015) Seasonality of the plankton community at an east and west coast monitoring site in Scottish waters. Journal of Sea Research, 105,16-29.

Bresnan E., Kraberg, A., Fraser, S., Amorim, A.–L., Janisch S., Wiltshire, K.H. (2015) A comparison of *Pseudo-nitzschia* diversity and seasonality at two long-term monitoring sites in the North Sea with new records of *P. multiseries* and *P. americana* at Helgoland Roads. Helgoland Marine Research, 69, 193 – 204.

Kopf, A., Bicak, M., Kottmann, R., Schnetzer, J., Kostadinov, I., Lehmann, K., Fernandez-Guerra, A., Jeanthon, C., Rahav, A., Ullrich, M., Wichels, A., Gerdts, G., Polymenakou, P., Kotoulas, G., Siam, R., Abdallah, R., Sonnenschein, E., Cariou, T., O'Gara, F., Jackson, S., Orlic, S., Steinke, M., Busch, J., Duarte, B., Caçador, I., Canning-Clode, J., Bobrova, O., Marteinsson, V., Reynisson, E., Loureiro, C., Luna, G., Quero, G., Löschert, G., Kremp, A., DeLorenzo, A., Øvreås, L., Tolman, J., LaRoche, J., Penna, A., Frischer, M., Davies, T., Barker, K., Meyer, C., Ramos, S., Jude-Lemeilleur, F., Aguirre-Macedo, M., Wang, S., Poulton, N., Jones, S., Collin, R., Fuhrmann, J., Conan, P., Alonso, C., Stambler, N., Goodwinn, K., Yakimov, M., Baltar, F., Bodrossy, L., Van De Kamp, J., Dion, M.F., Ostrowski, D., Van Ruth, P.,

Malthouse, P., Claus, P., Deneudt, K., Mortelmans, J., Pitois, S., Wallom, D., Salter, I., Costa, R., Schroeder, D., Kandil, M., Amaral, V., Pedrotti, M., Yoshida, T., Ogata, H., Ingleton, T., Munnik, K., Rodriguez-Ezpeleta, N., Berteaux-Lecellier, V., Wecker, P., Cancio, I., Vaulot, D., Bienhold, C., Ghazal, H., Chaouni, H., Essayeh, S., Ettamimi, S., Zaid, E., Boukhatem, N., Bouali, A., Chahboune, R., Barrijal, S., Timinouni, S., Otmani, F., Bennani, M., Todorova, N., Karamfilov, V., Hoopen, P., L'Haridon, S., Bizsel, K., Vezzi, V., Lauro, F., Martin, P., Jensen, R., Hinks, J., Gebbels, J., Rosselli, R., Pascale, F., Schiavon, S., dos Santos, A., Villar, E., Pesant, A,. Cataletto, B., Malfatti, S., Edirisinghe, R., Herrera, J., Barbier, M., Turk, V., Tinta, T., Fuller, W., Salihoglu, S., Serakinci, M., Ergoren, S., Bresnan, E., Iriberri, S., Nyhus, P., Edvardsen, B., Karlsen, P., Golyshin, J., Gasol, P., Moncheva, S., Dzhembekova, N., Johnson, Z., Sinigalliano, E., Gidley, L., Zingone, A., Tsiamis, G., Clark, M., Costa, A., Bour, M., Martins, A., Collins, E., Ducluzeau, A-L., Martinez, J., Costello, M., Amaral-Zettler, L., Gilbert, J., Davies, N. (2015) The Ocean Sampling Day Consortium. GigaScience, 4, 27. http://dx.doi.org/10.1186/s13742-015-0066-5.

Mayor, D.J., Sommer, U., Cook, K.B., Viant, M.R. (2015) The metabolic response of marine copepods to environmental warming, ocean acidification and food deprivation. Nature Scientific Reports, 5, 13690.

Stern, R., Amorim, A., Bresnan, E. (2014) Diversity and plastid types in *Dinophysis acuminata* complex (Dinophyceae) in Scottish waters. Harmful Algae, 39, 223 – 231.

Bresnan, E., Davidson, K., Edwards, M., Fernand, L., Gowen, R., Hall, A., Kennington, K., McKinney, A., Milligan, S., Raine, R., Silke, J. (2013) Harmful Algal Bloom Report Card. MCCIP Science Review 2013, 236-243, doi:10.14465/2013.arc24.236-243.

Edwards, M., Bresnan, E., Cook, K., Heath, M., Helaouet, P., Lynam, C., Raine, R., Widdicombe, C. (2013) Plankton Report Card. MCCIP Science Review 2013, 98-112, doi:10.14465/2013.arc12.098-112.

Eckford-Soper, L., Davidson, K., Bresnan, E. (2013) Identification and quantification of toxic and non-toxic strains of the harmful dinoflagellate *Alexandrium tamarense* using fluorescence in situ hybridization and flow cytometry. Limnology and Oceanography Methods, 11, 540 – 548.

Davidson, K., Gowen, R.J., Tett, P., Bresnan, E., Harrison, P.J., McKinney, A., Milligan, S., Mills, D.K., Silke, J., Crooks, A.-M. (2012) Harmful Algal Blooms: How strong is the evidence that nutrient ratios and forms control their occurrence. Estuarine, Coastal and Shelf Science, 115, 399 – 413.

Serpetti, N., Heath, M., Rose, M., Witte, U. (2012) High resolution mapping of sediment organic matter from acoustic reflectance data. Hydrobiologia, 680, 265-284.

Mayor, D.J., Everett, N.R., Cook, K.B. (2012) End of century ocean warming and acidification effects on reproductive success in a temperate marine copepod. Journal of Plankton Research, 34, 258-262.

Heath, M.R., Rasmussen, J., Bailey, M.C., Dunn, J., Fraser, J., Gallego, A., Hay, S.J., Inglis, M., Robinson, S. (2012) Larval mortality rates and population dynamics of Lesser Sandeel (*Ammodytes marinus*) in the northwestern North Sea. Journal of Marine Systems, 93, 47-57.

Serpetti, N., Heath, M., Armstrong, E., Witte, U. (2011) Blending single beam RoxAnn and multi-beam swathe QTC hydro-acoustic discrimination techniques for the Stonehaven area, Scotland, UK. Journal of Sea Research, 65, 442-455.

Pan, M., Pierce, G.J., Cunningham, C.O., Hay, S.J. (2011) Spatiotemporal coupling/decoupling of planktonic larvae and benthic settlement in decapods in the Scottish east coast. Marine Biology, 158, 31-46.

Pan, M., Pierce, G.J., Cunningham, C.O., Hay, S.J. (2011) Seasonal and interannual variation of decapod larval abundance from two coastal locations in Scotland, UK. Journal of the Marine Biological Association of the United Kingdom, 91, 1443-1451.

Mayor, D.J., Cook, K., Thornton, B., Walsham, P., Witte, U.F.M., Zuur, A.F., Anderson, T.R. (2011) Absorption efficiencies and basal turnover of C, N and fatty acids in a marine Calanoid copepod. Functional Ecology, 25, 509-518.

Bresnan, E., Fernand, L., Davidson, K., Edwards, M., Milligan, S., Gowan, R., Silke, J., Kröger, S., Raine, R. (2010) Climate Change impacts on Harmful Algal Blooms (HABs) in MCCIP Annual Report Card 2010-11, MCCIP Science Review, 10pp. www.mccip.org.uk/arc

Drif, K., Hirst, A.G., Hay, S. (2010) Seasonal abundance and egg production rates of *Oithona similis* and *Pseudocalanus elongatus* in the northern North Sea: a first comparison of egg-ratio and incubation methods. Marine Ecology Progress Series, 415, 159-175.

Hermann, G., Lacaze, J-P., Fraser, S., Turrell, E.A. (2010) Occurrence of algal toxins in water – Solid Phase Adsorption Toxin Tracking (SPATT) as a monitoring tool. Proceedings of the 13th International Conference on Harmful Algae 2008 (Hong Kong, China).

Brown, L., Bresnan, E., Graham, J., Lacaze, J-P., Turrell, E., Collins, C. (2010) Distribution, diversity and toxin composition of the genus *Alexandrium* (Dinophyceae) in Scottish waters. European Journal of Phycololgy, 45, 375-393.

Webster, L., Russell, M., Walsham, P., Phillips, L.A., Packer, G., Hussy, I., Scurfield, J.A., Dalgarno, E.J., Moffat C.F. (2009) An assessment of persistent organic pollutants (POPs) in wild and rope grown blue mussels (*Mytilius edulis*) from Scottish coastal waters. Journal of Environmental Monitoring, 11, 1169 – 1184.

Davidson, K. and Bresnan, E. (2009) Shellfish toxicity in UK waters: a threat to human health? Environmental Health, 8 (Suppl 1), S12.

Davidson, K., Miller, P., Wilding, T., Shutler, J., Bresnan, E., Kennington, K., Swan, S. (2009) A large and prolonged bloom of *Karenia mikimotoi* in Scottish waters in 2006. Harmful Algae, 45, 692 – 703.

Collins, C., Graham, J., Brown, L., Bresnan, E., Lacaze, J-P., Turrell, E.A. (2009) Identification and toxicity of *Alexandrium tamarense* (Dinophyceae) in Scottish waters. Journal of Phycology, 45, 692 – 703.

Bresnan, E., Hay, S., Hughes, S.L., Fraser, S., Rasmussen, J., Webster, L., Slesser, G., Dunn, J., Heath, M.R. (2009). Seasonal and interannual variation in the phytoplankton community in the north east of Scotland. Journal of Sea Research, 61, 17-25.

Tett, P., Carreira, C., Mills, D.K., van Leeuwen, S., Foden, J., Bresnan, E., Gowen, R.J. (2008) Use of a Phytoplankton Community Index to assess the health of coastal waters. ICES Journal of Marine Science, 65, 1475-1482.

Stobo, L., Lacaze, J.P., Scott, A.C., Petrie, J., Turrell, E.A. (2008) Surveillance of algal toxins in shellfish from Scottish waters. Toxicon, 51, 635 – 648.

Turrell, E., Stobo, L., Lacaze, J.-P., Bresnan, E., Gowland, D. (2007) Development of an 'early warning system' for harmful algal blooms using solid-phase adsorption toxin tracking (SPATT). Oceans '07, IEEE Aberdeen, Conference proceedings, Marine Challenges: Coastline to Deep Sea, Paper No. 070131-028.

Bresnan, E., Turrell, E., Fraser, S. (2008) Monitoring PSP and *Alexandrium* hotspots in Scottish waters. In: Proceedings of the 12th International Conference on Harmful Algae. (Ed. by Moestrup, Ø., Doucette, G., Enevoldson, H., Godhe, A., Hallegraeff, G., Luckas, B., Lundholm, N., Lewis, J., Rengefors, K., Sellner, K., Steidinger, K., Tester, P., Zingone, A.), Intergovernmental Oceanographic Commission of UNESCO, Copenhagen, pp 76-79.

Brown, L. and Bresnan, E. (2008) Seasonal occurrence of *Pseudo-nitzschia* species in the west coast and Shetland Isles, Scotland. In: Proceedings of the 12th International Conference on Harmful Algae. (Ed. by Moestrup, Ø., Doucette, G., Enevoldson, H., Godhe, A., Hallegraeff, G., Luckas, B., Lundholm, N., Lewis, J., Rengefors, K., Sellner, K., Steidinger, K., Tester, P., Zingone, A.), Intergovernmental Oceanographic Commission of UNESCO, Copenhagen, pp 165-167.

Pan, M., McBeath, A., Hay, S., Pierce, G.J., Cunningham, C.O. (2007) Real-time PCR assay for detection and relative quantification of *Liocarcinus depurator* larvae from plankton samples. Marine Biology, 153, 859–870.

Mayor, D.J., Matthews, C., Cook, K., Zuur, A.F., Hay, S. (2007) CO_2-induced acidification affects hatching success in *Calanus finmarchicus*. Marine Ecology Progress Series, 350, 91-97.

Hart, M.C., Green, D.H., Bresnan, E., Bolch, C.J. (2007) Large subunit ribosomal RNA gene variation and sequence heterogeneity of *Dinophysis* species from Scottish coastal waters. Harmful Algae, 6, 271 – 287.

Cook, K.B., Bunker, A., Hay, S., Hirst, A.G., Speirs, D.C (2007) Naupliar development times and survival of the copepods *Calanus helgolandicus* and *Calanus finmarchicus* in relation to food and temperature. Journal of Plankton Research, 29, 757-767.

Bonnet, D., Richardson, A., Harris, R., Hirst, A., Beaugrand, G., Edwards, M., Ceballos, S., Diekman, R., López-Urrutia, A., Valdes, L., Carlotti, F., Molinero, J.C., Weikert, H., Greve, W., Lucic, D., Albaina, A., Yahia, N.D., Umani, S.F., Miranda, A., dos Santos, A., Cook, K., Robinson, S., Fernandez de Puelles, M.L. (2005) An overview of *Calanus helgolandicus* ecology in European waters. Progress In Oceanography, 65, 1-53.

Book Chapters

Karlson, B., Cusack, C., Bresnan, E. (eds) (2010) Microscopic and molecular methods for quantitative phytoplankton analysis. Paris, UNESCO. (IOC Manuals and Guides, no. 55.) (IOC/2010/MG/55), 110 pp.

Lacaze, J.P. (2012). Solid-phase adsorption passive sampling: Review of a monitoring tool tracking in situ marine and freshwater toxins. In New Trends in Marine and Freshwater Toxins: Food and Safety Concerns; Cabado, A.G., Vieites, J.M., Eds.; Nova Science Publishers, Inc.: New York, NY, USA, pp. 91–113.

Pan, M., Gallego, A., Hay, S.J., Ieno, E.N., Pierce, G.J., Zuur, A.F., Smith, G.M (2007) Univariate methods to analyse abundance of decapod larvae. In: Analysing Ecological Data (Zuur, A.F., Ieno, E.N., Smith, G.M.), Springer, New York, 373 – 385.

Internal Reports

Walsham, P., Webster, L., Engelke, C., Greenwood, N., Stewart, B., Kivimae, C., Hartman, S., Pearce, D., Gowen, R. (2014) UK Ocean Acidification Coastal Monitoring Network - Expanding the Network - Defra Contract C5801/ME5309. Scottish Marine and Freshwater Science, 5 (1), 29pp.

Baxter, J.M., Boyd, I.L., Cox, M., Donald, A.E., Malcolm, S.J., Miles, H., Miller, B., Moffat, C.F. (eds) (2011) Scotland's Marine Atlas: Information for the national marine plan. Marine Scotland, Edinburgh. 191pp.

McCollin, T., Lichtman, D., Bresnan, E., Berx, B. (2011) A study of phytoplankton communities along a hydrographic transect on the north east coast of Scotland. Marine Scotland Science Report, 04/11, 37pp.

Pan, M. and Hay, S.J. (2010) Decapod crustacean larvae of Scottish coasts. A photographic identification guide (excluding Infraorder Brachyura). Scottish Marine and Freshwater Science, Vol 1 No 11, 106pp. ISSN 2043 7722.

Cook, K.B., Bresnan E., Turrell E.A. (2010) The influence of naturally occurring algal biotoxins on the biology of pelagic copepods: A review of the literature and data

currently available for Scottish waters. Scottish Marine and Freshwater Science report, Vol 1 No 15, 71pp.

Turrell, E., Bresnan, E., Collins, C., Graham, J., Lacaze, J.P., Amorim, A.–L., Brown, L., Koryzinska, A. (2009) Ecosystem Monitoring: Detection of 'indicator' phytoplankton in Scottish waters (ROAME AE1193). Fisheries Research Services Internal Report.

Fisheries Research Services (2007) Hughes, S.L. (ed.) Scottish Ocean Climate Status Report 2004 and 2005. Fisheries Research Services, 40pp.

Turrell, E., Bresnan, E., Collins, C., Brown, M., Graham, J., Grieve, M. (2006) Capacity building for ecosystem monitoring: The use of molecular probes in the study of phytoplankton in Scottish waters (ROAME AE1191). Fisheries Research Services Internal Report, No 26/06.

Fraser, S., Brown, L., Bresnan, E. (2005) Monitoring programme for toxin producing phytoplankton in Scottish coastal waters. 1 April 2004 – 31 March 2005. Fisheries Research Services Internal Report, No 03/06.

Fraser, S., Brown, L., McCollin, T., Bresnan, E. (2005) Monitoring programme for toxin producing phytoplankton in Scottish Coastal waters. 1 April 2005-30 June 2005. Fisheries Research Services Internal Report, No 04/06.

Fisheries Research Services (2004) Hughes, S.L. (ed.) Scottish Ocean Climate Status Report 2002 and 2003. Fisheries Research Services, 50pp.

Fraser, S., Bresnan, E., Moffat, C. (2004) Monitoring Programme for Toxin Producing Phytoplankton in Scottish Waters: 1st April 2003 – 31st March 2004. Fisheries Research Services Internal Report, No 12/04.

Bresnan, E. (2003) Monitoring Programme for toxic phytoplankton in Scottish coastal waters 1 April 2002 – 30 March 2003. Fisheries Research Services Internal Report, No 14/03.

Bresnan, E. (2002) Monitoring Programme for Toxic Phytoplankton in Scottish Coastal Waters. Fisheries Research Services Internal Report No 1 April 2001 – 30 March 2002.

Heath, M.R., Adams, R.D., Brown, F., Dunn, J., Fraser, S., Hay, S.J., Kelly, M.C., Macdonald, E.M., Robertson, M.R., Robinson, S., Wilson, C. (1999) Plankton monitoring off the east coast of Scotland in 1997 and 1998. Fisheries Research Services Report, 13/99.

External Reports

Ostle, C., Williamson, P., Artioli, Y., Bakker, D.C.E., Birchenough, S., Davis, C.E., Dye, S., Edwards, M., Findlay, H.S., Greenwood, N., Hartman, S., Humphreys, M.P., Jickells, T., Johnson, M., Landschützer, P., Parker, R., Pearce, D., Pinnegar, J., Robinson, C., Schuster, U., Silburn, B., Thomas, R., Wakelin, S., Walsham, P.,

Watson, A. J. (2016) Carbon dioxide and ocean acidification observations in UK waters: Synthesis report with a focus from 2010 - 2015. Report to DEFRA.

León P., Bresnan E., Cook K, Walsham P., Helfrich M. and Mackenzie K (2016) Can pelagic gastropods be used to assess the impacts of ocean acidification? ICES Science Fund Final Report. 15pp.

Scherer, C., Gowen, R.J., Tett, P., Atkinson, A., Baptie, M., Best, M., Bresnan, E., Cook, K., Forster, R., Keeble, S., McQuatters-Gollop, A. (2015) Development of a UK integrated plankton monitoring programme. Report to DEFRA.

Devlin, M.J., Best M., Bresnan E., Baptie, M. (2013) Water Framework Directive: The development and status of phytoplankton tools for ecological assessment of coastal and transitional waters. United Kingdom. Update Report to UK Technical Advisory Group for the Environment Agency (May 2013).

Gowen, R.J., Tett, P., McQuatters-Gollop, A., Forster, R., Scherer, C., Bresnan, E., Cook, K., Atkinson, A., Best, M., Baptie, M., Keeble, S., McCullough, G. (2013) Plankton indicators: Development of the Life-form and State-Space Method. Report to DEFRA.

Gowen, R.J., Tett, P., McQuatters-Gollop, A., Forster, R., Scherer, C., Bresnan, E., Cook, K., Atkinson, A., Best, M., Baptie, M., Keeble, S., McCullough, G. (2013) Part One of the UK Marine Strategy for the Marine Strategy Framework Directive: Plankton indicators: Development of the Life-form and State- Space Method. A report to Defra on a pre-project workshop held at the Agri-Food and Biosciences Institute, Belfast March 5th- 6th 2013.

Gowen, R.J., McQuatters-Gollop, A., Tett, P., Best, M., Bresnan, E., Castellani, C., Cook, K., Forster, R., Scherer, C., Mckinney, A. (2011) The Development of UK Pelagic (Plankton) Indicators and Targets for the MSFD. Report to Defra. 41pp.

Gowen, R., Tett, P., Bresnan, E., Davidson, K., Gordon, A., McKinney, A., Milligan, S., Mills, D., Naustvoll, L., Silke, J., Smayda, T., Coyle, A.-M. (2010) Anthropogenic Nutrient Enrichment Harmful Algal Blooms and Toxin Producing Algae. DEFRA final report.

Lusseau, S., Gallego, A., Rasmussen, J., Hatfield, E.M.C., Heath, M.R. (2009) Over-winter survival of larval herring in the Northern North Sea can be related to food intake. Fisheries Research Services Contract Report, No 04/09. http://www.gov.scot/uploads/documents/cc0409.pdf.

Bresnan, E., Davidson, K., Gowen, R., Higman, W., Lawton, L., Lewis, J., Percy, L., McKinney, A., Milligan, S., Shammon, T., Swan, S. (2008) Harmful phytoplankton in U.K. waters: Current and future organisms of concern. In [Davidson, K. and Bresnan, E eds] Relating harmful phytoplankton to shellfish poisoning and human health. Report Oban, Scotland October 2007. P 11 – 16.

Gubbins, M.J., McCollin, T., Lichtman, D., Miller, B.S., Dobson, J., Davies, I.M. (2006) Eutrophication assessment of Scottish coastal waters supporting aquaculture 2004 – 2005. Assessment tables. OSPAR EUC 06.02/Info. 1, 38 pp.

Gubbins, M.J., McCollin, T., Lichtman, D., Miller, B.S., Dobson, J., Davies, I.M. (2006) Eutrophication assessment of Scottish coastal waters supporting aquaculture 2004 – 2005. OSPAR EUC 06/02/Info.1, 303 pp.

Bresnan, E., Fryer, R., Hart, M., Percy, P. (2005) Correlation between algal presence in water and toxin presence in shellfish. FRS Contract Report 04/05.

ICES Reports

O'Brien, T.D., Wiebe, P.H., Falkenhaug, T. (2013) ICES Zooplankton Status Report 2010/2011. ICES Cooperative Research Report, No. 318, 208pp.

O'Brien, T.D., Li, W.K.W, Moran, X. (2012) ICES Phytoplankton and Microbial Ecology Status Report 2009/2010. ICES Cooperative Research Report, No. 313, 197pp.

O'Brien, T.D., Wiebe, P.H., Hay,S. (2011) ICES Zooplankton Status Report 2008/2009. ICES Cooperative Research Report, No. 307, 152pp.

O'Brien, T.D., López-Urrutia, A., Wiebe, P.H., Hay, S. (2008) ICES Zooplankton Status Report 2006/ 2007. ICES Cooperative Research Report, No. 292, 168pp.

Smayda, T. and Aertjeberg, G. (2008) Time Series Data Relevant to Eutrophication Ecological Quality Objectives [WKEUT].

Oral Presentations

León P., Bresnan E., Cook K, Walsham P., McCoy G., Helfrich M. and Mackenzie K. (2016). Analysis of the potential impact of ocean acidification on the pelagic gastropod community in the North East of Scotland. Scottish Microscopy Group meeting, Herriot Watt University, 25 Nov 2016.

León P., Bresnan E., Cook K, Walsham P., McCoy G., Helfrich M. and Mackenzie K. (2016). Analysis of the potential impact of ocean acidification on the pelagic gastropod community in the North East of Scotland. MASTs Annual Science Meeting, Glasgow, Oct 2016.

Swan S., Turner A., Paterson P., Bresnan E., Davidson K. (2016) An unusual bloom of *Dinophysis acuta* in Scottish coastal waters linked to a change in diarrhetic shellfish toxin profiles. International Harmful Algal Bloom Conference, Florianopolis, Brazil, 10 – 14th Oct.

Paterson R., Green D., Davidson K., Bresnan E., Lacaze J.-P. (2016). Too Small to See: Using qPCR to monitor azaspiracid producer *Azadinium spinosum* in Scottish waters. Oral Presentation, International Harmful Algal Bloom Conference, Florianopolis, Brazil, 10 – 14th Oct.

Bresnan E., Fraser S., Brown L., Leon P., Cook K., Hughes S., Walsham P. and Webster L. (2016). The spring diatom bloom in Scottish waters; regional differences and interannual variation. ICES ASC, Riga, Sept 2016.

Eerkes-Medrano, D., Cook, K.B., Wright, P.J. (2016) The role of temperature as a proxy for prey availability ICES ASC, Riga, Sept 2016.

Siemering B, Inall M., Davidson K.Bresnan E., Gowen R. (2016) Using gliders to study phytoplankton. Oral Presentation Challenger Society Meeting, Liverpool, 5 – 9 Sept.

Paterson R., Green D., Davidson K., Bresnan E., Lacaze J.-P. (2016). Keeping Shellfish Safe: New technologies help protect consumers of cultured shellfish from toxic algae (*Azadinium spinosum* and azaspiracids) in Scottish waters. Oral Presentation, Challenger Society Meeting, Liverpool, 5 – 9 Sept.

Siemering B, Bresnan E., Painter S. C., Daniels C. J., Inall M., Davidson K. (2016) Phytoplankton distribution in relation to environmental drivers on the North West European shelf sea. Oral Presentation, British Phycological Society Meeting, Bournemouth, 22 – 24 June, 2016

Paterson R., Green D., Davidson K., Bresnan E., Lacaze J.-P. (2016). Understanding the ecology of the toxic dinoflagellate *Azadinium spinosum* in Scottish coastal regions. Oral Presentation, British Phycological Society Meeting, Bournemouth, 22 – 24 June, 2016

Cook, K., Bresnan, E., Fraser, J., Fraser, S., Robinson, S., Brown, L., Diaz, P. (2016) Status of pelagic habitats in Scottish coastal waters: an application of the UK plankton index. ICES/PICES 6th Zooplankton Production Symposium, Bergen, Norway, 9-13 May 2016.

Wells, S., Cook, K., Bresnan, E., Douglas, A., Mayor, D. (2016) Environmental drivers of zooplankton community at Loch Ewe, Scotland. ICES/PICES 6th Zooplankton Production Symposium, Bergen, Norway, 9-13 May 2016.

Bresnan, E. (2016) The Marine Scotland Science Stonehaven time-series: lessons working at the science/policy interface. Invited lecture: Nippon Foundation - POGO centre of excellence in observational oceanography session 2016, Alfred Wegner Institute, Helgoland, Germany, 23 March 2016.

Bresnan, E. (2016) Plankton and policy: protecting human health and 'assessment of state'. Invited lecture: Nippon Foundation - POGO centre of excellence in observational oceanography session 2016, Alfred Wegner Institute, Helgoland, Germany, 22 March 2016.

Bresnan, E. (2015) The use of transmission electron microscopy to identify diatom cells. Invited presentation: Imaging Marine Microorganisms Workshop, NUIG, Galway, Ireland, 14 September 2015.

Bresnan, E. (2015) Harmful Algal Blooms in Scottish Waters. Invited presentation**:** Environmental Research Group Meeting, University of St. Andrews, UK, 10 December 2015.

Bresnan, E., Diaz, P., Walsham, P., Webster, L., Hartman, S. (2015) Seasonality of carbonate chemistry and coccolithophores at the Stonehaven monitoring site in the north east of Scotland. Bequalm International Phytoplankton Workshop, Copenhagen, 8-12 November 2015.

Walsham, P., Bresnan, E., Leon Diaz, P., Webster, L. (2015) Seasonal cycles and interannual variability in total alkalinity, dissolved inorganic carbon and coccolithophore diversity at a Scottish inshore monitoring site. ICES Annual Science Conference, Copenhagen. H:06.

Walsham, P., Bresnan, E., Diaz, P., Webster, L., Hartman, S. (2015) Ocean Acidification – Science & Policy (applied to a Scottish Coastal Monitoring site). Marine Climate Change, SNH, Inverness.

Bresnan, E., Fraser, S., Brown, L., Amorim, A., Diaz, P. (2014) Marine phytoplankton; good things come in (very) small parcels. Internal MSS Seminar, Aberdeen.

Bresnan, E., Cook, K., Brown, L., Lacaze, J-P., Amorim, A-L., Graham, J., Turrell, E., Collins, C. (2014), Harmful algae in Scottish waters: diversity of the dinoflagellate *Alexandrium* (Halim) and interaction with zooplankton grazers. Invited presentation: British Phycological Society Meeting, Galway, Ireland, June 2014.

Reguera, B., Bresnan, E., Martin, J., Tester, P., Karlson, B. (2014), Distribution and impacts of Harmful Algal Blooms in the ICES area, ICES ASC, Spain, Sept 2014.

Bresnan, E., Berx, B., Collins, C., Cook, K., Gallego, A., Hughes, S., Lacaze, J.P., Walsham, P., Webster, L., Turrell, W.R. (2013) The Marine Scotland Science Ecosystem Monitoring Programme. Invited Seminar, Herriot Watt University.

Walsham, P., Webster, L., Berx, B., Bresnan, E., Hydes, D., Hartman, S. (2013) Carbonate Chemistry Observations in Scottish Coastal and Offshore Waters. Oral Presentation to the UK Ocean Acidification Annual Science Meeting and Global Ocean Acidification observing Network. St Andrews 22nd -26th July 2013.

Bresnan, E., Cook, K., Geldart, M., Lacaze, J-P., Webster, L., Rasmussen, J., Turrell, W. (2012) Variability in a sealoch plankton community; observations over a decade of monitoring. ECSA meeting, Oban, May 2012.

Bresnan, E., Cook, K., Hughes, S.L., Berx, B., Walsham, P., Webster, L., Rasmussen, J., Hay, S., Turrell, W.R. (2012) Long term plankton monitoring in Scottish waters: requirements and emerging patterns. Invited speaker, Helgoland 50th Anniversary Symposium. Helgoland, Germany.

Bresnan, E., Cook, K., Geldart, M., Lacaze, J.-P., Webster, L., Brown, L., Fraser, J., Fraser, S., Hermann, G., Rasmussen, J., Robinson, S., Turrell, W.R. (2012) Seasonality and composition of the plankton community in Loch Ewe, a sea loch on the west coast of Scotland. ECSA Sea Lochs and Adjacent Waters Meeting. Oban, Scotland.

Eckford-Soper, L., Davidson, K., Green, D., Bresnan, E., Lacaze, J.P. (2012) The dynamics of toxic and non toxic strains of the harmful dinoflagellate *Alexandrium tamarense* from Scottish Waters. 60th Annual Meeting, British Phycological Society Meeting, Newcastle.

Eckford-Soper, L., Davidson, K., Green, D., Bresnan, E., Lacaze, J.P. (2012) The dynamics of toxic and non toxic strains of the harmful dinoflagellate *Alexandrium tamarense* from Scottish Waters. Challenger Society Meeting, Norwich.

Eckford-Soper, L., Davidson, K., Green, D., Bresnan, E., Lacaze J.P. (2012) The dynamics of toxic and non toxic strains of the harmful dinoflagellate *Alexandrium tamarense* from Scottish Waters. XIV Harmful Algal Bloom Conference, Korea.

Penston, M.J., Cook, K., Rasmussen, J., Fraser, J., Robinson, S., MacLachlan, P., Dunn, J., Hay, S. (2011) Seasonal and interannual variation of two *Calanus* species off the east and west coasts of Scotland. ICES/NAFO Symposium on the Variability of the North Atlantic and its Marine Ecosystems during 2000–2009, Santander, Spain, 10-12 May 2011.

Bresnan, E., Edwards, M., Stern, R., Hughes, S.L., Fraser, S., Johns, D.G., Lacaze, J.P. (2011) Changes in the diversity of the dinoflagellate genus *Dinophysis* (Ehrenberg) in the north west North Sea. World Conference on Marine Biodiversity, Aberdeen, 2011.

Bresnan, E., Hughes, S.L., Fraser, S., Amorim, A.L., Smith, K., Rose, M., Slesser, G., Hay, S., Rasmussen J., Heath, M.R. (2010) Changes in the phytoplankton community in the North East of Scotland: observations since 1997. EMBS symposium, Edinburgh 2010.

Bresnan, E., Hughes, S.L., Amorim, A-L., Smith, K., Rose, M., Slesser, G., Hay, S., Rasmussen, J., Heath, M.R. (2009) Changes in the phytoplankton community structure in the North East of Scotland: observations since 1997. 58th Annual Meeting of the British Phycological Society, Oban, Scotland, UK, 6-9 January 2010.

Rasmussen, J., Heath, M., Dunn, J., Fraser, J., Hay, S., Robinson, S. (2009) Seasonal Patterns of Size Structured Biomass in Scottish Coastal Zooplankton. CERF 20th Biennial Conference, Estuaries and Coasts in a Changing World, Portland, Oregon, USA, 1-5 November 2009.

Bresnan, E., Hughes, S.L., Amorim, A-L., Smith, K., Rose, M., Slesser, G., Hay, S., Rasmussen, J., Heath, M.R. (2009) Changes in the phytoplankton community structure in the North East of Scotland: observations since 1997. CERF 20th Biennial Conference, Estuaries and Coasts in a Changing World, Portland, Oregon, USA, 1-5 November 2009.

Bresnan, E., Hughes, S.L., Amorim, A-L., Smith, K., Rose, M., Slesser, G., Hay, S., Rasmussen, J., Heath, M.R. (2009) Changes in the phytoplankton community structure in the North East of Scotland: observations since 1997. Coasts and Estuaries Research Federation, 20th Biennial Conference, Estuaries and Coasts in a Changing World, Portland, Oregon, USA.

Fraser, S., Amorim, A.L., Bresnan, E. (2009) Phytoplankton monitoring in Scottish waters: developing time series to identify and evaluate community change. Aberdeen Research Consortium Environmental Change Awareness Day, MLURI, Aberdeen.

Gowen, R., Tett, P., Bresnan, E., Davidson, K., Milligan, S., McKinney, A. (2009) An investigation into the relationship between anthropogenic nutrient enrichment and blooms of harmful micro-algae. GEOHAB - 2nd Open Science Meeting on HABs and Eutrophication, Beijing, China.

Turrell, E. (2009) Early warning of harmful algal events – SPIES-DETOX. 9th Irish Shellfish Safety Scientific Workshop (Kenmare, Ireland).

Lacaze, J.-P., Alfonso, A., Rodriguez, P., Hermann, G., Touzet, N., Turrell, E. (2009) Advances in Solid-phase Adsorption Toxin Tracking (SPATT) for Detection of Toxins Produced by Alexandrium Species. 7th International Conference on Molluscan Shellfish Safety (Nantes, France).

Lacaze, J-P. (2009) SPATT as an early warning tool for harmful algal events. . SPIES-DETOX Workshop: Integrating new Marine biotoxin management Tools in HACCP and Food Safety management. Marine Institute, Galway (Sept 09).

Turrell, E. (2009) Warning of Algal Toxin Events to support aquaculture in the NPP Coastal Zone Region (WATER). Northern Periphery programme Scottish Project Partner Event (16 & 17 March, 2009, Inverness, UK).

Hermann, G., Lacaze, J.P., Bresnan, E., Fraser, S., Turrell, E.A. (2008) Occurrence of algal toxins in water – Solid Phase Adsorption Toxin Tracking (SPATT) as a monitoring tool. The 13th International Conference on Harmful Algae 2008 (Hong Kong, China).

Lacaze, J-P. (2008) Solid-phase adsorption toxin tracking (SPATT). Training in rapid testing for algal toxins in shellfish at NAFC (Shetland, UK).

Hermann, G., Turrell, E. (2008) Findings from an EC Collective Research Project – SPIES-DETOX – 'Early warning and detection of algal toxins'. Association of Scottish Shellfish Growers Annual Conference '08 (Oban, UK).

Bresnan, E., Hughes, S.L., Fraser, S., Johns, D., Edwards, M. (2008) Interannual variation of *Dinophysis* in Scottish waters: Where has D. acuta gone? The 13th International Conference on Harmful Algae, Hong Kong.

Bresnan, E., Kraberg, A., Fraser, S., Janish, S., Wiltshire, K. (2008) Diversity of *Pseudo-nitzschia* in the North Sea: Observations from two long term monitoring sites. 15th International Conference on Diatom Research, Croatia.

Bresnan, E. (2008) Phytoplankton dynamics in Scottish Coastal waters. Invited seminar. Botanik Institute, University of Copenhagen, Denmark.

Mayor, D.J., Matthews, C.A., Cook, K., Hay, S. (2007) Sub-lethal effects of elevated CO_2 on *Calanus* spp. ICES/PICES/GLOBEC 4th International Zooplankton Symposium Human and climate forcing of zooplankton populations, Hiroshima, Japan, 28 May-1 June 2007.

Turrell, E., Stobo, L.A., Piletsky, S., Drago, G., Kleivdal, H. (2007) Evaluation and Method Development of Solid Phase Adsorbents for Phycotoxins in the Marine Environment. 8th European Meeting on Environmental Chemistry (Inverness, UK).

Bresnan, E., Davidson, K., Gowen, R., Higman, W., Lawton, L., Lewis, J., Percy, L., McKinney, A., Milligan, S., Shammon, T., Swan, S. (2007) Harmful phytoplankton in U.K. waters: Current and future organisms of concern. NERC UK HAB Workshop, Oban.

Bresnan, E., Fraser, S., Brown, L., Cook, K., Dunn, J., Fraser, J., Hay, S., Rasmussen, J., Robinson S., Heath, M. (2007) Interannual variation in phytoplankton community structure in the North East of Scotland. Chapman conference on Long Time-Series Observations in Coastal Ecosystems: Comparative Analyses of Phytoplankton Dynamics on Regional to Global Scales, Croatia.

Brown, L. and Bresnan, E. (2006) Transmission electron microscopy: An essential tool in assessing diatom diversity in Scottish waters. Meeting of the Scottish Microscopy Group. Aberdeen.

Lacaze, J.P. (2005) Progress in research into on-site biotoxin monitoring. ASSG International Conference 2005 'The Sustainability of the Shellfish Sector' (Oban, UK).

Bresnan, E., Fryer, R., Fraser, S., Smith, N., Brown, N., Scott, A., Lacaze, J-P., Greive, M., Stobo, L., Smith, E. (2004) The relationship between the occurrence of toxin producing phytoplankton and toxin in shellfish flesh at two sites in Scotland – 5th International Conference on Molluscan Shellfish Safety (ICMSS 04), Galway, Ireland.

Bresnan, E. (2003) Toxic Phytoplankton Monitoring and Research at Fisheries Research Services (FRS). Association of Scottish Shellfish Growers Meeting, Oban.

Poster Presentations

Siemering B, Inall M., Davidson K. Bresnan E., Gowen R. (2016) Using gliders to study phytoplankton. Oral Presentation, International Harmful Algal Bloom Conference, Florianopolis, Brazil, 10 – 14th Oct.

Fanjul, A., Villate, F., Uriarte, I., Iriarte, A., Atkinson, A., Cook, K. (2016) Seasonal and interannual relationships in the zooplankton dynamics of the Northeast Atlantic Shelves in relation to latitude and trophic status. ICES/PICES 6th Zooplankton Production Symposium, Bergen, Norway, 9-13 May 2016.

Iriarte, A., Uriarte, I., Villate, F., Fanjul, A., Atkinson, A., Cook, K. (2016) Comparison of different scales of zooplankton variability in four sites of the Northeast Atlantic Shelves in relation to latitude and trophic status. ICES/PICES 6th Zooplankton Production Symposium, Bergen, Norway, 9-13 May 2016.

León, P., Bresnan, E., Cook, K., Walsham, P., McCoy, G.R., Helfrich, M., Mackenzie, K. (2016) Can pelagic gastropods be used to assess the impacts of ocean acidification in the North Sea? ICES/PICES 6th Zooplankton Production Symposium, Bergen, Norway, 9-13 May 2016.

Eerkes-Medrano, D., Cook, K.B., Wright, P.J. (2016) The role of temperature as a proxy for prey availability. ICES/PICES 6th Zooplankton Production Symposium, Bergen, Norway, 9-13 May 2016.

Mayor, D.J., Sommer, U., Cook, K.B., Viant, M.R. (2016) The metabolic response of marine copepods to environmental warming and ocean acidification in the absence of food. ICES/PICES 6th Zooplankton Production Symposium, Bergen, Norway, 9-13 May 2016.

Garvetto, A., Bresnan E., Gachon, C. (2016) Characterising novel oomycete and protist pathogens in the context of harmful algal blooms, EMBL Symposium, Heidelberg, Germany.

León, P., Bresnan, E., Cook, K., Walsham, P., Helfrich, M., Mackenzie, K. (2015) Can pelagic gastropods be used to assess the impacts of ocean acidification in the North Sea? ICES CM 2015/H.

Villate, F., Iriarte, A., Uriarte, I., Fanjul, A., Atkinson, A., Cook, K. (2015) Comparison of mesozooplankton-environment relationships during a fifteen years period at four coastal sites in the North Atlantic Shelves Province. 55th Conference of Estuarine Coastal Sciences Association, London, UK, 6-9 September 2015.

Fanjul, A., Villate, F., Uriarte, I., Iriarte, A., Atkinson, A., Cook, K. (2015) Comparison of seasonal and inter-annual patterns of variability of coastal zooplankton along a latitudinal gradient in the Northeast Atlantic Shelves Province. 55th Conference of Estuarine Coastal Sciences Association, London, UK, 6-9 September 2015.

Bresnan, E., Brown, L., Collins, C. (2015) Diversity and seasonality of the microbial community at the Stonehaven coastal ecosystem monitoring site in the north east of Scotland. MASTS Annual Science Meeting, Technology & Innovation Centre, Glasgow, 30 September - 2 October 2015.

