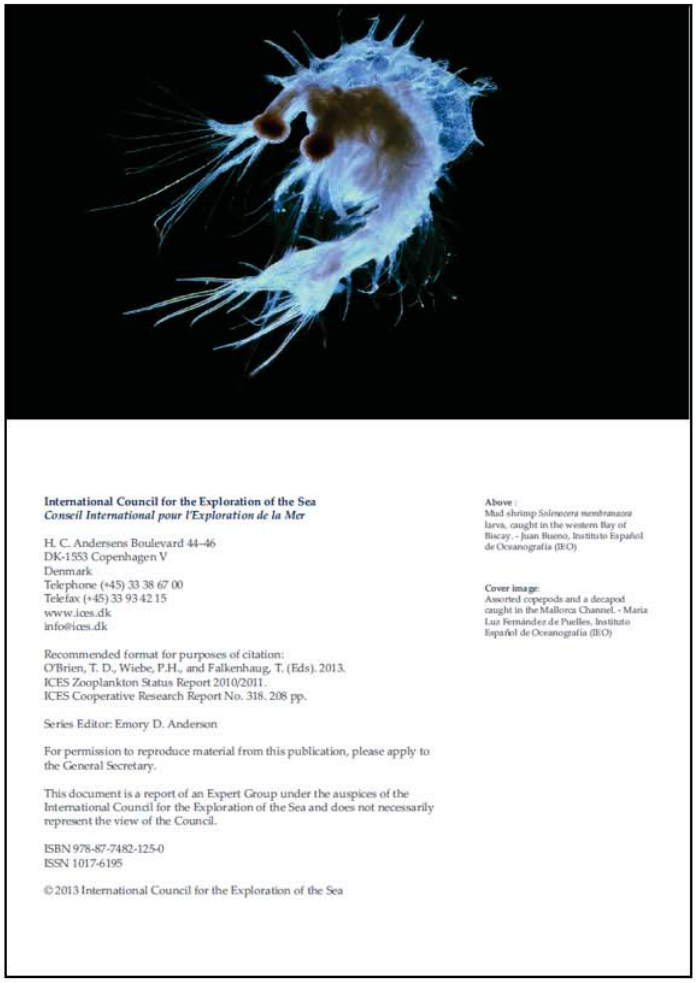

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Above :
Mud shrimp *Solenocera membranacea* larva, caught in the western Bay of Biscay. - Juan Bueno, Instituto Español de Oceanografía (IEO)

Cover image:
Assorted copepods and a decapod caught in the Mallorca Channel. - María Luz Fernández de Puelles, Instituto Español de Oceanografía (IEO)

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6.6 Southern Baltic Proper (Sites 37–39)

