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Data and Computational Science for Earth and Planetary History: Lessons from the Terrestrial Archive

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Over the past decade, analysis of large open datasets has become increasingly critical to the geosciences – driven by the increasing availability both of fair and open data and of the computational resources and open-source codes to effectively examine such data. Here we consider some of the opportunities and challenges of data and computational science in the Earth and Planetary realms, including those brought about by the evident and continuing trends towards ever more parallel computational systems, and by the current proliferation of machine learning techniques both in science and society. We consider in particular a number of lessons learned from case studies of computational and "big data" work in Earth history and terrestrial geochemistry, as well as the potential extensions and applications thereof to the planetary science realm.