

Christian Weikusat<sup>1,2</sup>, Sérgio H. Faria<sup>1</sup>, Gernot Nehrke<sup>2</sup>, Sepp Kipfstuhl<sup>2</sup>, Sebastian Schöder<sup>3</sup>, Werner F. Kuhs<sup>1</sup>

<sup>1</sup>GZG, Sect. of Crystallography, Göttingen University, Göttingen, Germany <sup>2</sup>Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany <sup>3</sup>European Synchrotron Radiation Facility, Grenoble Cedex, France

## Microdiffraction

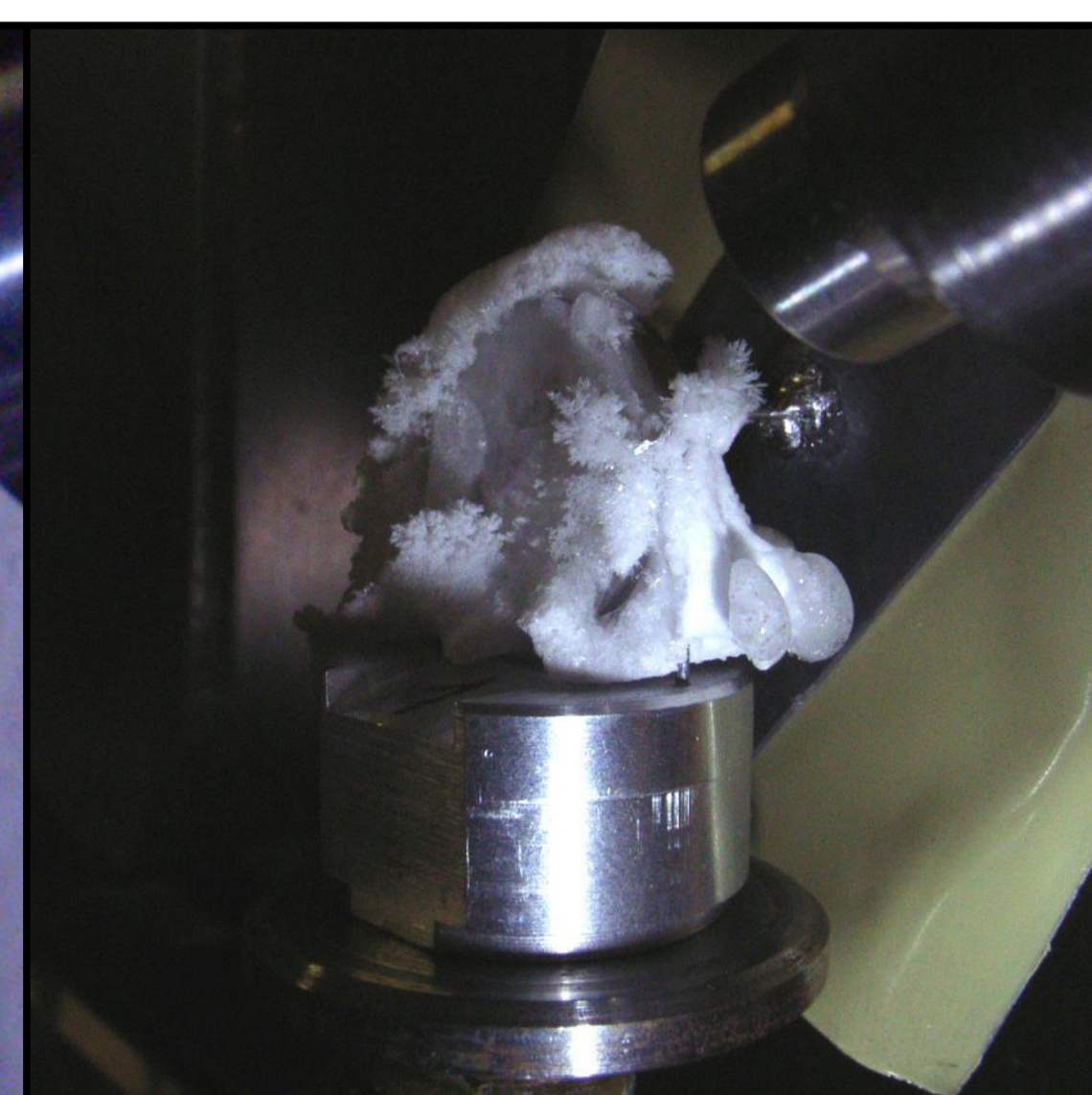
Microdiffraction experiments were conducted at the beamline ID13 of the ESRF in Grenoble. Various software bugs and technical difficulties (especially deposition of copious amounts of frost) prevented the detection and identification of single microinclusions.

Diffraction patterns of larger air hydrate crystals could be acquired.

