Third Joint WMO-IOC Commission for Oceanography and Marine Meteorology (JCOMM) Workshop on Advances in Marine Climatology (CLIMAR-III)

*by the CLIMAR-III Organizing Committee**

Background

Marine climatology is increasingly recognized as vital to improving our characterization and understanding of climate change. The numerical models that we rely on to predict changes to our climate must be able to model the evolution of past climate, so research to develop long-term and accurate historical datasets has never been more important.

The Third JCOMM Workshop on Advances in Marine Climatology (CLIMAR-III) was held in Gdynia, Poland, 6-9 May 2008. It built on outcomes from two previous CLIMAR workshops in 1999 (WMO, 2003(a)) and 2003 (WMO, 2004; Parker et al. 2004) and from two workshops in the alternating and closely related Advances in the Use of Historical Marine Climate Data (MARCDAT) series in 2002 (Diaz et al., 2002) and 2005 (Kent et al., 2007). In addition to wide-ranging presentations and discussions of the latest scientific and technical developments, the CLIMAR workshops have formed the mechanism for updating *Advances in the Applications of Marine Climatology*. This widely cited JCOMM publication, which is a dynamic extension of the *Guide to the Applications of Marine Climatology* (WMO-No. 781, 1994), allows a rapid and wide dissemination of the latest information and techniques relevant to marine climatology.

Participants in CLIMAR-III

CLIMAR-III, like all the earlier workshops, brought together the community of scientists who strive to produce climate-quality datasets of surface meteorology, air-sea interaction and, increasingly, scientists developing datasets of the subsurface ocean: 69 participants from 19 countries (representing all but one WMO regional association) involved in the fields of applications of marine climatology, climatological data archival and retrieval, and climate research, including modelling.

Presentations

The participants were welcomed to Poland by the hosts—the Institute of Meteorology and Water Management (IMGW) in Gdynia and the Mayor of Gdynia—and also by representatives of the University of Gdansk and the National Committee of Sea Research.

The programme of scientific presentations (Table 1) opened with a series of talks and posters on the characteristics of observational data. Progress has been made in several areas, including improved characterization of measurements and datasets of ocean subsurface and sea-surface temperature (SST), wind and wave, surface humidity and air temperature. Also presented were methods to combine uncertainty information to give estimates of sampling requirements and adequacy assessments for meteorological observations by Voluntary Observing Ships (VOS).

The second session considered data-management issues. Recent advances and future plans were presented for the International Comprehensive Ocean-Atmosphere Data Set (ICOADS), the archive of VOS and other surface marine data. Further improvements to include an update extending back to 1662, building on a range of recent efforts to digitize historical logbooks and the incorporation of many new data sources. Planned improvements include more frequent updates for near-real-time applications, better quality flags, and the routine replacement of observations from the WMO Global Telecommunication System with delayed-mode data for improved data quality. Further presentations focused on a variety of data and metadata rescue projects, which are providing important new information for the pre-industrial era and for other data-sparse periods and regions. The vital links between marine climatology and operational meteorology and oceanography were highlighted in a series of talks focusing on JCOMM's contribution to global data collection, sharing and archival.

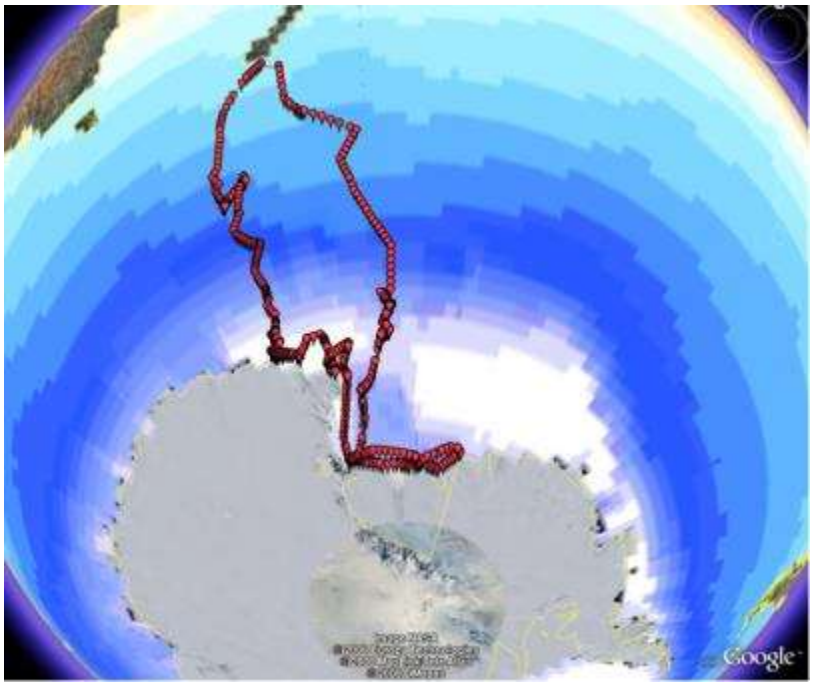
Research into new techniques for dataset production was presented in the third session. A diverse range of presentations covered modelling of diurnal variability, flux parameterization and innovative methods to construct gridded datasets from individual observations, both satellite and in situ, and for estimating and testing uncertainty measures for gridded datasets. Progress was also described toward developing climate quality SST from satellites with improved uncertainty estimation and facilities for intercomparison of data from a range of different satellites.

