

REPORT ON AUSTRALIAN ACTIVITIES TO THE CEOS WGCV#21

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This report covers 5 different activities

- 1. Jason-1 and TOPEX/Poseidon calibration**
- 2. MERIS (on ENVISAT) validation of ocean colour products**
- 3. SST validation in Australian waters**
- 4. Sea HARRE**
- 5. Validation of LST derived from the AATSR instrument on ENVISAT.**

1. Jason-1 and TOPEX/Poseidon calibration

1.1 Absolute bias measurements in Bass Strait

Seven GPS buoy deployments were performed at Jason-1/T/P overflight times near Burnie in Bass Strait from September, 2001 through May, 2002.

Results of this work are “in press” (Marine Geodesy special issue on Jason-1 calibration) and have been used in the absolute bias determination used by the Jason-1 project.

In addition, a current meter array was deployed from December, 2001 through September 2002. The data from these instruments has been used, in conjunction with the data from the GPS buoy deployments and the data from a Sutron Aquatrak tide gauge in Burnie to produce a high accuracy sea surface height time series, allowing us to fill in the gaps between the GPS buoy deployments. It also allows us to recalculate the T/P calibration over the whole mission, and to calculate Jason-1 calibration for more recent cycles.

1.2. Bias drift determination from multiple gauges in the Pacific

A number of the Australian-run tide gauges now have collocated GPS receivers, and more are due to have collocated receivers in the near future. We have done a preliminary assessment of the tide gauge and GPS data from these installations. The time series are not yet long enough to make realistic estimates of the bias drift.

2. MERIS (on ENVISAT) validation of ocean colour products

For the Australian MERIS validation project (AO595) optical and biogeochemical properties were measured in tropical, subtropical and temperate Australian estuaries, coastal and ocean waters, during 5 field campaigns in 2002-2003. Fieldwork locations were in the coastal waters near Perth (West Australia), Hobart (Tasmania), Brisbane (Queensland) and the coastal waters of the Great Barrier Reef (Queensland). These waters represent a large range of water types and can thus function as a indication of the validity of MERIS optical water quality and geophysical products for a range of Australian waters.

Water-leaving reflectances were measured using in situ profiling spectroradiometers (TRIOS Ramses or HOBILABS Hydorad-2). Inherent optical properties such as spectral absorption, scattering and backscattering coefficients were measured *in situ* using a WETLabs ac9 and a HOBILabs Hydroscat-6, respectively. These optical measurements were accompanied by a set of discrete optical and biogeochemical measurements such as particulate and CDOM absorption, HPLC pigments concentration, TSM dry weight and Total Organic Carbon concentrations. Relationships between Inherent Optical Properties and biogeochemical quantities are presented on the various types of waters explored.

Where match-ups become available, the MERIS L2 optical water quality and geophysical products are compared to in situ measurements of water leaving reflectances, chlorophyll *a*, TSM and CDOM absorption.

CSIRO is creating a MODIS based direct broadcast reception and processing system for all Australian coastal and ocean waters, initially based on the NASA algorithms. Initial comparisons will be presented between MERIS, MODIS Terra and MODIS Aqua L2 products where they co-occur.

3. SST validation in Australian waters

Instruments mounted on an Australian research vessel and an operational passenger ferry have provided two extensive data sets that have been used to assess the performance of eight different satellite instruments that provide estimates of Sea Surface Temperature (SST). These instruments are ATSR-2, AATSR, AMSR-E, MODIS (Terra), MODIS (Aqua), GLI, and the AVHRR instruments on NOAA-12 and NOAA-16. The DAR011 radiometer was deployed on the RV Southern Surveyor for a 32-day cruise in the Gulf of Carpentaria. The radiometer data were complemented with a full set of meteorological and thermosalinograph data throughout the cruise. Twenty AATSR scenes were obtained over the Gulf of Carpentaria and ten of these provided coincident data with the ship location. Four coincidences were cloud-free, providing good match-ups with the AATSR SST estimates. Infrared and microwave data from the other seven satellite instruments allowed a similar analysis to be undertaken for each system. The data sets also allowed an inter-comparison of SST estimates over large spatial areas.

A radiometer and bulk SST measuring device have been installed on a passenger ferry that makes regular trips between the west Australian coast and Rottnest Island. 1134 transects have been made over the eight-month period between October 2002 and May 2003. While there have been some teething problems with the radiometer the bulk SST measurements have provided a large valuable data set for comparisons with AATSR measurements. 270 cloud-free coincidences between the AATSR and the ferry data were obtained. The ferry data have also been supplied to JAXA and University of Miami for validation of the SSTs derived from GLI and the two MODIS instruments respectively.

4. SeaHARRE-II

Australian scientists are participating in the Second SeaWiFS HPLC Analysis Round-Robin Experiment (SeaHARRE-II). Data samples were delivered to CSIRO in Hobart and were processed during February 2003. The results will be compared with those from seven other

international laboratories analyzing the data samples. A meeting to discuss final results will be held in France at the end of 2003.

5. Validation of LST derived from the AATSR instrument on ENVISAT.

CSIRO continues to operate three fully instrumented land validation sites for Land Surface Temperature (LST). These are in three different biomes and have provided critical data to the AATSR program allowing the validation of the LST algorithms.