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Microanalysis of Fine Insoluble Particulates from the Colle Gnifetti Ice Core

Laura Hartman (1), Andrei Kurbatov (1,2), Martin Yates (2), Siwan Davies (3), Pascal Bohleber (1,4), Michael McCormick (5), Alexander More (5), Christopher Loveluck (5), Michael Handley (1), Elena Korotkikh (1), Sharon Sneed (1), and Paul Mayewski (1)

(1) University of Maine, Climate Change Institute, United States (laura.hartman@maine.edu), (2) School of Earth and Climate Sciences, University of Maine, (3) College of Science, Swansea University, (4) Institute of Environmental Physics, Heidelberg University, Heidelberg, Germany, (5) Initiative for the Science of the Human Past, Harvard University, Cambridge, United States

New methodological advancements allow for the capture and quantitative analysis of fine (5-10 μm) and ultra-fine (<4μm) insoluble particles from an ice core. This study examined several intervals from the Colle Gnifetti ice core, targeting deposits that were tied to volcanic eruptions using glaciochemical signatures. We used SEM/EDS to analyze all materials and the NIST DTSA-II methodology and software to provide fully quantitative data. One interval, from 57.67- 57.88 meters, had dust, minerals, and three (5-8 μm) rhyolitic tephra particles. According to the existing timescale developed using annual layer counting, this interval corresponds the late 400s CE. These tephra particles will help to confirm the existing timescale by providing tephrochronological context for the ice core, as well as, once a specific Icelandic source eruption is determined, provide context for atmospheric circulation at the time of deposition. The other intervals analyzed for this study had minerals and dust grains, but no tephra deposits. This study expands the number of established tephra sources in the Colle Gnifetti ice core, and establishes the framework for mapping insoluble particulate sources and related changes in atmospheric circulation patterns.

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