

Final project report

Project ID: 2002/5.4
Title: **Antarctic Meteorites**

Principal investigator: Marcello Mellini
Institution: Dipartimento di Scienze della Terra - Università di Siena
Email: mellini@unisi.it

Duration: two years
Assigned funding: € 77.468,00

Activities and results

Field work in Antarctica: from Dec. 2003 to Jan. 2004, we performed a meteorite search campaign in Northern Victoria Land (Miller Butte, Frontier Mountain, Johannessen Nunatak); the team was composed by Luigi Folco (Siena; field leader), Natale Perchiazzi (Pisa), Pierre Rochette (Aix-en-Provence). Through systematic search, we found 4, 19 and 101 meteorites, at Miller Butte, Johannessen Nunatak and Frontier Mountain, respectively. Two more meteorites were found during field reconnaissance, at Mount Walton and Mount Dewitt.

On the top of Frontier Mountain, we identified an important concentration of micrometeorites, within glacial sediments.

Laboratory investigations in Italy: prior to (and after) the expedition, we have deepened our knowledge of the mechanism responsible for meteorite concentration in Antarctica, by analyzing the existing geomorphological and glaciological data.

Furthermore, we have been busy with:

- *Preliminary meteorite classification*, by completing the classification of the 173 specimens collected during the 2001 field trip, as well all the new ones collected in 2003-2004.
 - *Advanced investigation of selected meteorites*, focused to a) evolution of primitive chondritic meteorites; b) extraterrestrial magmatic processes in achondrites.
 - *Tephra*: in addition to their volcanologic meaning, englacial tephra may have also an important glaciological stratigraphic and structural meaning. We completed the geochemical and mineralogical characterization of tephra collected prior to 2003-2004, and started an attempt to determine their absolute age, through Ar-Ar geochronology.
 - *Magnetic susceptibility* as a tool for speditive meteorite classification.
-

Products

A – papers in scientific magazines

1. FERRARIS C., FOLCO L., MELLINI M. (2002) - Chondrule thermal history from unequilibrated H-chondrites: a TEM-AEM study. *Meteoritics & Planetary Science* 37, 1299-1322.
2. FOLCO L., CAPRA A., CHIAPPINI M., FREZZOTTI M., MELLINI M., TABACCO I.E. (2002) The Frontier Mountain meteorite trap (Antarctica). *Meteoritics & Planetary Science* 37, 209-228.
3. FOLCO L., PERI F., PEZZOTTA F. (2002) The meteorite collection of the Civico Planetario and the Museo Civico di Storia Naturale in Milan, Italy. *Meteorit. Planet. Sci.* 37 (Suppl.) B95-B103.
4. ROCHETTE P., SAGNOTTI L., BOUROT-DENISE M., CONSOLMAGNO G., FOLCO L., OSETE M. L., PESONEN L. (2003) Magnetic classification of stony meteorites: 1. Ordinary chondrites. *Meteorit. Planet. Sci.* 38, 251-268.
5. RUSSELL S. S., ZIPFEL J., FOLCO L., JONES R., GRADY M. M., GROSSMAN J. N. (2003) The Meteoritical Bulletin, No. 87, 2003 July. *Meteorit. Planet. Sci.* 38 (Suppl.), A189-A248.
6. FOLCO L., RASTELLI N. (2002) The meteorite collection of the Museo Nazionale dell'Antartide in Siena – December 2002 update. *Terra Antartica* 9, 101-117.

Programma Nazionale di Ricerche in Antartide (PNRA)

7. PRATESI G., VITI C., CIPRIANI C., MELLINI M. (2002) – Silicate-silicate liquid immiscibility and graphite ribbons in the Libyan desert glass. *Geoch. Cosmoch. Acta* 66, 903-911.
8. D'ORAZIO M., FOLCO L. (2003) Chemical analysis of iron meteorites by inductively coupled plasma – mass spectrometry. *Geostandards Newsletter: The Journal of Geostandards and Geoanalysis* 27, 215-225.
9. FERRARIS C., FOLCO L., MELLINI M. (2003) – Sigmoidal exsolution by internal shear stress in pyroxenes from chondritic meteorites. *Phys. Chem. Minerals* 30, 503-510.

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.)

Research specialist (assegnato di ricerca)

- Cristiano Ferraris

PhD students

- Alessandro Burroni
- Pietro Curzio
- Michele Macrì

Research units

Siena

Marcello Mellini
Luigi Folco
Antonio Zeoli
Cristiano Ferraris
Alessandro Burroni
Pietro Curzio

Padova

Anna Maria Fioretti
Gianmario Molin
Paolo Guerriero
Raul Carampin

Programma Nazionale di Ricerche in Antartide (PNRA)

Pisa

Natale Perchiazzi
Marinella Laurenzi

Roma

Adriana Maras
Paolo Ballirano
Michele Macrì
Ernesto Palomba

Date: April 18th, 2008
