Coupling USArray and satellite gravity data – an integrated conductivity, density and seismic velocity model of the western USA

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The EarthScope USArray project provides high quality magnetotelluric and seismic observations, which have been used to identify tectonic boundaries of the USA. Combining these data sets together with satellite gravity observations, we investigate how the different data sets can complement each other in order to find a consistent model of the subsurface. Using a cross-gradient constraint, we first invert the magnetotelluric and gravity data sets in order to demonstrate the feasibility of our approach and to identify any difficulties. Once a joint conductivity and density model is found, we perform a full joint inversion of all three data sets. By comparison with models derived from separate inversions of the individual observables we can show how the different data sets interact. Examining the magnitude of the cross-gradient lets us distinguish parts of the model where a good agreement of the recovered structures has been achieved from those where differing patterns are necessary in order to achieve an acceptable data fit. In this presentation we will give an overview of our approach, highlight our strategy and show results from individual and joint inversions.