



OSIRIS-REx

Asteroid Sample Return Mission

OSIRIS-REx™
ASTEROID SAMPLE RETURN MISSION

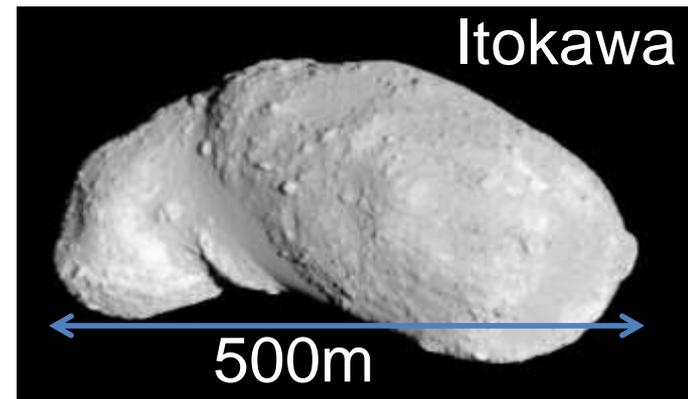
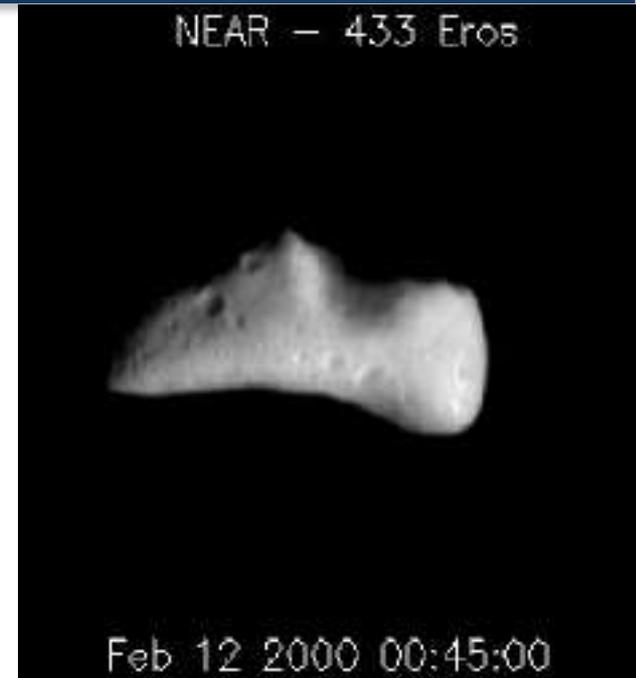
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Altimetry Lead and Co-Investigator