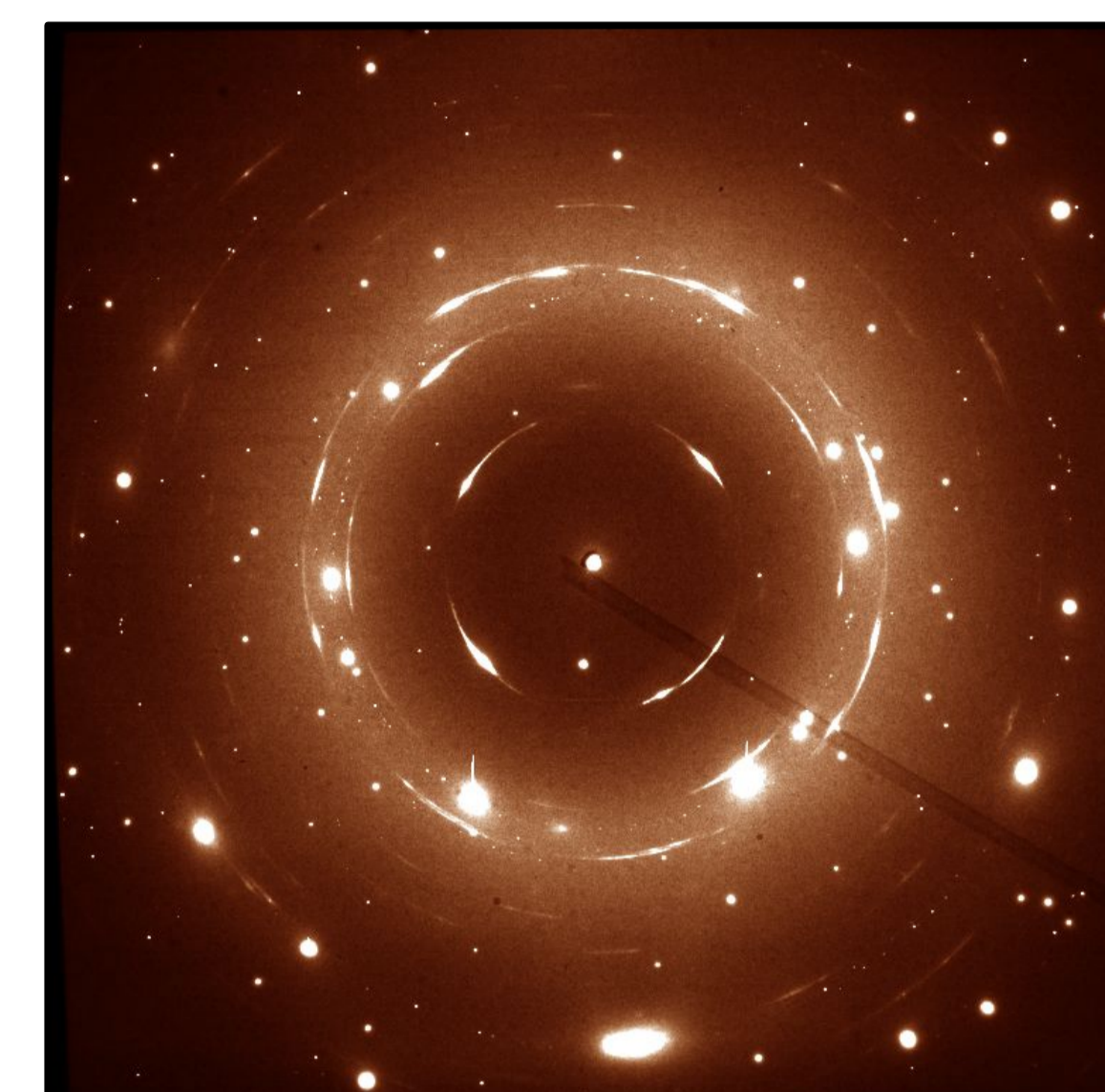
New methods for frost prevention and data treatment have to be developed.



Sample directly after mounting. Diameter of the glass plate is ~15 mm.



Sample after ~12 hours of measurements. The excessive production of frost is evident.

