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JCOMM PRESENTATION

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What is JCOMM?

JCOMM is the Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology. JCOMM coordinates, regulates and manages a fully integrated marine observing, data management and services system that uses state-of-the-art technologies and capabilities, is responsive to the evolving needs of all users of marine data and products, and includes an outreach programme to enhance the national capacity of all maritime countries.

The ocean observing networks managed by JCOMM in the polar regions, as elsewhere, comprise observations by a variety of different devices, including satellites, tide gauges, fixed and drifting buoys, moored arrays, subsurface floats, and oceanographic and meteorological observations from ships. The value of these individual data streams is greatly enhanced by their integration and subsequent assimilation into advanced numerical models to produce a variety of useful outputs.

The purpose of these observing systems in polar regions is twofold: (i) to provide products and services that create socio-economic benefits for the communities that live on polar coasts and in the hinterland (especially in the Arctic) and that rely on polar resources (in both the Arctic and the Antarctic); and (ii) to provide the measurements considered essential by the UN Framework Convention on Climate Change to improve understanding of the climate system and predictions of climate change. Among the products and services derived from JCOMM that bring socio-economic benefits to communities in polar regions are: (a) forecasts of weather, climate, and sea state (including waves, currents and sea ice cover); (b) information about living marine resources (especially plankton – the base of the food chain), pertinent to the fishing community; and (c) sensitivity maps and forecasts for such things as coastal erosion and the trajectories of oil spills. JCOMM data collected over the long-term from polar regions are essential to document critical changes in the environment, like the decade-long Arctic Oscillation, which affects weather and climate across the Arctic, Europe and North America, like the Circum-Antarctic Wave, which affects weather and climate in South Africa, Australia, New Zealand and South America, and like the thermohaline circulation, which affects climate globally.

JCOMM's polar ocean observing subsystems are components of the Global Ocean Observing System (GOOS), which is co-sponsored by ICSU, IOC, WMO and UNEP. At the same time they are the polar ocean components of the Global Climate Observing System (GCOS), which is also co-sponsored by ICSU. They contribute directly to the

goals of the Climate Variability Programme (CLIVAR) of the World Climate Research Programme (WCRP), and indirectly to the goals of the Global Ecosystem Variability Programme (GLOBEC) of the IGBP, and to the CO2 Programme of the International Global Carbon Project. JCOMM's components also contribute to the goals of the Ocean Theme of the Integrated Global Observing System (IGOS) Partnership, which brings together ICSU, IGBP, WCRP, IGFA, UNEP, FAO, IOC, WMO, UNESCO, and the space agencies (through the Committee on Earth Observation Satellites - CEOS). Through the Ocean Theme the IGOS Partners are creating a harmonious and coordinated approach to global observations for the benefit of the wider community, so as to avoid duplication and to accomplish the integration of data streams required for all measuring components to achieve their maximum effect.

What is the Significance of the IPY for JCOMM?

The IPY is expected to lead to the establishment of observing components many of which would be continued long after the IPY, thereby contributing to observations, data management and services in polar areas. Equally, the IPY is expected to enhance understanding of how processes taking place in the polar ocean influence the circulation of the global ocean, and hence have an influence on climate in far-flung areas. The present ocean observing is especially weak in polar regions. Thus the IPY offers a unique opportunity to improve and enhance the ocean observing systems in polar seas, so as to make their products and services more effective for local communities, and to facilitate ongoing research into long-term climate change.

Some specific requirements can be identified already. Among other things, we need vastly improved information about the temperature, salinity and other properties of the ocean's subsurface, to feed into numerical models of the ocean and climate systems. The required expansion in this information presently comes from the growing network of Argo floats collecting information about temperature and salinity from 2000m deep to the ocean surface. However, even when Argo is global these floats will not work under the sea-ice, thus leaving significant gaps in coverage in both the Arctic and the Southern Oceans. Hence, one of the key challenges for the IPY should be to develop and deploy the technology for under-ice Argo-type floats that would for the first time give a comprehensive year-round picture of circulation (i) in that part of the Southern Ocean where North Atlantic Deep Water wells up, and where Antarctic Intermediate Water and Antarctic Bottom Water form, and (ii) in the high Arctic Basin. The formation of water masses in these areas has a significant effect on ocean circulation globally, and hence on climate world-wide. Recent work by Sarmiento and others at Princeton (Nature, January 2004) shows that subsurface waters forming near the Polar Front in the Southern Ocean also influence ocean biology worldwide through their nutrient contents. Other technological solutions - like unmanned submersibles, or gliders, or fixed moorings - could also be part of an IPY programme to make observations under the ice.

Surface drifters providing information about sea surface temperature, marine meteorology, and ocean currents are important contributors to JCOMM. In polar regions they are deployed both in the water and on sea-ice. There has been substantial decline in

the number of such deployments, especially in the Southern Ocean. The advent of the IPY offers an opportunity to reverse this undesirable trend. These drifting buoys are managed by the scientists working through the International Arctic Buoy Programme (IABP) and the International Programme for Antarctic Buoys (IPAB).

Climate studies call for the reactivation of existing and the establishment of new sea level measurement stations, including those in polar regions, as part of the global sea-level system (GLOSS).

Sea-ice is a unique feature of polar regions and helps to control circulation. Much more needs to be done to harmonise the collection of sea-ice coverage, thickness and properties. More also needs doing to improve the management of sea-ice data, which will include long term archiving in JCOMM's Global Digital Sea Ice Data Bank (GDSIDB), for example.

While satellite data have greatly improved the coverage of the surface ocean, in situ data are still essential to see beneath the ocean surface and through the ice, as well as to calibrate the satellite data. Continuous measurements of ocean properties from ocean instruments are also essential to provide the fine-scale time resolution needed to capture short-term events that are missed by the slow repeat times of satellites. JCOMM is established to coordinate such in situ measurements.

Models of ocean circulation depend to a large degree for their accuracy on adequate ocean bathymetry, something that is not particularly well known in most of the polar regions. There is thus a pressing need to improve polar ocean bathymetry, as a first step in improving the output of advanced numerical models of the ocean and climate. For instance, around Antarctica the mid ocean ridge and the fracture zones that cut it steer the Antarctic Circumpolar Current. To improve models of the current we need improved swath bathymetric maps of these major topographic features. Improved polar bathymetry will help to ensure improved outputs from the Global Ocean Data Assimilation Experiment (GODAE).

There are some things we need from the Southern Ocean that we probably will not get in time for the IPY - for example ocean salinity from satellites (since the launches are not until 2008), and the ocean eddy field from the proposed Wide-Swath Ocean Altimeter (with a launch after 2007). In addition, it is likely that the activities of the IPY will identify new satellite remote sensing requirements that will influence future mission design leading to improved science and improved forecasts having socio-economic services benefits.

The net result of these and other improvements in the observing system will be improved services (including sea-ice services; marine safety services; and marine pollution response services) providing community benefits for coastal and marine populations.

How may JCOMM Contribute to Achieving the Goals of the IPY?

In addition to utilizing the various coordination groups and expert teams of JCOMM, and the associated suites of standards and documents, and network of data centres, JCOMM and GOOS can contribute to the success of the IPY in a variety of ways. The JCOMM Management Committee and the associated Scientific Steering Committees of GOOS and GCOS could review the relevant IPY proposals, establish contacts with the leading groups, and assist in promotion of these projects. Focal points can be appointed within JCOMM and GOOS to communicate with IPY mechanisms. Where there are gaps evident in the proposals JCOMM, GOOS and GCOS could identify the gaps in requirements and propose measures for addressing them.