



**The Soil Moisture and Ocean Salinity (SMOS)
Science Advisory Group (SAG)**

Minutes of the Twenty-Fourth Meeting

20-21 November 2008

Leeuwenhorst Centre, Noordwijkerhout, Netherlands

Chair: Y. Kerr

Participants:

SAG Members: E. Anterrieu (EA), I. Corbella (IC), J. Font (JF), T. Jackson (TJ),
Y. Kerr (YK), M. Peichl (MP), N. Reul (NR), N. Skou (NS),
P. Waldteufel (PW), D. Le Vine (DL), G. Lagerloef (GL), W. Wagner (WW),
C. Mätzler (CM)

ESA:	A. Hahne (AH)	EOP-PS
	M. Brown (MB)	EOP-PTR
	M. Zundo (MZ) (part time)	EOP-PEP
	M. Drusch (MDru)	EOP-SME
	C. Bouzinac (CB)	EOP-SME
	S. Delwart (SD)	EOP-PEL
	J. Benveniste (JB)	EOP-SER
	M. Drinkwater (MD) (part-time)	EOP-SM
	S. Mecklenburg (SM)	EOP-GM
	M. Martin-Neira (MM)	TEC-ETP
	A. Colliander (AC)	TEC-ETM

Excused: D. Stammer (DS), P.Y. Le Traon, J. Grandell (JG)

Distribution List:

All meeting participants

ESA: V. Liebig (D/EOP), S. Briggs (EOP-S), R. Haagmans (EOP-SME),
P. Wursteisen (EOP-SMS), E-A. Herland (EOP-SA), M. Doherty (EOP-SE),
G. Kohlhammer (EOP-G), H. Laur (EOP-GM), R. Zobl (EOP-P),

EOP-SM-SMOS-SAG-MIN-0024
(EOP-SM/1921/CB-ag)

1. Introduction (YK)

YK welcomed the participants and the agenda was completed (see Agenda in Annex 1).

All presentations are available at <ftp://ftp.estec.esa.nl> in the folder SAG24.

Login: smos-sag Password: MIRAS69-3

Or <ftp://smos-sag:MIRAS69-3@ftp.estec.esa.nl/SAG24/>

2. Actions Review (CB)

CB reviewed the past actions (closed recently or still open).

Action	No	Actionee	Status
To coordinate RFI related activities	19.10	D. LeVine & N. Skou	ongoing
To provide evidences of RFI to DL & NS & YK	19.11	All	ongoing
Give natural range of values and general statistical analysis for 4 th Stokes parameter at antenna level from measurements done over various surfaces	21.1	N. Skou	ongoing
To provide a technote to state what is used as frame/reference at the antenna level by the project regarding angles for L1 processor and send it to SAG members	21.2	Y. Kerr, M. Zundo, P. Waldteufel and B. Duesmann	Ongoing (the final version is almost ready, only missing one graph improvement)
Give specific SMOS information regarding RFI issues and possible implications and resolutions	21.7	N. Skou (C. Ruf)	Closed (report sent to SMOS in oct2008)
Flights data over the mountains during the Cal-Val campaigns should be made available for analysis of the 3 rd Stokes parameter to look at topography effects (EuroSTARRS + rehearsal campaigns)	22.2	C. Bouzinac (data) & D. Levine (analysis)	Ongoing (resend EuroSTARRS data over the Pyrenees and send EMIRAD data over Vercors)
Write conclusions on galactic contributions and send to SAG members	22.3	D. Levine	Ongoing (report in preparation)
Update technote on the use of Reich team galactic hemispheric maps and data	22.5	S. Delwart & N. Floury	Ongoing (published but not merged)

From the ongoing action 19.11, two new actions are requested :

Action 24.1: YK or MP to send report (in German) on RFI measurements made in March 2008 over the Danube validation area to AH and NS.

Action 24.2: TJ to send report on SMAP activities related to RFI when available.

