

GPS for Weather and Space Weather Forecasting (GWSWF)

SCAR Business Meeting, 1 August 2010, 15.30-17.30.

Hotel Panamericano, Room Rio Parana B, Buenos Aires, Argentina

A meeting of the SCAR SSG/PS Action Group GPS for Weather and Space Weather Forecast was held in Buenos Aires on August 1st. Sixteen people from 8 different countries attended the meeting (Tab.1).

An overview of the activities carried out by the teams involved with the AG during the intersessional period between SCAR XXX (SaintPetersburg) and SCAR XXXI (Buenos Aires), considering the activities kickoff the first AG meeting held in Rome on September 2009 (minutes available at http://www.scar.org/researchgroups/GPSforWeatherAG_MtgRept_09.pdf), was given. Particular attention was devoted to areas in which synergy among the groups demonstrated the effectiveness of the AG, and areas in which more collaboration is to be sought.

The presentations given during the meeting have shown the successes achieved by the AG: an enlargement of the GPS bi-polar network for investigating the ionospheric irregularities and scintillations (Fig.s 1,2), publications co-authored by different institutions (references – 1), joint SCAR OSC presentations on multi-instrument inter-hemispheric scintillation studies, on the mitigation of ionospheric effects on GPS positioning over Antarctica and on the water vapour retrieval using GPS over Antarctica (references- 2). The prototype of the GWSWF WEB site has been described, announcing its forthcoming publication and stressing its finalization in terms of effectiveness in results dissemination, data and software facilities sharing, and attraction of new collaborations with others groups and institutions in the GWSWF field of investigation. This aspect was particularly highlighted in the presentations by Larry D. Hothem and Gary Johnston on the GPS/GNSS observations at the remote sites of the POLENET in Antarctica and on the GIANT (Geodetic Infrastructure of Antarctica) activities and current work program within SCAR, respectively. Scientists of the AG coming from Canada (involved in the CHAIN network), South Africa and Brazil have shown their current activities within the GWSWF. Mauricio Gende, from University of La Plata, introduced the interest of Argentinean Institutions dealing with upper atmosphere studies in supporting and joining the AG.

Discussions took place on areas in which further effort is required, to achieve the expected cooperation, to share data, hardware and software, to arrange for joint measurement campaigns and to harmonise sharing of facilities, as well as areas in which joint papers could be produced. In particular, closer interaction also is envisaged with SCADM regarding metadata standards, quality control standards & data formats (similarly to INTERMAGNET standards for geomagnetic data) for ionospheric scintillation. All these aspects of the AG interaction will be supported by the GWSWF website that it is going to be published as soon as the INGV team will receive the necessary inputs from the AG participants. Within the next 2 years the AG plans to assess a clear formulation of products and deliverables (2 years have already lapsed since the formation of the group) and a better liaison with other SCAR groups e.g. ICESTAR. The AG participants agreed to organize a second GWSWF meeting in Italy on April 2011.

For further details please refer to the attachment describing the meeting agenda and summarizing the highlights of the presentations (agenda_highlights.doc).

NAME	AFFILIATION	COUNTRY
Natsuo Sato	NIPR	Japan
Terry Deshler	Un. of Wyoming	USA
Al Weatherwax	Siena College	USA
Emilia Correia	INPE	Brazil
Pail Prikryl	CRC	Canada
Monia Negusini	INAF	Italy
Alessandro Capra	Un. di Modena e Reggio Emilia	Italy
Maurizio Candidi	INAF-IFSI	Italy
Claudio Rafanelli	CNR-IDASC	Italy
Larry Hothem	USGS	USA
Maurizio Gende	UNLP	Argentina
Pierre Cilliers	HMO	South Africa
Terry Wilson	Ohio State Un.	USA
Gary Johnston	Geoscience Australia	USA
Lucilla Alfonsi	INGV	Italy
Giorgiana De Franceschi	INGV	Italy

Table 1. List of Attendees.

