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L-26 **Friday, 17.06., 10^{20} - 11^{00}**

Mineral dust iron geochemistry of the last 160 kyears

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Windblown mineral particles (dust) plays a key role in the climate system and many challenging studies allowed the quantitative estimation of direct and indirect effects on climate and environmental phenomena. Dusts are naturally stored in glaciers and ice sheets from polar areas represent unique natural archives of the particulate present in the atmosphere. Among the many challenging researches on aerosols/dust the current emergency determined by the global warming is triggering scientists to carefully look for signs of past climate changes. Indeed, the reconstruction of past climate trends may be useful to understand the Earth's climate and, eventually, paleoclimatic data could help to understand the balance between positive feedback components such as greenhouse gases and negative feedback components like mineral dust. The most precise information on Earth's climate variation can be extracted from ice cores drilled both in polar and mid-latitude-high-altitude glaciers. Within this framework, the characterization of low concentration of airborne particles in natural ice is fundamental. TALDICE (*Talos Dome* Ice Core) is a 1620 m long ice core, retrieved from *Talos Dome*, a peripheral dome of the *East Antarctic* plateau. The proximity to the sea influences the moisture budget and guarantees a high snow accumulation rate and thus a high time resolution of the climatic record. The TALDICE atmospheric dust record presents peculiar features, related to the influence of local *Antarctic* dust sources and to the regional atmospheric circulation, which affects the *Ross Sea* region [1,2].

The reconstruction of undisturbed stratigraphic sequences of dusty ice layers from shallow and deep ice cores provides information on the temporal variability of atmospheric dust loads and allows investigating the dust-climate coupling on different timescales. In addition, characterization of dust dispersed in the ice cores to correlate past environmental and climatic conditions with particles source areas is now possible. Cutting-edge synchrotron radiation-based spectroscopic techniques such as Total-Reflection X-Ray Fluorescence (TXRF) and X-ray Absorption Near Edge Structure (XANES) have been used to investigate in a non-destructive way the microparticle mineralogy. However, experiments are extremely challenging for *Antarctic* ice core samples, where mineral concentrations are extremely reduced and dust is often mixed with poorly crystalline material such as volcanic glasses. Experiments performed at the *Stanford Synchrotron Radiation Laboratory* (SSRL) and at the *Diamond* facility in *Oxford*, allowed to identify and to compare the mineral composition. XANES spectra combined with TXRF results not only demonstrate the feasibility of such kind of analysis but also that it may usefully complement other techniques commonly used in the ice core analysis [3,4].

I will show that the application of techniques usually applied in the field of materials science, mineralogy and crystallography can give an important contribution to ice core science, with new and original information. The interpretation of data and the extraction of useful climatic proxy is still in progress but premises are extremely encouraging. Preliminary results point out that the atmospheric dust deposited at *Talos Dome* during the last 160 kyr is not uniform, pointing out a clear and significant variability. The analysis could be a first step toward the comprehension of this and other unsolved climatic issues.

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