Title	**Reconstructing paleoenvironmental conditions form biogenic markers in ice cores**
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Project description:

Ice cores provide exceptional time-resolved archives of data on Earth's climatic conditions on timescales ranging up to 800,000 years. Obtaining older records has been an ongoing challenge in the ice core community with the current Beyond EPICA (BE) project focussing on the retrieval of a 1.5 million year old Antarctic ice core. Most ice core data focusses on inorganic components in the ice (e.g. water isotopes, inorganic salts, or gases) due to their higher concentrations. However, it has long been recognised that additional climatic information resides in the organic compounds present in the ice. For example, the biosphere is the largest emitter of both primary organic aerosols and volatile organic compounds. Specific organic compounds in ice cores may therefore explain how the terrestrial biosphere has changed due to rapid climate changes and glacial-interglacial transitions or give an indication of the sea ice extent in past eras. The proposed project aims to combine the growing field of microfluidics with improvements to conventional mass spectrometry to allow for continuous analysis of ice cores, gradually melted in continuous on a melting-head, for the determination of terrestrial and marine biomarkers with high time resolution in the archive.

In the framework of this research project, the prospective PhD student will experience working in an international collaborative environment. The student will develop skills in microfluidics, ma ss spectrometry for analysis of organic in ultra-trace levels and advanced data analysis techniques.

Publications:

King A.C.F.*, Giorio C.*, et al. (**2019**) Direct injection liquid chromatography high-resolution mass spectrometry for determination of primary and secondary terrestrial and marine biomarkers in ice cores. Analytical Chemistry, doi: 10.1021/acs.analchem.8b05224.

Giorio C.*, Kehrwald N.*, et al. (**2018**) Prospects for reconstructing paleoenvironmental conditions from organic compounds in polar snow and ice. Quaternary Science Reviews, 183, 1-22.

Collaborations/Network:

Professor Carlo Barbante, Università Ca' Foscari, Venezia
Professor Eric Wolff, University of Cambridge (UK)
Dr. Liz Thomas, British Antarctic Survey (UK)

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