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JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY

(Submitted by WMO)

Summary and purpose of document

To inform CGMS Members on activities of the Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) and its requirements for space-based observations.

DISCUSSION

Joint WMO/IOC Technical Commission

1. At its second session, Halifax, Canada, 19-27 September 2005, the Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) recognized that over the past two decades, satellite remote sensing had become a mature technology for measurements of many ocean variables. It recognized the evolving importance of remote sensing, and in particular satellite space-based data in the realization of the goals and work programme of the Commission. The role of ocean satellites in an ocean observing system for climate had been clearly stated at the OceanObs99 conference. Subsequently, the IGOS Partnership had published its "Ocean Theme" document, to plan the transition from research to operational environmental prediction of the oceans, critically linked to the availability of operational ocean satellites. The Commission recognized that potentially, many users of satellite-derived information were located in coastal areas, and that the role of the GOOS Regional Alliances (GRA) was crucial in facilitating the access and application of ocean satellite data by such users. Applications in coastal areas in particular required satellite products with high spatial resolution and rapid delivery times, which posed additional requirements on the satellite operators.

2. JCOMM noted and supported the significant role played by its satellite rapporteur during the intersessional period with regard to the Co-ordination Group for Meteorological Satellites (CGMS). In particular, the rapporteur had ensured that a new permanent action of the CGMS was to consider the IOC satellite data requirements, including those of the GRAs as noted above. The rapporteur has been working in conjunction with the JCOMMOPS Coordinator with the CBS ET-EGOS, and participated in its Rolling Review of Requirement process. In particular, they helped (i) in refining the JCOMM Statement Of Guidance for marine applications, and (ii) in providing input on satellite and in situ instrument performances.

3. The second JCOMM session decided to specify that each of the Programme Area Coordination Groups (observations, data management, and services PAs) have an appointed expert in satellite data, with two in the Observations Programme Area, bringing a meteorological and oceanographic perspective respectively. These four experts would form a crosscutting and integrative team on Satellite Data Requirements. It noted that one of these experts would meet with the Management Committee and would be responsible for organizing satellite/remote sensing requirements within the Commission, through coordination of the work and inputs of the other experts, as well as through liaison with other external bodies.

4. The development of JCOMMOPS had been conducted efficiently since its formal establishment at JCOMM-I in 2001. JCOMMOPS is based on existing international coordination mechanisms provided for the data buoy, ship based, and Argo profiling floats components of the observing system. JCOMMOPS provides essential day to day technical support as well as programme status and monitoring information facilitating: (i) decision making by programme managers; and (ii) implementation and operations of major JCOMM components of the operational or pre-operational in situ ocean observing system. JCOMM agreed that JCOMMOPS could act as host location for information developed by the satellite rapporteur and crosscutting Team on Satellite Data Requirements as well as for satellite information. The Commission therefore agreed to change JCOMMOPS Terms Of Reference to reflect this, bearing in mind that such services could only be made available provided that additional resources are committed.

JCOMM space-based observational requirements

The key observational requirements for JCOMM applications include the following ones. These satellite contributions are detailed in other international plans, but continued close coordination with the in situ systems is essential for comprehensive ocean observation.

- Sea Surface Temperature – continuation of the geostationary and low-earth-orbit meteorological satellite missions that produce merged sea surface temperature data products;
- Ocean Topography – continuation of a TOPEX/Poseidon-class high-precision altimetry mission (eg Jason-2 and its successor), and an ERS-ENVISAT-class altimeter;
- Ocean Vector Winds – appropriate satellite instruments (scatterometers and microwave imagers) to provide for good wind vector at low and high wind speed;
- Ocean Biology – continuation of global satellite missions for global ocean colour, such as SeaWIFS and MODIS, refining and coordinating the products from such missions;
- Sea Ice – continuation of the DMSP passive microwave systems, of Radarsat and of EOS/Terra and post-ENVISAT systems to provide long-term observations of ice extent and type. A key issue is funding for Radarsat-2.

Key challenges

The key knowledge challenges include:

- Precision Gravity Field or Geoid – to implement the GRACE/GOCE-class missions;

- Salinity – to develop and demonstrate space technologies for salinity;

- Sea Surface Temperature to provide global SST to better than +/- half a degree C.

- Ocean topography - The value of spaced-based altimeter measurements of sea surface height has now been clearly demonstrated by the TOPEX/Poseidon and Jason missions. Shorter space and time-scale phenomena at the ocean's mesoscale are not adequately sampled by a single altimeter, but the present configuration of Jason-1, Geosat follow-on, and Envisat, complementary altimeters does capture most of the signals of interest. Applications such as ocean eddy monitoring, surface current analysis, and ocean heat content for hurricane intensity forecasting require this higher resolution sampling. All these applications are of great interest for JCOMM. However, it is likely that Envisat and Geosat follow-on will cease without replacement, and Jason-2 Ocean Surface Topography Mission (OSTM) will be the only one operational altimeter. Overlap between missions is important for ensuring the accuracy and value of altimeter data for climate studies, and in particular for sea level rise monitoring, and for identifying instrument dependant problems. As for Jason-1, Jason-2 data will be complementary to in situ data, and in particular to (i) GSP-controlled tide gauges (for satellite validation), and (ii) Argo profiling floats (for combined in-situ/satellite products to provide for a complete description of the state of the ocean for ocean climate monitoring, e.g. determining how much of the sea level rise is due to thermal expansion). The planned Sentinel-3 altimeter will be adequate for shorter term forecasting, but the Sentinel-3 altimeter will not fly in the same orbit as TOPEX/Poseidon and Jason; and for monitoring long-term sea level change, continuation of precision altimeter missions in the TOPEX/Poseidon/Jason orbit is necessary. Jason follow-on altimeter missions (Ocean Surface Topography Mission, OSTM) are necessary to continue the long-term sea level record.

- Ocean surface wind vectors

  Both polarimetric microwave imagers and scatterometers are needed to derive surface vector wind at all scales. Scatterometer provides for good wind vector including wind speed and direction in particular at low and median wind speed. Polarimetric microwave imager provides for good wind vector at high wind speed. Scatterometry is less affected by precipitation contamination and provides for higher spatial resolution data. JCOMM operational applications as well as research applications require high spatial resolution data.

Research will provide insight regarding the need to develop a blended system of scatterometer and polarimetric radiometer winds, expecting that a merged product may have more strengths than any individual data set (e.g. SST derived from IR and microwave products).