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

Workshop for Themes 1 and 3:
Sea surface height error budget and feature dectibility
Orbit determination and satellite tracking

Hosted by:
Delft Institute for Earth-Oriented Space Research, Delft University of Technology
Venue:
Faculty of Technology, Policy and Management, Jaffalaan 5, Delft
Date:
November 7/8 2002

Attending:

Pierre-Yves LeTraon	CLS	letraon@cls.fr
Christian Le Provost	CNES	Christian.Le-Provost@cnes.fr
Baptiste Mourre	CNES	mourre@notos.cst.cnes.fr
Yves Menard	CNES	Yves.Menard@cnes.fr
Eric Thouvenot	CNES	eric.thouvenot@cnes.fr
Patrick Vincent	CNES	Patrick.Vincent@cnes.fr
Pierre Bahurel	CNES	bahurel@thor.cst.cnes.fr
Lucy Mathers	DEOS	L.Mathers@geo.tudelft.nl
Ejo Schrama	DEOS	E.J.O.Schrama@geo.tudelft.nl
Eelco Doornbos	DEOS	eelco@deos.tudelft.nl
Marc Naeije	DEOS	marc@deos.tudelft.nl
Remko Scharroo	DEOS/NOAA	remko.scharroo@noaa.gov
Ron Noomen	DEOS	ron.noomen@lr.tudelft.nl
Pieter Visser	DEOS	Pieter.visser@lr.tudelft.nl
Jose vd IJssel	DEOS	jose@deos.tudelft.nl
Sander Goossens	DEOS	sander@deos.tudelft.nl
Karel Wakker	DEOS	K.F.Wakker@deos.tudelft.nl
Boudewijn Ambrosius	DEOS	boudewijn.ambrosius@lr.tudelft.nl
Detlev Mueller	DKRZ	detlev.mueller@dkrz.de
Michiel Otten	ESA/ESOC	michiel.otten@esa.int
Drazen Svehla	TUM	svehla@bv.tum.de
Cees Leenaars	Leenaars	ceesl@xs4all.nl
Jean-Michel Brankart	LEGI-CNRS	Jean-Michel.Brankart@hmg.inpg.fr
Phil Moore	NCL	Philip.Moore@newcastle.ac.uk
CK Shum	OSU	ckshum@osu.edu
Philip Woodworth	POL	plw@pol.ac.uk
Keith Hanes	ESSC	kh@mail.nerc-essc.ac.uk
Peter Challenor	SOC	P.Challenor@soc.soton.ac.uk
Tom Allan	SOS	tom@satobsys.co.uk
David Cotton	SOS	d.cotton@satobsys.co.uk
Maarten Meerman	SSTL	m.meerman@sstl.co.uk

Agenda day 1: Thursday, November 7

09:30 Opening
- Welcome and opening: K. Wakker
- Introduction and local arrangements: E. Doornbos
- Purpose of the meeting: Y. Menard / D. Cotton

10:00 Overview of new altimeter projects
- Jason-2: Y. Menard
- WSOA: E. Thouvenot
- Cryosat: P. Vincent
- AltiKa: P. Vincent
- Gander: D. Cotton or T. Allan
- Bistatic Delay Doppler Altimeter: K. Raney and C. Shum

11:15 Coffee break

11:30 Results from simulations on the contribution of present/future altimeter missions
- LEGI: J.M. Brankart
- LEGOS: B. Mourre
- SOC: P. Challenor
- Discussion

12:30 Lunch

14:00 Refined requirements for sea level measurements (mainly sampling issues)
- Climate/mesoscale and operational oceanography applications: P.Y. Le Traon
- Coastal/tidal applications: C. Le Provost
- Discussion

15:00 Coffee Break

15:30 Requirements for SSH measurement errors
- General requirements (noise, orbit): P.Y. Le Traon
- Specific discussion on the choice of orbit (heliosynchroneous or not): C. Le Provost
- Gander specific issues : dual-frequency, no radiometer, non-repeat orbit: D. Cotton, P. Challenor

16:20 Summary, conclusions and recommendations of day 1
- GAMBLE recommendations for future altimeter missions

17:00 Close

19:00 Group dinner in Delft

Agenda day 2: Friday, November 8

09:00 Summary of future requirements affecting orbit choice and orbit determination for Themes 1 and 2
- Theme 1: P.Y. Le Traon
- Theme 2: D. Cotton

