

II GWSWF meeting, Modena April 11-12, 2011.

Meeting starts at 14:00 on April, 11th with a brief round of introductions of the attendees.

Giorgiana De Franceschi-GDF

GDF starts the meeting with a brief overview of the agenda. Then she reminds the main objectives of GWSWF Action Group recalling the first steps of the AG from SCAR 2008. The achievements of the AG are summarized in terms of: experimental observations, scientific results, web site development ([www.gwswf.scar.org](http://www.gwswf.scar.org)).

She reports two group of Countries: interest and support (Italy, UK, Poland; Canada, USA South Africa, Brazil); potentially interested but still observers (Argentina, Australia, China).

She convey greetings from people not attending and she announces a call for collaborations to study a storm occurred between 1<sup>st</sup> and 3<sup>rd</sup> of March 2011 over Antarctica By Gary Bust; he invites people dealing with magnetometers, VLF receivers, scintillation receivers, etc... to share their data.

Antonio Meloni-AM

AM introduces the structure and the strategy of SCAR. He reminds what is SCAR, its brief history, its current status and objectives. He then recalls the SCAR Strategic Plan (available at: [http://www.scar.org/strategicplan2011/SCAR\\_Strat\\_Plan\\_2011-16.pdf](http://www.scar.org/strategicplan2011/SCAR_Strat_Plan_2011-16.pdf)) where SCAR vision and strategy for the next 5 years are described. In particular he reports about the wide range of spectrum in which different investigations can be hosted within SCAR, organized according to three different Standing Scientific Groups: Life Science, Physical Science and Geosciences. He underlines the fact that GWSWF is a cross-linkage AG shared by Geosciences and Physical Science. Then he reminds, giving brief highlights on some examples, what SCAR defined as Scientific Research Program (SRP 6-8 years), Expert Group (EG 2-4 years) and Action Group (AG 2-4 years). He gives some indications on SCAR financing: 1 million US dollars in 2009 and other funding from privates. He describes typical SCAR products: data, database, catalogue, etc...

He reminds the ICSU role within SCAR.

Discussions:

Slovenia started the process to become SCAR member.

There is not mandatory way of becoming SRP from EG or AG. Maurizio Candidi reports the SCAR view to invite the Action Groups to find its objective and then merge into a SRP or into an EG or close. MC anticipates questions of the discussion to be held tomorrow.

SCAR invites to propose AG, EG and SRP in the fields that are not already covered by others.

GDF invites people to continue the discussion tomorrow asking in particular to Latty Hotem to report about Polenet future actions within SCAR.

Maurizio Candidi-MC

MC gives an overview on how SCAR sees the GWSWF AG. In 2002 SCAR organized a meeting to discuss about cross-linkages between different SSG. In 2006 the GWSWF was introduced for the first time during the cross-linkage SCAR meeting held in Rome at Villa Celimontana. During the meeting GWSWF was presented as an opportunity provided by people belonging to Polenet and Icestar, that at that time were grouped under UAMPY, an IPY project (2007-2008). UAMPY was merged inside Icestar giving its

contribution on upper atmosphere monitoring and investigation. He reminds that other linkages with our AG can be found inside SCOSTEP via CAWSES2 program, through the investigation of gravity waves propagating upwards from the troposphere. MC reminds there is almost no link between CAWSES and SCAR (but Cathryn Mitchell as WG Cawses member). He recalls that to address the SCAR strategy our AG has to define several (not only one) scientific objectives. In St. Peterburgh in 2008 during the SCAR OS this AG was endorsed by SCAR. In July 2009 at Punta Arenas during the SSG meeting this AG was mentioned again for his multidisciplinary in the use of GPS measurements. MC invites the attendees to discuss about the impact on climate study of the AG. He gives some examples on ozone changes possibly due to solar disturbances at high latitudes, signed also by auroral effects. He reminds also the Heppa Workshop on the thermosphere, ionosphere and atmospheric coupling after particles precipitations (<http://heppa2011.iaa.es/php/28-homepage.htm>).