3. SMOS Project Status (AH/MM)

Satellite: fully tested and stored; remaining: update of payload software, repeat of adaptor fit check with launch adaptor, system validation test; satellite is ready for launch

FOS: testing in progress; final test campaign early next year (LEOP dress rehearsal and long term test)

Acquisition stations: station at ESAC is tracking Demeter; Svalbard station final acceptance is under preparation (~January 2009)

DPGS: version 1.1 testing completed; version 2.0 acceptance test scheduled for December; version 3.0 envisaged for March 2009 (including NRT) expected to be late; product quality control, monitoring facility reasonably up-to-date

Processors: level-2 soil moisture expected 12/2008, level-2 ocean salinity 01/2009, NRT delivered

Calibration Expert Centre: almost completed, comprehensive distribution of tools and documentation will start in March 2009

The new official launch date is 16 July 2009.

4. Noise Injection Radiometer measurements in Maxwell chamber (AC)

The results presented were impressive. It was found that the variations were only of 50 mK variations per NIR channel, and 8 mK when all channels were averaged. A bias of 195 mK bias was identified but it can be due to air stratification in the "pyramid" area of the anechoic chamber. The sensitivity is 16-47 mK; no thermal dependency was identified in units (but with short injection time).

5. Level-1 Processor Status (MZ)

(V1.6.x) L1a baseline implemented (no change), L1b baseline implemented, L1c minor updates, algorithm has been stable since V1.5; V2.0 final delivery of launch version 12/2008; Gibbs1 is the baseline with Gibbs2 being an option; it is currently not possible to run Gibbs1 over land and Gibbs2 over ocean (SD), should this be flexible? The difference should be studied first: Gibbs1/Gibbs2 informative report should be sent to SAG members (EA; action 24.3).

Bias and RMS in V1.6 are reduced when compared against V1.5 (error budget through SEPS-GS).

The flat target is implemented (no alternative choice); the removal of foreign sources is implemented but still requires some tests. It was found that the angular rates were in different units (rad and deg).

SEPS-GS is to be released in Dec 2008. The RFI flagging method proposed by DL has been implemented. The failure case is currently being studied by EA (to be presented at the next SAG meeting).

6. Level-2 Processors Status (SD/JF/YK)

SM: uniform scene completed, complex scene in progress; SSS: hand-over from ACRI to Argans, complex and uniform scene algorithms completed

7. Data Distribution Plan (SD for NW)

8. Validation Campaigns Discussion

AH expects guidelines for campaigns as - depending on the launch date - ground equipment (boats, airplanes, ground teams) might or might not be available over surfaces, which might or might not be adequate (i.e. snow covered frozen soil). An alternative option for deep winter (Northern Hemisphere) should be studied. As if the set of instruments is fine, snow and frozen soil should be avoided during the validation campaign and could result in a flight delay (AH suggests to carry out the field campaign no matter what the conditions are, but skipping all the non relevant areas). One of the outputs of the rehearsal campaign was that the flight plans are fine but - as expected (it was only a rehearsal) - a longer period of aircraft acquisition is required (range of surface conditions). The idea is to make acquisition on both the trip South and the return trip North, staying possibly a little longer in Valencia. Costs involved have to be evaluated (feasibility). L2OS validation is not well covered in this plan but is supposed to be supported by the French funded CAROLS campaign (AH). A better coordination between ESA and CNES activities with aircraft is absolutely necessary on a regular basis (Malcolm Davidson: action 24.4 to contact Eric Thouvenot to coordinate activities). NS proposed a working meeting to compare the processing tools and to educate users on the EMIRAD / HUT2D data processing (NS; action 24.5 to organise this working meeting before the next SMOS cal/val meeting in March 2009).

TJ reiterated his feelings on the absolute necessity to have aircraft match-ups to calibrate Tb.

In general, ESA does not allow any publication about SMOS data before the end of the commissioning phase (AH). In case of exception to this rule, the publication will have to be rubber-stamped by the project and mission managers.

The next International Soil Moisture Working Group meeting will be in Lisbon on 10-11 March 2009.

The next SMOS Validation and Retrieval Team meeting will be in Lisbon on 11-13 March 2009.

Tools to read and view SMOS data products should be available in March 2009 (SD; action 24.6 to provide a list of these tools indicating where to get them in March 2009).

A campaign focussing on surface roughness with the airborne PALS instrument will be soon performed to study the effect of strong winds (GL).

9. Dual/Full polarisation modes in commission and operation phases: discussion

The SAG members confirmed their wish to the SMOS project (Recommendation 23.2) to alternate dual pol and full pol modes on a weekly basis during at least 6 weeks (W0+2 to W0+8) of the commissioning phase.