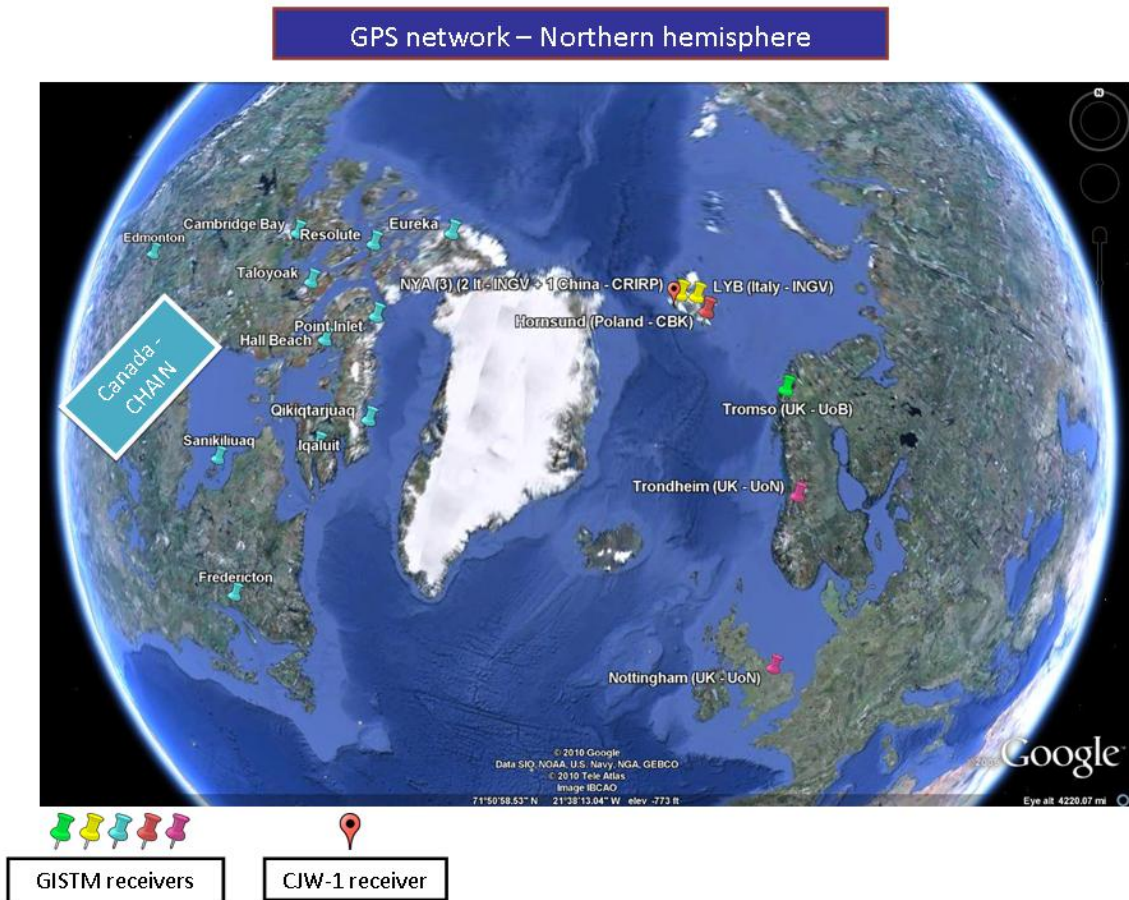


Figure 1

GPS network – Southern hemisphere

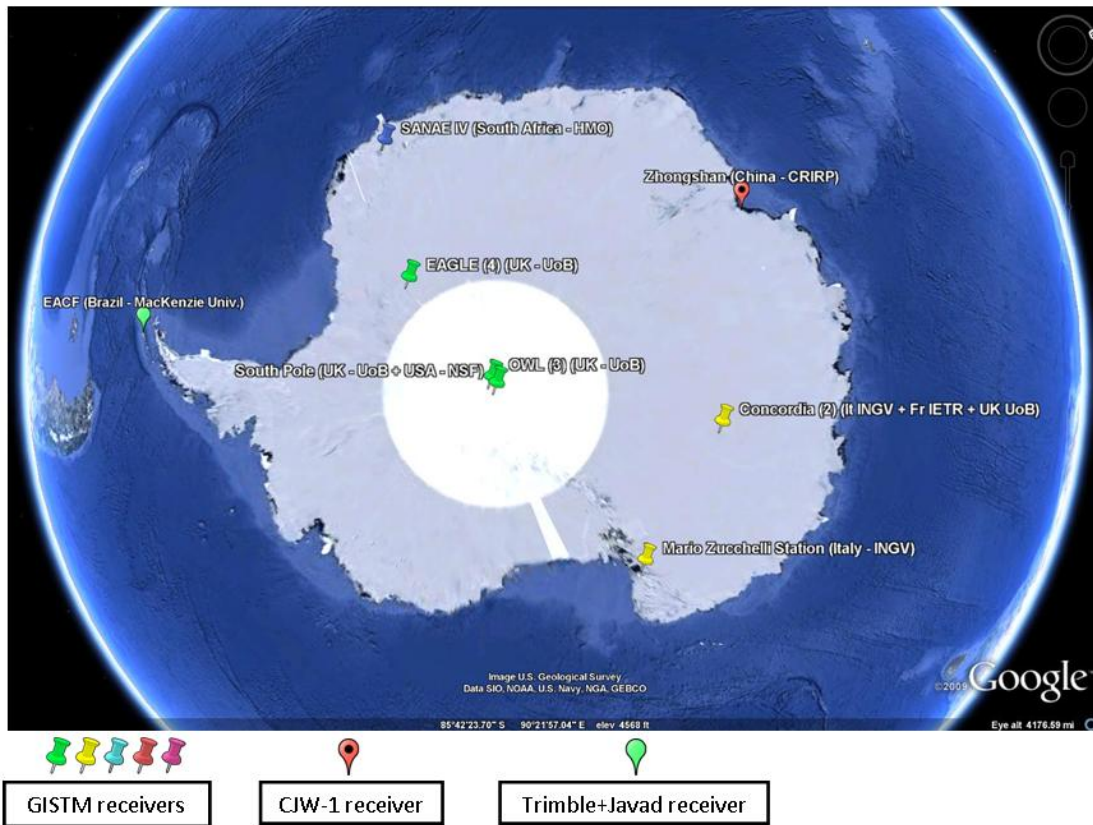


Figure 2

References 1

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Aquino M., Monico J.F.G., Dodson A.H., Marques H., De Franceschi G., Alfonsi Lu., Romano V., Andreotti M., Improving the GNSS Positioning Stochastic Model in the Presence of Ionospheric Scintillation, *Journal of Geodesy* (2009), doi: 10.1007/s00190-009-0313-6.

Beniguel Y., Romano V., Alfonsi L., Aquino M., Bourdillon A., Cannon P., De Franceschi, Dubey S, Forte B., Gherm V.E., Jakowski N., Materassi M., Noack T., Pozoga M., Rogers N.C., Spalla P., Strangeways H.J., Warrington M., Wernik A., Wilken V., Zernov N.N. (2009), Ionospheric scintillation monitoring and modelling, *Annals of Geophysics*, 52, 3/4, 2009.

Burston, R., I. Astin, C. Mitchell, Alfonsi Lu., T. Pedersen, and S. Skone (2009), Correlation between scintillation indices and gradient drift wave amplitudes in the northern polar ionosphere, *J. Geophys. Res.*, 114, A07309, doi:10.1029/2009JA014151.

