Supplementary information for "Mapping Geological Features onto Subducted Slabs"

The MATLAB scripts included with this paper require the MEX Compiler, Optimization, Parallel Computing and Mapping toolboxes and were run using MATLAB 2019a.

In addition, it uses the "Toolbox Fast Marching" from:

<u>https://uk.mathworks.com/matlabcentral/fileexchange/6110-toolbox-fast-marching</u> by Gabriel Payre. There currently some compilation issues with some of the c++ programs, but the perform_front_propagation_mesh.cpp is the key one to compile.

The following MATLAB scripts are included with this contribution to produce the figures in the paper:

Synthetic Example (Synth directory):

<u>mk_synth.m</u> – will calculate the synthetic examples and components of Figure 2 and 4. Uses toolbox fast marching.

MDS examples (MDS directory):

<u>run distance calc.m</u> – (Step 1) will calculate the along-surface distances for the slab geometry. Uses the toolbox fast marching. Need to set the path name to the correct location.

- Reads in the slabcontours_sa06.txt file
- Outputs geomguess.mat with the distances M and the lon lat locations of the points used

calc fz geomr1 geod.m – (Step 2) Calculates the great circle stress minimized MDS.

- Reads in geomguess.mat
- Outputs geomguess_geod2.mat with matrix x with the lon lat point of the unfolded slab.

<u>comp mds meth.m</u> – (Step 3) will calculate the stress and strain minimized MDS variations and compare it to the previously calculated great circle stress minimized MDS. It will do the final projections of the fracture zones

- Reads in FZ.mat which are the surface locations of the fracture zones from GPLATES
- Outputs text files with fracture zone locations, as well as MDS triangle centres and errors.

Kinematic Example (KINEMATIC directory):

<u>calc fz locsr1.m</u> – calculates the kinematic estimates of the fracture zone locations on the slab.

- Read in slabcontours_sa06.txt files
- Reads in ./Motion_PATHS/motion_path_output_00Ma.gmt using get_motion_paths.m helper script.
- Uses get_pts4fz.m to find the intersection between the fracture zones and the trench positions.
- Reads in FZ.mat which contains the fractures zone surface estimates from GPLATES
- Outputs text files with fracture zone locations.