

EARTH SCIENCES DIVISION (EOP-FS)  
DIRECTORATE OF EARTH OBSERVATION PROGRAMMES

<b>date</b>	<b>reference</b>	<b>number of pages</b>
16 December 2002	EOP-FS/0759/MB-dr	Page 1 of 20
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<b>to</b>	Members of the SMOS Science Advisory Group (distribution list attached)  Dr. P. Waldteufel IPSL/Service d'Aéronomie du CNRS, F  Dr. G. Lagerloef Earth and Space Research, Seattle, WA, USA  Dr. D. Le Vine, NASA GSFC, Greenbelt, MD, USA  Dr. T.J. Jackson USDA ARS Hydrology Lab, Beltsville, USA	
<b>c.c.:</b>	ESA HQ: J. Achache (D/EOP)  ESRIN: S. Briggs (EOP-A), W. Lengert (EOP-AM), J. Benveniste (EOP-AEU)  ESTEC: A. Ginati (EOP-F), E.A. Herland (EOP-FS), A. Tobias (EOP-FP), P. Silvestrin (EOP-FPP), M. Rast (EOP-FSL), E. Attema (EOP-FSS), N. Flourey (TOS-EEP), P. Wursteisen (EOP-FSS), M. Martin-Neira (TOS-ETP), P. Baptista (TOS-EEP), H. Rebhan (EOP-FSO), A. Hahne (EOP-PN), M. Drinkwater (EOP-FSO), R. Bock (EOP-PN), R. Zobl (EOP-P)	
<b>Subject:</b>	<b>Minutes of the 10<sup>th</sup> SMOS SAG Meeting held at CESBIO, Toulouse, France, 7 &amp; 8 November 2002</b>	

Dear Colleague,

Enclosed you will find the minutes of the tenth SMOS SAG meeting held at CESBIO, Toulouse, France, 7 and 8 November 2002.

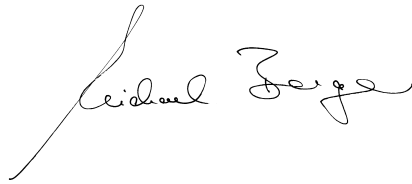
Please note that this document is also available in PDF format for downloading on our ftp server. The version on the ftp site also contains the presentation viewgraphs used during the meeting. The viewgraphs are not attached to the minutes send to you by e-mail.

I would like to ask you to mark the dates for our next SAG meeting which will take place at ESTEC, **24-25 February 2002** combined with the Final Presentation of the *Soil Moisture Requirement Study* which will take place on the **26 February 2002**. Invitations and draft agendas for both meetings will be send to you in due time.

I also would like to take this opportunity to remind you to complete open actions in particular actions related to the SMOS Science Report enabling us to review a first draft at our next meeting.

Should you have any questions concerning the minutes, please feel free to contact me.

Yours sincerely,

A handwritten signature in cursive script, appearing to read "Michael Berger". The signature is written in black ink on a white background.

Dr. M. Berger  
Land/Surfaces Unit  
Earth Sciences Division

**MINUTES OF THE  
TENTH  
SOIL MOISTURE AND OCEAN SALINITY (SMOS) MISSION  
SCIENCE ADVISORY GROUP MEETING**

**7 & 8 November 2002**

**CESBIO, Toulouse, France**

Participants: Y. Kerr, J. Font, M. Peichl, P. Ferrazzoli, P. Viterbo, P. Waldteufel,  
G. Lagerloef, M. Hallikainen, D. LeVine

Excused: A. Hahne, N. Skou, T. Jackson

Guests: J. Fernandez, W. Wagner, L.T. Pedersen

ESA: M. Martin-Neira, J. Benveniste, H. Rebhan (part time), N. Floury, M. Berger

## 1. Welcome and Introduction – Objectives of the Meeting

Y. Kerr and M. Berger welcomed the SMOS SAG members and their guests to the 10<sup>th</sup> SMOS SAG meeting.

N. Skou and T. Jackson were excused.

The objectives of the meeting were:

- to update the SAG with on-going Phase-B activities,
- to discuss the status of the Science Report,
- to discuss possible involvement of the cryosphere community,
- to discuss the 4<sup>th</sup> SMOS WS.