Burston R., I. Astin, C.N. Mitchell, Alfonsi Lu., T. Pedersen, S. Skone, Turbulent Times in the Northern Polar Ionosphere?, *J. Geophysical Research*, doi:10.1029/2009JA014813,

De Franceschi G., Alfonsi Lu., Romano V., Aquino M., Dodson A., Mitchell C.N., Spencer P., Wernik A.W. (2008). Dynamics of high-latitude patches and associated small-scale irregularities, *Journal of Atmospheric and Solar-Terrestrial Physics*, 70, 879-888, doi:10.1016/j.jastp.2007.05.018.

Forte B., M. Materassi, L. Alfonsi, V. Romano, G. De Franceschi, P. Spalla, Analysis of GPS measurements of ionospheric scintillation at high latitudes, *J. Adv. Space Res.*, accepted for publication, 2010.

Materassi M., Alfonsi Lu., De Franceschi G., Romano V., Mitchell C.N., Spalla P. Detrend effect on the scalograms of GPS amplitude scintillation, *J. Adv. Space Res.*(2009), doi:10.1016/j.asr.2008.01.023.

Romano V., S. Pau, M. Pezzopane, E. Zuccheretti, B. Zolesi, G. De Franceschi, and S. Locatelli, The electronic Space Weather upper atmosphere (eSWua) project at INGV: advancements and state of the art, *Ann. Geophys.*, 26, 345–351, 2008.