10. ELBARA Update (MM/CM)

NS talked recently with DS about FINO, it seems that the FINO experiment project is cancelled.

ELBARA in north Finland and South Spain will have to be carefully protected against extreme thermal conditions (the required thermal range in the contract is -10-+40 Celsius at the moment).

11. DOMEX Status (MD)

The DOMEX reports about the instruments design and construction should be sent to the SAG members (MD; action 24.7). The instrument is complete and on its way to Antarctica. Environmental tests were completed at Galileo facility; lake calibration / antenna pattern verification campaign was completed; the new Potter horn results in a narrower beam and negligible contamination by the Sun; all units reached a stable temperature during tests; 4 h standard deviation was less than 0.1 K. At Dome Concordia, the incidence angle will vary but the azimuth angle will be fixed. The variable incidence angle will only be employed during austral summer (permitting cold sky calibrations), and the angle will be fixed throughout the austral winter period to match the most frequent SMOS observation angle (i.e. 40 deg) at the Dome-C site.

12. Results from IVT (MM)

13. Radioastronomy and SMOS (MM)

A meeting with radioastronomers about the Corbella equation would be very useful in the future. Exchange between EA and MM will be reported at the next SAG meeting (MM; action 24.8).

14. Reich maps (Steven Delwart for Nicolas Floury)

NF will provide the references of the galactic maps (3rd and 4th Stokes parameters in the northern and southern hemispheres) with a summary on the use in SMOS data processor, updating his galactic map technical note (NF; action 24.9).

The article presenting the southern sky survey of linearly polarized celestial sky radiation is

Testori, J.C., P. Reich, and W. Reich, A fully sampled lambda=21cm linear polarization survey of the southern sky. *Astronomy and Astrophysics*, 2008. DOI:10.1051/0004-6361:20078842.

Data can be downloaded from the MPIfR web site. The combined all-sky map from the northern DRAO and the southern Villa Elisa 1.4 GHz polarization surveys will be presented in a forthcoming paper by Reich et al. (in preparation).

It is better to wait for the merging of the northern and southern hemispheres to be done by Reich et al. with cross calibration and homogenisation before the integration in SMOS database.

15. Salinity Retrieval Alternatives (NR)

NR presents SSS possible retrieval near the Amazon outflow in the Atlantic ocean with C and X band satellite products. Considering the frequency used (sensitivity ten times less than at L band), the quality of the retrievals (1 psu) indicate that SMOS should be able to meet the mission requirement (0.1 psu).

16. Date/Place/Objectives of next SAG meeting

The next SMOS SAG meeting will be held in ESRIN on the 19th and 20th of May 2009. SAG members should send their presentations titles well in advance to CB and YK in order to have a clear prepared agenda before the start of the meeting.

17a. SMAP Update (TJ)

SMAP is a JPL project. The launch is foreseen in 2013 at the earliest. The US science definition team was selected in October 2008.

17b. AQUARIUS Update (GL/DL)

The AQUARIUS launch is now planned for 22 May 2010. The mission CDR was completed, instrumentation integration and test are in progress; the solar flux forecasts are uncertain but indicate that SMOS and AQUARIUS will both fly through the solar max; but solar contamination is less than 0.1 K; cal/val will be through in-situ ARGO floats; cold sky will be used not more often than once per month; a process study is planned in 2011 on subtropical gyre to constrain coupled models addressing E-P relationship. A science team meeting is scheduled for November 2009 in Seattle. NR recommends comparisons of Tb maps from SMOS and AQUARIUS when available (Recommendation 24.1).

ARGO buoys stop their measurements 5 m before reaching the surface to avoid damage eg from oil slick or fouling.

GL should send the Interface Control Document with DPGS for exchange of data from AQUARIUS to SD for the same configuration in SMOS (GL; action 24.10).

17c. TEREÑO Project (CB)

This German coordinated project among Helmholtz Research Centres was kicked-off on the 22nd of September 2008 (www.tereno.com). This project aims at having a network of well-equipped sites, which could be used for Cal Val.

