

# Field Applications of Raman Spectroscopy

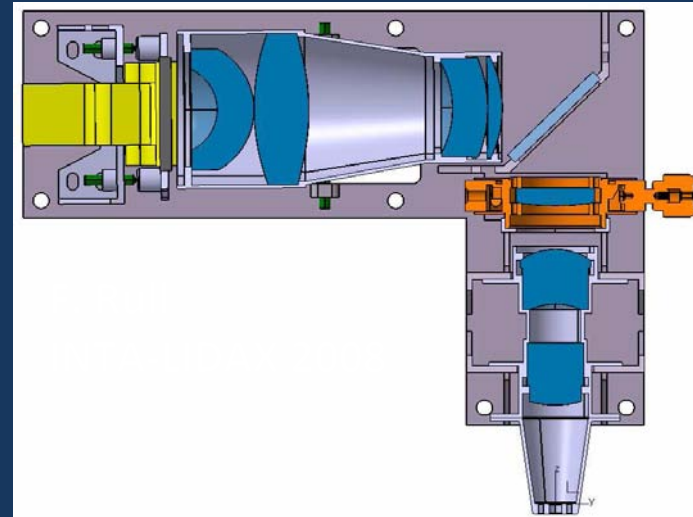
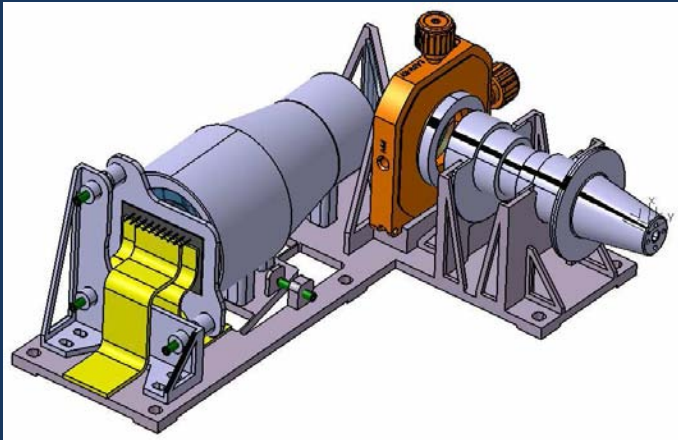
F. Rull

**EMU-CNRS INTERNATIONAL SCHOOL**

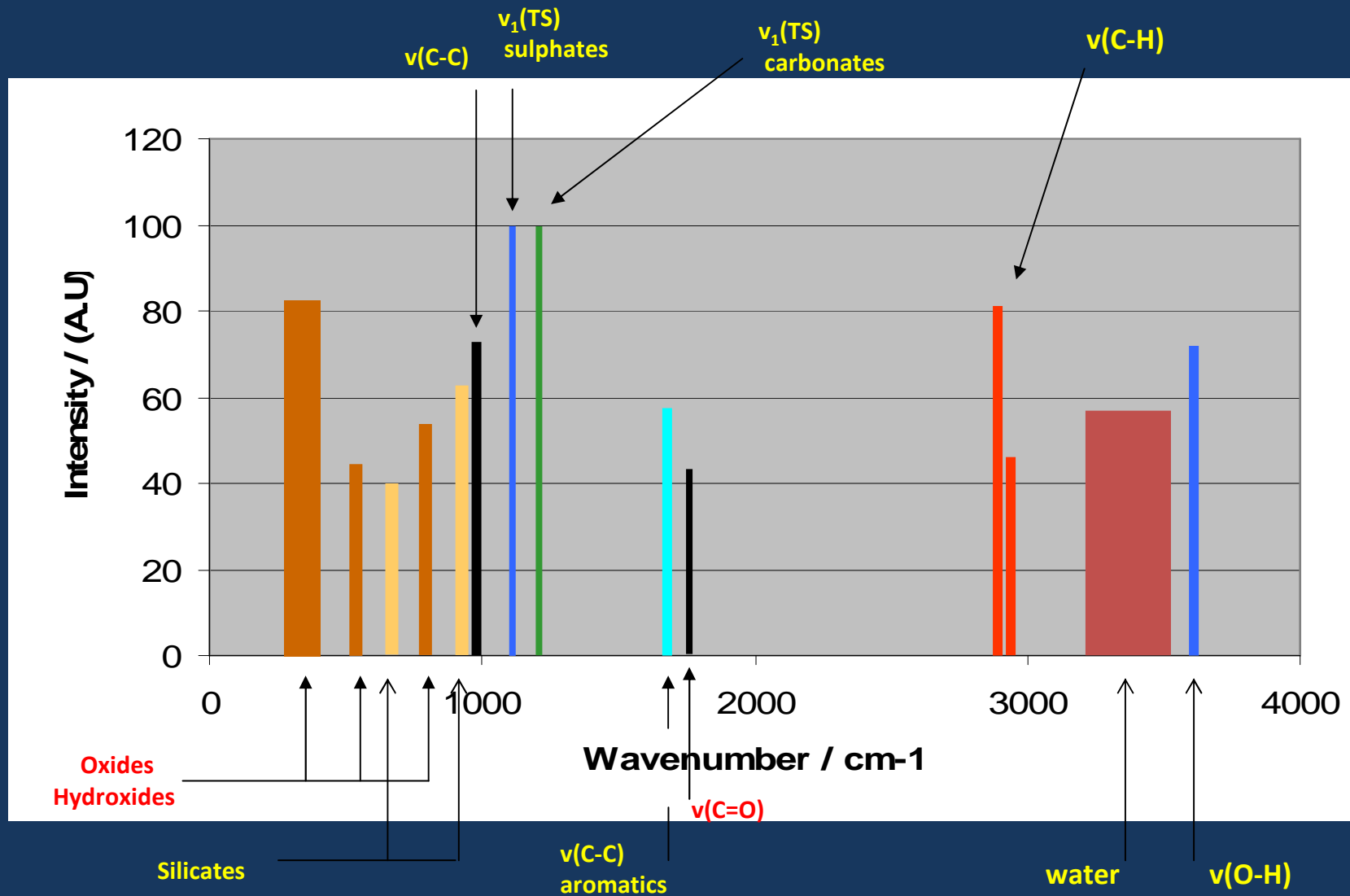
14<sup>th</sup> to 16<sup>th</sup> JUNE, NANCY (FRANCE)

**RAMAN SPECTROSCOPY APPLIED TO EARTH  
SCIENCES  
AND CULTURAL HERITAGE**

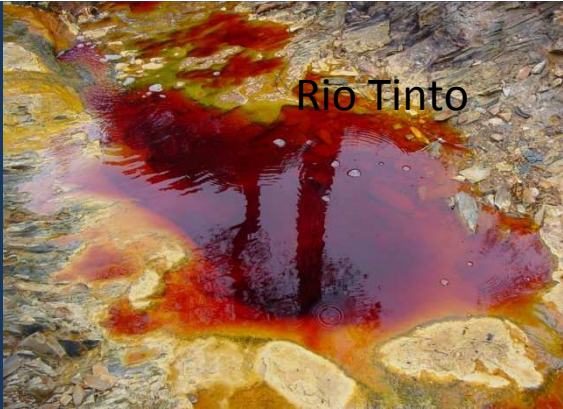
# Science Simulators and field prototypes



# Raman Detection Capability







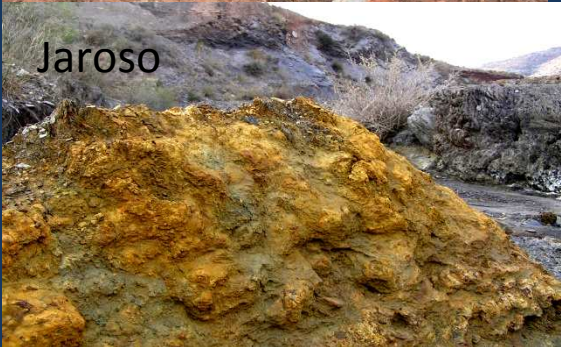
Río Tinto



Svalbard (AMASE)