Piotr Margonski

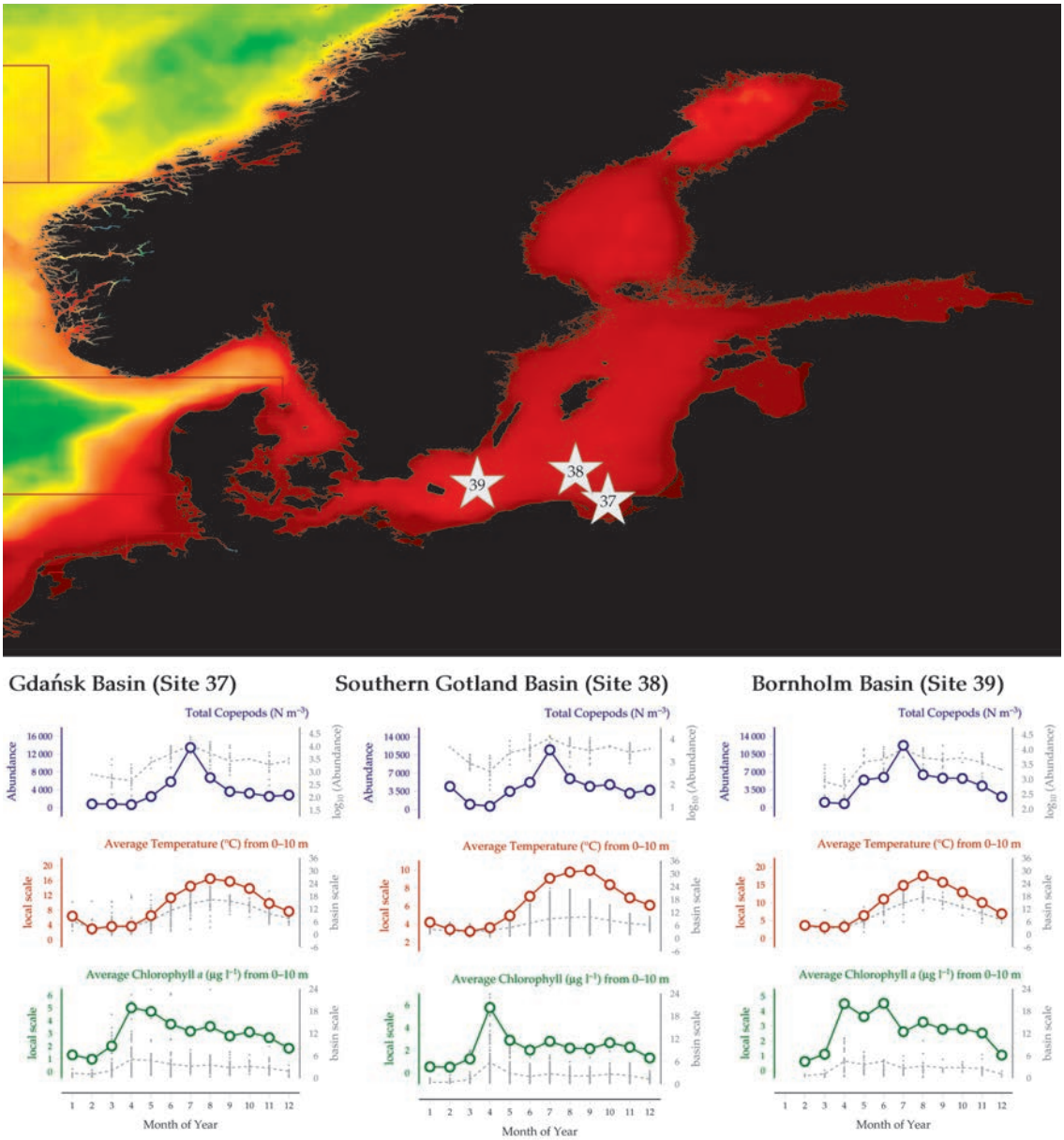


Figure 6.6.1
Locations of Polish zooplankton survey areas in the southern Baltic Proper (Sites 37–39), and their corresponding seasonal summary plot (see Section 2.2.1).

Zooplankton samples are collected within the Baltic Sea HELCOM COMBINE Monitoring Programme. The Maritime Branch of the Institute of Meteorology and Water Management is responsible for collecting the samples along the southern coast of the Baltic Sea (in the Polish EEZ); over the thirty years of monitoring, zooplankton has been analyzed by several experts working in various institutions.

The dataset starts in 1979 with two stations located in the Bornholm Basin (Site 39) and southern Gotland Basin (Site 38). Since 1986, samples have also been taken at the station located in the Gdansk Basin (Site 37). In the same year, the location of the southern Gotland Basin station was shifted.