## 2. Approval of Draft Agenda

M. Berger introduced the draft agenda.

The agreed agenda is attached to the minutes (Annex A).

## 3. Actions from the Last Meeting

Action items from the last meeting were reviewed and their status updated.

No.	Category	Subject	to	due	Status
1.17	Camp. Doc	To keep master copy/ circulate updates	NS		on-going
1.26	Promotion	To provide planned promotion activities/publications to MB	all		on-going
3.5	Faraday	To simulate Faraday effects over DOME-C	NF		done
3.6	Faraday	To analyse short-scale Faraday effects	NF		done
3.9	Promotion	To draft GEWEX article – PV and GL to provide inputs	YK/PV /GL	20/6	re-issued
6.10	MRD	To update MRD on OS requirements	JF/GL	31/8	open
6.11	Data Products	To analyse required number and locations of incidence angles for Level 1b data product	PhW		on-going
7.5	Simulator	To obtain more SSS simulations from OS req. study team	HR/GL	15/11	open
8.3	GS	To review the GS processing scheme drafted by Y. Kerr and to provide comments to Y. Kerr	SAG	15/1	obsolete
8.4	GS	To provide inputs for a possible study on the GS processing scheme to A. Hahne	YK/Ph W	15/2	done
8.5	Cal/Val	To provide A. Hahne with names and coordinates of potential experts of a subgroup reviewing the error budget	SAG	1/5	obsolete
8.6	Cal/Val	To draft a calibration scheme and a validation plan	YK	31/3	on-going
8.10	Campaigns	To further discuss science objectives of a possible Greenland campaign with cryosphere experts	NS	31/3	done
8.13	Science Report	To submit for draft of the Science Report to M. Berger	SAG	31/5	open

8.14	Promotion	To put the SAG minutes and TNs on the CESBIO SMOS web pages	YK	1/4	done
8.15	Promotion	To distribute various SMOS logos used to the SAG	MB	1/4	open
9.1	Camp. Doc	To provide N.S with a summary of all campaign activities performed so far	PW	15/5	open
9.2	Cryosphere	To ask his colleague to review MRD text on cryosphere and to discuss/outline requirements with the community	NS	1/5	done
9.3	Studies	To draft requirements for an assimilation study	PV	1/5	re-issued
9.4	SEPS	To provide inputs for improvements to AH	SAG	1/5	done
9.5	Portugal	To provide coordinates of potential institutes in Portugal	PV	1/5	done
9.6	Studies	To provide AH with a list of topics of OS studies after the final review of the OS req. study	NF/HR	3/5	obsolete
9.7	Studies	To draft scientific work which should be performed for an image reconstruction/ SEPS validation study	MB/NS /MP/Y K	15/5	done
9.8	Campaigns	To check status of calibration data for the Avignon experiment	NS	1/5	done
9.9	WS	To inform the SAG about the date and place of the WS on OS requirements and data products	HR	15/5	obsolete
9.10	WS	To provide coordinates of assisting personal to organise a WS in Portugal	AH	15/5	done
9.11	WS	To discuss different options for the WISE/EuroSTARRS WS with the campaign unit	MB/P W	1/5	done
9.12	Portugal	To provide list of Portuguese scientists to YK and MB	JB	1/5	done

#### Remarks:

**Action 1.17/9.1:** ESA campaign unit to provide inputs to update the campaign document. An updated version of the campaign document should be made available on the CESBIO SMOS web pages. It was emphasised that the document would improve by including a description of the activities performed within the US SMEX campaigns. M. Berger will ask T. Jackson to provide a SMEX description for the SMOS campaign document (**AI: 10.1**).

**Action 3.5/3.6:** N.F. to distribute the documents to the SAG (**AI: 10.2**).

**Action 3.9:** GL and PV to provide YK with their inputs.

**Action 8.15:** SAG to provide electronic copies of logos to MB (**AI: 10.3**).

**Action 9.9:** detailed requirements and data products will be discussed at the yearly SMOS WS.

#### 4. Project Status

M. Martin-Neira reported on behalf of A. Hahne on the status of the project.

Phase B proposal for the SMOS Payload was received and evaluated by ESA. A negotiation meeting is scheduled later this November 2002.