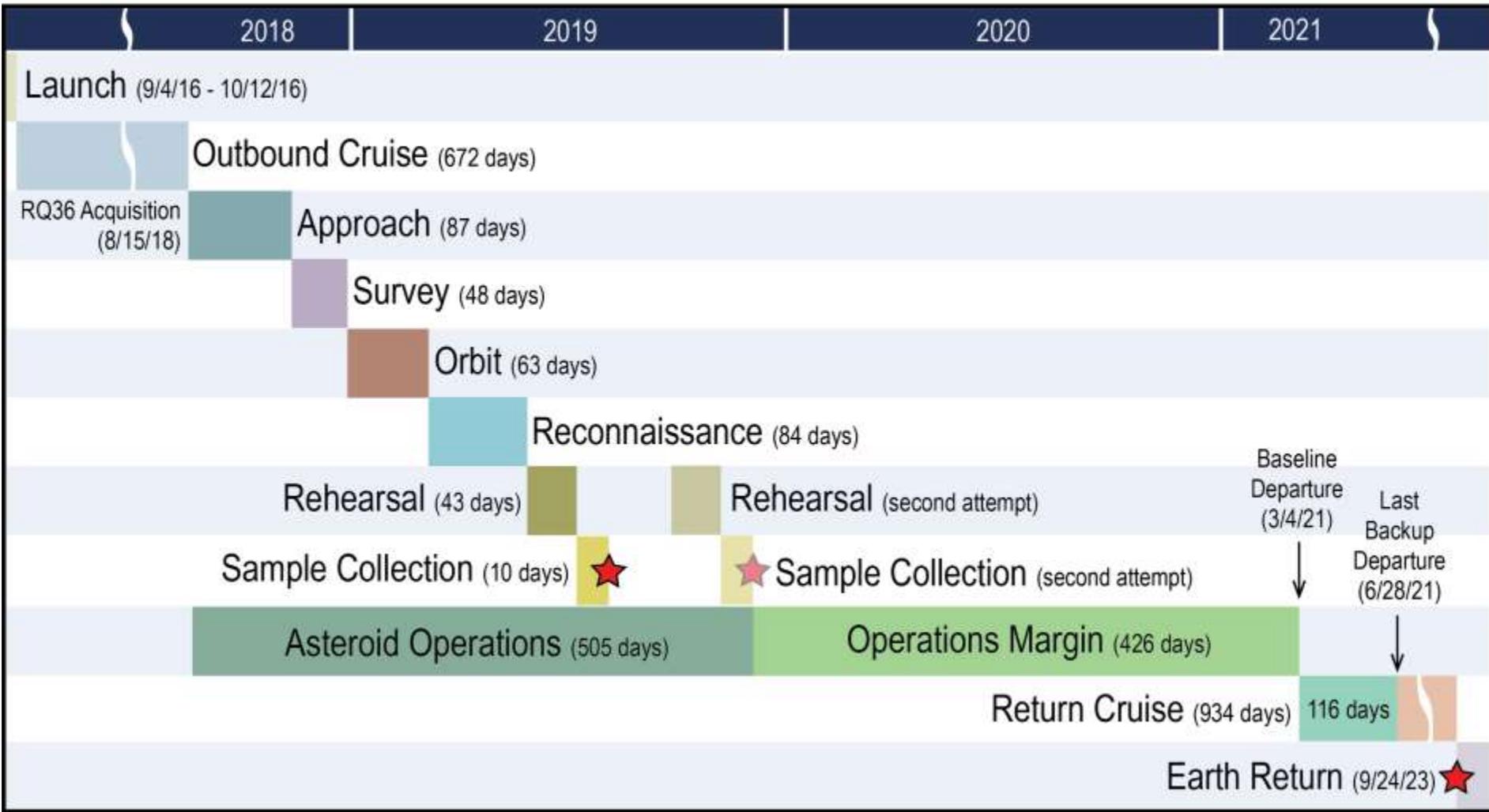
Sample Return

- Following NEAR and Hayabusa
 - Next 'leap' is to collect a large sample to analyze origin and evolution of asteroid in great detail
- OSIRIS-REx is first to sample a 'B-type' asteroid
 - Survey
 - Imaging
 - Laser altimetry
 - Remote sensing
 - Collect sample safely
 - Return sample to Earth
- **All enabled because gravity is small!**





Timeline



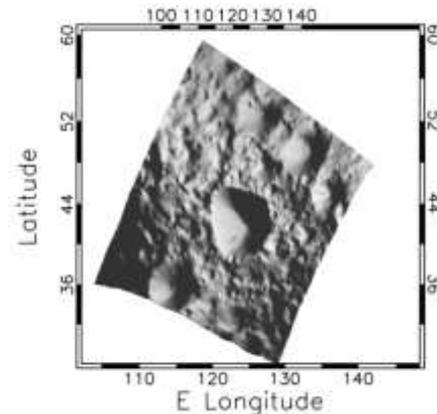
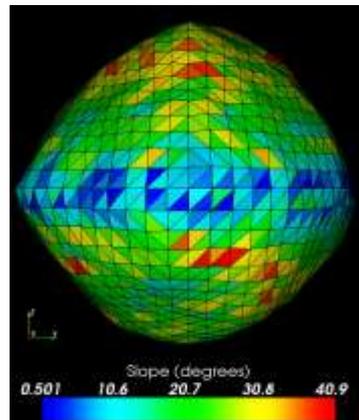
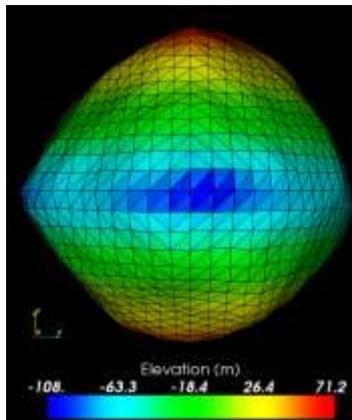


