SMOS SAG

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

Minutes of the Twenty-First Meeting 11-12 April 2007 ESA-ESTEC, Noordwijk, The Netherlands

Chair: Y. Kerr
ESA Executive Officer: M. Berger (EOP-SML)

Participants:

MAG Members:	M. Peichl (MP), Y. Kerr (YK), P. Waldteufel (PhW), N. Skou (NS), E.Anterrieu (EA), N. Reul (NR), T. Jackson (TJ), D. LeVine (DL), D. Stammer (DS) part time, C. Mätzler (CM), M. Drusch (MaD)	
ESA:	M. Berger (MB)	EOP-SML
	H. Rebhan (HR)	EOP-SMO
	A. Hahne (AH)	EOP-PS
	J. Benveniste (JB),	EOP-SER
	M. Zundo (MZ) (part time)	EOP-PEP,
	P. v. Oevelen (PvO)	EOP-SML
	M. Drinkwater (MD) (part time)	EOP-SM
	M. Martin-Neira (MM)	TEC-ETP
	C. Bouzinac (CB)	EOP-PYM
	A. Colliander (AC)	TEC-ETM
	R. Crapolicchio (RC)	EOP-GQ
	S. Pinori (SP)	EOP-GP
	I. Navas-Traver (IN)	EOP-PE
	P. Wursteisen (PW)	EOP-SMS
	N. Floury (NF)	TEC-EEP
Guests:	S. Mecklenburg (SM), M. Dinacci (MDi), C. Barbey (CB)	
Excused:	G. Lagerloef, J. Font, P.Y. LeTraon, S. Delwart (ESA), N. Wright (ESA), W. Wagner, J. Grandell (JG),	
Not present:	A. vd. Griend	

Distribution List:

All meeting participants

ESA:	V. Liebig (D/EOP), S. Briggs (EOP-S), E-A. Herland (EOP-SA), G. Kohlhammer (EOP-G), H. Laur (EOP-GM), S. Mecklenburg (EOP-GM), R. Zobl (EOP-P)

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(EOP-SM/1693/PvO-dw)

Introduction

Y. Kerr welcomed the participants to the 21st SMOS SAG meeting held at ESA-ESTEC, Noordwijk.

M. Berger announced his move to ESA-ESRIN and thanked the SMOS SAG for the pleasant working relationship and the tremendous learning experience during the last years. Furthermore, he informed the SAG of the new head of the Science Division, Mark Drinkwater.

Y. Kerr on behalf of the SAG thanked M. Berger for his work for the SAG.

Report on on-going activities including SMOS Ops and the NRT option.

A. Hahne reported on the progress for the various SMOS project activities. The flight model payload was completed by Jan. 2007. The mass property test and acoustic test have been completed successfully. Currently SMOS is placed in the Large Solar Simulator where testing will take place until end of April. Delivery after completion of all testing is still planned to Alcatel end of June 2007. The Proteus Platform is fully assembled and ready for SAT AIT. The impact of Jason-2 Programme running in parallel to SMOS using same Ground Support Equipment facilities and personnel is still uncertain. CNES has indicated that in case of conflict Jason-2 will have priority over SMOS (because Jason is part of operational series). Regarding the launcher there are so far no showstoppers. Only a minor issue namely the fuel transport to and from Plesetsk Launch Facility is still open. Issue of concern is that the Russian military planned a launch indicated for May 2008, which can have impact on SMOS launch date. This schedule assumes no significant delays for GOCE.

Flight Operations Ground Segment is proceeding well. Mission planning system and Payload programming centre are installed at ESTEC and ESAC. For the Payload Simulator the hardware is damaged but software delivered. The Mission control centre at Toulouse is installed. The preparations for instalment of X-band antenna at ESAC has finished, actual installation will take place end of April. The front-end processor has still several problems, but can be used for the time being. CDR is scheduled for September

Regarding NRT Implementation there are 3 distinct actions:

1) Open ITT to select Ground station Service (e.g. Svalbard, Kiruna+, Gatineau (Canada)

2) Development of NRT Processor (level 1 processor tailored to the specific needs of operational users (ECMWF, Meteo France, DWD) competition with at least 40% UK Return

3) Change notice to INDRA for incorporation of NRT, service into ESAC installations

Internal Technote to assess impacted facilities is under preparation.

