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TDMelts: A Theriak-Domino Wrapper for 2-dimensional batch melting models

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Conventionally, batch melting models involved assuming modal abundances of phases in a melting system to generate first-order approximations of trace element behaviour during partial melting. However, these manual systems often oversimplified the rock package, and there was no control on how close to reality the models were. More recently, scientists have incorporated thermodynamic models to control the mineral assemblages that are inputs for batch melt models, providing a fundamental control on the model's behaviour by reducing the requirement for manually picking changes in assemblages through P-T space. The rise in papers in the past few years indicates there is considerable interest in the modelling community to better marry batch melting to thermodynamic modelling.

Here we present a new approach to the problem, expanding from simple 1-dimensional approaches of batch melt models. Using a series of Python scripts to generate pseudosections (P–T, T–X, or P–X) in Theriak-Domino, we produce a 2-dimensional grid onto which we overlay a batch melting model with minimal user input (Figure 1). We can therefore expand our understanding of trace element behaviour into two-dimensions, reducing the sensitivity of picking 1-dimensional lines. These models have been set up on select trace elements, and we are looking to expand to increase the use for the wider geoscience community.