Tenerife



Jaroso



Mauritania



Barberton







**Identificación mineral**

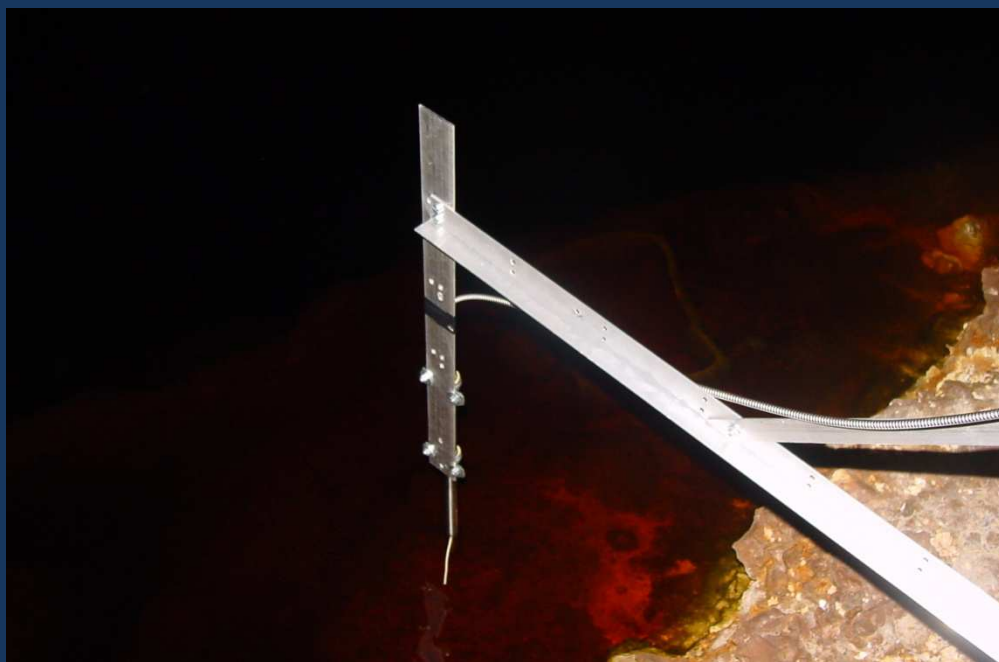
**Secuencias de precipitación**

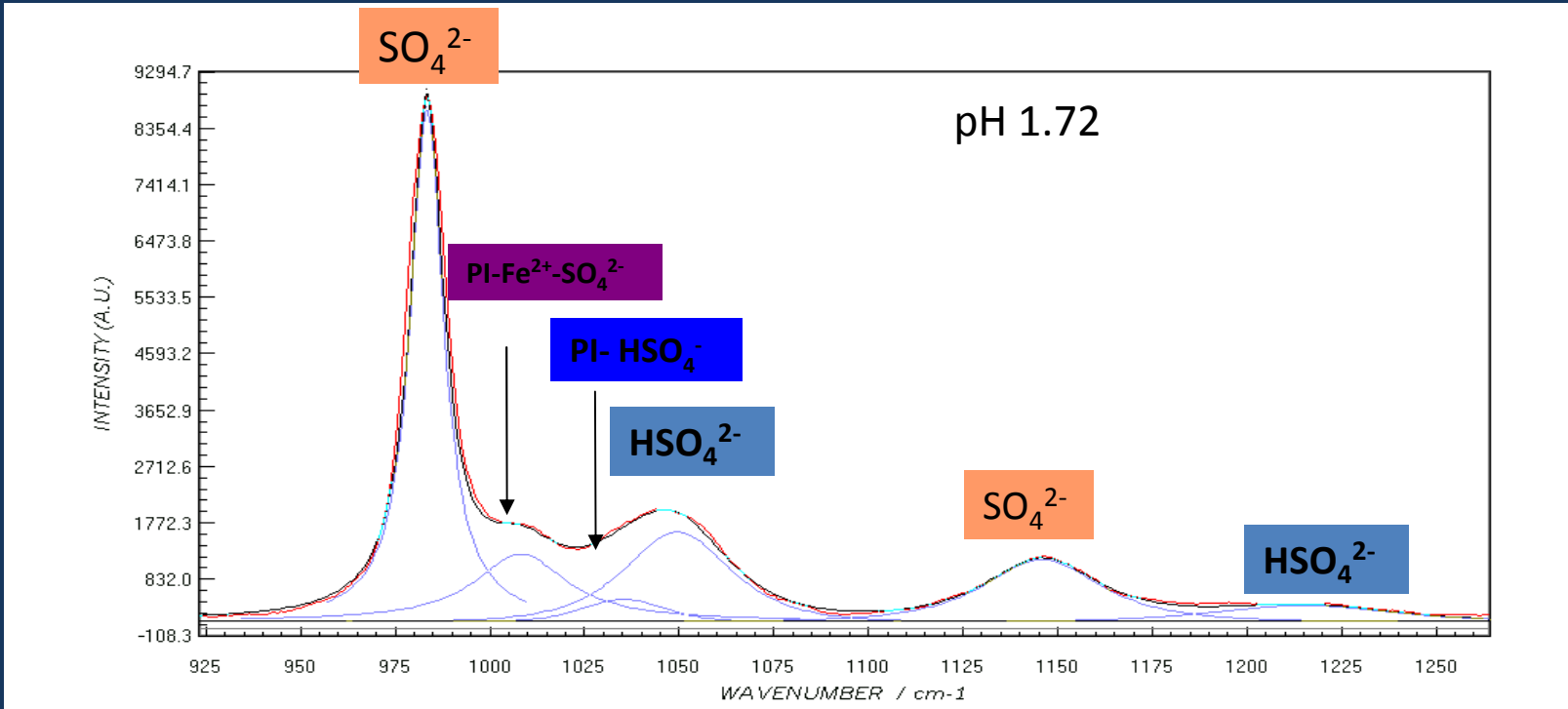
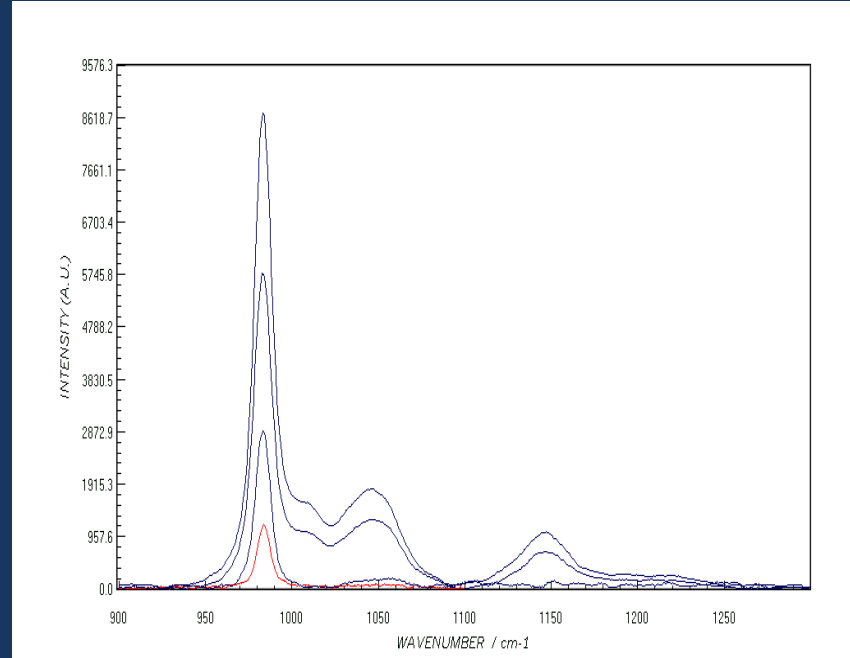
**Fisico-química de las soluciones ácidas**





Estudio in-situ y en laboratorio del equilibrio químico en soluciones acuosas ácidas.