Regarding SMOSops (which deals with what comes after SMOS or possible SMOS follow on, and how the current system design can be improved.) there is an industrial proposal from CASA Mier and UPC received and evaluated. Two major issues to be resolved:

- Involvement of specialist companies in the system study phase as consultants (Oerlikon, Astrium, HUT)
- Consideration of GPS reflectometry

Background work needs to be done on delegations for more comprehensive bread boarding in the 2nd phase. CNES has been requested to look into possibilities to enhance PROTEUS capabilities.

MB asked what is the framework for SMOSops? AH replied that it is to look at what can be afforded in technical sense, and to consider technical constraints

According to the SMOS schedule, launch could happen May/June 2008. Two external factors can influence this.

1. Jason 2: Based upon same platform, using same facilities/team. Delays in SMOS schedule, if conflict for resources. Only one launch campaign will take place at a time. If Jason 2 goes first, SMOS would have to wait for about 4 months
2. Launcher: Only one launch campaign at a time. GOCE, Russian military launch could affect SMOS

This all results in two possible launch periods: May /June or Sept/Oct 2008 (last option is most probable). More accurate information will be available end of June 2007 when it is known if delivery to Alcatel is possible and what the status of Jason is. The real hard decision is expected to be made December 2007. YK noted that his decision affects Cal-Val activities and campaigns and there is a need to know as soon as possible. Suggested to at least plan for spring 2009

DL asked about the influence of foil on antenna. NS answered that it was initially a worry but not anymore. Foil is presumed stable/not movable when in space.

MD asked when acceptance level 2 proc. chains. AH replied in June/July 07 for the initial versions. MD noted that for GOCE it took at least one month to go through it full end to end. YK replied on this that this will be discussed at a latter stage.

DS asked when to expect Aquarius to be launched. DL stated that currently it is planned for July 09 but delay for up to a year can be expected.

After SMOS Commissioning Phase the responsibility will go to ESRIN and fall under the SMOS mission manager.

Presentation of the SMOS Mission Manager

Suzanne Mecklenburg who will start as SMOS Mission manager at ESRIN June 18, 2007 presented herself. YK welcomed her on behalf of the SMOS SAG.

The whole SAG took advantage of the lunch break to see the SMOS payload in the Solar simulator.

Algorithm development

In the absence of SD and NW, Michele Zundo summarised the status of algorithm development for level 1. Status overview of level 1 prototype processor (L1PP) was given, current version is V2 (Aug 2006) with partial implementation of calibration. To do list for Work to V3 includes amongst others a major rework relating to incorporation of calibration consolidation. L1PP V3 will be released 11 April 2007.

Tools developed are the SMOS Data simulator (SEPS-GS) version 1.2 which is Matlab based will be released 11 April 2007 and the L1PP VT (Visualisation Tool) of level 1 processor products (Current support L1 b and L1c).

Future activities will include validation up to L1b/c with SEPS/GS, IVT coming (expected May 2007) and release for binaries and documentation to users (www.smos.com.pt)

E.A asked about 3 and 4th Stokes vector in simulation. To which MZ answered that it is simulated but that the real value is not know. Although the numbers are expected to be small NS is asked to provide numbers for 3 and 4th Stokes parameters based upon EMIRAD data (Action 21.1)

MZ indicates that V3.5 can be ready in June/July. Current V3 release will have most of it. YK inquired if with that version all currently identified problems will be corrected. MZ replied yes except the issue of the angles. This decision is driven by level 2. This resulted in Action item regarding angles to be discussed with YK, MZ and Bertil Duesmann (Action 21.2).

The Level 2 Prototype was in absence of Steven Delwart presented by Achim Hahne

Soil Moisture: Algorithm Validation phase 1 mainly (end April), completed, confirmation of SRS (SMOS Retrieval Software) results achieved

Algorithm improvements identified i.e. antenna vs. ground level retrieval.

Acceptance of open prototype is foreseen for July 2007. Conversion to operation l processor is ongoing. End2End algorithm validation (SEPS-BIO -> L1pp → L2pp) Kicked off, results foreseen for late fall 2007

Sea Surface Salinity: Algorithm Validation phase 1 is completed, confirmation of SRS results achieved and more! (E.g. galactic glint). No major algorithm improvements are identified. Acceptance of prototype is planned for July 2007

Surface Tb: Surface Tb study K.O. with CLS prime contractor and ACRI-CESBIO-IFREMER as sub-contractors. A progress meeting was held March 22 where 2 products were proposed:

1. Simple surface Tb
2. Complex surface Tb (including sun glint corrections):

→ ISSUE OF REFLECTION COEFFICIENT TO BE USED

The SAG is asked for advice on the issue of the reflection coefficient: Can the cardioid computation as an approximation to surface reflection be used and are there any other options? NR states that cardioid computation is no good approx. to surface reflection because of e.g. sun glint. PhW wondered how we are going to deal with the fact that the measurements are not simultaneous. How do we get rid of the resulting error which is a big problem for OS (not as much for SM)? The cause of the problem is the difference between the inc. angles of the two snapshots (1.2 msec) and not so much problem effects of Faraday rotation. This resulted in a discussion on the fundamental problem to obtain Tb at surface from Tb at antenna and how to validate this Tb product at the surface. NR explained this complicated issue in a short diagramme to the SAG. An action item proposed to make a Technote on this problem (Action 21.3).

Operational Processor development was not presented due to absence of Norrie Wright

YK stated that it was delayed and that Operational Processors are basically copied from the prototypes. RC clarified that the operational version is much faster. From a scientific point of view it is a copy of the prototype. From system architecture/software it is different. The whole process is now on track. Level 1c ready in June/July (not cross validated), end of year a cross validated version should be ready.

NRT Operational Processing is done by another consortium (40% UK contribution required). Currently waiting for proposals that are coming in.

Complementary studies

a. Neural networks

Not represented because P-Y LeTraon was not present. YK Work is progressing similarly CNES looks at NN over land. The results are mediocre according to YK. At least one year after launch when there is enough data is required for training the NN. DS asked what the consequences are of the problem related to surface Tb for NN. YK stated that it is not a real issue because NN can work at antenna level as well.

b. Land Assimilation

Matthias Drusch introduced this study of which the KO took place in Jan 2007: ESA funded part of the work starts in August 2007. Duration of Phase I will be 27 Months. Possible extensions (Ph II and III) are foreseen. Key objectives of this study are:

1. Implementation of a global L-band emissivity model.
2. Global monitoring of TOA brightness temperatures and surface soil moisture.
3. Further development of the variational surface data assimilation system.
4. Data assimilation impact studies using ECMWF's operational Integrated Forecast System and SMOS brightness temperatures over land

Further he showed various results of Tb simulations and the implications of different parameterizations. Ancillary data to describe the vegetation is important as well as to describe dielectric constant. A general problem related to Cal/Val activities is that everyone can play around with all the variables and changes the various parameters to match modelled versus measured data.

Discussion on oceanographic activities to identify where gaps exist if any

DS asked where it is best to put a radiometer for Cal-Val given the limited ESA support. Since this relates to the European Cal-Val Activities Catherine Bouzinac was asked to present the outcome of the Cal Val Workshop on key sites in Europe. In the workshop on the first day presentations of the proposed European field experiments were given. In particular the preparatory work towards coordinated European Airborne/Field campaigns centred on French and Spanish validation sites. For ocean it is not as clear yet. Currently the best equipped area is Bay of Biscay. The second day of the workshop focussed on 1) Field radiometers and 2) Measurement strategy on key sites. She also showed the requirements for the validation sites for both land and ocean.

DS asked about the plans for ocean. Currently mentioned only is CAROLS (point of contact Daniele Hauser) is looking both at land and Ocean (Gulf of Biscay)

PvO noted that the absolute bare minimum requirements for measurement protocol for both land and sea should be stated: e.g. surface temperatures, number of surface soil moisture measurements, measurement depths vegetation description, soil type etc. YK replied that for land that is basically mostly done but that it is good to have such requirements for both land and ocean (Action 21.4).

DS asked what is done for oceans. PW explained that a table was devised based upon description of quality of measurement sites at sea. For example drilling platforms suffer from RFI. DS stated that a real measurement time series under all conditions is missing. NR indicated that CAROLS will have 12 hours of flights under multitude of circumstances. However, the lack of certain types of measurements over oceans has been discussed extensively during CAL-VAL meeting but no solution to existing problem is found. For example FINO is not thrown out but will not be a key site for ocean either.

CM stated that a solution for absence of drilling platform measurements should be found in the form of replacement because long term sea surface measurements are necessary. He proposed to look at the option of using a bridge. YK agreed that indeed long term measurements are necessary and that the option of a bridge has been considered but was decided against it because it was far from ideal. HR indicated that we still are looking at it from theoretical point of view and that information from previous campaigns held should be used. NR replied that platforms will always give localized information not very useful for satellite comparisons. YK stated that the Gulf of Biscay is suited because of various reasons to which NS added that the availability of 2 airplanes (free of charge) in France is big plus.