SMOS Phase A Extension is coming to an end. The objectives of this continuation were the consolidation of all subsystems of MIRAS, including the procurement of the MMICs for the LICEF receivers, the refinement of the thermal and power systems and the validation of the SMOS simulator using the MDPP-2 hardware. The Final Review will be held at ESTEC on November 28.

*MDPP-1:*

MDPP-1 is near completion, too. The last test report will be sent to ESTEC in November. After the review of the test reports the activity will be closed. The Final Review of this contract will happen in combination with a meeting of MDPP-2 or Phase B.

*MDPP-2:*

MDPP-2 is progressing rapidly now. The deployment demonstration will happen in early December, after a successful Test Readiness Review (TRR) last October. The image validation campaign has been completed after the EMC problem was solved. The data are currently being processed by UPC. DICOS-2 is progressing without delays. The Band-Pass-Filter-2 activity has been completed. The NIR TRR is scheduled for early December. MOHA-3 Preliminary Design Review is progressing.

*HUT:*

M. Hallikainen reported on the status of the HUT-2D instrument development.

Main criticalities were self-interference within the digitising board. New digitising boards were produced and are currently being tested. In addition, different materials for the antenna radom will be tested. The following key-issues will be addressed within the next few months:

- Testing of the new digitiser boards for self-interference (currently on-going)
- Antenna measurements in an anechoic chamber (currently on-going)
- Testing of different radom material
- Correlation test as soon as subsystems are ready (image validation tests)
- Manufacturing

At the moment no critical issues are detected which possibly could further delay the manufacturing of the instrument.

**5. Open Issues Related to the Project:**

*Yaw steering:*

Yaw steering has been under discussion since SMOS Phase-A study. So far there is no clear evidence that yaw steering is required to correct for Earth rotation since the correction could be applied by software, too. This issue was brought forward to the SAG for further

discussion. Some simulations had been performed by P. Waldteufel, who explained the main findings, confirming that yaw steering is not very effective for SMOS due to the very wide field of view and since the effect of Earth rotation can be taken into account in the GS processing chain itself. D. LeVine confirmed the findings.

In the discussion it was agreed that Earth rotational effects should be corrected by software assuming a stable attitude control of the spacecraft and not by yaw steering.

*Pointing/restitution accuracy:*

The sensitivity of the brightness temperature with incidence angle is high in comparison to the SSS signal, in particular at vertical polarisation and at large incidence angles. Taking the SSS requirement and the typical variation of brightness temperature with incidence leads directly to stringent pointing requirements.

The fact that the beamwidth of the instrument is 2-2.5 degrees (depending on the apodisation window) helps very little as the beam is still narrow. A linear trend in the brightness temperature with incidence yields the same sensitivity for the single incidence as for the narrow beam case. The fact that SSS is retrieved only after fitting a model through various incidence angles does help in this respect but has not been quantified so far, and in any case the situation at the edge of the swath where the range of incidence angles is smaller will not differ so much as from the single incidence situation.

It was mentioned however that the capability of the mission (0.05 degrees 3 sigma by the use of new star trackers) is within the required pointing knowledge (0.03 degrees, interpreted as 1-sigma error). Therefore the issue was considered as not being a problem.

*Validity of the NIR input range:*

M. Martin-Neira reported that the NIRs currently are being designed for a maximum temperature of 280 K over the whole FOV. The SAG was asked if this is sufficient considering that the antenna will also look at arid areas. In the discussion it was indicated that a temperature of 280 K over the full FOV likely will not be observed. In order to further discuss the issue, M. Martin-Neira was asked to provide a detailed description of the problem (**AI: 10.4**).

## **6. Status Reports of ESA Support Studies**

*Soil Moisture Requirements Study:*

The Soil Moisture Requirement Study is currently in its second phase after a successful mid-term review which took place 7 May 2002.

Phase 2 focuses on the simulation of high resolution subsets (5 x 1500 x 1500 km Tb maps @ 4 km resolution), case studies and impact assessment studies. In addition, further work will be devoted to enhance retrievals as tested within Phase 1.