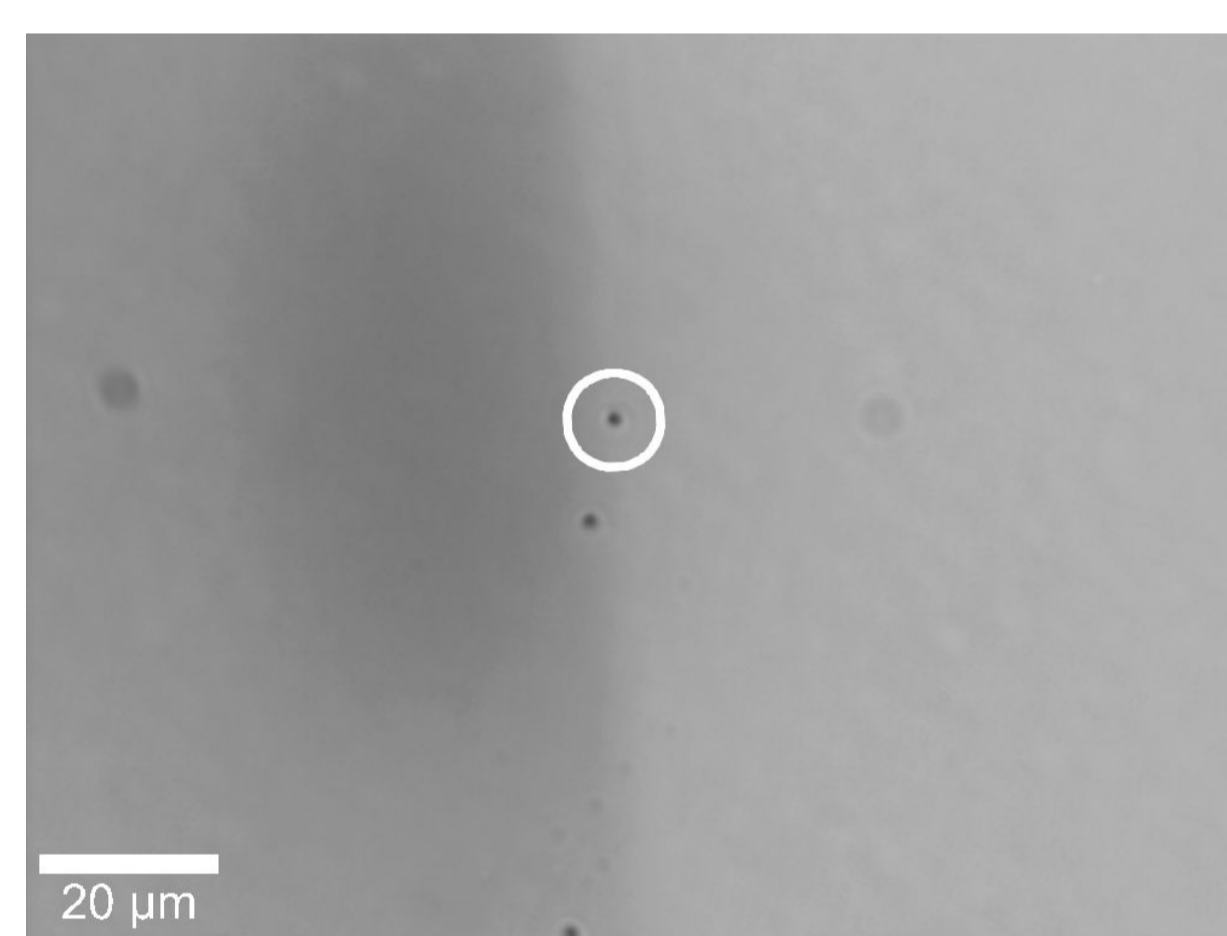
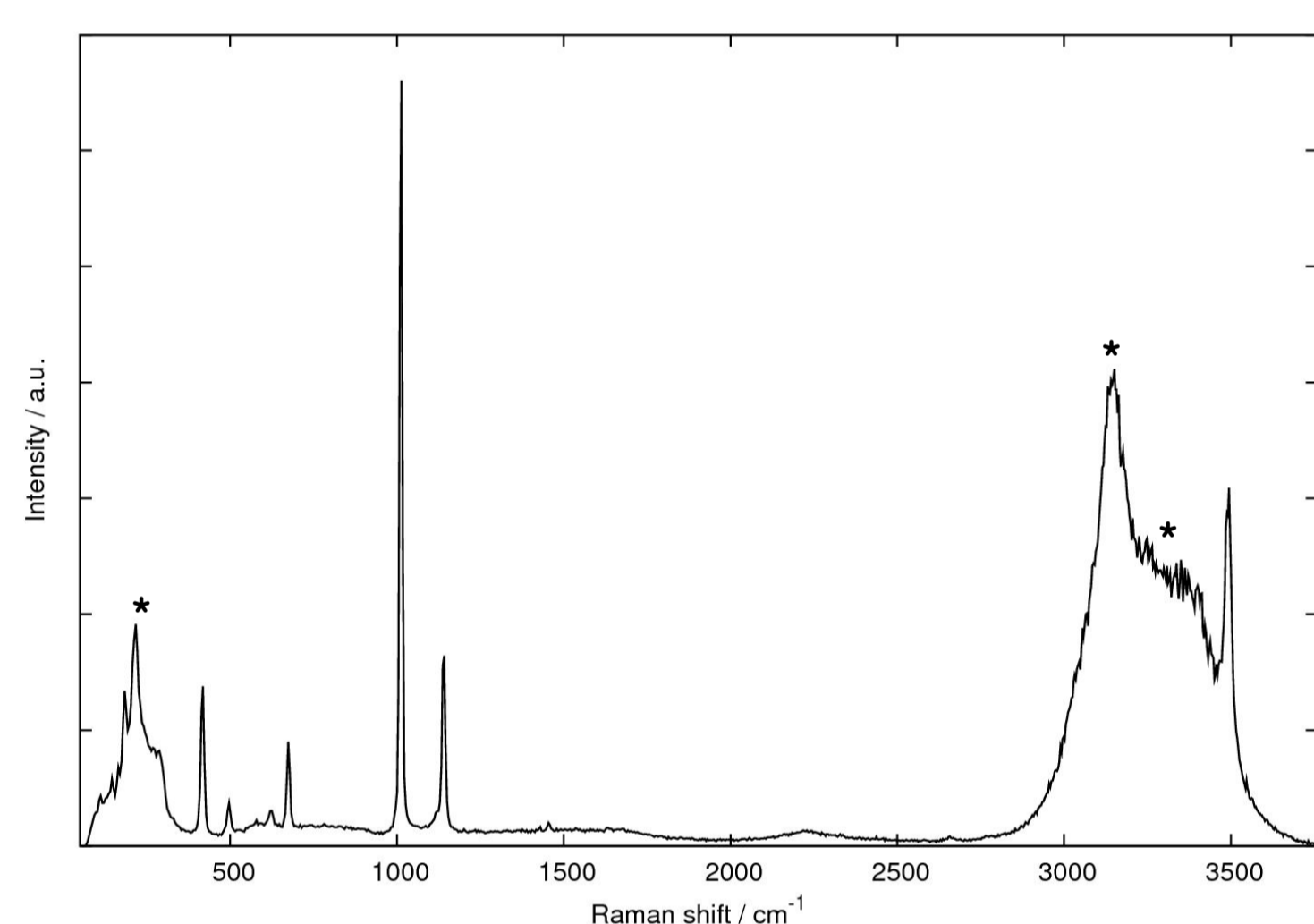


