Abstract. Intraplate deformation is, by definition, unexplained by plate tectonics. Because intraplate strain rates are relatively small, dominant intraplate strain rates driving observed deformation can arise from a number of different, non-mutually exclusive, sources. Driving processes include, but are not necessarily limited to, gravitational potential energy variations, glacial-isostatic adjustment, and tectonics at the base of the lithosphere. These forces are long suggested to contribute to plate motion as well as intraplate stresses. Any asthenospheric asthenospheric flow field will contribute to plate driving or resisting, depending on whether asthenospheric flow is leading or lagging the overlying plate. Stationary flows that are also spatially variable will induce stresses requiring differential stresses on the overlying lithosphere. One overdeepened driver of asthenospheric flow at the asthenosphere-lithosphere boundary that could have implications for geodynamics is the oceanic asthenosphere.

In a manner similar to an ascap on a continent, the addition of ocean mass on top of subsiding lithosphere drives a small degree of flow in the asthenosphere to accommodate the oceanic mass accumulated on top. Typically, oceanic lithosphere is understood to cool and subside away from mid ocean ridges to a Pratt-like isostasy condition. However, the presence of seawater added on top of subsiding lithosphere necessitates asthenosphere flux is variable, but systematic across the plate. The flow rate peaks beneath seafloor of about one-quarter the plate age and decreases with age for seafloor older than the cross-over age.

Compressive or Extensive Intraplate Stress. Asthenospheric flow drives oceanic lithosphere from young to old seafloor. For younger seafloor, the maximum flow rate peaks at cross-over ages in the seafloor is extremely variable. The histogram to the right shows counts of normal, reverse, and strike-slip data on normalized age of the seafloor. Normalized age in the seafloor age for the maximum age in the particular spreading corridor (see intraplate stress data走廊); most of the data of any type come from young seafloor. However, the overall distribution differs with extensive data much more prominent on young seafloor and compressional data having a larger presence on old seafloor. The graph of right shows the state of the natural and extended a histogram to the right shows the state of the natural and extended oceanic isostasy (Conder, 2012). Because fluid immediately fills any gap created typically viewed as a static process. However, cooling and contraction in the presence of a fluid ocean with non-negligible mass necessitates asthenosphere is leading or lagging the overlying plate. Stationary flows that are also spatially variable will induce tractions imparting differential stress on the overlying lithosphere. One overdeepened driver of asthenospheric flow at the asthenosphere-lithosphere boundary that could have implications for geodynamics is the oceanic asthenosphere.

Seafloor spreading corridors and data ages. The age of seafloor associated with each box is found using the seafloor age compilation of Muller et al. (2008). The age of oldest seafloor on the particular seafloor corridor is the midpoint between the last two observations. The box plot to the right shows the location of the oldest seafloor on the particular seafloor corridor and partial local direction of spreading.

Intraplate Normal Faulting

Intraplate Reverse Faulting

Intraplate Strike-Slip Faulting

References