# Locating Active Volcanic Hotspots on Io Using Juno's JIRAM Instrument

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## Background:

- Io is one of Jupiter's Galilean moons. Its volcanic hotspots are caused by tidal heating. Io is tidally locked: the same side faces Jupiter and it rotates the same speed as it orbits.
- Juno, a NASA spacecraft, is currently studying the Jovian system, particularly polar regions
- Jovian Infrared Auroral Mapper, or JIRAM, is an instrument on Juno used to take high resolution images of Io in the near infrared.

## Purpose and Goals:

- Measure position and brightness of active volcanoes on Io.
- Introduce new methodology for measurements

## Our Method vs. Mura et al (2020):

- We analyzed the 43 images of Orbit 17 separately and determined the latitude and longitude of each active volcano in each image.
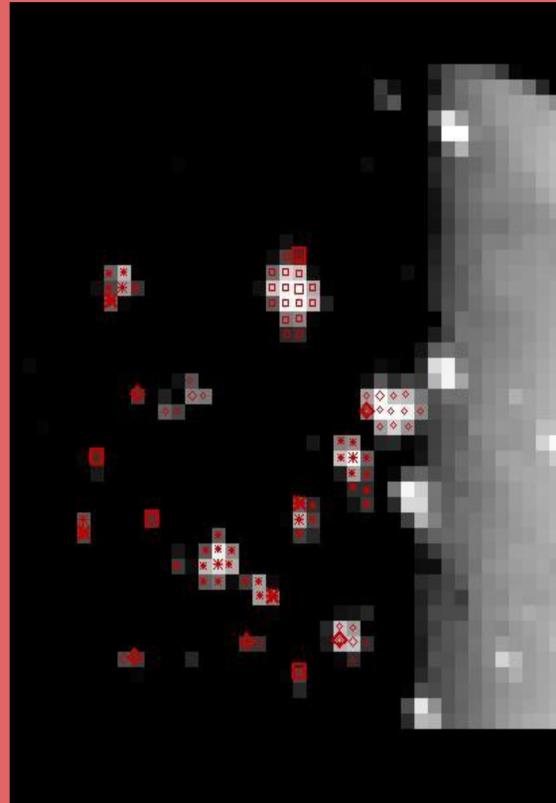- They summed all 43 images into one image with better signal to noise.



**Figure 1**: One of the images taken by Juno's instrument JIRAM during Orbit 17. The red markings represent where volcanic hotspots were found.
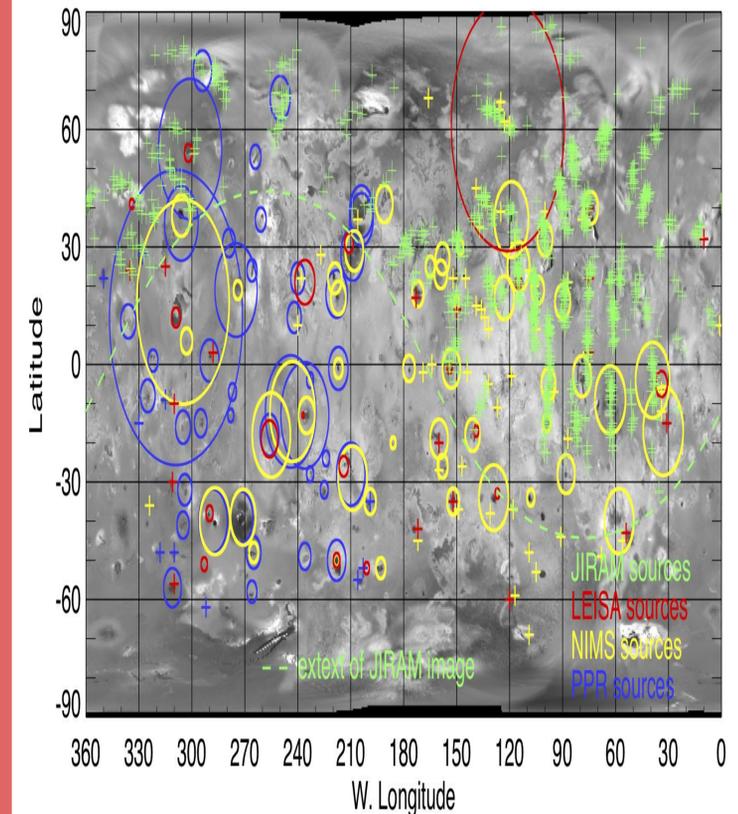


