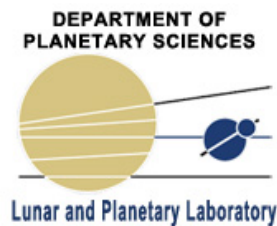
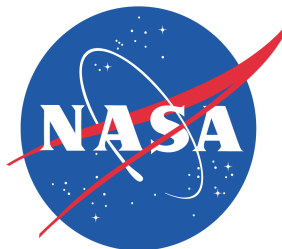


Monitoring For Recent Tectonic Activity On Mars

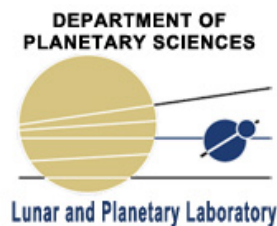
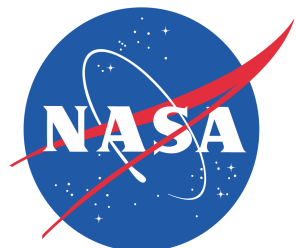
Brendan S. Bogar | Chris H. Okubo

University of Arizona



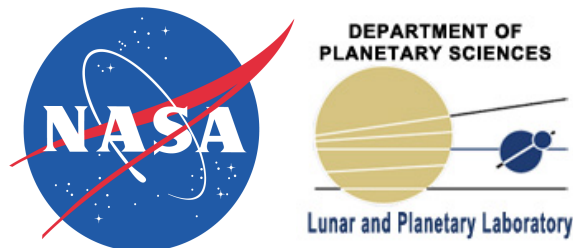
Outline and Acknowledgements

- Outline
- Statement of Problem
- Objectives
- Methods/Analysis Technique
- Results
- Interpretation of Results
- Interpretations cont./Future Applications



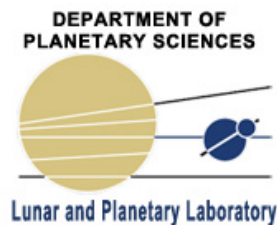
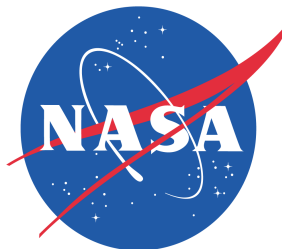
Statement of Problem

- Satellite imaging not fully analyzed for tectonic activity over time
- Difference in overlapping imaging across multiple years is not investigated for tectonic activity, usually for surface changes only
- Image analysis is difficult to accomplish on individual basis
- 933 stereo pairs collected during HiRISE's first year in operations not updated or organized according to tectonic activity

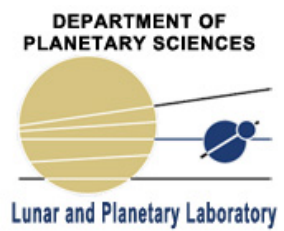
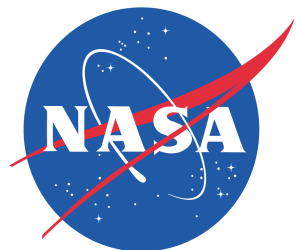


Objectives

- Examining the oldest and highest-resolution HiRISE stereo images of Mars beginning with images taken August 7th, 2007
- A total of 933 stereo pairs collected during HiRISE's first Mars year in operation to be prioritized and compared along season and time
- New images will be visually compared with the old images to evaluate for any surface changes that may indicate tectonic activity
- New techniques are to be investigated to enhance tectonic analysis work-flow

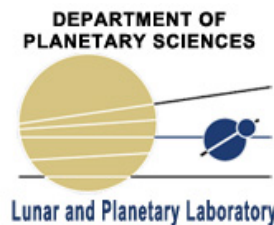
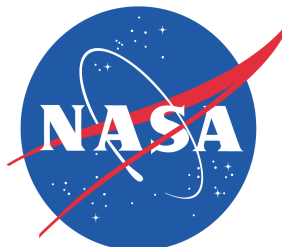


ESP_053753_2505_RED
VS
PSP_009803_2505_RED



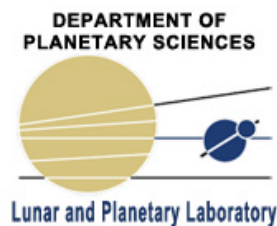
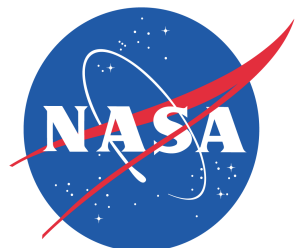
Objectives (cont.)

