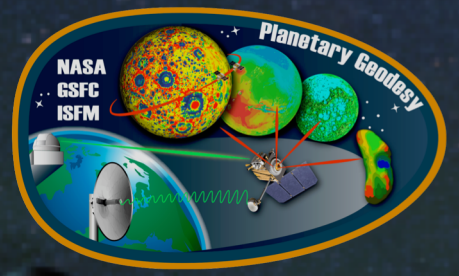
Improving the geometry of the Kaguya data with GRAIL and LOLA



Team:

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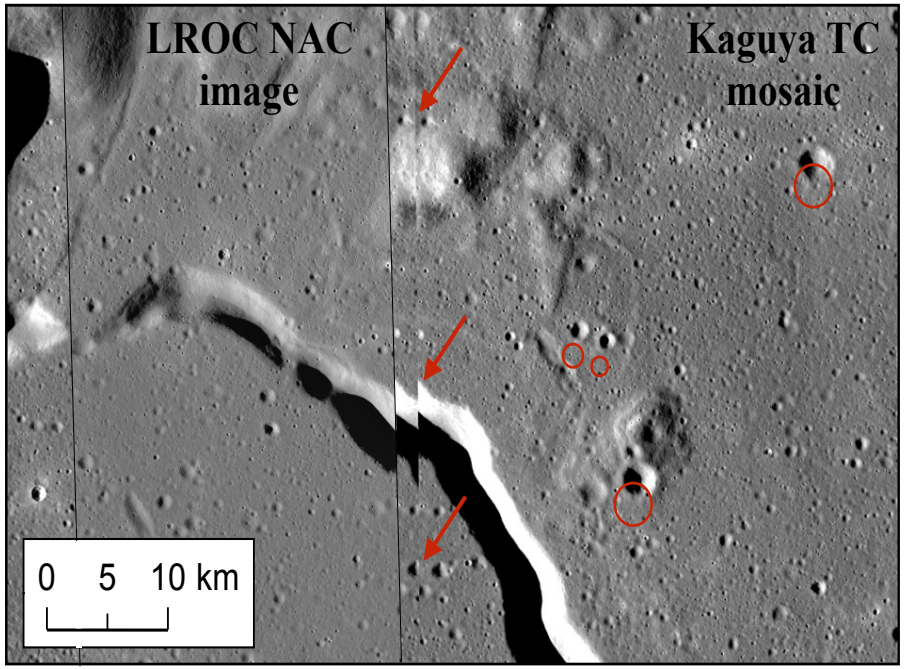
In collaboration with USGS (Lisa Gaddis, Brent Archinal, Trent Hare)

Short Summary

- Kaguya data are very useful (e.g., as context data) but extended mission data have poor geolocation
- We use GRAIL gravity fields and a novel data type (fitting Kaguya laser altimetry with a high-resolution, high-precision LOLA basemap)
- We can improve the Kaguya extended mission geolocation from several km to a few tens of meters, improving the geolocation precision with several orders of magnitude
- We will create a test mosaic of the Hadley Rille region using Terrain Camera data. Orbit products will be archived for public use.

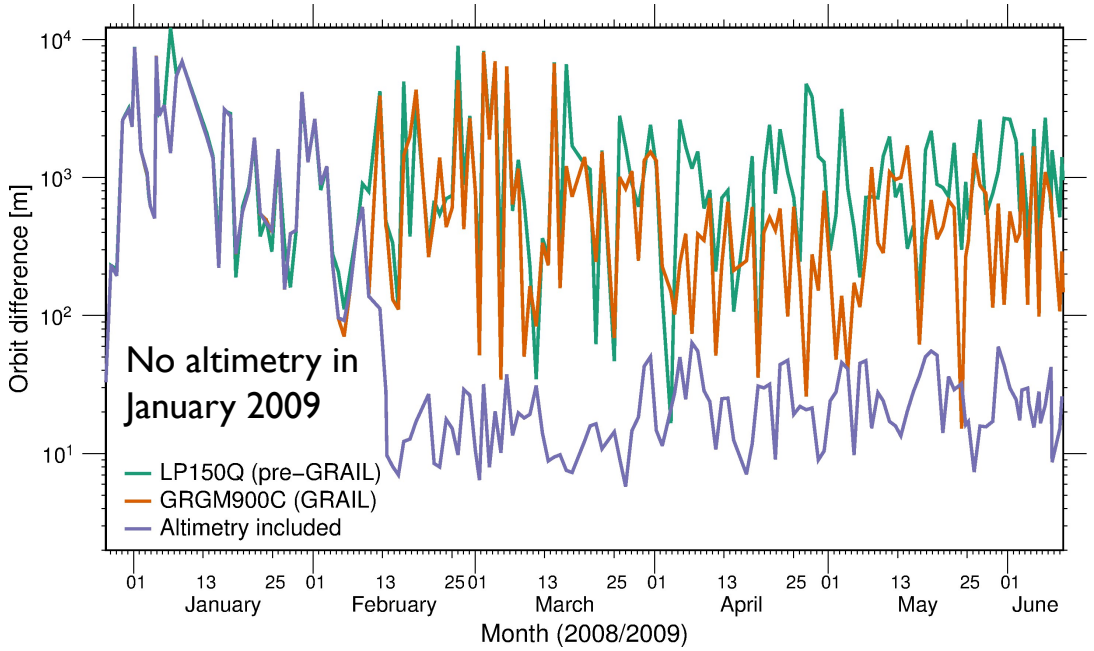
Duration of Award: April 2018 – March 2021



The currently archived orbits for Kaguya (and attitude) result in **geolocation errors** (circles) **and mosaic seams** (arrows).

