



Measuring Magnetic Fields at Ocean Worlds



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Summary

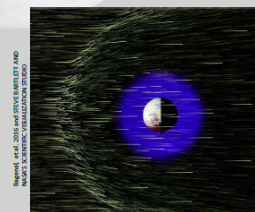
Measuring magnetic fields at ocean worlds will yield important science results. Magnetometers are very low resource instruments (even with magnetic cleanliness). We welcome interest in collaborations for future missions.

Ocean Worlds Magnetometer Science

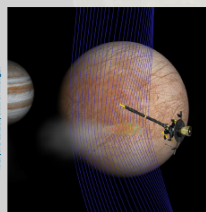
Magnetic fields tell us about a world's:

- plasma environment (magnetosphere, ionosphere)
- volatile escape (plumes, atmospheric erosion)
- distribution of conducting materials (water, metal)

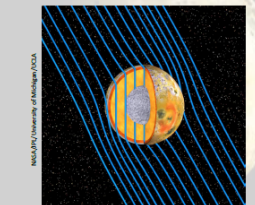
	Fluxgate	Small fluxgate	Magnetostrictive
Heritage	Juno, MAVEN, Parker	POGS, GTOsat	None/Limited
Capability	~< 0.01 nT	~ 0.1 nT	~10 nT
Sensor Mass	400 g	30 g	<1g
Total Mass	~ 1 kg	< 1 kg	<< 1 kg
Power	~1 W	<0.5 W	<0.1 W
Radiation Tolerance:			
Sensor	5+ Mrad TID	?	?
Electronics	100 krad TID	?	?



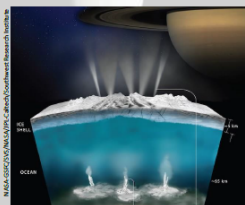
Ocean world (?) Pluto's induced (?) magnetosphere



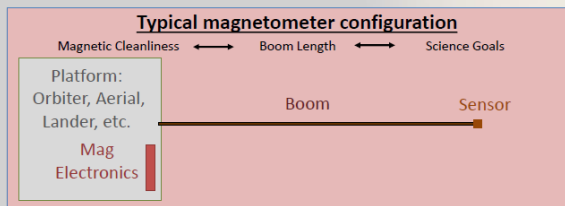
Europa's plume observed by Galileo's magnetometer



Io's conducting (?) interior



Enceladus's conducting (?) interior feeding its volatile plumes (?)



Goddard Mag Team Strengths

- Extensive in-house calibration with unique facilities
- Experienced cooperation w/spacecraft on mag cleanliness
- Experienced, end-to-end data quality assurance
- Experienced science team participation
- In-house boom design available
- 50+ years of heritage and 80+ flight instruments