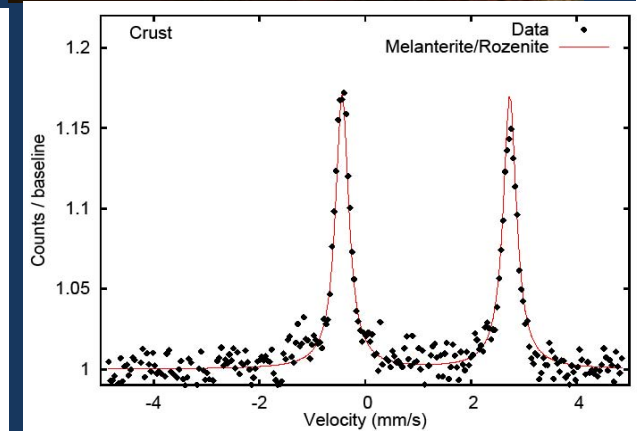
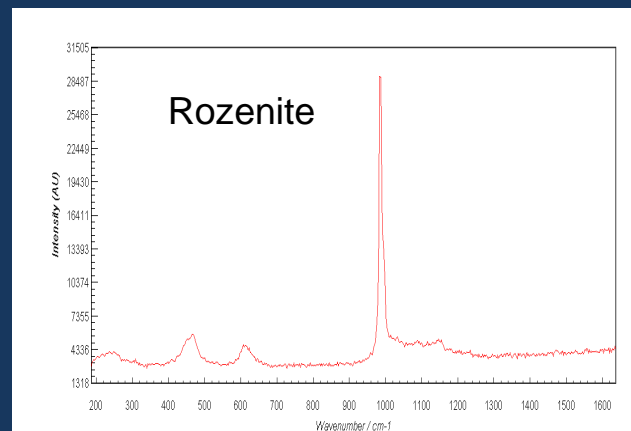








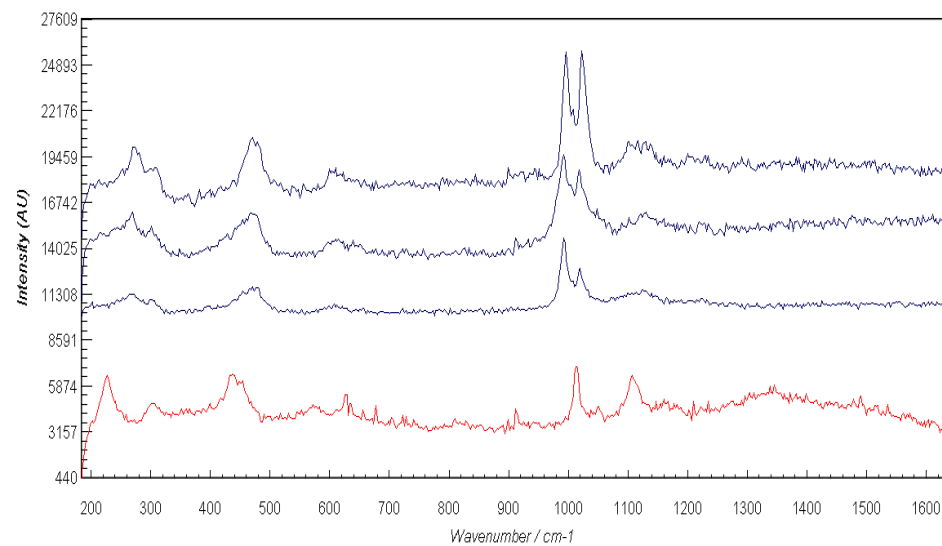
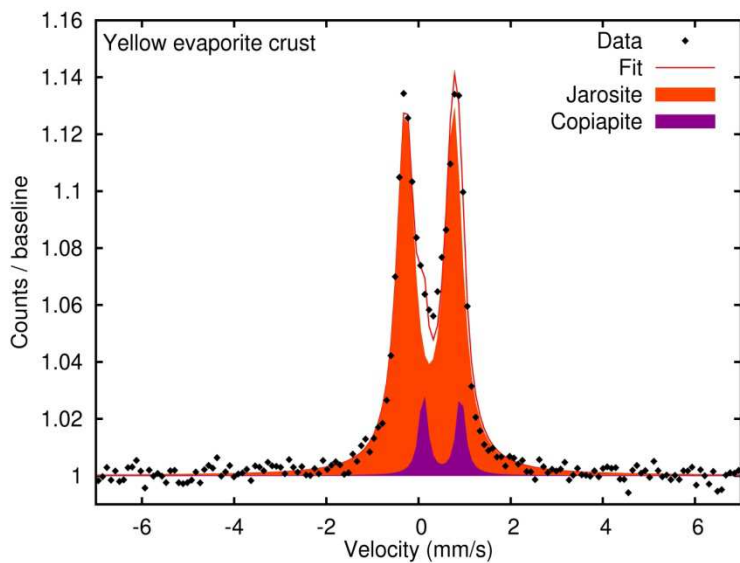
## External operation mode at Rio Tinto Coordination with Moessbauer (June 2008)