León Diaz, P., Bresnan, E., Cook, K., Walsham, P., Helfrich, M., Mackenzie, K. (2015) Can pelagic gastropods be used to assess the impacts of ocean acidification in the North Sea? ICES CM H: 16.

León Diaz, P., Bresnan, E., Cook, K., Walsham, P., Helfrich, M., Mackenzie K. (2015) Can pelagic gastropods be used to assess the impacts of ocean acidification in the North Sea? MASTS Annual Science Conference Glagsow, Sept 2015.

León Diaz, P., Bresnan, E., Cook, K., Walsham, P., Helfrich, M., Mackenzie, K. (2015) Can pelagic gastropods be used to assess the impacts of ocean acidification in the North Sea? “Response of pteropods to ocean acidification and climate change” Workshop in Cambridge, June 2015.

McCoy, G.R., Brown, L., Leon Diaz, P., Bresnan, E. (2015) A first description of seasonality of the nano and pico-plankton communities in the north-east of Scotland. MASTS Annual Science Meeting, Technology & Innovation Centre, Glasgow, 30 September - 2 October 2015.

Winterton, C., Austin, W., Bresnan, E., Davidson, K. (2015) A 100-year record of changing toxic algae in Scottish coastal waters relating to climate change. MASTS Annual Science Meeting, Technology & Innovation Centre, Glasgow, 30 September - 2 October 2015.

Winterton, C., Bresnan, E., Davidson, K., Austin, W. (2015) A 100-year record of toxic algae in Scottish coastal waters relating to changes in climate change. IOC-ICES-PICES Symposium on HABs and climate change. Gothenburg, Sweden, May 2015.

Bresnan, E., Lacaze, J-P., Fraser, S., Brown, L., Amorim, A-L., Cook, K. (2014) Algal toxins in Scottish waters: the first association of domoic acid with the diatom *Pseudo-nitzschia pseudodelicatissima* complex in the North East of Scotland, MASTs Annual Science Meeting, Edinburgh.

Diaz, P., Bresnan, E., Walsham, P., Webster, L. (2014) Seasonal variation of *Emiliania huxleyi* morphology at an ecosystem monitoring site off the east coast of Scotland. MASTs ASM, Edinburgh.

Paterson, R., Davidson, K., Green, D., Bresnan, E., Lacaze, J-P., Tillman, U. (2014) Understanding the factors governing *Azadinium* generated shellfish toxicity in Scottish waters. Harmful Algae XVI, New Zealand.

Siemering, B., Inall, M., Bresnan, E., Gillibrand, P., Davidson, K. (2014) Advective transport of harmful phytoplankton. British Phycological Society Meeting, Galway, June 2014. *Awarded Manton Prize for best student poster at meeting.*

Siemering, B., Inall, M., Bresnan, E., Gillibrand, P., Davidson, K. (2014) Advective transport of harmful phytoplankton. Challanger Society Meeting, Plymouth, July 2014.

Smith, K., Walsham, P., Bresnan, E., Webster L. (2014) High performance liquid chromatography (HPLC) and fluorometric analyses of phytoplankton pigments at a Scottish coastal ecosystem monitoring site. MASTs ASM, Edinburgh, Sep 2014.

Walsham, P., Bresnan, E, Webster L., Hartman, S. (2014) High frequency monitoring of carbonate chemistry parameters (Total Alkalinity and Dissolved Inorganic Carbon) at a Scottish Coastal monitoring site to understand seasonal and inter-annual variation.

Scott-Murray, A., Colucci-Gray, L., Cook, K., Bresnan, E., Mayor, D.J. (2013) Communicating marine science in the 21st century. MASTs Annual Science Meeting, Edinburgh.

Bresnan, E., Brown, L., Fraser, S., Lacaze, J.P., Kinnear, S., Hermann, G., Stobo, L., Turrell, E., Cook, K. (2013) *Pseudo-nitzschia* (Peragallo) and domoic acid in Loch Ewe, a sea loch on the west coast of Scotland. GEOHAB open science meeting, UNESCO, France.

Sander, B., Edwards, C., Lacaze, J.P., Bresnan, E. (2013) Investigation into the toxicity of *Alexandrium minutum* isolated from Scottish waters. RGU final year student poster day, June 2013.

Stern, R., Amorim, A.-L., Bresnan E.(2013) Diversity and plastid types in *Dinophysis acuminata* complex (Dinophyceae) in Scottish waters. E-poster at MASTs ASM, Edinburgh.

Eckford-Soper, L., Davidson, K., Green, D., Bresnan, E., Lacaze, J.P. (2012) The dynamics of toxic and non toxic strains of the harmful dinoflagellate *Alexandrium tamarense* from Scottish Waters. 60th Annual Meeting, British Phycological Society Meeting, Newcastle.

Eckford-Soper, L., Davidson, K., Green, D., Bresnan, E., Lacaze, J.P. (2012) The dynamics of toxic and non toxic strains of the harmful dinoflagellate *Alexandrium tamarense* from Scottish Waters. Challenger Society Meeting, Norwich.

Eckford-Soper, L., Davidson, K., Green, D., Bresnan, E., Lacaze, J.P. (2012) The dynamics of toxic and non toxic strains of the harmful dinoflagellate *Alexandrium tamarense* from Scottish Waters. XIV Harmful Algal Bloom Conference, Korea.

Mayor, D.J., Cook, K., Thornton, B., Walsham, P., Witte, U.F.M., Zuur, A.F., Anderson, T.R. (2011) Absorption efficiencies and basal turnover of carbon, nitrogen and fatty acids in *Calanus* spp. ICES/PICES/GLOBEC 5th International Zooplankton Symposium. Population connections, community dynamics and climate variability. Pucon, Chile. 14-48 March 2011.

Cook, K., Penston, M., Rasmussen, J., Fraser, J., Robinson, S., MacLachlan, P., Dunn, J., Hay, S. (2011) Interannual variation in 'indicator' chaetognaths off the east and west coasts of Scotland. ICES/NAFO Symposium on the Variability of the North Atlantic and its Marine Ecosystems during 2000–2009, Santander, Spain, 10-12 May 2011.

Bresnan, E., Hughes, S.L., Fraser, S., Amorim, A-L., Smith, K., Walsham, P., Webster, L., Berx, B., Slesser, G., Rasmussen, J., Hay, S. (2011) Observed changes in the marine phytoplankton community in the north east of Scotland. Plankton Symposium, SAHFOS, Plymouth, Sept 2011.

Bresnan, E., Hughes, S.L., Fraser, S., Amorim, A.L., Smith, K., Rose, M., Walsham, P., Slesser, G., Hay, S., Rasmussen, J., Heath, M.R. (2011) Variation in the phytoplankton community in Scottish waters over the last decade. ICES/NAFO

Symposium on the Variability of the North Atlantic and its Marine Ecosystems during 2000–2009, Santander, Spain, 10-12 May 2011.

Bresnan, E., Hay, S., Hughes, S.L., Slesser, G., Lichtman, D., Smith, K., Walsham, P., Webster, L., Lacaze, J.P., Rasmussen, J., Amorim, A-L., Fraser, S., Fraser, J., Robinson S., Dunn, J. (2011) Marine Scotland - Science Inshore Ecosystem Monitoring Programme: Observed changes in the plankton community since 1997. MASTS Science Meeting, Edinburgh.

Fraser, S., Amorim, A-L., Rasmussen, J., Hay, S., Bresnan, E. (2010) Interannual variation in the diatom genus *Skeletonema* (Greville) in Scottish waters 58th Annual Meeting of the British Phycological Society, Oban, Scotland, Uk, 6-9 January 2010.

Fraser, S., Amorim, A.L., Bresnan, E. (2009) Phytoplankton monitoring in Scottish waters: developing time series to identify and evaluate community change. Scottish Marine Group Autumn Meeting, Stirling, Scotland, UK, 29 October 2009.

Scherer, C., Tett, P., Gowen, R., Gilpin, L., Bresnan, E., Mills, D. (2009) Can the phytoplankton community index be improved by accounting for the heterotrophic and mixotrophic microplankton? 44th European Marine Biology Symposium 2009, Liverpool.

Bresnan, E., and Yucel, R. (2009) Marine microflagellates: investigations of diversity and seasonality using flow cytometry. Flow Cytometry Workshop, University of Aberdeen.

McCollin, T. (2009) *Mediopyxis helysia* in Scottish Waters. British Phycological Society meeting, London.

Brown, L. and Bresnan, E. (2009) The diversity of the genus *Alexandrium* Halim (Dinoflagellata) in Scottish waters, assessed using morphological criteria. British Phycological Society meeting, London.

Turrell, E.A, Lacaze, J.P., Hermann, G., Alfonso, A., Maher, M., Raine, R., Keady, E., Touzet, N., Papapanagiotou, E. (2008) Occurrence of algal toxins in water and shellfish from Europe – The potential of solid phase adsorption toxin tracking as a monitoring tool. 11th International Conference on Applied Phycology (Galway, Ireland).

Fraser, S. and Bresnan, E. (2009) Comparing the current distribution of *Pseudo-nitzschia* (Peragallo) and *Dinophysis* (Ehrenberg) along the west coast of Scotland with data collected a century ago. British Phycological Society meeting, London.

Bresnan, E. (2008) Phytoplankton Projects at Fisheries Research Services, Marine Laboratory. Poster: 9th Advanced Phytoplankton Taxonomy Course, Naples, Italy.

Brown, L., Bresnan, E., Graham, J., Collins, C., Lacaze, J-P,. Turrell, E.A. (2008) Diversity of *Alexandrium* (Dinophyceae) in Scottish waters. Algal Culture Collections conference, Oban.

Bresnan, E., Hay, S.J., Hughes, S.L., Fraser, S., Heath M.R. (2008) Changes in spring bloom dynamics in the North East of Scotland. Annual Science Conference 2008, Halifax, Nova Scotia, Canada, 22-26 September 2008 CM 2008.

McCollin, T. (2008) Observation of *Mediopyxis helysia* in Scottish waters. Annual Science Conference 2008, Halifax, Nova Scotia, Canada, 22-26 September 2008 CM 2008.

McCollin, T. (2008) *Mediopyxis helysia* in Scottish Waters. Non-Native Species Forum, Cardiff, Wales, 29-30 May 2008.

McCollin, T. (2008) *Mediopyxis helysia* in Scottish Waters. Non-Native Species Workshop, Leicester, England, June 2008.

Brown, L. and Bresnan, E. (2008) The diversity of the genus *Alexandrium* Halim (Dinoflagellata) in Scottish waters, assessed using morphological criteria. 3rd Congress of the International Society for Applied Phycology, Galway, Ireland.

Fraser, S. and Bresnan, E. (2008) Comparing the current distribution of *Pseudo-nitzschia* (Peragallo) and *Dinophysis* (Ehrenberg) along the west coast of Scotland with data collected a century ago. 3rd Congress of the International Society for Applied Phycology and the 11th International Conference on Applied Phycology, Galway, Ireland.

Turrell, E.A. (2007) Active biological monitoring and removal of toxins in aquaculture ecosystems and shellfish-including the development of a Solid-Phase In-situ Ecosystem Sampler (SPIES) and detoxification of shellfish (DETOX). Association of Scottish Shellfish Growers (ASSG) International Conference ’07 - “Managing coastal resources” (Oban, UK).

Fraser, S., Brown, L., Bresnan, E. (2007) Investigation of an atypical *Pseudo-nitzschia* spp. bloom in Scottish waters. 10th Canadian Workshop on Harmful Algae, Quebec, Canada.

Hay, S., Robinson, S., Fraser, J., Rasmussen, J., Cook, K., Dunn, J., Heath, M., Bresnan, E., Fraser, S., Lichtman, D., Rose M. (2007) Zooplankton community description and comparison of seasonal population development for common species and groups, sampled weekly at time series sites on the Scottish east and west coasts. ICES/PICES/GLOBEC 4th International Zooplankton Symposium Human and climate forcing of zooplankton populations, Hiroshima, Japan.

Cook, K.B., Hay, S., Robinson S., Skinner, C. (2007) Seasonal patterns of abundance, egg production and egg viability of the calanoid copepods *Calanus helgolandicus* and *Calanus finmarchicus* at a station off the north-western North Sea coast. ICES/PICES/GLOBEC 4th International Zooplankton Symposium Human and climate forcing of zooplankton populations, Hiroshima, Japan, 28 May-1 June 2007.

Graham, J., Turrell, E., Stobo, L., Bresnan, E. (2006) Identification and assessment of the toxicity burden of natural phytoplankton populations. Proceedings of the 6th International Conference on Molluscan Shellfish Safety, Marlborough, New Zealand, 18-23 March 2006.

Stobo, L., Turrell, E., Lacaze, J.-P., Bresnan, E.(2006) Solid phase adsorption toxin tracking (SPATT) from New Zealand to the Scottish Coast. XII International Conference on Harmful Algae, Copenhagen, Denmark.

Collins, C., Bresnan, E., Brown, L., Grieve, M., Turrell, E., Cunningham, C. (2006) Molecular diversity of *Pseudo-nitzschia* cf. *delicatissima* in Scottish waters. Unravelling the algae, London.

Lichtman, D., Hughes, S., Beaton, J., Turrell, W.R. (2006) How water currents in the northern Atlantic Ocean effect Scottish coastal temperature. Poster displayed at an exhibition on the sea held at Taigh Chearsabhagh arts centre Lochmaddy.

Smith, E.A., Gubbins, M.J., Grieve, M., Bresnan, E. (2005) Monitoring toxic phytoplankton and shellfish in support of eutrophication assessments for Scottish coastal waters. GEOHAB Open Science Meeting on HABs and Eutrophication, Baltimore, Maryland, USA, 7-10 March 2005.

Stobo, L.A., Lacaze, J-P., Scott, A.C., Smith, E.A. (2004) An investigation into the occurrence of pectenotoxins (PTXs) in shellfish from Scottish waters. XI International Conference on Harmful Algae, Cape Town, 15-19 November 2004.

Fraser, S., Bresnan, E., Brown, L. (2004) Variation in *Dinophysis* spp: Cell size in Scottish waters. XI International Conference on Harmful Algae, Cape Town, South Africa.

Bresnan, E., Fraser, S., Smith, N. (2004) Diversity of *Pseudo-nitzchia* blooms in a sealoch in Northern Scotland. XI International Conference on Harmful Algae, Cape Town, South Africa.

Fraser, S., Bresnan, E., Smith, N. (2004) Variation in toxic phytoplankton cell numbers determined from replicate integrated tube samples. 5th International Conference on Molluscan Shellfish Safety (ICMSS 04), Galway, Ireland.

Lichtman, D., Hughes, S., Beaton, J. (2003) The FRS Coastal Long Term Monitoring Project. Poster presented at SUT's 6th underwater science symposium,

Lichtman, D., Hughes, S., Bresnan, E., Beaton, J. (2003) Monitoring Long Term Change in Scottish Coastal Waters. Poster displayed at the 2003 Loch Maddy Bay Forum.

Bresnan, E., Hay, S., Heath, M.R., Fraser, S., Smith, N., Dunn, J. (2003) The occurrence of toxin producing algae in Scottish waters. Invited poster HAB Watch Workshop, Ville-France, France.

Stobo, L.A., Lewis, J., Quilliam, M.A., Hardstaff, W.R., Gallacher, S., Webster, L., Smith, E.A., McKenzie, M. (2003) Detection of yessotoxin in UK and Canadian isolates of phytoplankton and optimisation and validation of LC-MS methods. 8th Canadian Workshop on Harmful Marine Algae.

Bresnan, E., Fraser, S., Smith, N., Brown, N., Scott, A. (2003) *Pseudo-nitzschia* numbers and Amnesic Shellfish Toxins (AST) in shellfish at Loch Ewe, a Sealoch in northern Scotland. 8th Canadian Workshop on Harmful Marine Algae, Moncton, Canada.

Bresnan, E., Hart, M., Stobo, L., Petrie, J., Fraser, S., Smith, N., McKenzie, M., Bolch, C. (2002) *Dinophysis* species and diarrhetic shellfish toxins at the Isle of Ewe, Scotland, during 2001. X International Conference on Harmful Algae, Florida USA.

Stobo, L.A., Lewis, J., Quilliam, M.A., Gallacher, S., Webster, L., Smith, E.A. (2002) Optimisation and validation of LC-MS detection of yessotoxin in UK isolates of phytoplankton. X International Conference on Harmful Algae, Florida, USA.

Media

Bresnan, E. (2014) The ocean sampling day consortium. Interview with American Public Radio, Savannah, Georgia.

Bresnan, E., Collins, C., Turrell, E., Brown, L., Graham, J., Amorim, A.L., Lacaze, J-P., Campbell, C. (2009) A new collection of Alexandrium cultures available at the Culture Collection for Algae and Protozoa. Harmful Algal News.

Bresnan, E., Collins, C., Turrell, E., Brown, L., Graham, J., Amorim, A.L., Lacaze, J-P., Campbell, C, (2009) A new collection of Alexandrium cultures available at the Culture Collection for Algae and Protozoa. CCAP website.

Bresnan, E., Collins, C., Turrell, E., Brown, L., Graham, J., Amorim, A.L., Lacaze, J-P., Campbell, C. (2009) A new collection of Alexandrium cultures available at the Culture Collection for Algae and Protozoa. The Phytologist, 2009, vol 77, page 9.

Lacaze, J-P. (2010) Could “tea bags” help monitor the presence of marine biotoxins in seawater? Fish Farmer, November/December 2010, pp. 38-39.

Mayor, D.J. and Cook, K. (2008). The Water Flea: Source of all life in our seas. Leopard Magazine: Feb'08, 21-22.

Turrell, E. (2007) Active biological monitoring and removal of toxins in aquaculture ecosystems and shellfish - including the development of a Solid-Phase In-situ Ecosystem Sampler (SPIES) and detoxification of shellfish (DETOX). The Grower.

Turrell, E. (2007) Surveillance of Lipophilic Shellfish Toxins. FishUpdate, January 2007, Issue No. 11 p.7.

Davidson, K., Bresnan, E., Kennington, K., Swan, S., Fraser, S., Miller, P. (2006) A large and prolonged bloom of *Karenia mikimotoi* in Scottish waters in 2006. Harmful Algal News.

Studentships (PhD Completed)

Lisa Eckford- Soper (2013) The competitive dynamics of toxic and non-toxic ribotypes of the harmful dinoflagellates *Alexandrium tamarense* in Scottish waters. Ph.D. thesis. University of Highlands and Islands.

Natalia Serpetti (2011) Modelling and mapping the physical and biogeochemical properties of sediments. PhD thesis, University of Aberdeen.

Traiani Stari (2010) Seasonal Stability in Time Series of Zooplankton Abundance. PhD thesis, Department of Mathematics and Statistics, University of Strathclyde.

Dorota Demain (2010) Settlement ecology of juvenile cod *Gadus morhua*, haddock *Melanogrammus aeglefinus* and whiting *Merlangius merlangus*. University of Aberdeen.

María C. Pan Añón (2009) Decapod Crustacean Larvae in Scottish (UK) Coastal Plankton. Seasonal Patterns, Settling Stages and a Real-Time PCR Identification Method. University of Aberdeen.

Studentships (PhD In Progress 2016)

Angelina Angelova (in progress) Hydrocarbon degrading bacteria in the FSC. Herriot Watt University.

Andrea Garvetto (in progress) Phytoplankton parasites. University of the Highlands and Islands.

Ruth Paterson (in progress) Ecology of *Azadinium* in Scottish waters. University of Highlands and Islands.

Beatrix Siemering (in progress) Advection of harmful algal blooms. University of Highlands and Islands.

Seona Wells (in progress) Ecology of zooplankton on the west coast of Scotland. University of Aberdeen.

Cathy Winterton (in progress) *Alexandrium* in the paleoecological record. University of St. Andrews.

Studentships (MSc Completed)

Anna Harte (2015) Factors influencing the Density of Larval Sea Lice at East and West Locations in Scotland. MSc thesis, University of Aberdeen.

Paul Dees (2015) Domoic acid concentration and *Pseudo-nitzschia* spp. cell count compared to environmental conditions within a Scottish sea loch. MSc thesis, University of Aberdeen.

Neil Everett (2011) Examination of the Effects of Ocean Acidification on Copepod Egg Viability Using Novel Staining Techniques. MSc thesis, University of Aberdeen.

Christine McGunnigle (2008) An investigation into the behaviour of *Phaeocystis globosa* and *Skeletonema sp.* grown at different light and nutrient concentrations. MSc. Thesis, University of Aberdeen.

Ceri Matthews (2006) The sub-lethal effects of elevated carbon dioxide on *Calanus* spp. in the year 2300: the worst case scenario. MSc thesis, University of Aberdeen.

Studentships (BSc Completed)

Bianca Sander (2013) The toxicity of *Alexandrium minutum*. BSc Honours thesis, Robert Gordon's University.

Sarah Lou Giering (2008) Estimation of LC_{50} of hydrochloric acid and carbon dioxide on *Temora longicornis*. BSc honours thesis, University of Aberdeen.

Claire Skinner (2005) Reproduction of *Calanus helgolandicus* and *Calanus finmarchicus* at a station off Stonehaven: effect of female gonad maturity, female size, chlorophyll concentration and temperature. BSc honours thesis, University of Aberdeen.

Nuffield Students

Skye Arnott (2015) Albyn School. Can jellyfish blooms be predicted? Crest gold award, British Association for Science gold award, Two press releases.

Mairi Bell (2011) Hazlehead Academy. Diagnosing Embryo Abnormalities in Zooplankton. British Association for Science gold award, Big Bang science festival Manchester winner, BBC special commendation, Tomorrows Water UK winner.

Katie Forbes (2010) Kincorth Academy. Sampling efficiency of plankton nets. British Association for Science Gold medal, Big Bang Science festival London 2nd place, Tomorrows Water UK Winner & International 3rd place, two press releases locally and nationally.

Nicole Little (2009) Inverurie Academy. Biometrics in Zooplankton. Press release.

Emma Moore (2008) Bridge of Don Academy. Moulting Enzymes in Marine Crustacean Plankton: Can they be used to measure growth? British Association for Science gold medal.

Danny Plows (2007) Peterhead Academy. The relationship between body size and release of Chitobiase in Crustacean Zooplankton.

Katherine Ralston (2006) Mackie Academy. Juvenile Fish Composition in a coastal Nursery ground. British Association for Science Gold Medal and into last ten in London final, press release.

Emma Ramsay (2005) Inverurie Academy. Juvenile fish composition in a coastal nursery ground. Presented at ICES ASC in Aberdeen, two press releases.

Topic Sheets

Coastal ecosystem monitoring at Marine Scotland

M. V. Temora

Outputs by External Authors

Gillibrand, P.A, Siemering, B., Miller, P.I., Davidson, K. (2016) Individual-based modelling of the development and transport of a *Karenia mikimotoi* bloom on the North-west European continental shelf. Harmful Algae, 53,118–134.

Licandro, P., Conway, D.V.P., Daly Yahia, M.N., Fernandez de Puelles, M.L., Gasparini, S., Hecq, J.H, Tranter, P., Kirby, R.R. (2016) A blooming jellyfish in the northeast Atlantic and Mediterranean. Biology Letters, 6, 688-691. doi:10.1098/rsbl.2010.0150.

Nunez-Riboni, I. and Akimova, A. (2015) Monthly maps of optimally interpolated in situ hydrography in the North Sea from 1948 to 2013. Journal of Marine Systems, 151, 15 – 34.

Melle, W., Runge, J.A., Head, E., Plourde, S., Castellani, C., Licandro, P., Pierson, J., Jonasdottir, S.H., Johnson C., Broms, C., Debes, H., Falkenhaug, T., Gaard, E., Gislason, A., Heath, M.R., Niehoff, B., Nielsen, T.G., Pepin, P., Stenevik, E.K., Chust, G. (2014) Biogeography of key mesozooplankton species in the North Atlantic, by manual counting methods, and egg production of *Calanus finmarchicus*. Earth System Science Data Discussions, 7, 225-242.

Mariani, P., Andersen, K.A., Visser, A.W., Barton, A.D., Kiørboe, T. (2013) Control of plankton seasonal succession by adaptive grazing. Limnology and Oceanography, 58, 173–184.

Xing Chuanxi (2013) Modelling the life cycle dynamics of Acartia clausi: a key copepod species in the North Sea. Ph.D. thesis, University of Hamburg.

Hufnagl, M. and Peck, M.A. (2011) Physiological individual-based modelling of larval Atlantic herring (*Clupea harengus*) foraging and growth: insights on climate-driven life-history scheduling. ICES Journal of Marine Science, 68, 1170 – 1188.

Yebra, L., Bonnet, D., Harris, R.P., Lindique, P.K., Peijnenburg, K. (2011) Barriers in the pelagic: population structuring of *Calanus helgolandicus* and *C. euxinus* in European waters. Marine Ecology Progress Series, 428, 135–149.

Cloern, J.E. and Jassby, A.D. (2010) Patterns and Scales of Phytoplankton Variability in Estuarine–Coastal Ecosystems. Estuaries and Coasts, 33, 230–241.

Sun, H., Benzie, P.W., Burns, D.C., Hendry, D.C., Player, M.A., Watson, J. (2008) Underwater digital holography for studies of marine plankton. Philosophical Transactions of the Royal Society A, 366, 1789–1806.

2. Appendix B: Data File

Table 2 lists the parameters included in the data set available at doi 10.7489/1761-1 which accompanies this report. The figure numbers refer to those presented in part 2 of this report (Bresnan et al., 2016). Shaded rows in italics indicate supporting data.

Table 2: Scottish Coastal Observatory data included in data file available at doi 10.7489/1761-1.

Data No.	Fig No.	Description	Site	Units
1	*4.2*	*Mean air temperature at eight sites around Scotland*	*Ballypatrick*	*°C*
2	*4.2*	*Mean air temperature at eight sites around Scotland*	*Dunstaffnage*	*°C*
3	*4.2*	*Mean air temperature at eight sites around Scotland*	*Tiree*	*°C*
4	*4.2*	*Mean air temperature at eight sites around Scotland*	*Stornoway*	*°C*
5	*4.2*	*Mean air temperature at eight sites around Scotland*	*Lerwick*	*°C*
6	*4.2*	*Mean air temperature at eight sites around Scotland*	*Wick Airport*	*°C*
7	*4.2*	*Mean air temperature at eight sites around Scotland*	*Nairn*	*°C*
8	*4.2*	*Mean air temperature at eight sites around Scotland*	*Leuchars*	*°C*
9	*4.3*	*Number of days of frost at eight sites around Scotland*	*Ballypatrick*	*Days*
10	*4.3*	*Number of days of frost at eight sites around Scotland*	*Dunstaffnage*	*Days*
11	*4.3*	*Number of days of frost at eight sites around Scotland*	*Tiree*	*Days*
12	*4.3*	*Number of days of frost at eight sites around Scotland*	*Stornoway*	*Days*
13	*4.3*	*Number of days of frost at eight sites around Scotland*	*Lerwick*	*Days*
14	*4.3*	*Number of days of frost at eight sites around Scotland*	*Wick Airport*	*Days*
15	*4.3*	*Number of days of frost at eight sites around Scotland*	*Nairn*	*Days*
16	*4.3*	*Number of days of frost at eight sites around Scotland*	*Leuchars*	*Days*
17	*4.4*	*Number of sunshine hours at eight sites around Scotland*	*Ballypatrick*	*Hours*
18	*4.4*	*Number of sunshine hours at eight sites around Scotland*	*Dunstaffnage*	*Hours*
19	*4.4*	*Number of sunshine hours at eight sites around Scotland*	*Tiree*	*Hours*
20	*4.4*	*Number of sunshine hours at eight sites around Scotland*	*Stornoway*	*Hours*
21	*4.4*	*Number of sunshine hours at eight sites around Scotland*	*Lerwick*	*Hours*
22	*4.4*	*Number of sunshine hours at eight sites around Scotland*	*Wick Airport*	*Hours*
23	*4.4*	*Number of sunshine hours at eight sites around Scotland*	*Nairn*	*Hours*
24	*4.4*	*Number of sunshine hours at eight sites around Scotland*	*Leuchars*	*Hours*
25	*4.5*	*Rainfall at eight sites around Scotland*	*Ballypatrick*	*mm*

26	*4.5*	*Rainfall at eight sites around Scotland*	*Dunstaffnage*	*mm*
27	*4.5*	*Rainfall at eight sites around Scotland*	*Tiree*	*mm*
28	*4.5*	*Rainfall at eight sites around Scotland*	*Stornoway*	*mm*
29	*4.5*	*Rainfall at eight sites around Scotland*	*Lerwick*	*mm*
30	*4.5*	*Rainfall at eight sites around Scotland*	*Wick Airport*	*mm*
31	*4.5*	*Rainfall at eight sites around Scotland*	*Nairn*	*mm*
32	*4.5*	*Rainfall at eight sites around Scotland*	*Leuchars*	*mm*
33	*4.9*	*River flow for 10 rivers on the West Coast of Scotland*	*Annan*	m^3s^{-1}
34	*4.9*	*River flow for 10 rivers on the West Coast of Scotland*	*Nith*	m^3s^{-1}
35	*4.9*	*River flow for 10 rivers on the West Coast of Scotland*	*Cree*	m^3s^{-1}
36	*4.9*	*River flow for 10 rivers on the West Coast of Scotland*	*Ayr*	m^3s^{-1}
37	*4.9*	*River flow for 10 rivers on the West Coast of Scotland*	*Clyde*	m^3s^{-1}
38	*4.9*	*River flow for 10 rivers on the West Coast of Scotland*	*Leven*	m^3s^{-1}
39	*4.9*	*River flow for 10 rivers on the West Coast of Scotland*	*Orchy*	m^3s^{-1}
40	*4.9*	*River flow for 10 rivers on the West Coast of Scotland*	*Shiel*	m^3s^{-1}
41	*4.9*	*River flow for 10 rivers on the West Coast of Scotland*	*Carron*	m^3s^{-1}
42	*4.9*	*River flow for 10 rivers on the West Coast of Scotland*	*Ewe*	m^3s^{-1}
43	*4.10*	*River flow for 13 rivers on the East Coast of Scotland*	*Naver*	m^3s^{-1}
44	*4.10*	*River flow for 13 rivers on the East Coast of Scotland*	*Conon*	m^3s^{-1}
45	*4.10*	*River flow for 13 rivers on the East Coast of Scotland*	*Ness*	m^3s^{-1}
46	*4.10*	*River flow for 13 rivers on the East Coast of Scotland*	*Findhorn*	m^3s^{-1}
47	*4.10*	*River flow for 13 rivers on the East Coast of Scotland*	*Spey*	m^3s^{-1}
48	*4.10*	*River flow for 13 rivers on the East Coast of Scotland*	*Deveron*	m^3s^{-1}
49	*4.10*	*River flow for 13 rivers on the East Coast of Scotland*	*Don*	m^3s^{-1}
50	*4.10*	*River flow for 13 rivers on the East Coast of Scotland*	*Dee*	m^3s^{-1}
51	*4.10*	*River flow for 13 rivers on the East Coast of Scotland*	*North_Esk*	m^3s^{-1}

52	*4.10*	*River flow for 13 rivers on the East Coast of Scotland*	*South_Esk*	*m^3s^{-1}*
53	*4.10*	*River flow for 13 rivers on the East Coast of Scotland*	*Earn*	*m^3s^{-1}*
54	*4.10*	*River flow for 13 rivers on the East Coast of Scotland*	*Tay*	*m^3s^{-1}*
55	*4.10*	*River flow for 13 rivers on the East Coast of Scotland*	*Tweed*	*m^3s^{-1}*
56	*4.12*	*Sea surface temperature for 13 Scottish Sea Areas*	*Clyde*	*°C*
57	*4.12*	*Sea surface temperature for 13 Scottish Sea Areas*	*Minches and Malin Sea*	*°C*
58	*4.12*	*Sea surface temperature for 13 Scottish Sea Areas*	*Hebrides*	*°C*
59	*4.12*	*Sea surface temperature for 13 Scottish Sea Areas*	*Rockall*	*°C*
60	*4.12*	*Sea surface temperature for 13 Scottish Sea Areas*	*Bailey*	*°C*
61	*4.12*	*Sea surface temperature for 13 Scottish Sea Areas*	*Faroe Shetland Channel*	*°C*
62	*4.12*	*Sea surface temperature for 13 Scottish Sea Areas*	*North Scotland Coast*	*°C*
63	*4.12*	*Sea surface temperature for 13 Scottish Sea Areas*	*West Shetland*	*°C*
64	*4.12*	*Sea surface temperature for 13 Scottish Sea Areas*	*East Shetland*	*°C*
65	*4.12*	*Sea surface temperature for 13 Scottish Sea Areas*	*Fladen*	*°C*
66	*4.12*	*Sea surface temperature for 13 Scottish Sea Areas*	*Moray Firth*	*°C*
67	*4.12*	*Sea surface temperature for 13 Scottish Sea Areas*	*Forties*	*°C*
68	*4.12*	*Sea surface temperature for 13 Scottish Sea Areas*	*East Scotland Coast*	*°C*
69	5.3 & 5.4	Sea surface temperature from Minilogger data at nine coastal monitoring sites around the Scottish coast	Millport	°C
70	5.4	Sea surface temperature from Minilogger data at nine coastal monitoring sites around the Scottish coast	Mallaig	°C
71	5.4	Sea surface temperature from Minilogger data at nine coastal monitoring sites around the Scottish coast	Loch Maddy	°C
72	5.4	Sea surface temperature from Minilogger data at nine coastal monitoring sites around the Scottish coast	Loch Ewe	°C
73	5.4	Sea surface temperature from Minilogger data at nine coastal monitoring sites around the Scottish coast	Fair Isle	°C
74	5.4	Sea surface temperature from Minilogger data at nine coastal monitoring sites around the Scottish coast	Scalloway	°C
75	5.4	Sea surface temperature from Minilogger data at nine coastal monitoring sites around the Scottish coast	Scapa	°C
76	5.4	Sea surface temperature from Minilogger data at nine coastal monitoring sites around the Scottish coast	Cromarty	°C

77	5.4	Sea surface temperature from Minilogger data at nine coastal monitoring sites around the Scottish coast	East Coast	°C
78	5.5	Sea surface temperature data at Loch Maddy	Loch Maddy	°C
79	5.6	Sea surface salinity data at Loch Maddy	Loch Maddy	PSU
80	5.7	Upper layer temperature data (0-10m) at Loch Ewe	Loch Ewe	°C
81	5.8	Upper layer salinity data (0-10m) at Loch Ewe	Loch Ewe	PSU
82	5.9	Lower layer temperature data (>30m) at Loch Ewe	Loch Ewe	°C
83	5.10	lower layer salinity data (>30m) at Loch Ewe	Loch Ewe	PSU
84	5.11	Sea surface temperature data at Scapa	Scapa	°C
85	5.12	Sea surface salinity data at Scapa	Scapa	PSU
86	5.13	Sea surface temperature data at Scalloway	Scalloway	°C
87	5.14	Sea surface salinity data at Scalloway	Scalloway	PSU
88	5.15	Upper layer temperature data (0-10m) at Stonehaven	Stonehaven	°C
89	5.16	Upper layer salinity data (0-10m) at Stonehaven	Stonehaven	PSU
90	5.17	Lower layer temperature data (>30m) at Stonehaven	Stonehaven	°C
91	5.18	Lower layer salinity data (>30m) at Stonehaven	Stonehaven	PSU
92	6.1	Seicchi depth at Loch Ewe	Loch Ewe	m
93	6.2	Seicchi depth at Stonehaven	Stonehaven	m
94	7.1	Dissolved inorganic phosphorus (DIP, µM) data at Loch Maddy	Loch Maddy	µM
95	7.2	Dissolved silicate (DSi, µM) data at Loch Maddy	Loch Maddy	µM
96	7.3	Total oxidised nitrogen (TOxN, µM) data at Loch Maddy	Loch Maddy	µM
97	7.4	Surface layer (0 -10 m) dissolved inorganic phosphorus (DIP, µM) data at Loch Ewe	Loch Ewe	µM
98	7.5	Lower layer (>30m) dissolved inorganic phosphorus (DIP, µM) data at Loch Ewe	Loch Ewe	µM
99	7.6	Surface layer (0 -10 m) dissolved silicate (DSi, µM) data at Loch Ewe	Loch Ewe	µM
100	7.7	Lower layer (>30m) dissolved silicate (DSi, µM) data at Loch Ewe	Loch Ewe	µM
101	7.8	Surface layer (0 -10 m) total oxidised nitrogen (TOxN, µM) data at Loch Ewe	Loch Ewe	µM
102	7.9	Lower layer (>30m) total oxidised nitrogen (TOxN, µM) data at Loch Ewe	Loch Ewe	µM
103	7.10	Surface layer (0 -10 m) ammonia (µM) data at Loch Ewe	Loch Ewe	µM
104	7.11	Lower layer (>30m) ammonia (µM) data at Loch Ewe	Loch Ewe	µM

105	7.12	Dissolved inorganic phosphorus (DIP, µM) data at Scapa	Scapa	µM
106	7.13	Dissolved silicate (DSi, µM) data at Scapa	Scapa	µM
107	7.14	Total oxidised nitrogen (TOxN, µM) data at Scapa	Scapa	µM
108	7.15	Dissolved inorganic phosphorus (DIP, µM) data at Scalloway	Scalloway	µM
109	7.16	Dissolved silicate (DSi, µM) data at Scalloway	Scalloway	µM
110	7.17	Total oxidised nitrogen (TOxN, µM) data at Scalloway	Scalloway	µM
111	7.18	Ammonia (µM) data at Scalloway	Scalloway	µM
112	7.19	Surface layer (0 -10 m) dissolved inorganic phosphorus (DIP, µM) data at Stonehaven	Stonehaven	µM
113	7.20	Lower layer (>30m) dissolved inorganic phosphorus (DIP, µM) data at Stonehaven	Stonehaven	µM
114	7.21	Surface layer (0 -10 m) dissolved silicate (DSi, µM) data at Stonehaven	Stonehaven	µM
115	7.22	Lower layer (>30m) dissolved silicate (DSi, µM) data at Stonehaven	Stonehaven	µM
116	7.23	Surface layer (0 -10 m) total oxidised nitrogen (TOxN, µM) data at Stonehaven	Stonehaven	µM
117	7.24	Lower layer (>30m) total oxidised nitrogen (TOxN, µM) data at Stonehaven	Stonehaven	µM
118	7.25	Surface layer (0 -10 m) ammonia (µM) data at Stonehaven	Stonehaven	µM
119	7.26	Lower layer (>30m) ammonia (µM) data at Stonehaven	Stonehaven	µM
120	8.1	Stonehaven Total Alkalinity - Surface	Stonehaven	µmol/kg
121	8.2	Stonehaven Total Alkalinity - Depth	Stonehaven	µmol/kg
122	8.3	Stonehaven Dissolved Inorganic Carbon - Surface	Stonehaven	µmol/kg
123	8.4	Stonehaven Dissolved Inorganic Carbon – Depth	Stonehaven	µmol/kg
124	8.5	Stonehaven pH (Derived, Total Scale) – Surface	Stonehaven	total scale
125	8.6	Stonehaven pH (Derived, Total Scale) – Depth	Stonehaven	total scale
126	8.7	Stonehaven Calcite Saturation (Derived) – Surface	Stonehaven	(No Units)
127	8.8	Stonehaven Calcite Saturation (Derived) – Depth	Stonehaven	(No Units)
128	9.1	Diatoms: Millport	Millport	cells L^{-1}
129	9.2	Diatoms: Loch Maddy	Loch Maddy	cells L^{-1}
130	9.3	Diatoms: Loch Ewe	Loch Ewe	cells L^{-1}
131	9.4	Diatoms: Scapa	Scapa	cells L^{-1}
132	9.5	Diatoms: Scalloway	Scalloway	cells L^{-1}

133	9.6	Diatoms: Stonehaven	Stonehaven	cells L^{-1}
134	9.7	Dinoflagellates: Millport	Millport	cells L^{-1}
135	9.8	Dinoflagellates: Loch Maddy	Loch Maddy	cells L^{-1}
136	9.9	Dinoflagellates: Loch Ewe	Loch Ewe	cells L^{-1}
137	9.10	Dinoflagellates: Scapa	Scapa	cells L^{-1}
138	9.11	Dinoflagellates: Scalloway	Scalloway	cells L^{-1}
139	9.12	Dinoflagellates: Stonehaven	Stonehaven	cells L^{-1}
140	9.13	Alexandrium: Millport	Millport	cells L^{-1}
141	9.14	Alexandrium: Loch Maddy	Loch Maddy	cells L^{-1}
142	9.15	Alexandrium: Loch Ewe	Loch Ewe	cells L^{-1}
143	9.16	Alexandrium: Scapa	Scapa	cells L^{-1}
144	9.17	Alexandrium: Scalloway	Scalloway	cells L^{-1}
145	9.18	Alexandrium: Stonehaven	Stonehaven	cells L^{-1}
146	9.19	Dinophysis: Millport	Millport	cells L^{-1}
147	9.20	Dinophysis: Loch Maddy	Loch Maddy	cells L^{-1}
148	9.21	Dinophysis: Loch Ewe	Loch Ewe	cells L^{-1}
149	9.22	Dinophysis: Scapa	Scapa	cells L^{-1}
150	9.23	Dinophysis: Scalloway	Scalloway	cells L^{-1}
151	9.24	Dinophysis: Stonehaven	Stonehaven	cells L^{-1}
152	9.25	Pseudo-nitzschia: Millport	Millport	cells L^{-1}
153	9.26	Pseudo-nitzschia: Loch Maddy	Loch Maddy	cells L^{-1}
154	9.27	Pseudo-nitzschia: Loch Ewe	Loch Ewe	cells L^{-1}
155	9.28	Pseudo-nitzschia: Scapa	Scapa	cells L^{-1}
156	9.29	Pseudo-nitzschia: Scalloway	Scalloway	cells L^{-1}
157	9.30	Pseudo-nitzschia: Stonehaven	Stonehaven	cells L^{-1}
158	10.1	Chlorophyll ‘a’: Loch Ewe	Loch Ewe	µg L^{-1}
159	10.2	Chlorophyll ‘a’: Stonehaven	Stonehaven	µg L^{-1}