- Incidental Solar Longitudes (days on Mars)
- Within accomplishable season of internship
- Delta Days less than 100
- Priority of tectonic investigation to include faults, joints, and drainage pits
- Promising tectonic attributes for selected landscapes to be re-imaged



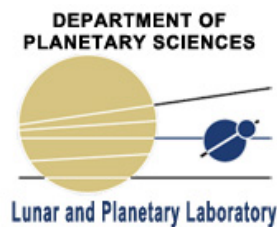
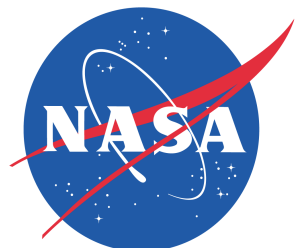
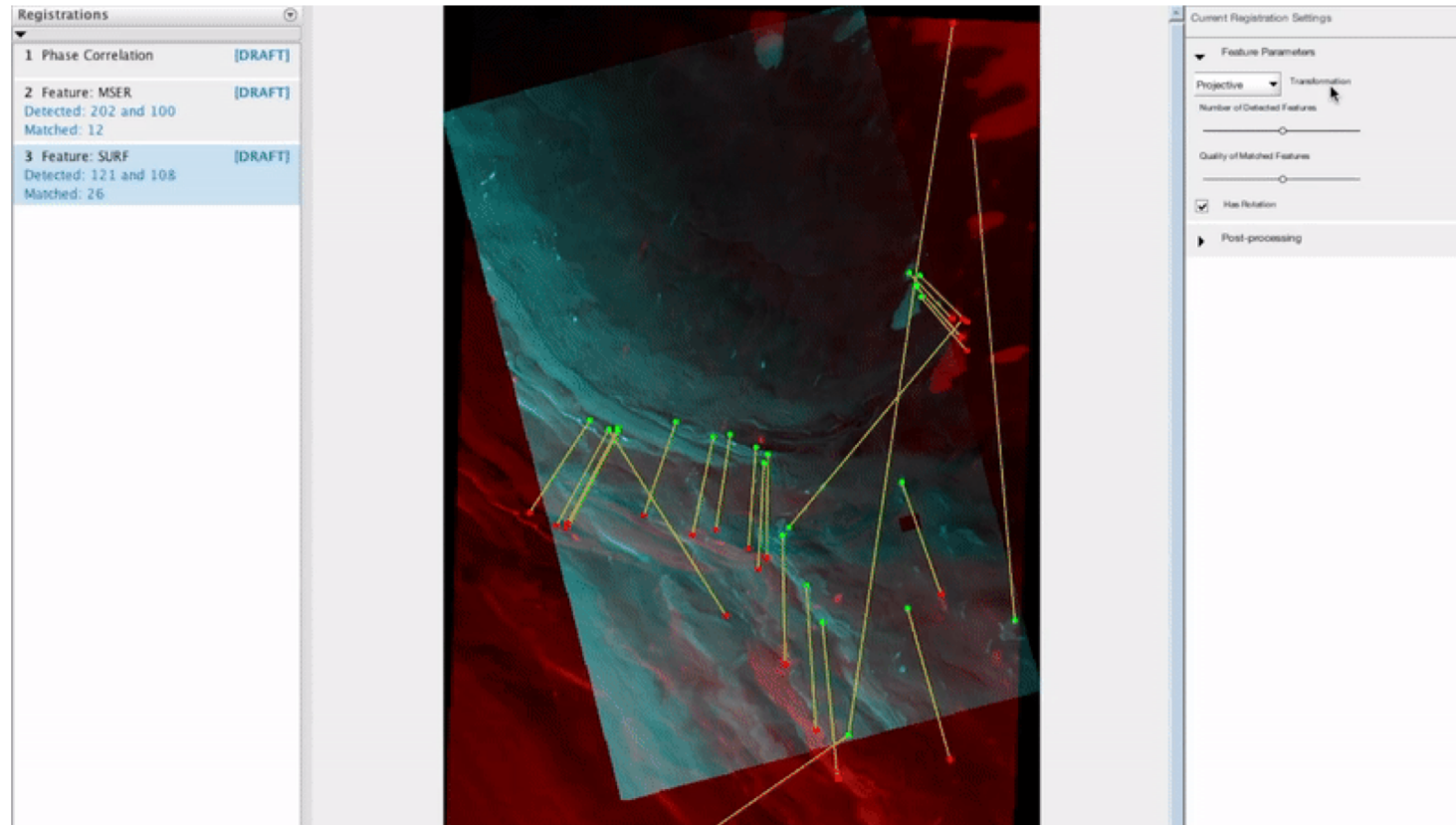
Methodology Used