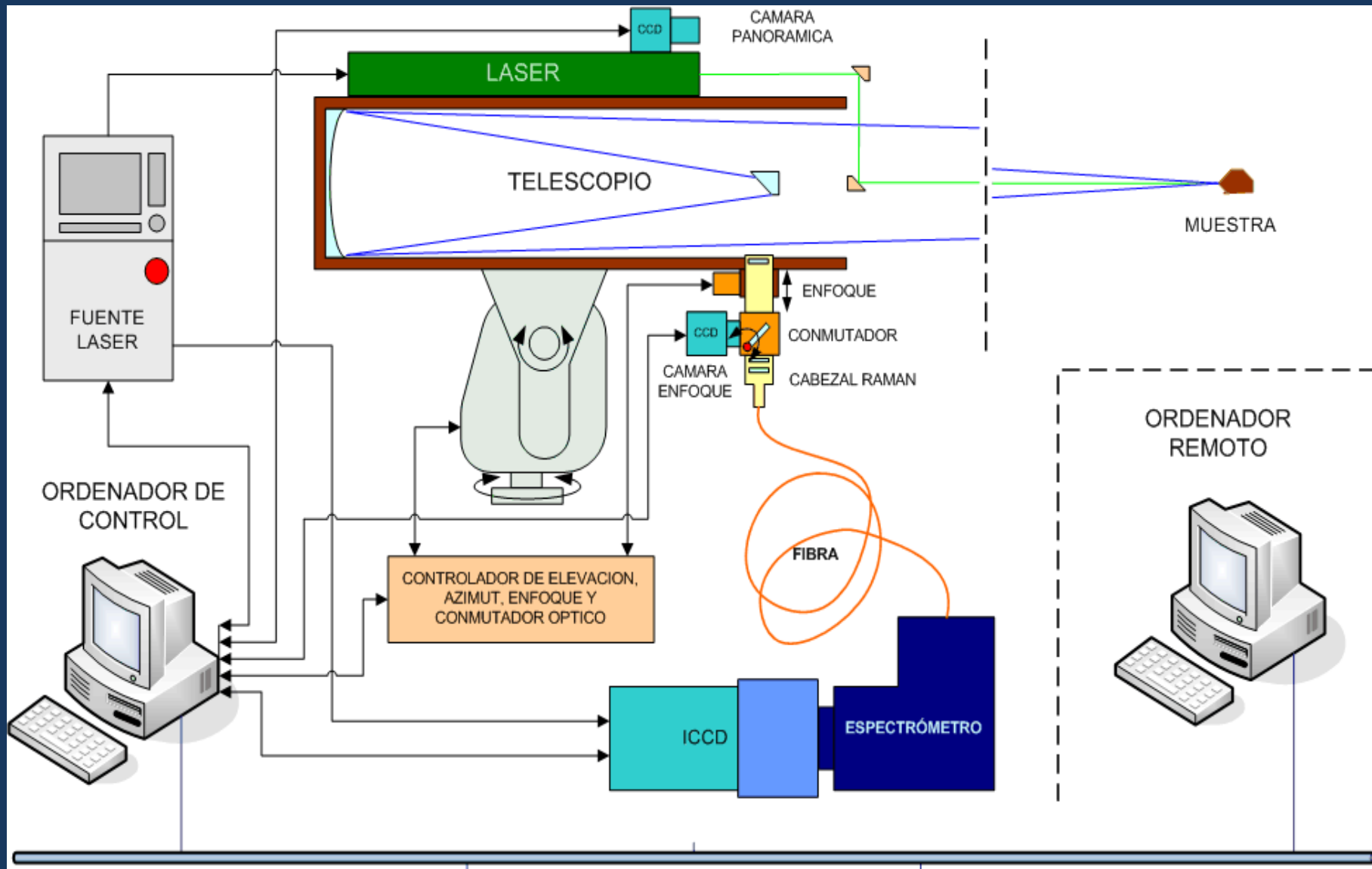


### yellow crust on red substrate

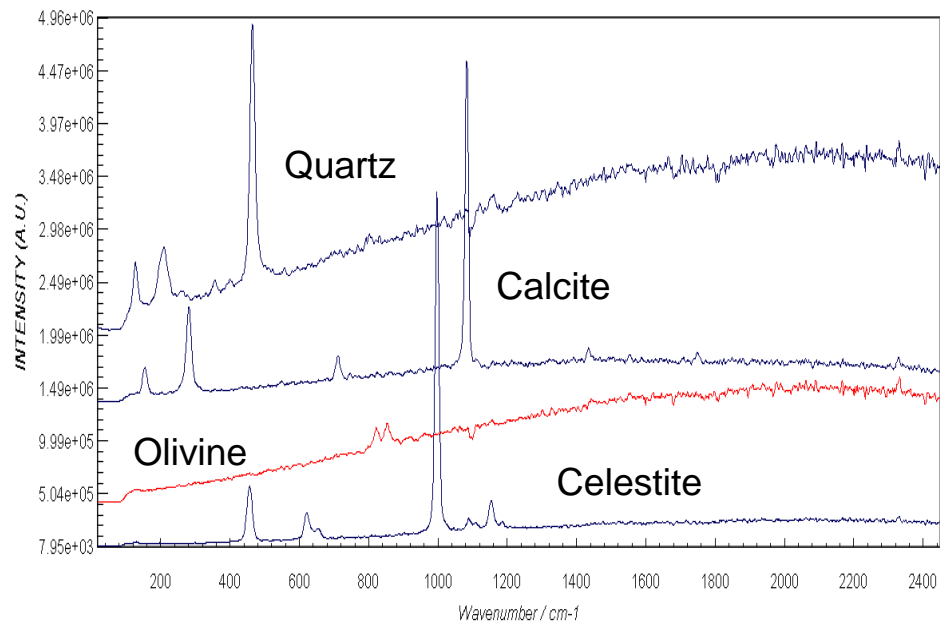


Top: copiapite with different structural order,  
Bottom: jarosite at some yellow spots.

# Remote Raman





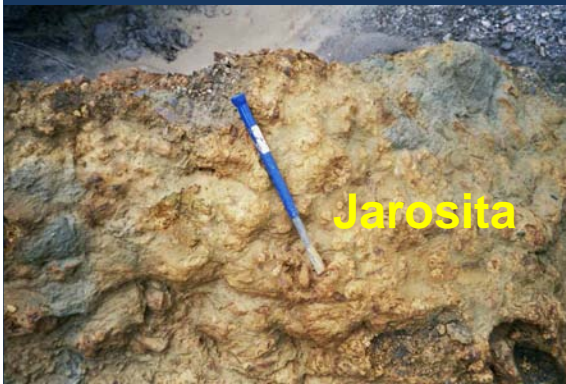
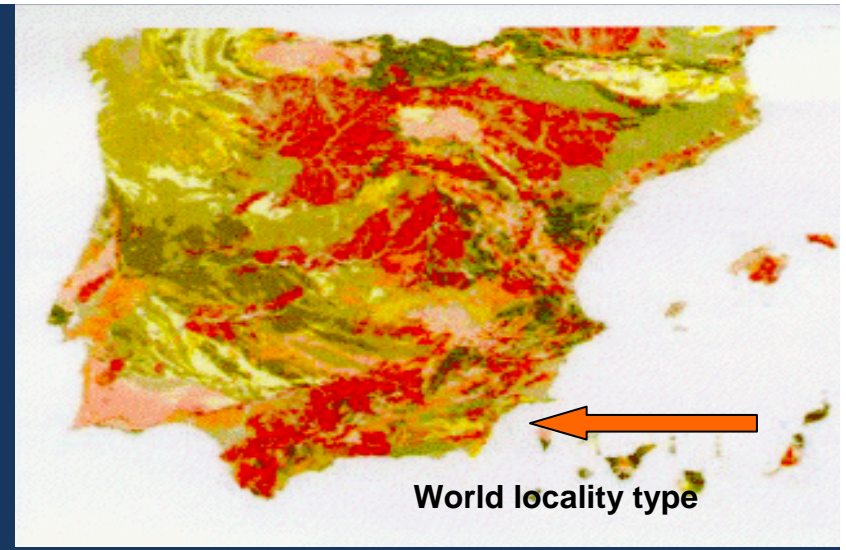
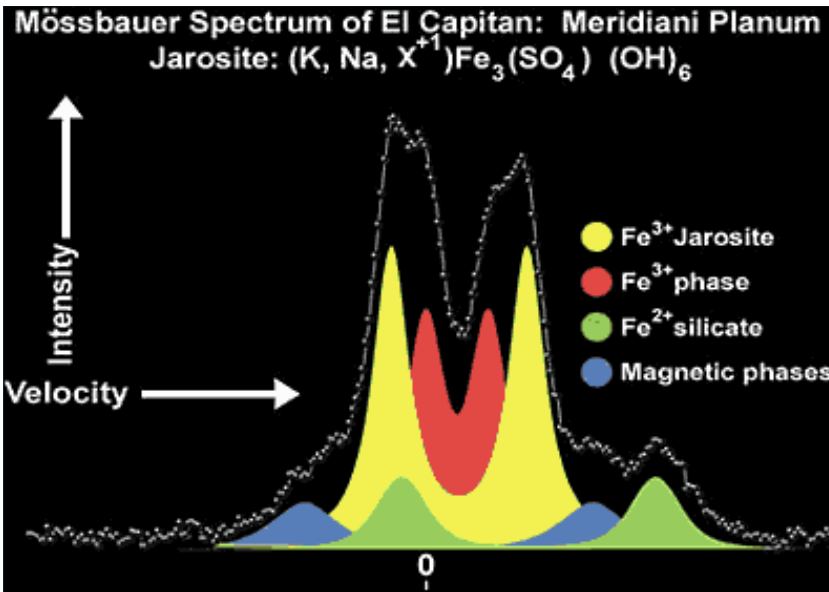


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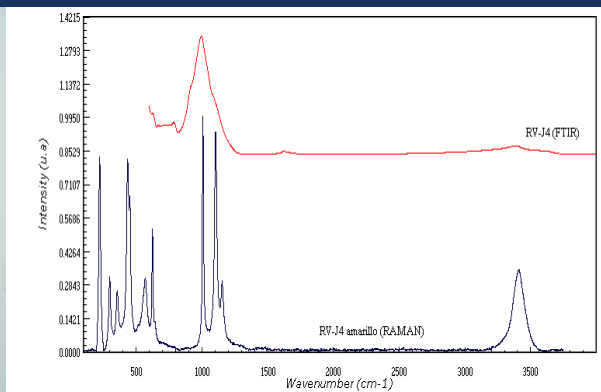
**Remote Raman  
Instrument working in  
Rio Tinto in day light  
conditions and  
mineral spectra taken  
at 10 mtrs distance**