Mission overview



Challenge: Quickly Generate Global Shape and Topography

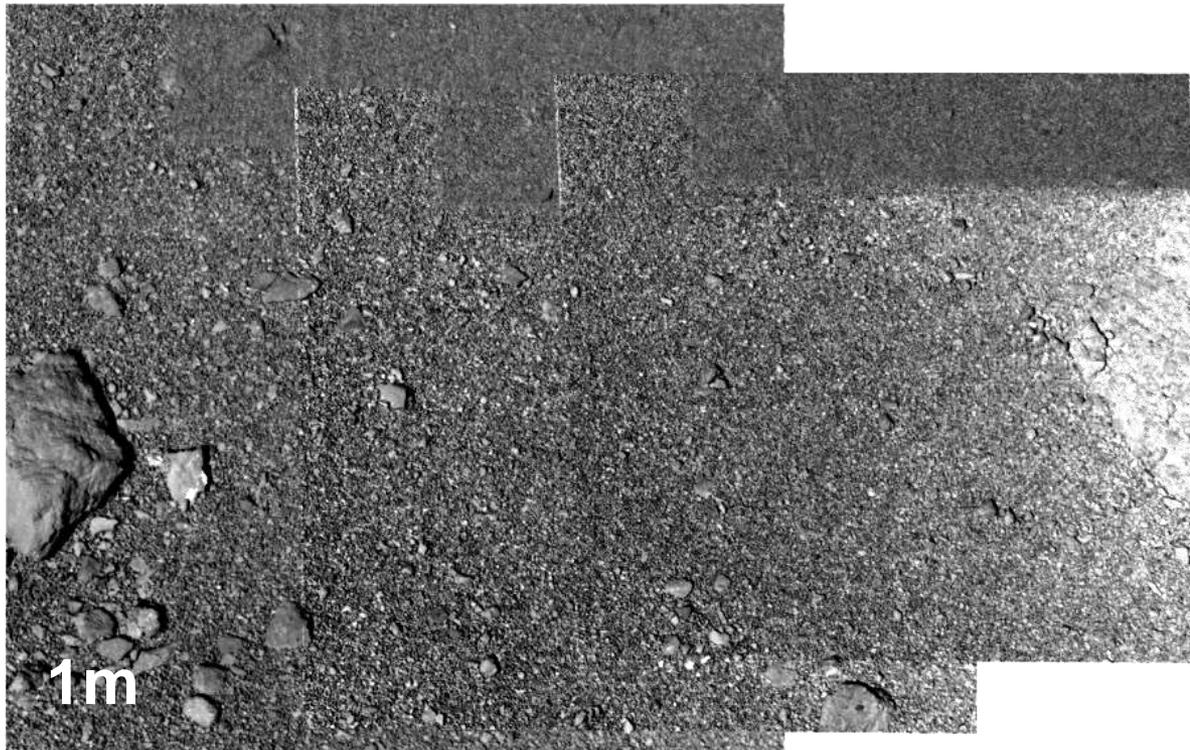
- Global scale
 - Determine mass and shape of asteroid within a few months
 - Optimize mission success by providing asteroid shape and mass
 - Understand and measure the dominant surface processes that affect sample site
 - **Need data globally at 1 meter or better** to obtain asteroid shape, volume, total mass, mass distribution, bulk density, porosity, rotation state