- Solar longitudes (Ls) and incidental seasonal changes to decrease potential candidates
- Dates between stereo images taken to increase image quality and difference
- Landscapes noted with larger chance of tectonic activity placed with imaging priority
- Re-imaging of areas of Mars must be within similar seasons for better comparison of landscapes



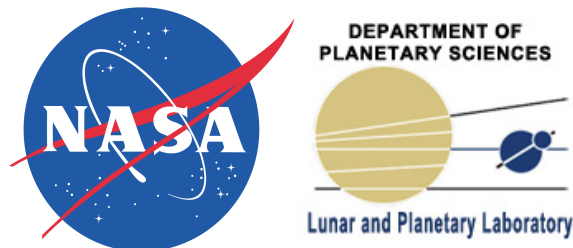
Methodology Used (cont.)

ESP_053334_2650_RED
VS
PSP_009279_2650_RED



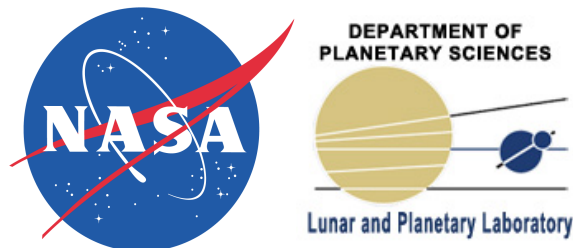
Results

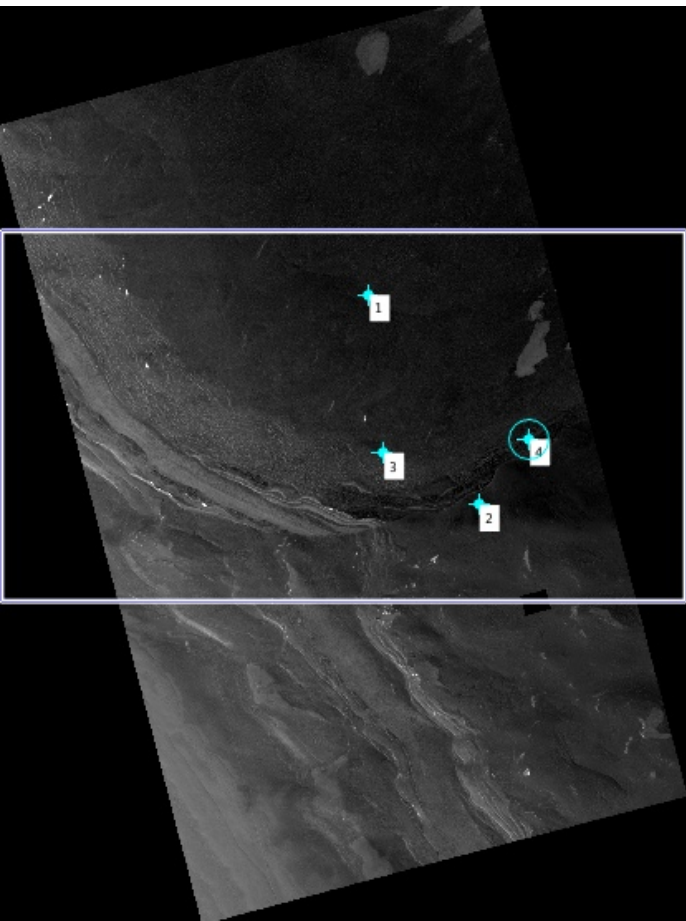
- Total of seven sets of stereo images re-imaged for tectonic analysis
- Use of Matlab machine learning for image registration and comparison aided in identifying potential differences
- Potential differences across images were noted and are to be peer-reviewed for accuracy before confirmation is made