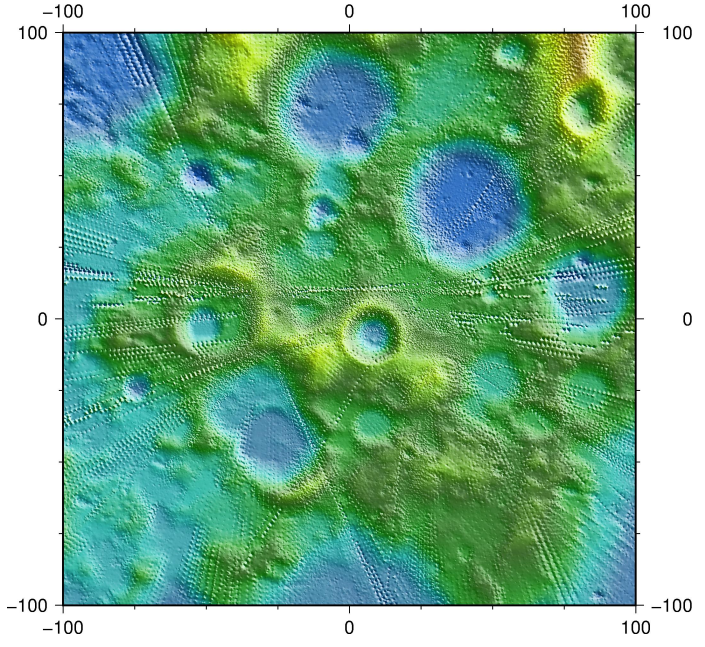
Major Findings or Results

Extended mission orbits for Kaguya are greatly improved

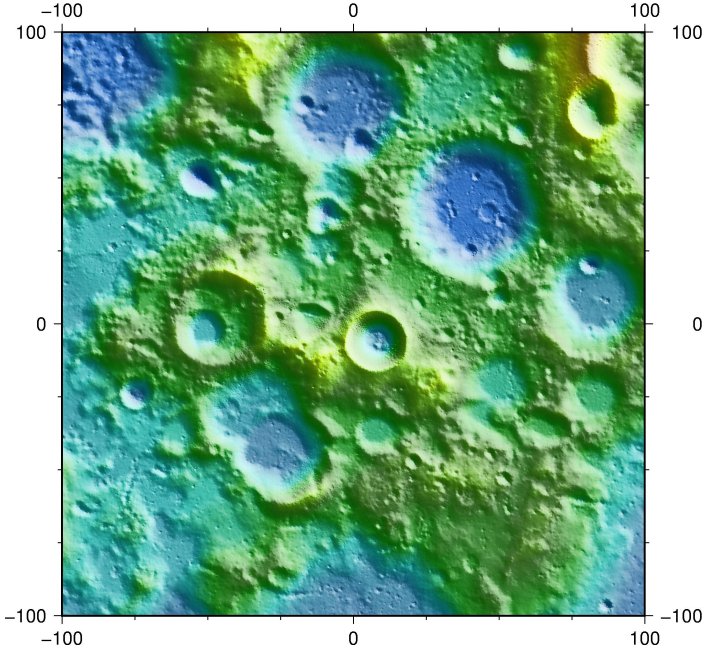


Orbit overlap differences (measure of precision) show consistent and much improved orbits

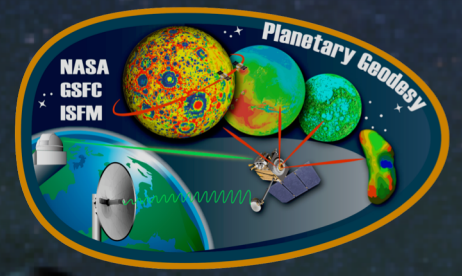
New improved orbits result in improved geolocation of Kaguya data sets.



South pole altimetry with **old** orbits



South pole altimetry with **new** orbits: **no noisy tracks!**



Metrics Delivered

- Project overview presented at the LPSC 2018 meeting in March 2018
- Updated results presented at the COSPAR 2018 meeting in July 2018
- Result of ROSES PDART proposal, with no funds required for Goossens and Mazarico
- Orbit products, test mosaic, new camera models, and Kaguya data sets with updated geolocation (altimetry, magnetic data) will be publicly archived
- New collaborations with USGS, ASU, ongoing collaboration with JAXA
- Future work:
  - Same technique can be applied to Clementine
  - With improved geolocation, extended mission Kaguya Terrain Camera data can be combined with LOLA data to update lunar DEM models