# The continental crustal composition from seismic observables and its implication on thermal structures of the U.S. and Antarctica

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In this presentation, we show an effort that takes advantage of the correlation between the chemical composition ($SiO_2$ weight percentage) and seismic observables (Vs: Shear wave speed and Vp/Vs: ratio between primary to shear wave speed) for typical crustal rocks (Fig. 1; Sui et al., 2022). Combining the previously published Vs model with newly-measured crustal Vp/Vs, the $SiO_2$ wt% is quantified with uncertainties beneath the seismic stations. This approach is applied to the seismic data collected from the Earthscope/USArray in the continental U.S., as well as from arrays deployed in Antarctica (e.g., POLENET). The crustal compositional models are constructed respectively for the two continents. Based on the compositional models, we further infer the abundance of heat producing elements and associated crustal heat generation. Together with other thermal constraints (e.g., Moho temperature, Curie depth, surface temperature, Etc.), crustal thermal models for the continental U.S. and Central and West Antarctica are constructed. These chemical and thermal models provide insights into crustal strength and tectonic evolution. For Antarctica, the thermal models estimate the geothermal heat flux, which serves as an essential boundary condition for ice-sheet modeling.

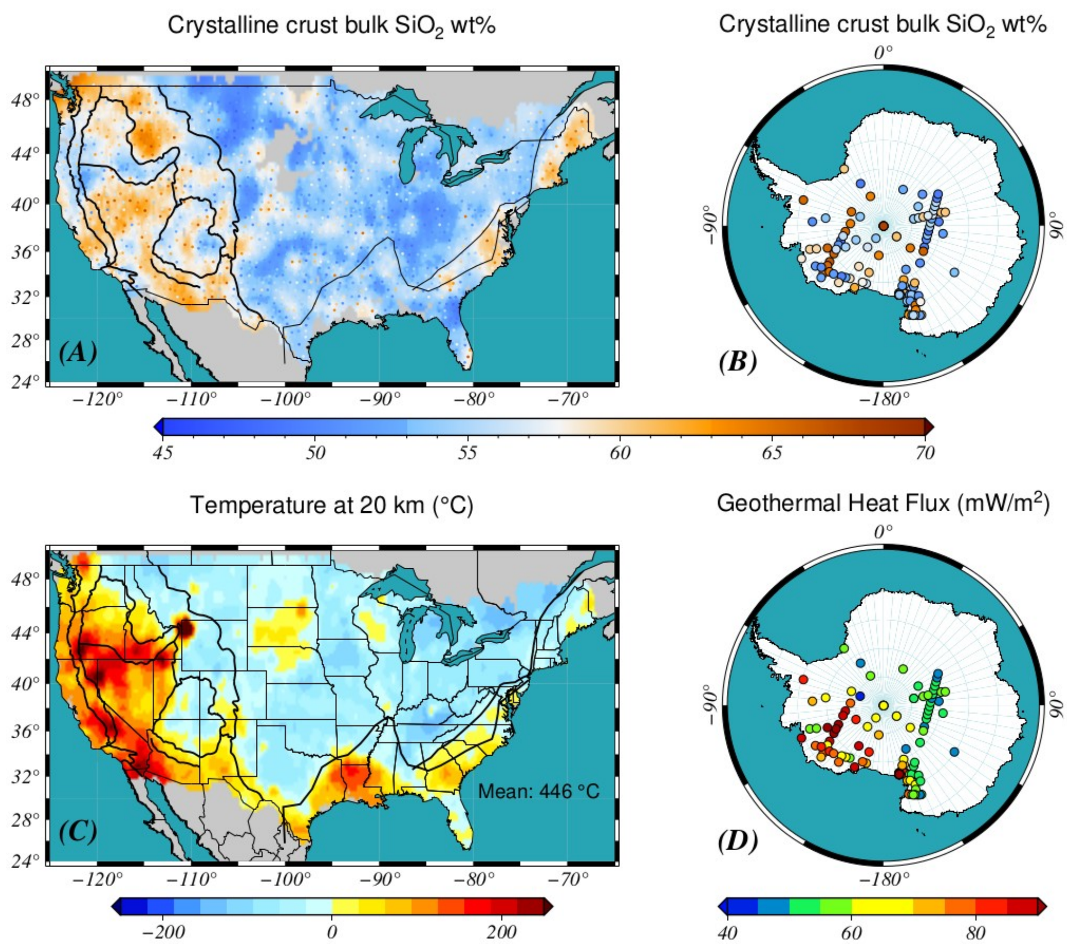


*Figure 1. (A) The crystalline crust bulk $SiO_2$ wt% of the U.S. The solid lines represent the boundaries of major tectonic regions. (B) The crystalline crust bulk $SiO_2$ wt% of Antarctica. The colored dots represent the $SiO_2$ wt% beneath individual seismic stations. (C) The temperature at 20 km compared to the mean value (labeled on the right) for the U.S. (D) The geothermal heat flux at the seismic stations in Antarctica.*