

Notes for Geophysics CA assignment

This assignment is based, as you're well aware now I'm sure, on processing, analysing and interpreting real data. There will therefore be all sorts of uncertainties that arise naturally from uncertain measurements through to the natural heterogeneity of the geology itself...all of which are simply par for the course, so to speak, for geophysicists and geologists. And, of course, there is, and can never be, a "correct" answer, just the scientific process of data analysis, organisation, and interpretation.

The key question posed, and that we wish to answer, is "How is the topography of the Himalaya-Tibet mountain range supported at depth?" This question begs the additional one of "Is a purely Airy-type local compensation mechanism appropriate, or is part of the topographic load supported in other ways, e.g. by the strength of the lithosphere, and if so how/what indicates this?"

One of the key skills geoscientists' possess, and the one highlighted as the skill most valued by employers from my experience, is the ability to make sensible decisions about complex situations based on woefully little and often ambiguous data. So, to some extent, this assignment will test all sorts of skills...mostly geophysical ones (I hope) but also skills at identifying the key points/arguments of a paper/s relevant to the question/task at hand, being able to synthesise a lot of information into a small (or better still, very small) number of key diagrams/graphs and with minimal but effective and sufficient explanation.

So, what I'm getting at, I guess, is that I have deliberately not been, and do not want to be, prescriptive about what you **MUST** hand in for this exercise. So there is no list of items I want to see...you could easily write 20 pages of text on this topic/material with dozens of really interesting plots I'm sure. But you don't want to do this, I suspect, and I certainly do not want you to do this. And rest assured, I will be happy and delighted to receive a wide and varied array of examples of cutting this particular cake...so do not worry about what your peers are doing or whether somebody has included different graphs etc to you...do what you think works best.

So, please try not to get lost in the forest of data columns, variable names and plots, but step back a bit so you can see the wood from the trees, so to speak. Be ruthless about what figures/graphs you really must include to support/illustrate your interpretation of the gravity data in the context of the question we posed.

So, without being prescriptive, and as a very rough guide to what to include in your report, I would consider;

1. A terse summary and description of the relevant observations we have to work with (i.e. the pattern/variation of the gravity anomalies (Bouguer and Free Air) and the topography along the three transects).
2. A brief description of the model and of the rationale for the forward modelling approach you used to help interpret the observed data.
3. A terse **description** of the model results (including description/comment on any relevant statistics concerning "goodness of fit". Did it "fit" the observed data well, poorly, in places very well and in others poorly etc).
4. A **discussion** of your model results. This is the most important part of the report and should include your interpretation/discussion of what your model has enabled you conclude regarding the key question posed, i.e. How is the mass of the Tibetan plateau supported by the crust/lithosphere? And, importantly how your conclusions/results compare/contrast with relevant work published by other scientists (i.e. the published papers identified and any others that you discovered). Note it is not sufficient, or sensible, to conclude that the model

worked or didn't work or that it was 'right' or 'wrong'. As George Box said, "All models are wrong, but some are useful". So was your model useful? If it was, what use was it, and what did it indicate about the state of isostatic support of the plateau.

So, in a nutshell, we're after a 2000 word (or less) report that explains as clearly and succinctly as possible what you did, with what, why, and what you found out.