DS's other point of concern was that very cold and very warm waters are not both covered and that only cold water is being measured. NR added that most sites covering all specifics are listed in the Cal-Val plan.

DS: asked what is needed in terms of measurements other than flights because Argo is not sufficient because of the measurement errors even with using models to give surface salinity. YK: In gulf Biscay there will be drifters to cover the lack of salinity measurement coverage. DL added that surface roughness is the big unknown over oceans and that is why Aquarius uses a radar measurement as first order approximation.

Discussion on CEC (Calibration & Expertise Centre) functionality and presentation of tools

R. Crapolicchio presents along with Sabrina Pinori the activities of the CEC. They distributed a DVD with a demonstration of the SMOS Interactive Analysis Tools (IAT) and samples of SMOS DPGS operational products v1.0. They also raised various questions to the SAG on what to address (Action 21.5)

PhW noted that time series are missing to look at the temporal variability. MaD that because products for soil moisture are so different for different instruments when doing comparisons you need to look at time series. YK stated that some of this has been discussed wart Monitoring facility. MaD added that a comparison between NRT level 1 products and ECMWF Tb should be made too.

YK: Instrument stability should be measured as close to the instrument as possible.

MZ wondered why the galaxy is not being used as a stable target. (Monitor Visibility as the astronomers do)

Furthermore 2 demonstrations were given:

- Demonstration of the IAT (Land cover tool &SMOS data viewer)
- Demonstration by VEGA of SMOSView

Galactic contributions (David Levine and Nicolas Floury)

David Levine presented an overview on galactic contributions. The comparison of the radiation maps used by Aquarius and SMOS led to the conclusion that they are basically the same maps (minor differences). Another issue is that of discrete sources. Several sources have Tb larger than the value that is reported in the Reich and Reich (R&R) map (such as e.g. Cassiopeia). Question is what to do with these points. 13 of such points were identified that pass the threshold test to be significant to both Aquarius and SMOS. All of these points are in R&R map except two, namely Cassiopeia A and Cygnus A but the amplitude is not correctly given (larger than in the map). Because of gridding the point sources are distributed in the map. The temperature is not the issue but the energy (flux density). Concluded was that the flux densities agree reasonably well except the already mentioned exceptions.

Recommendation: Flag Cassiopeia A and Cygnus A in SMOS Image and possibly include one or two others. There is definitely a need to examine the data after launch.

CM inquired if these point sources are constant over time. NF replied that some are changing but these changes are small. Exception is again Cassiopeia but that is not in the R and R map anyway. Furthermore Northern and Southern Hemisphere maps are different. Northern one is complete; the Southern one is probably less complete but good enough. DL suggested adding some extended looks at the galaxy with both SMOS and Aquarius to get more information on galactic background radiation. NF added that the Galactic North pole is a clean, good target. YK summarised that not too much trouble is expected using the galactic map (for both SMOS and Aquarius).

Radio Frequency Interference – background and results from the COSMOS campaigns

Niels Skou opened with the statement that SMOS will have to live with RFI associated problems. Three different domains to detect RFI:

1. Time domain – look for pulses (used by Emirad)
2. Freq. Domain – look for carrier frequencies (not doable for EMIRAD)
3. Amplitude domain – look for non-thermal distribution (used by Emirad)

From examples of Norway and Australian experiments it is seen that there can be significant influence of RFI. But if you could throw away these measurements it would not be too bad. If you cannot throw away the flagged values (using kurtosis – done in the amplitude domain-: if the distribution is not Gaussian it is most likely man made interference) away most of the flagged will only contribute between 0-1 Kelvin but there are small percentages that contribute to even 30 or more Kelvin.

AH requested that at the next SAG meeting specific SMOS information regarding RFI issues and possible implications and resolutions can be given (Action 21.7)

coSMOS status and next steps

Patrick Wursteisen presented the coSMOS-OS status and reported that the campaign was successful campaign with accurate flights execution. Furthermore, Good cooperation with Norwegian partners at NIVA and Met. Office, NS commented that the reason for doing this campaign was to check if there was any self induced RFI and that was not found.

a. North Sea

Nicolas Reul gave a short overview of North Sea activities. NS suggest providing some radiometer data that looks at the sky/sun from the roof in the period that it is not installed on the plane (Action 21.6). YK mentioned that already these types of data had been provided but looking at temporal evolution not at the absolute temperatures.