Preliminary results show that the anticipated accuracy could not be met in most cases by the 3 parameter retrievals (SM, LST, and optical thickness) using snapshots only. Further improvements are expected by the use of assimilation schemes and by constraining the retrieval with LST with the required accuracy of 2 K derived from complimentary satellite observations or from circulation models.

Simulations of the high-resolution subset are completed. Data have been provided to the study team of the *SM Data Processing Study* (see below).

The next progress meeting will take place 10 December 2002 at KNMI together with an ELDAS/SMOS mini-workshop.

*Soil Moisture Retrieval Study:*

The study was kicked-off on 15 July 2002. The first progress meeting will take place 26 November 2002. The mid-term presentation is scheduled for 30 January 2003.

P. Waldteufel, who is a member of the study team, outlined the work plan to the SAG.

The overall objectives of this study are to develop and analyse new SM retrievals accounting for the SMOS data characteristics and spatial and temporal land surface variability. High resolution simulated brightness temperature maps as generated within the *Soil Moisture Requirements Study* will be used to analyse the retrievals.

Work is progressing according to schedule. A draft version of the Retrieval Concept Document has been delivered which will be discussed at the next progress meeting.

*Salinity Data Processing Study:*

The Salinity Data Processing study is currently in its last stage, with a delay of 3-4 months with respect to the original planning. Most work-packages have been closed and technical notes have been generated. Objectives and current results of the study were presented (see attached viewgraphs). A small extension (CCN) is scheduled to refine a few issues outlined during the study. It was proposed to invite SAG members/experts to a meeting at the contractor's place in order to give the opportunity to present to interested SAG members a complete status of the activity and to discuss on where to put the remaining effort and to contribute to the discussion about the common tools to be used by the community (theoretical emission model, datasets, inversion tools). This meeting could be held end of 2002.

*Scientific inputs for the SMOS level-1 processor development (with emphasis on calibration and image reconstruction techniques):*

A study providing scientific support to the ground segment development is planned to be kicked-off soon. The study was offered to DLR, Germany. A proposal is expected to be submitted by beginning of December.



M. Markus outlined to the SAG the objectives and a draft work plan of the study.

The main objectives of this study are to review and enhance algorithms used for applying calibration and for image reconstruction techniques, to provide detailed feedback for improving the current version of SEPS, and to propose an algorithmic baseline for the SMOS level 1 data processing scheme including recommendation for on-board and on-ground calibration.

## **7. Update on Campaign Activities – Cal/Val Issues**

Results of the WISE, EuroSTARRS and LOSAC campaigns were presented at the campaign workshop that was held at CESBIO prior to SMOS SAG meeting during the same week. Results are summarized in the workshop proceedings which will be published in spring next year. Furthermore, campaign requirements were intensively discussed during the workshop. The most important findings are summarised below:

### *Azimuthal dependence:*

Azimuthal dependence of the brightness temperature to wind direction is still an open issue. Data obtained from WISE and LOSAC are not yet conclusive. First results show that there is no azimuthal dependence at low and moderate wind speed whereas under strong wind conditions dependence could be observed.

Variations of the brightness temperature in the order of 0.5-1 K as observed by LOSAC within circle flights could not be explained. The assumption that this variance is due to the natural variability at high spatial resolution could not be confirmed by circle flights at higher altitudes and thus lower spatial resolution. In addition the effect is likely not due to instrument instabilities as emphasised by S. Schmidl Søbjeørg.

It therefore was recommended to cover missing LOSAC flights as soon as possible at a location where in-situ sea state measurements are available. In order to increase the integration time for a given direction relative to the wind direction, a star pattern rather than circle flights were proposed. This would be on the cost of azimuthal resolution but may provide more conclusive data with respect to the observed brightness temperature variations.

### *Foam/rain:*

Preliminary results show that only thick foam (thicker than 2 cm) is contributing to the brightness temperature but the signal level is still an open question. The effect of rain (increasing roughness, atmospheric effects) also needs to be quantified. It therefore was recommended to conduct an experiment under controlled conditions using a foam and rain generator.

