

Zürich, August 10, 2019.

The files stored with this Readme file contain modeling results from the study "Tidal Response of Mars Constrained from Laboratory-based Viscoelastic Dissipation Models and Geophysical Data" by Bagheri et al. (2019).

Data used to plot Figure 3 from Bagheri et al. (2019) are stored in the folder *G\_Q*. Figure 3 can be reproduced by running the matlab script `plot_compare.m`. The files `Andrade_period.dat`, `Burgers_period.dat`, `PL_period.dat`, `SC_period.dat`, and `Maxwell_period.dat` contain the values used to plot Figures 3a and 3b of Bagheri et al. (2019), i.e. the period dependency of the shear modulus and quality factor. Columns are ordered as:  $\log_{10}(T/T_0)$ , relaxed shear modulus, and  $-\log_{10} Q$ .

The files `burgers_temperature.dat`, `Andrade_temperature.dat`, `Maxwell_temperature.dat`, `SC_temperature.dat`, and `PL_temperature.dat` contain the data used to plot Figures 3c and 3d. Columns are ordered as: temperature, relaxed shear modulus, and  $-\log_{10} Q$ .

The files `Andrade_grain.dat`, `Burgers_grain.dat`, `PL_grain.dat`, `SC_grain.dat`, and `Maxwell_grain.dat` contain the grain-size dependency of the shear modulus (used in Figures 3e and 3f). Columns are ordered as:  $\log_{10}(d_g/d')$ , relaxed shear modulus, and  $Q$  factor.

For the posterior probability of the model parameters, we have put the .fig version of the plots produced by matlab in the folder `model_parameters`. Note that each color in the figures is associated with one of the rheological models and this is consistent among all the plots (legend only shown in `dlit.fig`).

The profiles of the elastic and dissipative properties are put in the folder `models`. Only the best fitting models based on each of the rheological models are provided. Columns are ordered as: radius (m), density ( $\text{kg/m}^3$ ), bulk modulus (GPa), complex shear modulus (GPa), relaxed shear modulus (GPa), temperature ( $^{\circ}\text{C}$ ), and pressure (Pa). The model parameters used to generate the models and the associated synthetics are also provided in the same folder in separate files.

Use of these models in any publications should cite: ...