Barranco Jaroso

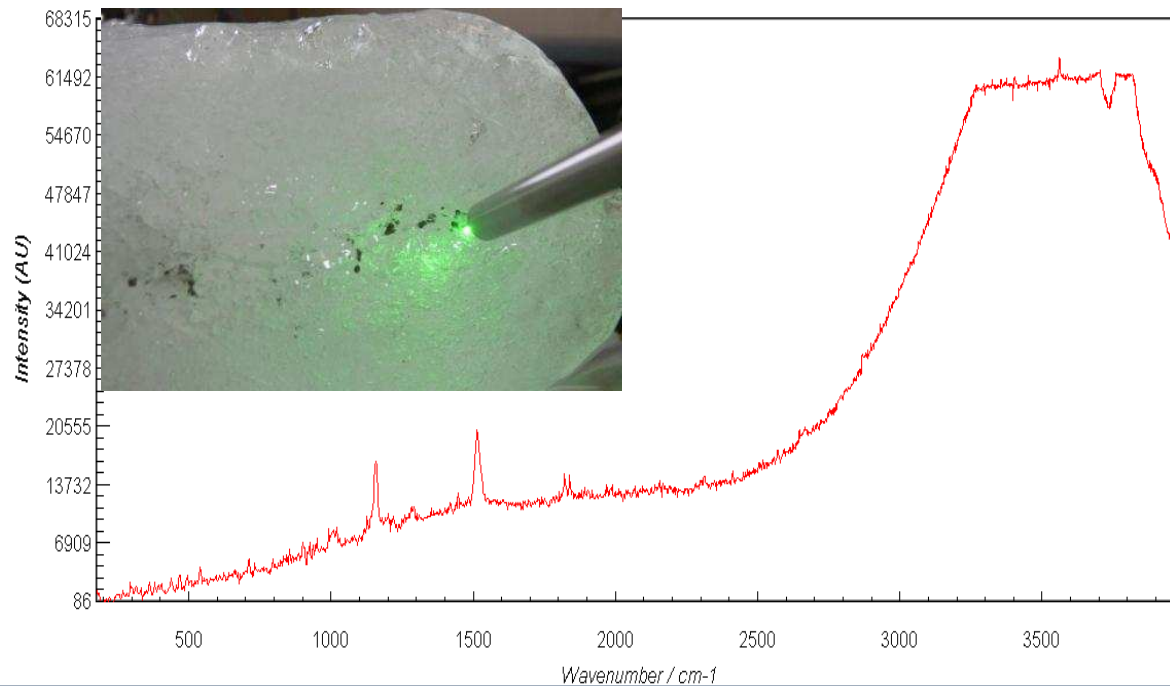




# AMASE (2007 y 2008)



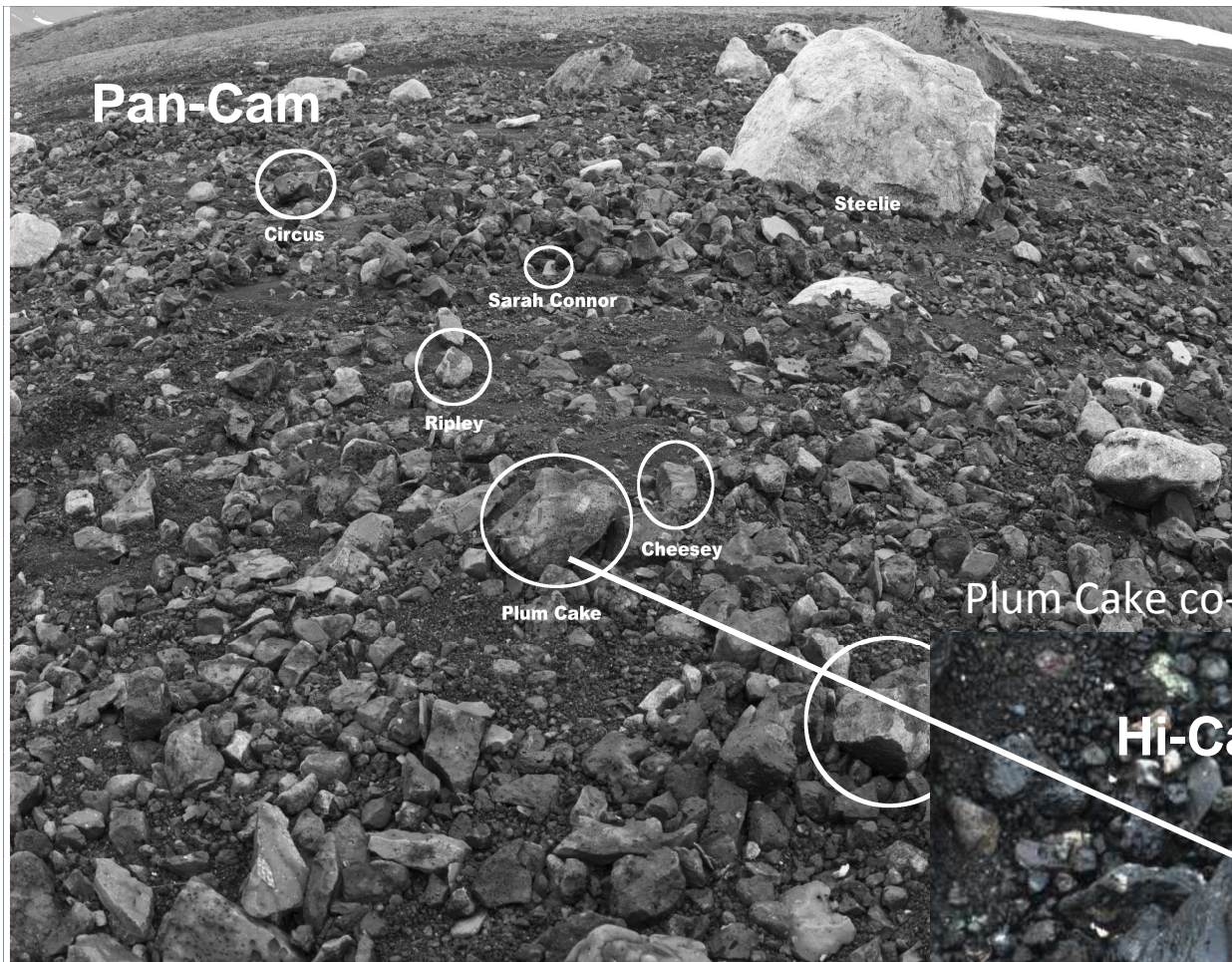




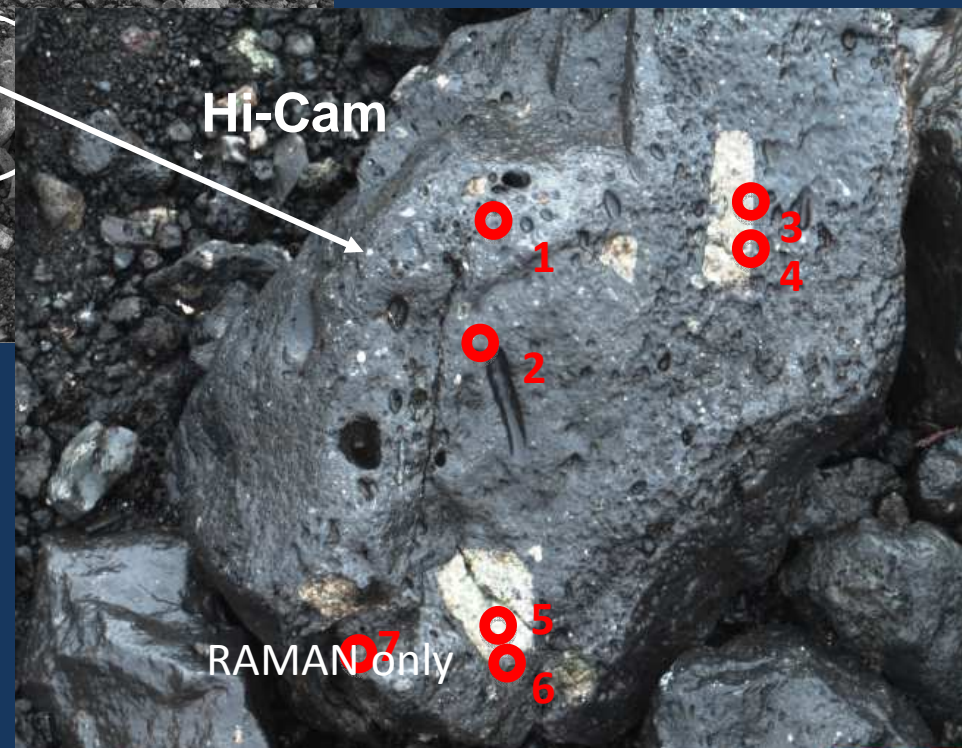
Raman spectrum  
of  $\beta$ -Carotene  
inside an ice  
core



