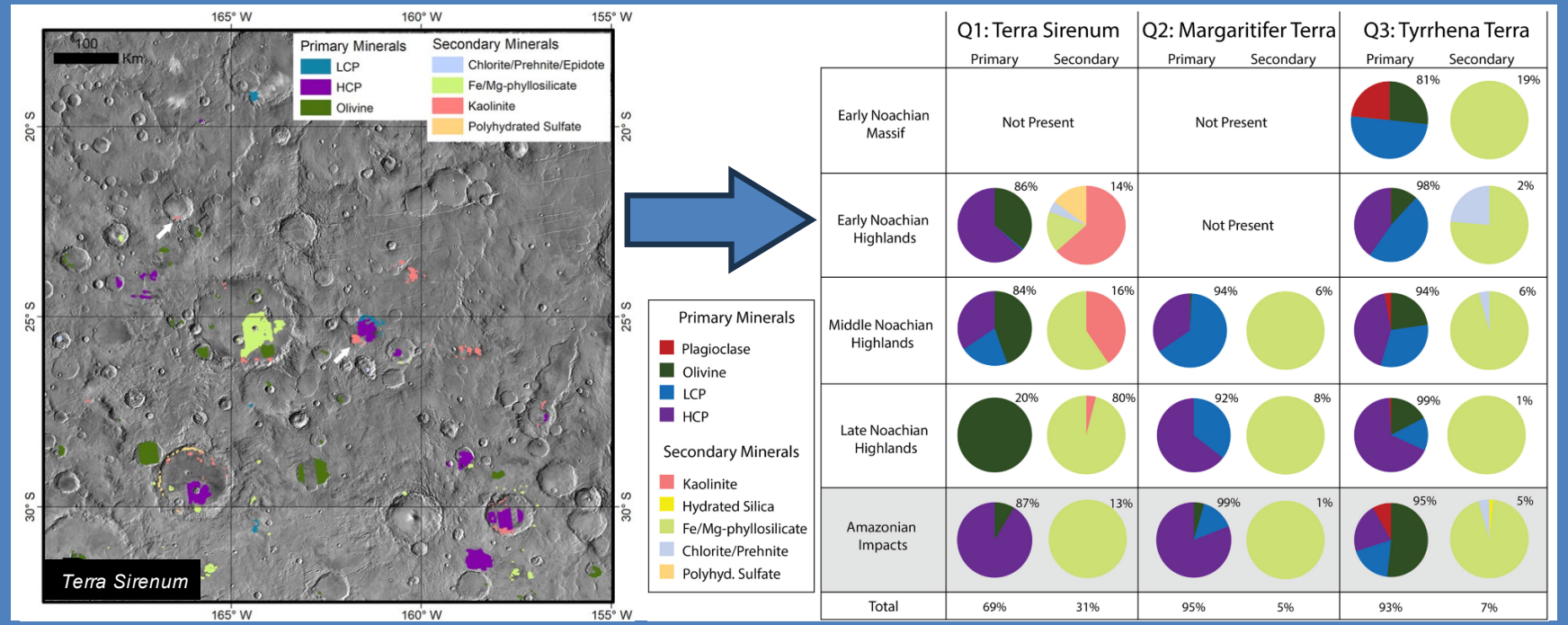
JOHNS HOPKINS
APPLIED PHYSICS LABORATORY

Oldest crust on Mars shows evidence for variable alteration

Regional mapping of old (Noachian-aged) crust on Mars reveals distinct differences in alteration environments in similar aged terrains across the globe

Previous analyses of alteration in Noachian terrains has been limited to high-resolution analysis of small targeted locations (18m/pixel) or global low-resolution analysis (~300m to 5km/pixel).



	Q1: Terra Sirenum		Q2: Margaritifer Terra		Q3: Tyrrhena Terra	
	Primary	Secondary	Primary	Secondary	Primary	Secondary
Early Noachian Massif	Not Present		Not Present		81%	19%
Early Noachian Highlands	86%	14%	Not Present		98%	2%
Middle Noachian Highlands	84%	16%	94%	6%	94%	6%
Late Noachian Highlands	20%	80%	92%	8%	99%	1%
Amazonian Impacts	87%	13%	99%	1%	95%	5%
Total	69%	31%	95%	5%	93%	7%

(left) Example mineral mapping from one of the representative Noachian-aged locations. (right) Relative abundances of primary and secondary minerals from three mapping locations, subdivided by age range.

Primary minerals and secondary (alteration) minerals were mapped at 180 m/pixel using CRISM data for three representative Noachian regions.

Variable degrees of alteration was observed between regions.

Variations likely result from differences in heat availability in the crust due to large impact basins and/or magmatic bodies.

Viviano et al. (2023), *GRL*
https://doi.org/10.1029/2022GL102711