Discussion: Larry Hothem points out that is necessary that different aspects of interest can be studied with the same instruments, supporting the idea to join towards the Expert group. Claudio Tomasi (CT) focused on the importance of the vertical profiles and the use of satellite data to improve the resolution on the water vapor determination (ENVISAT - 20% of resolution up to 50 km). MC notices that the presence of CT is important as an expert of atmospheric physicist, which was missing in the previous meeting. CT and MN are working together as they measure vapor with different techniques (calibration issues).

Lucilla Alfonsi-LA

LA presented the implementation plan from Action Group to Expert Group. LA presents some parts of the SCAR scientific strategic plan. He says that it is the first time that solar-terrestrial physics are considerably taken in consideration in the SCAR plans. We should promote ourselves, because our contribution to S-T Physics is important and less expensive (ground based) with respect to investigations done with space-borne instrumentation. LA illustrates the CAWSES II (SCOSTEP new scientific program): our first aims can be framed in theme 2 – space weather: science and application. LA illustrates ICESTAR, where the importance of studies similarities and differences between Arctic and Antarctic atmosphere was addressed. There is also an action group, BipAG II, to address bipolar issues: we should try to contact those people to let them aware of our work and to ask how we can contribute practically to their work. Anybody of the Upper Atmosphere Physics seems to be present in that AG. LA presents the new group: GBA - GNSS based studies of the bipolar atmosphere. The keyword of the group should be: multidisciplinary. We should talk about the structure of the proposed expert group and the proposed deliverables.

Discussion: Larry points out the importance of the impact of logistic support and the support to the model developer. GDF point out the importance of LA, AM and MC presentation in discussing and preparing the implementation plan. MC reminds that this is a draft implementation plan and we should be ready to present it, in its new form, in SCAR-OS meeting in Portland.

Vincenzo Romano-VR

VR introduces the philosophy driving the eSWua project due to stimulate the discussion about the production of deliverables in the direction of data management. The SCADM vision has a key point: the interoperability between different data infrastructure. Then he illustrates the eSWua system architecture, highlighting also the importance of structuring the GNSS data to enable statistics studies (as in the case of Alfonsi et al, 2011 paper, in press on RS).

VR describes the form that he realized together with Luca Spogli (INGV) and that can be downloaded from the AG website. It is divided into 3 parts: general, data description, data tools. VR concludes underlining his

experience in data managing especially on weather and space weather data. The goal is to improve the relevance and the utility of data products. Open questions for discussion: what our community needs?, which is the data policy?; Which is the data availability?; Which is the data and tools sharing?

Discussion:

GDF and VR stimulate the discussion on the adoption of common standard (as rinex for geodesy) of GNSS measurements. LH recommends to keep the raw information also when data are converted and highlights the importance of metadata stressing that the point is what we would like to include in the metadata. VR points out that rinex format is not suitable for scintillation monitoring. LH invites to include in the metadata also the station monumentation for geodetic community use. LH invites to consult the **ISO2011 (??)** data standardization. GDF, VR and Joe Kinrade (Bath) explains to LH that GISTM receivers can allocate different data formats. MN specifies that the upper atmosphere community doesn't have a common adopted standard as in the case of geodetic community.

**The session closes at 17:15.**

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April 12<sup>th</sup>, the session starts at 9:33