160	11.3	OA concentration in SPATT passive samplers deployed at Loch Ewe since April 2005	Loch Ewe	ng OA g of resin^{-1}
161	11.4	PTX-2 concentration in SPATT passive samplers deployed at Loch Ewe since April 2005	Loch Ewe	ng PTX-2 g of resin^{-1}
162	11.5	DTX-1 concentration in SPATT passive samplers deployed at Loch Ewe since April 2005	Loch Ewe	ng DTX-1 g of resin^{-1}
163	11.6	DTX-2 concentration in SPATT passive samplers deployed at Loch Ewe since April 2005	Loch Ewe	ng DTX-2 g of resin^{-1}
164	11.7	AZA-1 concentration in SPATT passive samplers deployed at Loch Ewe since April 2005	Loch Ewe	ng AZA-1 g of resin^{-1}
165	11.8	YTX concentration in SPATT passive samplers deployed at Loch Ewe since April 2005	Loch Ewe	ng YTX g of resin^{-1}
166	11.9	OA concentration in SPATT passive samplers deployed at Scapa since May 2011	Scapa	ng OA g of resin^{-1}
167	11.10	PTX-2 concentration in SPATT passive samplers deployed at Scapa since May 2011	Scapa	ng PTX-2 g of resin^{-1}
168	11.11	DTX-1 concentration in SPATT passive samplers deployed at Scapa since May 2011	Scapa	ng DTX-1 g of resin^{-1}
169	11.12	DTX-2 concentration in SPATT passive samplers deployed at Scapa since May 2011	Scapa	ng DTX-2 g of resin^{-1}
170	11.13	AZA-1 concentration in SPATT passive samplers deployed at Scapa since May 2011	Scapa	ng AZA-1 g of resin^{-1}
171	11.14	YTX concentration in SPATT passive samplers deployed at Scapa since May 2011	Scapa	ng YTX g of resin^{-1}
172	12.1	Total Copepod Biomass (mg dry weight m^{-3}) data at Loch Ewe	Loch Ewe	mg dry weight m^{-3}
173	12.2	Total Copepod Biomass (mg dry weight m^{-3}) data at Stonehaven	Stonehaven	mg dry weight m^{-3}
174	12.3	Calanus finmarchicus Stages C5-6 Biomass (mg dry weight m^{-3}) data at Loch Ewe	Loch Ewe	mg dry weight m^{-3}
175	12.4	Calanus finmarchicus Stages C5-6 Biomass (mg dry weight m^{-3}) data at Stonehaven	Stonehaven	mg dry weight m^{-3}
176	12.5	Calanus helgolandicus Stages C5-6 Biomass (mg dry weight m^{-3}) data at Loch Ewe	Loch Ewe	mg dry weight m^{-3}
177	12.6	Calanus helgolandicus Stages C5-6 Biomass (mg dry weight m^{-3}) data at Stonehaven	Stonehaven	mg dry weight m^{-3}
178	12.7	Centropages hamatus Stages C1-6 Biomass (mg dry weight m^{-3}) data at Loch Ewe	Loch Ewe	mg dry weight m^{-3}
179	12.8	Centropages hamatus Stages C1-6 Biomass (mg dry weight m^{-3}) data at Stonehaven	Stonehaven	mg dry weight m^{-3}
180	12.9	Centropages typicus Stages C1-6 Biomass (mg dry weight m^{-3}) data at Loch Ewe	Loch Ewe	mg dry weight m^{-3}
181	12.10	Centropages typicus Stages C1-6 Biomass (mg dry weight m^{-3}) data at Stonehaven	Stonehaven	mg dry weight m^{-3}
182	12.11	Acartia clausi Stages C1-6 Biomass (mg dry weight m^{-3}) data at Loch Ewe	Loch Ewe	mg dry weight m^{-3}
183	12.12	Acartia clausi Stages C1-6 Biomass (mg dry weight m^{-3}) data at Stonehaven	Stonehaven	mg dry weight m^{-3}
184	12.13	Paracalanus parvus Stages C1-6 Biomass (mg dry weight m^{-3}) data at Loch Ewe	Loch Ewe	mg dry weight m^{-3}
185	12.14	Paracalanus parvus Stages C1-6 Biomass (mg dry weight m^{-3}) data at Stonehaven	Stonehaven	mg dry weight m^{-3}

186	12.15	Pseudocalanus spp. Stages C1-6 Biomass (mg dry weight m^{-3}) data at Loch Ewe	Loch Ewe	mg dry weight m^{-3}
187	12.16	Pseudocalanus spp. Stages C1-6 Biomass (mg dry weight m^{-3}) data at Stonehaven	Stonehaven	mg dry weight m^{-3}
188	12.17	Temora longicornis Stages C1-6 Biomass (mg dry weight m^{-3}) data at Loch Ewe	Loch Ewe	mg dry weight m^{-3}
189	12.18	Temora longicornis Stages C1-6 Biomass (mg dry weight m^{-3}) data at Stonehaven	Stonehaven	mg dry weight m^{-3}
190	12.19	Oithonidae Stages C1-6 Biomass (mg dry weight m^{-3}) data at Loch Ewe	Loch Ewe	mg dry weight m^{-3}
191	12.20	Oithonidae Stages C1-6 Biomass (mg dry weight m^{-3}) data at Stonehaven	Stonehaven	mg dry weight m^{-3}
192	12.21	Benthic Larvae Biomass (mg dry weight m^{-3}) data at Loch Ewe	Loch Ewe	mg dry weight m^{-3}
193	12.22	Benthic Larvae Biomass (mg dry weight m^{-3}) data at Stonehaven	Stonehaven	mg dry weight m^{-3}
194	12.23	Decapod Larvae Biomass (mg dry weight m^{-3}) data at Loch Ewe	Loch Ewe	mg dry weight m^{-3}
195	12.24	Decapod Larvae Biomass (mg dry weight m^{-3}) data at Stonehaven	Stonehaven	mg dry weight m^{-3}
196	12.25	Bivalve Larvae Biomass (mg dry weight m^{-3}) data at Loch Ewe	Loch Ewe	mg dry weight m^{-3}
197	12.26	Bivalve Larvae Biomass (mg dry weight m^{-3}) data at Stonehaven	Stonehaven	mg dry weight m^{-3}
198	12.27	Barnacle Larvae Biomass (mg dry weight m^{-3}) data at Loch Ewe	Loch Ewe	mg dry weight m^{-3}
199	12.28	Barnacle Larvae Biomass (mg dry weight m^{-3}) data at Stonehaven	Stonehaven	mg dry weight m^{-3}
200	12.29	Cnidaria Biomass (mg dry weight m^{-3}) data at Loch Ewe	Loch Ewe	mg dry weight m^{-3}
201	12.30	Cnidaria Biomass (mg dry weight m^{-3}) data at Stonehaven	Stonehaven	mg dry weight m^{-3}
202	12.31	Calcifying Plankton Biomass (mg dry weight m^{-3}) data at Loch Ewe	Loch Ewe	mg dry weight m^{-3}
203	12.32	Calcifying Plankton Biomass (mg dry weight m^{-3}) data at Stonehaven	Stonehaven	mg dry weight m^{-3}

3. Appendix C: Sample Numbers

Tables 3 – 8 details the numbers of samples collected at Millport, Loch Maddy, Loch Ewe, Scapa , Scalloway and Stonehaven.

Table 3: Millport sample numbers

Parameter	Phyto	$Phyto_{tox}$
1997	0	0
1998	0	0
1999	0	0
2000	0	0
2001	0	0
2002	0	0
2003	0	0
2004	0	0
2005	14	14
2006	38	38
2007	42	42
2008	43	43
2009	38	38
2010	41	41
2011	47	47
2012	49	49
2013	41	41
Sample total	353	353

Table 4: Loch Maddy sample numbers

Parameter	DIP	DSi	TOxN	Phyto	$Phyto_{tox}$	Sal
1997	0	0	0	0	0	0
1998	0	0	0	0	0	0
1999	0	0	0	0	0	0
2000	0	0	0	0	0	0
2001	0	0	0	0	0	0
2002	0	0	0	0	0	0
2003	37	25	37	0	30	37
2004	34	31	40	36	37	40
2005	29	29	29	30	33	30
2006	0	25	19	35	35	35
2007	26	27	27	29	27	27
2008	15	16	12	28	27	28
2009	4	8	18	24	23	25
2010	5	10	7	15	15	24
2011	0	0	0	0	2	37
2012	0	0	0	0	0	47
2013	0	0	0	0	0	30
Sample total	150	171	189	197	229	360

Table 5: Loch Ewe sample numbers

Parameter	DIP: Upper	DSi: Upper	TOxN: Upper	Amm: Upper	DIP: Lower	DSi: Lower	TOxN: Lower	Amm: Lower	Secchi	Phyto	$Phyto_{tox}$	Chl	Al_{tox}	Zoo	Sal Upper	Sal Lower
1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0
2000	0	0	0	0	0	0	0	0	0	0	44	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0	42	52	0	0	0	0	0
2002	0	0	0	0	0	0	0	0	0	39	52	28	0	40	24	24
2003	31	39	38	39	0	0	0	0	0	52	52	52	0	52	52	52
2004	0	50	48	51	0	0	0	0	0	51	52	52	0	52	52	52
2005	0	52	40	47	0	0	0	0	0	49	52	52	37	51	52	52
2006	0	44	50	1	0	0	0	0	0	49	50	52	51	52	52	52
2007	50	52	52	1	0	0	0	0	0	52	52	53	52	53	52	52
2008	133	152	134	1	44	49	44	0	49	52	52	52	52	51	52	52
2009	154	155	156	1	51	51	52	0	52	52	52	52	52	52	52	52
2010	156	155	156	153	51	52	52	51	52	52	52	52	52	51	52	52
2011	156	152	156	156	52	51	52	52	52	52	51	52	52	52	52	52
2012	104	108	104	104	50	50	50	49	53	52	51	53	52	53	53	53
2013	67	67	67	131	45	45	45	84	51	51	52	50	52	52	51	51
Sample total	851	1026	1001	685	293	298	295	236	309	645	730	600	452	611	596	596

Table 6: Scapa sample numbers

Parameter	DIP	DSi	TOxN	Amm	Phyto	$Phyto_{tox}$	Al_{tox}	Sal
1997	0	0	0	0	0	25	0	0
1998	0	0	0	0	0	20	0	0
1999	3	3	3	0	0	25	0	3
2000	28	28	28	0	11	32	0	29
2001	14	22	15	0	32	33	0	24
2002	24	34	24	0	52	52	0	36
2003	48	38	49	1	53	52	0	50
2004	44	45	46	0	44	47	0	46
2005	21	50	27	0	49	49	0	50
2006	1	50	45	0	52	52	0	50
2007	41	48	41	0	49	49	0	48
2008	44	31	44	0	47	48	0	45
2009	34	35	34	0	47	47	0	45
2010	24	49	24	0	48	48	0	49
2011	50	49	50	0	49	49	29	50
2012	45	26	45	0	50	50	53	50
2013	49	49	49	87	49	49	49	89
Sample total	470	557	524	88	632	727	131	664

Table 7: Scalloway sample numbers

Parameter	DIP	DSi	TOxN	Ammonia	Phyto	$Phyto_{tox}$	Al_{tox}	Sal
1997	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	0	0	0
1999	0	0	0	0	0	0	0	0
2000	25	25	25	25	3	3	0	26
2001	41	41	41	41	42	42	0	43
2002	28	28	28	28	41	40	0	28
2003	0	40	34	35	39	41	0	41
2004	15	23	23	23	33	36	0	35
2005	15	15	15	21	24	24	0	21
2006	0	32	32	0	36	36	0	34
2007	15	15	15	1	20	20	0	15
2008	21	21	21	1	40	38	0	33
2009	31	20	32	1	39	38	0	44
2010	43	43	43	13	43	44	0	44
2011	42	43	42	43	44	45	12	44
2012	44	46	44	33	43	44	10	46
2013	57	60	56	84	49	49	31	85
Sample total	377	452	451	349	496	500	53	539

Table 8: Stonehaven sample numbers

Parameter	DIP: Upper	DSi: Upper	TOxN: Upper	Amm: Upper	TA Upper	DIC Upper	DIP: Lower	DSi: Lower	TOxN: Lower	Ammonia: Lower	TA Lower	DIC Lower	Secchi	Phyto	$Phyto_{tox}$	Chl	Zoo	Sal Upper	Sal Lower
1997	31	36	35	37	0	0	34	37	36	36	0	0	0	39	40	37	0	45	45
1998	21	16	22	22	0	0	24	16	24	24	0	0	0	49	50	40	0	49	49
1999	51	48	51	49	0	0	51	48	51	48	0	0	0	51	51	48	51	51	51
2000	48	47	48	47	0	0	50	48	49	50	0	0	0	50	52	51	52	58	58
2001	47	46	48	48	0	0	46	45	46	46	0	0	27	48	48	45	48	48	48
2002	44	45	44	45	0	0	42	43	43	43	0	0	44	44	51	45	44	45	45
2003	6	49	50	18	0	0	10	46	49	17	0	0	47	50	50	53	51	51	51
2004	0	46	46	33	0	0	0	42	41	31	0	0	45	46	47	49	46	46	46
2005	0	45	45	45	0	0	0	45	45	45	0	0	44	46	46	45	46	45	45
2006	0	47	47	0	0	0	0	47	47	0	0	0	46	47	47	47	47	47	47
2007	45	47	46	0	0	0	46	46	46	0	0	0	46	44	47	46	46	46	46
2008	62	70	64	0	4	4	44	47	45	0	4	4	50	48	49	48	49	49	49
2009	92	92	92	0	42	38	46	46	46	0	39	38	46	48	47	47	47	47	47
2010	85	88	86	72	42	42	41	43	41	36	41	41	44	44	44	39	44	44	44
2011	79	74	79	77	20	20	38	35	38	37	19	19	39	40	40	39	40	40	40
2012	60	60	60	58	38	38	37	37	37	36	38	38	36	39	39	38	38	38	38
2013	47	49	48	105	37	37	36	38	38	75	37	37	41	42	42	40	42	42	42
Sample total	718	905	911	656	183	179	545	709	722	524	178	177	555	775	790	757	691	791	791

4. Appendix D: Data Quality Flags

Table 9 presents the quality flags assigned to Scottish Coastal Observatory data.

Table 9: Quality Flags from SEADATA NET 2010

Flag	Name	Explanation of protocol used in this dataset
0	No Quality Control Applied	This is the initial status for all data values in the file. Note that for chemical parameters subject to UKAS accreditation these values will have passed the initial analytical tests.
1	Good Data	These data have passed all appropriate analytical tests without question. These data have passed all environmental and statistical range tests without question.
2	Probably Good Data	These data have failed an initial analytical test or been flagged as unusual during environmental and statistical range tests. Following review, and using available evidence from associated parameters they have been determined to be good.
3	Probably Bad Data	These data have failed an initial analytical test or been flagged as unusual during environmental and statistical range tests. Following review, and using available evidence from associated parameters they have been determined to be bad.
4	Bad Data	Obviously erroneous values. These data may have failed repeated analytical tests and are therefore flagged as bad. Or these data have been flagged as out of expected range during environmental and statistical range tests. Following review, and using evidence from associated parameters no evidence can be found to show they are good.
5	Changed Value	Data value has been adjusted during quality control. These are generally limited to metadata information where evidence

		of a misstype has been found in paper records.
6	Below limit of detection	The level of the measured phenomenon was too small to be quantified by the technique employed to measure it.
7	Above limit of detection	The level of the measured phenomenon was too large to be quantified by the technique employed to measure it.
8	Estimated/Interpolated	Estimated Data. This value has been derived by interpolation from other values in the data object.
9	Missing data	A survey was made on this date, but no data is available for this particular parameter either because it was not measured or the sample was lost or spoilt. Any accompanying value will be a magic number representing absent data,typically a number < -99.
10	Repeated Bad Flag	Internal QF flag, used to assist with repeated flagging, has the same meaning as QF4.

5. Appendix E: Supplementary Meteorological Figures

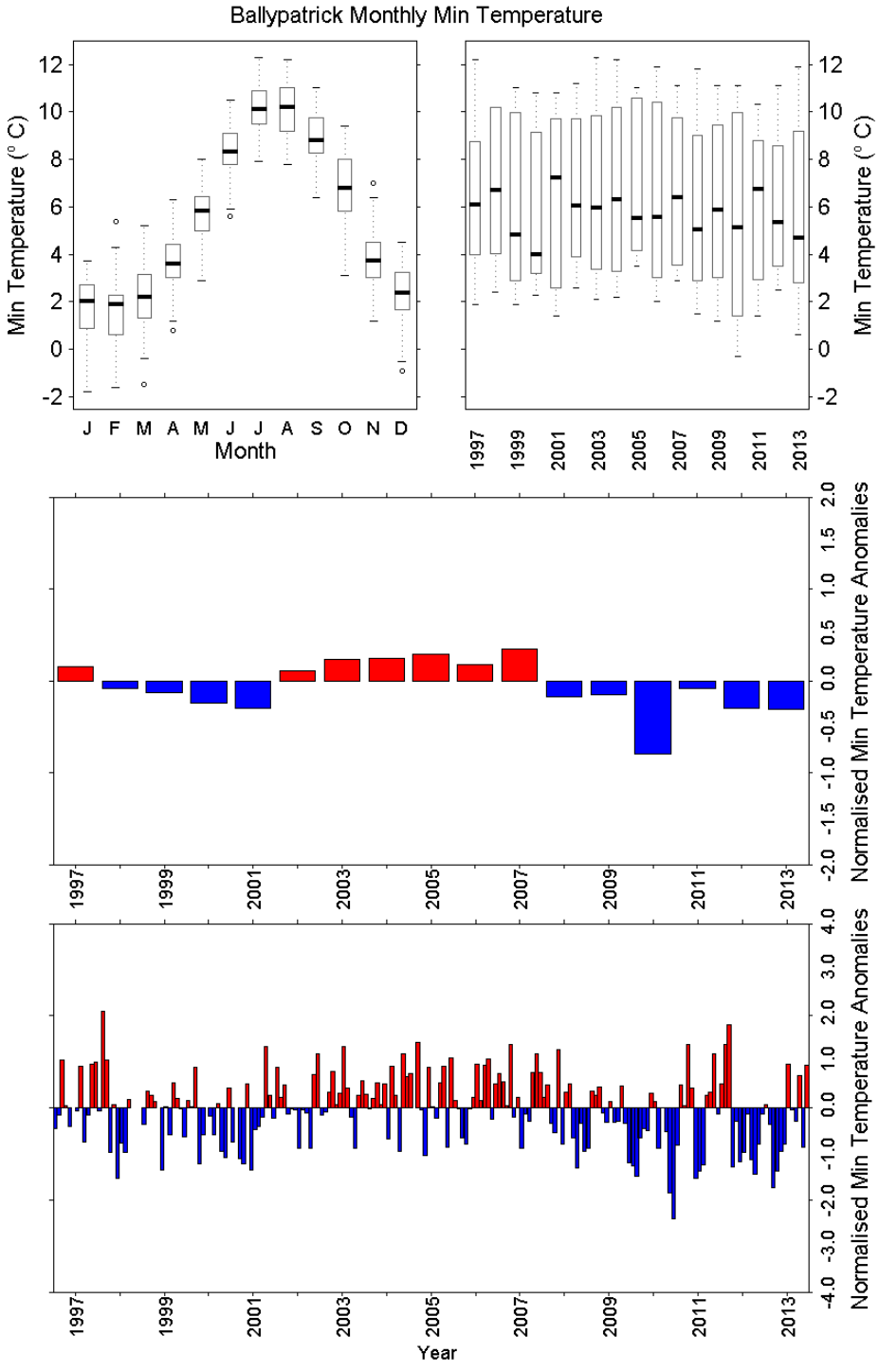

Figure E1.1 Monthly Minimum Air Temperature (°C) data from the meteorological station at Ballypatrick. a) Monthly boxplot of minimum air temperature data. b) Annual boxplot of minimum air temperature data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries. There were no data available in Jun 1997, Oct-Dec 1998, May 1999, Jun 2000, Feb 2001 and Feb 2005.

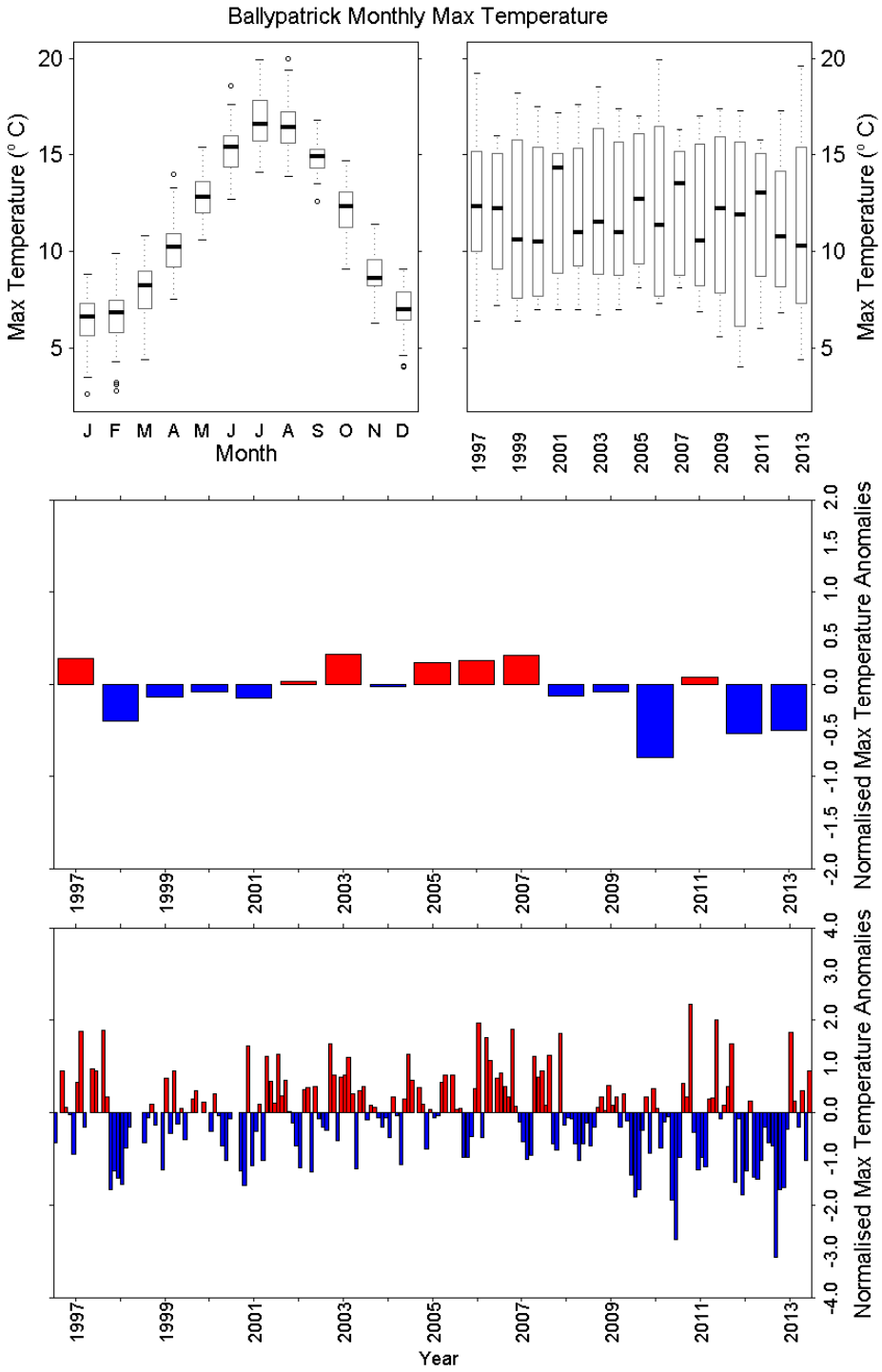

Figure E1.2 Monthly Maximum Air Temperature (°C) data from the meteorological station at Ballypatrick. a) Monthly boxplot of maximum air temperature data. b) Annual boxplot of maximum air temperature data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries. There were no data available in February or October 1997, October, November or December 1998, May 1999, April or June 2000, January or February 2001, or February 2005.

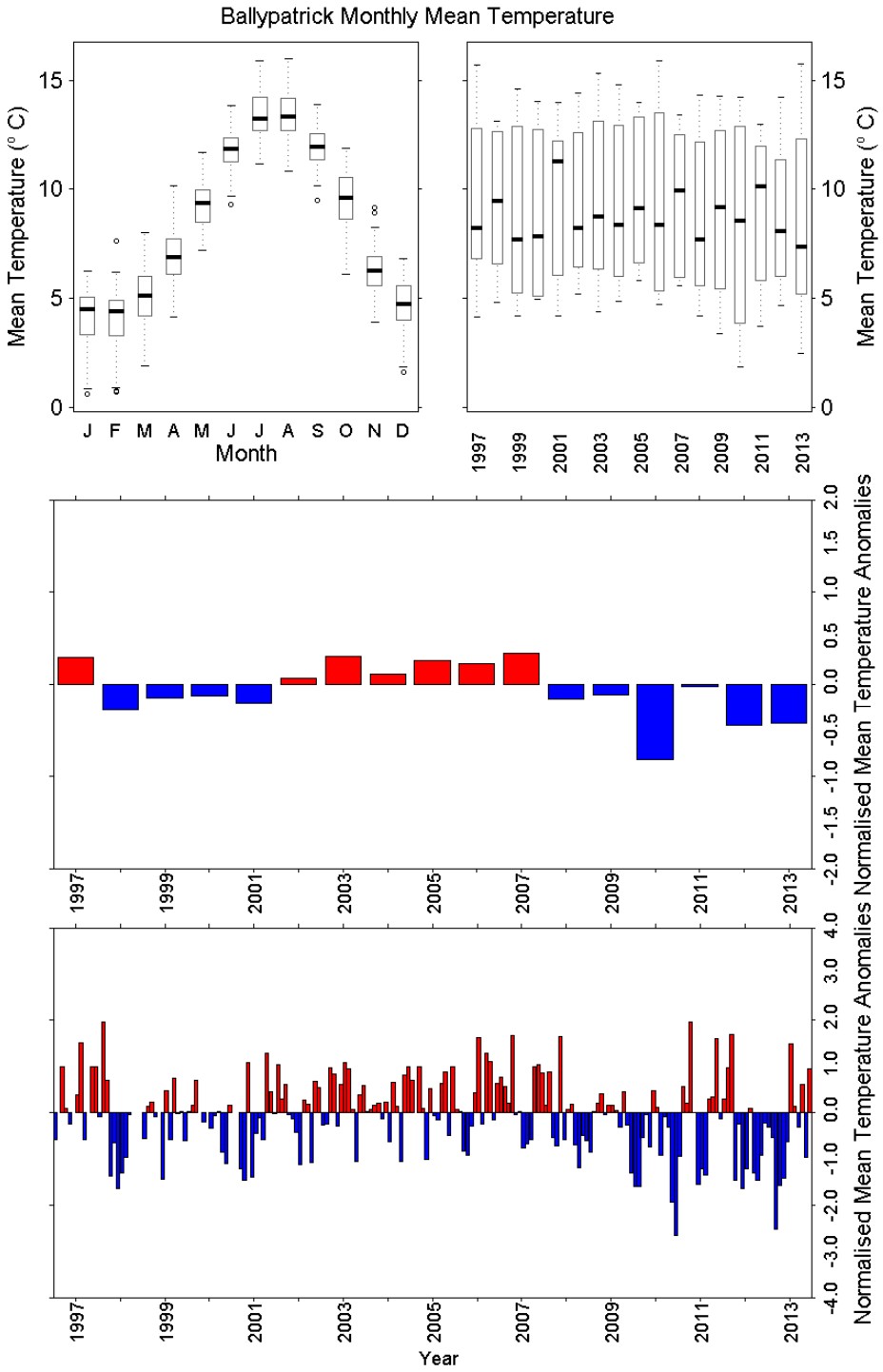

Figure E1.3 Monthly Mean Air Temperature (°C) data from the meteorological station at BallyPatrick. a) Monthly boxplot of mean air temperature data. b) Annual boxplot of mean air temperature data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries. There were no data available in February 1997, June 1997, October 1997, October, November or December 1998, May 1999, April 2000, June 2000, January or February 2001, or February 2005.

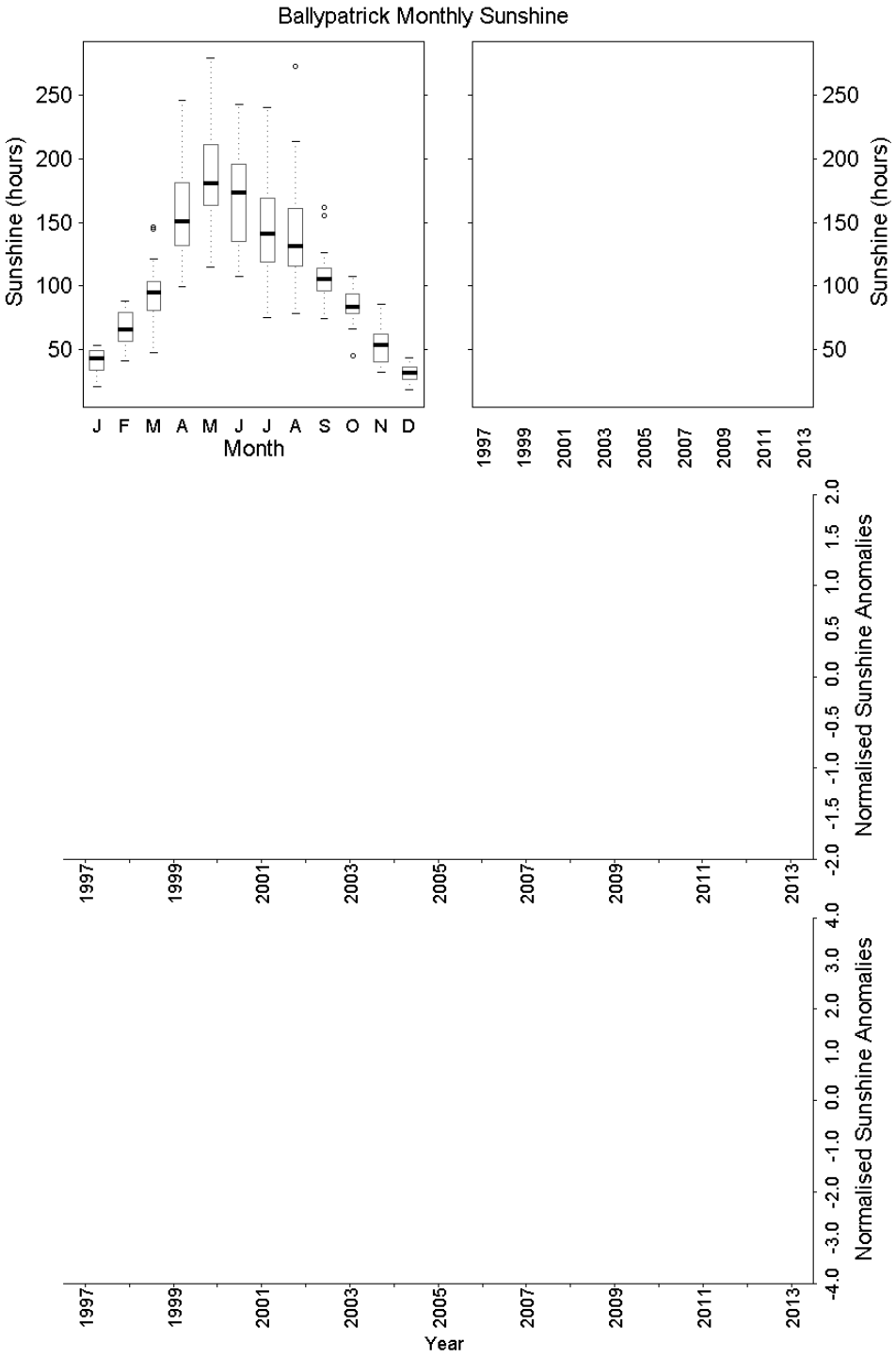

Figure E1.4 Monthly Sunshine hours from the meteorological station at Ballypatrick. a) Monthly boxplot of sea surface temperature data. b) Annual boxplot of sea surface temperature data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries

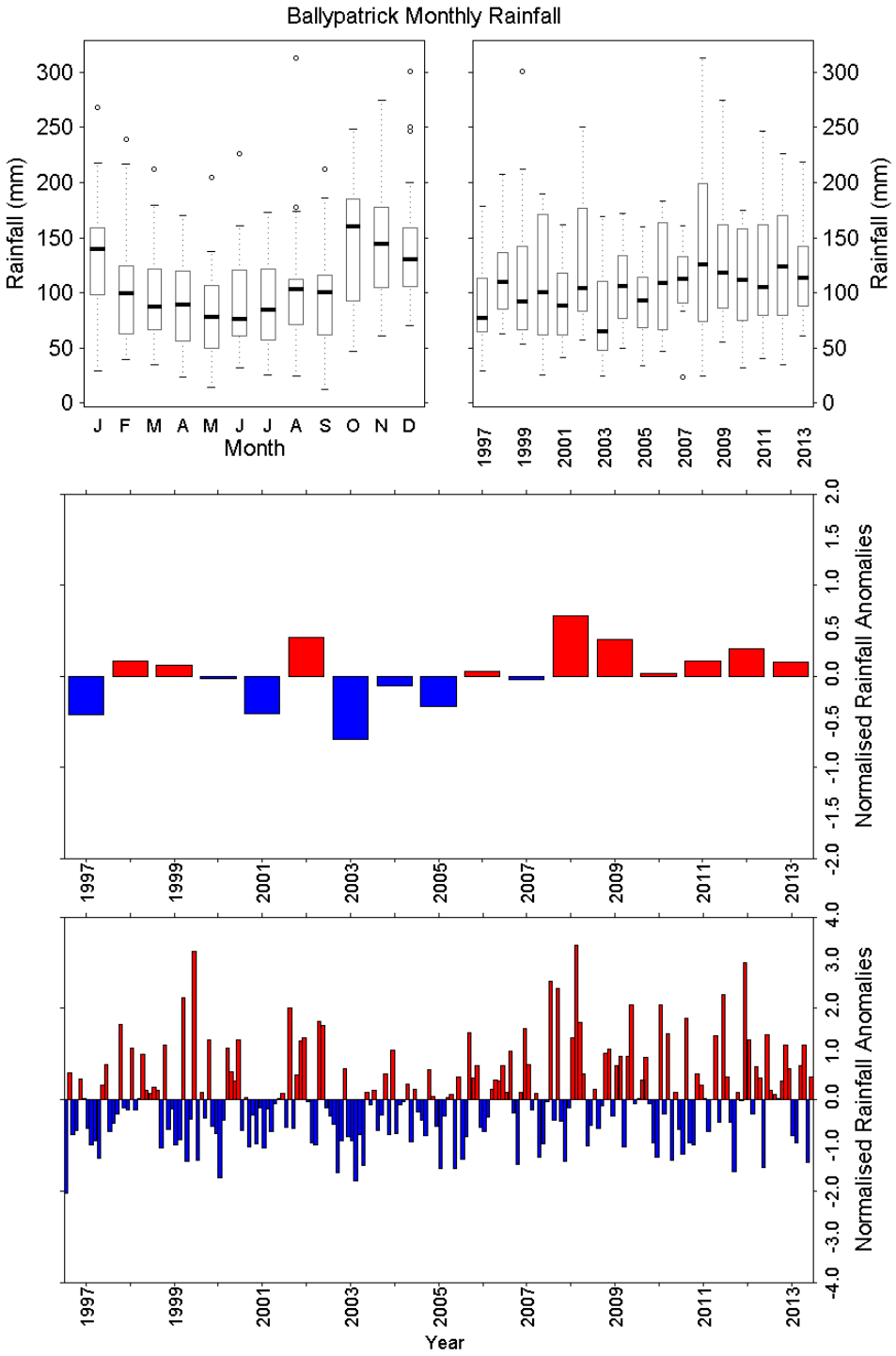

Figure E1.5 Rainfall totals from the meteorological station at Ballypatrick. a) Monthly boxplot of rainfall data. b) Annual boxplot of rainfall data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries.

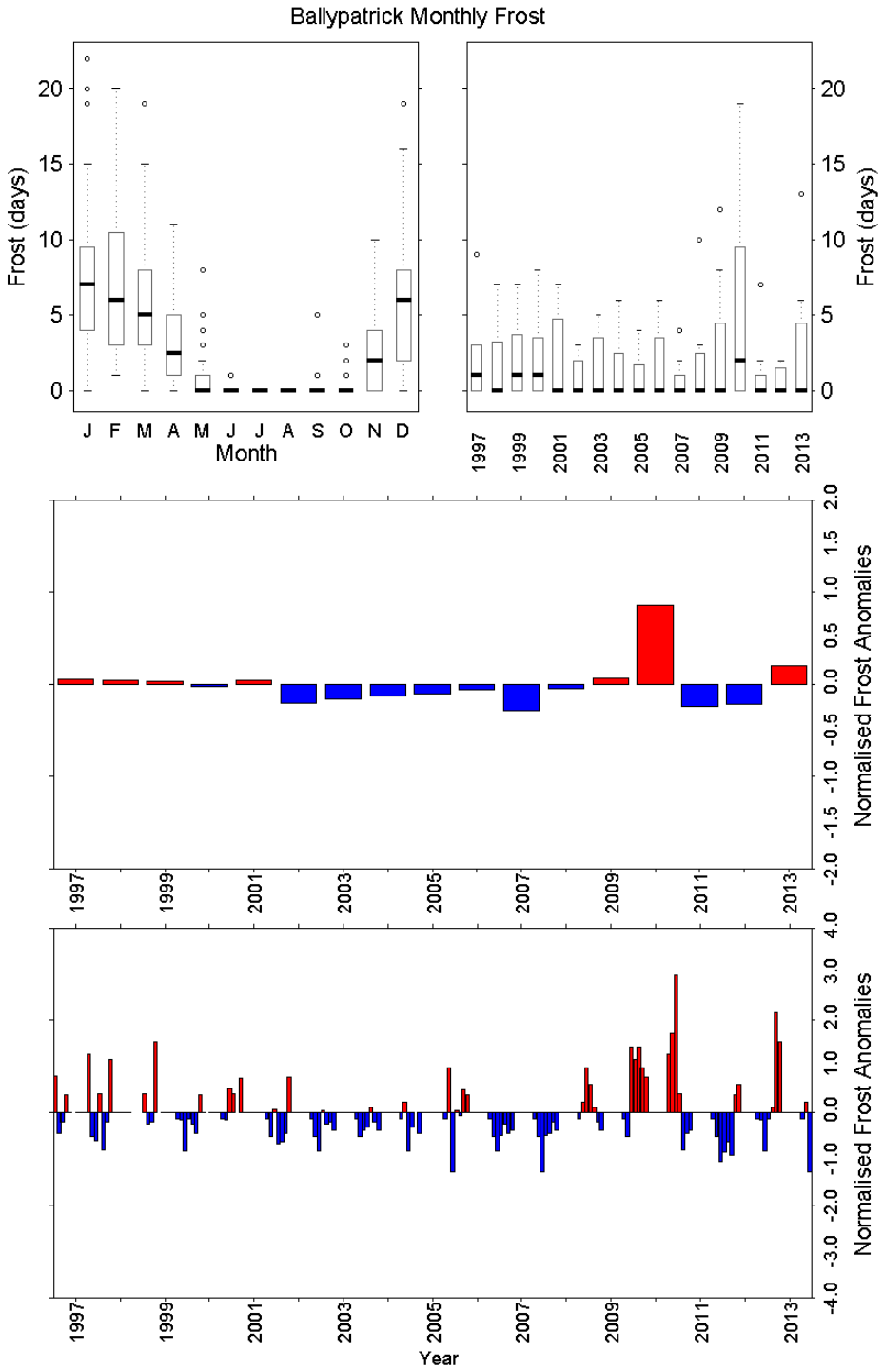

Figure E1.6 Monthly Days of Frost from the meteorological station at Ballypatrick. a) Monthly boxplot of frost data. b) Annual boxplot of frost data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries.