*Sea spectrum:*

It was emphasised that all measurements performed so far were acquired over areas with limited fetch conditions. A campaign at a site with full-developed sea is therefore recommended for model validating.

In the discussion it was stated that complimentary data providing information on the effective wave heights (e.g. products derived from altimeter data) is preferred rather than wind data (e.g. derived from scatterometer data). This is due to the fact that the correlation between the wind fields and the wave spectrum is not necessarily strong in all cases.

*Sea Water permittivity at L-Band:*

S. Blanch gave a presentation on dielectric constant measurement, recently performed at UPC, Barcelona, at the campaign workshop. The measurements of water with different salinity and temperature at a range of frequencies including L-band were performed using wave-guides. Results are between the model outputs of Ellison and Klein & Swift, but closer to the model output of Klein & Swift.

A similar experiment but using a different measurement set-up is planned at the George Washington University in the US.

It was strongly recommended that the UPC team iterate with the US team for comparing/validating results. Furthermore, it was emphasised that a repetition of the measurements would be useful in order to get more confidence on the results and to indicate the uncertainty of the used measurement set-up.

*Litter and understorey:*

The understorey and in particular litter is difficult to account for in soil moisture retrievals as shown by EuroSTARRS data. In order to get a better quantification of the effect tower based measurements were proposed and discussed. The possibility to include these measurements within the SMOSREX (see below) campaign is currently being assessed.

*Urban & Topography:*

First data over urban areas and mountains were acquired by EuroSTARRS but data so far were only assessed qualitatively.

Data revealed lots of RFI over urban sites. It should be possible to filter strong RFI spikes but low level RFI contamination will be difficult to account for. Statistical analysis of the signal might be helpful for doing this. Until no better quantifications of the signal over urban sites are present, urban sites will be treated as bare soils in the retrieval.

Models to account for topographic effects still need to be developed. The criteria which will be used to flag topographic areas (e.g. slope distribution statistics) still have to be developed.

It is being expected that more insights will be available after a more thoroughly analysis of the EuroSTARRS data.

*Calibration and Validation:*

The use of land sites and ice for calibration is still an open issue. It has been noted that there is likely no suitable site over land and ice which is homogeneous, stable and large enough to serve as a SMOS calibration site. In this regard also the usefulness of a campaign at Dome-C was questioned. In the discussion it was agreed that although Dome-C likely is not a suitable SMOS calibration site but a campaign would provide useful measurement on the behaviour of layered ice sheets at L-band. Furthermore it is expected that a campaign over Dome-C will draw interest within the cryosphere research community. Therefore the SAG recommended to assess the feasibility of deploying a L-band radiometer at Dome-C by taking advantage of already planned measurement campaigns in order to minimise costs. Clear campaign objectives need to be defined and care should be taken by the selection of the L-band radiometer.

In the frame of the calibration/validation discussion G. Lagerloef reported that an ocean salinity database will be generated at his institute for Aquarius which would be also available to the SMOS community.

Concerning soil moisture validation the largest shortcoming is considered to be the lack of consistent network programme. A European network is missing and should be proposed to GEWEX.

P. Viterbo reported that a draft validation plan was generated within the ELDAS project which he agreed to forward to Y. Kerr (**AI: 10.5**).

Further issues concerning calibration and validation will be discussed after a new version of the cal/val document is available which currently is being drafted by Y. Kerr. The document should be available by the end of this year. The SAG was asked to provide detailed feedback to the draft by end of January (**AI: 10.6**).

*Soil Moisture Assimilation:*

EuroSTARRS only provided a snapshot at V-polarisation in SMOS like configuration. A long-term airborne campaign of 30-60 days to observe various land cover types under different soil moisture conditions to enhance retrievals and assimilation schemes was therefore proposed. An ideal site would be close to Toulouse providing different land cover and soils with contrasting moisture condition and where the infrastructure for the ground measurements would be present. The preferred instrument for such a campaign should have at least dual polarisation capability. The use of HUT-2D is being considered. Envisaged time frame for the campaign would be 2004.

*SMOSREX:*

Y. Kerr presented the status of the long-term experiment at the Fauga site which is now called SMOSREX (Surface Monitoring Of the Soil Reservoir EXperiment).