PW asked what the status is of the L2 Ocean Salinity processor. NR replied that models are fine at low incidence angles. Problem is absence of swell in models at higher incidence angles. Some scale issues are still unresolved because not clear yet which model is better.

b. Australia

For sake of time no presentation.

12. Airborne demonstrators - first results/limitation/Schedule/discussion

Patrick Wursteisen presented the demonstrator campaigns based on initiative from ESTEC (M. Martin-Neira). Idea is to use a large range of sensors and sensor configurations (HUT2D, AMIRAS, EMIRAD, Paris GPS, and IR); Schedule is to be discussed with sensor operators and TKK (Skyvan). Currently first campaigns scheduled for early August 2007. AMIRAS maintained and upgraded until early 2008, some campaigns delayed to mid-2008

AOB

Various:

At the ENVISAT Symposium SMOS presentations will be given on Tuesday April 24. YK will present Science and AH will present project status. At the IGARSS'07 symposium 2 special

sessions on SMOS: one on Project Implementation Status and one on Science Issues. The special issues on SMOS of IEEE Transaction on Geoscience and Remote Sensing is proceeding well.

Activities on sea ice and campaigns.

Patrick Wursteisen gave a presentation on a recent sea ice campaign together with a short background briefing by Helge Rebhan. The POL-Ice campaign is a national initiative by Finland and Germany with intensive in-situ sampling and ice thickness measurement from a helicopter. In parallel flights with EMIRAD on Skyavn were successfully concluded experiencing very variable surface conditions (open sea, ice etc).

Cal/Val Workshop: No real general conclusion came out of this workshop due to lack of discussion.

AH indicated that for the Cal-Val campaigns a better footing (i.e. costs and various flight patterns) is needed. E.g. what in case it rains in Salamanca and not Valencia or vice versa. Furthermore, given the time scale of producing results it is doubtful that specific science issues can be resolved during rehearsal in 2008 in order to help set-up/develop answer science questions in 2009. TJ suggested to use ASCAT or AMSR-E data for the validation rehearsal (means correlation ground measurements with airborne and space borne data). TJ would endorse to have Salamanca included in the Cal-Val.

It was agreed to endorse CAL/VAL rehearsal without spec. addressing open science issues but naturally make the best possible measurements (Recommendation 21.1).

Radiometer procurement (ELBARA)

Reported by C. Matzler. AH approached CM initially for 4 radiometers (No redesign and delivery summer 2008), currently delivered one instrument to Zurich. Due to lack of funds a program called PRODEX is planned to be used but not clear if it will work (usually reserved for space ground hardware). Minimum concept for 3 radiometers (one was dropped for budget reasons) should now be feasible using TRP funds (160K from SMOS, 200 K by ESA-TRP). Proposal comes within one month after this SAG meeting. Idea is to have 2 fixed radiometers plus one mobile radiometer.

NS raised the issue that DS wants to use the mobile Elbara system for ocean validity purposes at no cost to SMOS Project. YK said that this would be possible when Steven Delwart makes an AO in order to make available possibly 2 instruments (Elbara and possibly EMIRAD-1/2). PW reminded to make sure that radiometer is properly protected, maintained and cleaned.

CAROLS

Yann Kerr gave a short overview on CAROLS which will fly on ATR42. Open issue is where to put the one available GPS receiver (GOLD-RTR) to obtain surface roughness (mainly sea surface) either on ATR42 or on SKYVAN? NS said that since Skyvan will fly in Danube catchment no GPS receiver is needed for surface roughness detection. First flights planned in Sept'07 and Nov'07 additional flights can be added when deemed necessary). In spring and fall of 2008 algorithm development and validation is planned. In 2009 experimental campaigns simultaneous with SMOS are planned (about 3 months). PW should get in touch with the people in France regarding coordination with Cal-Val activities (Action 21.8).

Radar Altimetry and soil moisture: synergies with SMOS

Short presentation was given by Jerome Benveniste on synergistic possibilities between radar altimetry and SMOS. He asked for soil moisture validation of dry/desert type areas. TJ suggested data sets from the several experiments that were held in Arizona.

Preparation of next workshops

Cal Val workshop is planned in week of October 29th, 2007 (same set up as in Avila) and will be organised by AH with Frascati as preferred location. Proposed is to start workshop Monday afternoon until Wednesday afternoon and to have on Thursday the SMOS SAG (November 1st).

