Supporting Information for

Finding order in chaos:
Quantitative predictors of chaos terrain morphology on Europa

E. J. Leonard¹, S. Howell¹, A. Mills², D. A. Senske¹, D. A. Patthoff³, H. C. F. C. Hay¹, R. T. Pappalardo¹

¹Jet Propulsion Laboratory, California Institute of Technology, ²University of Alabama, ³Planetary Science Institute

Corresponding Author – Erin Leonard (Erin.J.Leonard@jpl.nasa.gov)

Contents of this file

Figure S1
Figure S2
Table S1

Additional Supporting Information (Files uploaded separately)

Captions for Dataset S1

Introduction

We provide two Figures, a Table, and a Dataset to complement the contents of the manuscript.

Figure S1 shows the mapping of the chaos terrains on the Leading and Trailing Hemispheres of Europa.

Figure S2 shows the histogram of chaos block sizes for each chaos terrain that we mapped.

Table S1 contains the information on the images we used for mapping the chaos terrains.

Dataset S1 is a text file that contains the total area (km²) of each mapped chaos terrain and the area (km²) of every block we mapped within each chaos terrain.
Figure S1. The unmapped images (left) and the mapped chaos terrains borders and chaos blocks (right) on the Leading Hemisphere (top) and Trailing Hemisphere (bottom). See Figure 1 in the main text for context and labels.
Figure S2. Histograms for the number of blocks mapped within each chaos terrain, binned in intervals of 0.5 km of characteristic length (square-root of the block area). The colors of the bars correlate to the chaos terrains in Fig. 2. Note the general trend of highest number of blocks in the smallest bin.
Table S1: Information on images used for mapping

| Observation ID         | Image Number | Image Resolution (m/pixel) | Incidence Angle (deg) | Emission Angle (deg) | Phase Angle (deg) |
|------------------------|--------------|----------------------------|-----------------------|----------------------|-------------------|
| 15ESREGMAP02           | 15ESREGMAP02 | 4301 (0449974301)          | 264                   | 75                   | 32                |
|                        | 15ESREGMAP02 | 4313 (0449974313)          | 251                   | 82                   | 32                |
|                        | 15ESREGMAP02 | 4326 (0449974326)          | 270                   | 74                   | 38                |
|                        | 15ESREGMAP02 | 4339 (0449974339)          | 256                   | 81                   | 34                |
|                        | 15ESREGMAP02 | 4352 (0449974352)          | 278                   | 74                   | 44                |
|                        | 15ESREGMAP02 | 4366 (0449974366)          | 259                   | 82                   | 46                |
|                        | 15ESREGMAP02 | 4378 (0449974378)          | 286                   | 75                   | 51                |
|                        | 15ESREGMAP02 | 4401 (0449974401)          | 268                   | 82                   | 55                |
|                        | 15ESREGMAP02 | 4413 (0449974413)          | 312                   | 75                   | 61                |
|                        | 15ESREGMAP02 | 4427 (0449974427)          | 257                   | 87                   | 59                |
|                        | 15ESREGMAP02 | 4439 (0449974439)          | 322                   | 68                   | 52                |
| 17ESREGMAP01           | 17ESREGMAP01 | 4165 (0466664165)          | 230                   | 81                   | 22                |
|                        | 17ESREGMAP01 | 4166 (0466664166)          | 230                   | 81                   | 22                |
| 17ESNERTRM01           | 17ESNERTRM01 | 4552 (0466664552)          | 215                   | 81                   | 17                |
|                        | 17ESNERTRM01 | 4565 (0466664565)          | 215                   | 81                   | 13                |
| 11ESREGMAP01           | 11ESREGMAP01 | 9200 (0420619200)          | 222                   | 75                   | 16                |
|                        | 11ESREGMAP01 | 9213 (0420619213)          | 222                   | 81                   | 23                |
|                        | 11ESREGMAP01 | 9226 (0420619226)          | 222                   | 74                   | 16                |
|                        | 11ESREGMAP01 | 9239 (0402610239)          | 221                   | 80                   | 23                |
| E6ESDRKLN01            | E6ESDRKLN01  | 3700 (0383713700)          | 248                   | 82                   | 47                |
|                        | E6ESDRKLN01  | 3701 (0383713701)          | 248                   | 82                   | 47                |
|                        | E6ESDRKLN01  | 3713 (0383713713)          | 249                   | 82                   | 45                |
|                        | E6ESDRKLN01  | 3726 (0383713726)          | 251                   | 83                   | 45                |
|                        | E6ESDRKLN01  | 3739 (0383713739)          | 221                   | 76                   | 41                |
|                        | E6ESDRKLN01  | 3752 (0383713752)          | 222                   | 76                   | 39                |
|                        | E6ESDRKLN01  | 3765 (0383713765)          | 224                   | 77                   | 38                |

Dataset S1. Shapefiles for each of the chaos blocks mapped and the borders of each chaos region mapped. The text file contained raw data of the area of each block mapped and total chaos area. The dataset is contained at: https://doi.org/10.5281/zenodo.6338798.