Assess a Safe Site for Sampling

- Sample-site scale
 - Provide quantitative measure of hazards
 - Characterize local geological and geophysical context
 - **Requires centimeter-scale resolution** to characterize processes





Properly Engineer Sampling

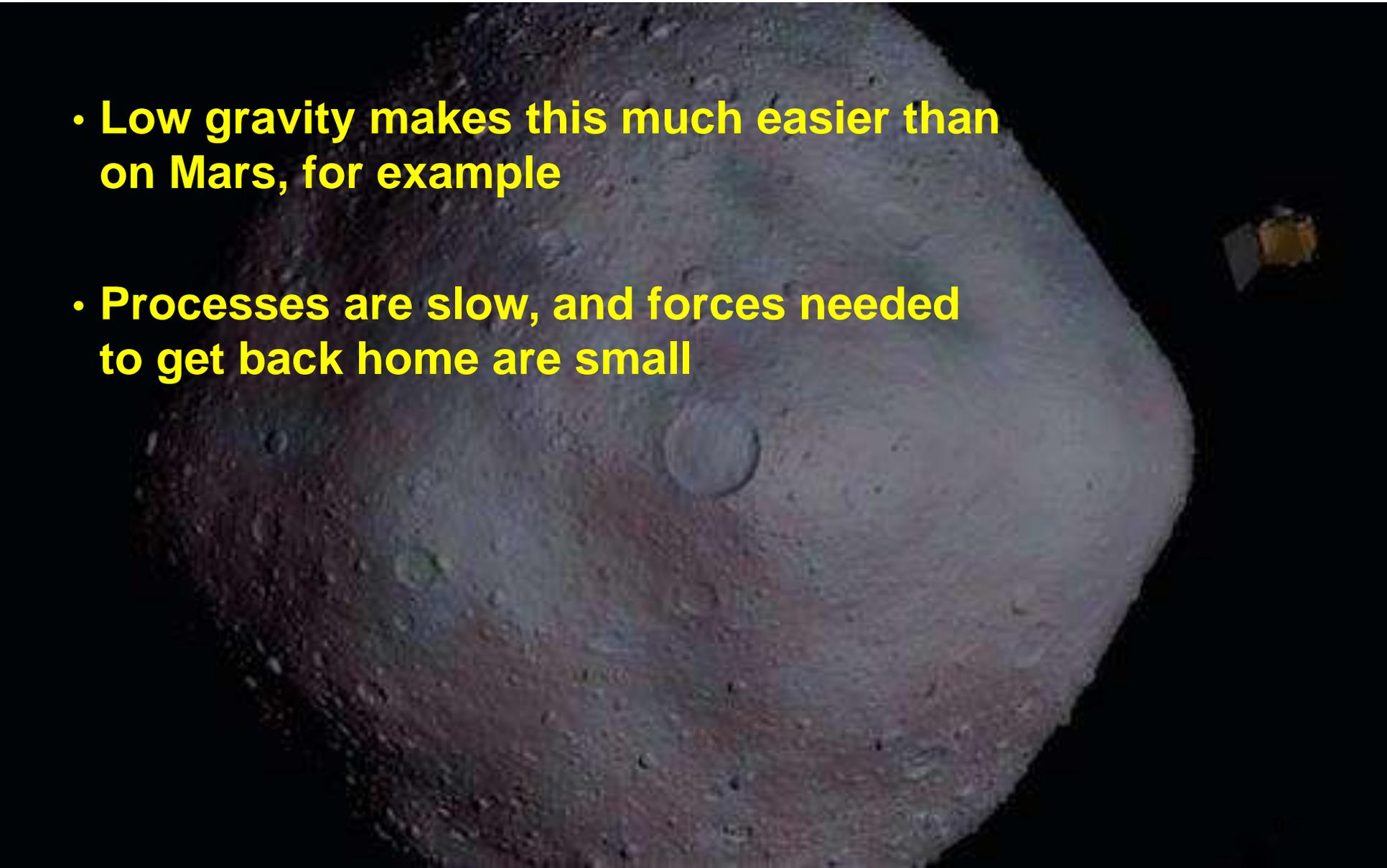
- Match spacecraft speed to asteroid rotation rate
- Ensure you are in the right corridor upon approach of a sample site and that you can actually 'hit' the sample region
- Drop down safely to the sample site
- Collect the sample
- 'Get out of Dodge' with the goodies!





