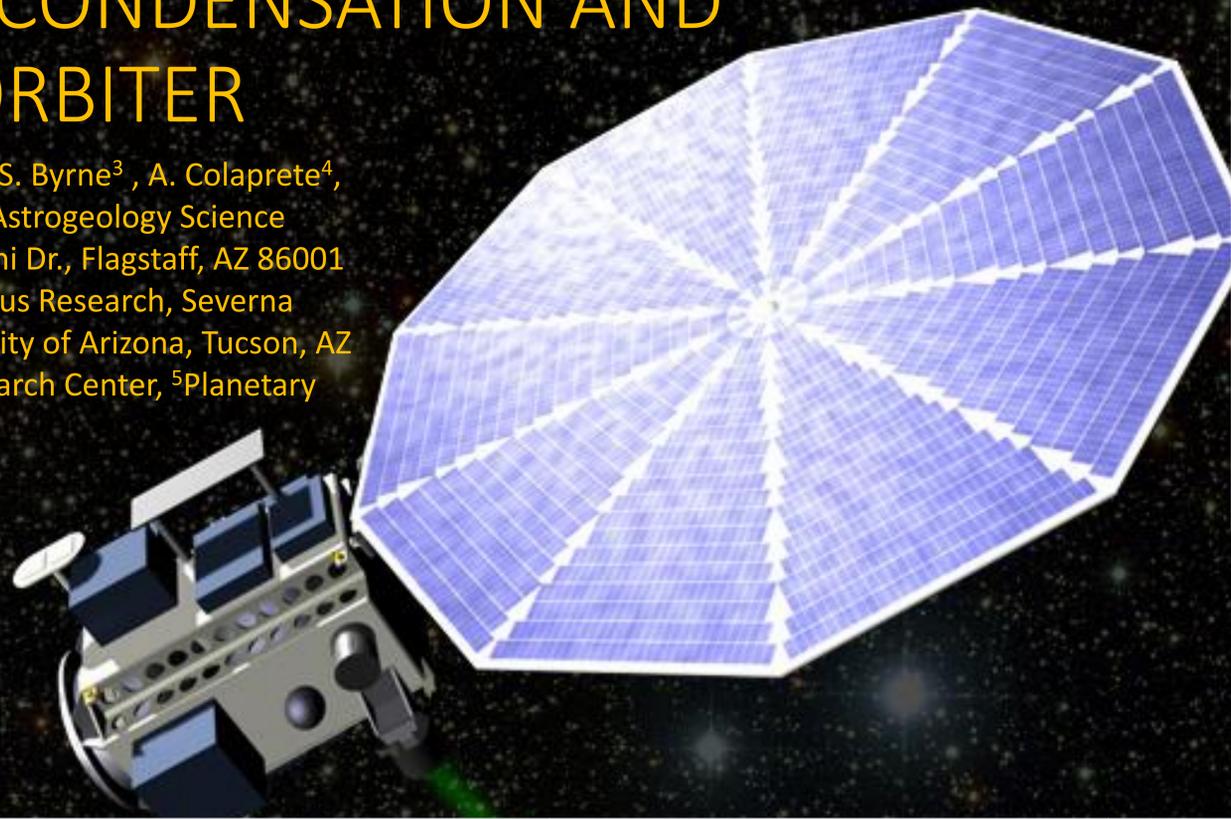


MARS MISSION CONCEPT: MARS ICE CONDENSATION AND DENSITY ORBITER

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Suggested Instrumentation	Wave-length	Science Focus	Legacy Examples
Imaging LiDAR (with Tunable LASER)	~ 1.2-1.6 μm	Volatile Composition and grain size; Altitude of ice particles	MOLA
Interferometric synthetic-aperture radar	~ 1-10 cm	Monitor Ice Depth	Magellan
Thermal Neutron Imager	Thermal Neutrons	Monitor Column Abundance	MONS
Thermal Emission Imager	6-100 μm	Monitor energy balance	TES, THEMIS, MCS

Polar Science	Science Questions	Investigation	Measurement(s)	Possible Instruments	Current MEPAG Goal(s)
	What fraction of seasonal CO ₂ ice deposits are from snow vs direct deposition?	Determine surface ice grain size and composition.	Composition; Grain size	Imaging LiDAR	IIA4
	What altitude does the CO ₂ snow form?	Determine altitude of snow formation.	Altitude	Imaging LiDAR	IIA1; IIA4
	What is the role of H ₂ O ice in CO ₂ condensation?	Determine when, where and how H ₂ O ice is incorporated into the seasonal cap.	Composition; Grain size	Imaging LiDAR	IIA1; IIA4 IIIA1
	What is the role of dust in CO ₂ condensation?	Determine when, where and how dust is incorporated into the seasonal cap.	Composition; Grain size	Imaging LiDAR	IIA1; IIA4 IIIA1
	What happens to the snow/ice deposits after they are deposited on the surface?	Monitor surface ice changes in composition and grain size. Monitor changes in local ice density.	Composition; Grain size; Ice Depth; Ice Column Abundance	Imaging LiDAR InSAR Thermal Neutron Imager	IIIA1
	What is the net affect of basal sublimation of seasonal CO ₂ ?	Measure the heat budget and compare to ice column abundance	Heat Emission; Ice Column Abundance	Thermal Emission Imager; Thermal Neutron Imager	IIIA1
Non-Polar Science	What is the extent and composition of diurnal ice deposition?	Determine condensation mode, composition, and amount of ice that forms during the night.	Composition; Grain size	Imaging LiDAR	IIA1; IIA4 IVB3
	What is the extent & composition of ice deposits in permanently shadowed regions (PSR)?	Determine the composition and amount of ice that exists in PSRs.	Composition; Grain size	Imaging LiDAR	IB1; IIA4; IIB3 IVB3