The radiometer (200 kg – 3 m horn) has been measured in an anechoic chamber. Its performance is satisfactory (almost no back lobes, stability not perfect but within expectations). Currently the instrument is measuring the sky. Data were compared with a galactic model which would be also made available to the SMOS community by D. LeVine. A scaffold to host the instrument on the Fauga site will be erected in the week following the SAG meeting.

## **8. Cryosphere Issues**

L. Pedersen from the Technical University of Denmark presented potential cryosphere research fields.

He reported that SMOS could be perfectly complimentary to CryoSat and other higher frequency sensors. CryoSat will be able to measure ice thickness larger than 1 m whereas SMOS has the capability to detect thinner sea ice. Data acquired at higher frequency would be helpful to detect ice edges. Another potential research application would be the detection of melt ponds. It was reported that there is currently an US study underway where data acquired by ESTAR over melt ponds will be analysed.

One of the bottlenecks using L-band for cyrospheric research application is the little knowledge of the dielectric behaviour of different ice at L-band. Campaigns were strongly recommended. One option would be a campaign in Greenland to observe sea ice at various conditions and ice sheets at various thicknesses. Considering the costs of such campaigns it is advisable to piggyback on on-going activities (e.g. CryoSat campaigns) wherever possible (AI: 10.7).

## **9. Science Report**

The status of the SMOS Science Report was reviewed. M. Berger again stressed the importance of this document. It was emphasised that this document should serve the wider research community to draw interest in the SMOS mission.

There was some discussion concerning the copyrights of the figures which will be used in the report. After further consultation of the ESA publication division, the SAG is herewith informed of the following:

- ESA is not taking restricted copyrights. In other words, it is free to the author to publish figures used in the Science Report in other publications but reference to the Science Report should be given.
- In case the figures have been already published somewhere else, then the authors should make sure that there are no restricted copyrights. References should be provided in the figure caption.

- In case there are restricted copyrights on the figures, then copyrights have to be obtained from the publisher or modifications have to be applied to the figures.

Below the format descriptions are given again:

Format Instructions for the SMOS Science Report:

- Text should be in chapters (each chapter being one file)
- Stick to one font and one font size
- Use only one format template throughout the text (NORMAL – do not use HEADING or others)
- Do not use Headers or Footers other than automatic page numbering
- Do not use automatic numbering or outlines (no bullets etc.)
- Note that Publications will insist on UK English – set the language accordingly for your spell-checker
- All graphics need to be provided in electronic format in separate files
- Raster graphics need to be provided at least at 300dpi resolution
- Illustrations with restricted copyrights must have a copyright release letter!
- Use terms consistently through the document: e.g. top-of-the-atmosphere, Top-Of-Atmosphere.
- Acronyms should be expressed on the first occasion of usage and a list maintained.
- Reference list should be maintained from the beginning and not as an afterthought – keep the reference list consistent.

Please note that in case you need illustrations drawn, a designer in publications could assist. Make sure to provide rough sketches in time.

It was agreed that all book captains would provide inputs by the end of this year latest. As agreed in the previous SAG meeting the book captains are:

<b>Introduction</b>	<u>YK</u>
<b>Scientific Objectives and Mission Requirements:</b>	
- Introduction	
- Soil Moisture	<u>YK</u> , PV, PF
- Ocean Salinity	<u>JE</u> , NS, GL
- Cryosphere	<u>MH</u> , YK
<b>Mission and System Overview:</b>	<u>AH</u> , PS
<b>Instrument Concept:</b>	<u>AH</u> , PS, MMN
<b>Characterisation and Calibration:</b>	<u>AH</u> , PS, PW, MMN
<b>Data Processing, Data Products and Validation:</b>	
Image Reconstruction	<u>AH</u> , MP, PW, YK
Soil Moisture	<u>AH</u> , YK, PF
Ocean Salinity	<u>AH</u> , JF, GL, NF
<b>Concluding Remarks:</b>	<u>YK</u> , JF

M. Berger will combine the various inputs and send out a first draft for further iteration by end of January/beginning of February. Assuming this schedule will be met than the next SAG meeting could be used to review the first draft.