Diffraction pattern of an air hydrate crystal

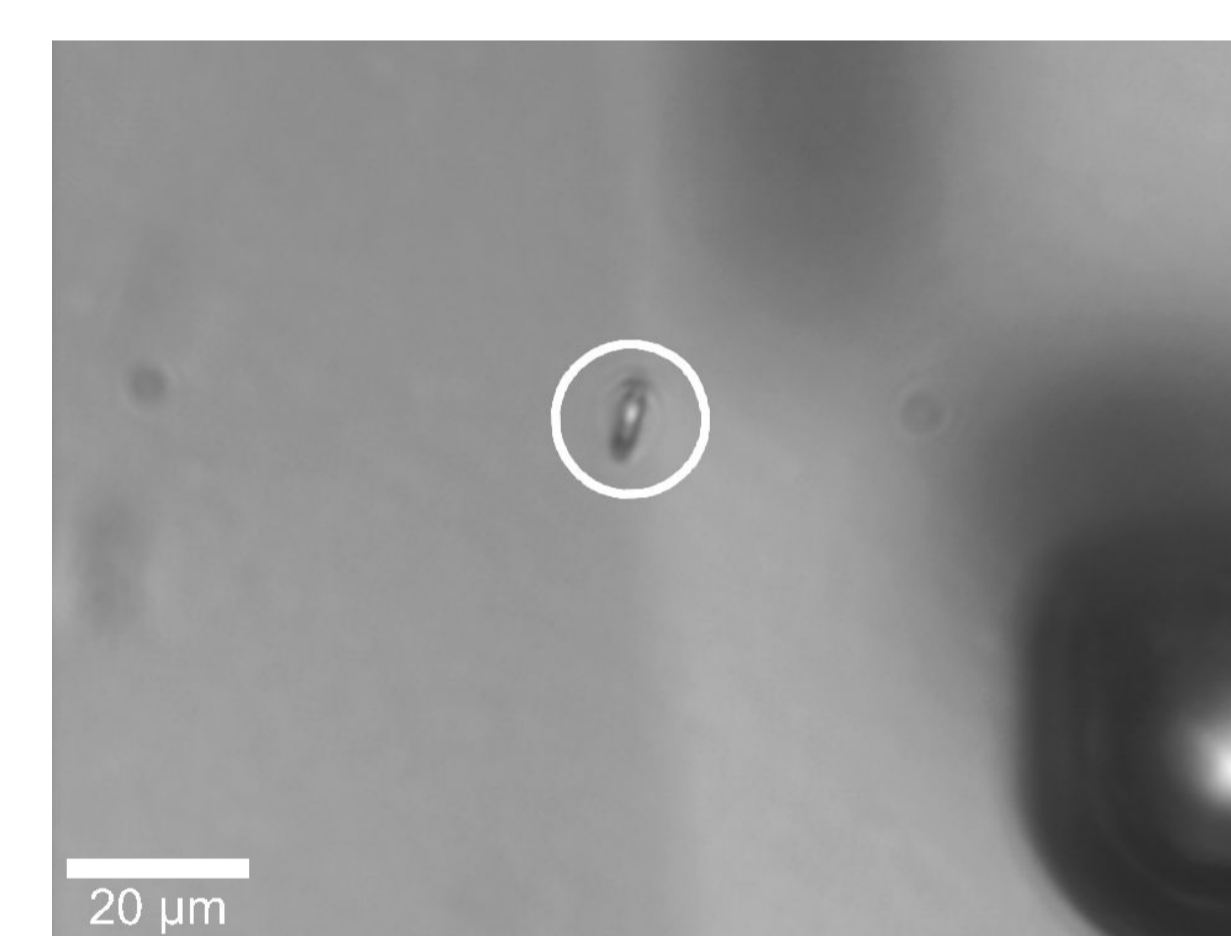
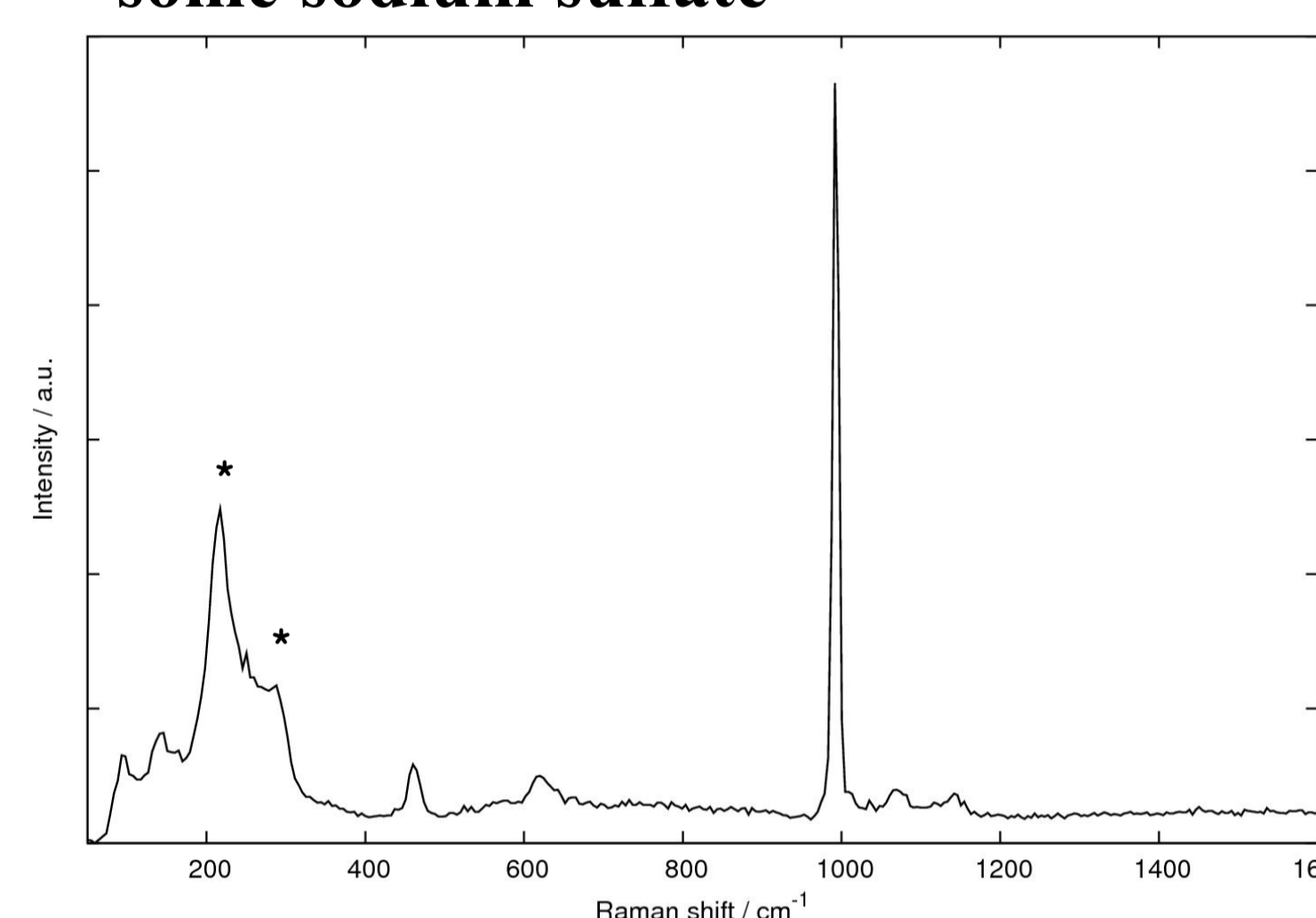
## Raman spectroscopy