09:30 Presentations on future developments in high precision satellite tracking for low-Earth satellites:
- SLR: R. Noomen
- DORIS: P. Vincent
- GPS: D. Svehla
- GPS receiver for GANDER: M. Meerman

10:30 Coffee Break

11:00 Opportunity for presentations on future developments in orbit determination and related issues, for example:
- Aspects of Precise Orbit Determination for Geodetic and Altimetric Missions: Current Issues and Future Trends: P. Moore
- Orbit choices and OD using kinematic approach: C. Shum and D. Chambers
- Gravity models: P. Visser
- Non-gravitational force models: E. Doornbos

12:30 Lunch

14:00 Guided discussion on orbit determination and tracking, providing preliminary recommendations on:
- Tracking systems
- Orbit choice and orbit determination strategy for future missions

15:30 Coffee break

15:45 Discussion on summary, conclusions and recommendations of the workshop, and to establish:
- Contributions to GAMBLE reports on theme 1 and 3.
- What work should be carried out in second phase of both work packages.

16:30 Close

Minutes

Day 1

1. Opening

- Karel Wakker welcomed the participants and opened the meeting.
- Eelco Doornbos presented the agenda and arrangements.
- David Cotton presented the purpose of the meeting.

2. Overview of new altimeter projects

- Patrick Vincent presented the Jason-2 mission.
- Eric Thouvenot presented the WSOA (presentation available online).
- Patrick Vincent presented the Cryosat mission.
- Patrick Vincent presented the Altika mission (presentation available online).
- David Cotton presented the GANDER mission (presentation available online).
- C.K. Shum presented the bistatic delay Doppler altimeter and mission concepts (presentation available online).

3. Results from simulations on the contribution of present/future altimeter missions

- Jean-Michel Brankart presented recent results at LEGI.
- Baptiste Mourre gave a presentation on the work at LEGOS-CNES about altimetry and coastal ocean dynamics (presentation available online).
- Peter Challenor gave a presentation on the sampling of ocean eddies with satellite altimetry.

4. Refined requirements for SSH measurement errors

- Pierre-Yves Le Traon presented climate/mesoscale and operational oceanography applications.
- Christian Le Provost presented coastal/tidal applications and gave a presentation discussing the choice of orbit.

5. Requirements for SSH measurement errors

- Pierre-Yves Le Traon presented the general requirements.
- David Cotton presented the GANDER specific issues (presentation available online).

6. Summary, conclusions and recommendations of day 1

- Patrick Vincent presented a summar y of the issues and presented scenarios for future missions. The outcome of the discussion is presented in the interim report for GAMBLE WP2.

Day 2

7. Summary of future requirements affecting orbit choice and orbit determination for themes 1 and 2

- Pierre-Yves Le Traon presented the theme 1 requirements.
- David Cotton presented the theme 2 requirements (presentation available online).

8. Presentations on future developments in high precision satellite tracking for low-Earth satellites

- Ron Noomen presented the current status and future developments in Satellite Laser Ranging (SLR) (presentation available online).
- Patrick Vincent discussed the ongoing developments and applications of the DORIS tracking system (presentation available online).
- Dražen Švehla presented the applications of GPS tracking on low-Earth satellites, including the various orbit determination strategies available with this measurement type (presentation available online) .
- Maarten (Max) Meerman gave a presentation on the development of miniaturized GPS hardware at SSTL (presentation available online).

9. Presentations on future developments in orbit determination and related issues

- Phil Moore gave a presentation titled “Aspects of precise orbit determination for geodetic and altimetric missions: current issues and future trends” (presentation available online).
- C.K. Shum gave a presentation on orbit choices and orbit issues (presentation available online).
- Pieter Visser presented the role of gravity models (presentation available online).
- Eelco Doornbos gave a presentation on non-gravitational force models in orbit determination of altimetry satellites (presentation available online).

10. Guided discussion on orbit determination and tracking

- Ejo Schrama lead the discussion on the choice of tracking system and orbit determination strategy for the future missions. Notes by Marc Naeije are available online.

11. Summary and conclusions

- David Cotton presented a short summary and conclusion. He also thanked the participants and organization. The interim reports for WP2 and WP4 are currently available on www.altimetrie.net. The deadline for the final reports of these work packages is April 2003.