Grilling the Antarctic ice sheets and how to imagine the perfect crust.

The lithosphere is the Earth’s crust and uppermost mantle and forms the tectonic plates. It has a large impact on global systems through its interaction with Antarctica’s great ice sheets. We need to know more about how the lithosphere varies to understand how the ice load can change the crust over time and how much heat is supplied to the ice sheets from beneath.

This project aims to progress knowledge about the structure and variability of the deep reaches of the Antarctic continent basement. I will use geophysical observables like seismic velocities, airborne gravity and magnetic data to create a model of the lithosphere. This will be constrained with the limited rock type observations exposed around the coast and the few mountains in the interior. In the tectonic history of the Earth, Antarctica appears to have been a hub in the supercontinent Gondwana assembly (c. 570-180 million years ago) and also of central concern for reconstruction of earlier supercontinents. Constrains from neighbouring continents can also add further constrains to better understand Antarctic geology.

Big new datasets are available after the field campaigns begun in the International Polar Year of 2007. I will use a variety of techniques to infer the location and extent of significant hidden domains from these new datasets.

I hope to find out which parts of Antarctica are most buoyant and where the heat supply to the ice sheets from the rock beneath is greatest. This can contribute to better ice sheet models and better understanding of the Earth response to changing climate.