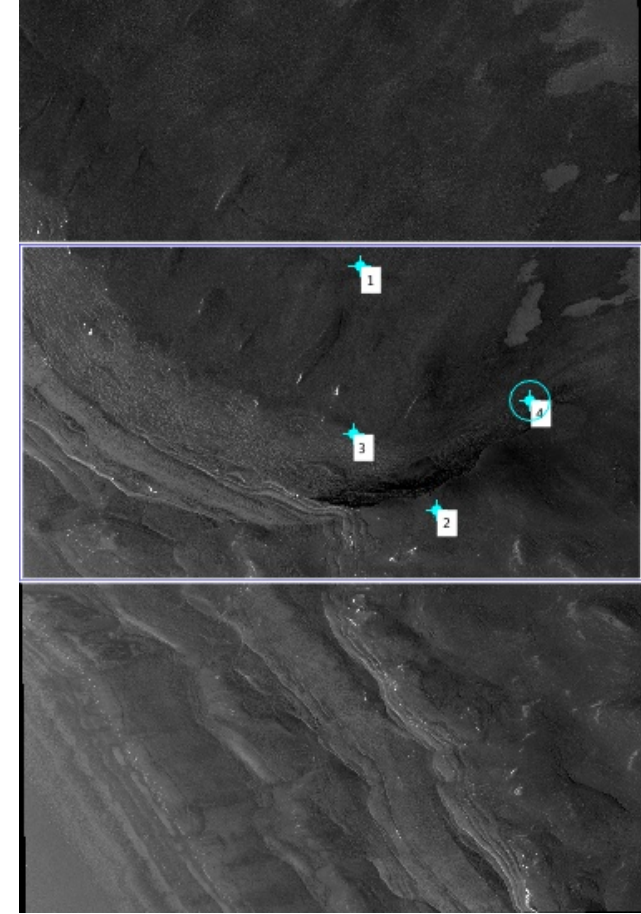
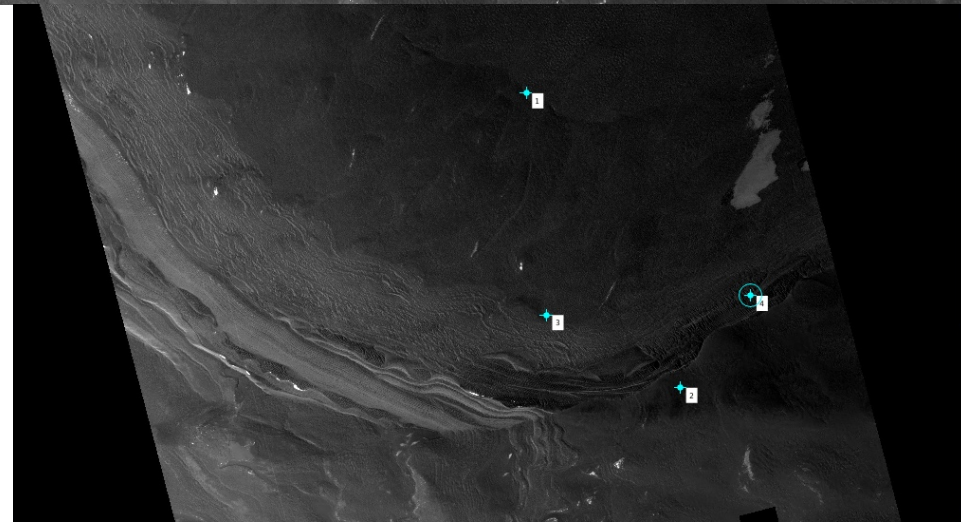
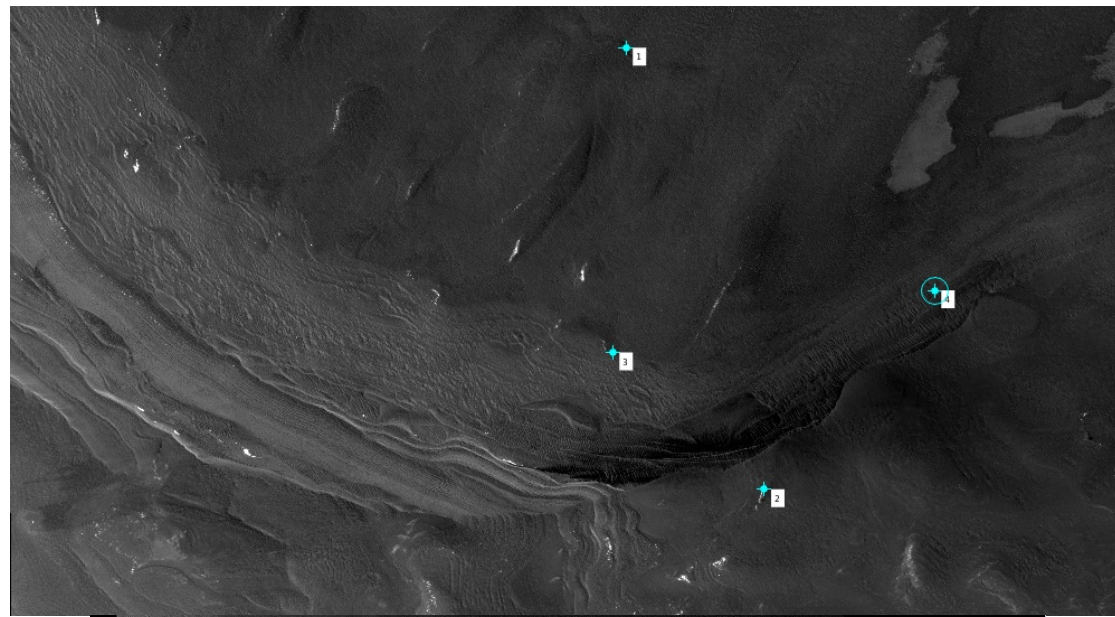
Potential Opportunities

