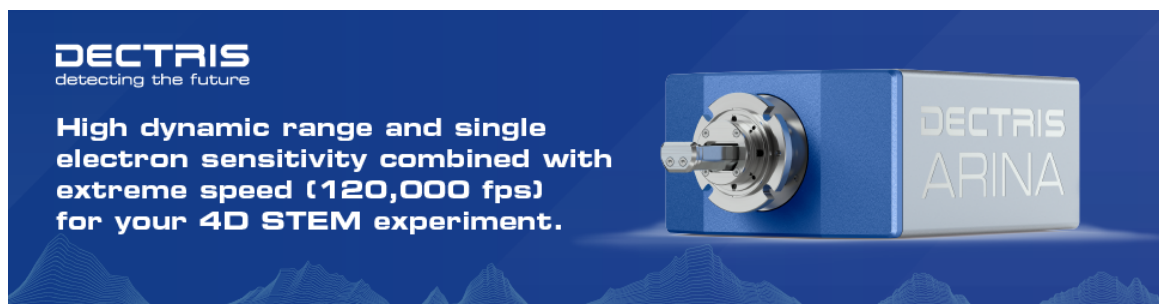


Tephra Community Tools for Archiving Sample Information, Analytical Methods, Samples Geochemistry, and Standards Geochemistry at SESAR and EarthChem

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Since 2014, the international volcanic ash (tephra) research community has been building a set of data best practices and digital research tools for pyroclastic volcanology, based on input gathered from more than 250 scientists during a series of workshops and other discussions [1,2]. Primary objectives are to improve data documentation and availability to meet Findable, Accessible, Interoperable, and Reusable (FAIR) goals and to thereby enhance research collaboration, support student and early career training, streamline research workflows, and facilitate the construction of next generation digital data systems.

Microanalytical geochemistry data, microscopy methods, and lithostratigraphic data are widely used in tephra research to characterize samples, understand processes of volcanic eruptions, and to match samples to eruptive events across continental to trans-continental distances. Comprehensive best practice recommendations for data and metadata have been released [1,2] which cover samples, physical properties, optical imaging, electron microscope imaging, EPMA and LA-ICP-MS analytical methods, and geochemical data reporting and archiving.

A series of spreadsheet templates have also been prepared in collaboration with SESAR and EarthChem, and these are available via the Tephra Community portal at EarthChem [3]. Comprehensive and simplified templates support archiving of sample information and associated project metadata simultaneously with registration of samples with International Generic Sample Numbers (IGSNs) [4]. New analytical method templates now make it possible to archive in detail EPMA and LA-ICP-MS methods in standardized formats so that they may be re-used and cited with a DOI. In this way, the method expert, often the laboratory manager, can complete the template once for each method, and then all subsequent users can cite the method DOI in all related publications and datasets.

A new microanalytical data template for EarthChem also now makes it possible to submit data obtained from research samples and standard reference materials together in the same way with all data linked to a method DOI. The new format also makes it possible to associate at the analytical session or batch level all research sample data and reference material data for both primary and secondary standards. This supports the tephra research community consensus that reference material data must always be archived with research sample data as one of the most important indicators of data quality [1]. This new archiving approach will also make reference material data more readily searchable and discoverable at EarthChem. These new approaches are available for use by any research community with similar data and metadata archiving and discovery needs.

Further digital tool and API development is also being planned to make it easier for researchers to utilize these new mechanisms and to link information across multiple existing data systems.

References

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