Alessandro Capra-AC

AC speaks as Chair of Geoscience SCAR SSG. He describes the structure of his SSG highlighting the POLENET interest in our AG. He recalls the idea to create a connection between GNSS users for geodesy and for upper atmosphere physics, reminding polenet and icestar perspectives. He points out the interdisciplinary linkages between geosciences and physical science. SERCE (Solid Earth Response and influences on Cryospheric Evolution, <http://www.scar.org/researchgroups/geoscience/serce/>) will be likely proposed as SRP during the next SCAR meeting in Portland in 2012, taking the legacy by polenet project that was active during IPY. He invites the AG to be in contact with Terry Wilson to be sure that the polenet network will continue the monitoring activity. GDF indicates Larry Holthem as the polenet contact person. AC invites the AG to provide a report that he will present during the next cross-linkages workshop in Ottawa on next May. AC summarizes the agenda of that meeting stressing also that SCADM will be discussed as well. GDF underlines the possibility of presenting something about data from the AG. AC will attend also the SCAR Executive Meeting in Edinburgh and invites the AG to present there (he will do it on AG behalf) about the AG future steps. LH supports the AC invitation in order to keep the attention of SCAR on this AG for funding but also for supporting the GNSS Antarctic monitoring. AC describes the funds provided to the AG from geoscience (1500 \$ during 2011); other 1500 \$ will be provided in 2012 and these can be used to support the SCAR OS attendance of AG members. AC explains that in case that other AGs will not use their 2011 funds within July those funds can be reallocated also in favor of our AG. In this frame it's very important to present a very good activity report in July for the SCAR Executive meeting where the reallocations can be discussed. PP asks to attend the Ottawa meeting, but AC replies that the meeting is close and reserved only to the SCAR Executive members. AC stresses the fact that the future of SERCE will be clarified during the next SCAR meeting in Edinburgh where it will be decided if SERCE will become a SRP after the SCAR OS in Portland on 2012.

Ermanno Amata-EA

EA introduces the SuperDARN perspective into the AG and speaks on behalf of Mark Lester, SD chair. He describes the principal operations, illustrating the SD fields of view in the southern and northern

hemisphere and stressing that the principle of operation is on refraction, backscattering and Doppler-shift. In case of absorption SD are unable to receive backscattering echoes. He describes ground and ionosphere backscattering. He briefly describes the importance of SD to produce real-time space weather products. SD can also measure the mesospheric winds, provide MUF and foF2 products and provide convection maps. He discusses the polar cap potential or the number of echoes as best space weather proxy. He closes his presentation illustrating the SD and space facilities (Image, Themis, etc..) and describing the upgrading of SuperDARN that can be addressed extending the SD network to middle latitudes, covering the Siberia region and completing the southern coverage.

Joe Kinrade-JK

JK presents the first results of the Antarctic campaign performed by the team of University of Bath. The campaign was performed roughly between South POLE and the Antarctic peninsula. He illustrated a tomography case study on 5<sup>th</sup>-6<sup>th</sup> April 2010. He shows a coverage map including GNSS observations from polenet+IGS+ Bath during April 2010. He shows features of the TOI over Antarctica reproduced by MIDAS. He illustrates a multi-instrument approach to find out the role of optical emissions in the case event.

Larry Hothem-LH

LH introduces the status and the future of Polenet, stressing the fact that the US polenet is thinking to turn into permanent stations the ones deployed during IPY. He describes the current status of GPS constellation. He underlines that the next challenge is to use multi-constellation receivers. He shows the coverage map of Polenet sites updated to March 2011, zooming on the US Polenet sector to describe the field season 2011-2012. US Polenet is going to be funded by NSF polar programs (June 2011) to gain an approval for 4 years. Possibly the submission will be delayed to September 2011, so in time to consider also the support from the GWSWF AG after the SCAR meeting in Edinburgh on next July. Then he describes the venue of the next OS SCAR in Portland on 13-20 July 2012. GDF asks to LH about the polenet data archive during the solar minimum. LH replies that US data are stored in an archive in Boulder and the archive is funded by NSF, other data from GNSS data service are stored into NASA archives. The data are available and it is something that we should discuss. GDF asks LH to indicate a contact person for data issues in order to facilitate the data use within the AG. LH points out the problem of identified the people that manage the summer campaign data and indicates into SCADM the responsibility of indicating clearly who are the contact people for data.

Andreja Sušnik- AS

AS presents the possible contribution of Slovenia to AG, showing the scientific topics that they covered: remote sensing and water vapour concentration by means of Mie and Raman lidars; GNSS measurements. She stressed that they don't have any instruments located in polar regions, but they can offer to the AG their expertise. MC invites AS to be in contact with Countries that have polar projects in order to join SCAR. GDF proposes the Italian and the UK projects to host Slovenian experiments. MG offers the Hornsund facilities to host Slovenian instruments.

