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Community-specific Best Practices for FAIR Data and Samples. Examples from the Tephra EarthChem Community

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EarthChem and SESAR offer services designed to promote sample discovery and management, publication of data as well as its preservation, and to support data mining and analysis. These services are built on the foundation of best practices from the geochemical and sample communities.

EarthChem and SESAR recognize that different user communities have different needs. As such, these data systems offer users a platform to host community recommendations for data and sample documentation, built around specific data types or scientific themes.

There are currently four EarthChem Community spaces, each with very distinct research focus areas and data management requirements - Tephra, Clumped Isotopes, Experimental Petrology and Critical Zone Network. The Tephra Community is one of our most comprehensive user spaces. System curators have worked closely with representatives of the global tephra community [1] to create tephra-specific workflows and tools that leverage our services.

Based on the tephra community Best Practices Guidelines [2], we created a data submission workflow and templates that addresses processes and recommendations for submitting methods, samples, and analytical data to EarthChem/SESAR for registration and preservation. Through the EarthChem Library [3], we provide data curation, publishing and DOI minting of analytical data, and through SESAR [4] sample metadata is curated and cataloged. These resources are then leveraged in the EarthChem synthesis - PetDB [5], where data from tephra samples can be accessed interactively, and the Volcano (Decade) Portal [6] where different observational data types are aggregated by individual volcanoes.

The development of community spaces directly supports EarthChem's mission to drive innovation and discovery in Earth, Ocean, and Environmental Sciences, by ensuring best practices are followed at the research community level, and that these guidelines are in alignment with international best practices for OPEN and FAIR data sharing.

[1] Wallace et al. (2021), *Goldschmidt2021*. [2] Abbott et al. (2020), *Zenodo*. [3] https://ecl.earthchem.org/ [4] https://www.geosamples.org/ [5] https://search.earthchem.org/ [6] https://decade.earthchem.org/