



Update on CRUST1.0 - A 1-degree Global Model of Earth's Crust

Gabi Laske (1), Guy Masters (1), Zhitu Ma (1), and Mike Pasyanos (2)

(1) SIO, UCSD, IGPP-0225, La Jolla, United States (GLASKE@UCSD.EDU, 001 858-534 5332), (2) Lawrence Livermore National Laboratory, Livermore, CA, United States

Our new 1-by-1 degree global crustal model, CRUST1.0, was introduced last year and serves as starting model in a comprehensive effort to compile a global model of Earth's crust and lithosphere, LITHO1.0 (Pasyanos et al., 2012). The Moho depth in CRUST1.0 is based on 1-degree averages of a recently updated database of crustal thickness data from active source seismic studies as well as from receiver function studies. In areas where such constraints are still missing, for example in Antarctica, crustal thicknesses are estimated using gravity constraints.

The compilation of the new crustal model initially followed the philosophy of the widely used crustal model CRUST2.0 (Bassin et al., 2000; <http://igppweb.ucsd.edu/~gabi/crust2.html>) to assign elastic properties in the crystalline crust according to basement age or tectonic setting (loosely following an updated map by Artemieva and Mooney (2001; <http://www.lithosphere.info>). For cells with no local seismic or gravity constraints, statistical averages of crustal properties, including crustal thickness, were extrapolated. However, in places with constraints the depth to basement and mantle are given explicitly and no longer assigned by crustal type. This allows for much smaller errors in both.

In each 1-degree cell, boundary depth, compressional and shear velocity as well as density is given for 8 layers: water, ice, 3 sediment layers and upper, middle and lower crystalline crust. Topography, bathymetry and ice cover are taken from ETOPO1. The sediment cover is based on our sediment model (Laske and Masters, 1997; <http://igppweb.ucsd.edu/~sediment.html>), with some near-coastal updates. In an initial step toward LITHO1.0, the model is then validated against new global surface wave dispersion maps and adjusted in areas of extreme misfit. This poster presents the next validation step: compare the new Moho depths with in-situ active source and receiver function results. We also present comparisons with CRUST2.0. CRUST1.0 is available for download.

References:

Pasyanos, M.E., Masters, G., Laske, G. and Ma, Z., LITHO1.0 – An Updated Crust and Lithospheric Model of the Earth Developed Using Multiple Data Constraints, Abstract T11D-09 presented at 2012 Fall Meeting, AGU, San Francisco, Calif., 3-7 Dec, 2012.

Artemieva, I.M. and Mooney, W.D., Thermal thickness and evolution of Precambrian lithosphere: A global study, *J. Geophys. Res.*, 106, 16,387-16,414, 2001.

Bassin, C., Laske, G. and Masters, G., The Current Limits of Resolution for Surface Wave Tomography in North America, *EOS Trans AGU*, 81, F897, 2000.

Laske, G. and Masters, G., A Global Digital Map of Sediment Thickness, *EOS Trans. AGU*, 78, F483, 1997.

URL: <http://igppweb.ucsd.edu/~gabi/crust1.html>