

Final project report

<i>Project ID</i>	2004/7.05
<i>Title</i>	Stazione groenlandese per osservatori aurorali
<i>Principal investigator</i>	Stefano Massetti
<i>Institution</i>	INAF/IFSI (ex-CNR)
<i>Email</i>	stefano.massetti@ifsi-roma.inaf.it
<i>Duration</i>	3 years
<i>Assigned funding</i>	35.000,00 Euro

Activities and results

After the installation of the permanent auroral observatory in the North-East coast of Greenland in 2002 (PNRA project 2002/7.2), at the Danish base of Zackenberg/Daneborg, thanks to an agreement with the *Danish Polar Center* (DPC, now *Danish Agency for Science, Technology and Innovation*), the main field activities were connected to the maintenance of the observatory and its equipment, instrument test and repair, and the download of the data acquired during the winter season. The observatory is composed by a digital *all-sky camera*, a PC running Linux, an UPS unit, and an Inmarsat/B satellite phone. The system is scheduled to acquire all-sky images for a period of about 3 months centred in the winter solstice. The all-sky images are taken in three wavelengths: 427.8nm (blue), 557.7nm (green) and 630.0nm (red), which are the most intense auroral emission lines observable from ground. The Inmarsat/B satellite phone provides a (slow) connection to the station to check the instrument, download some images and possibly change the acquisition scheduling. Due to the very limited bandwidth of the satellite phone, the whole database is manually downloaded during summertime, every year, when a person of the research unit travels to the station. During the stay that person performs also the ordinary maintenance of all the equipment (comprising the small hut, which host the instruments), makes test/calibration of the all-sky camera, and prepares the station for the next winter season. The database is then archived on CD/DVD and the data are analysed during the rest of the year.

This station on the North-East coast of Greenland, named ITACA-DNB, is part of a small network made up of two monitor located at nearly the same magnetic latitude, where the second twin instrument is located at the Italian base in Ny-Ålesund (ITACA-NAL), Spitzbergen, Svalbard archipelago. Both stations are also part of MIRACLE, an international network distributed along the Scandinavia (lead by the FMI/Space, Helsinki, Finland), devoted to the study of the aurora physics. ITACA-DNB and ITACA-NAL field-of-view overlap and cover about 120° in magnetic longitude, a unique tool to monitor and study the auroral activity linked to the direct penetration of the solar wind plasma through the geomagnetic (northern) cusp.

The remoteness of the Greenlandic North-East coast adds extra difficulties in running and maintaining scientific instrumentation, and due to limited funding, ITACA-DNB is not operating since 2007, because of the failure of the main instrument (all-sky camera) that need to be repaired and/or substituted.

Products

A – papers in scientific magazines

1. Massetti S., *Dayside magnetosphere-ionosphere coupling during IMF clock-angle $\sim 90^\circ$: longitudinal cusp bifurcation, quasi-periodic cusp-like auroras and traveling convection vortices*, JGR, 110, doi:2004JA010965, 2005.
2. Massetti S., *Antiparallel magnetic merging signatures during B_y -dominated IMF: longitudinal and latitudinal cusp aurora bifurcations*, Ann. Geophys., 24, 2299-2311, 2006.
3. Eriksson, S., G. Provan, F. J. Rich, M. Lester, S. E. Milan, S. Massetti, J. T. Gosling, M. W. Dunlop, and H. Rème: *Electrodynamics of a split-transpolar aurora*, J. Geophys. Res., 111, A11319, doi:10.1029/2006JA011976, 2006.

Programma Nazionale di Ricerche in Antartide (PNRA)

B – book chapters

1. Massetti S., M. Candidi: *ITACA² - Dayside aurora joint observations in the Greenland-Svalbard sector*, in ZERO 10th annual report 2004, Rasch M. and Caning K. (eds), pp.73-74, 2005.
2. Massetti S.: *ITACA² - Dayside aurora joint observations in the Greenland-Svalbard sector*, in ZERO 11th annual report 2005, Klitgaard A.B., Rasch M. and Caning K. (eds), pp.99-100, 2006.

C - proceedings of international conferences

1. Provan, G., S. Eriksson, M. Lester, S. Massetti, B. Anderson: *Transpolar arcs and the Dungey cycle: A multi-instrument study*, poster to the European Geosciences Union, General Assembly 2006, 02-07 April, Vienna, Austria, 2006.

D – proceedings of national meetings and conferences

1. Amata E., M. Candidi, M. Centrone, G. Consolini, L. Contarino, M. De Lauretis, P. Diego, I. Ermolli, P. Francia, F. Giorni, M. Laurenza, M. Magri, F. Marcucci, S. Massetti, M. Messerotti, M. Oliviero, V. Penza, C. Perna, E. Pietropaolo, P. Romano, G. Severino, D. Spadaio, M. Storini, M. Vellante, U. Villante, P. Zlobec and F. Zuccarello, *SINERGIES (Sun, INterplanetary, EaRth Ground-based InstrumEntS) or the potential of the Italian Network for Ground-Based Observations of Sun-Earth Phenomena*, Memorie della Società Astronomica Italiana, 9, 82-84, 2006.
2. Amata E., F. Berrilli, M. Candidi, S. Cantarano, M. Centrone, G. Consolini, L. Contarino, M. De Lauretis, D. Del Moro, A. Egidi, I. Ermolli, P. Francia, S. Giordano, F. Giorgi, M. Oliviero, M. Magri, F. Marcucci, S. Massetti, M. Messerotti, M. Parisi, C. Perna, E. Pietropaolo, P. Romano, G. Severino, D. Spadaro, M. Storini, M. Vellante, U. Villante, P. Zlobec and F. Zuccarello, *SINERGIES, the Italian Network for Ground-Based Observations of Sun-Earth Phenomena*, Memorie della Società Astronomica Italiana, 9, 79-81, 2006.

E – thematic maps

--

F – patents, prototypes and data bases

G – exhibits, organization of conferences, editing and similar

--

H - formation (PhD thesis, research fellowships, etc.)

--

Research units

S. Massetti	Researcher	INAF-IFSI
M. Candidi	Researcher	INAF-IFSI
P. Cerulli-Irelli	Researcher	INAF-IFSI

Date: 02-07-2009

Notes