Paul Prikryl-PP

PP introduces the CHAIN (Canadian High Arctic Ionospheric Network) network chaired by P.T. Jayachandran (<http://chain.physics.unb.ca/chain/>). He illustrates the network of CADI ionosondes and GPS receivers and highlight their data products in terms of 3D tomographic maps. He briefly describes the CHAIN database and then the Canadian Geospace Monitoring Program. In the future they plan to extend the CHAIN network and then they will launch the CASSIOPE/ePOP satellite to measure in-situ plasma and irregularities and they

hope to make interhemispheric comparison within this AG. He describes their work on scintillation climatology. MC asks whether they are included in any virtual observatories; PP indicates Enric Donovan as the person within IceStar in charge of data management.

Emilia Correia-EC

EC presents the Brazilian experiments deployed in Antarctica at King George Island: Javad and Novatel GPS receivers, CADI, VLF receivers and riometers. She describes also the network they manage in South America. GDF asks to EC to act as the contact person to join the South American teams involved in the field. EC agrees and highlights the importance of SAMA (South Atlantic Magnetic Anomaly) monitoring and studies also to satellite potential damages application. She describes their scientific objectives: TEC and scintillations investigation over Antarctica and SAMA region and multi-instruments approach.

Marcin Grzesiak-MG

MG presents measurement made in the Polish station in Hornsund (Svalbard islands) by GPS receivers, riometers, digisonde, magnetometers, radioactive collector and field mill, automatic weather station. Then he illustrates the MISTECS project to measure the drift velocity of the ionospheric irregularities. He then shows some example of the measurements coming from MISTEC experiment, ionosonde soundings. Then he gives some hints on WAM to model ionospheric scintillations. MG advertises their station to host other kind of measurements within the AG. GDF thanks MG for his offer highlighting their experience in ionospheric irregularities modeling.

Luca Spogli-LS

LS presents the INGV facilities as contribution to the AG: the Arctic and Antarctic GPS TEC and scintillation receivers, ionosondes and riometers in Antarctica. He also reminds the eSWua database already presented yesterday by VR and invites people to register. Then he briefly illustrates the GBSC (Ground Based Scintillation Climatology) tools. GDF advertises the GBSC tools as a concrete contribution to the AG. LS and GDF stress that GBSC future application is towards the forecasting.

Monia Negusini-MN

MN describes the Italian station to monitor the water vapour over Antarctica and she ensures the continuation of the activity also in collaboration with other groups especially with US people dealing with radio soundings stations. GDF stresses that the team led by MN and Pierguido Sarti (PS) needs to have more collaboration (from Slovenia maybe?) and invites people to address this problem. MN confirms their difficulty in forming a thematic group relying on a so small number of people working on water vapor retrieval and asks the attendees to discuss about it. MC invites MN to find other contact within the SCAR also outside the AG. MN replies that she and PS tried to do that by without success and then he underlines that they are at now not able to convey in a thematic group. MC stresses that AS from Slovenia and Claudio Tomasi can join them. GDF identifies Martin Jarvis as a potential interested person from BAS. JK agrees on this possibility and will contact British Antarctic Survey people to investigate this opportunity.

Paul Prikryl-PP

PP comments the document he circulated discussing his view of the future of this AG as possible SRP. He proposes GTWITS as acronym meaning GNSS tropospheric water vapor, ionospheric TEC and scintillation for weather and space weather forecasting. He explains that his comments derive from scientific objectives by Papitashvili presentation about ICESTAR scopes: precipitable water vapour, ionospheric irregularities,

scintillation climatology and mitigation tools. He shows some water vapor estimates made by UCAR and then he presents tomographic maps by MIDAS. The objectives should focus on specialized GPS scintillation networks and LH stresses the fact that also TEC GPS measurements can be used and adopted by the AG. LH suggests to identify better the coverage distribution (defined as global by PP) to attract funding. Then PP expresses some key scientific questions such as scintillation forecasting etc... He suggests to implement GWSWF data portal and merge the measurements facilities, producing joint papers as the AGU presentation on the interhemispheric scintillations event on April 2010. He closes showing possible logos and acronyms for the AG. GDF highlights the difficulty to face the water vapor thematic group with a so small number of people, unless we will find other partners (maybe among the people working on climate studies). PP confirms the difficulty of attracting people in such matter reporting his unsuccessful try to draw people on this matter.

