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# Data for “Moonquake-Triggered Mass Wasting Processes on Icy Worlds”, Mills et al. 2022

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## # Summary

Data for "Moonquake-Triggered Mass Wasting Processes on Icy Worlds" is a collection of datasets used in the associated publication. This collection has the following files/folder order: "ArcGIS", "AxiSEM", "Dione", "Enceladus", "Europa", "Figures", "Ganymede", "Python Code".

## # File description

– “ArcGIS”: It contains a subfolder of each satellite (“Dione”, “Enceladus”, “Europa”, Ganymede”) which contains the mapped data (an .mxd file) and the GIS geodatabase folders (i.e. “Heaves.gdb”) required to load the map and feature classes. The folders (and .mxd files) need to be linked to the “ArcGIS scratch” folder which also contains some geodatabases. Also, any images (listed in Table 1 in the publication) or DTMs (also listed in the publication) need to be downloaded and linked separately.

– “AxiSEM”: This subfolder contains datasets produced using the AxiSEM/Instaseis packages applied to the icy satellite structural models from PlanetProfile. There are four datasets (Enceladus, Europa: 5 km, Europa: 20 km, Ganymede) and each has two copies: a .csv version and an .xlsx version. Each file has the following columns of the model seismic data: distance (from epicenter of modeled quake), PGV vertical (Peak Ground Velocity, vertical component), PGV horizontal (Peak Ground Velocity, horizontal component), PGV max (Peak Ground Velocity, maximum), PGA vertical (Peak Ground Acceleration, vertical component), PGA horizontal (Peak Ground Acceleration, horizontal component), PGA max (Peak Ground Acceleration, maximum).

– “Dione”: This subfolder has two parts. The first is “Dione\_Beddingfield\_ScarpLabels.xlsx”, which identifies the endpoints of the scarps studied by Beddingfield et al. (2015). The endpoints were necessary to accurately reproduce the mapped profiles in ArcGIS in the correct order. The second part is “Dione.xlsx”. This Excel file contains all data (i.e. measured surface dimensions from ArcGIS files, spacecraft viewing angles at the transects, associated estimated throw from topography transects, etc.) for the scarps studied on Dione. Each scarp (A-D) is represented by a separate sheet.

– “Enceladus”: This subfolder contains “Enceladus.xlsx”. This Excel file contains all data (i.e. measured surface dimensions from ArcGIS files, spacecraft viewing angles at the transects, associated estimated throw from topography transects, etc.) for the scarps studied on Enceladus. Each scarp (A-G) is represented by a separate sheet.

– “Europa”: This subfolder has three parts. The first part is “Europa.xlsx”. This Excel file contains all data (i.e. measured surface dimensions from ArcGIS files, spacecraft viewing angles at the transects, associated estimated throw from topography transects, etc.) for the scarps studied on three sites on Europa. Each scarp (A-K, Katreus, Manannan) is represented by a separate sheet. The second part is the subfolder entitled “GIS Transects”. This contains the GIS files (various shape files beginning with “Heaves...”) and GIS map file (“Europa\_Transects.qgs”) which record the topography transect locations taken for this satellite. Also in the folder are the topography transect locations as x and y arrays (in an Excel file entitled “Europa\_ScarpTransects.xlsx”). Again, each sheet represents a studied scarp. Finally, the third part is “Shadows.xlsx”. This contains the measured scarp parameters used for shadow scarp calculations (i.e. measured shadow surface length, spacecraft viewing angles at the transects, solar angles, etc.).

– “Figures”: This folder contains the figures included in the associated publication (“Paper Figures” subfolder) and those in the published supplementary material (“Supplement Figures” subfolder). In the “Paper Figures” subfolder, there is another subfolder entitled “Figure 8 data”. This has the Figure 8 labeled topography transect locations as x and y arrays (in an Excel file) and transect profile images which were used to create Figure 8.

– “Ganymede”: This subfolder has three parts. The first part is “Ganymede.xlsx”. This Excel file contains all data (i.e. measured surface dimensions from ArcGIS files, spacecraft viewing angles at the transects, associated estimated throw from topography transects, etc.) for the scarps studied on Ganymede. This first Excel dataset assumes the smooth areas of scarps are the faces. Each scarp (A-H) is represented by a separate sheet. The second part is the subfolder entitled “GIS Transects”. This contains the GIS files (various shape files beginning with “Heaves...”) and GIS map file (“Ganymede\_Transects.qgs”) which record the topography transects taken for this satellite. Also in the folder are the topography transect locations as x and y arrays (in an Excel file entitled “Ganymede\_ScarpTransects.xlsx”). Again, each sheet represents a studied scarp. Finally, the third part is “ScarpFaceComparison.xlsx”. This contains the measured scarp parameters (i.e. measured surface dimensions from ArcGIS files, spacecraft viewing angles at the transects, associated estimated throw from topography transects, etc.). This second Excel dataset assumes the striated areas of scarps are the faces, and is used to compare to the first file here, “Ganymede.xlsx”, for scarp structural analysis. Again, each sheet represents a studied scarp. The first sheet of this file, “All-Ganymede” contains all six scarp data combined into one sheet.

– “Python Code”: This contains the Python code created for this project. It is available as a Jupyter Python Notebook (Mills\_et\_al\_MoonquakeCode.ipynb).