GAMBLE

Global **A**ltimeter **M**easurements **B**y **L**eading **E**uropeans

A Thematic Network under Framework 5 - Energy, Environment and Sustainable Development.

Workshop for Theme 2- Sea State Applications

ISDGM, Venice - 30th September 2002

The European Commission
Community Research
Fifth Framework Programme
1998 - 2002

The European Commission
Community Research
Energy, Environment
and Sustainable Development

The GAMBLE Themes

1 - Sea Surface Height. CLS

2 - Sea State. ISDGM

3 - Orbit Determination and Satellite Tracking. DUT

4 - Marine Operations. SOS

5 - Research Recommendations. SOC

6 - Constellation Optimisation. CNES

GAMBLE Meetings

21/03/02	**Kick-Off** (LEGOS, Toulouse)
30/09/02	**Sea State Workshop** (ISDGM, Venice) (To provide recommendations for multi-satellite measurements)
7-8/11/02	**Joint Orbits / Sea Surface Height Workshop** (DUT, Delft)) (To provide recommendations for multi-satellite measurements and discuss how to optimise sampling, crossover corrections)
~01/03	**GAMBLE Mid Term Review**
~03/03	**Marine Operator's Workshop** (To provide recommendations from an operational prospective)
~06/03	**Constellation Optimisation Workshop** (To provide recommendations for orbits and satellite payloads)
~09/03	**Final Workshop**

Workshop Aims To:

- *Identify priorities in future requirements for altimeter sea-state data.*
- *Establish data specifications.*

and so provide initial recommendations for:

- *Processing and provision of sea state date from present and future missions (TOPEX,JASON, ERS-2,ENVISAT, Geosat Follow On, JASON-2, NPOESS, Altika, GANDER, SWIMSAT …..)*
- *Studies required to support recommendations for future missions*

Workshop Format

- ***An opportunity for discussion:***
  - *Morning - Presentations*
    - *Review of Interim Report (Luigi)*
    - *Future user requirements / priorities*
  - *Afternoon - Separate into Discussion Groups*
    - *Data Priorities /Data specifications.*
    - *Recommendations for further studies.*
    - *Tentative initial altimeter / mission specifications.*
  - *Close*
    - *What are the next steps?*

Discussion Groups

We suggest 2 or 3 discussion groups:

- Forecasting / Nowcasting
- Extreme events / process studies
- Climatology
- Coastal Studies

Each group to provide recommendations for:

- Data requirements and specifications.
- Research work required to support detailed mission specifications.

Discussion Groups

Forecasting/ Nowcasting	Climatology	Process / Event Studies
Luigi Cavaleri	David Cotton	Peter Challenor
Peter Janssen	David Woolf	Johannes Guddall
Jean-Michel Lefevre		Daniele Hauser
Stefano Tibaldi		Susanne Lehner
Daniele Hauser		*Laurent Phalippou*
Johannes Guddall		*Eric Thouvenot*
Tom Allan		*Paco Ocampo Torres*

Discussion Groups

As a ***support*** to aid the discussion we have provided 2 tables for each group:

- Data requirements / specifications
- Altimeter / mission characteristics

Discussion Groups

- *What are the data requirements?*
  - *Interim GAMBLE Sea State Requirements Report (compiled by ISDGM with input from SOC, ISDGM, SOS, CETP)*
  - *Requirements from ECMWF, UKMO, DNMI/MaxWave, DLR, Meteo-France, CICESE,….*
- *Use to derive:*
  - *Accuracy specifications.*
  - *Sampling requirements.*
  - *Need for new parameters?*
- *What supporting studies are necessary?*

2.1 Climatologies

Application	Parameter	Optimum requirements				Threshold requirements			
		Spatial res (km)	Time res	latency	accuracy	Spatial res (km)	Time res	latency	accuracy
Climate Research	Sig. wave hgt Combined / windsea / swell?	50	6hr	months	0.1 m	100	1 mon	3 months	0.1 m
Offshore appls. (climate)	Sig. wave ht. Combined / windsea / swell?	10	6 hr	years	0.1 m	1° x 1°	1 mon	Years	0.1 m
Climate Research	Wind speed	100	10d	10d	0.5 mm yr^{-1}	100	10d	10d	1 mm yr^{-1}
Offshore appls. (climate)	Wind speed	100	NA	NA	1 cm	500	NA	NA	5-10 cm
Climate Research	Wave period Combined / windsea / swell?					200	5d	5d	4 cm
Offshore appls. (climate)	Wave period Combined / windsea / swell?	10	6 hr	years	0.1 s	1° x 1°	1 mon	Years	0.2 s

Discussion Groups

- ***What Altimeter / Orbit Configurations?***

  See briefing note from ALCATEL

  - *What "Type"?*
    - *Basic - AltiKa/GANDER; Doppler Delay; JASON/ENVISAT class; (I)SAR mode; SIRAL - Cryosat, Real Aperture Radar - SWIMSAT; SWATH capability,.....*
  - *Single or dual frequency?*
  - *What frequency (Ku /Ka, C / S)*
  - *Constellation?*
    - *Large (5+?), small (<=3), or single, more sophisticated satellite.*
  - *What orbit arrangement?*
    - *Dense spatial coverage and longer repeat period, or more frequent sampling with larger track separation?*
    - *Even coverage, or focussed sampling?*
    - *Repeat orbits required?*
    - *What latitude coverage requirements?*

- *What supporting studies are necessary?*

3.4 Event / Process Studies

Application	Parameter	Critical Steps, Auxilary Data	Relevant Future Develop-ments	Main Freq	2nd Freq	Altimeter Type	Mission characteristics			
							Constellation type	No sats	Repeat cycle	Accurate orbit?
Event and feature studies	e.g. Signi ficant wave height									
Tropical Cyclones / Hurricanes										
Individual Extreme Waves										

What Next?

- Gamble Mid Term Review - Jan/Feb 2003
- Operators Workshop - Spring 2003

- WP 3 Finishes Apr 2003
  - Deliverable: “Final Report on Sea State Error Budgets / Impact of GAMBLE on Sea State Analysis and Forecasting”

What inputs are required for this report?