Università
Ca'Foscari
Venezia

PROJECT ACRONYM AND TITLE: **MICRO-CLIMATE – Micron-scale Ice Core Reconstruction of Abrupt Climate Changes**

FUNDING PROGRAMME: **HORIZON 2020**

CALL: **H2020-MSCA-IF-2020 – Marie Sklodowska-Curie Global Fellowship**

DESCRIPTORS: **Cryosphere, dynamics of snow and ice cover, sea ice, permafrost and ice sheets, Geochemistry, crystal chemistry, isotope geochemistry, thermodynamics, Paleoclimatology, paleoecology, Analytical chemistry, Environmental chemistry, environmental forensics**

HOST DEPARTMENT: **Department of Environmental Sciences, Informatics and Statistics**

SCIENTIFIC RESPONSIBLE: **Barbante Carlo**

FELLOW: **Bohleber Pascal**

FINANCIAL DATA:

Project total costs	Overall funding assigned to UNIVE
€ 269.002,56	€ 269.002,56

ABSTRACT:
Understanding natural climate dynamics is fundamental to anticipate, avoid, and assess mitigation potential for abrupt climate change, one of the grand challenges to global sustainability. As one of the most important natural archives, polar ice cores have led to the discovery of past abrupt climate transitions, such as the abrupt onset of stadial-interstadial warming in Greenland, happening as fast as just a few decades. The underlying processes remain to be fully deciphered, especially whether oceanic or atmospheric changes initiate abrupt changes, or if they act simultaneously. To study the sequence of events requires fine temporal detail, which conventional cm-resolution melting techniques cannot provide due to continuous thinning of ice layers. Laser-Ablation Inductively-Coupled Plasma Mass Spectrometry (LA-ICP-MS) is a key technology in this respect, offering micro-destructive ice core impurity analysis at micron scale-resolution. At this high resolution, however, it is pivotal to avoid misinterpretation by taking into account interaction of impurities with the ice crystal matrix. MICROCLIMATE brings together, for the first time, two state-of-the-art LA-ICP-MS setups (at the Universities of Maine and Venice) to realize what one partner could not achieve alone: high-throughput AND high detail analysis for constraining signal preservation. In Venice, imaging the 2D impurity distribution detects the imprint of the ice matrix. In Maine, impurity profiles over meter-long ice core rods are investigated to decipher the timing of changes in marine, terrestrial and atmospheric proxies, before, during and after abrupt transitions. By this means a high-resolution fingerprint of the abrupt change is unfolded – which climate components change first, which follow? Ultimately, the project will advance our understanding of how to interpret ice core geochemistry at high-resolution and produce a refined LA-ICPMS application that can be employed in upcoming ice core projects.

Planned Start date	Planned End date
15st January 2022	14th January 2025

PARTNERSHIP:

1	University of Maine	Bangor (USA)	Coordinator
2	Università Ca' Foscari Venezia	Venice (IT)	Partner