**Figure 2**: Based on the results from our method vs. Mura's method, we found key differences. We detected all the volcanoes that Mura et al. (2020) detected plus others that we are currently investigating to determine if they are real or noise.
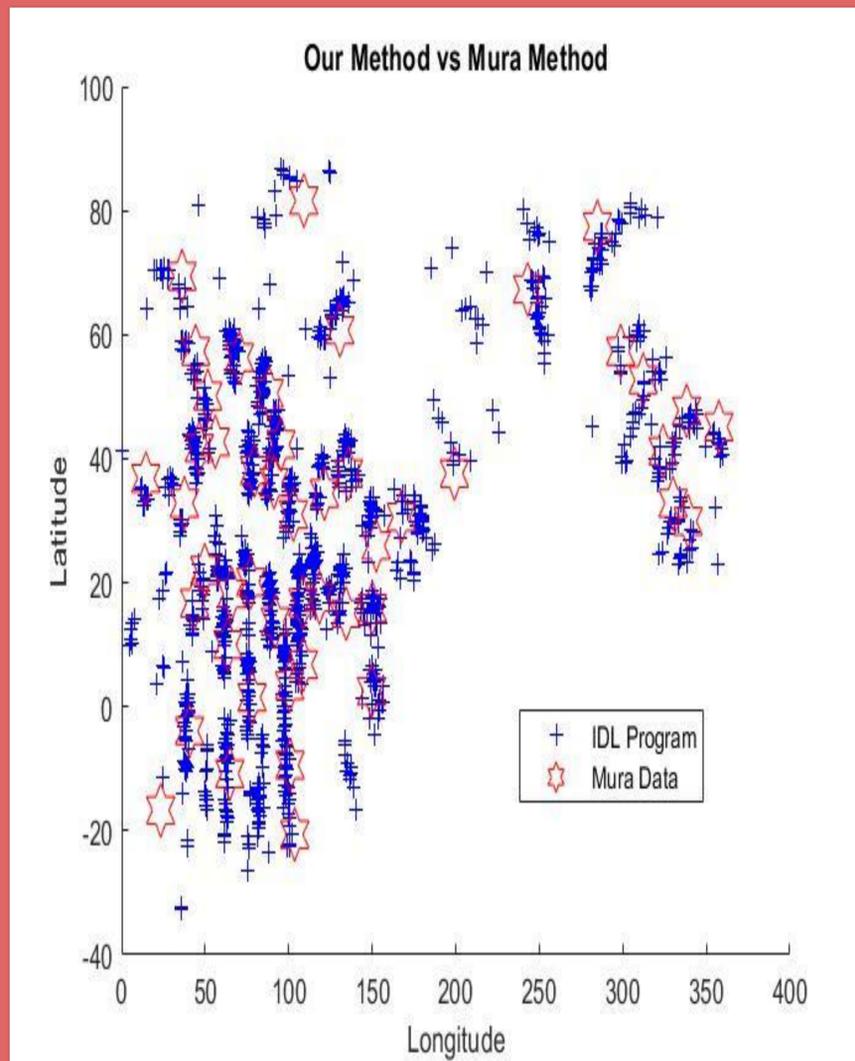


**Figure 3**:This image shows where volcanic hotspots on Io have been observed in previous NASA missions. Note that the Juno measurements have better coverage of the north pole than previous observations.

## Future Work and Skills Learned:

- Analyze the South Polar Region of Io by analyzing images from Orbit 25.
- Use Matlab to get the longitude and latitude of the volcanoes from an image with super resolution.