Samples are taken following the guidelines of the Manual for Marine Monitoring in the COMBINE Programme of HELCOM (especially Annex C-7: Mesozooplankton), which means that vertical hauls of the WP-2 net with 100 µm mesh size are used. Stratified samples (presented here as an average of the whole water column) were collected in the layers from the bottom to the halocline (included); from the top of the halocline to the thermocline (included); and from the top of the thermocline to the surface. Preservation (4% formaldehyde solution) as well as subsampling and lab analyses are carried out according to the HELCOM guidelines. The frequency of sampling varied in time (3–6 times per year), but spring and summer conditions can be described for each year. Data from years 1998 and 2000–2001 are still missing in the database. In addition, zooplankton samples were not taken at the station located in the Bornholm Basin during the period 2002–2006.

Seasonal and interannual trends (Figures 6.6.2–6.6.6)

In the Gdansk Basin (Figure 6.6.2), a clear trend in the near-surface temperature (positive) and salinity (negative) is evident. Changes in hydrological forcing were, most probably, influencing the decrease in *Pseudocalanus minutus* abundance (a copepod that prefers higher-salinity waters) and increasing presence of other copepods such as *Acartia longiremis* and *Temora longicornis.*

In the Bornholm Basin (Figure 6.6.4), there is an increasing trend in surface temperature, but the pattern in salinity is not so obvious. Nevertheless, since the beginning of the 1990s, mostly negative anomalies in salinity are evident, with a possible reversed trend over the last few years. Positive anomalies in temperature dominated the last decade. Despite the observed year-to-year variation, trends in copepod abundance and biomass are similar to those observed in the Gdansk Basin and the southern Gotland Basin.

In the southern Gotland Basin (Figure 6.6.3), strong year-to-year variation in the abundance of *T. longicornis* and *A. longiremis* has been observed. Here, total copepod abundance is decreasing due to the significant decrease in *P. minutus*.

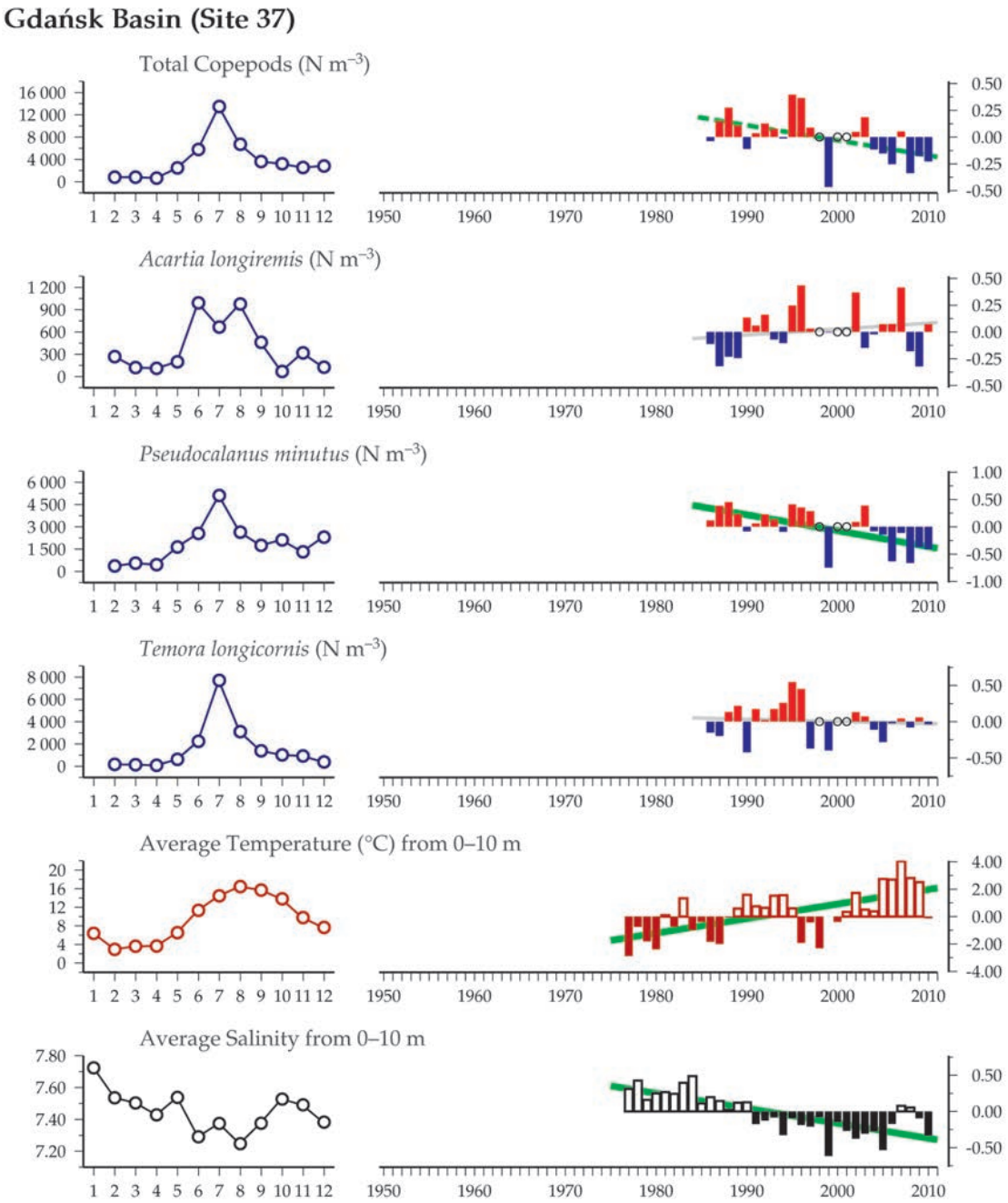
Long-term surface temperature trends in all three regions present a modest, but consistent increase over the last 50 years (Figure 6.6.5). Within the 100+ year extended time-series, temperatures have been near or above the 100-year maximum (red dashed line, Figure 6.6.6) since the 1990s.