17d. Update on Altimeter Backscatter Data for SM Estimation over Arid Areas (JB)

Roughness parameters for active and passive sensors are very different. There is no known relationship between them.

17e. SMOSops Update (MM)

The SMOS Ops project has been adapted following the first studies led by CASA for ESA. The main objectives are to improve sensitivity and possibly temporal revisit. It is expected to also have a GNSSR system as well as a 1D interferometer (C band instead of X) but to keep the current SMOS steer angle.

17f. SMOS Simulations (YK)

The current simulations for SMOS done by CESBIO (using the end to end simulator SEPSBIO and all the Prototypes) for the rehearsal activities were presented by YK. Data have been made available to the investigators on the CESBIO SMOS site.

It is expected that these data sets will also be useful for anybody wanting to start training on the use of SMOS data (same formats). It was also suggested that ESA proposes a small training event somewhat similar to that described in action 24.5, but this time with all the SMOS tools.

A recurrent issue was made during the meeting: stop changing the data product formats, especially when changes are purely cosmetic or even without any visible justification. This is a very strong recommendation to the Project by the SAG (Recommendation 24.3).

Recommendations

No	Description
24.1	Tb maps from SMOS and AQUARIUS should be compared when available.
24.2 (23.2)	During the commissioning phase, the dual and full polarisation modes should be equally used with a weekly change.
24.3	Data products format should not change anymore.

New Action Items

Action	No	Actionee	Due Date	Status
send report (in german) on RFI measurements made in March 2008 over the Danube validation area to Achim Hahne and Niels Skou	24.1	Yann Kerr & Markus Peichl	Dec 2008	Closed
send report on SMAP activities related to RFI when available, to all SAG members	24.2	Tom Jackson	When possible	Open
send Gibbs1/Gibbs2 informative report to all SAG members	24.3	Eric Anterrieu & Francois Cabot	Feb 2009	Open
contact Eric Thouvenot to coordinate campaign activities between CNES and ESA	24.4	Malcolm Davidson	Feb 2009	Open
organise a working meeting before the next SMOS cal/val meeting in March 2009 for airborne data processing	24.5	Niels Skou	Dec 2008	Closed
provide a list of data tools indicating where to get them in March 2009	24.6	Steven Delwart	Mar 2009	Open
send DOMEX reports about the instrument design and construction to SAG members	24.7	Mark Drinkwater	Dec 2008	Closed
Report exchange between EA and MM about the Corbella equation at the next SAG meeting	24.8	Manuel Martin-Neira	Next SAG meeting	Open
update his galactic map technical note	24.9	Nicolas Floury	Mar 2009	Open
send the Interface Control Document for exchange of data in AQUARIUS to Steven Delwart	24.10	Gary Lagerloef	Dec 2008	Closed

24th SMOS SAG Meeting Agenda

20-21 November 2008

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1. Welcome and Introduction (Yann Kerr)
 - Objectives and approval of the draft agenda
2. Actions Review (Catherine Bouzinac)
3. Overview of on-going activities (Achim Hahne/Manuel Martin-Neira)
 - ground segment status and new error budget
4. NIR measurements in Maxwell chamber (Andreas Colliander)
5. Level 1 processor status (Michele Zundo)
6. Level 2 processors status (Steven Delwart/Jordi Font/Yann Kerr)
7. Data distribution plan (Steven Delwart for Norrie Wright)
8. Rehearsal and validation campaigns: discussion
9. Dual/Full polarisation modes in commission and operation phases: discussion
10. ELBARA update (Manuel Martin Neira/Christian Matzler)
11. DOMEX status (M. Drinkwater)
12. Results from IVT (Manuel Martin-Neira)
13. Radioastronomy and SMOS (Manuel Martin-Neira)
14. Reich maps (Steven Delwart for Nicolas Floury)
15. Salinity retrieval alternatives (Nicolas Reul)
16. Date/Place/Objectives of next SAG meeting (all)
17. AOB:
 - a. SMAP update (Tom Jackson)
 - b. AQUARIUS update (G. Lagerloef/David Levine)
 - c. TERENO project (C. Bouzinac)
 - d. Update on Radar Altimeter Backscatter for SM estimates (J. Benveniste)
 - e. SMOSops update (M. Martin-Neira)
 - f. SMOS Simulations (Y. Kerr)