- Using Machine learning along with geo-physicist knowledge and direction to produce tectonic imaging references
- Better future analysis speed for higher image resolution and image quantity
- Decreasing the learning curve towards in depth, successful tectonic analysis

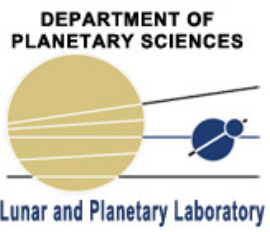
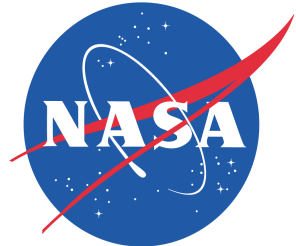




ESP_053334_2650_RED

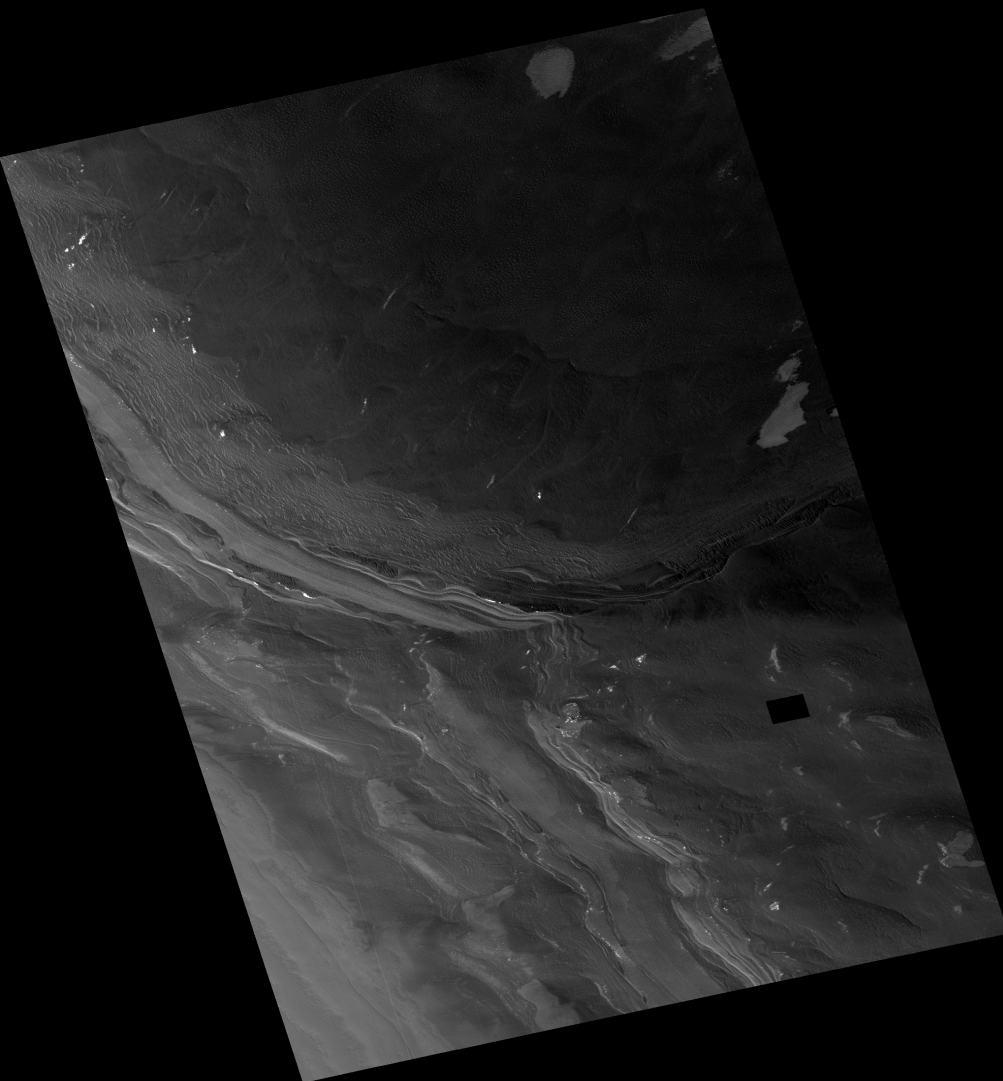


PSP_009279_2650_RED



ESP_053334_2650_RED

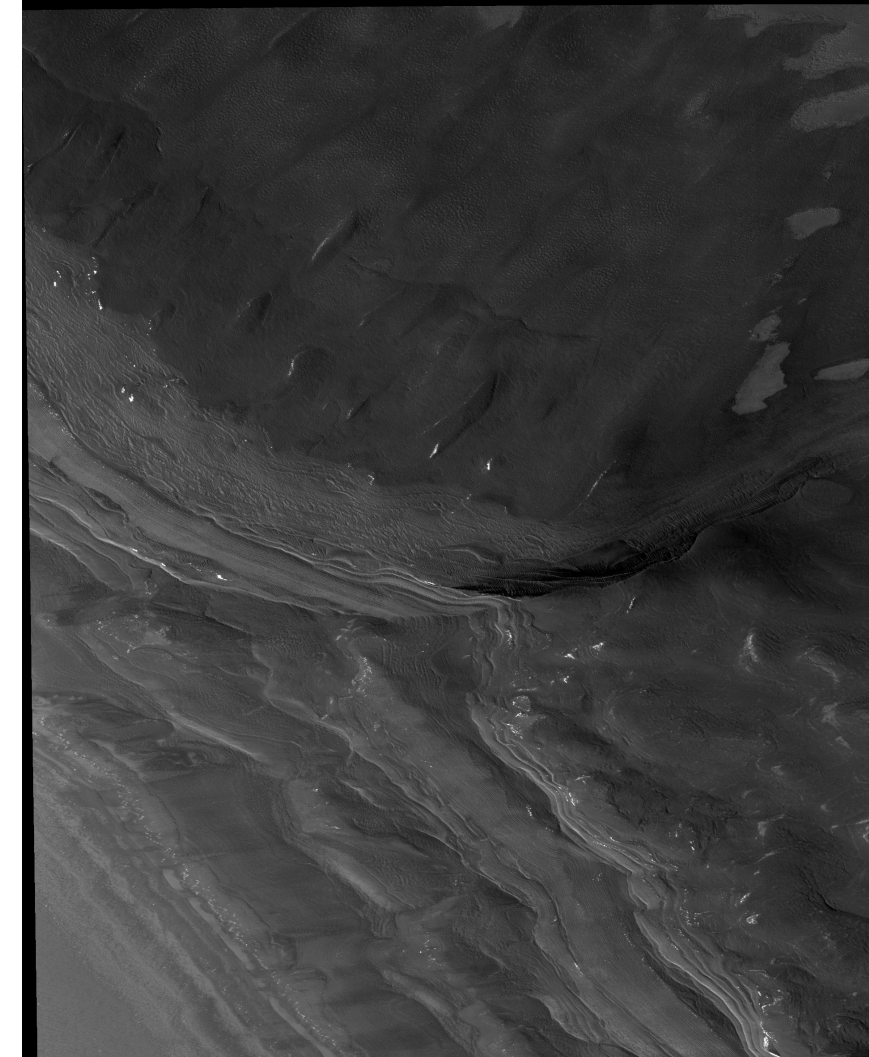
500 meters



NASA/JPL/University of Arizona