Raman spectroscopy was performed at GZG, University of Göttingen, and at AWI Bremerhaven. Results obtained with the two systems are in perfect agreement with each other. Several crystalline microinclusions could be identified (\* denotes Raman bands of the ice matrix):

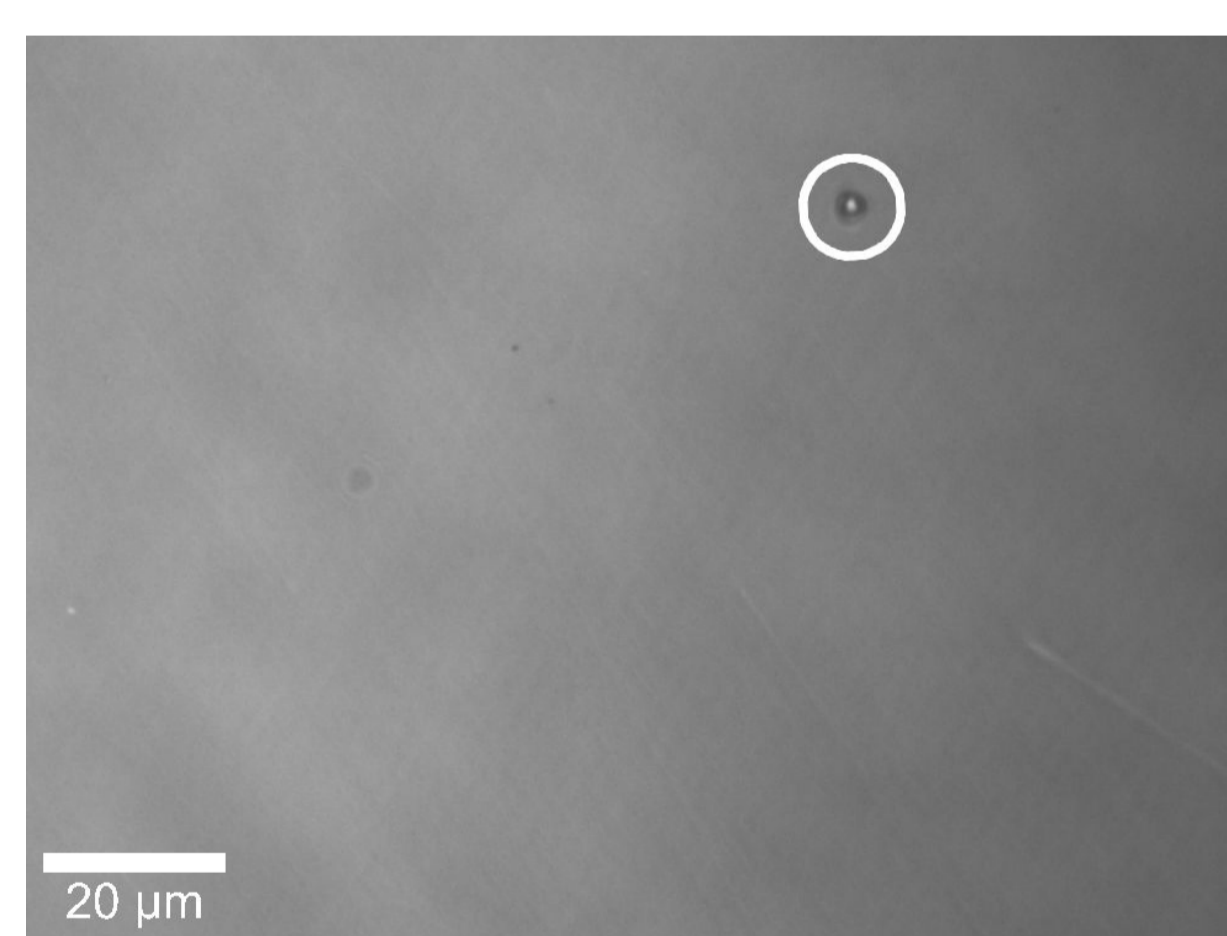
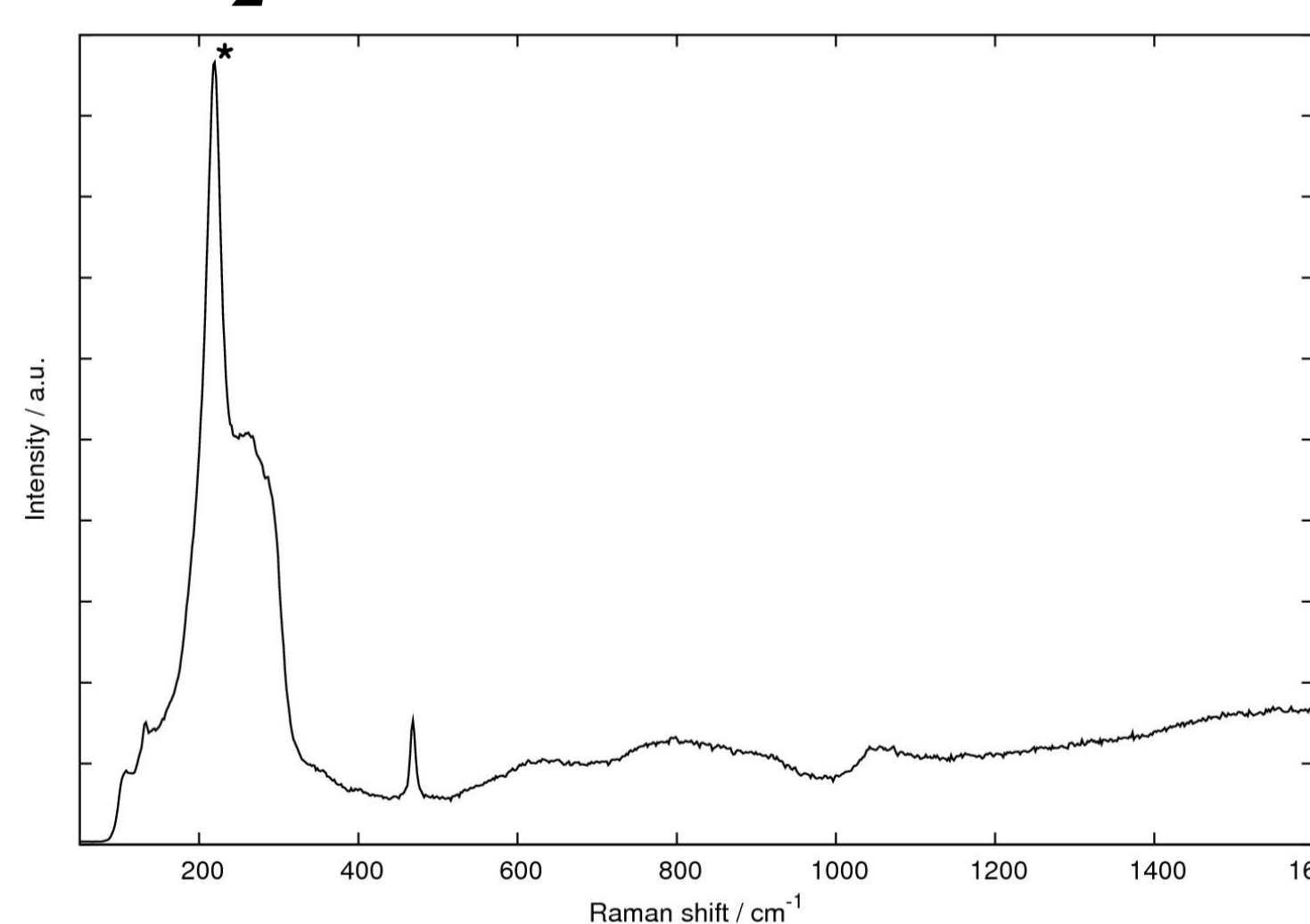
### CaSO<sub>4</sub> · 2 H<sub>2</sub>O (Gypsum)