MC thanks everybody before leaving and confirm that after filling some gaps this AG has the potential to become a SRP in the future.

GDF introduces the afternoon session about the discussion on thematic WG and possible leaderships. GDF invites all the attendees to express their opinions.

- GDF is in favor of proposing the AG to become an EG (4 years duration) because she thinks that the GWSWF AG is not yet ready for a SRP. In these 4 years she suggests to attract other communities to enlarge the critical mass and try to become a SRP in the future.
- MN agrees with GDF also because the water vapor team is composed by few members, so she confirms their willingness of continuing to provide their contribution and hope to enlarge the team.
- JK expresses the willingness of University of Bath in going on to monitor and image the scintillations over Antarctica and to contribute to the GWSWF.
- LH, as polenet representative, expresses the need of polenet to enlarge outside US their membership and he thinks that the GWSWF could provide recommendations to polenet in order to provide a contribution. He is in favor of continuing a discussion about data among polenet and the GWSWF.
- VR underlines the important chance of sharing data and knowledge within UAMPY and then within GWSWF. This means that small communities can put in place concrete collaboration. He thinks that we are ready to identify and deliver deliverables.
- AS, on behalf of Nova Gorica Un., expresses her impression of how much efforts have been made by this AG.
- PP express his willingness to attract other people within the Group and he is now in favor of constituting an EG. He expresses the willingness of Canadian community to continue to offer its contribution. GDF suggests to PP to merge the two implementation plan documents. PP asks for specific requirements to arrange the proposal. LA replies that, according to MC, there aren't requirements but GDF reminds that SCAR asks for precise deliverables and products. GDF remembers that Australia, South Africa, Chile, Argentina, Peru express their willingness to join us. PP asks to think about the name of the new EG and GDF agrees asking to pay attention on the possible overlapping with other community that cannot be in favor of being confused with us.
- EC thinks that we are now focusing the target step by step (after each meeting) and she is confident about the future of the group.
- LA is in favor of an expert group. We can continue in our work in that shape. Putting the accent in using the GPS for the multidisciplinary approach. Open the way to other communities without triggering any competition. Focus on what we are now able do to, without touching word such as

tropospheric, atmospheric and so on. LA stresses the importance of understanding what can be our role into polenet and asks LH to act in this direction.

- LS agrees on the formation of an EG to strengthen the efforts also on the data and tools sharing.
- EA reminds that this morning he presents different SuperDARN products underlining that maybe mesospheric winds measurements are of interest for some people within the group. If it is the case he can act to identify and attract some people from SD community to join the group. He reminds the papers by Milan et al. and Prkryl et al. and his efforts with INGV team to use in synergy SD and scintillations data. EA will report the outcome of this meeting during the next SD workshop and he is in favour of an EG. He asks about possible duplication with Icestar EG, but GDF replies that AI Weatherwax likes our team and appreciate and hope in a possible interaction and collaboration. EA envisages the possibility of convey icestar and our EG into a future SRP.
- MG agrees with the previous speakers on the possibility to become an EG to tight the scientific collaboration and to clarify what can be proposed as a SRP.

LH stresses the importance of identifying which is the expertise of the future EG, underling the group expertise on the use of GNSS data. He invites people to choose carefully the title.

PP asks to discuss about his proposal of logo and acronym.

LH suggest to focus the name on polar, poles or high latitude wording to stress the bipolar feature of the EG.

