Geotherms from the Curie Depth Constrained Solutions of the One Dimensional Steady-state Heat Flow Equation

We incorporate the magnetic Curie depth as an *a posteriori* condition into the solution of one dimensional heat flow equation to anchor the geotherms at crustal depths. The Curie depth is derived from careful analyses of appropriate spectral methods where the magnetic power spectra lead to bracketing of temperatures at the bottom of the lithospheric magnetic layer (normally in the crust for continental regions). The use of the Curie depth constraint leads to a geotherm in the crust and it also yields the value of the ratio of heat production to thermal conductivity. We use this method at a few locations in the western U.S where we have constraints from other techniques from the EarthScope experiment and other temperature-sensitive methods (see Figure 1). There are many areas of the world where high quality aeromagnetic data are available but none with high quality EarthScope-like coverage of seismic and/or magnetotelluric data with capability of constraining geotherms in the three dimensional sense. As a result, we anticipate that our new method will be useful in constraining lithospheric geotherms worldwide where steady state assumption is valid in a regional sense.

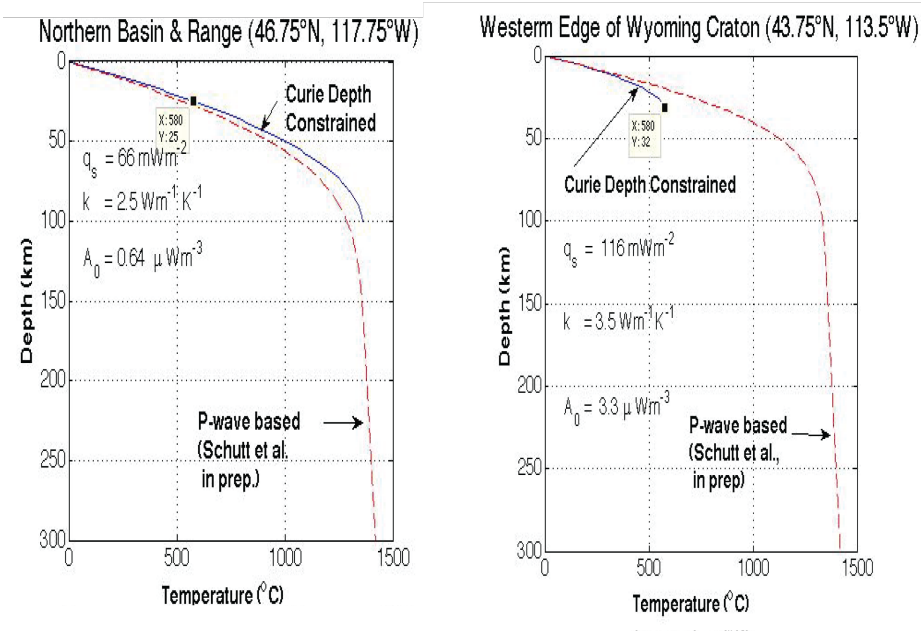

Figure 1. Comparison of Curie Depth constrained geotherms and P-wave velocity based geotherms