

# Report for the Joint Use/Research of the Institute for Planetary Materials, Okayama University

2019 fiscal year first term / ~~second term~~ / others

30/06/2020

**Category:** International Joint Research/ ~~General Joint Research~~/ ~~Joint Use of Facility~~/ ~~Workshop~~

**Name of the research project:** Mineralogy, chemistry and isotope systematics of an Argentinian meteorite fall

**Principal applicant:** Dr. Julia Walter-Roszjar

**Affiliated institution and department:** Department of Mineralogy and Petrography, Natural History Museum Vienna, Vienna, Austria

## **Collaborator:**

**Name:** Prof. Ryoji Tanaka

**Affiliated institution and department:** Institute for Planetary Materials, Okayama University, 827 Yamada, Misasa, Tottori 682-0193, Japan

## **Research report:**

Purpose of this international joint research project was a detailed petrological, chemical and isotopic analysis of a re-discovered differentiated meteorite (achondrite) fall from Argentina, now termed “Malotas (b)” and classified as a basaltic eucrite and test of its’ potentially pairing with a type H5 ordinary chondrite found nearby.

Both specimens were recently discovered in the local Cordoba museum, Argentina by Prof. Maria Varela, which let to this joint research project. In principle, detailed investigations using state-of the art instrumentations of these meteorites will help further our understanding of meteorite evolution and pairing in general such as the potential polymict (mixed lithologies) character of meteorite parent bodies and the genesis of basaltic eucrite in particular.

Here, careful sample preparation was conducted and a stable isotope mass spectrometer (Thermo MAT253) and laser fluorination system at the IPM, Okayama University were used to measure stable oxygen isotopes on representative sample aliquots. These informations, together with petrological-mineralogical investigation of the meteorite material, made by the applicant at the NHM Vienna, Austria are required (i) for an official classification of the rock

[\(https://www.lpi.usra.edu/meteor/metbull.php?sea=malotas&sfor=names&ants=&nwas=&falls=&](https://www.lpi.usra.edu/meteor/metbull.php?sea=malotas&sfor=names&ants=&nwas=&falls=&)

[valids=&stype=contains&lrec=50&map=ge&browse=&country=All&srt=name&categ=All&mblist=All&rect=&phot=&strewn=&snew=0&pnt=Normal%20table&code=67632](https://www.lpi.usra.edu/meteor/metbull.php?sea=malotas&sfor=names&ants=&nwas=&falls=&valids=&stype=contains&lrec=50&map=ge&browse=&country=All&srt=name&categ=All&mblist=All&rect=&phot=&strewn=&snew=0&pnt=Normal%20table&code=67632)), (ii) unambiguous identification of its provenance, i.e., asteroidal parent body, Moon or Mars, (iii) and proof of its' potential pairing with the H5 ordinary chondrite, found 1931 at the same site in Santiago del Estero, Argentina. First results were presented at the 82nd Annual meeting of the Meteoritical Society, held in Sapporo, Japan in July 2019. A paper, currently in preparation for submission to *Meteoritics and Planetary Science*, will also include trace element analysis of the Malotas (b) meteorite conducted by Prof. Muni Humayun and noble gas analysis of these meteorites, currently made by Dr. Henner Busemann.

### **Collaborations:**

Prof. Maria Eugenia Varela and Dr. Marcela Saavedra, ICATE - Instituto de Ciencias Astronómicas de la Tierra, y del Espacio, Facultad de Ciencias Exactas, Físicas y Naturales, Universidad Nacional de San Juan, Av. España Sur 1512, J5402DSP, San Juan, Argentina

Prof. Munir Humayun, The National High Magnetic Field Laboratory, Florida State University, 1800 E. Paul Dirac Dr. Tallahassee , FL 32310-3706

Dr. Henner Busemann,, Institute of Geochemistry and Petrology, Clausiusstrasse 25, 8092 Zürich, Switzerland

### **Outcome:**

Official classification of the meteorite in the Meteoritical Bulletin Database: <https://www.lpi.usra.edu/meteor/metbull.php?sea=malotas&sfor=names&ants=&nwas=&falls=&valids=&stype=contains&lrec=50&map=ge&browse=&country=All&srt=name&categ=All&mblist=All&rect=&phot=&strewn=&snew=0&pnt=Normal%20table&code=67632>

Saavedra M. E., Roszjar J., Humayun M., Tanaka R., Varela M. E., Lira R. (2019) Malotas: A new view of an old (paired?) meteorite fall from Argentina. *In preparation for submission to Meteoritics and Planetary Science.*

Saavedra M. E., Roszjar J., Humayun M., Tanaka R., Varela M. E., Lira R. (2019) Malotas: A new view of an old fall from Argentina. *82nd Annual meeting of the Meteoritical Society, held July 7-12, Sapporo Japan, #6168.*