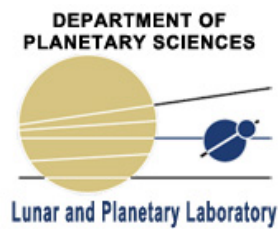
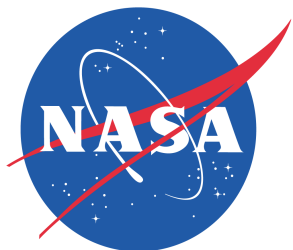
MRO/HiRISE

PSP_009279_2650_RED



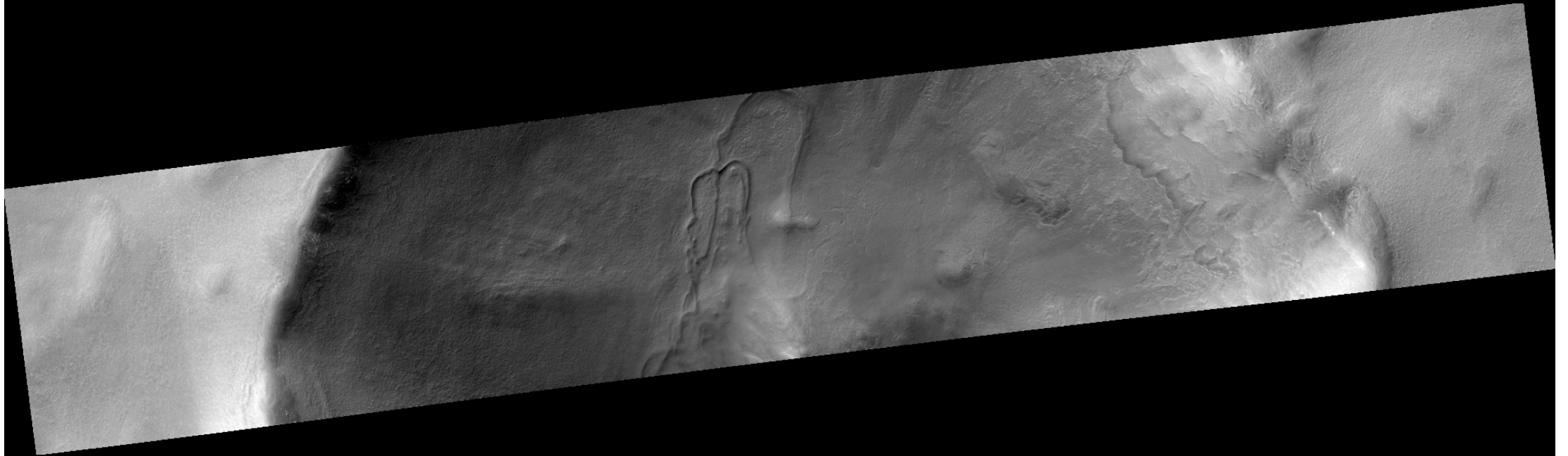
NASA/JPL/University of Arizona

MRO/H



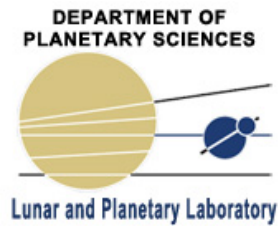
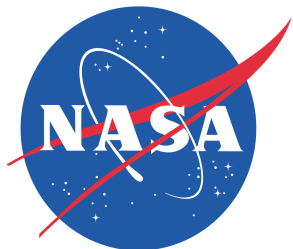
PSP_009803_2505_RED