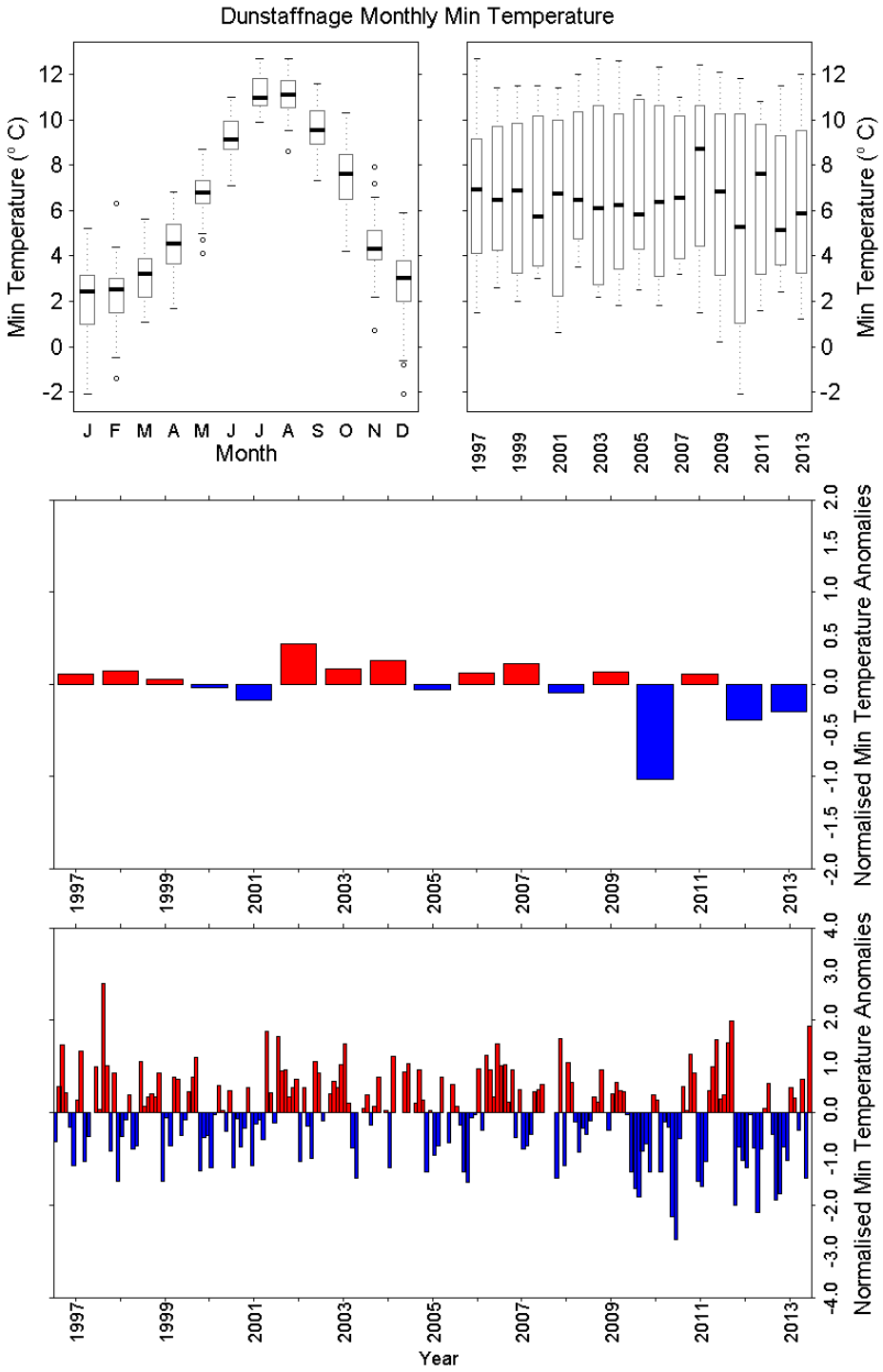

Figure E2.1 Monthly Minimum Air Temperature (°C) data from the meteorological station at Dunstaffnage. a) Monthly boxplot of minimum air temperature data. b) Annual boxplot of minimum air temperature data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries. There were no data available in Nov 1997, Nov 2003, May and Sep-Oct 2004, Jan and Oct 2005, Jan-Mar 2008.

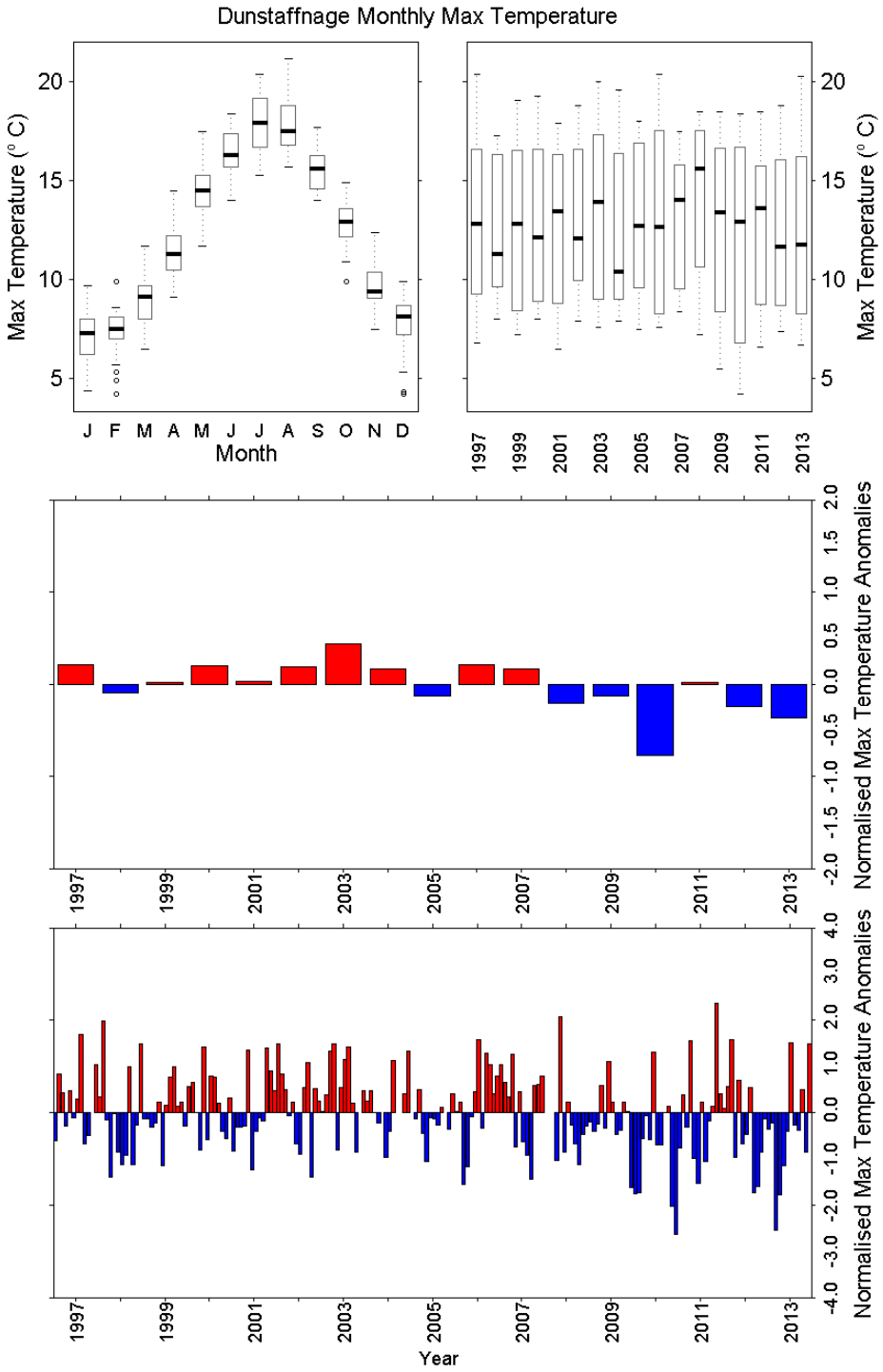

Figure E2.2 Monthly Maximum Air Temperature (°C) data from the meteorological station at Dunstaffnage. a) Monthly boxplot of maximum air temperature data. b) Annual boxplot of maximum air temperature data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries. There were no data available in November 1997, November 2003, May, September or October 2004, January or October 2005, January, February or March 2008.

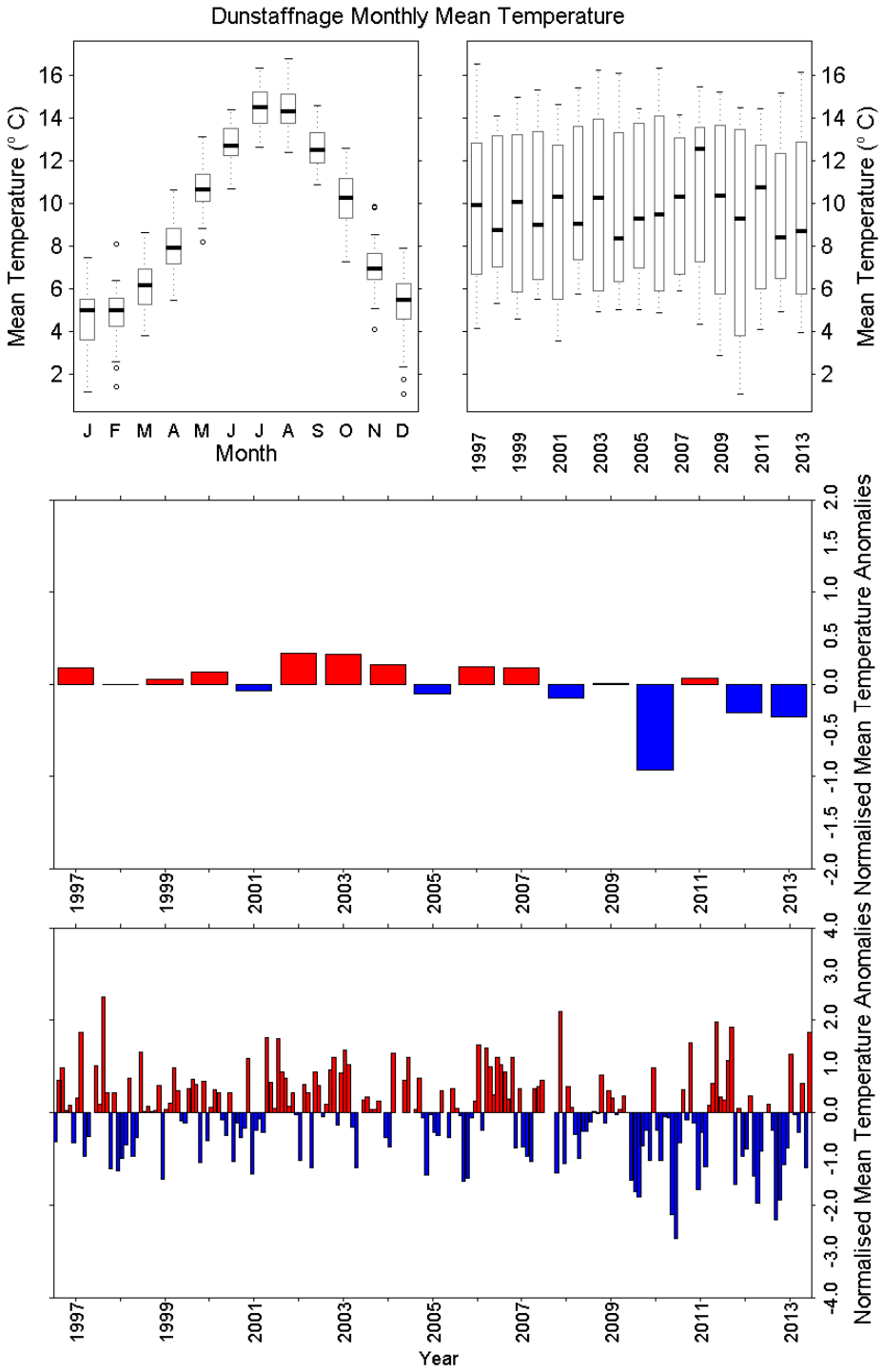

Figure E2.3 Monthly Mean Air Temperature (°C) data from the meteorological station at Dunstaffnage. a) Monthly boxplot of mean air temperature data. b) Annual boxplot of mean air temperature data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries. There were no data available in November 1997, November 2003, May 2004, September or October 2004, January 2005, January, February or March 2008.

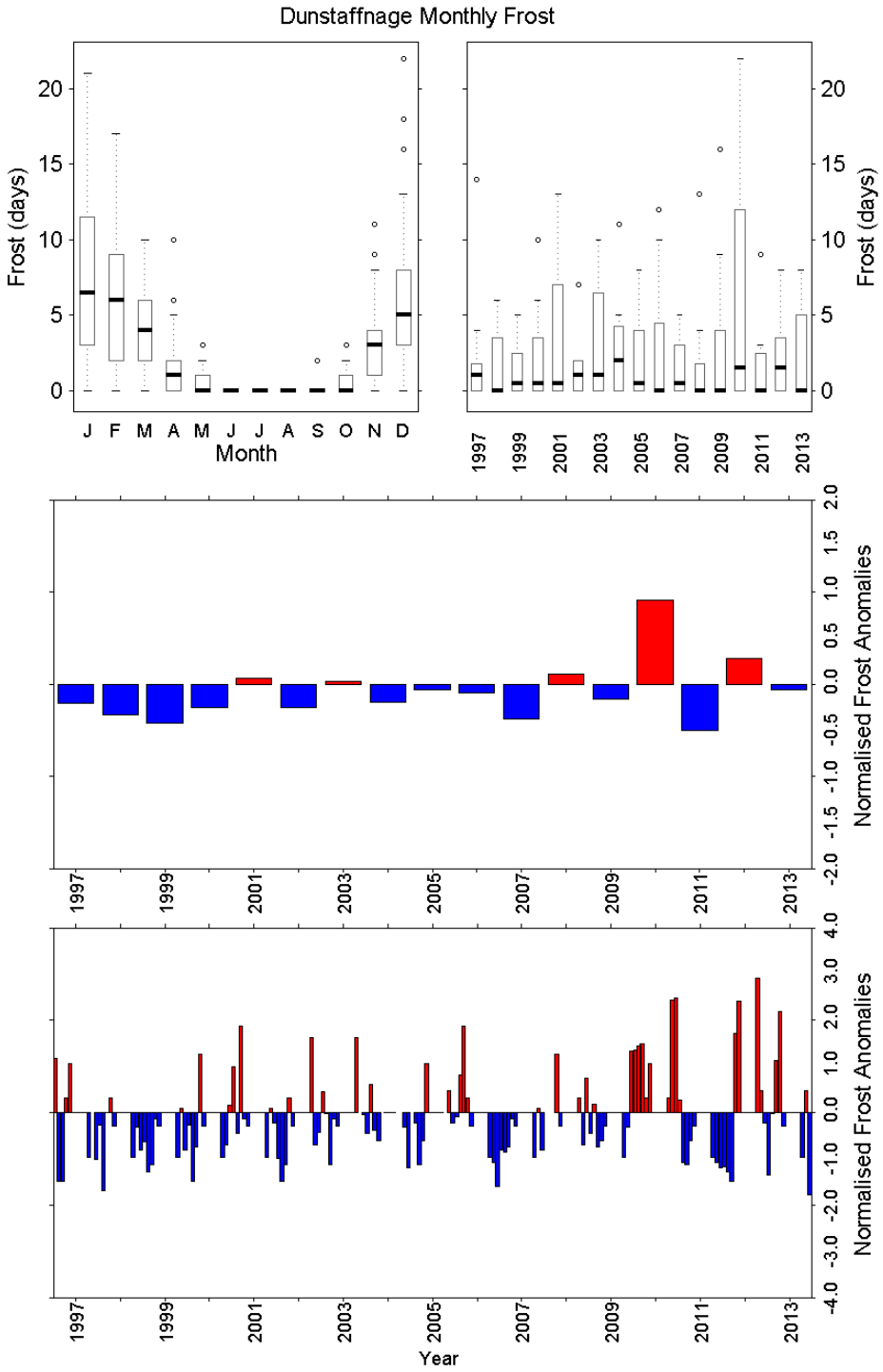

Figure E2.4 Monthly Days of Frost from the meteorological station at Dunstaffnage. a) Monthly boxplot of frost data. b) Annual boxplot of frost data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries. There were no data available in June 1997, October, November or December 1998, May 1999, June 2000, February 2001 or February 2005.

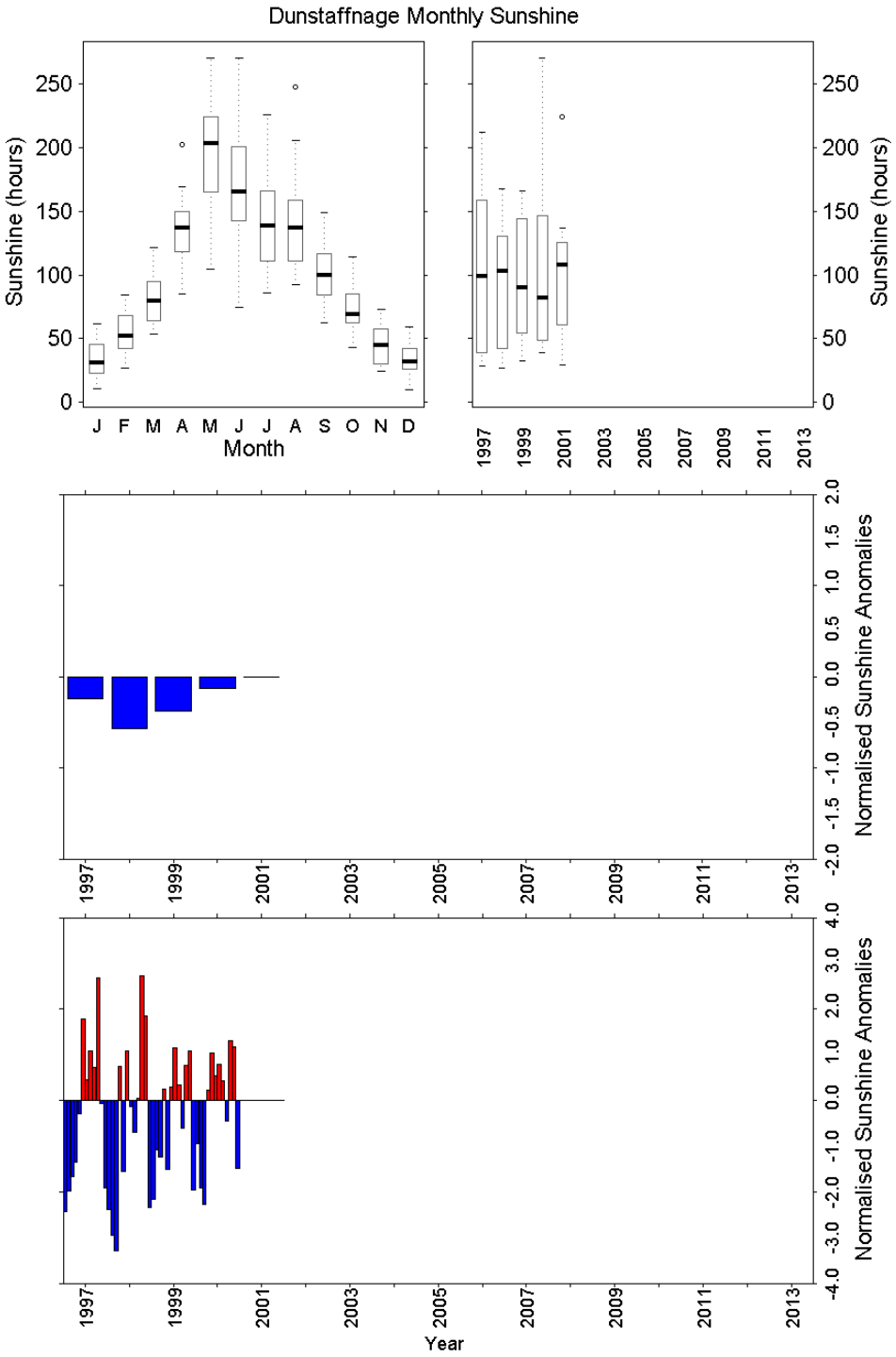

Figure E2.5 Monthly Sunshine hours from the meteorological station at Dunstaffnage. a) Monthly boxplot of sea surface temperature data. b) Annual boxplot of sea surface temperature data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries. There were no data available after December 2001.

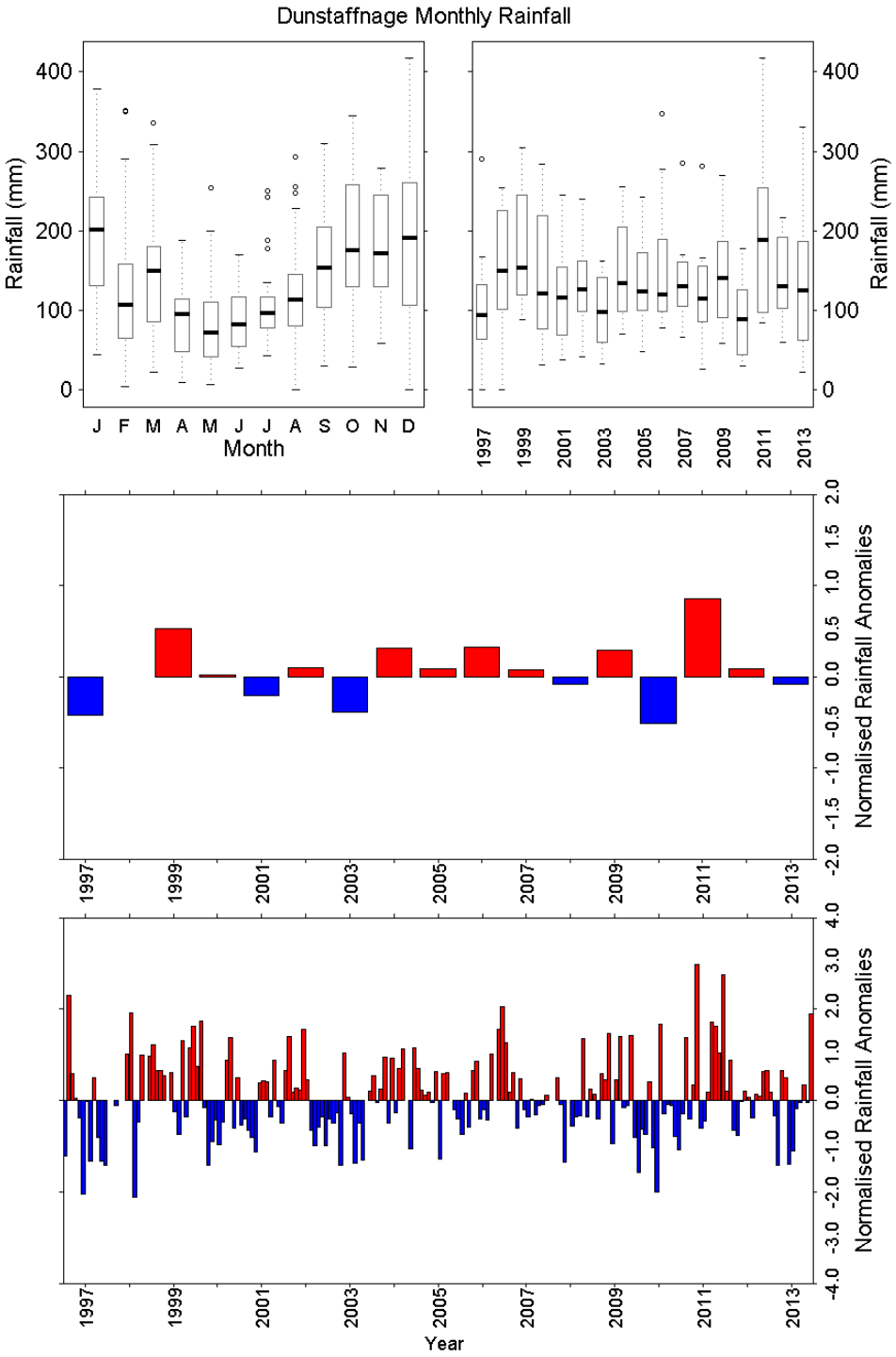

Figure E2.6 Rainfall totals from the meteorological station at Dunstaffnage. a) Monthly boxplot of rainfall data. b) Annual boxplot of rainfall data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries. There were no data available in January, February, April, Nay or November 1998, May 1999, November 2003, October 2004, October 2005, October 2006, January, February or June 2008.

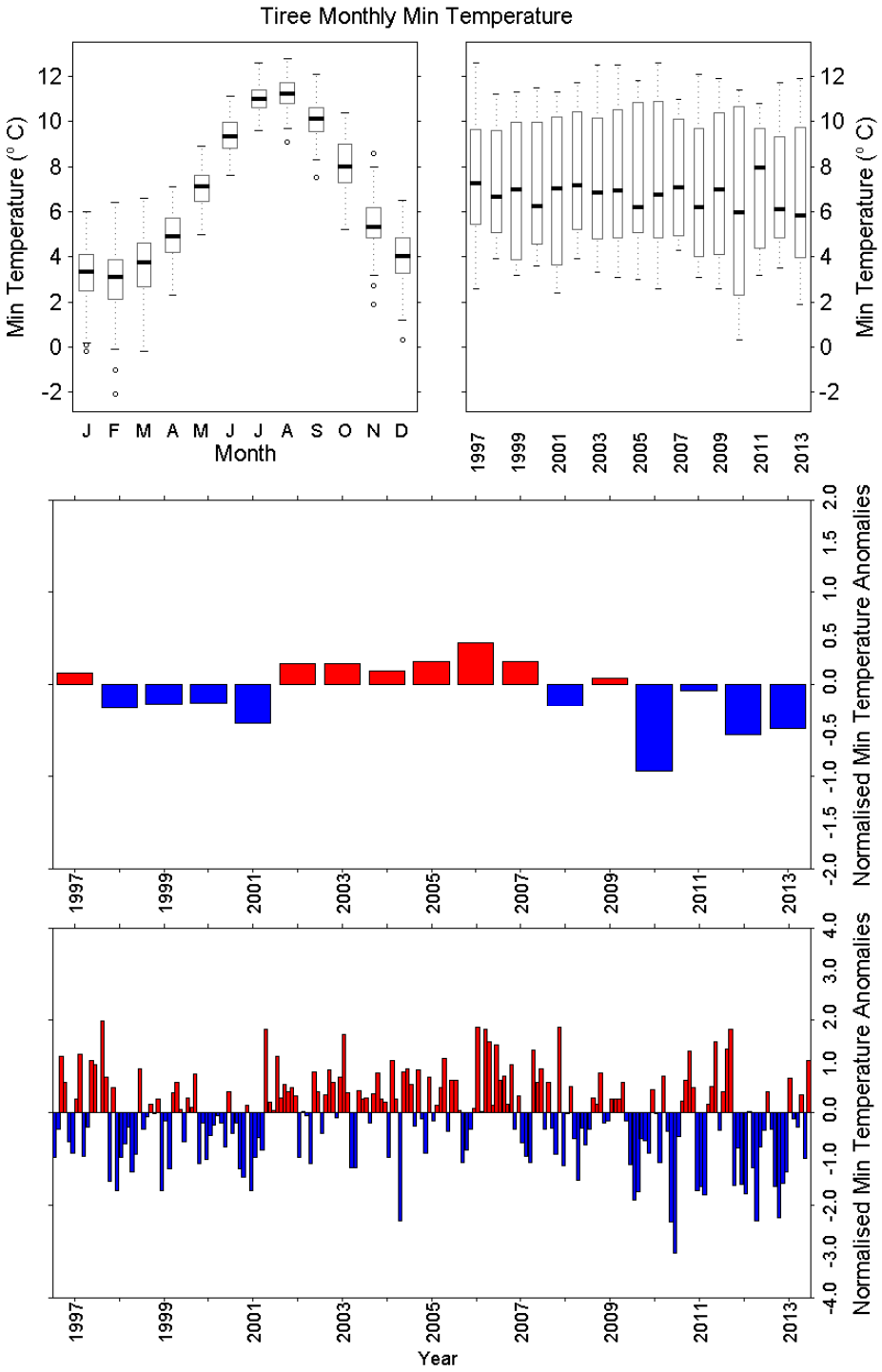

Figure E3.1 Monthly Minimum Air Temperature (°C) data from the meteorological station at Tiree. a) Monthly boxplot of minimum air temperature data. b) Annual boxplot of minimum air temperature data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries.

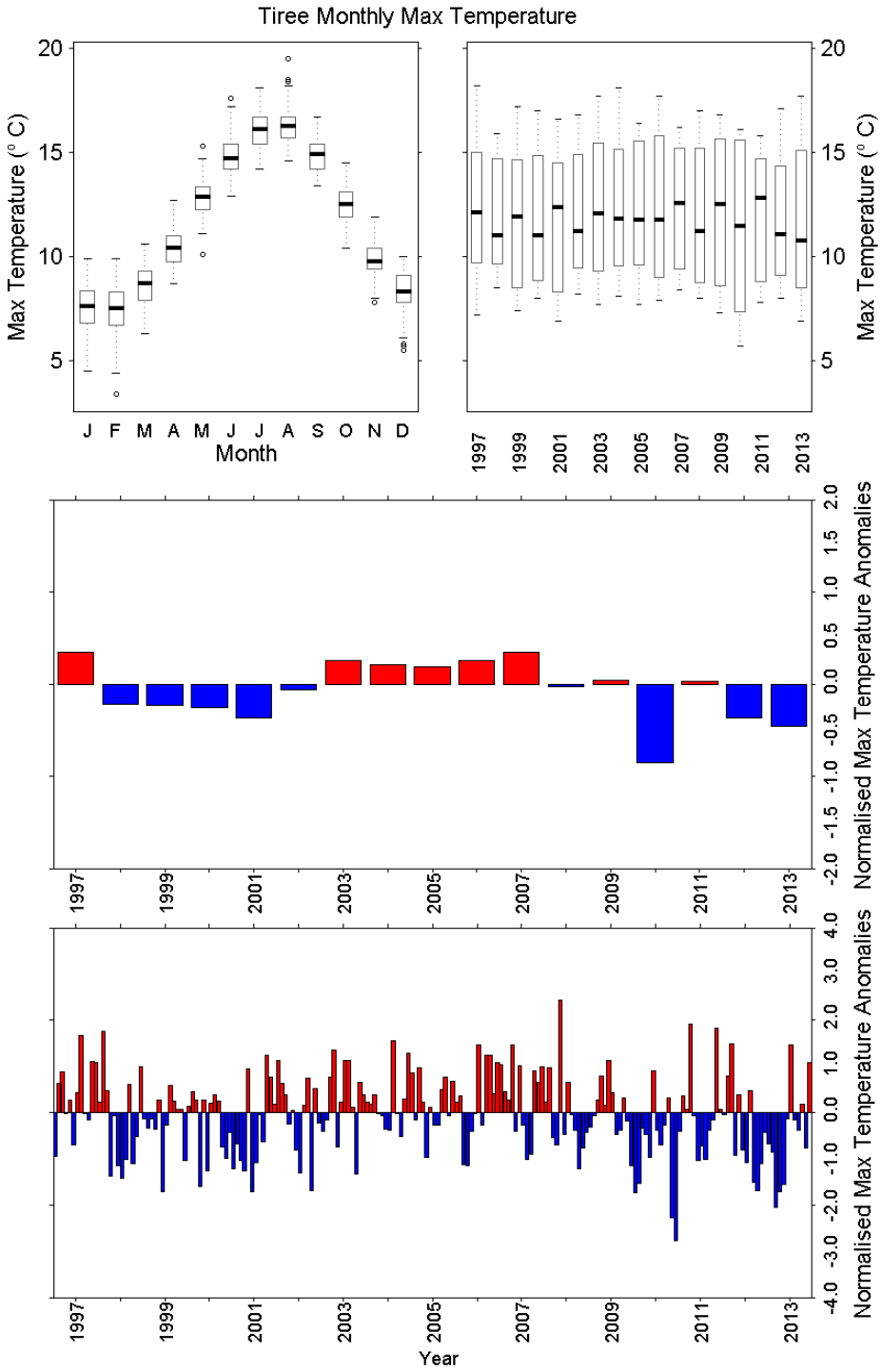

Figure E3.2 Monthly Maximum Air Temperature (°C) data from the meteorological station at Tiree. a) Monthly boxplot of maximum air temperature data. b) Annual boxplot of maximum air temperature data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries.

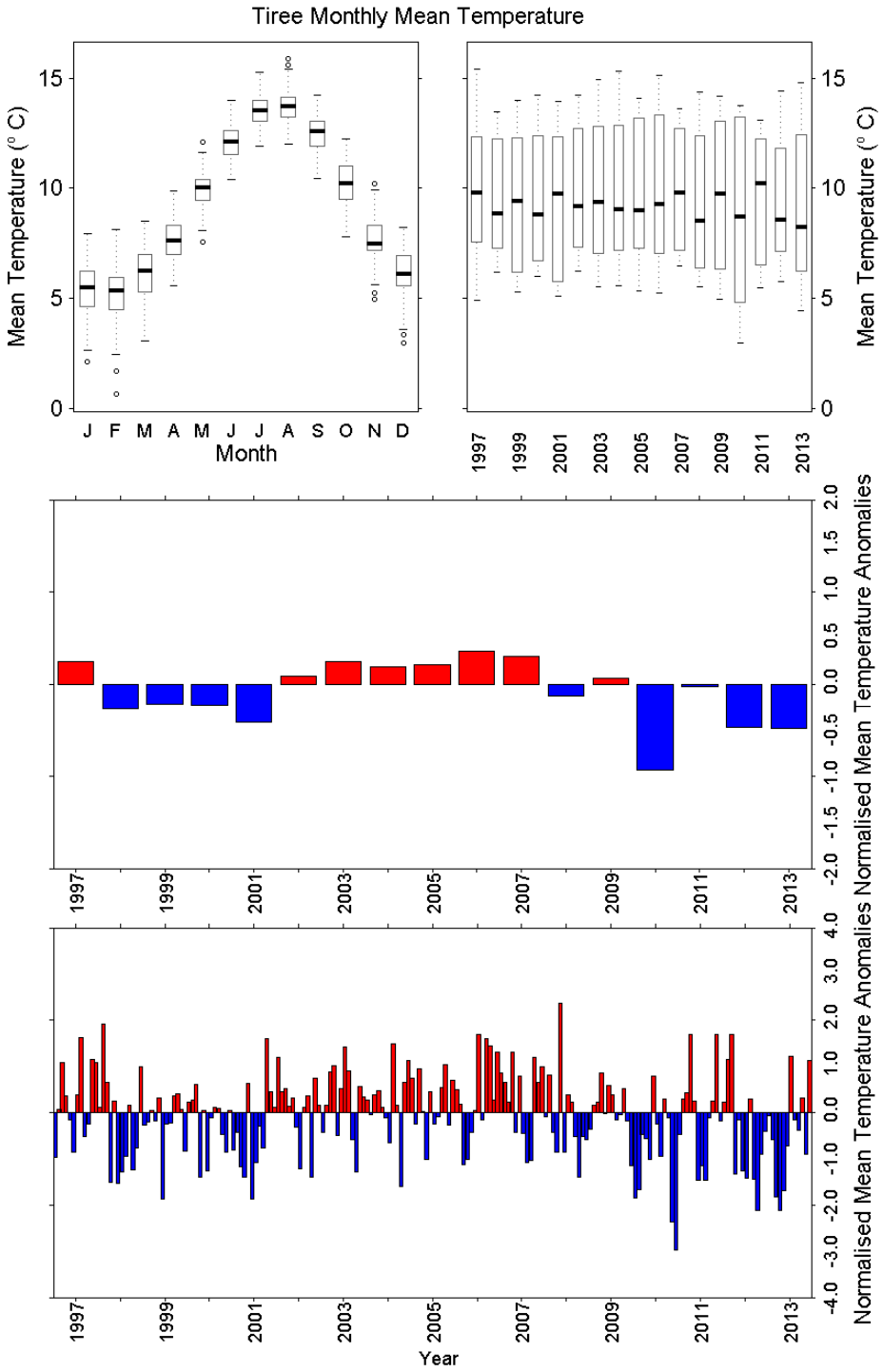

Figure E3.3 Monthly Mean Air Temperature (°C) data from the meteorological station at Tiree. a) Monthly boxplot of mean air temperature data. b) Annual boxplot of mean air temperature data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries.

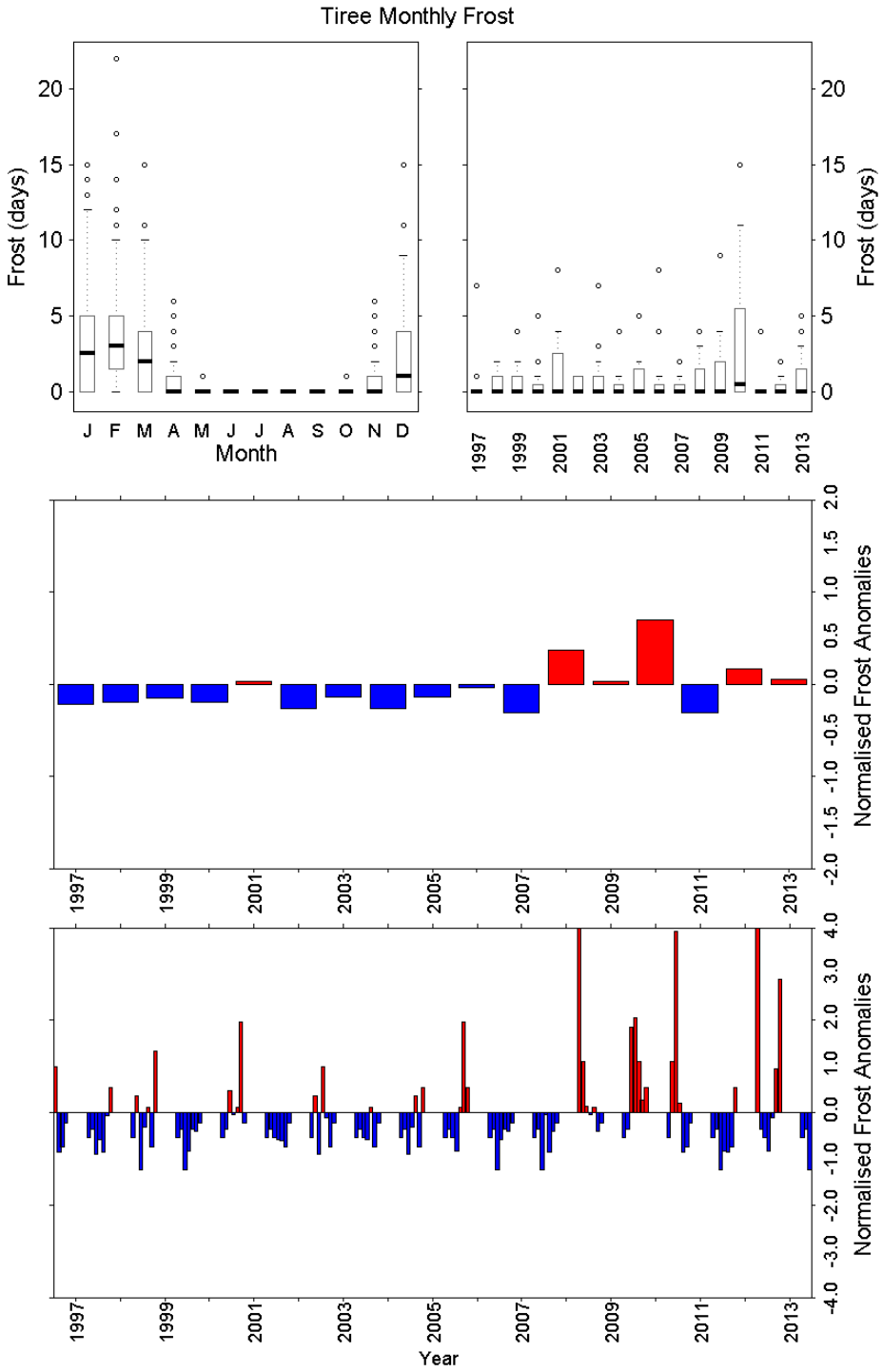

Figure E3.4 Monthly Days of Frost from the meteorological station at Tiree. a) Monthly boxplot of frost data. b) Annual boxplot of frost data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries. There were no data available in November 1997, November 2003, May, September or October 2004, January or October 2005, January, February or March 2008.

