Activities and results

The present project concerns the measurements, analysis and interpretation of ULF (1 mHz-1 Hz) geomagnetic field fluctuations recorded in Antarctica at Terra Nova Bay (TNB, since 1992) and at Dome C (DMC, since 2005). At both stations the instruments consist in almost identical, high sensitivity triaxial induction coil magnetometers, and automatic acquisition systems, with timing provided by GPS and a final sample rate at 1 Hz. These very high latitude measurements are important in that these regions are magnetically connected to the outer magnetosphere, where several mechanisms of energy transfer from the solar wind are active.

The characteristics of ULF pulsations were studied using the data recorded at TNB and DMC, at other Antarctic stations (cooperation with the Bell Laboratories, NJ), at low latitude (station of L’Aquila) and from interplanetary spacecraft. The main results are the following:

- By means of a polarization analysis of the ULF signals (1-100 mHz) recorded at TNB, it has been proposed a new model of the diurnal and latitudinal variation of the resonance region, characterized by a shift toward lower latitudes of this region with increasing frequencies. At frequencies greater than 20 mHz the experimental observations suggest additional contributions from waves propagating along the magnetotail lobes (Villante et al., 2009).

- An analysis of the ULF (1-100 mHz) power during 2003-2006 at DMC and TNB, indicates a more significant solar wind speed control at DMC, less influenced by cusp related phenomena. At TNB the power maximizes around local magnetic noon, in correspondence to the cusp proximity, while at DMC the power is almost uniform through the day, with a small enhancement in the post-midnight sector. At TNB the characteristics of the daytime pulsations are connected to the fundamental and higher harmonics of the field line resonances of the neighboring lower latitude regions, and the characteristics of nighttime Pc3 pulsations indicate a penetration of upstream waves through the magnetotail lobes (De Lauretis et al., 2009; Francia et al., 2009).

The results of such scientific activity have also been discussed in some review papers (Villante et al., 2006; Cafarella et al., 2007).
Programma Nazionale di Ricerche in Antartide (PNRA)

Products

A – papers in scientific magazines


B – book chapters

C - proceedings of international conferences


D – proceedings of national meetings and conferences

E – thematic maps

F – patents, prototypes and data bases

G – exhibits, organization of conferences, editing and similar

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


2. Borsa di studio "Analisi dati antartici", titolare Davide Di Memmo, dal 06.02.2006 al 05.08.2006, euro 4352,51.


Research units

Composizione dell'Unità operativa:

Umberto Villante (Università dell'Aquila)
Marcello De Lauretis (Università dell'Aquila)
Patrizia Francia (Università dell'Aquila)
Andrea Piancatelli (Università dell'Aquila)
Massimo Vellante (Università dell'Aquila)
Mauro Regi (Borsista Università dell'Aquila)
Davide Di Memmo (Contrattista Università dell'Aquila)
Alfredo Del Corpo (Contrattista Università dell'Aquila)
Chiara De Paulis (Contrattista Università dell'Aquila)
Mirko Piersanti (Assegnista Università dell'Aquila)

Date:

Notes