## **8. AOB**

### *4<sup>th</sup> SMOS WS:*

The next SMOS workshop will take place in Porto, Portugal. The University of Porto will host the meeting and J. Fernandez will make local arrangements. The week after the AGU/EGS meeting (week 16) is considered a good choice. 2 ½ days are planned for the workshop and an extra day will be used as a general information to the Portuguese science community on the SMOS project. Y. Kerr will distribute the announcement to the SMOS community shortly.

### *2D-STAR – status report:*

D. LeVine presented the status of the 2D-STAR development in the US.

2D-STAR is a 2-dimensional synthetic aperture L-band aircraft radiometer being developed at the Goddard Space Flight Center under NASA's Instrument Incubator Program (IIP). The instrument employs dual polarised patch antennas and is currently configured to image using a 'cross' configuration.

2D-STAR made its maiden flight in August 2002. It flew on the NASA P-3 together with ESTAR over the Delmarva Peninsula south of Goddard's Wallops Flight Facility. The two instruments flew again in September over forest sites in Virginia. Analysis of the data is currently underway.

### *Aquarius/Hydros – results of the ESSP selection:*

G. Lagerloef presented a status of Aquarius and Hydros in the NASA ESSP selections.

In July, NASA selected Aquarius and Orbiting Carbon Observatory (OCO) as the primary missions, and Hydros as the alternate. Each mission has started a 9-month Risk Mitigation Phase to address concerns raised during the proposal reviews. Formulation phases for Aquarius and OCO are planned to start at the beginning of the next fiscal year in October 2003. Risk Mitigation activities for Aquarius include evaluating the scientific impact of the salinity data for resolving air-sea water fluxes in mid to high latitudes, and for additional study of the radar backscatter vs brightness temperature relationship linearity in its use for Aquarius wind roughness corrections.

### *Study ideas in Portugal*

J. Fernandez presented the research work that is performed at the University of Porto and outlined possible SMOS related studies of interest. Particular interest exists in OS studies addressing synergies between radar altimeter data and SMOS, studies on temporal and spatial averaging procedures and in data assimilation studies. Furthermore, interest in the implementation and realisation of open ocean campaigns was expressed. For soil moisture, soil moisture retrievals in coastal zones and fire risk maps supported by SMOS data are first ideas.

In the discussion it was agreed that J. Font and G. Lagerloef will further iterate with J. Fernandez and M. Alves on ideas and keep M. Berger in the loop (**AI: 10.8**).

### *Soil Moisture retrieval from scatterometers / possible synergies*

W. Wagner from the University of Vienna, Austria presented the generation of an operational global soil moisture data product derived from ERS scatterometer data. First assessment and validation exercise show promising results. Possible synergies with SMOS in particular on vegetation covered areas were addressed. An open issue remains the physical meaning of the soil moisture product derived from scatterometer data and from SMOS data.

W. Wagner reported that he was able to obtain validation data from a large Asian network which could be also of interest for SMOS validation. The lack of a European measurement network was emphasised.

### *Radiometric error due to sun reflections entering the alias free FOV*

During the MicroCal-2002/CEOS workshop in Barcelona, A. Camps showed some simulations where the image was degraded through the side lobes of the Sun, the Sun being received through direct path in front of the antenna (the elevation of the Sun over the antenna plane can be as high as 31 degrees). The Dwingeloo measurements conducted at ESTEC also showed a contamination of the alias-free Field of View by side lobes from the direct Sun. Earlier this year P. Waldteufel noted some bright points which degraded the images when using the SMOS simulator but could not match those points with direct nor reflected Sun, nor their aliases. He already suggested looking into Sun effects.

Therefore simulations and measurements point out that the Sun is a potential source of image degradation for SMOS. During the discussion it was agreed that the effect has to be quantified, not only in terms of degradation of the image (brightness temperature error) but also in fraction of the orbit and days of the year (**R10.1**). This will have to include necessarily running the SMOS simulator but also making a good estimation of the Sun intensity during the SMOS lifetime. Right now, the brightness temperature of the Sun is about 180,000 K per polarisation and can decrease by a factor 3 during the minimum (launch of SMOS) but then will start increasing again up to probably some 100,000 K by 2010. A. Camps' simulations considered a worst case Sun of 200,000 K. P. Waldteufel was of the opinion that the Sun effect can be compensated through software. The possibility of looking into point source response suppression techniques in the study of signal processing was mentioned.

