Sea level tutorial
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(1) Fingerprinting ice sheet melt

Run the sea level code to calculate sea level fingerprints of the Greenland and Antarctic ice sheets to identify what locations are more / less sensitive to melt from these ice sheets.

- Check the 'ice sheet reconstruction' section and load 'fingerprint_melt'. Choose the Greenland_melt ice history by choosing ice = Greenland_melt. This ice model melts 1m of ice everywhere on Greenland. Plot out the ice height at timestep 1 and 2 to check that ice is indeed 'melting' in this ice sheet input model.
- Run the sea level code. This should be very fast considering that we're only calculating the solution for 1 timestep.
- Use the fingerprint plotting script plot_fingerprint.m to plot output. This script normalizes sea level change so that the average sea level change over the oceans is 1. Plot the spatial sea level pattern – does it make sense?
- Go back to the 'ice sheet reconstruction' section and choose the West Antarctic ice melt history (WAIS_melt). This ice model melts 1m of ice everywhere on West Antarctica.
- Go through the same steps as above: Check the ice model, run the sea level code, plot the output, normalize the fingerprint.
- Calculate the sea level signal for both fingerprints in different location, e.g. New York (74ºW, 40.7ºN), Sydney (151.2ºE, 33.9ºS), Buenos Aires (58.4ºW, 34.6ºS) or anywhere else! What do these values tell you?

(2) Sea level change over the past 40,000 years

Run the sea level code to calculate sea level changes over the last 40ka.

- Check the 'ice sheet reconstruction' section and load 'ice7g_40ka_GL256.mat'. This ice model is based on ICE-7G (https://www.atmosp.physics.utoronto.ca/~peltier/data.php) but adds a glaciation phase (see code for details). Look at the time vector and maybe plot a few ice slices (at different times) to get a sense for what this model is.
- Run the sea level code. This will take a little bit and screen output gives you information about run status.
- Use the plotting script plot_RSL.m to plot output. Plot the spatial sea level pattern at different times (e.g. the last glacial maximum, 26 ka, and the mid Holocene, 5ka) – does it make sense?
- Plot time series for a few locations, e.g. Hudson Bay Canada (76.3ºW, 56.2ºN), North Carolina (77.9ºW, 34.2ºN), Sydney (151.2ºE, 33.9ºS) or anywhere else! Can you explain the patterns you see?
- Go to 'Set up love number input' and switch out the love number file that you load. Try loading a file with a higher or lower viscosity (in the lower mantle for example). Rerun the code and see how your predictions change.