

## CAPTIONS FOR SUPPLEMENTAL MOVIES

TO ACCOMPANY THE THESIS ENTITLED:

“USING EARTH DEFORMATION CAUSED BY SURFACE MASS LOADING TO CONSTRAIN  
THE ELASTIC STRUCTURE OF THE CRUST AND MANTLE”

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**Movie S1.** Global distribution of the  $M_2$  tide from the FES2012 ocean-tide model [Lyard et al., 2006, Carrère et al., 2012].

**Movie S2.** Global distribution of the  $O_1$  tide from the FES2012 ocean-tide model.

**Movie S3.** Global distribution of the  $M_f$  tide from the FES2012 ocean-tide model.

**Movie S4.** Global distribution of the  $M_2$  tide from the FES2012 ocean-tide model, with the vertical-displacement component of Earth’s elastic deformation response to loading by the  $M_2$  ocean tide shown over the continents. The deformation response was computed based on an oceanless, elastic, and isotropic version of PREM [Dziewonski and Anderson, 1981].

**Movie S5.** Observed (left) and predicted (right) displacement responses to surface mass loading by the  $M_2$  ocean tide for a network of GNSS receivers in South America. The predictions were derived by convolving load Green’s functions from PREM with an ocean-tide model from FES2012. The observed displacements were estimated using the GIPSY software [Zumberge et al., 1997]. The displacement at each GNSS receiver is shown as a particle motion ellipse (PME), with the horizontal displacements denoted by the size and shape of the ellipse and the vertical displacements denoted by the color of the ellipse. The black lines show the phase of the horizontal displacement response, relative to the equilibrium tide at the Greenwich Meridian. The ellipses outlined in cyan indicate stations that recorded fewer than 1000 days of data.

**Movie S6.** Observed (left) and residual (right) displacement responses to surface mass loading by the  $M_2$  ocean tide for a network of GNSS receivers in South America. Receivers directly adjacent to the Patagonian shelf and Amazon river delta have been excluded. Furthermore, receivers that recorded fewer than 1000 days of data have also been excluded. The residuals represent the vector differences between the observed displacement responses and the predicted displacement responses, which were derived by convolving load Green’s functions from PREM with an ocean-tide model from FES2012. The displacement at each GNSS receiver is shown as a PME, with the horizontal displacements denoted by the size and shape of the ellipse (black lines show the phase relative to Greenwich). The vertical displacements are denoted by the color of the ellipse.

**Notes.** Additional details may be found in the main thesis document. In particular, Ch. 3 discusses the GNSS processing, Ch. 4 discusses the methods for predicting the load-induced displacement response, and Ch. 7 discusses a case study for South America.

## References

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