Acknowledgements

Data were collected within the Polish National Monitoring Programme, and permission to present them was granted by the Chief Inspector of Environmental Protection (http://www.gios.gov.pl/).

Figure 6.6.2
Multiple-variable comparison plot (see Section 2.2.2) showing the seasonal and interannual properties of select cosampled variables at the Gdańsk Basin monitoring area.

Additional variables are available online at: http://WGZE.net/time-series.



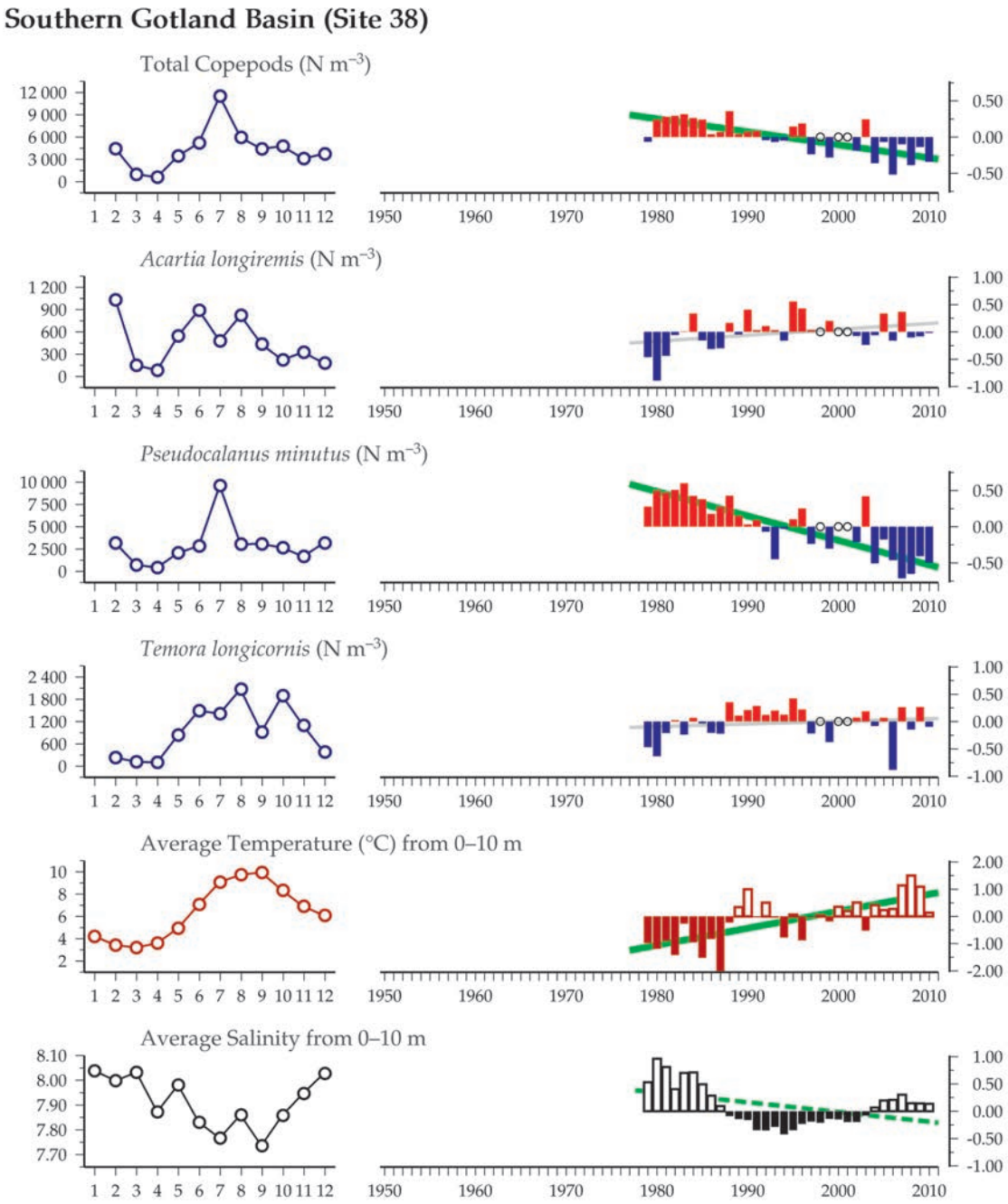
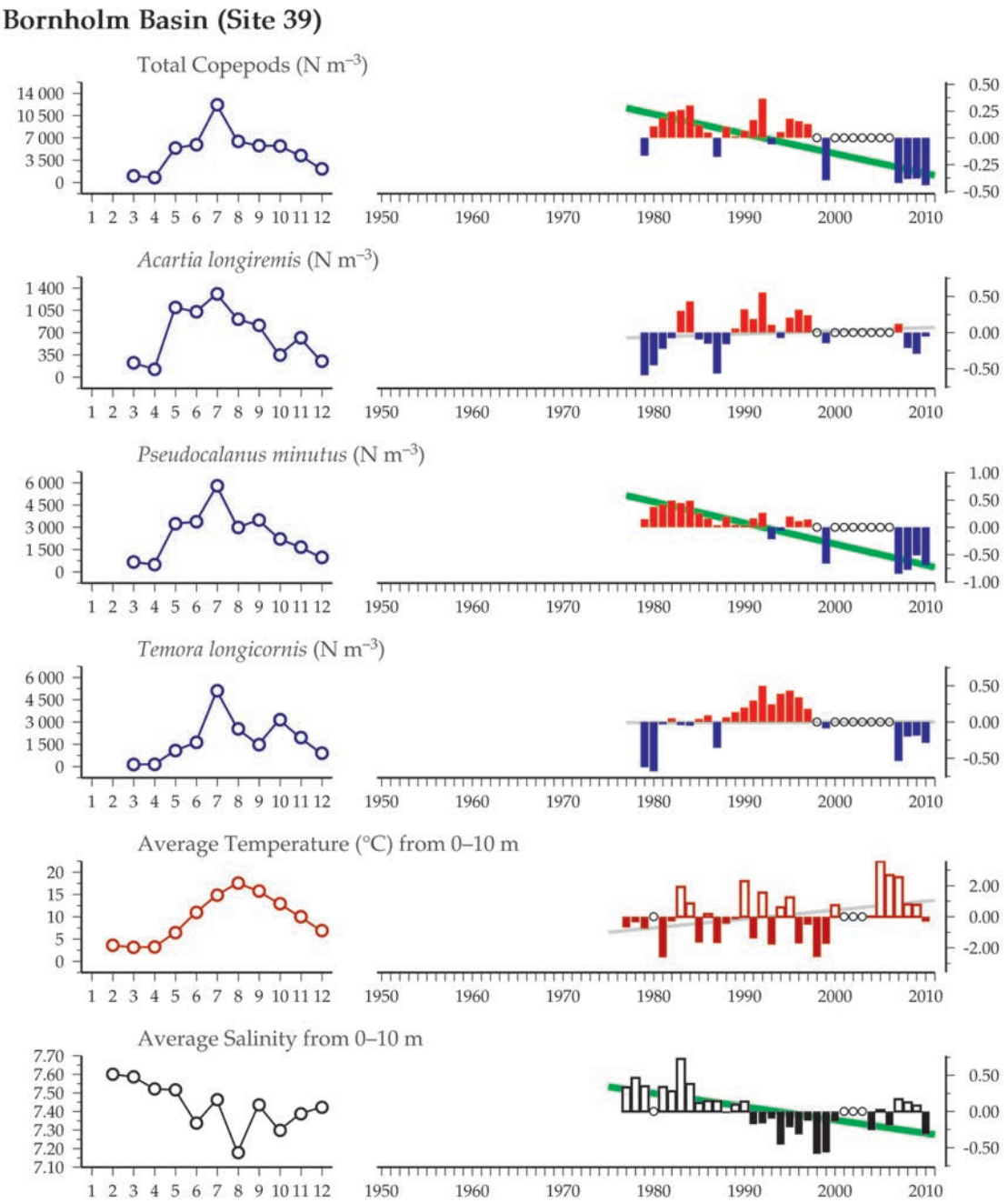