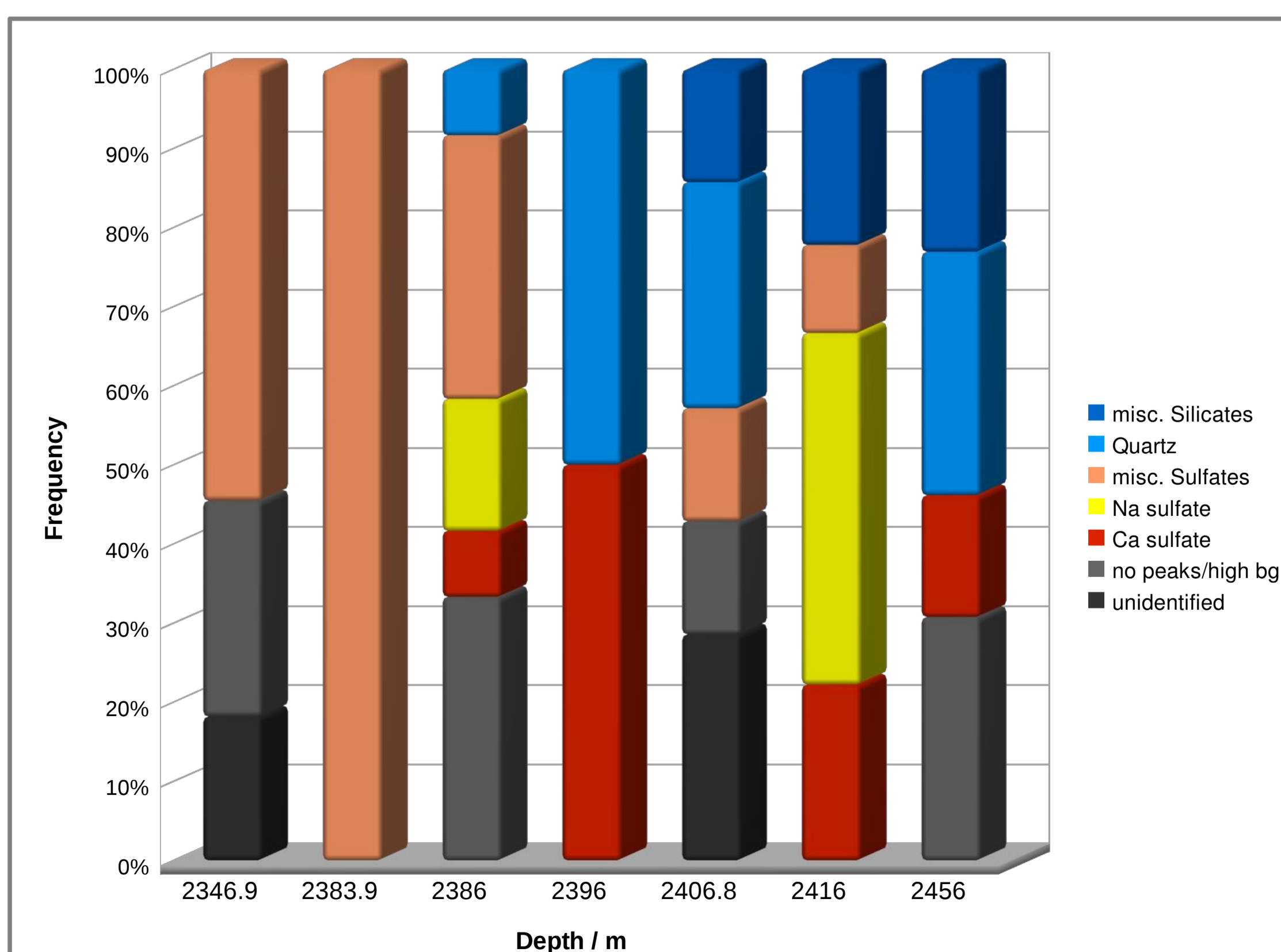
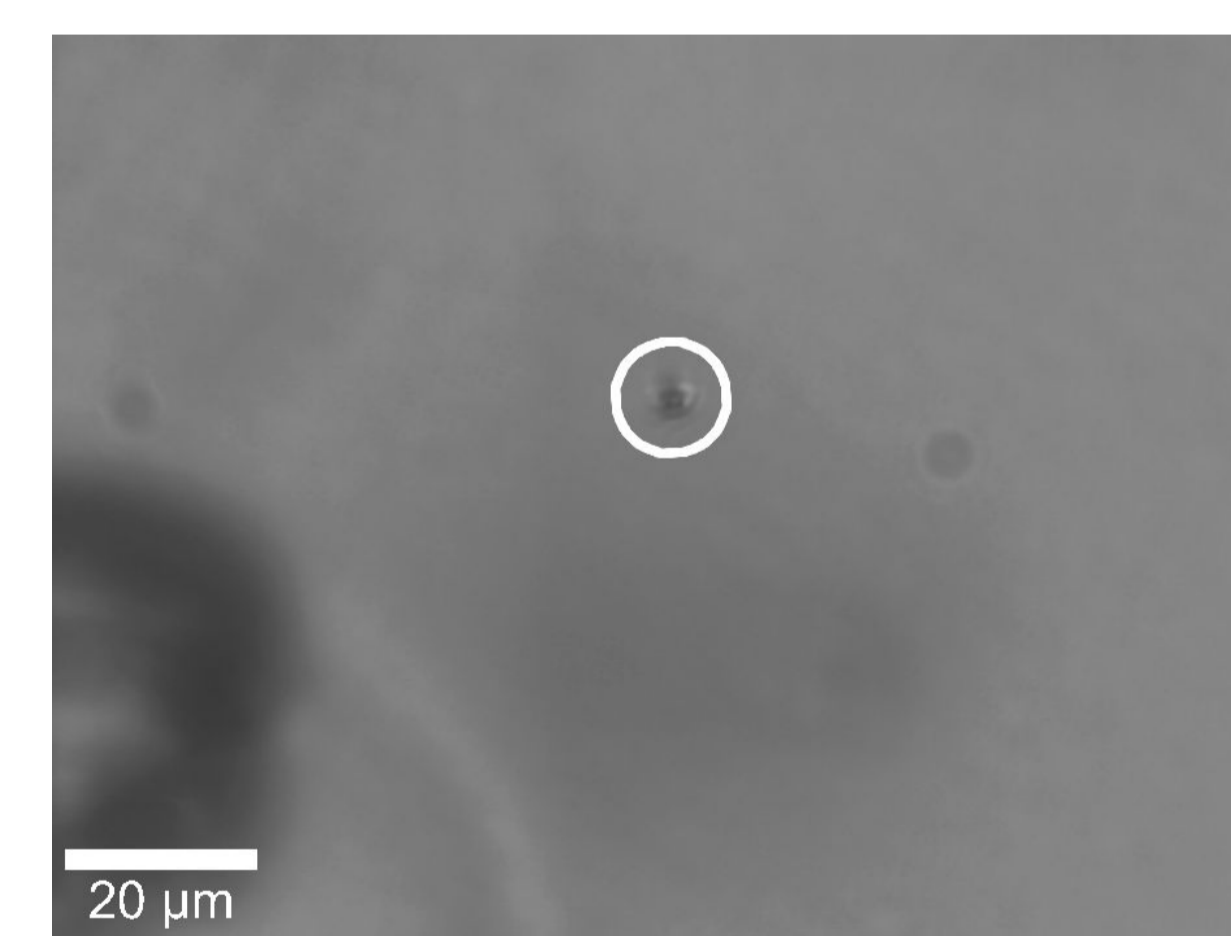
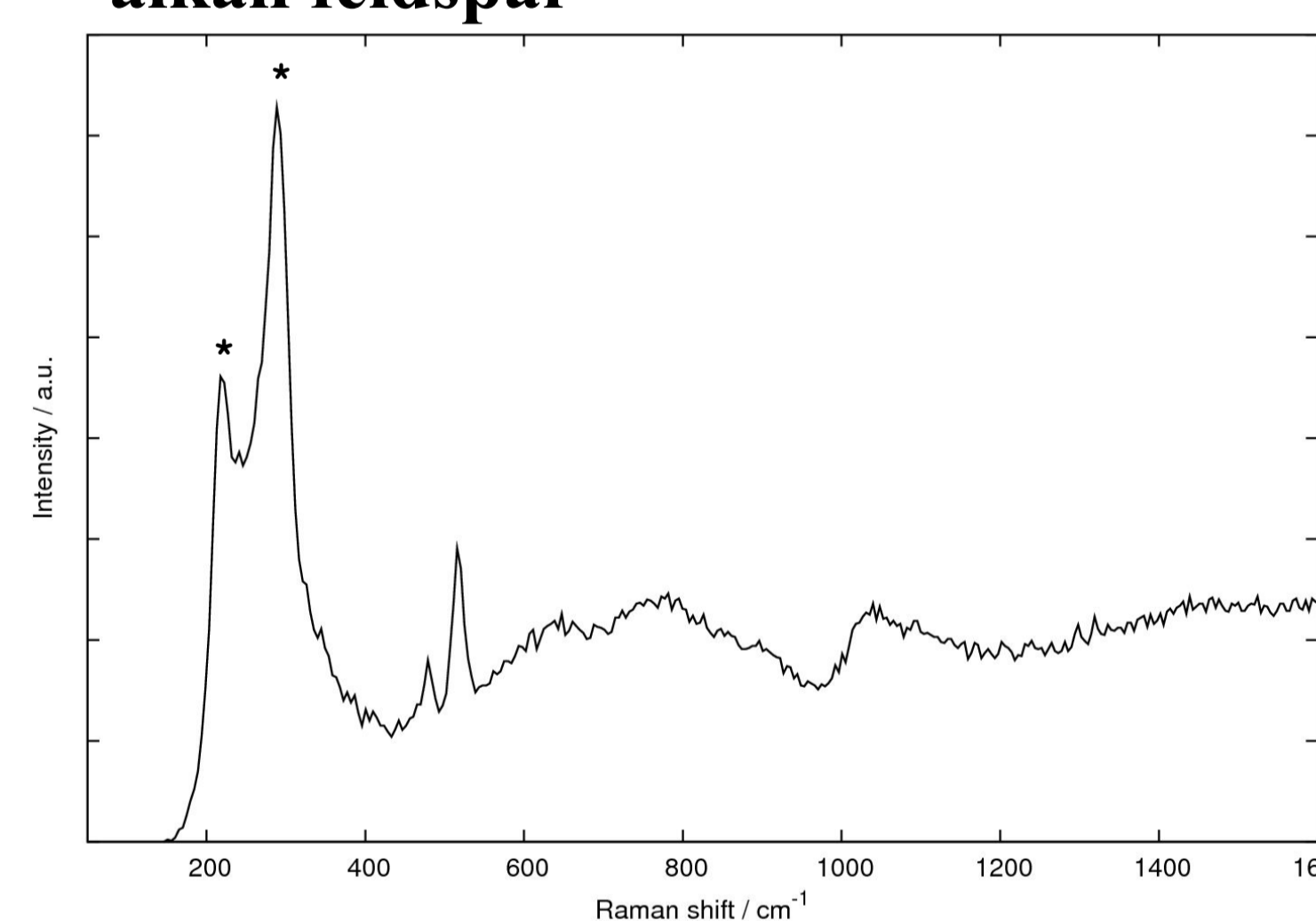
### some sodium sulfate



### SiO<sub>2</sub> (Quartz)



### alkali feldspar



## Statistic of microinclusions

Preliminary results for the MIS6-MIS5e transition.

The increased frequency of quartz and silicates in the deeper parts could account for the observed changes in mechanical properties (e.g. borehole closure).

## References

- A.J. Gow, T. Williamson, *Geol. Soc. Am. Bull.*, **87**, 1665-1677 (1976)  
 S.H. Faria, J. Freitag, S. Kipfstuhl, *Quaternary Science Reviews*, **29**, 338-351 (2010)  
 T. Sakurai et al., *Journal of Glaciology*, **55**, 777-783 (2009)  
 A. Nedelcu, ongoing PhD-thesis, *University of Göttingen* (2010)