

## **BASIC INFORMATION:**

This README document describes the Digital Appendix containing the global P-wave velocity model (LLNL-G3Dv3) described and shown in the Journal of Geophysical Research paper #2012JB009525 entitled:

"LLNL-G3Dv3: Global P-wave tomography model for improved regional and teleseismic travel time prediction"

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The Digital Appendix includes 57 model files (1 file per layer) and 1 coordinates file for each of the formats including: 1) a regularly gridded version interpolated to a lat/lon grid, and 2) actual model points defined on the spherical tessellation grid described in the paper.

## **INTERPOLATED MODEL FILE DETAILS:**

The "Interpolated" model is interpolated to a regular lat/lon grid with 1-degree spacing. The first 361 rows are for -90 degrees latitude, the next 361 are for -89 degrees latitude, etc.

The coordinates file "LLNL\_G3Dv3.Interpolated.Coordinates.txt" contains 4 columns of coordinates corresponding to the location of the points in the model files, with the same ordering.

The columns in the coordinates file are:

[1-Geodetic(geographic) Latitude, 2-Longitude, 3-Geocentric Latitude, 4-Sealevel Radius (km)]

Each model file is named "LLNL\_G3Dv3.Interpolated.Layer{n}\_{Layer Descriptor}.txt" where "n" is the layer number from the top of Earth's surface to the core-mantle boundary. The "Layer Descriptor" often contains just the name of the layer (for example: "Lower\_Crust\_Bottom"). Others will have the depth if the model were spherical (for example: "Lower\_Mantle\_1271km"). In addition, some descriptors will have the nominal depth preceded by the letter "a" (for example: "Transition\_Zone\_a660km\_topside"). The "a" means "about" since these are actually undulating layers.

The columns in the model files are:

[1-Radius (km), 2-Absolute Vp (km/s), 3-Delta Vp (% variation relative to layer mean)]

## **TESSELLATED MODEL FILE DETAILS:**

The "Tessellated" model is the velocity values defined exactly at the nodes defined by the spherical tessellation grid with a nominal spacing of 1 degree in the crust and upper mantle and 2 degrees in the lower mantle.

The coordinates file "LLNL\_G3Dv3.Tessellated.Coordinates.txt" contains the coordinates of the tessellation grid, with the same column definitions as the "Interpolated" version. The ordering of the points is dictated by the occurrence of new points defined during the recursive subdivision process.

Each model file is named "LLNL\_G3Dv3.Tessellated.Layer{n}\_{Layer Descriptor}.txt" just as with the "Interpolated" version. One caveat is that the "Lower\_Mantle" layers have fewer points owing to the lower resolution limit relative to the crust and upper mantle (2 degree spacing rather than 1). The ordering of the points is the same as the coordinates file, but only the first 10242 coordinates are needed for these layers.

## **LAYER AVERAGES:**

The layer average file "LLNL\_G3Dv3.LayerAverages.txt" contains 4 columns:  
[1-Layer #, 2-Average Layer Radius, 3-Average Layer Depth Below Sea Level, 4-Average Vp]

## **IMPORTANT NOTES:**

\*Latitudes are geodetic (geographic), opposed to geocentric.

\*Note that the water layer and other crustal layers will have negative depths (above sealevel). This is due to the pinching out of the layers onto land which is above sealevel.

\*Note that some precision may be lost due to interpolation to a regular grid. Therefore, detailed travel time measurements may differ from those calculated in the development of the model if the "Interpolated" version is used for that purpose.

\*Depths to the model points may be approximated by taking Sealevel Radius (in the coordinates file) minus the layer radius (in the model files).

\*See the paper for more details.

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