Figure 6.6.3
Multiple-variable comparison plot (see Section 2.2.2) showing the seasonal and interannual properties of select cosampled variables at the southern Gotland Basin monitoring area.

Additional variables are available online at: http://WGZE.net/time-series.

Figure 6.6.4
Multiple-variable comparison plot (see Section 2.2.2) showing the seasonal and interannual properties of select cosampled variables at the Bornholm Basin monitoring area.

Additional variables are available online at: http://WGZE.net/time-series.



50-year trends in the Gdańsk Basin / southern Baltic Proper region

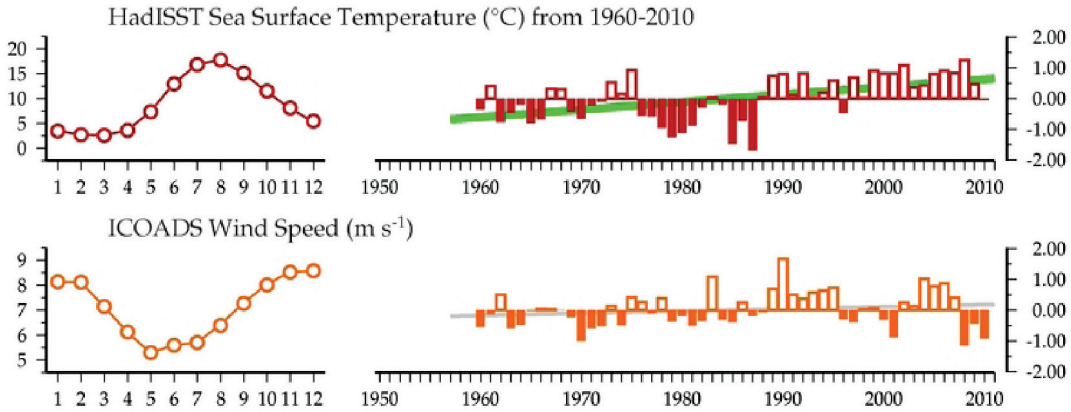
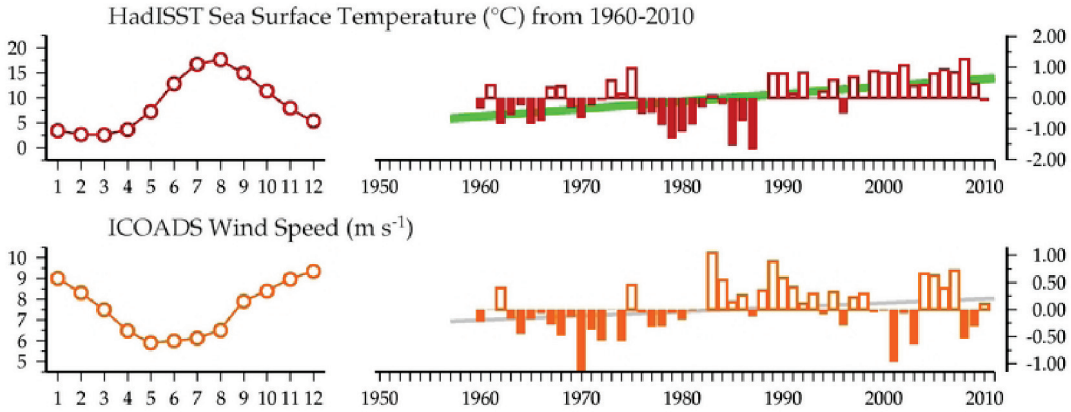


Figure 6.6.5
Regional overview plot (see Section 2.2.3) showing long-term sea surface temperatures and wind speeds in the general region surrounding the southern Baltic Proper monitoring areas.