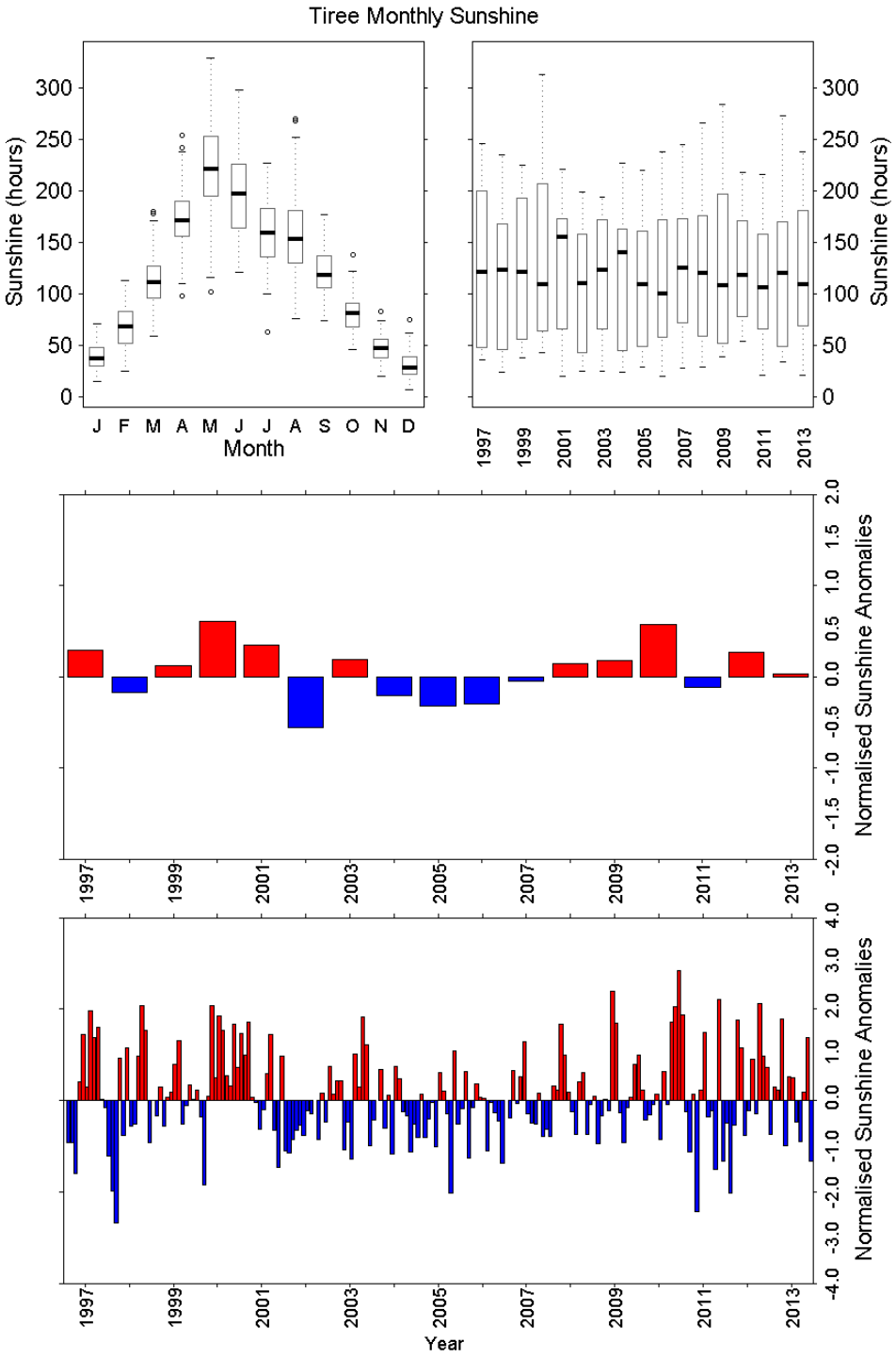

Figure E3.5 Monthly Sunshine hours from the meteorological station at Tiree. a) Monthly boxplot of sea surface temperature data. b) Annual boxplot of sea surface temperature data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries. There were no data available in September 2002, February 2004 or January 2007.

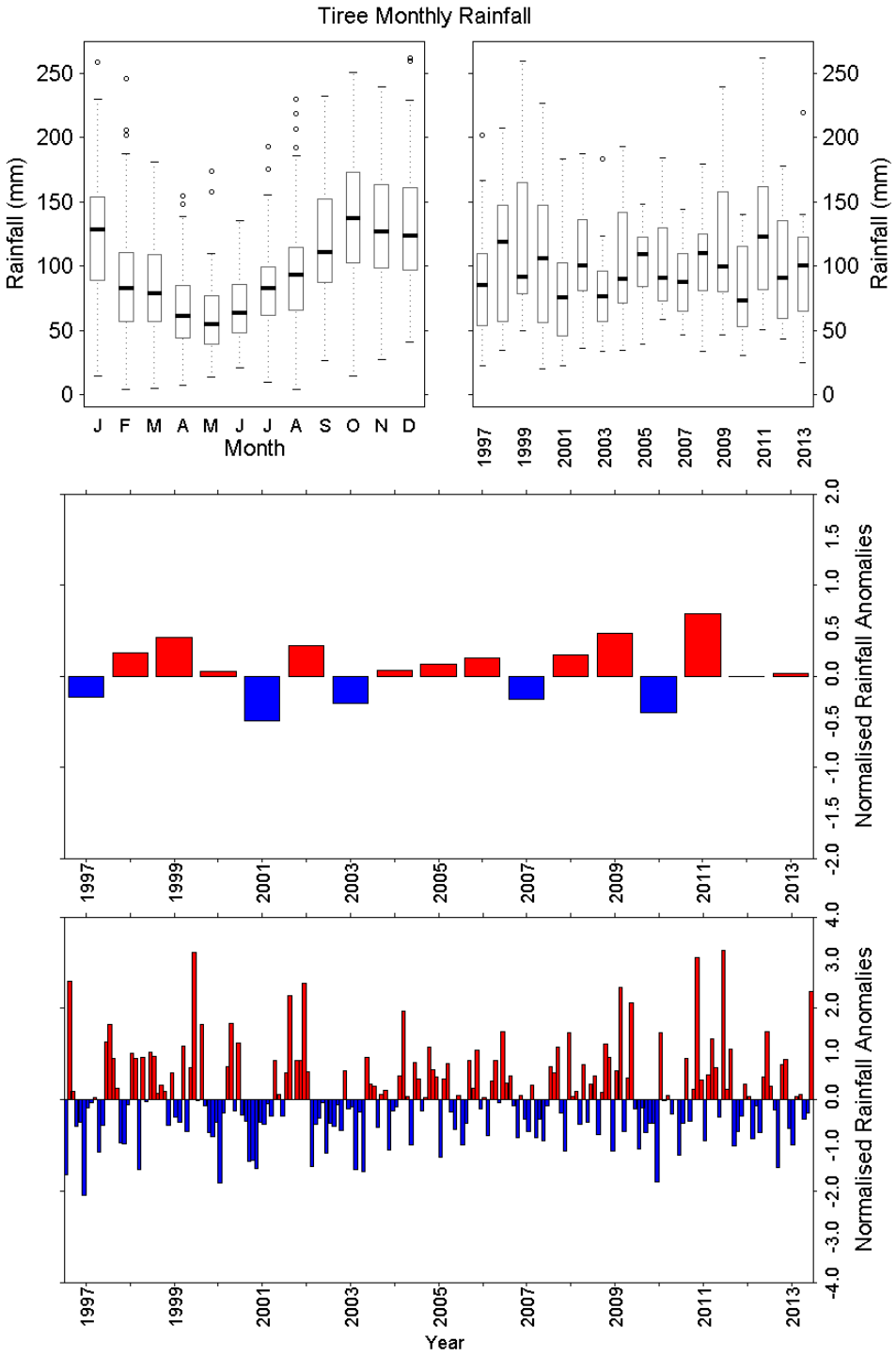

Figure E3.6 Rainfall totals from the meteorological station at Tiree. a) Monthly boxplot of rainfall data. b) Annual boxplot of rainfall data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries.

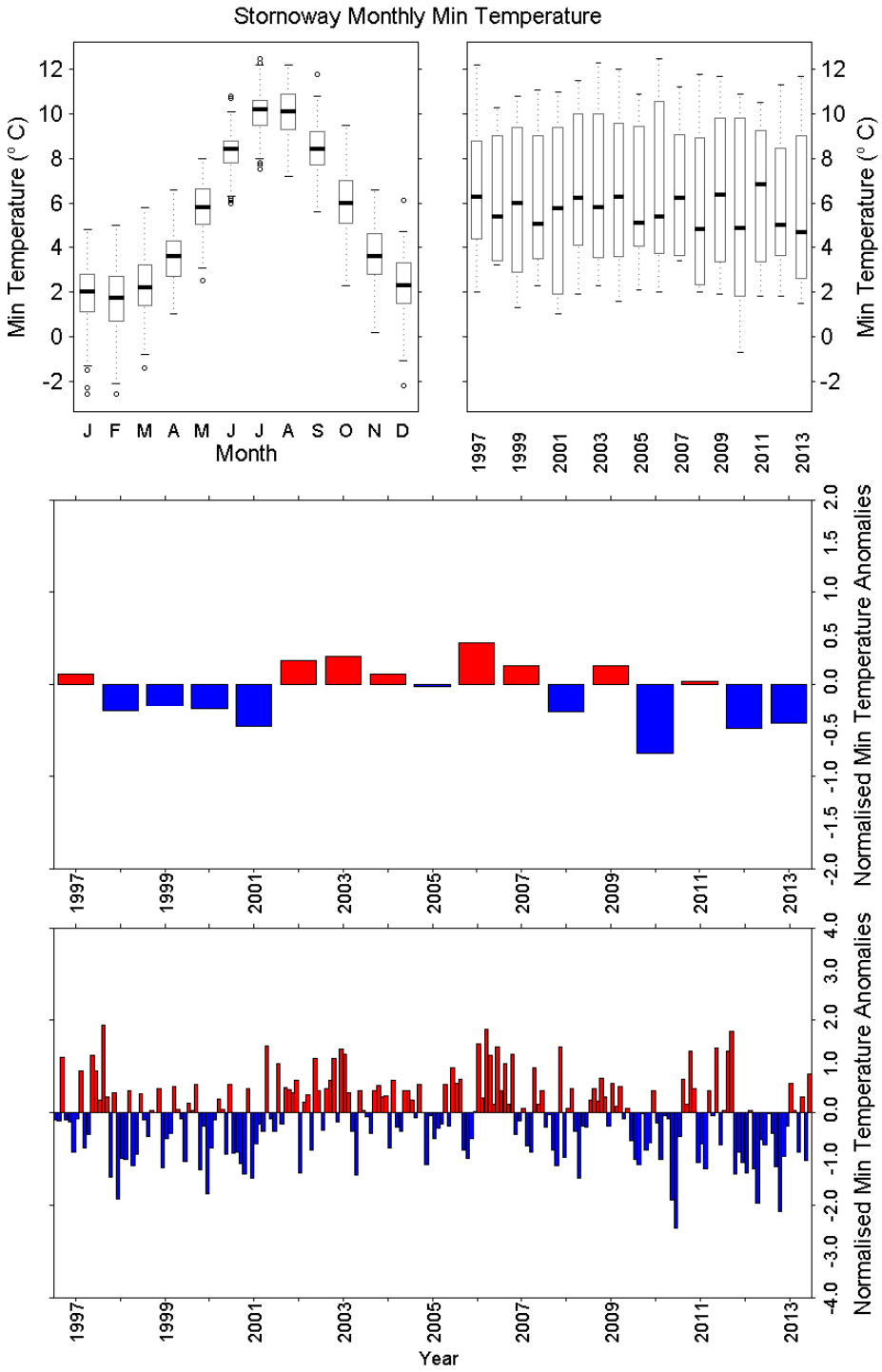

Figure E4.1 Monthly Minimum Air Temperature (°C) data from the meteorological station at Stornoway a) Monthly boxplot of minimum air temperature data. b) Annual boxplot of minimum air temperature data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries.

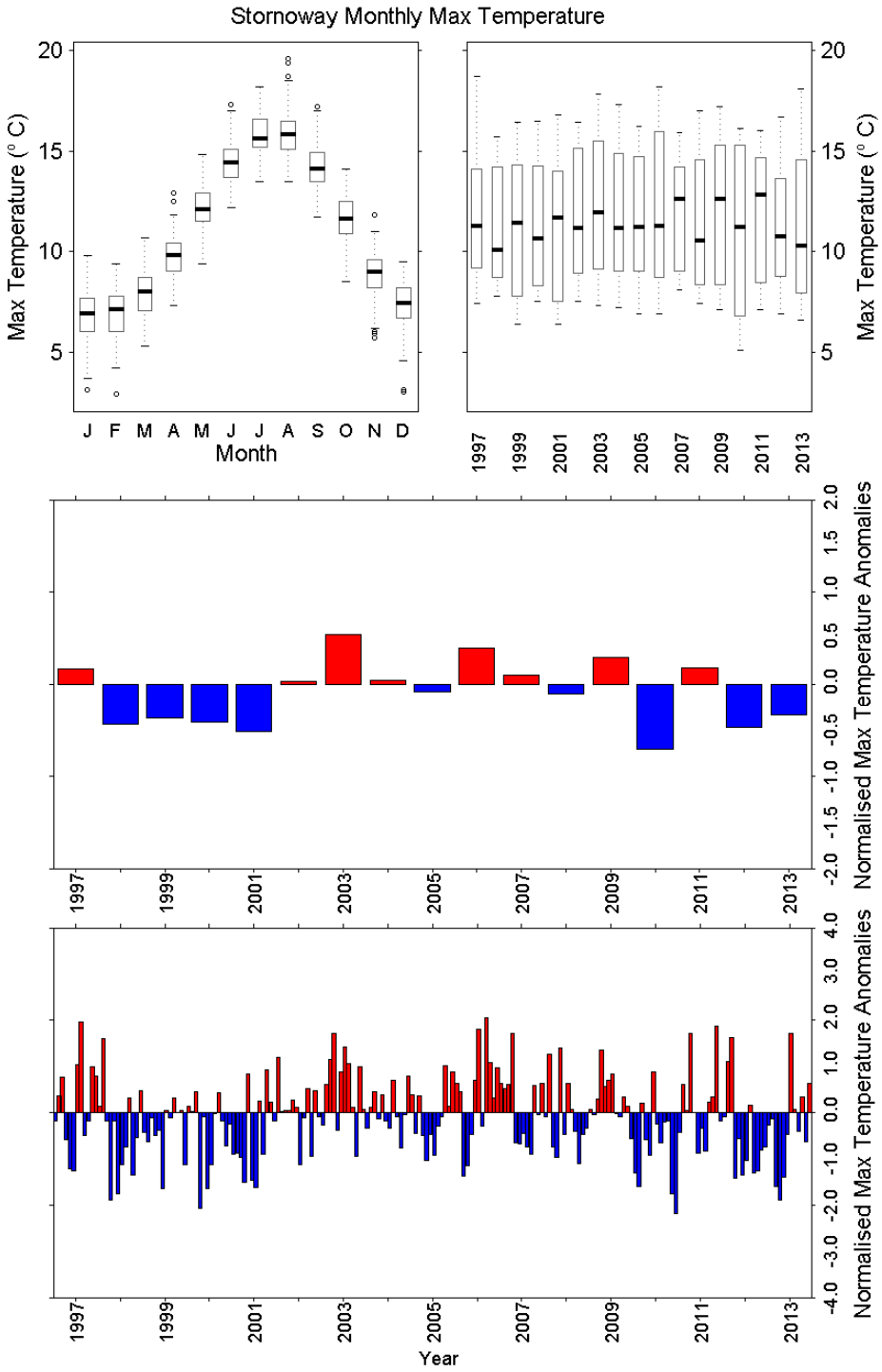

Figure4.2 Monthly Maximum Air Temperature (°C) data from the meteorological station at Stornoway. a) Monthly boxplot of maximum air temperature data. b) Annual boxplot of maximum air temperature data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries.

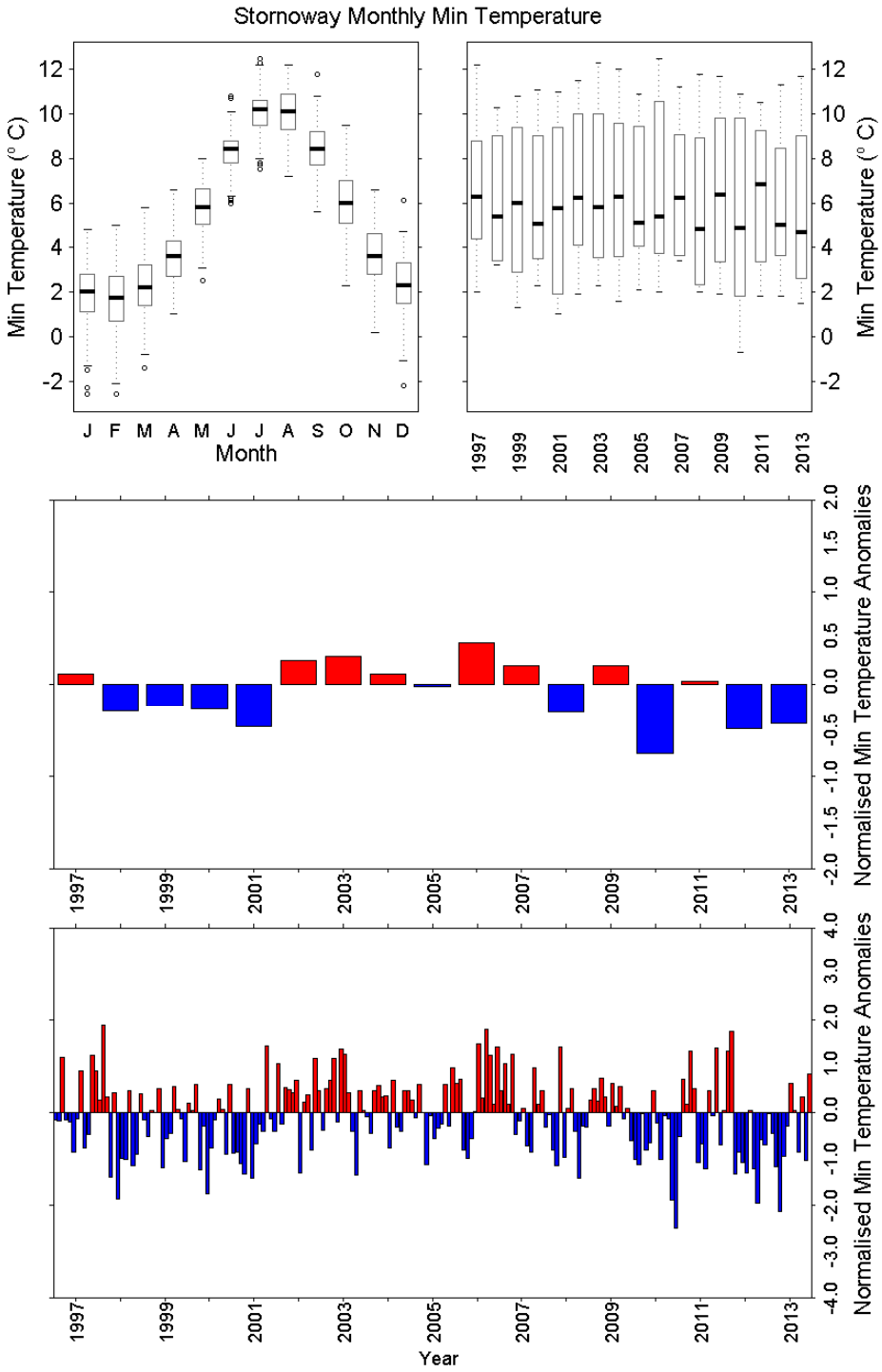

Figure E4.3 Monthly Mean Air Temperature (°C) data from the meteorological station at Stornoway. a) Monthly boxplot of mean air temperature data. b) Annual boxplot of mean air temperature data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries.

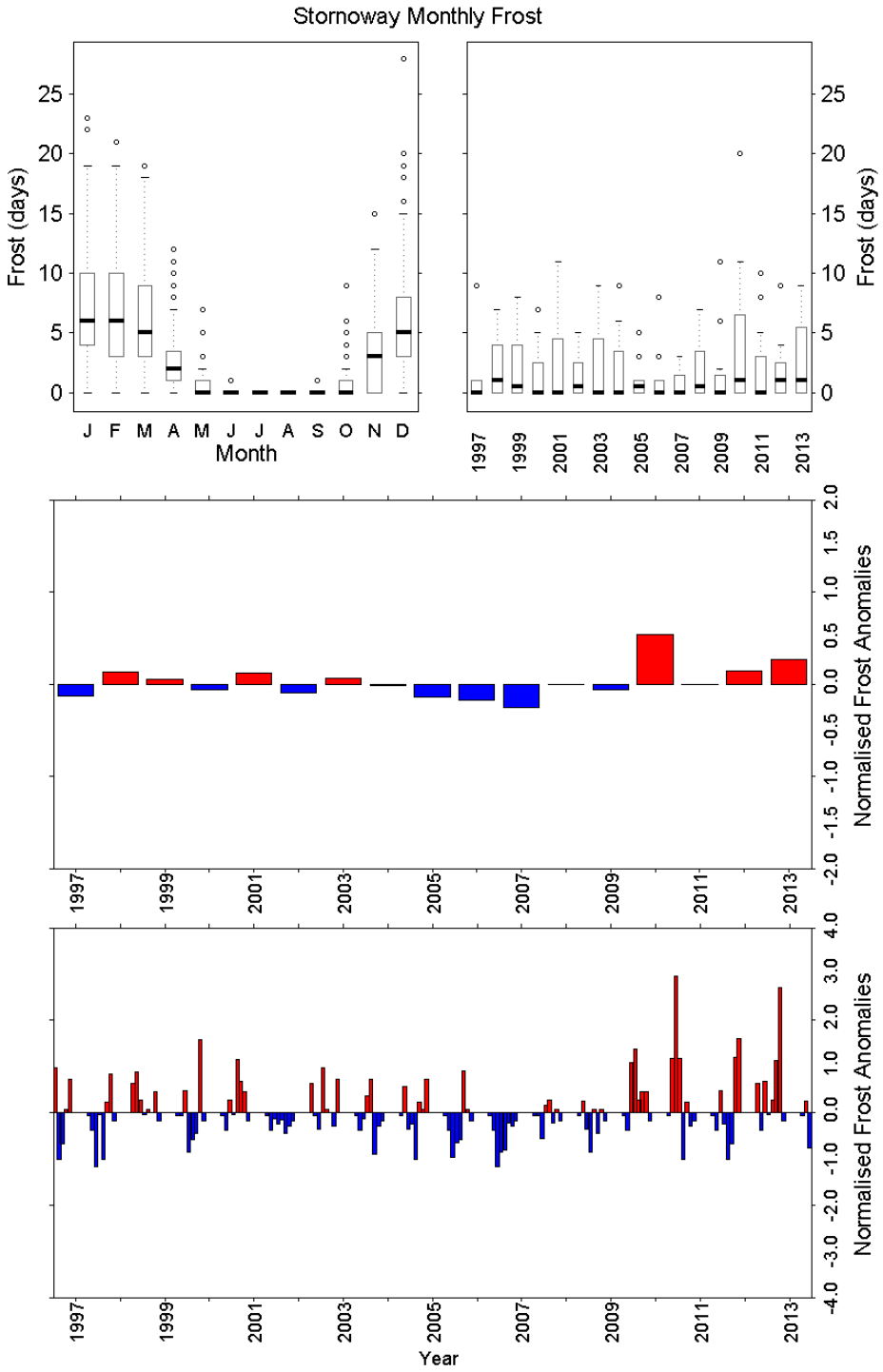

Figure E4.4 Monthly Days of Frost from the meteorological station at Stornoway. a) Monthly boxplot of frost data. b) Annual boxplot of frost data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries.

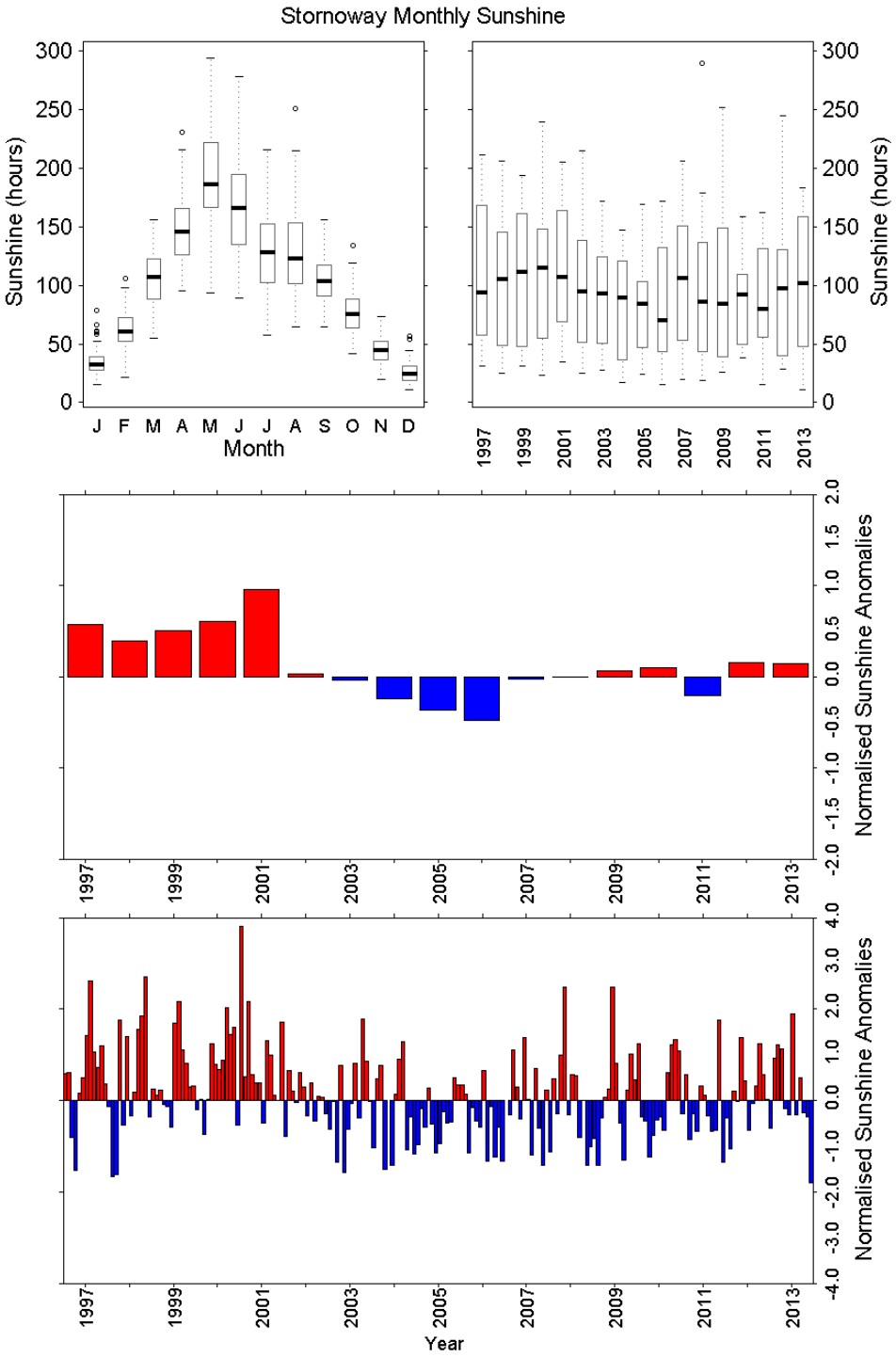

Figure E4.5 Monthly Sunshine hours from the meteorological station at Stornoway. a) Monthly boxplot of sea surface temperature data. b) Annual boxplot of sea surface temperature data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries. There were no data available in May 2004 or January 2007.

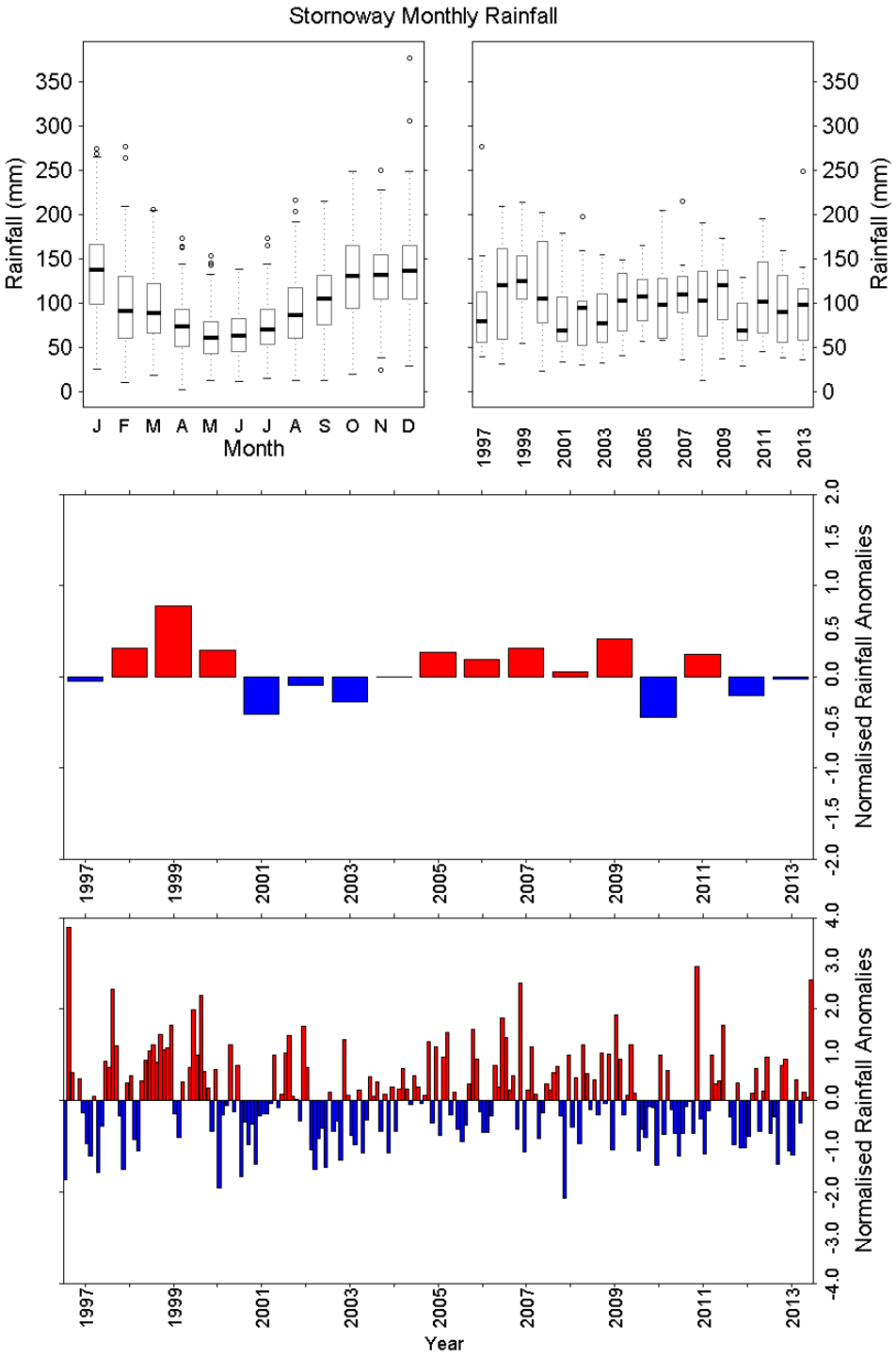

Figure E4.6 Rainfall totals from the meteorological station at Stornoway. a) Monthly boxplot of rainfall data. b) Annual boxplot of rainfall data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries.

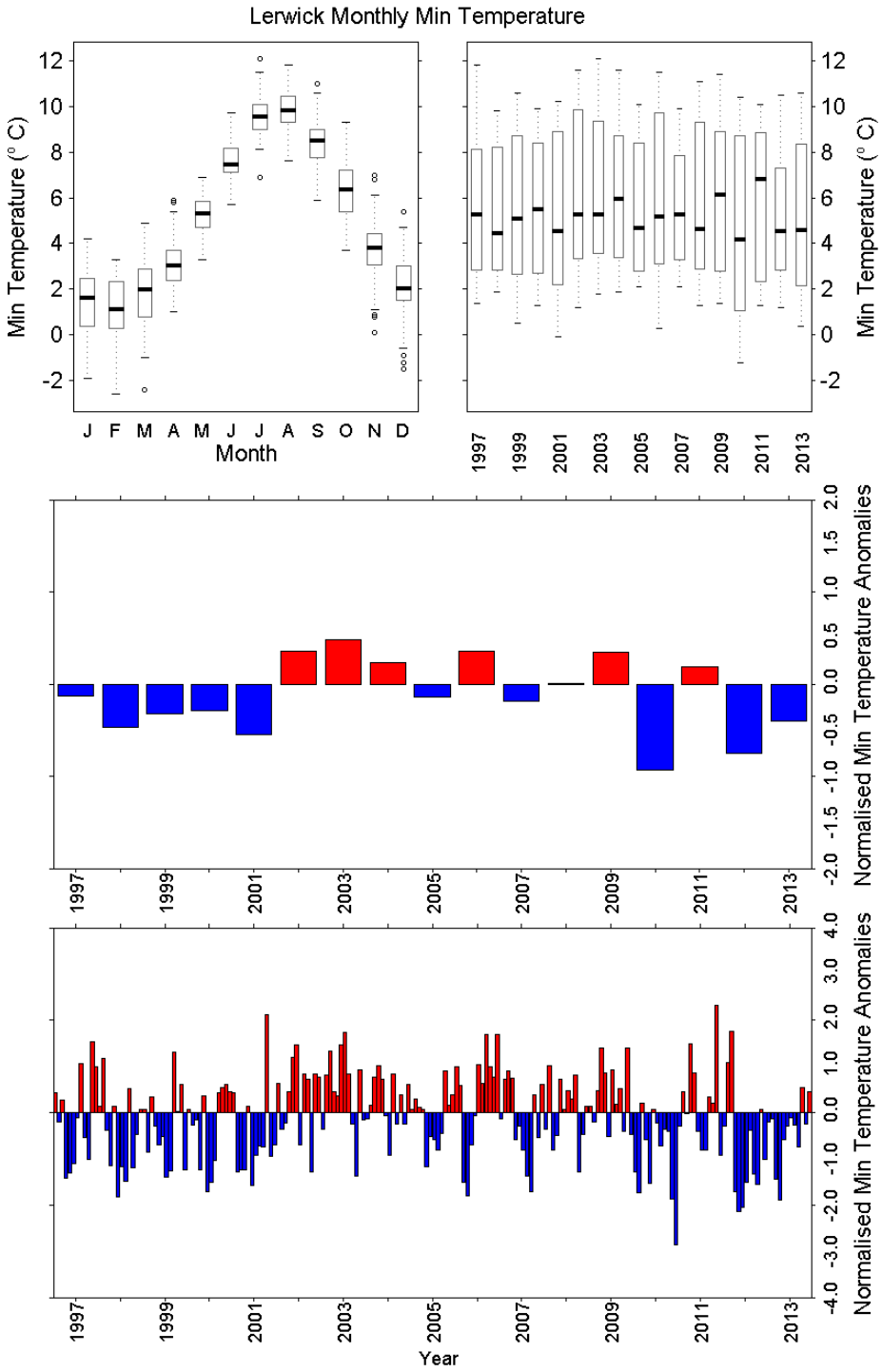

Figure E5.1 Monthly Minimum Air Temperature (°C) data from the meteorological station at Lerwick. a) Monthly boxplot of minimum air temperature data. b) Annual boxplot of minimum air temperature data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries.

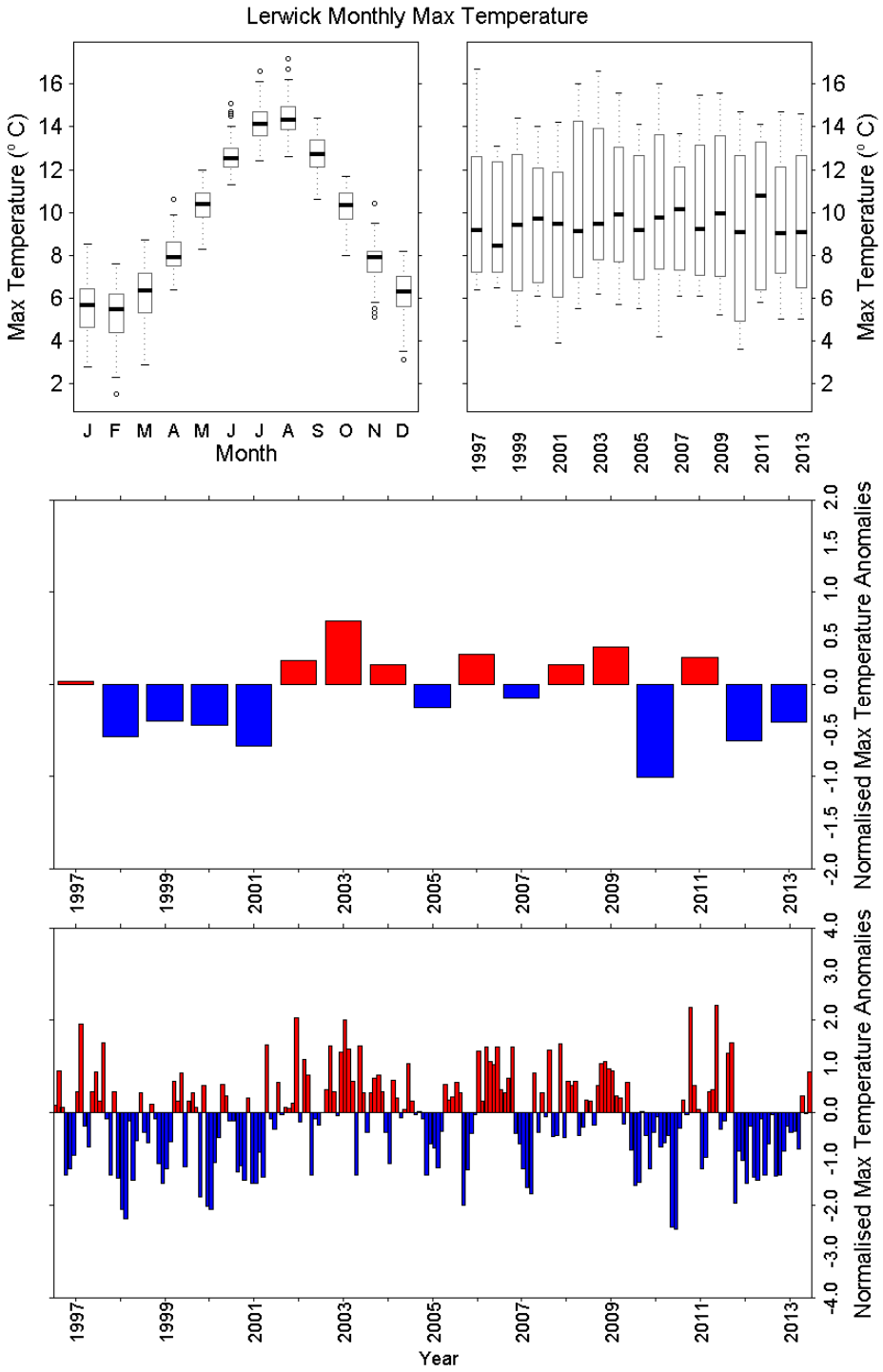

Figure E5.2 Monthly Maximum Air Temperature (°C) data from the meteorological station at Lerwick. a) Monthly boxplot of maximum air temperature data. b) Annual boxplot of maximum air temperature data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries.

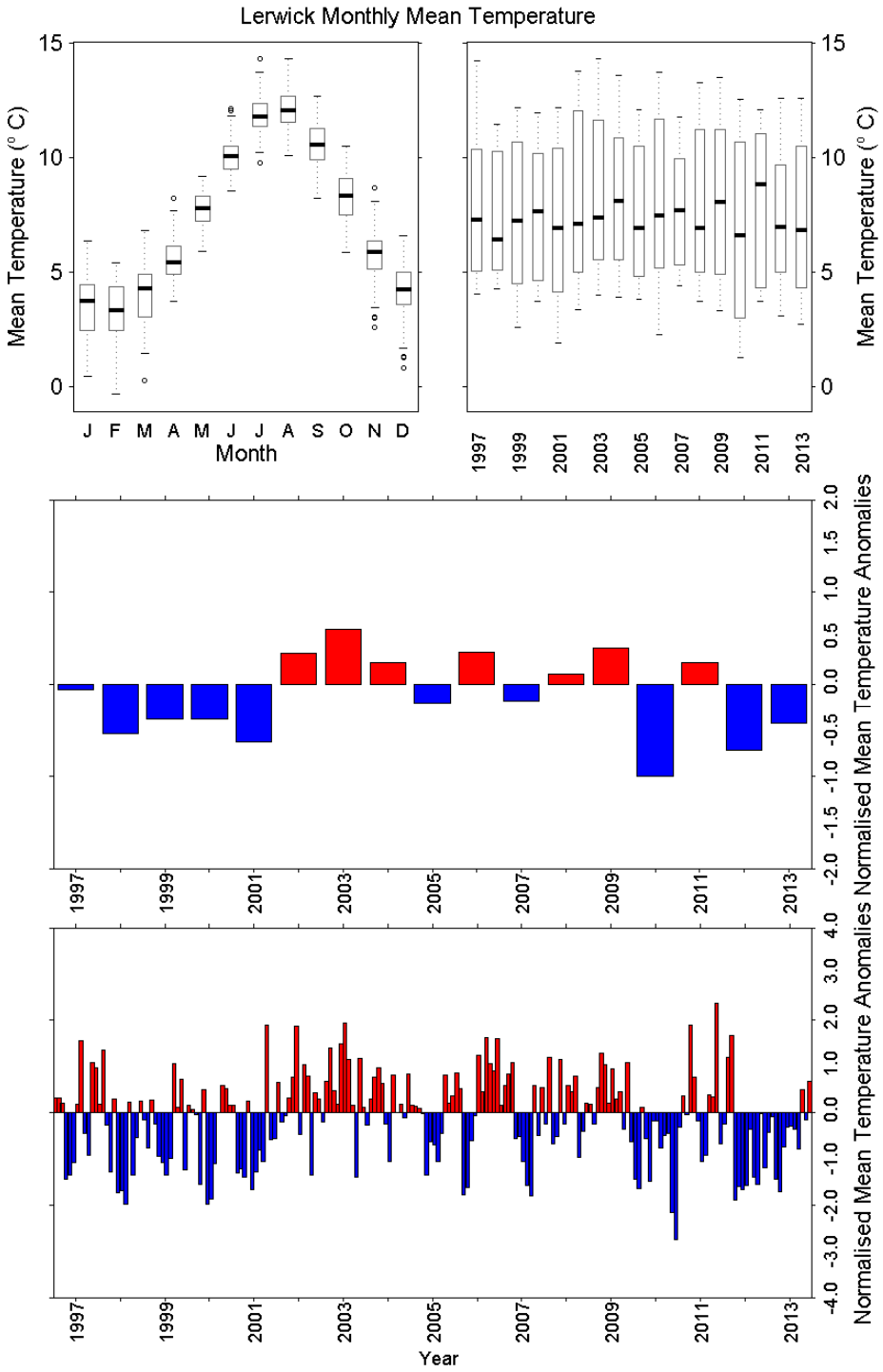

Figure E5.3 Monthly Mean Air Temperature (°C) data from the meteorological station at Lerwick. a) Monthly boxplot of mean air temperature data. b) Annual boxplot of mean air temperature data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries.