# RAMAN SPECTROSCOPY IN THE CONTEXT OF THE EXOMARS INSTRUMENT PAYLOAD

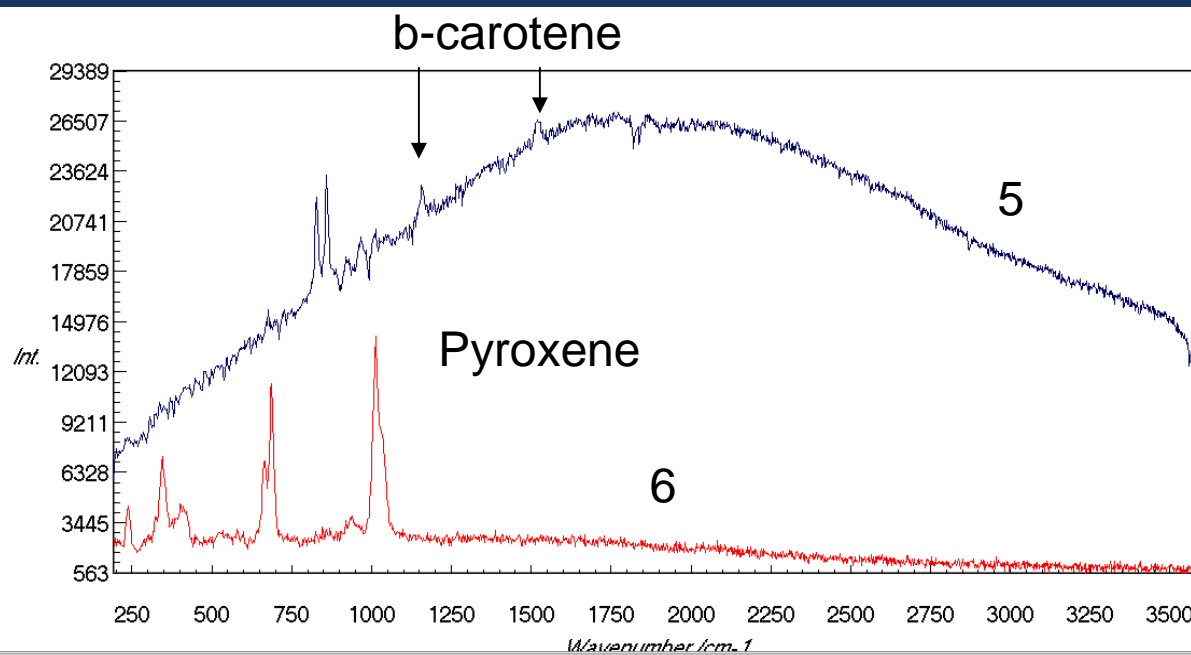
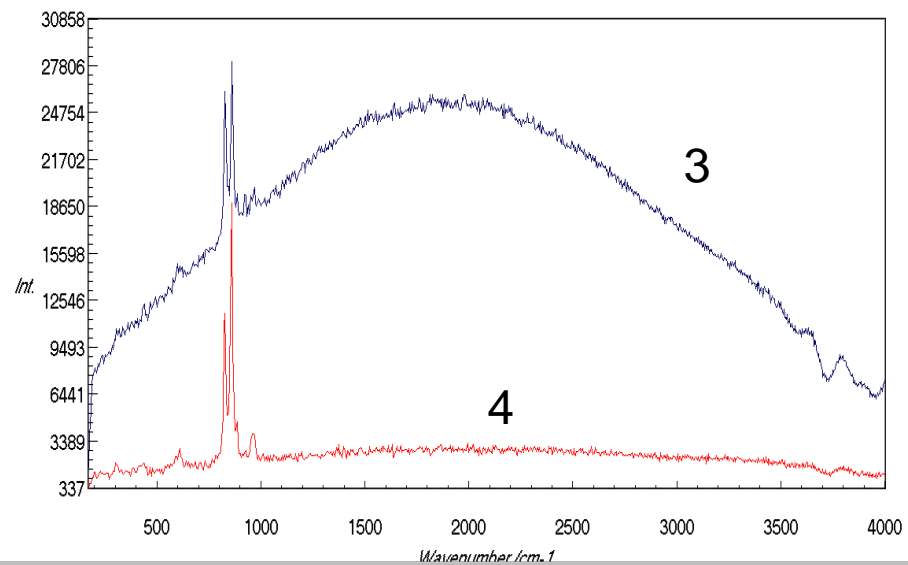
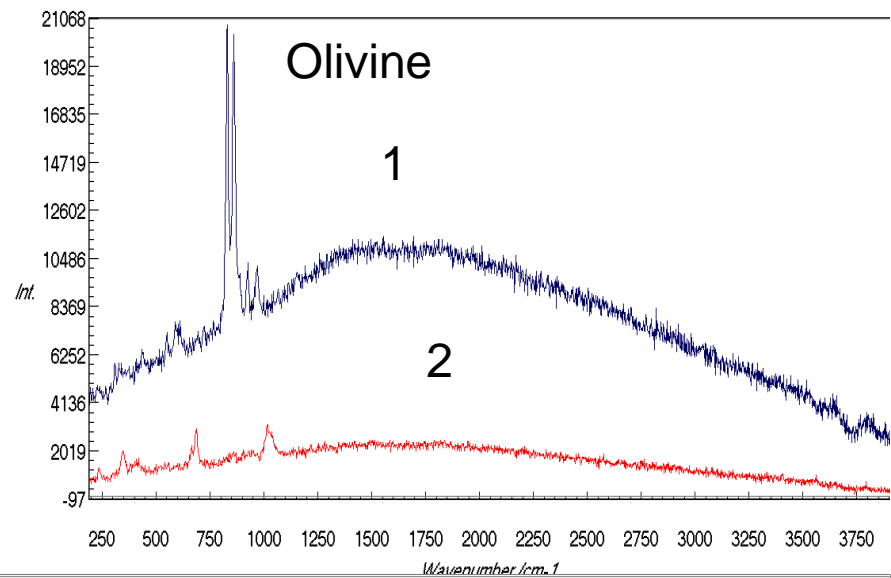


Plum Cake co-located IR and Raman analyses



PANCAM view of the area with SOWG selected targets encircled and detail of High resolution image of "Plum cake" target showing the different spots requested for contact instrument analysis. Raman results.  
(Credits AMASE 2008)