50-year trends in the Southern Gotland Basin / southern Baltic Proper region



50-year trends in the Bornholm Basin / southern Baltic Proper region

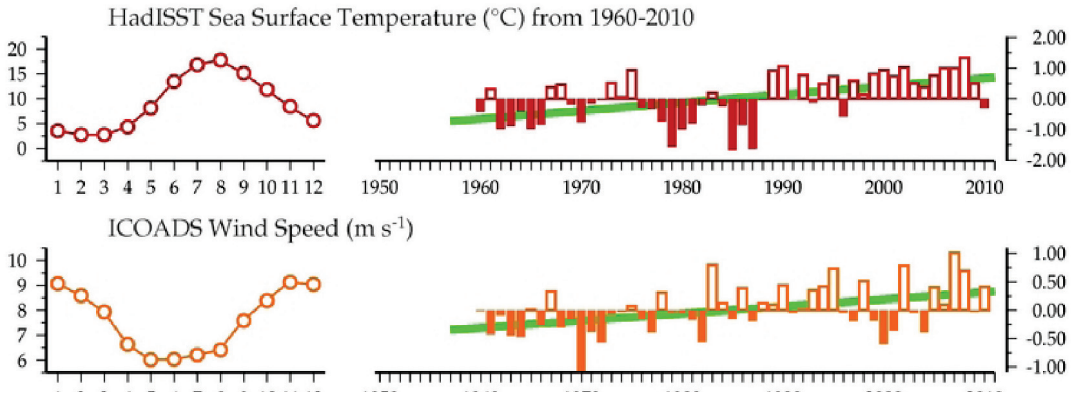
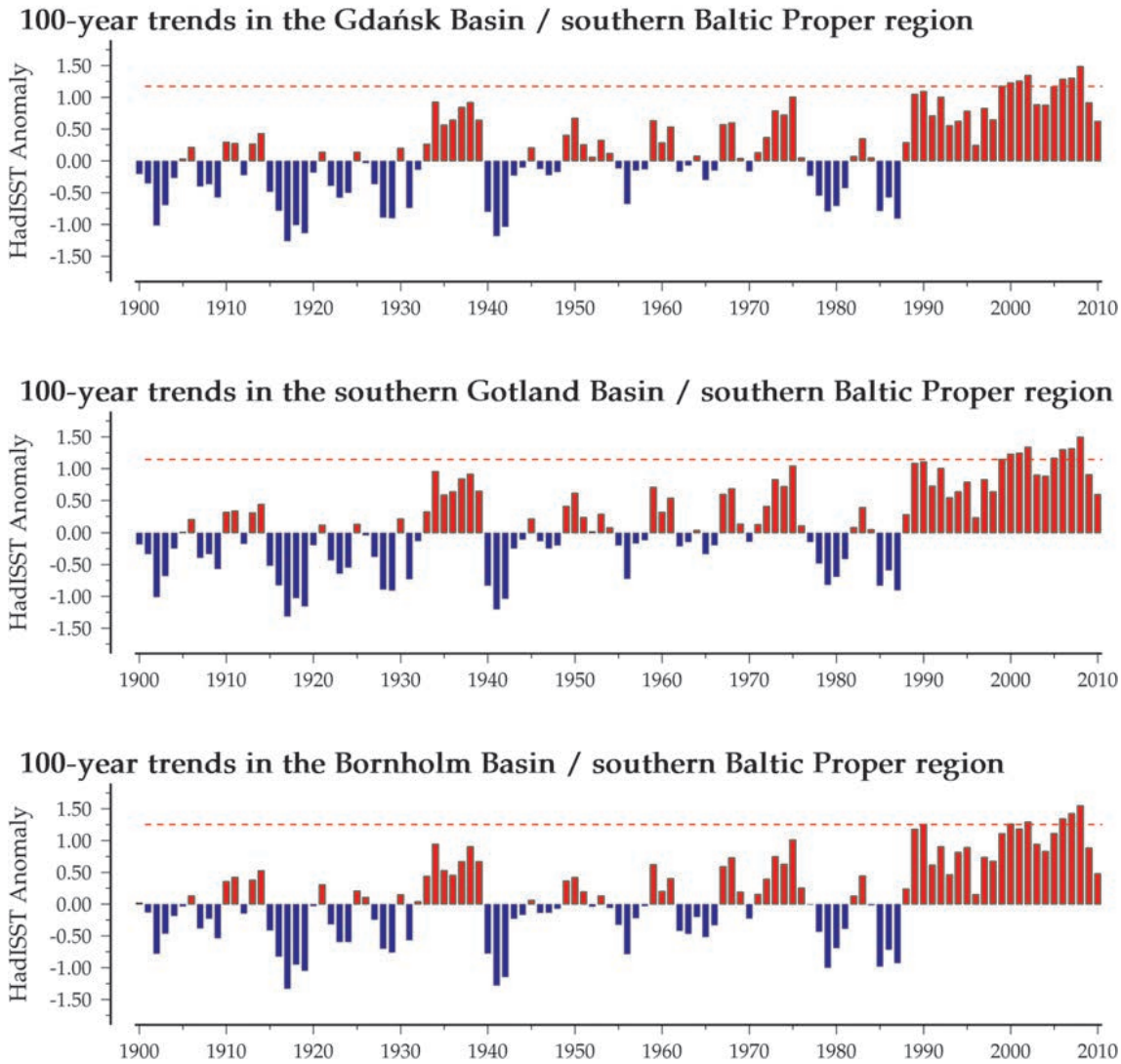



Figure 6.6.6
Regional overview plot (see Section 2.2.3) showing 100-year sea surface temperatures in the general region surrounding the Southern Baltic Proper monitoring areas.