**Abstract**

We are working to generate a census of craters across most large Saturnian satellites with the goal to better understand the origin(s) of the crater populations: the exosystem impactors (mostly comets), intra-system impactors (sesquinary craters), and secondary ejecta impactors (secondary craters). We present our approach to processing the data, our results for Mimas, and our results to-date for Rhea. This is inherently a comparative planetology investigation, so our results to-date are a report of the crater population and preliminary interpretation.

**Comparison of Crater Populations**

- Mimas is more heavily saturated than Rhea.
- Rhea’s spatial density of large (D > 50 km) impacts is larger than Mimas’.
- Mimas’ population of smaller (D < 10 km) craters decreases rapidly relative to Rhea’s.
- Rhea’s larger surface gravity retains faster-moving ejecta that makes small secondaries which may be why Rhea has more smaller craters than Mimas.

**Potential Scenario**

- Secondary craters require a minimum velocity to form which may be greater than the escape velocity of the moon, e.g., Mimas.
- Below that corresponding diameter, no secondaries will be present.
- Largest craters may show production population beyond saturation.
- Rhea and Mimas are the largest and smallest end-members for spherical Saturnian satellites without atmospheres.

**Methods**

- **Images:**
  1. Cassini ISS “clear” and “green” filter images with resolutions ≤1 km/px were downloaded from PDS.
  2. Processed in USGS’s ISIS using standard radiometric and geometric corrections, and the default SPICE kernels.
  3. Output in equiangular projection, and north or south polar if the image extended >±50° latitude.
  4. Imported into ESRI’s ArcMap software, sorting by best resolution within individual “flyby shooting” sequences. This and the following steps were done in different files for each map projection.
  5. Georectified individual images to latest basemaps [1].
  6. Using highest spatial resolution images first, iteratively mapped footprints of usable portions of each image. This takes into account smear due to off-nadir pointing, incidence angle, data dropouts, and image quality.

- **Data Analysis:**
  A) Standard size-frequency analysis for craters from each individual image.
  B) Grouped images by using natural breaks in image pixel scale sets to create aggregate size-frequency distributions (shown for Mimas, not Rhea).
  C) We are examining spatial distributions globally, across each satellite.
  D) We are examining spatial distributions relative to large impact structures for both crater erasure and secondary craters.

**References & Acknowledgments**


**Conclusions & Future Work**

- Mimas’ crater counts generally agree with published work that covered more limited areas.
- Rhea’s larger diameter retains faster-moving ejecta that makes small secondaries, potentially explaining the observed difference at small diameters.
- Many of the small, unclustered craters on Rhea may be “background” secondaries [3,4].
- Continuing to identify craters on ≤1 km/px Rhea images, then on to Iapetus!

Find our ePoster online: http://www.lpi.usra.edu/meetings/lpsc2015/eposter/1654.pdf