The IGME Ts builds on activities which were part of GLOBEC (supported by the International Geosphere-Biosphere Programme - IGBP, the Scientific Committee on Oceanic Research - SCOR, and the IOC), and later continued through working groups funded by ICES and SCOR, which stressed the need to broaden the utilization of existing time-series data sets and to link current and past studies (Fig. 1).

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Implementation:
- Compilation of data of > 300 ship-based marine ecological time series sites (plus about 100 estuarine sites) (Fig. 2 & 3)
- Comprehensive report will be published in November 2015
- Online depository for additional analysis and further information describing single time series

VISION

IGME Ts intends to:
- Encourage the use of already-established common metadata standards and formats to further facilitate cost-efficiency of new and existing sampling programmes and projects by designing them based on known spatial, temporal and process-related data coverage;
- Analyze time series data at the global and regional level to create a platform for modelling studies based on maximized input quality and quantity;
- Increase the visibility of less internationally connected groups;
- Allow the possibility for web-based quick-look analysis of time series variables;
- Provide a strong base for future predictions which in turn can strengthen policy advice/suggestions.

Joint implementation:

- Further information describing single time series sites included in IGME Ts (February 2015) broken down by the number of years data are available for.

SINGLE TIME SERIES ANALYSIS

I. Identification of temporal patterns.
II. Understanding of local processes.

Refer to Fig. 6

JOINT TIME SERIES ANALYSIS

I. Identification of temporal and spatial patterns.
II. Establishment of regional baselines.
III. Understanding of regional and global processes – insights on linkages between climate variability and ocean biogeochemistry at regional, basin and world ocean scales can be gained from several time series geographically distributed. (e.g., Fig. 4 & 5)
IV. Separation of stressors.
V. Projection and forecasting.

Refer to Fig. 6

VALUE OF OCEAN TIME SERIES – OCEAN’S HERITAGE

I. No substitute exists for adequate observations.

Sensors for biological measurements are limited; automated sensors and remote sensing analysis are in situ data calibration and validation.

II. Observations which are not made today are lost forever!

In the past, especially during the 1980’s, financial drawdowns caused the termination of continuous time series work with an assortment of ICES and SCOR time series analysis working groups. (125 & 137)

The analysis, at the very minimum, will be a global coverage, expanded-variable-set of the general analyses done in the North Atlantic by the ICES WEGE and WGMET.

Temporal resolution: minimum annual changes; if possible, monthly analysis provides an additional layer of detail.

The overall analysis focuses on individual variables (e.g., total zooplankton biomass) as well as multi-variable analysis (e.g., nutrient ratios and diatom ratios), discussed in comparison with satellite observations and existing literature.

Figure 2. Number of time series sites included in IGME Ts (February 2015) broken down by the number of years data are available for.

Figure 3. Map showing Time Series sites involved in the IGME Ts assessment.


Figure 5. Maps illustrating statistical trends (NSD: negative trend, decreasing values; POS: positive trend, increasing values) in the area of the North Atlantic. A. Trends in satellite Chlorophyll from 2008-2012. B. Trends in satellite Chlorophyll from 2003-2012. C. Trends in total number of dinoflagellates from 2008-2012 (not including CPR data). D. Trends in total number of dinoflagellates from 2008-2012 (including CPR data).

Figure 6. Schematic representation of relevant temporal and spatial scales for key physical and ecological process in the sea. The orange box indicates what kind of processes can be explored with single Ocean Time Series measurements, and the green box, what kind of processes can be followed with the analysis of multiple Ocean Time Series. (Adapted from Dickey 2002)

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