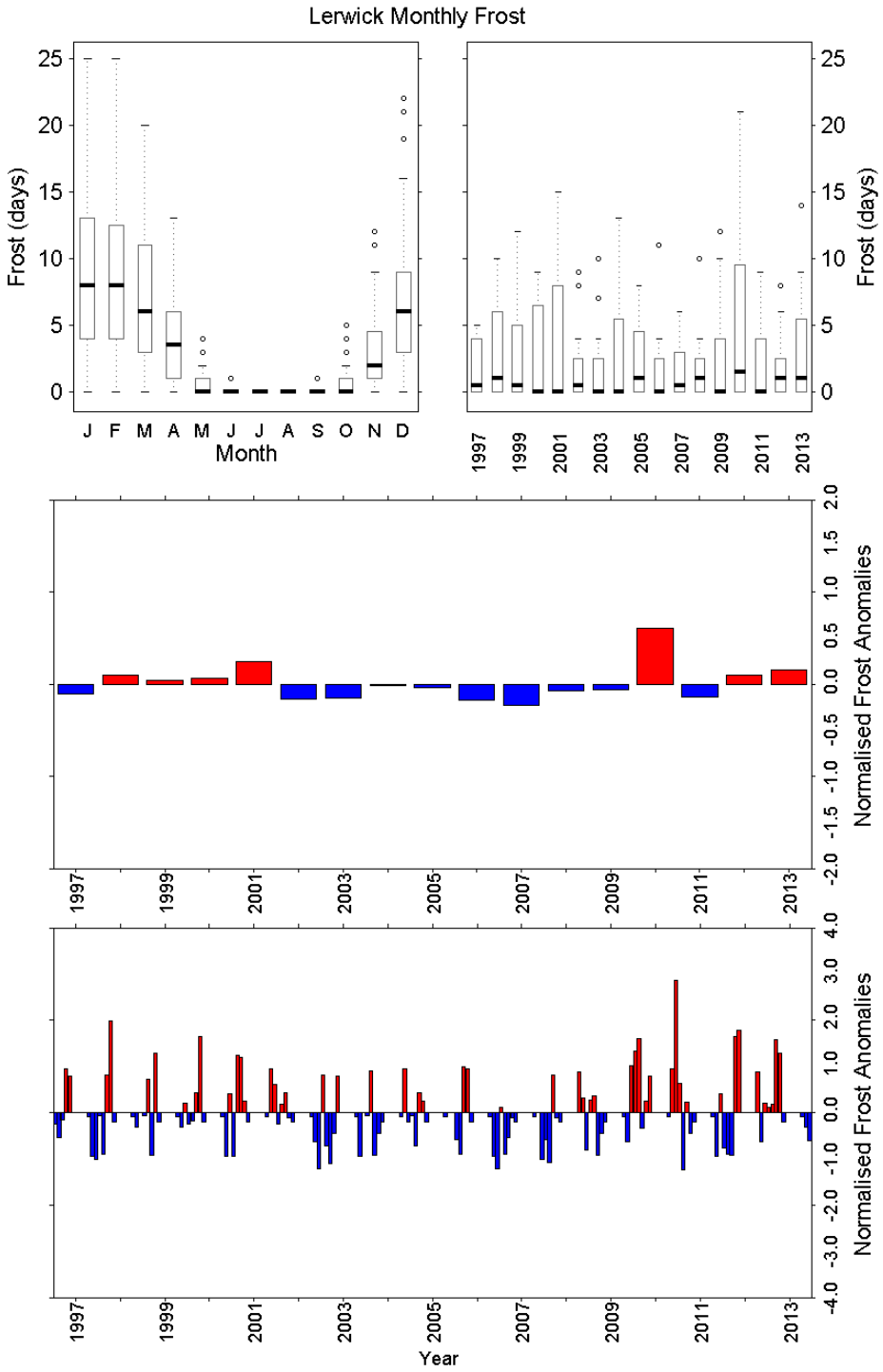

Figure E5.4 Monthly Days of Frost from the meteorological station at Lerwick. a) Monthly boxplot of frost data. b) Annual boxplot of frost data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries.

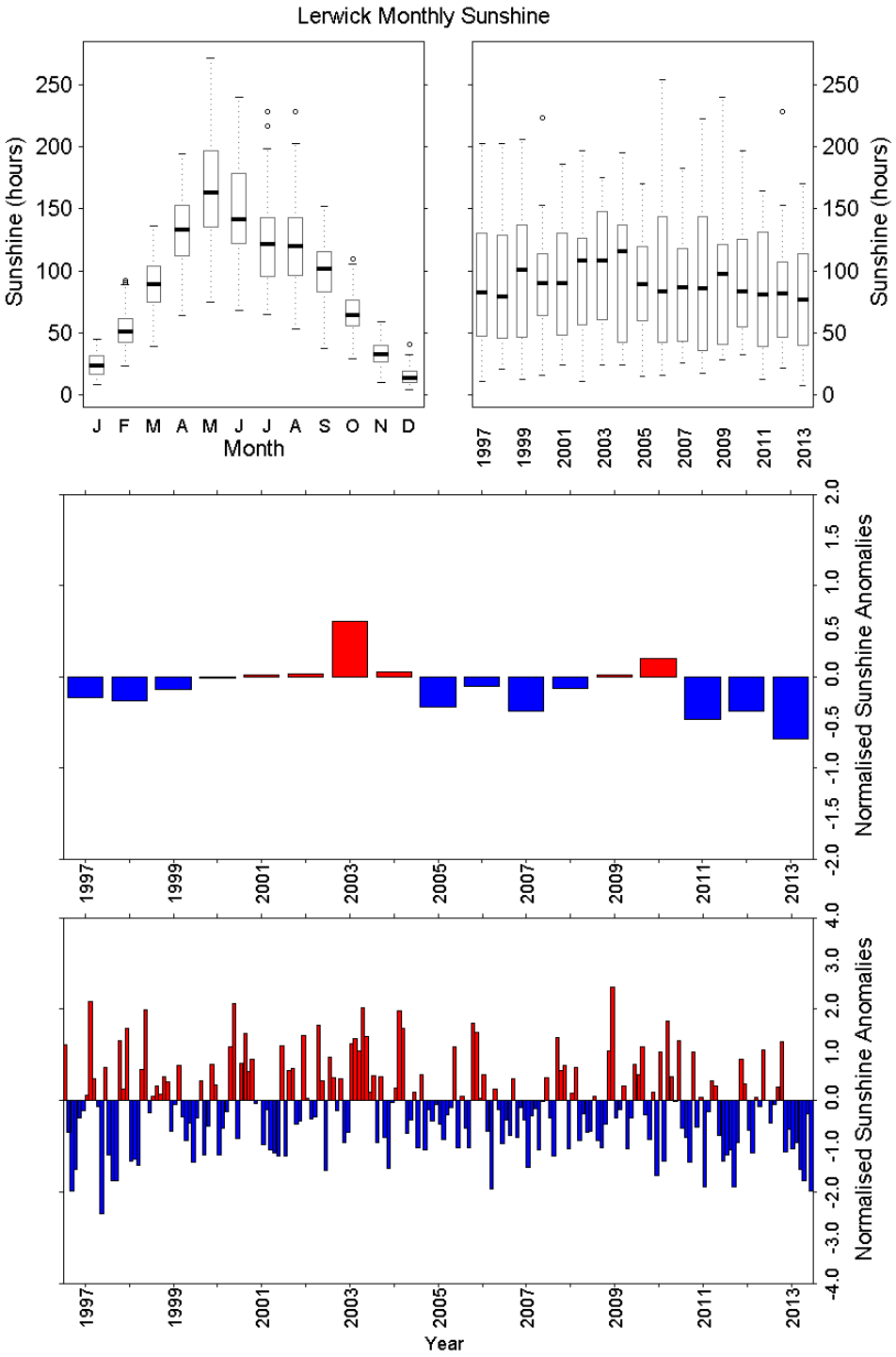

Figure E5.5 Monthly Sunshine hours from the meteorological station at Lerwick. a) Monthly boxplot of sea surface temperature data. b) Annual boxplot of sea surface temperature data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries.

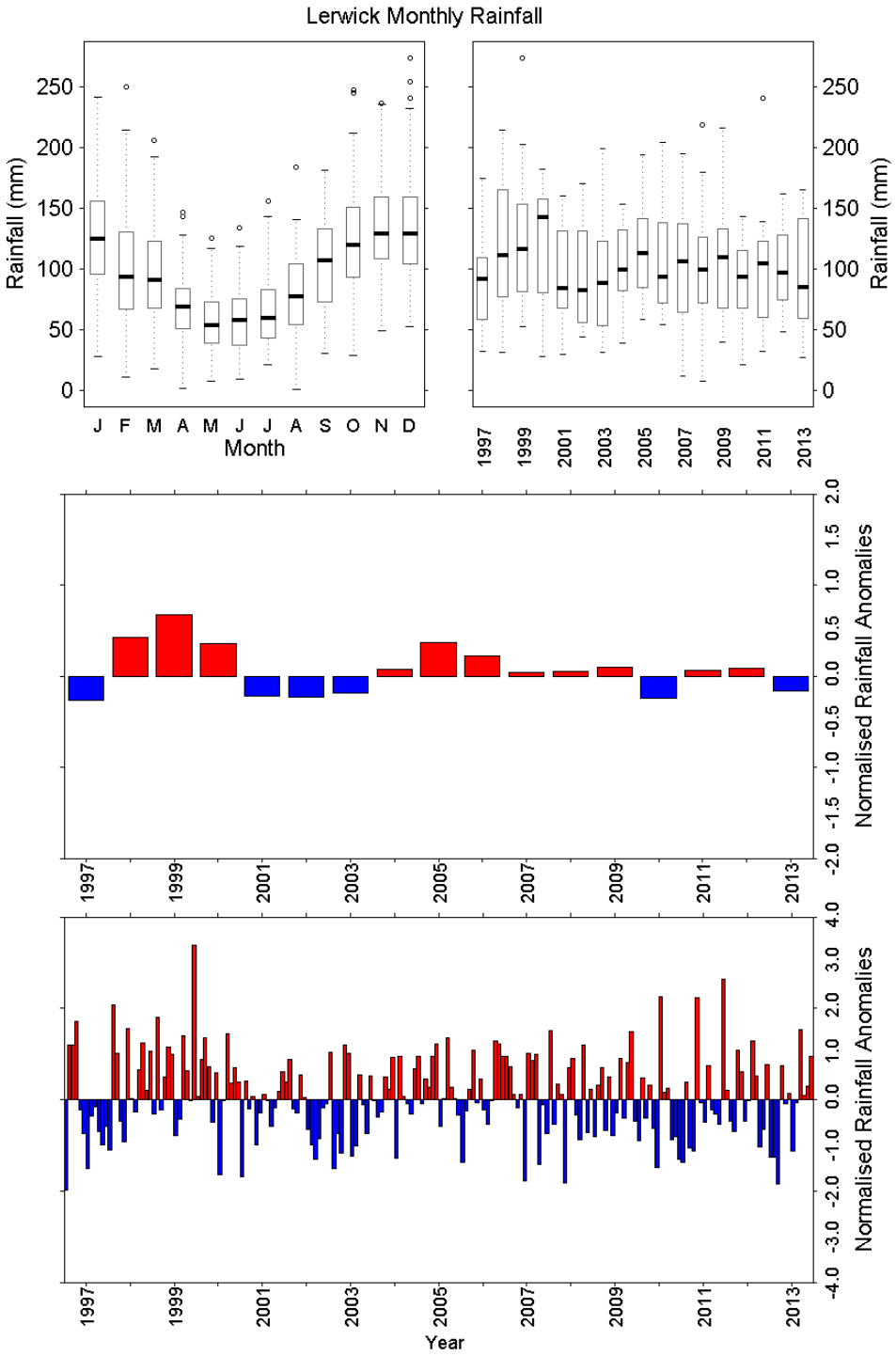

Figure E5.6 Rainfall totals from the meteorological station at Lerwick. a) Monthly boxplot of rainfall data. b) Annual boxplot of rainfall data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries.

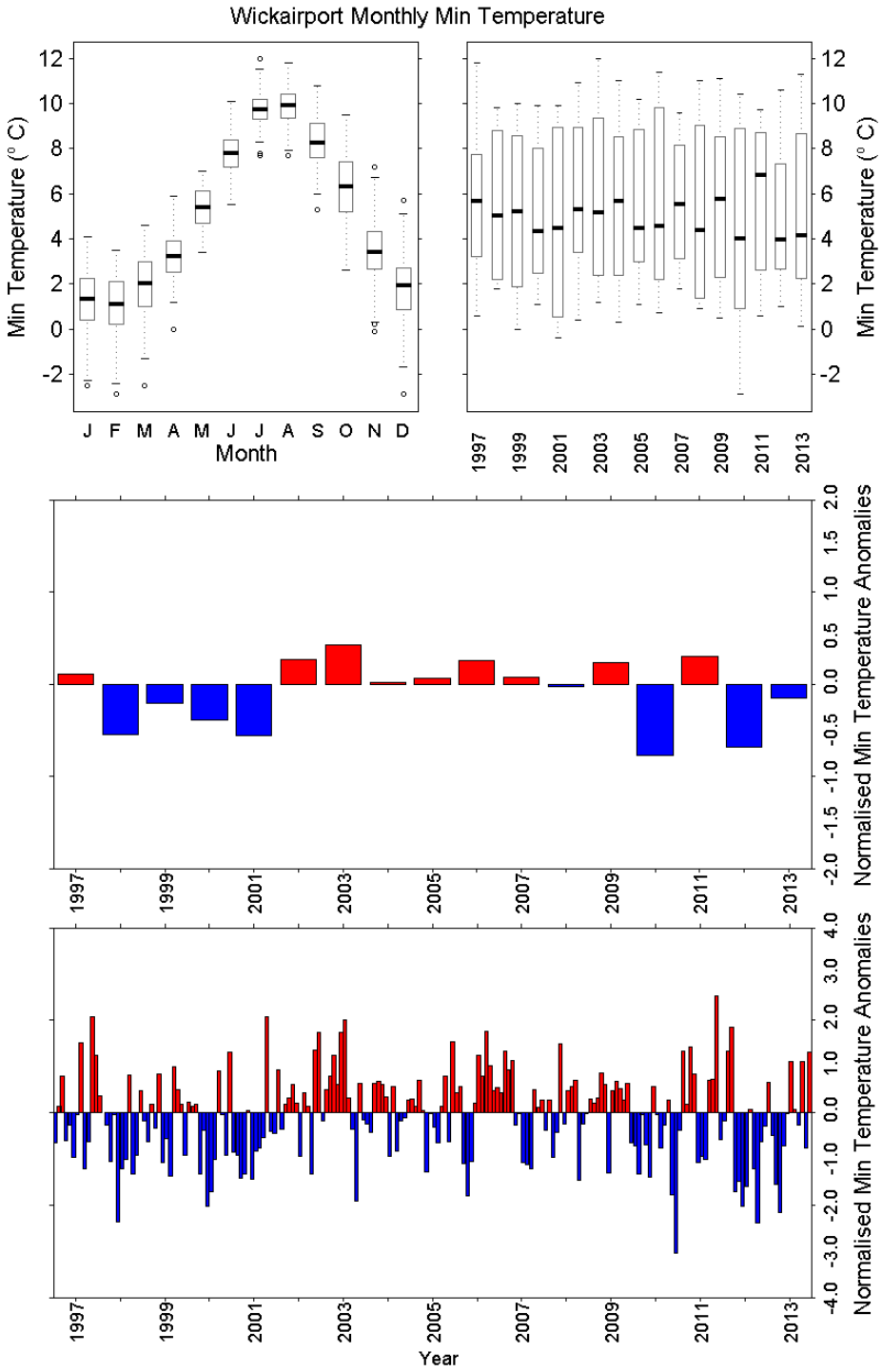

Figure E6.1 Monthly Minimum Air Temperature (°C) data from the meteorological station at Wick. a) Monthly boxplot of minimum air temperature data. b) Annual boxplot of minimum air temperature data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries. There were no data available in February 1998.

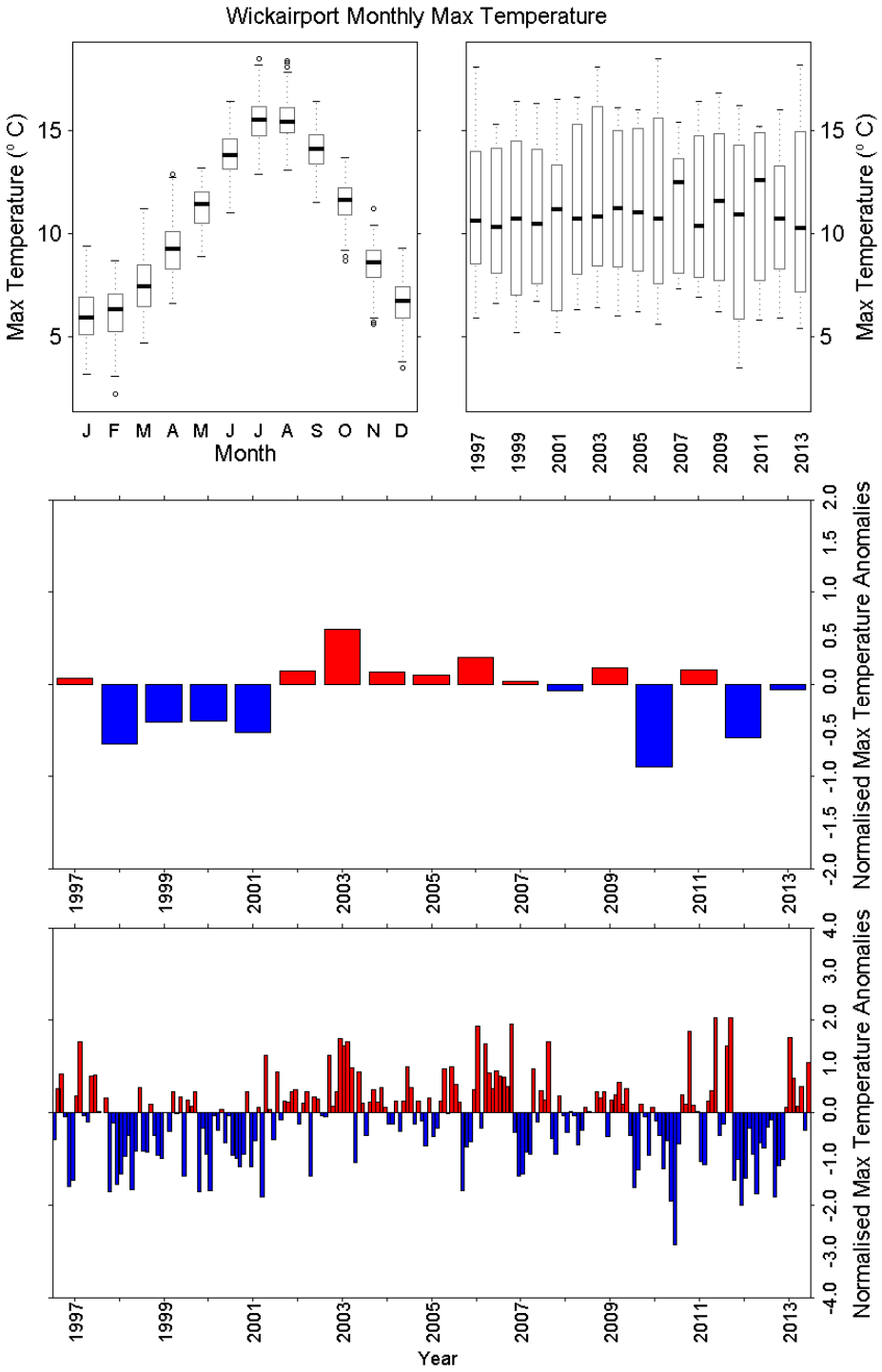

Figure E6.2 Monthly Maximum Air Temperature (°C) data from the meteorological station at Wick. a) Monthly boxplot of maximum air temperature data. b) Annual boxplot of maximum air temperature data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries. There were no data available in February 1998.

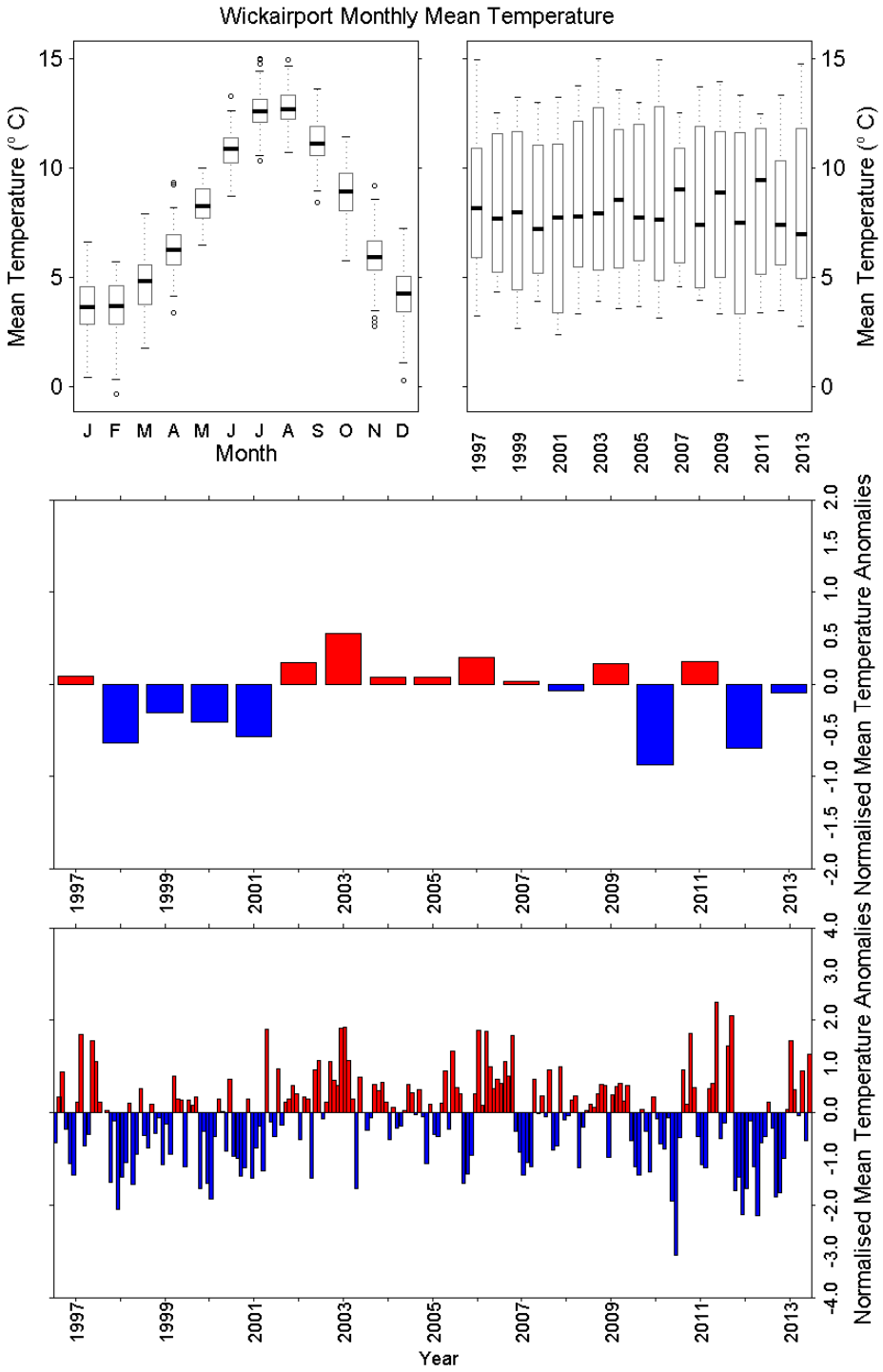

Figure E6.3 Monthly Mean Air Temperature (°C) data from the meteorological station at Wick. a) Monthly boxplot of mean air temperature data. b) Annual boxplot of mean air temperature data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries. There were no data available in February 1998.

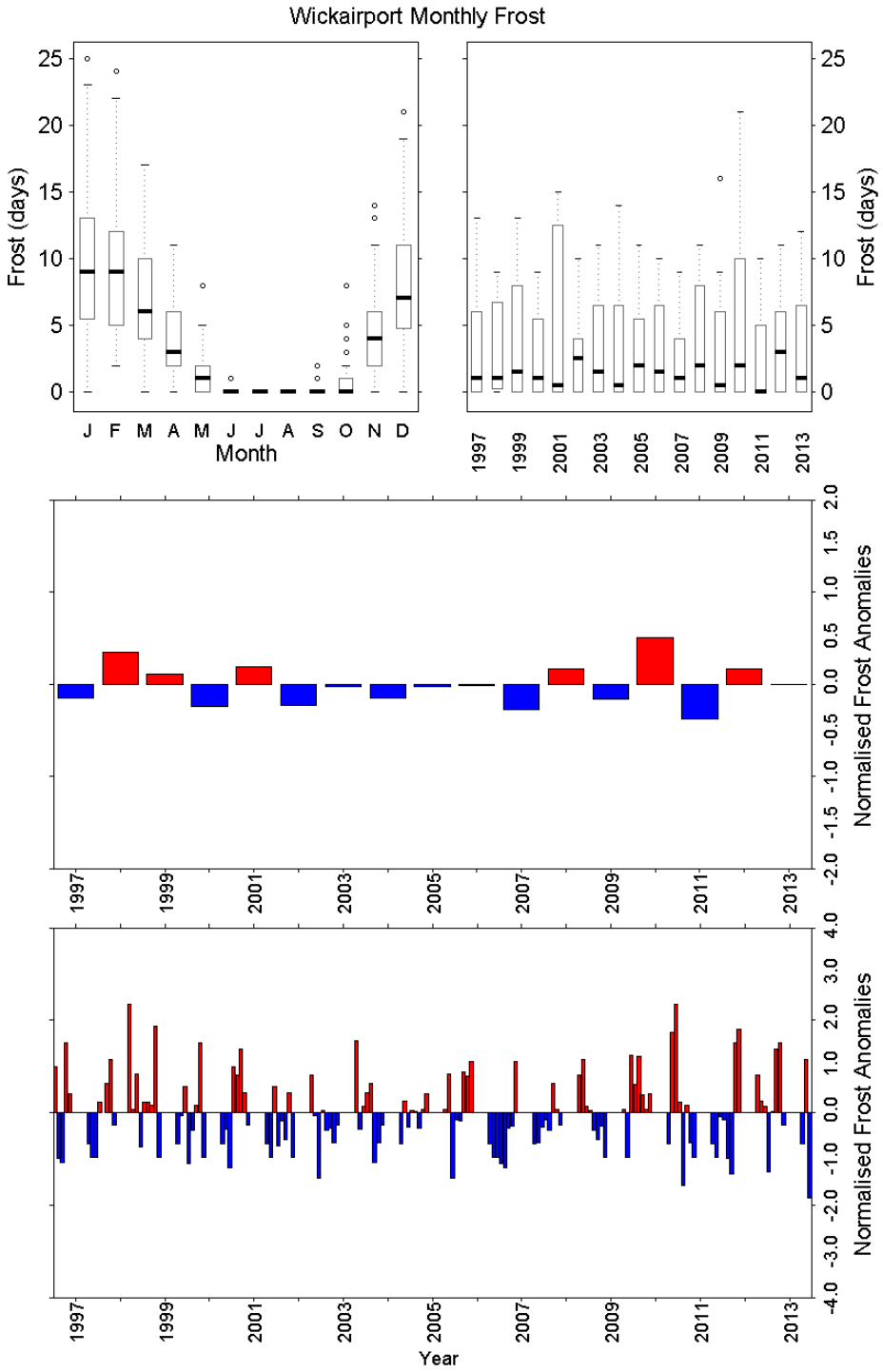

Figure E6.4 Monthly Days of Frost from the meteorological station at Wick. a) Monthly boxplot of frost data. b) Annual boxplot of frost data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries. There were no data available in February 1998.

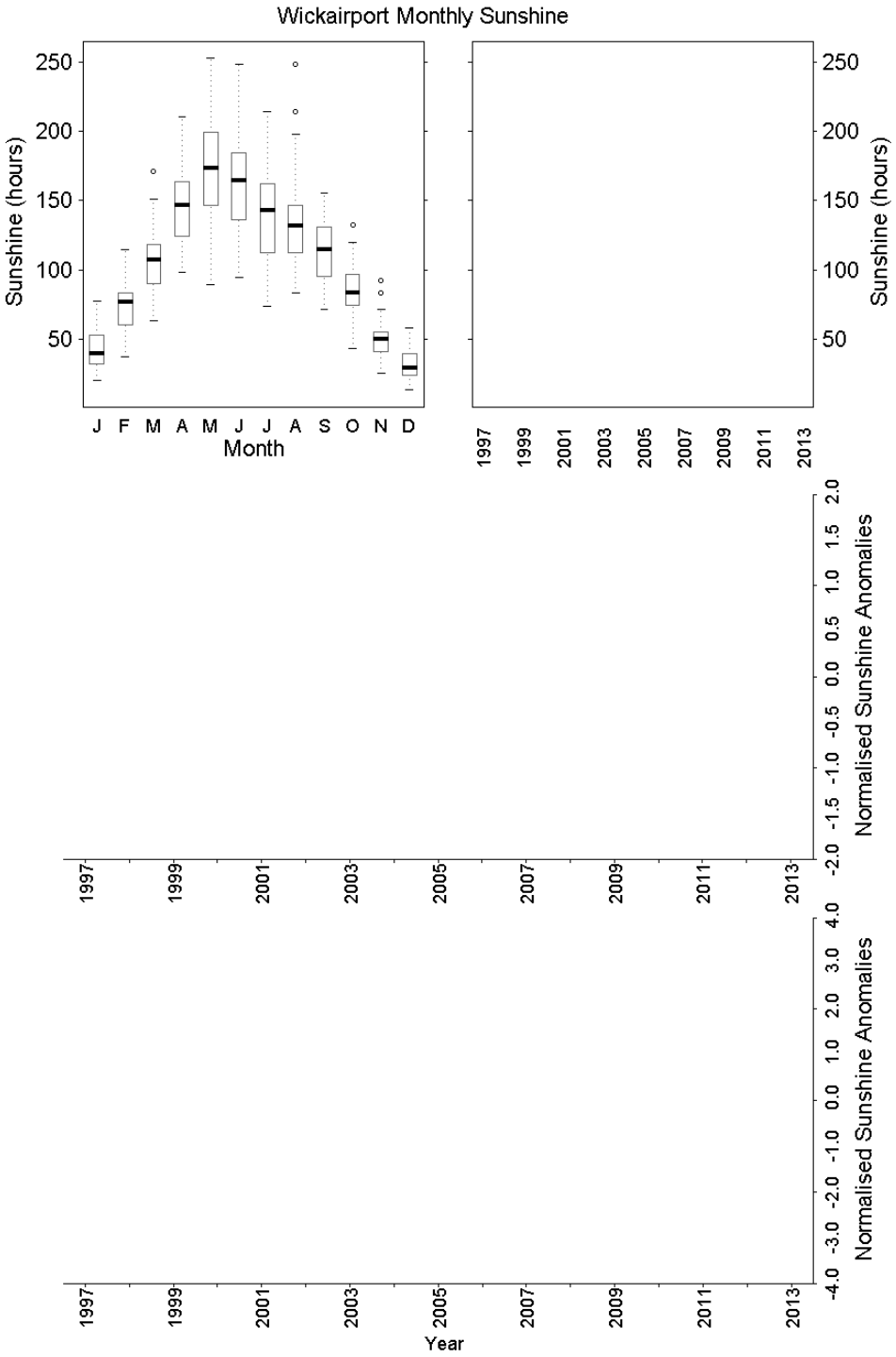

Figure E6.5 Monthly Sunshine hours from the meteorological station at Wick. a) Monthly boxplot of sea surface temperature data. b) Annual boxplot of sea surface temperature data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries.

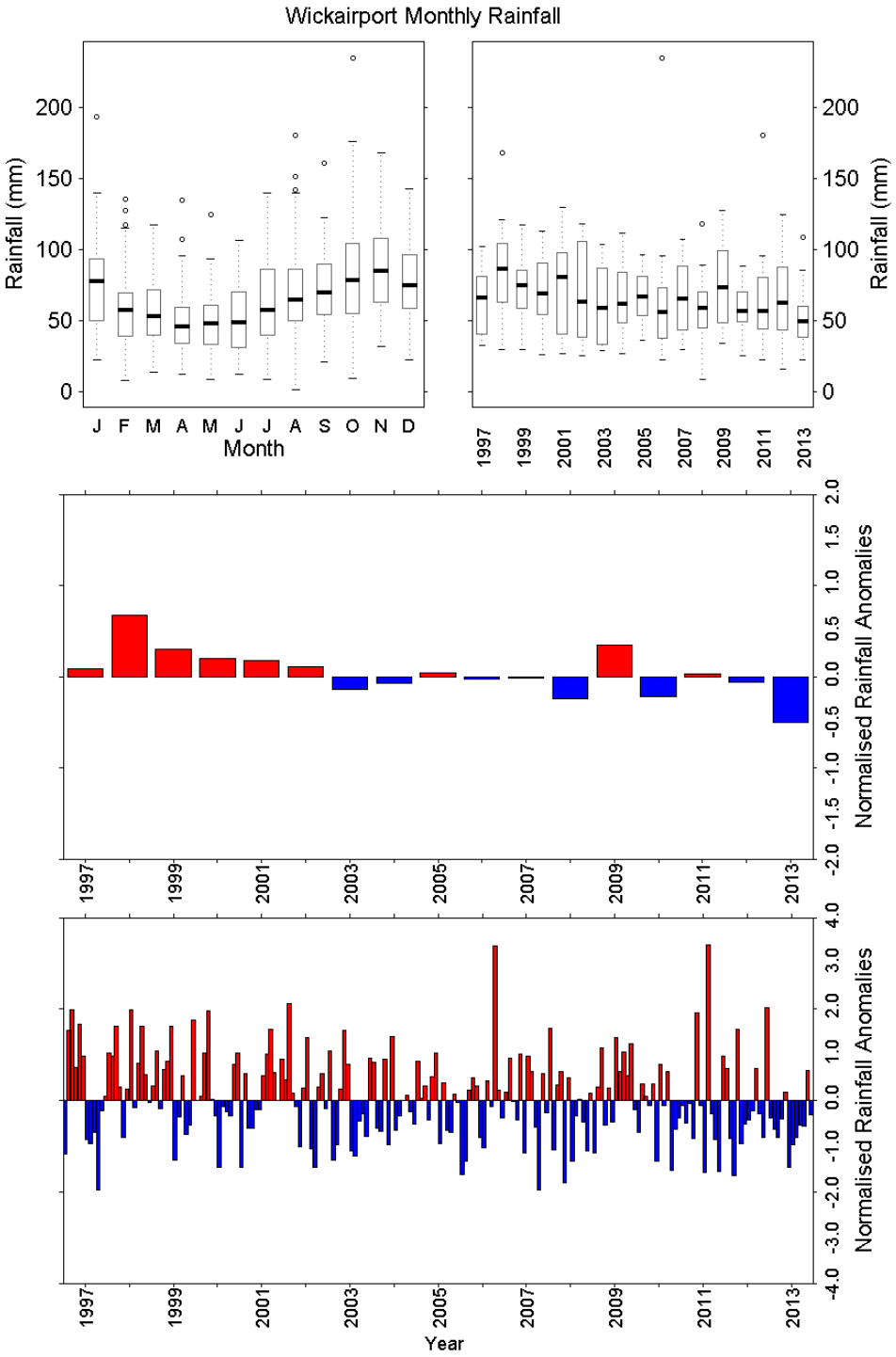

Figure E6.6 Rainfall totals from the meteorological station at Wick. a) Monthly boxplot of rainfall data. b) Annual boxplot of rainfall data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries.

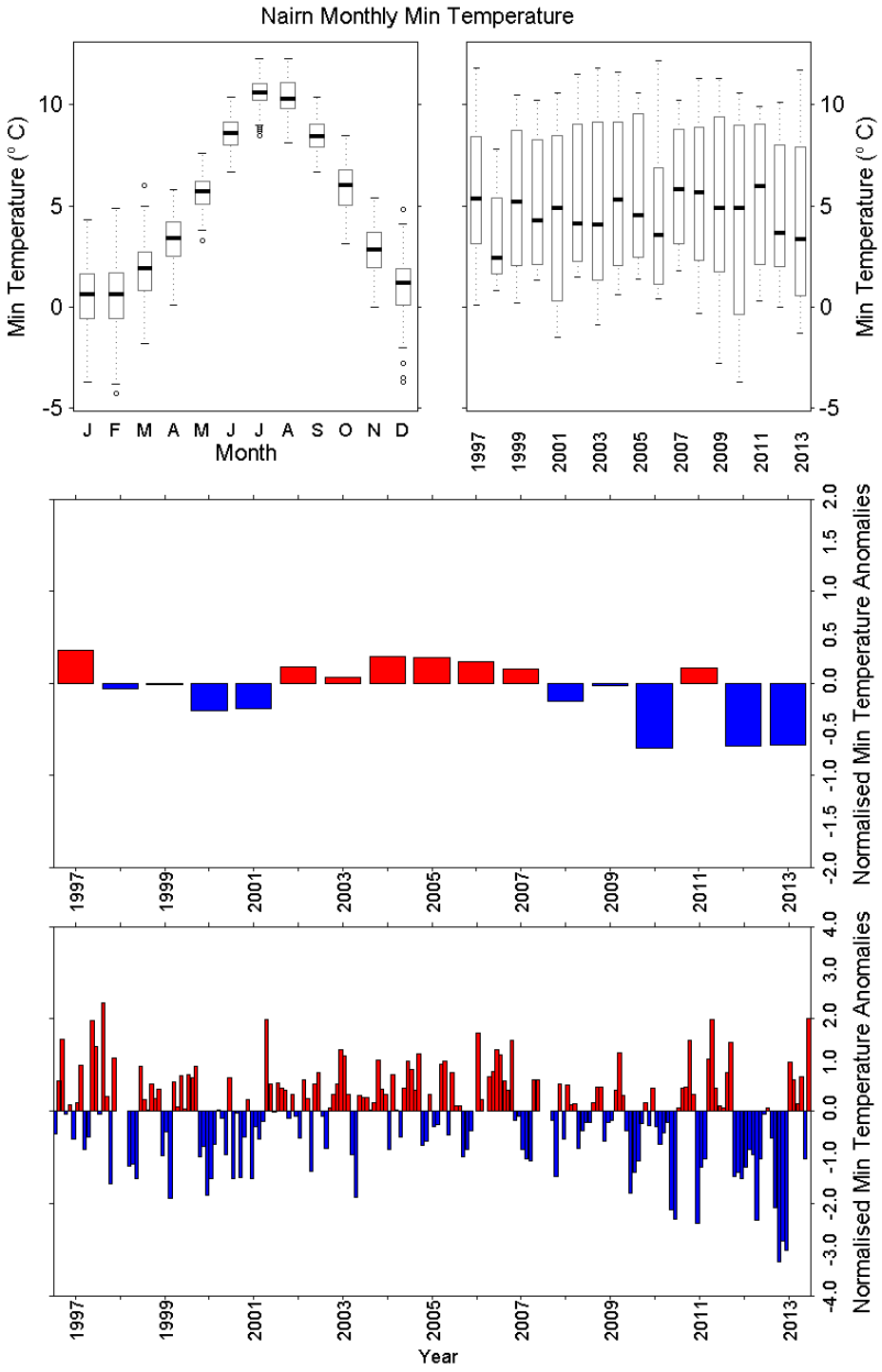

Figure E7.1Monthly Minimum Air Temperature (°C) data from the meteorological station at Nairn. a) Monthly boxplot of minimum air temperature data. b) Annual boxplot of minimum air temperature data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries. There were no data available June-August 1998, June 2006, September 2006, December 2007, January and February 2008.

