SPiRaL global seismic velocity model, version 1.4

Reference
Simmons N. A., S. C. Myers, C. Morency, A. Chiang, and D. R. Knapp (2021). SPiRaL: A multi-resolution global tomography model of seismic wave speeds and radial anisotropy variations in the crust and mantle, *Geophysical Journal International*, https://doi.org/10.1093/gji/ggab277

MODEL INFORMATION
The SPiRaL model is a joint model of P- and S-wave speeds and vertical transverse isotropy (VTI) variations from the surface to the core. The data used to construct the model include millions of P- and S-wave travel times including crustal, regional, and teleseismic phases. We also incorporated surface wave constraints including Rayleigh and Love fundamental mode dispersion curves (phase and group velocities) from Ma et al. (2014) and Ma and Masters (2014). The model is parameterized using spherical tessellation grids and includes multiple crustal units (water, ice, sediments, and crystalline layers) which were part of the inversion. SPiRaL is a multi-resolution model with node spacing ranging from about 0.25 to 2 degrees and includes undulating surfaces including crustal and transition zone discontinuities.

See the reference above for more information and please direct any questions to simmons27@LLNL.gov

Surface wave references

Ma, Z., and G. Masters (2014). A New Global Rayleigh- and Love-Wave Group Velocity Dataset for Constraining Lithosphere Properties, Bull. Seism. Soc. Amer., 104, 2007-2026, doi: 10.1785/0120130320.

Ma, Z., G. Masters, G. Laske and M.E. Pasyanos (2014). A comprehensive dispersion model of surface wave phase and group velocity, Geophys. J. Int., 199, 113-135, doi: 10.1093/gji/ggu246

TESSELLATED MODEL FILES
The "Tessellated" version of the model is the full fidelity version (i.e. the actual model values at each model node).

Coordinates file
The coordinates file "SPiRaL_1.4.Tessellated.Coordinates.txt" contains 4 columns of geographic coordinates corresponding to the latitudes/longitudes of the points in the model files, with the same ordering.

The 4 columns in the coordinates file are:
1-Geodetic(geographic) Latitude
2-Longitude
3-Geocentric Latitude
4-Sealevel Radius (km)

Model files
Each model file corresponds to one surface in the SPiRaL model with the naming convention: "SPiRaL_1.4.Tessellated.Surface.{*n*}.{Surface Descriptor}.txt". The ordering of the points is the same as in the coordinates file. Note that the number of points (***NP***) varies in the model files due to the variable resolution scales. The model values in each file correspond to the first ***NP*** points in the coordinates file. Here is a breakdown of ***NP*** in each of the surface files:

Surfaces ***n***=1-19   ***NP***=67,052 nodes (rows) in each file
Surfaces ***n***=20-21   ***NP***=54,480 nodes (rows) in each file
Surfaces ***n***=22-33   ***NP***=40,962 nodes (rows) in each file
Surfaces ***n***=34-59   ***NP***=10,242 nodes (rows) in each file

The 7 columns in the model files are:
1-Radius (km)
2-Depth below sea level (km)
3-Vpv (km/s)
4-Vph (km/s)
5-Vsv (km/s)
6-Vsh (km/s)
7-Eta (unitless anisotropy term)