Consiglio Nazionale delle Ricerche

ISTITUTO DI SCIENZE POLARI

ANNUNCIO SEMINARIO

Mercoledì 21 Luglio 2021 ore 14.30

Relatore: Dott. Nicolas Stoll

" MICRO-INCLUSIONS AND DEFORMATION IN THE EGRIP ICE CORE"

Impurities play a crucial role regarding the deformability and the flow of polar ice. To better understand this interplay it is especially important to investigate the location and chemical composition of micro-inclusions. New results from a systematic analysis of micro-inclusions in Holocene ice from the East Greenland Ice Core Project (EGRIP), which has been drilled near the onset of the Northeast Greenland Ice Stream (NEGIS), offer novel insights into the dynamics of fast flowing ice. Investigating the small-scale properties of eleven solid samples from Holocene ice, i.e. the upper 1340 m of the EGRIP ice core, we mapped the locations of several thousand micro-inclusions inside the ice. The use of cryo-Raman spectroscopy allowed us to obtain a representative overview of the mineralogy of these inclusions in the ice without the risk of contamination. We identified a variety of Raman spectra, mainly from sulphates (dominated by gypsum) and terrestrial dust, such as quartz, mica and feldspar. The observed mineralogy changes with depth and EGRIP Holocene ice can be categorised in two different depth regimes, i.e. the upper (100-900 m) and lower (900-1340 m) regimes, depending on their mineralogy. Furthermore, micro-inclusions show certain spatial patterns, such as clustering or layering, which are partly related to their mineralogy. We thus conclude that Greenlandic Holocene ice has a broader, and more variable, mineralogy than previously reported and that chemical reactions might take place within the ice sheet, possibly altering the paleo-climate record. Our approach further demonstrates the added value of systematic, combined high-resolution impurity and microstructural studies, and the importance of considering different spatial scales.