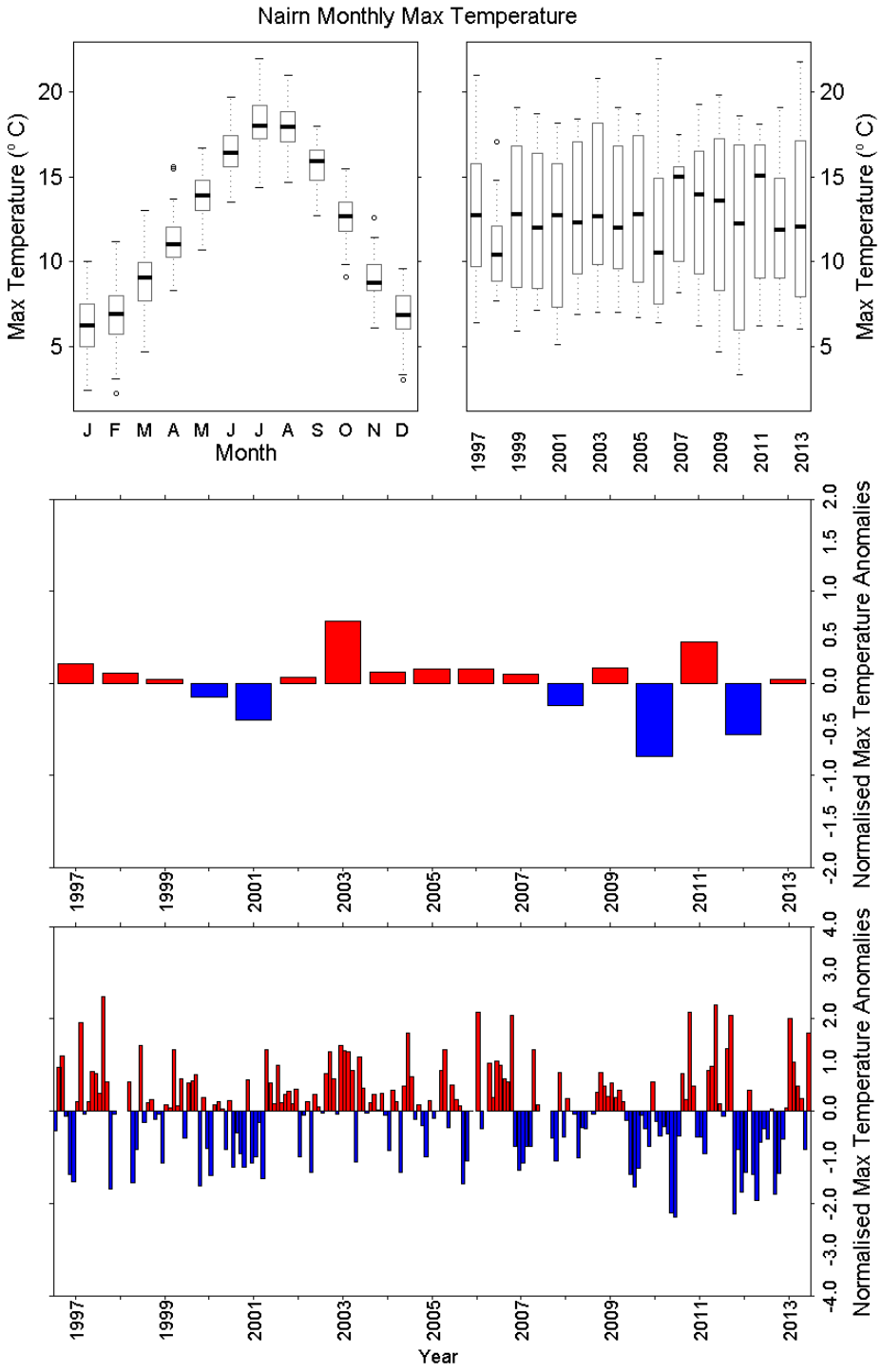

Figure E7.2 Monthly Maximum Air Temperature (°C) data from the meteorological station at Nairn. a) Monthly boxplot of maximum air temperature data. b) Annual boxplot of maximum air temperature data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries. There were no data available in June, July or August 1998, June or September 2006, December 2007, January or February 2008.

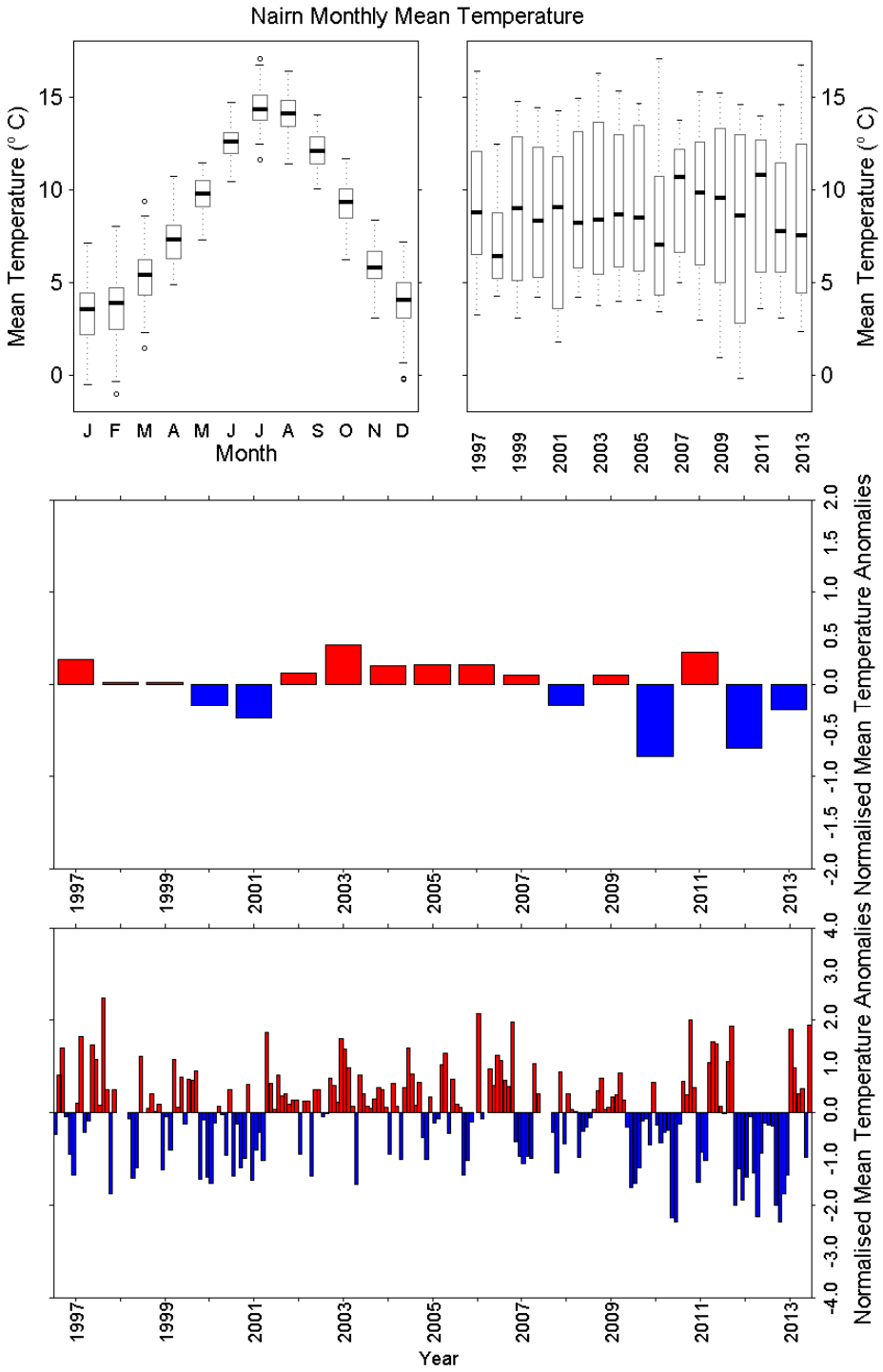

Figure E7.3 Monthly Mean Air Temperature (°C) data from the meteorological station at Nairn. a) Monthly boxplot of mean air temperature data. b) Annual boxplot of mean air temperature data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries. There were no data available in June, July or August 1998, June 2006, September 2006, December 2007, January or February 2008.

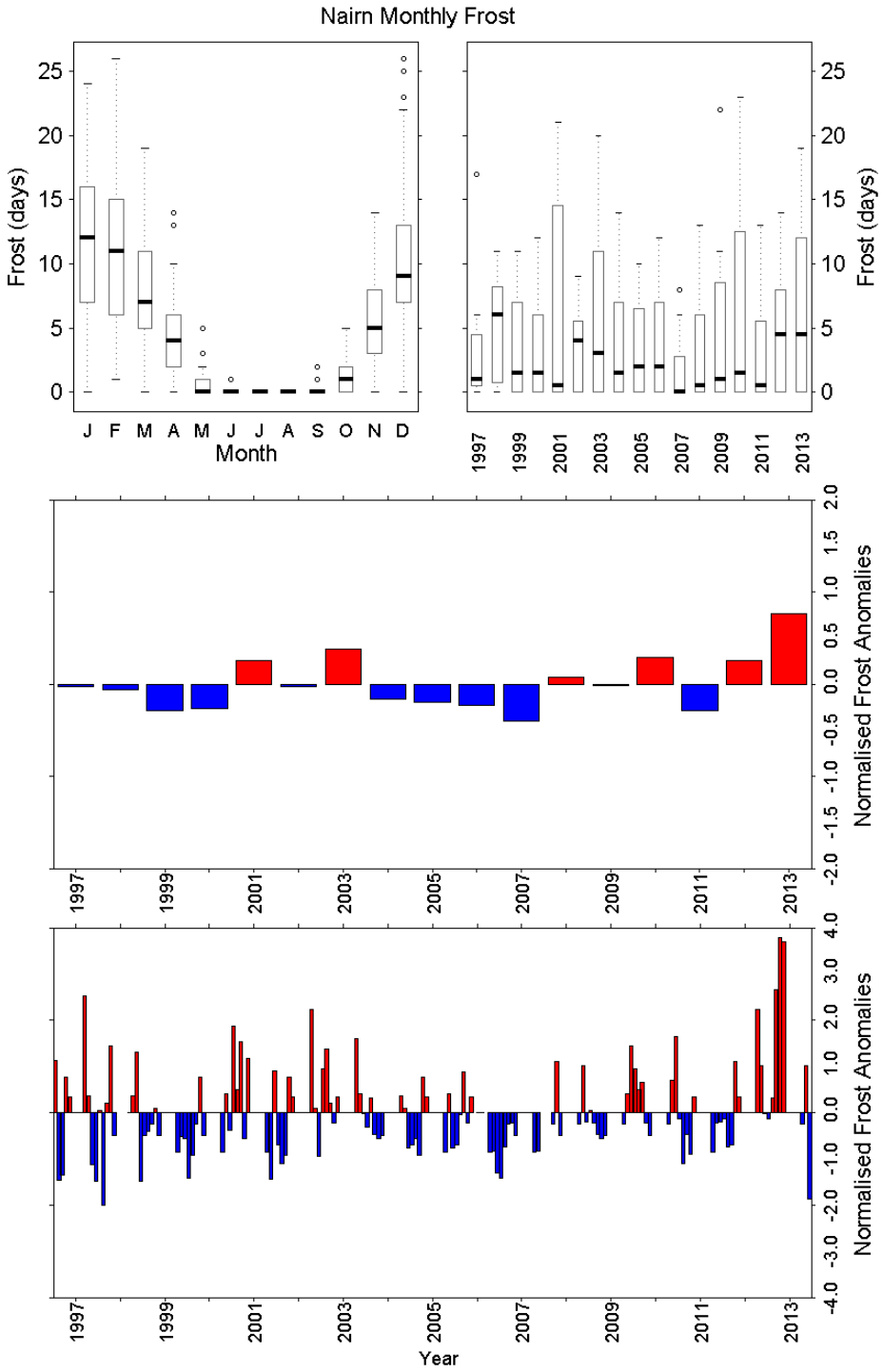

Figure E7.4 Monthly Days of Frost from the meteorological station at Nairn. a) Monthly boxplot of frost data. b) Annual boxplot of frost data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries. There were no data available in June, July or August 1998, June or September 2006, December 2007, January or February 2008.

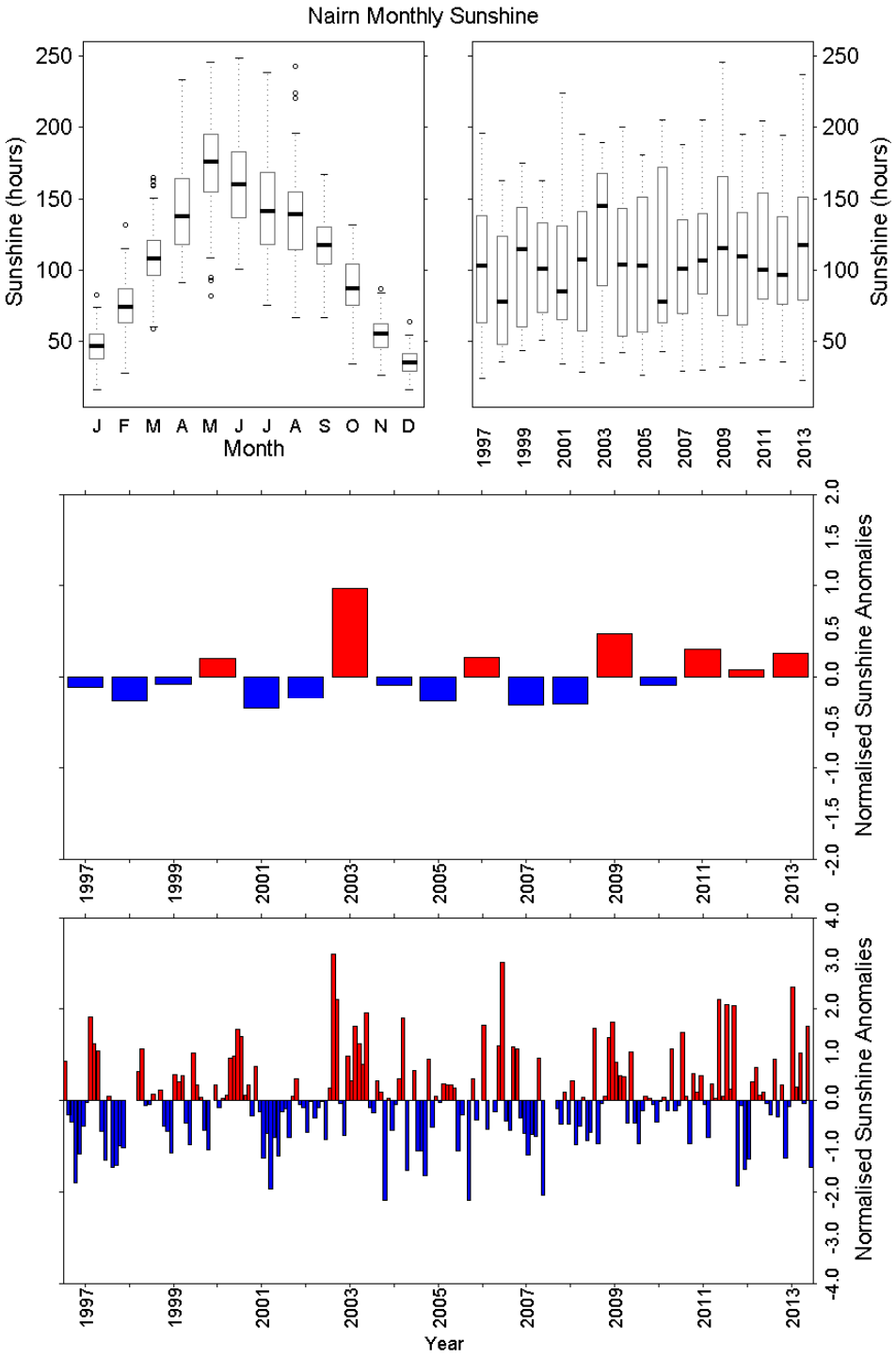

Figure E7.5 Monthly Sunshine hours from the meteorological station at Nairn. a) Monthly boxplot of sea surface temperature data. b) Annual boxplot of sea surface temperature data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries. There were no data available in June, or July or August 1998, May 2000, February 2006, June 2006, September 2006, December 2007, January or February 2008.

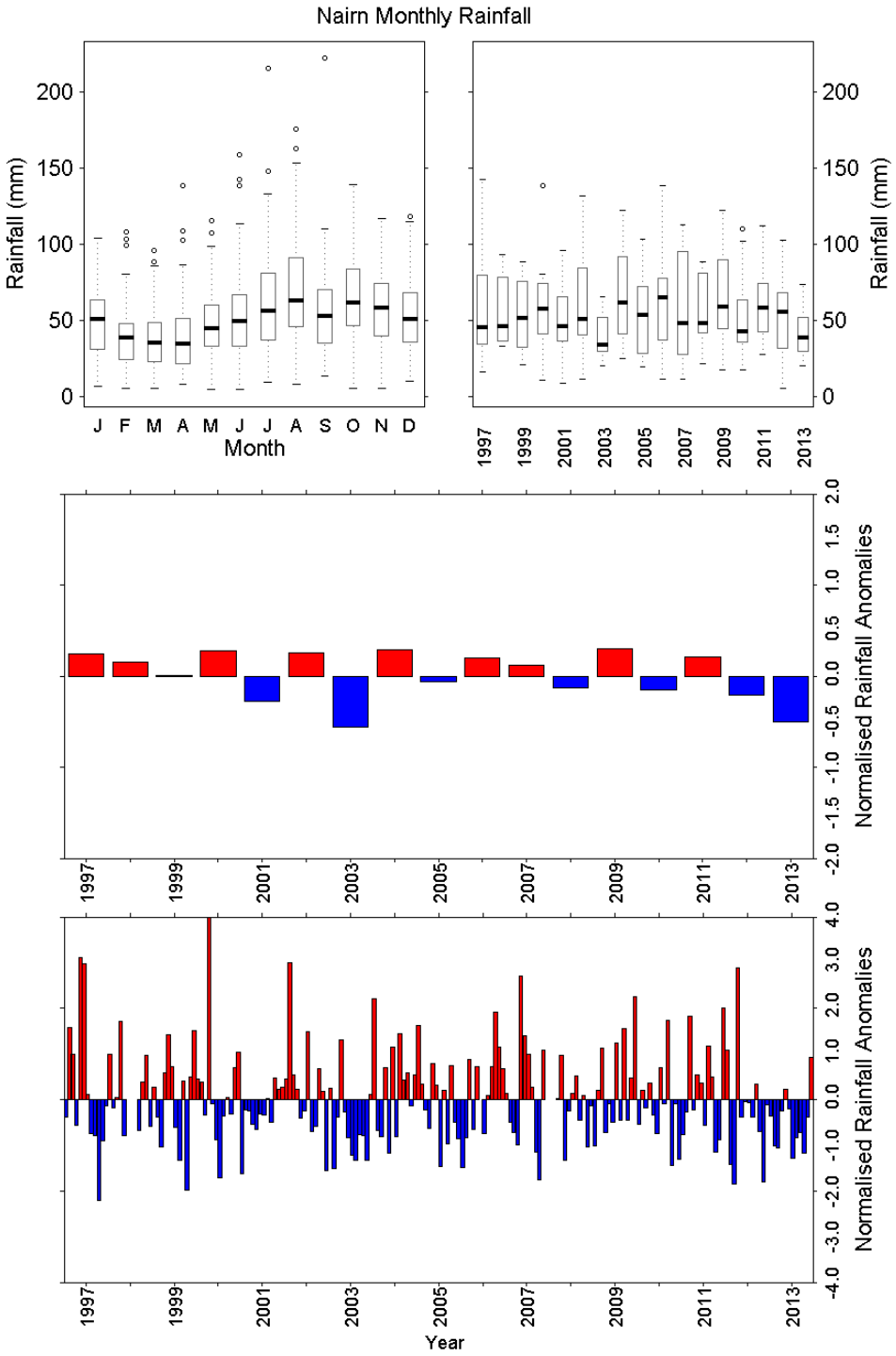

Figure E7.6 Rainfall totals from the meteorological station at Nairn. a) Monthly boxplot of rainfall data. b) Annual boxplot of rainfall data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries. There were no data available in June, July or August 1998, June 2006, December 2007, January or February 2008.

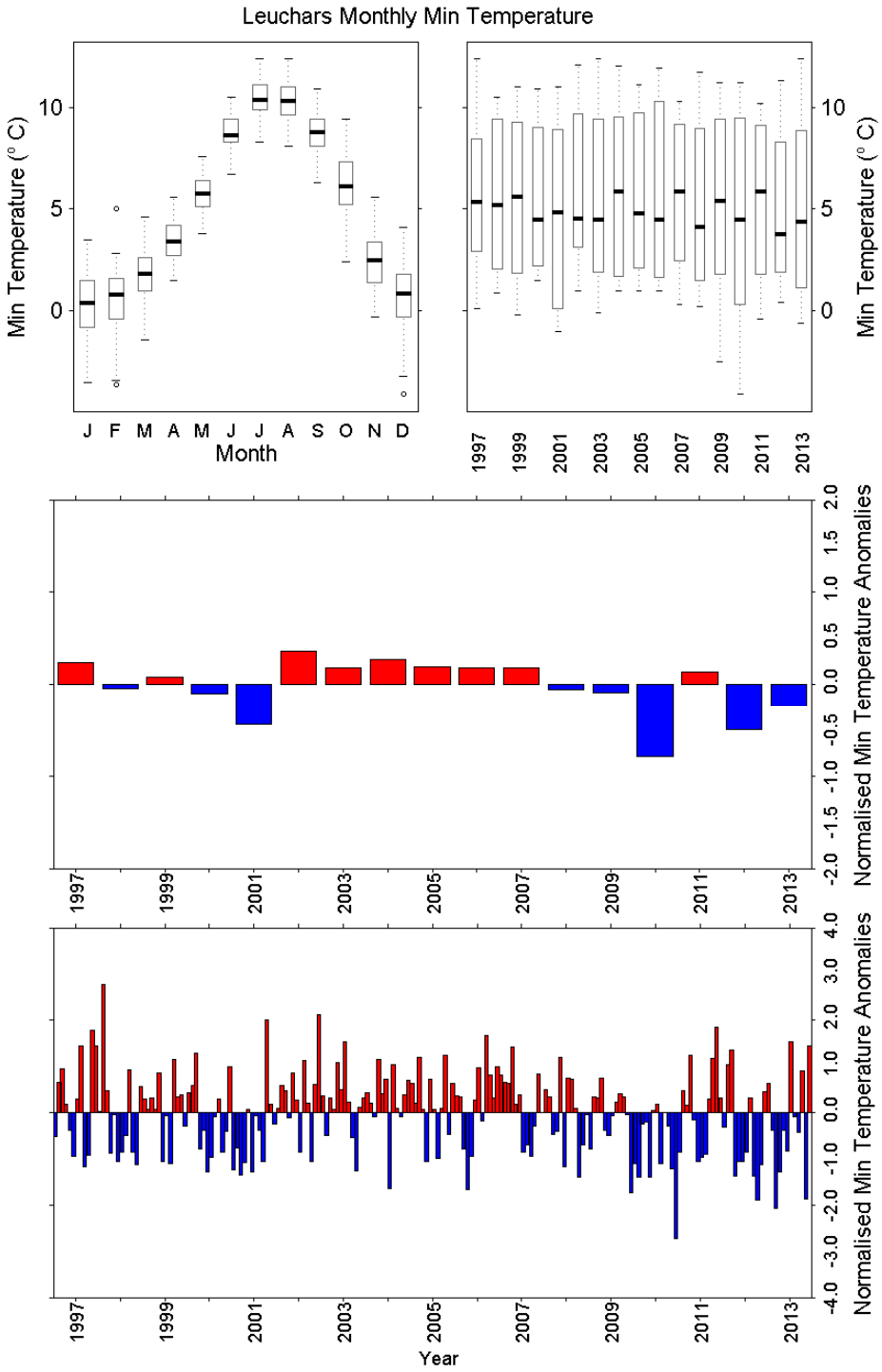

Figure E8.1 Monthly Minimum Air Temperature (°C) data from the meteorological station at Leuchars. a) Monthly boxplot of minimum air temperature data. b) Annual boxplot of minimum air temperature data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries.

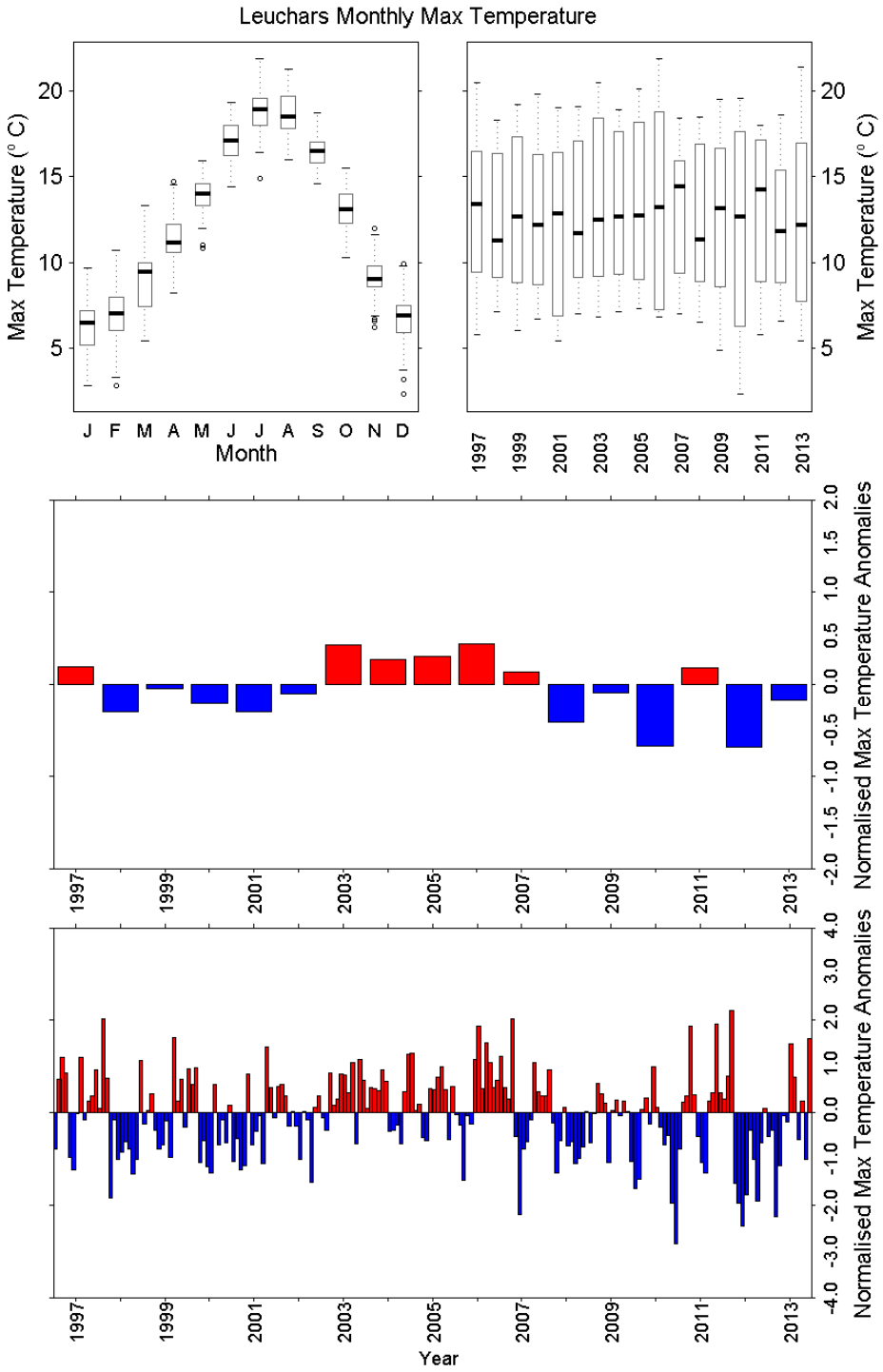

Figure E8.2 Monthly Maximum Air Temperature (°C) data from the meteorological station at Leuchars. a) Monthly boxplot of maximum air temperature data. b) Annual boxplot of maximum air temperature data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries.

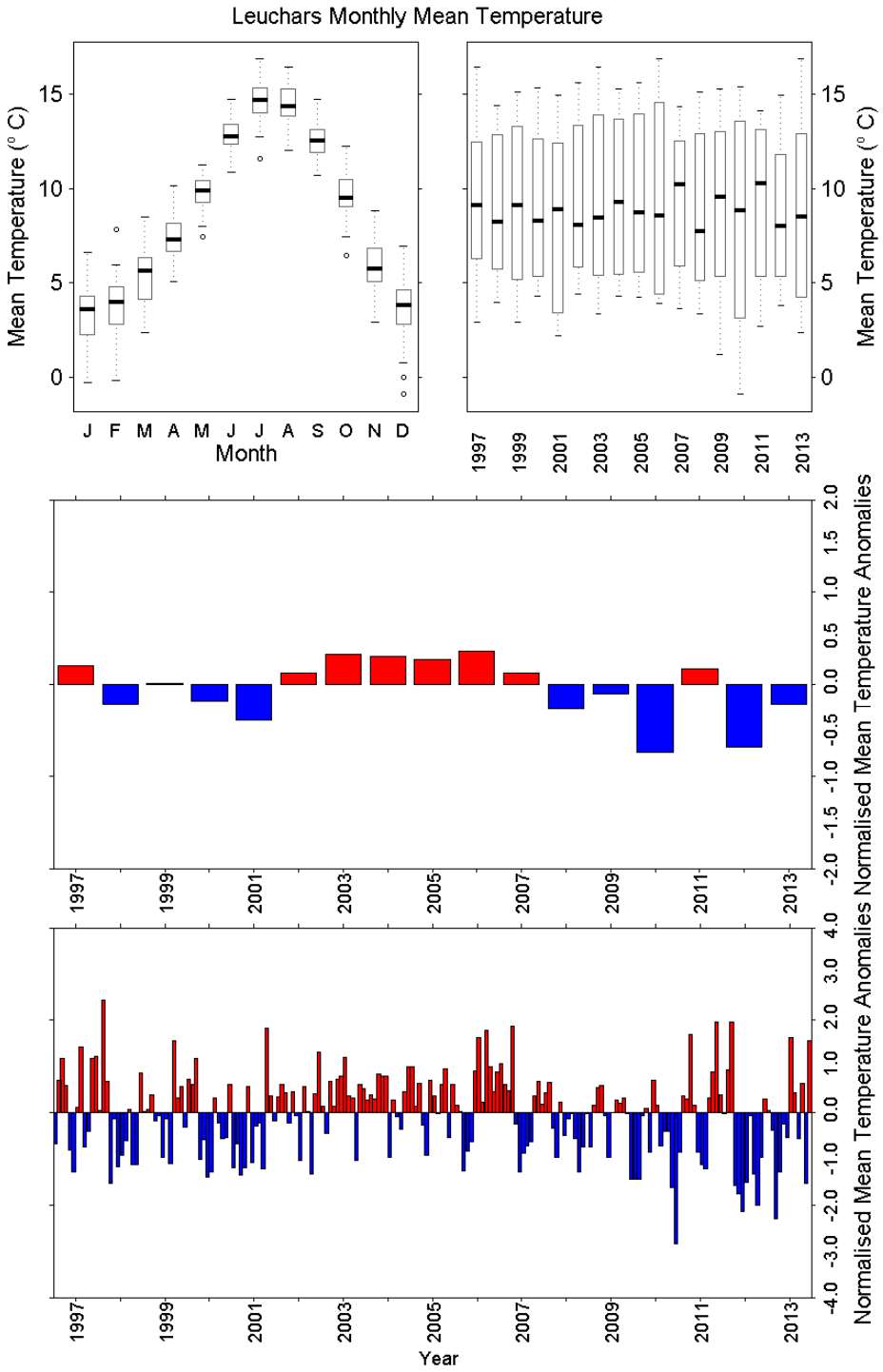

Figure E8.3Monthly Mean Air Temperature (°C) data from the meteorological station at Leuchars. a) Monthly boxplot of mean air temperature data. b) Annual boxplot of mean air temperature data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries.

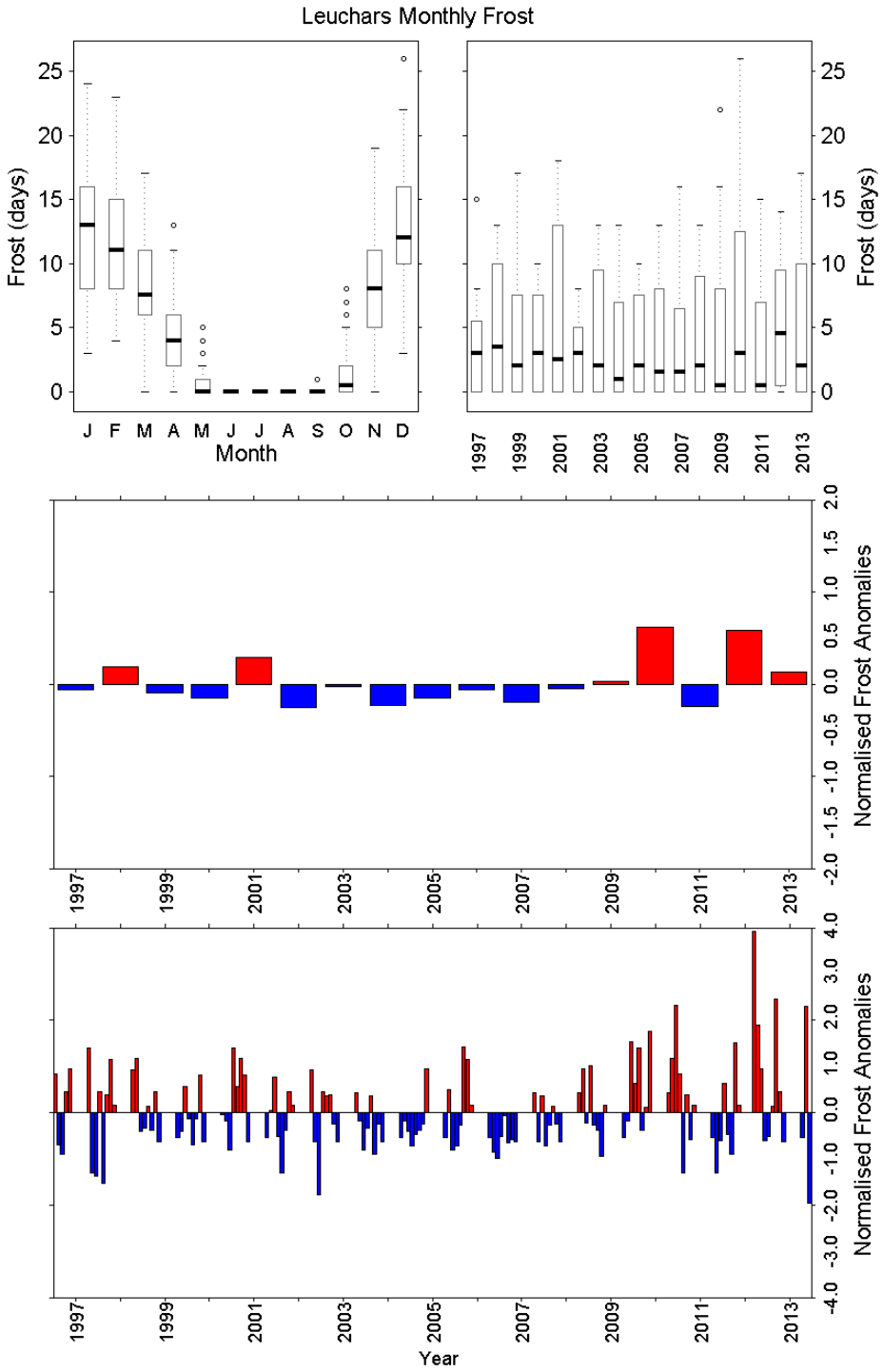

Figure E8.4 Monthly Days of Frost from the meteorological station at Leuchars. a) Monthly boxplot of frost data. b) Annual boxplot of frost data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries.

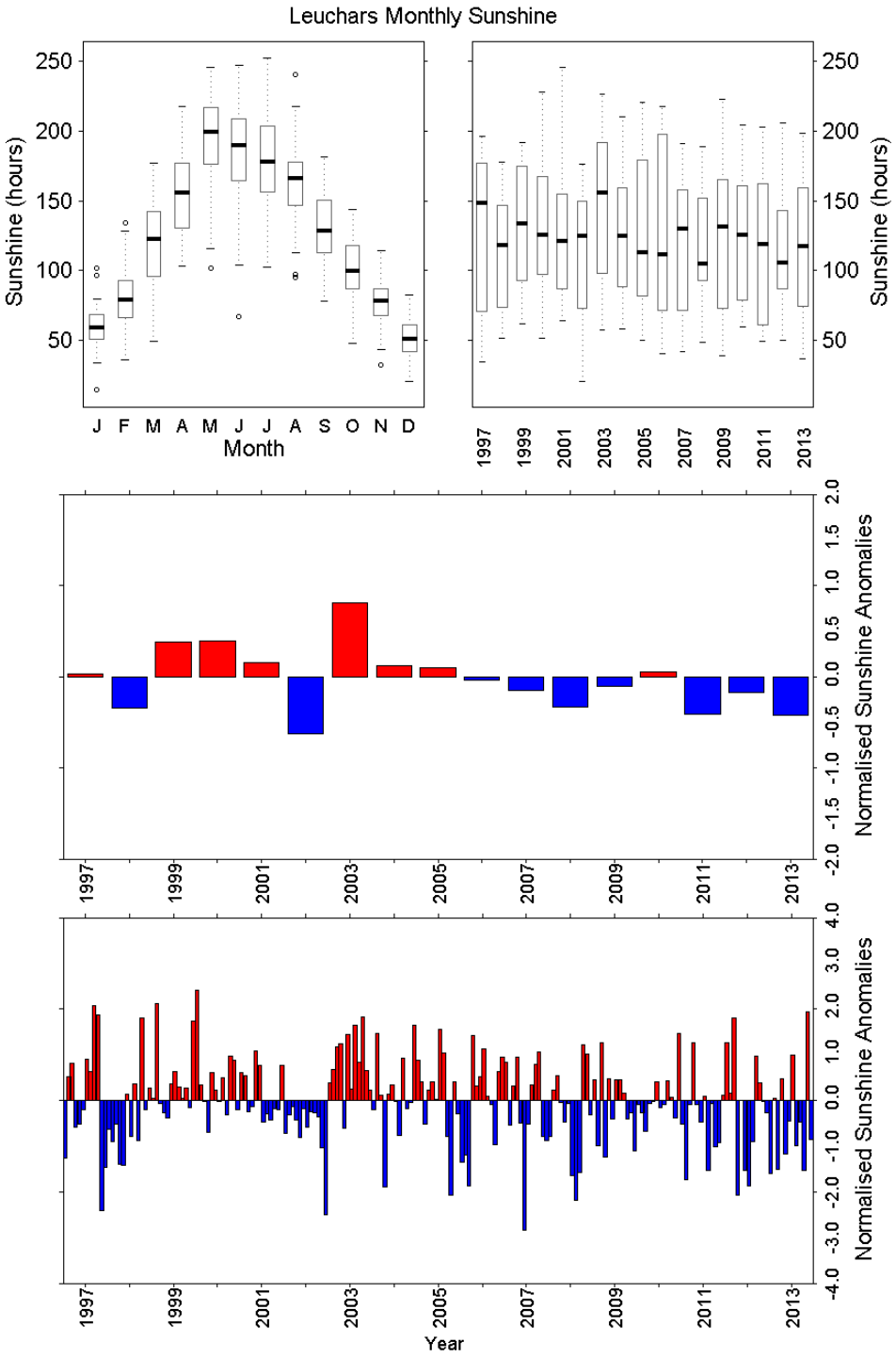

Figure E8.5 Monthly Sunshine hours from the meteorological station at Leuchars. a) Monthly boxplot of sea surface temperature data. b) Annual boxplot of sea surface temperature data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries.