Session four presented new data products, including SST from a range of different satellites and a new global air-sea interaction dataset based on ICOADS. The need to intercompare the many datasets now available was recognized with presentations

illustrating the use of Geographic Information Systems to view data and a new intercomparison framework for global SST datasets. There is an ongoing need to incorporate research results, such as improved observation correction algorithms, into historical datasets. To this end, a proposal was presented that would produce a value-added version of ICOADS, incorporating bias adjustments and uncertainty information directly alongside observations, ensuring that users have access to the latest information.

Observation-based analyses of climate variability and change were presented in session five, illuminating the vital role of marine data in the detection and attribution of climate change. Several talks considered the changing heat content of the ocean, highlighting the importance of studies also extending beneath the ocean's surface. The wide variety of data types and applications was illustrated through presentations on SST, winds, waves, sea ice, ocean temperatures and salinity, sea level, and surface fluxes. The emerging use of this information to develop climate indices to summarize often complex information was presented.

The final session on new initiatives looked to the future, presenting a range of new and ongoing projects. Firstly the data requirements for the Intergovernmental Panel on Climate Change (IPCC) 5th Assessment Report were considered. Climate-related results from the recent first JCOMM Scientific and Technical Symposium on Storm Surges in October 2007, Republic of Korea (WMO, 2008) were described. Also discussed were upcoming historical re-analysis projects and related data-rescue efforts the Baltic Sea Experiment (BALTEX) Assessment of Climate Change, and other innovative new projects.



Data from the Terra Nova expedition of 1910-13 digitized from Simpson (1923). These records were from the first voyage (1910-11) the ship made to land the expedition during the Antarctic summer and then return to New Zealand. SST data have been added from HadISST (Rayner et al. 2003). Figure courtesy of Philip Brohan, Met Office Hadley Centre

Table 1. Programme of scientific presentations. Oral presentations, including both invited and contributed papers, made up most of workshop programme. Many of the presentations and posters can be found on the meeting Website.

Session	Title	Additional information
1	Characteristics of observational data	Characteristics of the data available from marine and oceanographic observing platforms, primarily encompassing Voluntary Observing Ships (VOS) and Research Vessels, buoys, and other automated in situ Ocean Data Acquisition Systems (ODAS); and secondarily considering some satellite data characteristics (6 oral and 7 poster)
2	Data management	Review of the flow of marine and oceanographic observational data within and related to JCOMM, best practices (including emerging standards for metadata, data quality, and quality control), historical and contemporary data and metadata rescue, and the status of and plans for ICOADS (9 oral and 6 poster)
3	Product development	Methodologies for the development of marine and oceanographic climate products, including data requirements, the utilization of quality controls and data quality assessments, and parameterizations (6 oral and 4 poster)
4	New climate products and intercomparisons	New marine and oceanographic climate products, including product and dataset intercomparisons (7 oral and 3 poster)
5	Observation-based analyses of climate variability and change	Applications of marine and oceanographic data to other major avenues of climate research, including indices, variability and global change (9 oral and 10 poster)
6	New initiatives	New initiatives originating within or outside JCOMM, including marine climate indices and applications of observational marine and oceanographic data to climate models and reanalyses (6 oral and 2 poster; e.g. Figure 2)

Plenary discussions

The presentation sessions were interleaved with four focused plenary discussion sessions: Marine data and data quality; Metadata and data management; Marine indices and products; and Workshop outcomes. A discussion summary is available on the marine climatology "Wiki" [Note: discontinued in 2015, no longer available]. A synthesis of results include:

- Recommendations to continue to engage other user communities (e.g. coastal and ecosystems) and to improve emerging synergies with the satellite community (e.g. enable improved access to the satellite community to required in situ information about extreme events);
- Recommendations that NMHSs engage actively in the recovery of historical marine data and metadata, including early ship logbooks, and that the scanned and digitized results be made as widely and openly available as possible. Data-rescue efforts must ensure adequate coordination across data disciplines (e.g. oceanographic and marine data rescue);
- Recommendations to emphasize the continuing importance of VOS data (including irreplaceable manual observations)—a critical datastream that is declining in coverage and also threatened by international developments related to ship security and commercial concerns;
- Recommendation supporting the importance of the construction of a value- added (or bias-adjusted) version of ICOADS;
- Recommendation that WMO expedite its new mandatory publication policy in order to facilitate access by international partners supporting WMO programmes and co-sponsored programmes.
- Recommendations to enhance use of the marine climatology Wiki, which already tracks consolidated recommendations from the previous CLIMAR and MARDAT workshops, for discussion of a proposed set of marine climate indices, and for finalization of the overall CLIMAR-III workshop discussion results.
- Recommendations to continue the two successful, alternating workshop series with a third MARCDAT around 2010 and a fourth CLIMAR around 2012. These successful workshops have all been self-funded, and as such could form a useful example for some other JCOMM and WMO events.

Outcomes

A special issue of the International Journal of Climatology of the Royal Meteorological Society will be published as one outcome from CLIMAR-III, representing the second revision of *Advances in the Applications of Marine Climatology* (WMO, 2003(b); 2005).

Authors of both the oral and poster sessions were encouraged to submit a full paper to this special journal issue, due by 31 December 2008. Publication is expected by approximately late 2009. Alternatively, opportunities are available for publication by any interested authors in a new Polish scientific journal, *Air & Water*.

A JCOMM Technical Report (CD-ROM and online) is also being published, which will include abstracts and electronic (pdf) presentations from interested authors. This Technical Report will be distributed to the participants and to all NMHSs.

Acknowledgements

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