

GAMBLE – A Thematic Network to Consider Future Developments in Satellite Altimetry

Workshop for Theme 2 – Sea State Applications

Venue: Istituto Studio Dinamica Grandi Masse, S. Polo 1364, 30125 Venice.

Date: Monday 30th September 0900-1630

Workshop Aims:

The Purpose of this GAMBLE workshop is look ahead - to hold discussions and provide preliminary recommendations on how the needs of the scientific and operational oceanographic community can be best met in terms of:

- Processing and provision of sea state data from present and planned altimeter missions (JASON, TOPEX, ERS2, ENVISAT, Geosat Follow On, JASON-2, NPOESS,....)
- Defining the ideal characteristics of new altimeter missions beyond 2005. In addition we aim to provide recommendations for studies that are required to support the above recommendations.

Workshop Format:

The intention is to provide an opportunity for in-depth discussions, rather than a time to listen to presentations. Thus the draft agenda allocates a significant proportion of the time for discussion groups themed along applications.

Provisionally, these themes are:

- **Climatologies,**
- **Forecasting/now-casting,**
- **Process/event studies (e.g. air-sea flux studies, characterizing tropical storms)**
- **Coastal studies**

Agenda

09:30 **Welcome** and local arrangements - Luigi Cavaleri, ISDGM

09:45 **Aims of Meeting** - David Cotton, Satellite Observing Systems (SOS)

10:00 **Review of Interim Gamble Report** - Luigi Cavaleri

10:30 **Coffee break**

11:00 **Priorities for developments in altimeter sea state data:**

Peter Janssen, ECMWF:

1. error estimation of model, buoy and altimeter wave height.

2. benefit of flying an additional altimeter on wave height analysis

Jim Gunson UKMO: Not attending but see statement of interests in appendix

John-Michel Lefevre, Meteo France: Priorities for Meteo-France

Johannes Guddall, DNMI/Max Wave: Suggested use of altimetry in Storm Surge Forecasting connected with Tropical Cyclones.

Susanne Lehner, DLR: Global statistics using SAR data

Francisco Ocampo-Torres, CICESE (Mexico):

Stefano Tibaldi, University of Bologna:

Wolfgang Rostentahl, GKSS,

12:30 **Lunch**

14:00 -15:00 **Discussion groups**, to provide recommendations for:

- future mission scenarios (instruments, orbits,...)

- data provision and processing of the existing and approved missions

- necessary studies (numerical studies, assimilation / simulation studies).

- **Climatology**
- **Forecasting**
- **Process / event studies (Hurricanes, large waves, air/sea fluxes)**
- **Coastal Studies**

15:30 **Combined group discussion** to agree

- What work should be carried out in second part of Work Package 3

- Contributions to final GAMBLE Report - Requirements for Sea State data.

16:30 - **Close**

● Appendices:

Suggested use of altimetry in Storm Surge Forecasting connected with Tropical Cyclones.

Submitted to the GAMBLE meeting, Venice, 30 September,
By Johannes Guddal.

Abstract.

Storm surges connected with landfalls of Tropical Cyclones are perhaps the most dramatic, damaging and suddenly occurring between natural disasters. Up to half a million people are believed to have perished only through one night with a storm surge hitting Bangladesh. The prominent drivers of extreme storm surges in the tropics are the tropical cyclones and their wind fields. These are intensive atmospheric cyclones, with sustained wind speeds even beyond 100kts, and propagating rapidly over large distances. Conventional forecasting of cyclone developments seeks to predict the intensity and movement track of the cyclone, with a rough parameterization of the wind/pressure fields around the eye of the cyclone. Wind/pressure fields are necessary forcing fields for the numerical models to predict storm surges. The state-of-art leaves much to be improved regarding the quality of such forecasting. This document suggests the inclusion of global tropical altimetry, and, optionally scatterometry, to improve the accuracy of storm surge forecasting.

Possible inclusion of altimetry and scatterometry.

The operational mode of a storm surge forecasting model has the following phasing:

1. Initialization, which normally means using the prognostic fields from a previous prognosis or a 'warming up' of the model with analytical wind/pressure fields.
2. Provision of forcing fields for wind/pressure, normally from a large responsible computer center such as the Japan Meteorological Agency.
3. Ocean Model operation 2 – 5 days, predicting future development of sea level including tides in a region such as the South China Sea.
4. Performing verification statistics by comparison with tidal gauges etc.

It is strongly believed that inclusion of altimetry (and scatterometry) becomes beneficial under phase 1 and 4, perhaps in phase 2 as well. Much of the lack of accuracy in sea level forecasting is due to inadequate initialization, as well as a too rough description of the acting wind fields.

Altimetry/scatterometry products that may help in storm surge forecasting.

Near real time gridded sea level and wind fields could be 'sold' to responsible centers in the Tropical Cyclone Programme, or to regional/national forecasting agencies in closer contact with disaster mitigation mechanisms. These would again be used to update the corresponding numerical fields, and thereby have a positive impact on the forecasting accuracy.

Statement Summarising the UK Meteorological (Wave Prediction and Modelling) Interests with Respect to GAMBLE

Submitted to the GAMBLE meeting, Venice, 30 September,
By Jim Gunson

The Met Office runs a spectral wave model to provide sea-state forecasts and hindcasts for a variety of customer needs. The model is run both globally and regionally for the European and UK waters. An important need is the accurate representation of long-period swell propagation. Good quality satellite observations of wave height and wind speed from an altimeter, and the two-dimensional wave energy spectra from the SAR, are highly desirable. A synergy of the wave model with the satellite observations over regions of swell generation would greatly improve the sea-state forecasts.