Spogli, L.; Alfonsi, L.; De Franceschi, G.; Romano, V.; Aquino, M. H. O.; Dodson, A. - Climatology of GPS ionospheric scintillations over high and mid-latitude European regions, *Ann. Geophys.*, 27, 3429–3437, 2009.

Spogli, L.; Alfonsi, L.; De Franceschi, G.; Romano, V.; Aquino, M. H. O.; Dodson, A. – Climatology of GNSS ionospheric scintillations at high and mid latitudes under different solar activity conditions, *Il Nuovo Cimento B* (2010), doi: 10.1393/ncb/i2010-10857-7.

Yin P., Mitchell C.N., Alfonsi Lu., De Franceschi G., Romano V., Sarti P., Negusini M., Capra A., Ionospheric imaging over Antarctica, *Journal of Atmospheric and Solar-Terrestrial Physics*, *Journal of Atmospheric and Solar-Terrestrial Physics* 71 (2009) 1757–1765.

References 2

Oral presentations

S20 - 3 August 17.00-17.20: WATER VAPOUR RETRIEVAL USING GPS IN VICTORIA LAND, ANTARCTICA - Negusini, M., Sarti, P., Tomasi, C., Petkov, B. and Benedetti, E.

S20 - 3 August 16.30-17.00: MONITORING THE IONOSPHERE IN ANTARCTICA – Correia, E.

S20 – 3 August 17.20-17.40: ACTIVE TECTONICS IN THE NORTHERN VICTORIA LAND (ANTARCTICA) INFERRED FROM THE INTEGRATION OF GPS DATA AND GEOLOGICAL SETTING - Dubbini, M., Cianfarra, P., Casula, G., Capra, A., Salvini, F.

S20 – 4 August 11.00-11.20: THE ITALIAN GEODETIC OBSERVATORY IN ANTARCTICA - Capra, A., Casula, G., Dubbini, M., Gerhard Jentzsch.

S11 – 4 August 17.00-17.20: BIPOLAR CLIMATOLOGY OF GNSS IONOSPHERIC SCINTILLATION UNDER QUIET GEOMAGNETIC CONDITIONS - Alfonsi, L., Spogli, L., De Franceschi, G., Romano, V., Aquino, M. H. O., Dodson, A., Mitchell, C.N.

S11 – 4 August 17.20-17.40: GPS SCINTILLATION CLIMATOLOGY STUDY WITH CANADIAN HIGH ARCTIC IONOSPHERIC NETWORK - Prikryl, P., Jayachandran, P. T., Mushini, S. C.

Poster presentations

S11 - MITIGATION OF IONOSPHERIC EFFECTS ON GNSS POSITIONING OVER ANTARCTICA: A CASE STUDY DURING LOW SOLAR ACTIVITY - Silva, H. A., Monico, J. F. G., Aquino, M., Marques, H. A., De Franceschi, G., Alfonsi, L., Romano, V., Spogli, L., Mitchell, C., Alan Dodson

S1 - LONG TERM IONOSPHERIC BEHAVIOR FROM MONITORING VLF SIGNALS - Correia, E., Kaufmann, P., Raulin, J-P., Bertoni, F., Gavilán, H.R.

S11 - FIRST COMPARATIVE SCINTILLATION STUDY USING ARCTIC AND ANTARCTIC GPS RECEIVER ARRAYS - Prikryl, P., Spogli, L., Alfonsi, L., Jayachandran, P. T., Mitchell, C. N., De Franceschi, G., Romano, V., Spanswick, E., Donovan, E.

S1 - INVESTIGATING THE INTERFREQUENCY BIAS COMPONENT DUE TO LENGTH OF THE GNSS RECEIVER CABLE - Aguiar, C. R., Aquino, M., Monico, J. F. G., Elmas, Z. G., Camargo, P. O.

S11 - GPS PHASE SCINTILLATION OBSERVED OVER A HIGH-LATITUDE ANTARCTIC STATION - Ngwira, C. M., McKinnell, L-A., Cilliers, P. J.

S11- ESTIMATE OF SPECTRAL FEATURES FOR IONOSPHERIC PLASMA DENSITY SPATIAL STRUCTURES BY USING EISCAT MEASUREMENTS AND HIGH RESOLUTION GPS DATA AT HIGH LATITUDES - Forte, B., Aquino, M., Häggström, I., Turunen, E.