Credits: AMASE 2008



**Raman**



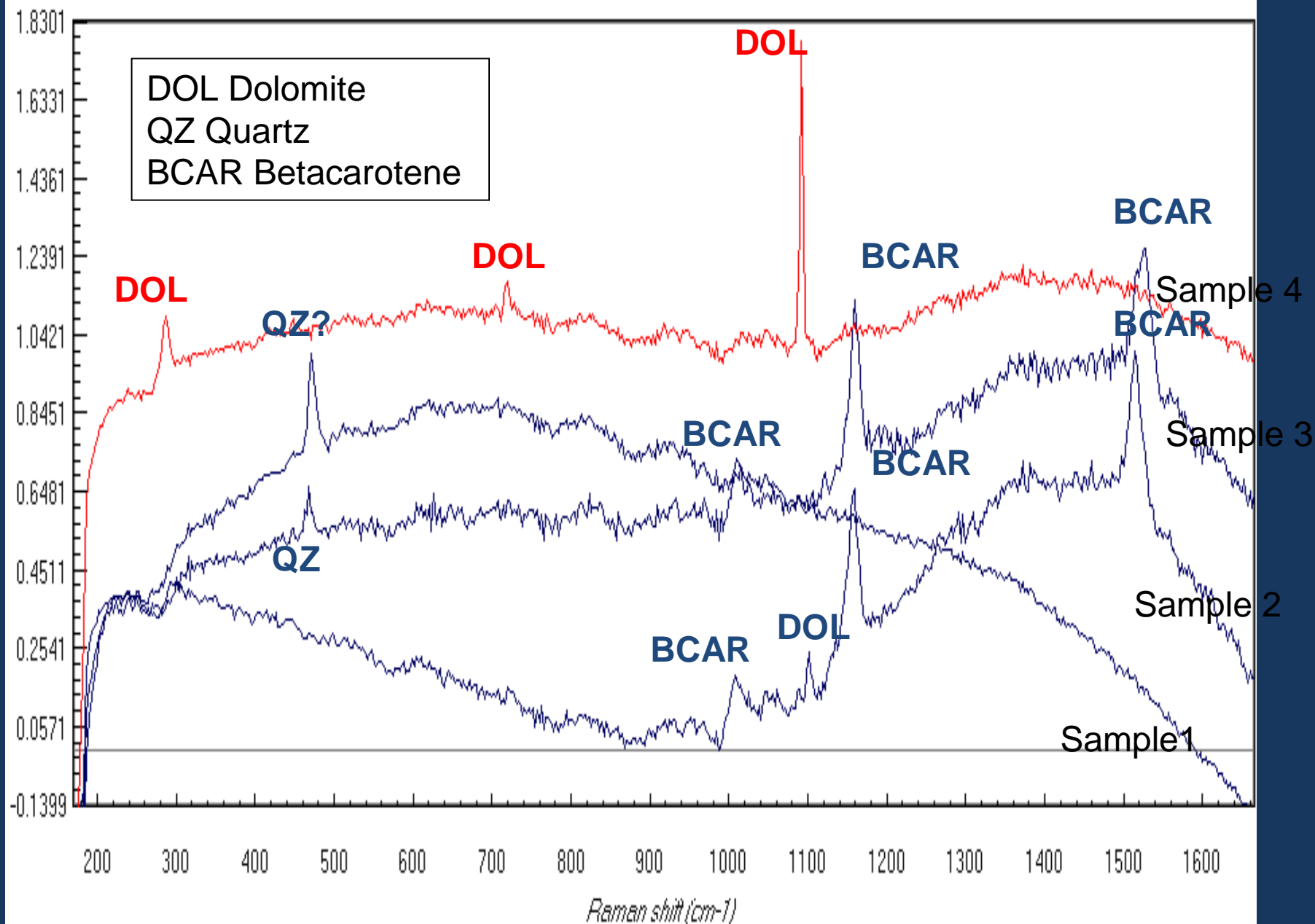


Work in coordination with NASA's Cliffbot rover

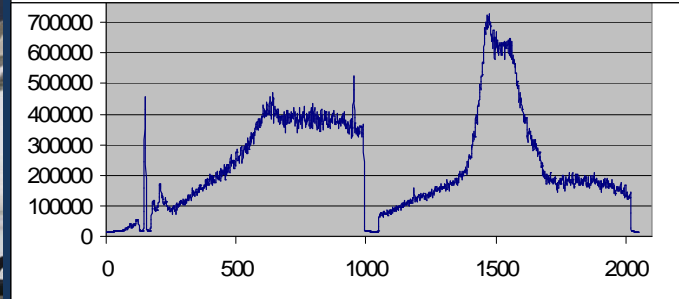
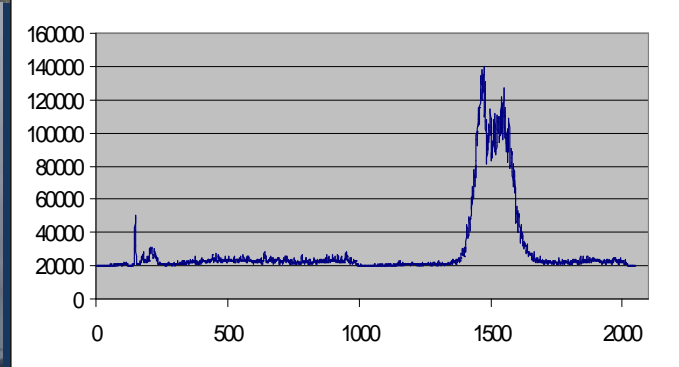