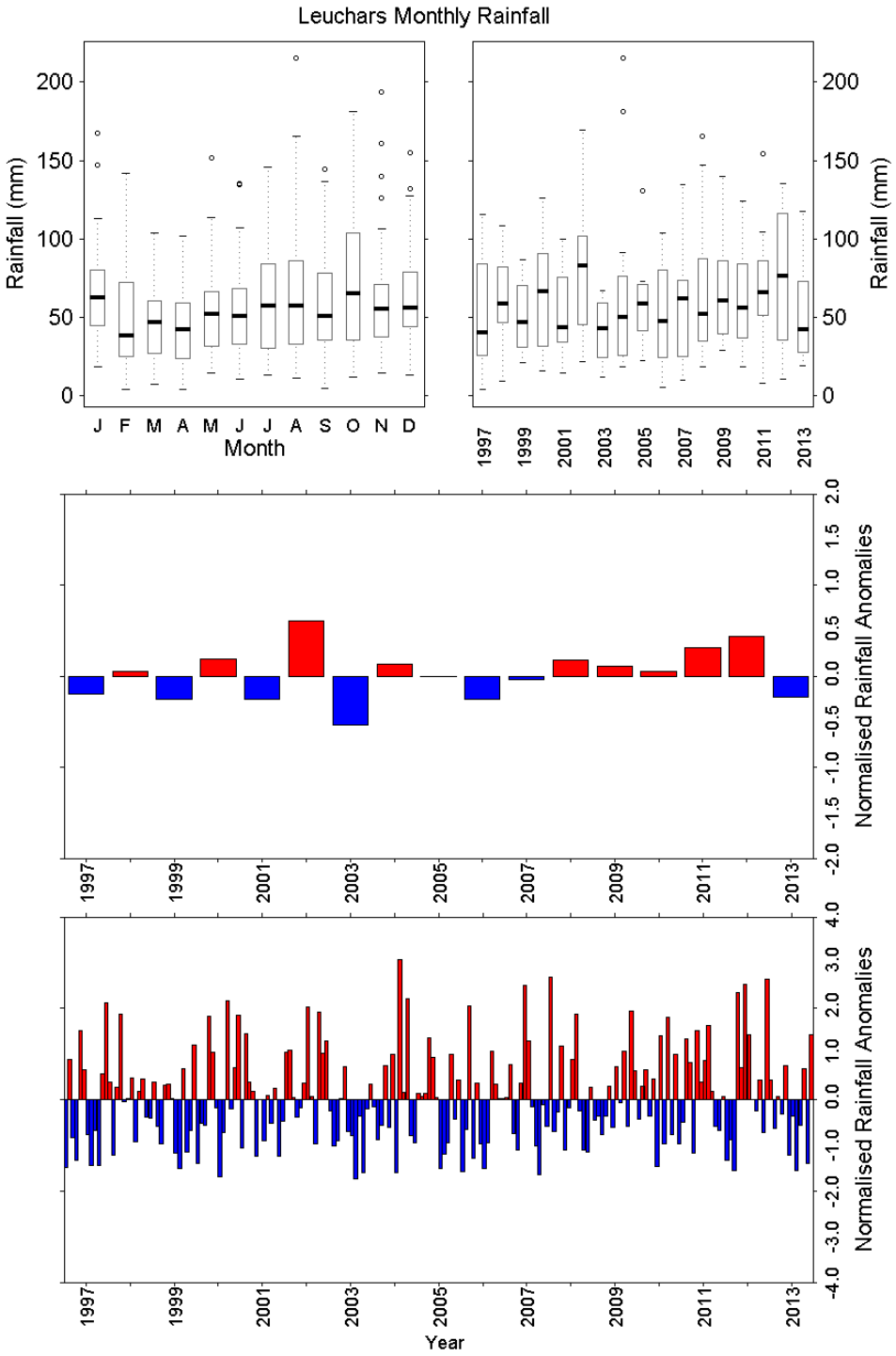

Figure E8.6 Rainfall totals from the meteorological station at Leuchars. a) Monthly boxplot of rainfall data. b) Annual boxplot of rainfall data. c) Annual mean anomaly timeseries d) Monthly mean anomaly timeseries.

6. Appendix F: Phytoplankton Species List

Genus	Species/Group	Size (um) when used	Life form type
Asteromphalus	species		Diatom
Achnanthes	longipes		Diatom
Bacillaria	paxillifera		Diatom
Ceratoneis/Nitzschia	closterium/longissima		Diatom
Cylindrotheca	gracilis		Diatom
Fragilariopsis	species		Diatom
Licmophora	species		Diatom
Pseudo-nitzschia sp	species		Diatom
Pseudo-Nitzschia	species	(≤4.9µm)	Diatom
Pseudo-Nitzschia	species	(≥5µm)	Diatom
Attheya	species		Diatom
Bacteriastrum	species		Diatom
Chaetoceros	species		Diatom
Chaetoceros	Phaeroceros		Diatom
Chaetoceros	Hyalochaetae		Diatom
Chaetoceros cf. socialis colonies		(≤399µm)	Diatom
Chaetoceros cf. socialis colonies		(≥400µm)	Diatom
Corethron	pennatum		Diatom
Coscinodiscus	species		Diatom
Coscinodiscus	species	<20µm	Diatom
Coscinodiscus	species	20-50µm	Diatom
Coscinodiscus	species	>50µm	Diatom
Actinoptychus	spp		Diatom
Fragilaria	species		Diatom
Grammatophora	marina		Diatom
Asterionella	formosa		Diatom
Asterionellopsis	glacialis		Diatom
Asteroplanus	karianus		Diatom
Cerataulina	pelagica		Diatom
Eucampia	cornuta		Diatom
Eucampia	groenlandica		Diatom
Eucampia	zodiacus		Diatom
Hemiaulus	species		Diatom
Helicotheca	tamesis		Diatom
Leptocylindrus	cf. danicus		Diatom
Leptocylindrus	mediterraneus		Diatom
Leptocylindrus	cf. minimus		Diatom
Bellerochea	species		Diatom
Ditylum	brightwellii		Diatom
Lithodesmium	undulatum		Diatom
Podosira	stelligera		Diatom
Melosira	species		Diatom

Stephanopyxis	species		Diatom
Stephanopyxis	turris		Diatom
Navicula	species		Diatom
Navicula	species	<20µm	Diatom
Navicula	species	20 - 50µm	Diatom
Navicula	species	> 50µm	Diatom
Meuniera	membranacea		Diatom
Gyrosigma/Pleurosigma	species		Diatom
Lennoxia	species		Diatom
Striatella	unipunctata		Diatom
Paralia	sulcata		Diatom
Dactyliosolen	fragilissimus		Diatom
Dactyliosolen	antarcticus		Diatom
Guinardia	cylindrus		Diatom
Guinardia	delicatula		Diatom
Guinardia	flaccida		Diatom
Guinardia	striata		Diatom
Proboscia	alata		Diatom
Pseudosolenia	calcar-avis		Diatom
Neocalyptrella	robusta		Diatom
Rhizosolenia	species		Diatom
Rhizosolenia	species	0-10µm	Diatom
Rhizosolenia	species	10-20µm	Diatom
Rhizosolenia	species	>20µm	Diatom
Rhizosolenia	borealis		Diatom
Rhizosolenia	setigera f. pungens		Diatom
Rhizosolenia	setigera		Diatom
Rhizosolenia	styliformis		Diatom
Rhizosolenia	hebetata		Diatom
Rhizosolenia	imbricata		Diatom
Mediopyxis	helysia		Diatom
Thalassionema	species		Diatom
Thalassionema	nitzschioides		Diatom
Lauderia	annulata		Diatom
Detonula	confervacaea		Diatom
Detonula	pumila		Diatom
Skeletonema	species		Diatom
Planktoniella	sol		Diatom
Thalassiosira sp	species		Diatom
Thalassiosira	species	<10µm	Diatom
Thalassiosira	species	10-50µm	Diatom
Thalassiosira	species	>50µm	Diatom
Odontella	species		Diatom
Triceratium sp			Diatom
Trigonium	alternans		Diatom
Indet. araphiated pennate	species		Diatom

Indet. araphiated pennate	species	<20µm	Diatom
Indet. araphiated pennate	species	20-50µm	Diatom
Indet. araphiated pennate	species	>50µm	Diatom
Indet. raphiated pennate	species		Diatom
Indet. raphiated pennate	species	<20µm	Diatom
Indet. raphiated pennate	species	20-50µm	Diatom
Indet. raphiated pennate	species	>50µm	Diatom
Indet. centric	species		Diatom
Indet. centric	species	<20µm	Diatom
Indet. centric	species	20-50µm	Diatom
Indet. centric	species	>50µm	Diatom
Indet. chain diatom	ribbons		Diatom
Other diatoms			Diatom
Dinophysis	species		Dinoflagellate
Dinophysis	species	<20µm	Dinoflagellate
Dinophysis	species	20-50µm	Dinoflagellate
Dinophysis	species	>50µm	Dinoflagellate
Dinophysis	acuminata		Dinoflagellate
Dinophysis	acuminata/norvegica complex		Dinoflagellate
Dinophysis	acuta		Dinoflagellate
Dinophysis	caudata		Dinoflagellate
Dinophysis	dens		Dinoflagellate
Dinophysis	fortii		Dinoflagellate
Dinophysis	hastata		Dinoflagellate
Dinophysis	nasuta		Dinoflagellate
Dinophysis	norvegica		Dinoflagellate
Dinophysis	odiosa		Dinoflagellate
Dinophysis	ovum		Dinoflagellate
Dinophysis	pulchella		Dinoflagellate
Dinophysis	punctata		Dinoflagellate
Phalacroma	rotundatum		Dinoflagellate
Dinophysis	sacculus		Dinoflagellate
Dinophysis	skagii		Dinoflagellate
Dinophysis	tripos		Dinoflagellate
Sinophysis	species		Dinoflagellate
Coolia	species		Dinoflagellate
Alexandrium	species		Dinoflagellate
Alexandrium	species	<20µm	Dinoflagellate
Alexandrium	species	20-50µm	Dinoflagellate
Alexandrium	species	>50µm	Dinoflagellate
Amylax	buxus		Dinoflagellate
Amylax	triacantha		Dinoflagellate
Gonyaulax	species		Dinoflagellate
Gonyaulax	species	<20µm	Dinoflagellate
Gonyaulax	species	20-50µm	Dinoflagellate

Gonyaulax	species	>50µm	Dinoflagellate
Gonyaulax	spinifera		Dinoflagellate
Gonyaulax	verior		Dinoflagellate
Gonyaulax	grindleyi		Dinoflagellate
Lingulodinium	polyedrum		Dinoflagellate
Oxytoxum	species		Dinoflagellate
Pyrocystis	species		Dinoflagellate
Dissodinium	species		Dinoflagellate
Amphidinium	species		Dinoflagellate
Amphidinium	cartarae		Dinoflagellate
Cochlodinium	species		Dinoflagellate
Gymnodinium	species		Dinoflagellate
Gymnodinium	species	<20µm	Dinoflagellate
Gymnodinium	species	20-50µm	Dinoflagellate
Gymnodinium	species	>50µm	Dinoflagellate
Karenia	mikimotoi		Dinoflagellate
Akashiwo	sanguinea		Dinoflagellate
Gyrodinium	species		Dinoflagellate
Gyrodinium	species	<20µm	Dinoflagellate
Gyrodinium	species	20-50µm	Dinoflagellate
Gyrodinium	species	>50µm	Dinoflagellate
Katodinium	species		Dinoflagellate
Torodinium	robustum		Dinoflagellate
Polykrikos	species		Dinoflagellate
Oxyrrhis	marina		Dinoflagellate
Noctilucales			Dinoflagellate
Noctiluca	scintillans		Dinoflagellate
Pronoctiluca	species		Dinoflagellate
Pronoctiluca	pelagica		Dinoflagellate
Spatulodinium	pseudonoctiluca		Dinoflagellate
Kofoidinium	species		Dinoflagellate
Scrippsiella/Pentapharsodinium	species		Dinoflagellate
Tripos	species		Dinoflagellate
Tripos	species	<20µm	Dinoflagellate
Tripos	species	20-50µm	Dinoflagellate
Tripos	species	>50µm	Dinoflagellate
Tripos	tripos		Dinoflagellate
Tripos	arietinum		Dinoflagellate
Tripos	azoricum		Dinoflagellate
Tripos	hexacanthum		Dinoflagellate
Tripos	setaceum		Dinoflagellate
Tripos	furca		Dinoflagellate
Tripos	fusus		Dinoflagellate
Tripos	macroceros		Dinoflagellate
Tripos	minutum		Dinoflagellate
Tripos	horridum		Dinoflagellate

Tripos	lineatum		Dinoflagellate
Tripos	longipes		Dinoflagellate
Tripos	platycorne		Dinoflagellate
Tripos	compressum		Dinoflagellate
Heterocapsa	species		Dinoflagellate
Heterocapsa	triquerta		Dinoflagellate
Heterocapsa minima/Azadinium/Amphidoma.	Species/Group		Dinoflagellate
Diplopsalis	group		Dinoflagellate
Protoperidinium	species		Dinoflagellate
Protoperidinium	species	<20µm	Dinoflagellate
Protoperidinium	species	20-50µm	Dinoflagellate
Protoperidinium	species	>50µm	Dinoflagellate
Protoperdinium	bipes		Dinoflagellate
Peridinium spp.			Dinoflagellate
Peridinium quinquecorne			Dinoflagellate
Kryptoperidinium	foliaceum		Dinoflagellate
Prorocentrum	species		Dinoflagellate
Prorocentrum	species	<20µm	Dinoflagellate
Prorocentrum	species	20-50µm	Dinoflagellate
Prorocentrum	species	>50µm	Dinoflagellate
Prorocentrum	lima		Dinoflagellate
Prorocentrum	micans		Dinoflagellate
Prorocentrum	triestinum		Dinoflagellate
Prorocentrum	cordatum/balticum		Dinoflagellate
Indet. armoured dinoflagellate	species		Dinoflagellate
Indet. armoured dinoflagellate	species	<20µm	Dinoflagellate
Indet. armoured dinoflagellate	species	20-50µm	Dinoflagellate
Indet. armoured dinoflagellate	species	>50µm	Dinoflagellate
Indet. naked dinoflagellate	species		Dinoflagellate
Indet. naked dinoflagellate	species	<20µm	Dinoflagellate
Indet. naked dinoflagellate	species	20-50µm	Dinoflagellate
Indet. naked dinoflagellate	species	>50µm	Dinoflagellate
Other dinoflagellates			Dinoflagellate
Phaeocystis	species		Others
Phaeocystis	colonies	(≤399µm)	Others
Phaeocystis	colonies	(≤400µm)	Others
Silicoflagellates indet			Others
Dictyocha	fibula		Others
Dictyocha	speculum		Others
Octactis	octonaria		Others
Desmid indet			Others
Cyanobacteria indet			Others
Pediastrum indet			Others
Coccolithophorid indet			Others
Others	others		Others

Euglenophyceae indet			Others
Microflagellates	species		Others
Crucigenia	species		Others
Dinobyron	species		Others
Scenedesmus	species		Others
Desmodesmus			Others
Tetraedron	species		Others
Pyramimonas	species		Others
Ciliates			Ciliates
Tintinnids			Ciliates
Mesodinium	rubrum		Ciliates

7. Appendix G: Zooplankton Species List

The following tables present the species list used in the community analysis of zooplankton.

AphiaID is a unique identifier from the World Register of Marine Species (http://www.marinespecies.org)

M = male

F = female

C = copepodite stage.

AphiaID	*Taxa name*	Dry Wgt. (mg)	*Family*	*Suborder*	*Order*	*Superorder*	*Infraclass*	*Subclass*	*Class*	*Subphylum*	*Phylum*
152230	Coelenterata	**0.5**									Coelenterata
13551	Anthoathecata	**0.5**			Anthoathecata			Hydroidolina	Hydrozoa		Cnidaria
117117	Hydractinia spp.	**0.05**	Hydractiniidae	Filifera	Anthoathecata			Hydroidolina	Hydrozoa		Cnidaria
117848	Rathkea octopunctata	**0.01**	Rathkeidae	Filifera	Anthoathecata			Hydroidolina	Hydrozoa		Cnidaria
117345	Lizzia blondina	**0.01**	Rathkeidae	Filifera	Anthoathecata			Hydroidolina	Hydrozoa		Cnidaria
117015	Bougainvillia spp.	**0.5**	Bougainvilliidae	Filifera	Anthoathecata			Hydroidolina	Hydrozoa		Cnidaria
117988	Hybocodon prolifer	**0.05**	Tubulariidae	Capitata	Anthoathecata			Hydroidolina	Hydrozoa		Cnidaria
117095	Euphysa spp.	**0.01**	Corymorphidae	Capitata	Anthoathecata			Hydroidolina	Hydrozoa		Cnidaria
117836	Proboscidactyla stellata	**0.5**	Proboscidactylidae	Filifera	Anthoathecata			Hydroidolina	Hydrozoa		Cnidaria
117070	Sarsia spp.	**0.5**	Corynidae	Capitata	Anthoathecata			Hydroidolina	Hydrozoa		Cnidaria
117491	Sarsia tubulosa	**0.5**	Corynidae	Capitata	Anthoathecata			Hydroidolina	Hydrozoa		Cnidaria
117791	Leuckartiara octona	**1**	Pandeidae	Filifera	Anthoathecata			Hydroidolina	Hydrozoa		Cnidaria
117178	Amphinema spp.	**0.5**	Pandeidae	Filifera	Anthoathecata			Hydroidolina	Hydrozoa		Cnidaria
13552	Leptothecata	**0.5**			Leptothecata			Hydroidolina	Hydrozoa		Cnidaria
116998	Aequorea spp.	**3**	Aequoreidae	Conica	Leptothecata			Hydroidolina	Hydrozoa		Cnidaria
117804	Phialella quadrata	**0.3**	Phialellidae	Conica	Leptothecata			Hydroidolina	Hydrozoa		Cnidaria
117515	Eutima gracilis	**0.5**	Eirenidae	Conica	Leptothecata			Hydroidolina	Hydrozoa		Cnidaria
117978	Tiaropsis multicirrata	**0.5**	Tiaropsidae	Conica	Leptothecata			Hydroidolina	Hydrozoa		Cnidaria
117452	Corymorpha nutans	**0.05**	Corymorphidae	Capitata	Anthoathecata			Hydroidolina	Hydrozoa		Cnidaria
117725	Laodicea undulata	**0.5**	Laodiceidae	Conica	Leptothecata			Hydroidolina	Hydrozoa		Cnidaria
594013	Staurostoma mertensii	**3**	Laodiceidae	Conica	Leptothecata			Hydroidolina	Hydrozoa		Cnidaria
117755	Mitrocomella polydiademata	**0.5**	Mitrocomidae	Conica	Leptothecata			Hydroidolina	Hydrozoa		Cnidaria
117368	Clytia hemisphaerica	**0.3**	Campanulariidae	Proboscoida	Leptothecata			Hydroidolina	Hydrozoa		Cnidaria
117034	Obelia spp.	**0.05**	Campanulariidae	Proboscoida	Leptothecata			Hydroidolina	Hydrozoa		Cnidaria
117849	Aglantha digitale	**0.2**	Rhopalonematidae		Trachymedusae			Trachylina	Hydrozoa		Cnidaria
117947	Solmaris corona	**3**	Solmarisidae		Narcomedusae			Trachylina	Hydrozoa		Cnidaria
1371	Siphonophorae	**0.2**			Siphonophorae			Hydroidolina	Hydrozoa		Cnidaria
135484	Agalma elegans	**0.2**	Agalmatidae	Physonectae	Siphonophorae			Hydroidolina	Hydrozoa		Cnidaria

AphiaID	*Taxa name*	Dry Wgt. (mg)	*Family*	*Suborder*	*Order*	*Superorder*	*Infraclass*	*Subclass*	*Class*	*Subphylum*	*Phylum*
135496	Nanomia cara	**0.2**	Agalmatidae	Physonectae	Siphonophorae			Hydroidolina	Hydrozoa		Cnidaria
135338	Diphyidae	**0.01**	Diphyidae	Calycophorae	Siphonophorae			Hydroidolina	Hydrozoa		Cnidaria
135441	Muggiaea atlantica	**0.01**	Diphyidae	Calycophorae	Siphonophorae			Hydroidolina	Hydrozoa		Cnidaria
135220	Scyphozoa ephyra	**0.5**							Scyphozoa		Cnidaria
135259	Cyanea spp.	**0.83**	Cyaneidae		Semaeostomeae			Discomedusae	Scyphozoa		Cnidaria
135259	Cyanea spp. Ephyra	**0.5**	Cyaneidae		Semaeostomeae			Discomedusae	Scyphozoa		Cnidaria
135302	Cyanea lamarcki	**0.83**	Cyaneidae		Semaeostomeae			Discomedusae	Scyphozoa		Cnidaria
135263	Aurelia spp. Ephyra	**0.5**	Ulmaridae		Semaeostomeae			Discomedusae	Scyphozoa		Cnidaria
135306	Aurelia aurita	**0.83**	Ulmaridae		Semaeostomeae			Discomedusae	Scyphozoa		Cnidaria
135305	Pelagia noctiluca	**0.02**	Pelagiidae		Semaeostomeae			Discomedusae	Scyphozoa		Cnidaria
100782	Cerianthus spp.	**0.02**	Cerianthidae	Spirularia	Ceriantharia			Hexacorallia	Anthozoa		Cnidaria
1248	Ctenophora (remains)	**0.04**									Ctenophora
1248	Ctenophora	**0.04**									Ctenophora
106386	Pleurobrachia pileus	**0.5**	Pleurobrachiidae		Cydippida			Typhlocoela	Tentaculata		Ctenophora
106358	Beroe cucumis	**1**	Beroidae		Beroida				Nuda		Ctenophora
106265	Bosmina spp.	**0.016**	Bosminidae	Cladocera	Diplostraca			Phyllopoda	Branchiopoda	Crustacea	Arthropoda
106269	Podon spp.	**0.016**	Podonidae	Cladocera	Diplostraca			Phyllopoda	Branchiopoda	Crustacea	Arthropoda
106277	Podon leuckartii	**0.016**	Podonidae	Cladocera	Diplostraca			Phyllopoda	Branchiopoda	Crustacea	Arthropoda
106276	Podon intermedius	**0.016**	Podonidae	Cladocera	Diplostraca			Phyllopoda	Branchiopoda	Crustacea	Arthropoda
247981	Pleopis polyphaemoides	**0.016**	Podonidae	Cladocera	Diplostraca			Phyllopoda	Branchiopoda	Crustacea	Arthropoda
106273	Evadne nordmanni	**0.003**	Podonidae	Cladocera	Diplostraca			Phyllopoda	Branchiopoda	Crustacea	Arthropoda
127482	Halocyprididae	**0.020**	Halocyprididae	Halocypridina	Halocyprida			Myodocopa	Ostracoda	Crustacea	Arthropoda
1082	Cirripedia cypris	**0.008**					Cirripedia	Thecostraca	Maxillopoda	Crustacea	Arthropoda
1082	Cirripedia nauplius	**0.001**					Cirripedia	Thecostraca	Maxillopoda	Crustacea	Arthropoda
1080	Copepoda C1-6	**0.053**						Copepoda	Maxillopoda	Crustacea	Arthropoda
1100	Calanoida C1-6	**0.053**			Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104152	Calanus spp. C6 F	**0.149**	Calanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104152	Calanus spp. C6 M	**0.138**	Calanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104152	Calanus spp. C1	**0.005**	Calanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104152	Calanus spp. C2	**0.011**	Calanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104152	Calanus spp. C3	**0.025**	Calanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104152	Calanus spp. C4	**0.048**	Calanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda

AphiaID	*Taxa name*	Dry Wgt. (mg)	*Family*	*Suborder*	*Order*	*Superorder*	*Infraclass*	*Subclass*	*Class*	*Subphylum*	*Phylum*
104152	Calanus spp. C5	**0.120**	Calanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104464	Calanus finmarchicus C6 F	**0.149**	Calanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104464	Calanus finmarchicus C6 M	**0.138**	Calanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104464	Calanus finmarchicus C5	**0.120**	Calanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104466	Calanus helgolandicus C6 F	**0.189**	Calanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104466	Calanus helgolandicus C6 M	**0.185**	Calanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104466	Calanus helgolandicus C5	**0.120**	Calanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
149718	Eucalanus elongatus C1-5	**0.269**	Eucalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
149718	Eucalanus elongatus C6 F	**0.859**	Eucalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
149718	Eucalanus elongatus C6 M	**0.859**	Eucalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104544	Subeucalanus crassus C1-5	**0.269**	Subeucalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104544	Subeucalanus crassus C6 F	**0.859**	Subeucalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104544	Subeucalanus crassus C6 M	**0.859**	Subeucalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104543	Rhincalanus nasutus C6 F	**0.189**	Rhincalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104543	Rhincalanus nasutus C6 M	**0.185**	Rhincalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104543	Rhincalanus nasutus C1-5	**0.132**	Rhincalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104685	Paracalanus parvus C5 F	**0.006**	Paracalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104685	Paracalanus parvus C6 F	**0.008**	Paracalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104685	Paracalanus parvus C5 M	**0.006**	Paracalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104685	Paracalanus parvus C6 M	**0.007**	Paracalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104685	Paracalanus parvus C1	**0.001**	Paracalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104685	Paracalanus parvus C2	**0.001**	Paracalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104685	Paracalanus parvus C3	**0.002**	Paracalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104685	Paracalanus parvus C4	**0.004**	Paracalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104685	Paracalanus parvus C5	**0.006**	Paracalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104193	Calocalanus spp. C6 F	**0.008**	Calocalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
149711	Pseudocalanus minutus elongatus C5 F	**0.008**	Clausocalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
149711	Pseudocalanus minutus elongatus C6 F	**0.012**	Clausocalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
149711	Pseudocalanus minutus elongatus C5 M	**0.008**	Clausocalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
149711	Pseudocalanus minutus elongatus C6 M	**0.008**	Clausocalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda

AphiaID	*Taxa name*	Dry Wgt. (mg)	*Family*	*Suborder*	*Order*	*Superorder*	*Infraclass*	*Subclass*	*Class*	*Subphylum*	*Phylum*
149711	Pseudocalanus minutus elongatus C1	**0.001**	Clausocalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
149711	Pseudocalanus minutus elongatus C2	**0.002**	Clausocalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
149711	Pseudocalanus minutus elongatus C3	**0.003**	Clausocalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
149711	Pseudocalanus minutus elongatus C4	**0.005**	Clausocalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104510	Ctenocalanus vanus C6 F	**0.010**	Clausocalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104510	Ctenocalanus vanus C6 M	**0.008**	Clausocalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104510	Ctenocalanus vanus C5	**0.005**	Clausocalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
157675	Microcalanus pusillus C6 F	**0.001**	Clausocalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
157675	Microcalanus pusillus C6 M	**0.001**	Clausocalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
157675	Microcalanus pusillus C1	**0.000**	Clausocalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
157675	Microcalanus pusillus C2	**0.000**	Clausocalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
157675	Microcalanus pusillus C3	**0.000**	Clausocalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
157675	Microcalanus pusillus C4	**0.001**	Clausocalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
157675	Microcalanus pusillus C5	**0.001**	Clausocalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104161	Clausocalanus spp. C1-6	**0.006**	Clausocalanidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104275	Aetideus armatus C1-6	**0.009**	Aetideidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104086	Euchaetidae C1-6	**0.025**	Euchaetidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104566	Paraeuchaeta norvegica C1-6	**0.026**	Euchaetidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104103	Scolecitrichidae C1-5	**0.003**	Scolecitrichidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104811	Scolecithricella minor C6 F	**0.024**	Scolecitrichidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104811	Scolecithricella minor C6 M	**0.019**	Scolecitrichidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104811	Scolecithricella minor C1-5	**0.003**	Scolecitrichidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104521	Diaixis hibernica C6 F	**0.010**	Diaixidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104521	Diaixis hibernica C5 M	**0.005**	Diaixidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104521	Diaixis hibernica C6 M	**0.008**	Diaixidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104521	Diaixis hibernica C2	**0.001**	Diaixidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104521	Diaixis hibernica C3	**0.002**	Diaixidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104521	Diaixis hibernica C4	**0.003**	Diaixidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104521	Diaixis hibernica C5	**0.005**	Diaixidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104521	Diaixis hibernica C1-5	**0.002**	Diaixidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104878	Temora longicornis C5 F	**0.012**	Temoridae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda

AphiaID	*Taxa name*	Dry Wgt. (mg)	*Family*	*Suborder*	*Order*	*Superorder*	*Infraclass*	*Subclass*	*Class*	*Subphylum*	*Phylum*
104878	Temora longicornis C6 F	**0.032**	Temoridae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104878	Temora longicornis C5 M	**0.014**	Temoridae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104878	Temora longicornis C6 M	**0.023**	Temoridae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104878	Temora longicornis C1	**0.001**	Temoridae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104878	Temora longicornis C2	**0.002**	Temoridae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104878	Temora longicornis C3	**0.003**	Temoridae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104878	Temora longicornis C4	**0.006**	Temoridae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104878	Temora longicornis C5	**0.013**	Temoridae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104092	Metridinidae C1-6	**0.015**	Metridinidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104633	Metridia lucens C6 F	**0.066**	Metridinidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104633	Metridia lucens C6 M	**0.023**	Metridinidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104633	Metridia lucens C1	**0.001**	Metridinidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104633	Metridia lucens C2	**0.003**	Metridinidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104633	Metridia lucens C3	**0.005**	Metridinidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104633	Metridia lucens C4	**0.011**	Metridinidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104633	Metridia lucens C5	**0.016**	Metridinidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104496	Centropages hamatus C5 F	**0.013**	Centropagidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104496	Centropages hamatus C6 F	**0.026**	Centropagidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104496	Centropages hamatus C5 M	**0.014**	Centropagidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104496	Centropages hamatus C6 M	**0.019**	Centropagidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104496	Centropages hamatus C1	**0.001**	Centropagidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104496	Centropages hamatus C2	**0.002**	Centropagidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104496	Centropages hamatus C3	**0.004**	Centropagidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104496	Centropages hamatus C4	**0.007**	Centropagidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104496	Centropages hamatus C5	**0.013**	Centropagidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104499	Centropages typicus C6 F	**0.035**	Centropagidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104499	Centropages typicus C6 M	**0.028**	Centropagidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104499	Centropages typicus C1	**0.001**	Centropagidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104499	Centropages typicus C2	**0.003**	Centropagidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104499	Centropages typicus C3	**0.005**	Centropagidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104499	Centropages typicus C4	**0.009**	Centropagidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104499	Centropages typicus C5	**0.019**	Centropagidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda

AphiaID	Taxa name	Dry Wgt. (mg)	Family	Suborder	Order	Superorder	Infraclass	Subclass	Class	Subphylum	Phylum
104501	Isias clavipes C6 F	**0.026**	Centropagidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104501	Isias clavipes C6 M	**0.019**	Centropagidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104501	Isias clavipes C1-5	**0.006**	Centropagidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104474	Candacia armata C6 F	**0.087**	Candaciidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104474	Candacia armata C6 M	**0.076**	Candaciidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104474	Candacia armata C1	**0.002**	Candaciidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104474	Candacia armata C2	**0.005**	Candaciidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104474	Candacia armata C3	**0.010**	Candaciidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104474	Candacia armata C4	**0.021**	Candaciidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104474	Candacia armata C5	**0.040**	Candaciidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104722	Anomalocera patersoni C6 F	**0.226**	Pontellidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104722	Anomalocera patersoni C6 M	**0.162**	Pontellidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104722	Anomalocera patersoni C1-5	**0.069**	Pontellidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
149755	Acartia (Acartiura) clausi C5 F	**0.006**	Acartiidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
149755	Acartia (Acartiura) clausi C6 F	**0.010**	Acartiidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
149755	Acartia (Acartiura) clausi C5 M	**0.005**	Acartiidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
149755	Acartia (Acartiura) clausi C6 M	**0.008**	Acartiidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
149755	Acartia (Acartiura) clausi C1	**0.001**	Acartiidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
149755	Acartia (Acartiura) clausi C2	**0.001**	Acartiidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
149755	Acartia (Acartiura) clausi C3	**0.002**	Acartiidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
149755	Acartia (Acartiura) clausi C4	**0.003**	Acartiidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
149755	Acartia (Acartiura) clausi C5	**0.005**	Acartiidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
346037	Acartia (Acartiura) longiremis C6 F	**0.006**	Acartiidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
346037	Acartia (Acartiura) longiremis C6 M	**0.005**	Acartiidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
346037	Acartia (Acartiura) longiremis C1-5	**0.002**	Acartiidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
234125	Acartia (Acartiura) discaudata C6 F	**0.010**	Acartiidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda

234125	Acartia (Acartiura) discaudata C1-5	**0.002**	Acartiidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
345919	Acartia (Acanthacartia) bifilosa C6 F	**0.010**	Acartiidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104097	Pontellidae C1-6	**0.152**	Pontellidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104686	Parapontella brevicornis C6 F	**0.226**	Parapontellidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda

AphiaID	*Taxa name*	Dry Wgt. (mg)	*Family*	*Suborder*	*Order*	*Superorder*	*Infraclass*	*Subclass*	*Class*	*Subphylum*	*Phylum*
104686	Parapontella brevicornis C6 M	**0.162**	Parapontellidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104686	Parapontella brevicornis C1-5	**0.069**	Parapontellidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104204	Xanthocalanus spp. C1-5	**0.069**	Phaennidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104757	Pseudocyclopia minor C6 F	**0.226**	Pseudocyclopiidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
104757	Pseudocyclopia minor C1-5	**0.069**	Pseudocyclopiidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
247924	Diaptomus spp. C6 F	**0.226**	Diaptomidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
247924	Diaptomus spp. C6 M	**0.162**	Diaptomidae		Calanoida	Gymnoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
1102	Harpacticoida C1-6	**0.007**			Harpacticoida	Podoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
116115	Microsetella norvegica C1-6	**0.001**	Ectinosomatidae		Harpacticoida	Podoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
116116	Microsetella rosea C1-6	**0.001**	Ectinosomatidae		Harpacticoida	Podoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
128586	Oncaeidae C1-6	**0.016**	Oncaeidae		Poecilostomatoida	Podoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
128569	Corycaeidae C1-6	**0.016**	Corycaeidae		Poecilostomatoida	Podoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
1101	Cyclopoida C1-6	**0.006**			Cyclopoida	Podoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
106422	Oithonidae C1-6	**0.002**	Oithonidae		Cyclopoida	Podoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
106485	Oithona spp. C1	**0.001**	Oithonidae		Cyclopoida	Podoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
106485	Oithona spp. C2	**0.002**	Oithonidae		Cyclopoida	Podoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
106485	Oithona spp. C3	**0.004**	Oithonidae		Cyclopoida	Podoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
106485	Oithona spp. C4-5	**0.008**	Oithonidae		Cyclopoida	Podoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
106485	Oithona spp. C6 M	**0.016**	Oithonidae		Cyclopoida	Podoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
106485	Oithona spp. C6 F	**0.016**	Oithonidae		Cyclopoida	Podoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
119777	Monstrillidae C1-6	**0.01**	Monstrillidae		Monstrilloida	Podoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
135513	Caligidae C1-6	**0.01**	Caligidae		Siphonostomatoida	Podoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
135566	Caligus spp. C1-6	**0.01**	Caligidae		Siphonostomatoida	Podoplea	Neocopepoda	Copepoda	Maxillopoda	Crustacea	Arthropoda
1071	Malacostraca	**0.32**							Malacostraca	Crustacea	Arthropoda
149668	Mysida	**0.31**			Mysida	Peracarida		Eumalacostraca	Malacostraca	Crustacea	Arthropoda
1137	Cumacea	**0.1**			Cumacea	Peracarida		Eumalacostraca	Malacostraca	Crustacea	Arthropoda
1131	Isopoda	**0.01**			Isopoda	Peracarida		Eumalacostraca	Malacostraca	Crustacea	Arthropoda
1131	Isopoda (parasitic)	**0.01**			Isopoda	Peracarida		Eumalacostraca	Malacostraca	Crustacea	Arthropoda
1135	Amphipoda (non-hyperiidea)	**0.21**			Amphipoda	Peracarida		Eumalacostraca	Malacostraca	Crustacea	Arthropoda
1135	Amphipoda (parasitic)	**0.21**			Amphipoda	Peracarida		Eumalacostraca	Malacostraca	Crustacea	Arthropoda
101800	Themisto spp.	**0.24**	Hyperiidae	Hyperiidea	Amphipoda	Peracarida		Eumalacostraca	Malacostraca	Crustacea	Arthropoda
101796	Hyperia spp.	**0.07**	Hyperiidae	Hyperiidea	Amphipoda	Peracarida		Eumalacostraca	Malacostraca	Crustacea	Arthropoda

AphiaID	*Taxa name*	Dry Wgt. (mg)	*Family*	*Suborder*	*Order*	*Superorder*	*Infraclass*	*Subclass*	*Class*	*Subphylum*	*Phylum*
110671	Euphausiidae calyptopis	**0.01**	Euphausiidae		Euphausiacea	Eucarida		Eumalacostraca	Malacostraca	Crustacea	Arthropoda
110671	Euphausiidae furcilia	**0.08**	Euphausiidae		Euphausiacea	Eucarida		Eumalacostraca	Malacostraca	Crustacea	Arthropoda
110671	Euphausiidae nauplius	**0.01**	Euphausiidae		Euphausiacea	Eucarida		Eumalacostraca	Malacostraca	Crustacea	Arthropoda
254316	Nyctiphanes couchii adult	**0.28**	Euphausiidae		Euphausiacea	Eucarida		Eumalacostraca	Malacostraca	Crustacea	Arthropoda
254316	Nyctiphanes couchii juvenile	**0.14**	Euphausiidae		Euphausiacea	Eucarida		Eumalacostraca	Malacostraca	Crustacea	Arthropoda
254316	Nyctiphanes couchii furcilia	**0.07**	Euphausiidae		Euphausiacea	Eucarida		Eumalacostraca	Malacostraca	Crustacea	Arthropoda
110679	Thysanoessa spp. furcilia	**0.08**	Euphausiidae		Euphausiacea	Eucarida		Eumalacostraca	Malacostraca	Crustacea	Arthropoda
110708	Thysanoessa inermis adult	**1.04**	Euphausiidae		Euphausiacea	Eucarida		Eumalacostraca	Malacostraca	Crustacea	Arthropoda
110709	Thysanoessa longicaudata adult	**0.32**	Euphausiidae		Euphausiacea	Eucarida		Eumalacostraca	Malacostraca	Crustacea	Arthropoda
107254	Nephrops norvegicus larva	**0.21**	Nephropidae	Macrura Reptantia	Decapoda	Eucarida		Eumalacostraca	Malacostraca	Crustacea	Arthropoda
1130	Decapoda larva	**0.21**			Decapoda	Eucarida		Eumalacostraca	Malacostraca	Crustacea	Arthropoda
51	Mollusca	**0.004**									Mollusca
101	Gastropoda larva	**0.004**							Gastropoda		Mollusca
101	Gastropoda egg	**0.000**							Gastropoda		Mollusca
140227	Limacina retroversa	**0.010**	Limacinidae	Euthecosomata	Thecosomata		Opisthobranchia	Heterobranchia	Gastropoda		Mollusca
138101	Lamellaria spp. larva	**0.004**	Velutinidae		Littorinimorpha			Caenogastropoda	Gastropoda		Mollusca
138101	Lamellaria spp. egg	**0.000**	Velutinidae		Littorinimorpha			Caenogastropoda	Gastropoda		Mollusca
164	Gymnosomata	**0.004**			Gymnosomata		Opisthobranchia	Heterobranchia	Gastropoda		Mollusca
139178	Clione limacina	**0.005**	Clionidae		Gymnosomata		Opisthobranchia	Heterobranchia	Gastropoda		Mollusca
105	Bivalvia larva	**0.001**							Bivalvia		Mollusca
5953	Sagittidae	**0.048**	Sagittidae		Aphragmophora				Sagittoidea		Chaetognatha
5953	Sagittidae juvenile	**0.012**	Sagittidae		Aphragmophora				Sagittoidea		Chaetognatha
105440	Parasagitta elegans	**0.048**	Sagittidae		Aphragmophora				Sagittoidea		Chaetognatha
105443	Parasagitta setosa	**0.048**	Sagittidae		Aphragmophora				Sagittoidea		Chaetognatha
105464	Serratosagitta serratodentata	**0.048**	Sagittidae		Aphragmophora				Sagittoidea		Chaetognatha
15177	Spadellidae	**0.048**	Spadellidae		Phragmophora				Sagittoidea		Chaetognatha
11676	Fish larva	**0.517**							Actinopterygii	Vertebrata	Chordata
11676	Fish egg	**0.005**							Actinopterygii	Vertebrata	Chordata
125464	Clupeidae larva	**0.084**	Clupeidae		Clupeiformes				Actinopterygii	Vertebrata	Chordata
10313	Gadiformes larva				Gadiformes				Actinopterygii	Vertebrata	Chordata
125516	Ammodytidae larva	**0.084**	Ammodytidae		Perciformes				Actinopterygii	Vertebrata	Chordata
883	Polychaeta adult	**0.30**							Polychaeta		Annelida

AphiaID	*Taxa name*	Dry Wgt. (mg)	*Family*	*Suborder*	*Order*	*Superorder*	*Infraclass*	*Subclass*	*Class*	*Subphylum*	*Phylum*
883	Polychaeta larva	**0.006**							Polychaeta		Annelida
129715	Tomopteris spp.	**0.292**	Tomopteridae	Phyllodocida incertae sedis	Phyllodocida			Aciculata	Polychaeta		Annelida
1789	Phoronida larva	**0.292**									Phoronida
146142	Bryozoa cyphonautes	**0.001**									Bryozoa
1806	Echinodermata larva	**0.001**									Echinodermata
1818	Hemichordata larva	**0.01**									Hemichordata
1839	Ascidiacea larva	**0.01**							Ascidiacea	Tunicata	Chordata
146421	Appendicularia	**0.050**							Appendicularia	Tunicata	Chordata
137272	Salpa fusiformis	**0.1**	Salpidae		Salpida				Thaliacea	Tunicata	Chordata
137215	Doliolidae	**0.01**	Doliolidae		Doliolida				Thaliacea	Tunicata	Chordata
1824	Cephalochordata	**0.1**								Cephalochordata	Chordata