Properly Engineer Sampling

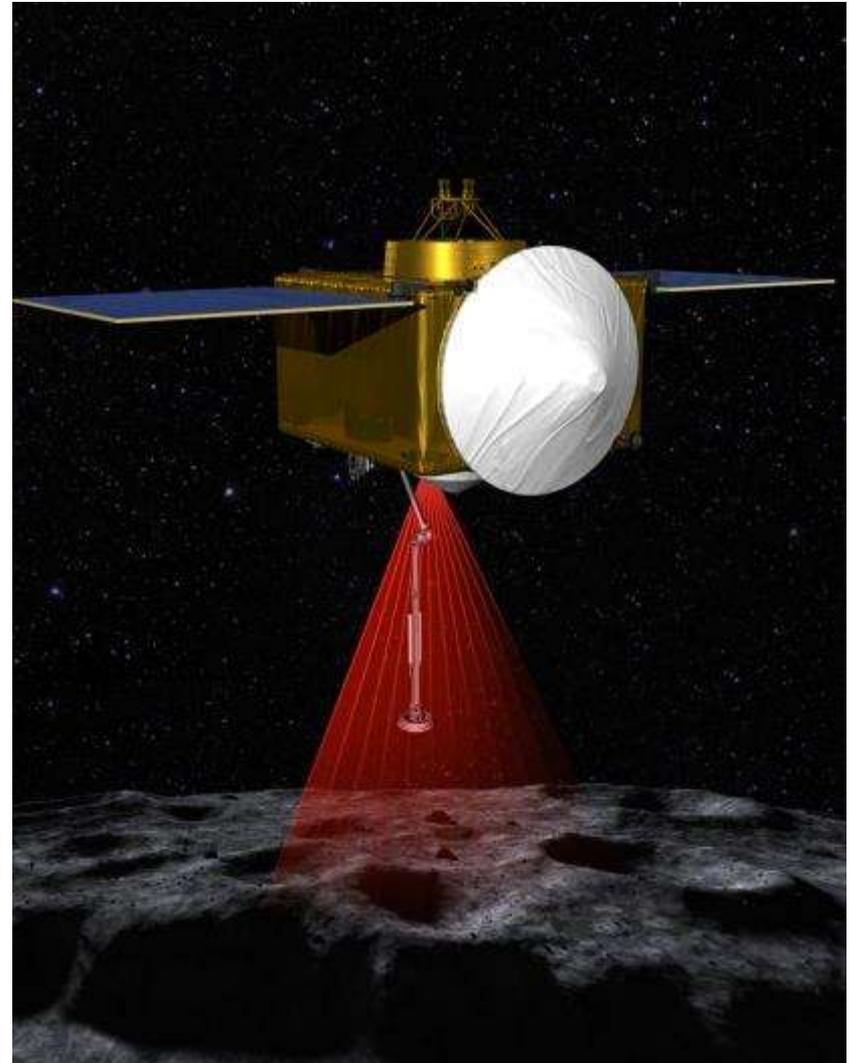
- **Low gravity makes this much easier than on Mars, for example**
- **Processes are slow, and forces needed to get back home are small**





APL's Role: Co-Investigator

Oversee the OSIRIS-REx
Laser Altimeter





APL's Role: Co-Investigator

Cognizant Co-I responsible for topographic products from imaging and altimetry