Credits: AMASE 2008 / NASA



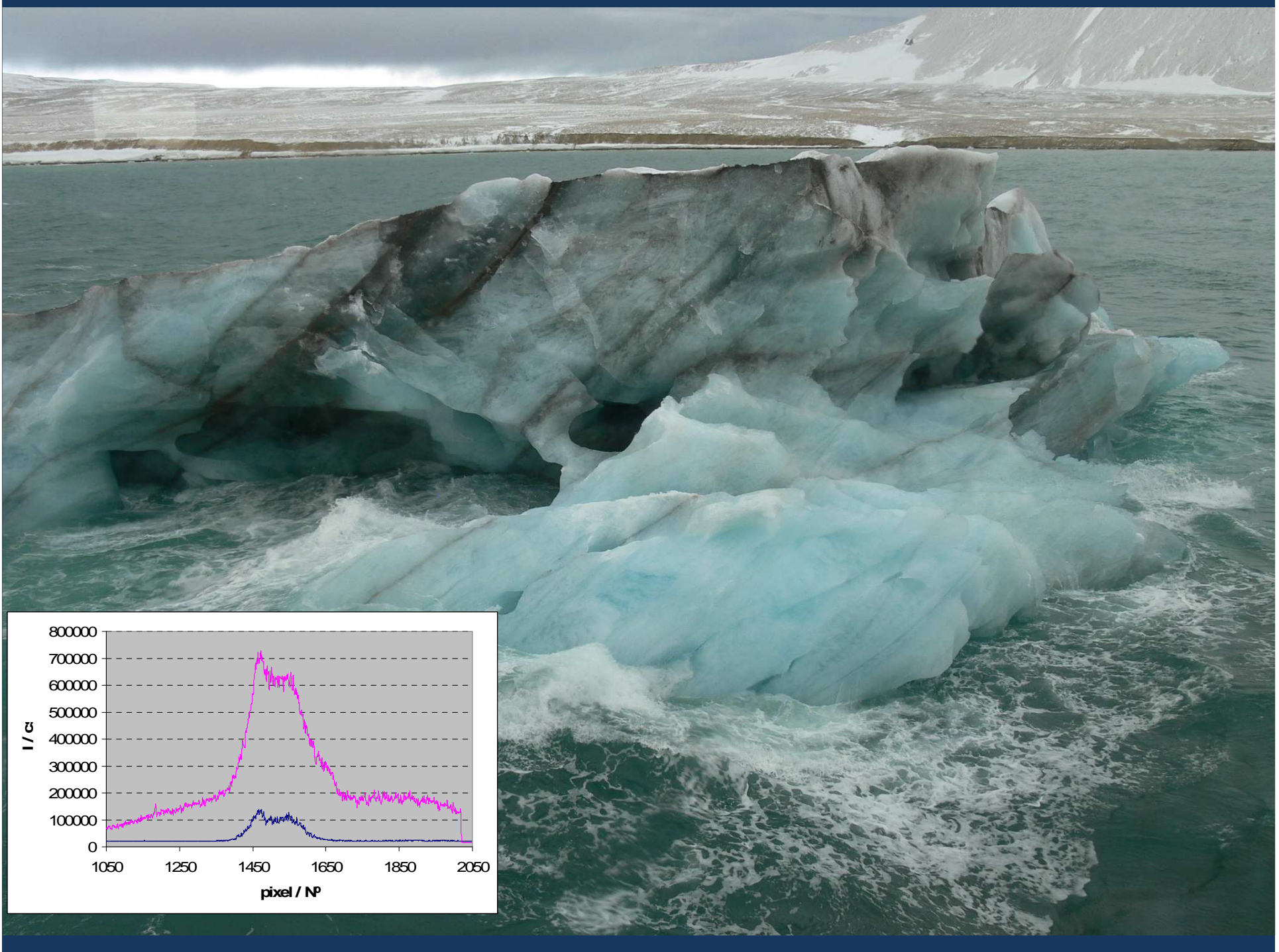






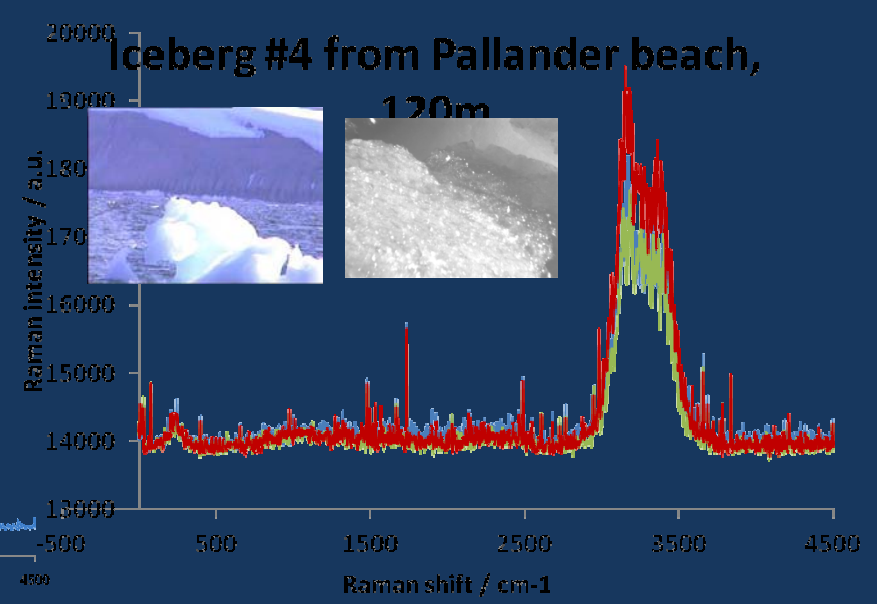
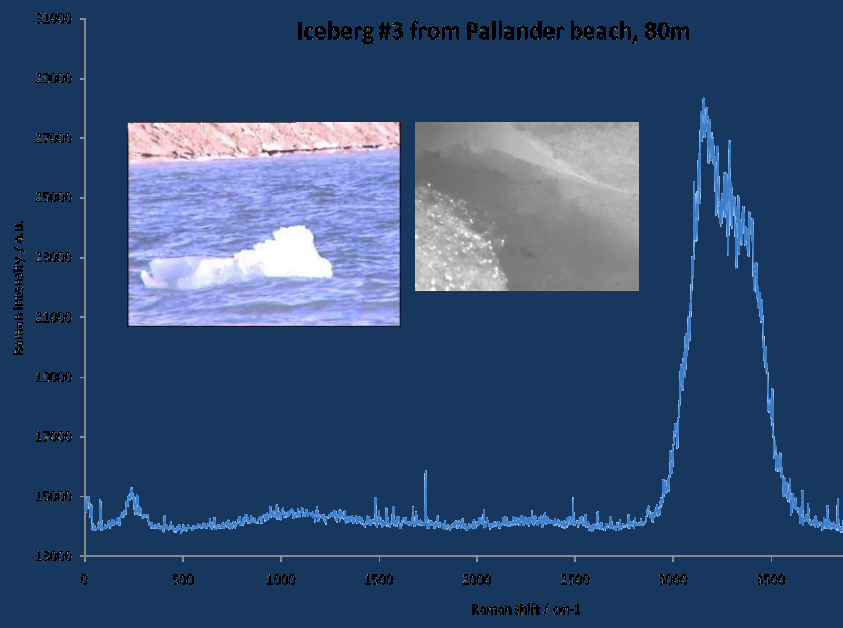
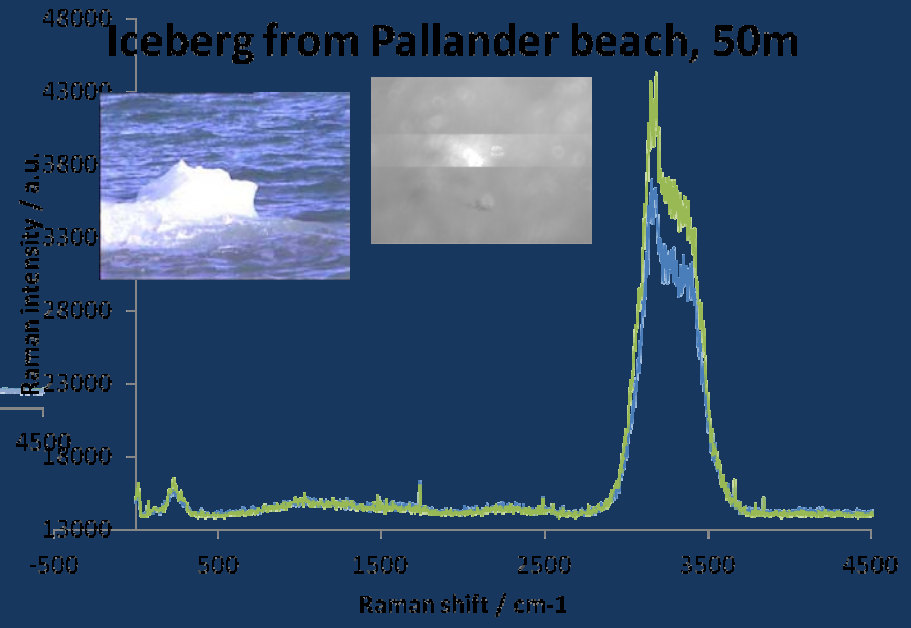
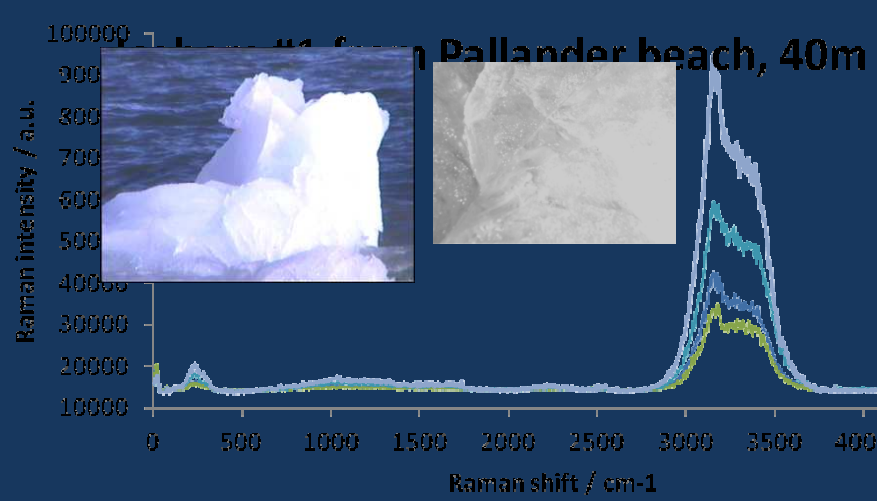
Video



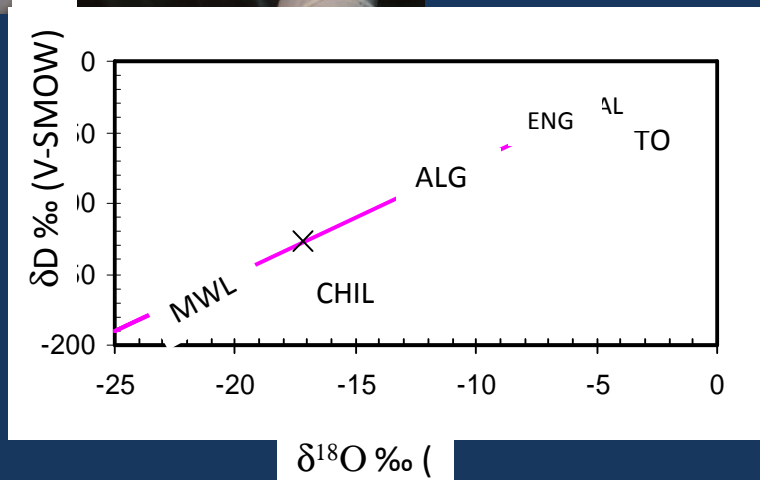




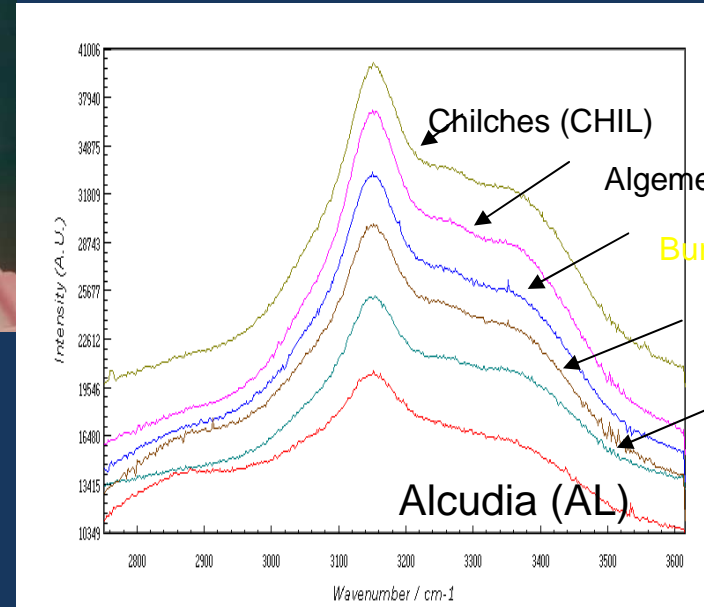








MWL = Meteoric Water Line (Craig, 1961) ( $\delta D = 8 * \delta^{18}O + 10$ )



# Megacryometeors

<http://tierra.rediris.es/megacryometeors/>