### **11. Date and Place of the Next Meeting**

The next SAG meeting was scheduled for **24 and 25 February** at ESTEC combined with the Final Presentation of the *Soil Moisture Requirement Study* which will take place on the 26 February at ESTEC.

### **12. Summary and Conclusion**

Y. Kerr and M. Berger thanked the guests for their excellent presentations and the SAG for the fruitful discussions. M. Berger thanked CESBIO for hosting the meeting and apologised for the time pressure posed by a very busy agenda.



**List of Actions:**

No.	Category	Subject	to	due	Status
1.17	Camp. Doc	To keep master copy/ circulate updates	NS		on-going
1.26	Promotion	To provide planned promotion activities/publications to MB	all		on-going
3.9	Promotion	To draft GEWEX article – PV and GL to provide inputs	YK/PV/GL	31/1	re-issued
6.10	MRD	To update MRD on OS requirements	JF/GL	31/1	open
6.11	Data Products	To analyse required number and locations of incidence angles for Level 1b data product	PhW		on-going
7.5	Simulator	To obtain more SSS simulations from OS req. study team	HR/GL	31/1	open
8.6	Cal/Val	To draft a calibration scheme and a validation plan	YK	31/12	on-going
8.13	Science Report	To submit for draft of the Science Report to M. Berger	SAG	31/12	open
8.15	Promotion	To distribute various SMOS logos used to the SAG	MB	31/1	open
9.1	Camp. Doc	To provide N.S with a summary of all campaign activities performed so far	PW	31/1	open
9.3	Studies	To draft requirements for an assimilation study	PV	31/1	re-issued
10.1	Campaigns	To ask T.J. for a SMEX chapter to be included in the campaign document	MB	31/1	
10.2	Faraday	To distribute the TNs to the SAG	NF	31/1	
10.3	Promotion	To provide electronic copies of logos to M.B.	SAG	31/1	
10.4	Instrument	To provide a TN on the validity of NIRs to the SAG	MMN	31/1	
10.5	Cal/Val	To forward draft ELDAS validation plan to Y.K.	PV	31/12	
10.6	Cal/Val	To provide detailed feedback to the draft cal/val document which will be distributed at the end of this year	SAG	31/1	
10.7	Campaigns	To review planned CRYOSAT campaigns for possible collaborations	MD/H R	31/1	
10.8	Portugal	To further discuss possible studies in Portugal with J. Fernandez and M. Alves	JF/GL	31/1	

**List of Recommendations:**

- 10.1 The SAG recommends to analyse and quantify the effect of the sun in the alias-free field of view.

**10th SMOS SAG Meeting****7 / 8 November 2002****CESBIO, Toulouse, France, starting 7 November, 09:00**

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1. Welcome and Introduction - Objectives of the meeting
2. Approval of draft agenda
3. Actions from the last meeting
4. Project status:
  - Programmatics and organisation
  - On-going activities
  - Technical progress
  - MDPP
  - HUT-2D
  - Portuguese activities
5. Open issues related to the project
  - Yaw steering
  - Pointing/restitution accuracy
  - Validity of the NIR input range
6. Status reports of ESA support studies:
  - Soil Moisture Requirement Study
  - Soil Moisture Retrieval Study
  - Salinity Data Processing Study
  - Scientific support for the level-1 processor development
7. Update on campaign activities – Cal/Val issues:
  - LOSAC
  - Fauga, Avignon
  - Cal/Val issues (Dome-C)
  - Status of the campaign document
8. Cryosphere issues:
  - Presentation by L. T. Pedersen
9. Science Report

10. AOB

4<sup>th</sup> SMOS WS

STAR-2D – status report

Aquarius/Hydros – result of the ESSP selection

Study ideas in Portugal – J. Fernandez

Radiometric error due to sun reflections entering the alias-free FOV

11. Date and place of next meeting

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