5.0 km



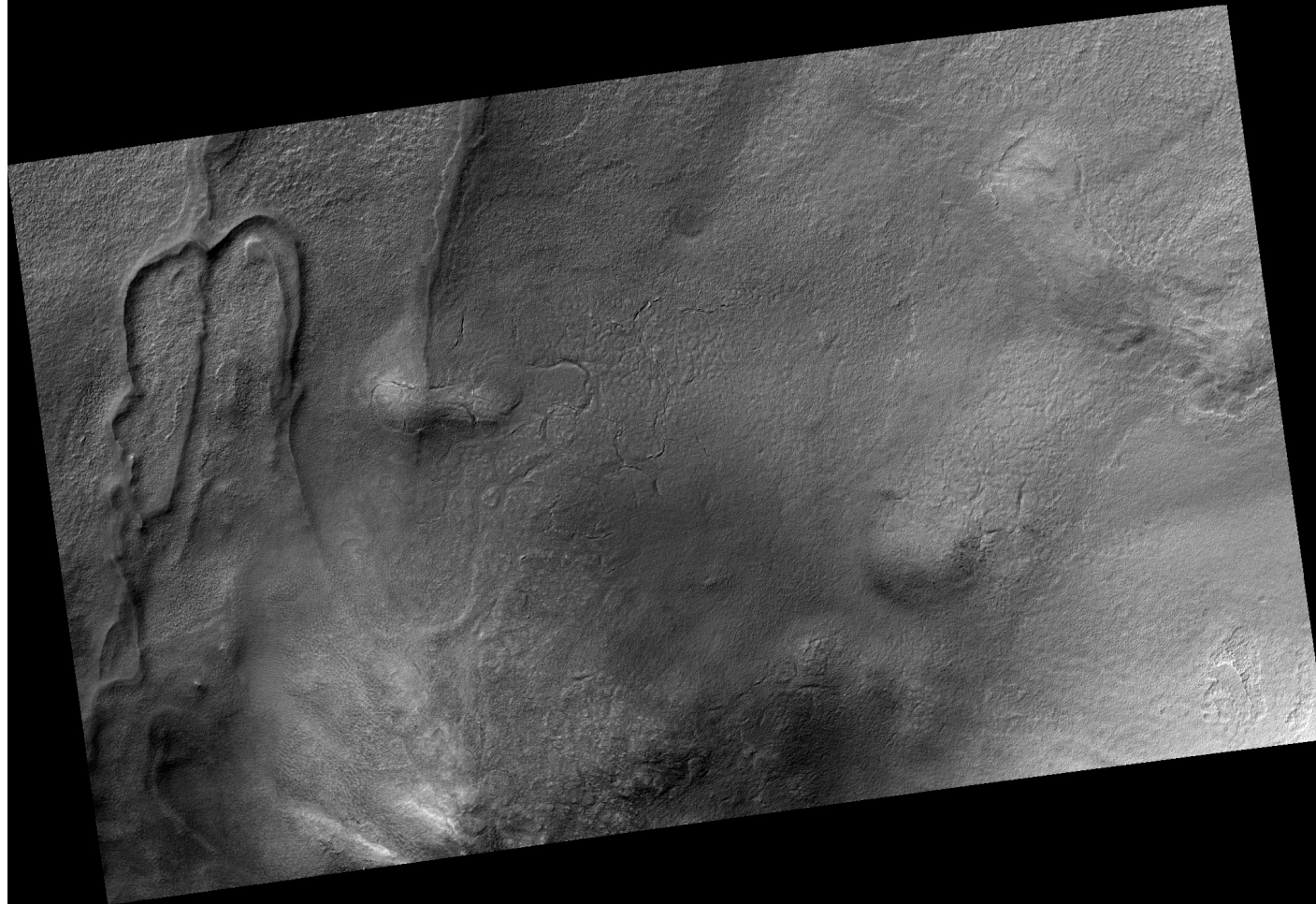
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MRO/HiRISE



ESP_053753_2505_RED

1000 meters



NASA/JPL/University of Arizona

MRO/HiRISE