Presentation by Tom Jackson

Tom Jackson stated that HYDROS might probably come back as SMAP. He also gave a short overview of the CLASIC experiment that will be held this June 2007. In response to the discussion on the 3and 4th Stokes parameter he gave an overview of Windsat observations during SMEX 05. He focussed on 3 and 4th Stokes parameters for 10.7 GHz. There is not showing much signal over Amazonian which is expected. In Mongolia (large homogenous grassland region) a signal is seen indicating snow other than that no signal is seen. For the dune area in China (with strong orientation) a strong signal is observed in 3rd Stokes vector but no signal in 4th Stokes vector. Hence most likely no topographical information present in 4th Stokes vector. For the agricultural area with topographical features that show strong directionality again in 3rd Stokes vector a signal is observed related to probably (directional) crop growth. In 4th Stokes vector no real signal observed just a bit of noise or response related to same growth period.

AH asked about PALS participation in experiment to characterize DOME-C (Antarctica). TJ replied he will inquire about that.

TJ Asked what happened to Salamanca site. YK replied it is still there but not as a reference site for long term monitoring. Problem with Salamanca site is that it is not as representative and does not reach field capacity.

Date/Place/Objectives of next meetings

SMOS SAG will take place on November 1st after the SMOS Cal-Val Workshop.

Old Action Items

Action	No	Actionee	Status
To distribute analysis on bright galactic targets to SAG	20.1	D. LeVine	Closed
to consolidate results from galactic target studies with previous ESA activities	20.2	D. LeVine	Closed
to provide details of TEC processing to SAG	20.3	C. Mätzler	Closed
to provide feedback on SM-Database to P.van Oevelen	20.4	W.Wagner, A. van der Griend, M. Drusch	Closed
to distribute a list of Toolbox requirements to SAG	20.5	J. Benveniste	Closed (21.11)
to coordinate RFI related activities	19.10	D. LeVine, N. Skou	reiterated
to provide evidence of RFI to D.Levine/N.Skou	19.11	All	reiterated
to draft proposals for a special TGARS SMOS issue (TGARS Deadline March 07)	19.15	All	Closed

Recommendations:

No	Description
21.1	The SAG reached an agreement to endorse CAL/VAL rehearsal without specifically addressing open science issues but naturally making the best possible measurements and effort. Furthermore, it is recommended to use an available satellite soil moisture product (i.e. AMSR-E, ASCAT) to "simulate" SMOS product.

New Action Items

Action	No	Actionee	Status
to coordinate RFI related activities	19.10	D. LeVine, N. Skou	reiterated
to provide evidence of RFI to D.Levine/N.Skou	19.11	All	reiterated
give range of value for 4th Stokes parameter at antenna level from measurements done over various surfaces and/or to direct to people who have reliable numbers.	21.1	N. Skou	Open
To provide a technote to state what is used as frame/reference at the antenna level by the project regarding angles for L1 processor	21.2	Y. Kerr, M. Zundo, P. Waldteufel and B. Duesmann	Open
Technote to be written on how to obtain Tb at surface from Tb at antenna which is fundamental problem.	21.3	N. Reul, P. Waldteufel, S. Delwart	Open
Separate Cal-Val measurements in absolute necessary and useful measurements	21.4	SAG, (S. Delwart, C. Bouzinac, P. Wursteisen)	Open
CEC team raised various questions to SAG what to address (Get PPT and get the specific questions) within next month if possible	215	All	Open
Gather radiometer measurements on the sun and provide to N. Reul	21.6	N. Skou, Y. Kerr	Open
Next SAG give specific SMOS information regarding RFI issues and possible implications and resolutions	21.7	N. Skou, C. Ruff	Open
ESA (PW) should contact the French regarding activities with ATR42/CAROLS and other national activities and coordinate for rehearsal and Cal-VAL activities	21.8	P. Wursteisen	Open
To give update on TEC what is there	21.9	R. Crapolicchio	Open
N. Floury sent P. van Oevelen Technote regarding TEC	21.10	N. Floury	Open
SMOS Toolbox changed to BEAM refurbishing under responsibility of probably P. Regner and will require funding from SMOS Mission Manager. Status needs to be clarified	21.11	Changed to S. Delwart	Open
Have P. Viterbo give an presentation on the SMOS Soil Moisture Network activity at next SMOS SAG 22	21.12	P. van Oevelen (P. Viterbo)	Open