GDF starts the discussion about the WGs formation and asks to PP to express his opinion. GDF recalls the WGs proposed in the draft of the implementation plan she circulated ([link to the document?](#)). She support the importance of forming a specific WG on data management. PP asks to VR to lead the WG in collaboration with LH. VR agrees on PP idea to create a data portal as an EG deliverable. GDF invites VR to lead the group and ask to LH to ensure the polenet collaboration. LH replies that he is already very busy in the polenet but he would like to continue to support the GWSWF. LH agrees to act as a contact at least with the US polenet side. JK offers Bath leadership to manage the S-T interactions but also modeling and model testing WG can be considered as well. GDF offers the leadership of the lower atmospheric delay on GNSS with collaboration of Slovenian team (AS agrees) and maybe with the BAS contribution. MN replies that at now she is able only to offer her efforts to form a group on this topic and she proposes to change the WG task into the formation of the sufficient critical mass. LH suggests [Boler from Unavco](#) as a possible member of the data management WG. LA invites LH to consider the data management collaboration as a mutual benefits to look for funding. GDF invites PP to lead the S-T interactions and he agrees also in case that Un. of Bath will lead the WG. JK asks if Gary Bust can be involved as well and GDF agrees on that stressing that the leader act as a contact and a coordinator to push people to collaborate. VR says that everybody joins all the WG but GDF stresses the fact that we need to identified leaders in order to coordinate effectively. GDF asks about modeling WG. LA supports the GDF idea to leave the leadership of the modeling WG. GDF invites EC to join PP to lead the ST interactions WG. EC and PP agree on that. GDF invites EA to push SD people to join us and to report to the GWSWF group about the reactions after the SD workshop. PP will help EA on this because he will attend the SD workshop as well. GDF observes that maybe SuperDARN community could be happy of being involved within SCAR through the GWSWF group. GDF fills the leadership of the WGs.

After the break GDF invites the attendees to close the meeting within 1 hour and stimulate the discussion about the logos proposed by PP. She likes the BIGTWITS option and agrees with PP on the use of his logo with different acronym. JK proposes MAPS standing for Multi instruments Approach for Polar Studies, or Science or...PP propose PoleGAS standing for Pole GNSS Atmosphere and Space. VR proposes GRAPE

standing for GNSS Research and Application for Polar Environment. VR proposes to collect the proposal and to vote the best on the web within 1 week and GDF agrees on that. GDF asks PP to use his logo in the web portal of the EG and to take care of the portal layout. PP will provide the logo with the approved acronym to INGV for data portal upgrading. VR asks to GDF about the Coordination with other projects WG leadership and GDF express his willingness to ask to MC and Phil Wilkinson to take the lead. She also asks to LA to join the leadership but she denies. VR proposes to change the WG title from data management to data management strategy. GDF introduce the deliverables issues:

- Creation of data portal at end of 4 years reporting every year the advancements (Coordination: VR and Pierre Cilliers)
- Maps of ionospheric scintillation and TEC over both the poles and imaging case studies as joint publications and reports (Coordination: LA, PP)
- Long term behavior and features of PWW over polar regions derived by GNSS observations to develop of regional atmospheric models (Coordination: MN)
- Website development, outreach and dissemination (all, Coordination: TBD).

GDF will circulate within the end of April a document producing what discussed and what proposed by PP. PP agrees to produce the draft. GDF would like to provide to the SCAR people all the inputs on the proposed EG. GDF invites all to list all their references (publications+presentations) from 2008 up to now. LH suggests to highlight the different contributions but GDF is in favor of an easier approach to merge the 2 documents.

GDF asks 2 people to act as contacts for the proposed EG and open the vote for this. MN proposes PP, Cathryn Mitchell as possible co-chairs. GDF invites PP but he denies because he doesn't think to be the right person to push people. GDF asks to Emilia, but she denies as well. GDF asks to MG, he answers that he has to think about as it would be his first experience, but he doesn't think to be the right person. VR points out that now the responsibilities are shared among the working group leaders, so the leader of the group has a lighter work to do. LA reminds that the minutes will be circulated soon for integrations and comments and to make available the presentations of the two days. GDF reminds EC to be the contact person for the south American groups.

The meeting closes at 5:34 PM.