HyMaTZ: a graphical Python program for calculating seismic velocities in a hydrous mantle transition zone

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Mapping the spatial distribution of water in the mantle transition zone may be approached by combining mineral physics data with regional seismic studies. We have written a Python program, HyMaTZ (Hydrous Mantle Transition Zone), which allows the user to adjust and display predicted seismic velocities for different scenarios of hydration in the transition zone. After choosing a compositional model to work with (e.g. pyrolite, harzburgite, or various mixtures), the user can test the influence of water by applying experimental or theoretical constraints on how water influences the elastic moduli of Mg_2SiO_4 polymorphs. One can also specify the water-depth profiles. Adiabatic temperature profiles that are internally consistent with the phase proportion model are applied. The program also makes available different polycrystalline averaging schemes. While HyMaTZ is primarily a visualization tool to interactively evaluate the effect of various mineralogic models on seismic velocities and compare these results to global and regional velocity models, the output can also be exported for use in other programs to make custom figures and plots.