

Simultaneous estimation of melting degree and source composition of MORB: an application of data-driven analysis to Geochemistry

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Geochemical data sets, such as major, trace and isotopic compositions, preserve precious information about various physical and chemical processes. For example, bulk compositions of igneous rocks directly reflect melting of original rocks, magma mixing and rock-fluid interaction in the earth's interior. However, it has been still difficult to extract physical and chemical processes quantitatively due to many unknown factors and insufficient quality of data sets. Recently, many sophisticated data-driven methodologies have been proposed to extract useful information from high-dimensional data sets in information sciences. In this presentation, we will briefly overview data-driven analytical technologies and introduce an application to simultaneous estimation of melting degrees and a mantle source composition from MORB bulk compositions based on Bayesian estimation and Markov chain Monte Carlo (MCMC) optimization.

Keywords: data-driven, Bayesian estimation, sparse modeling, Markov chain Monte Carlo method