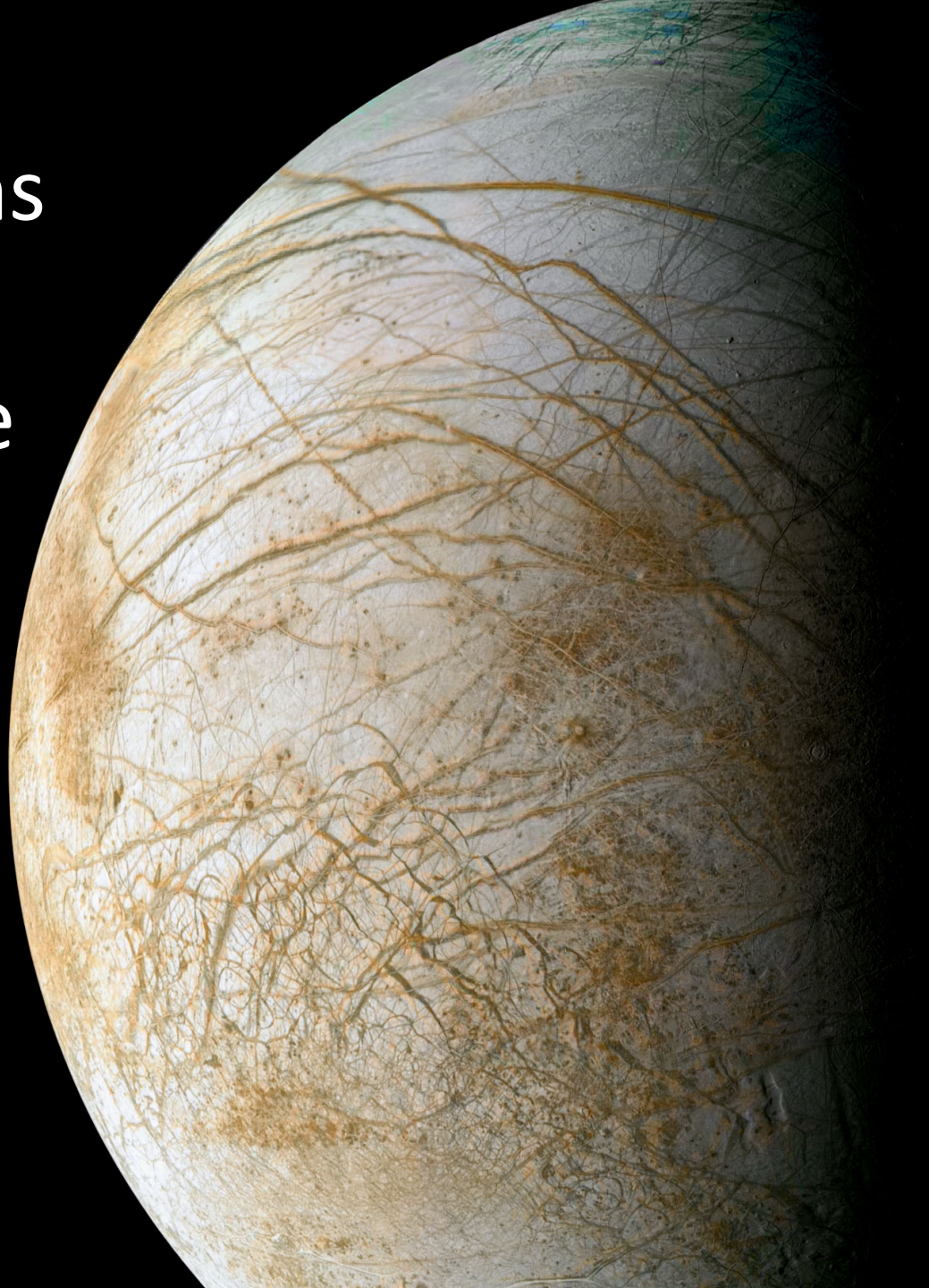
New Observations of Europa from the Hubble Space Telescope

AGU Media Briefing

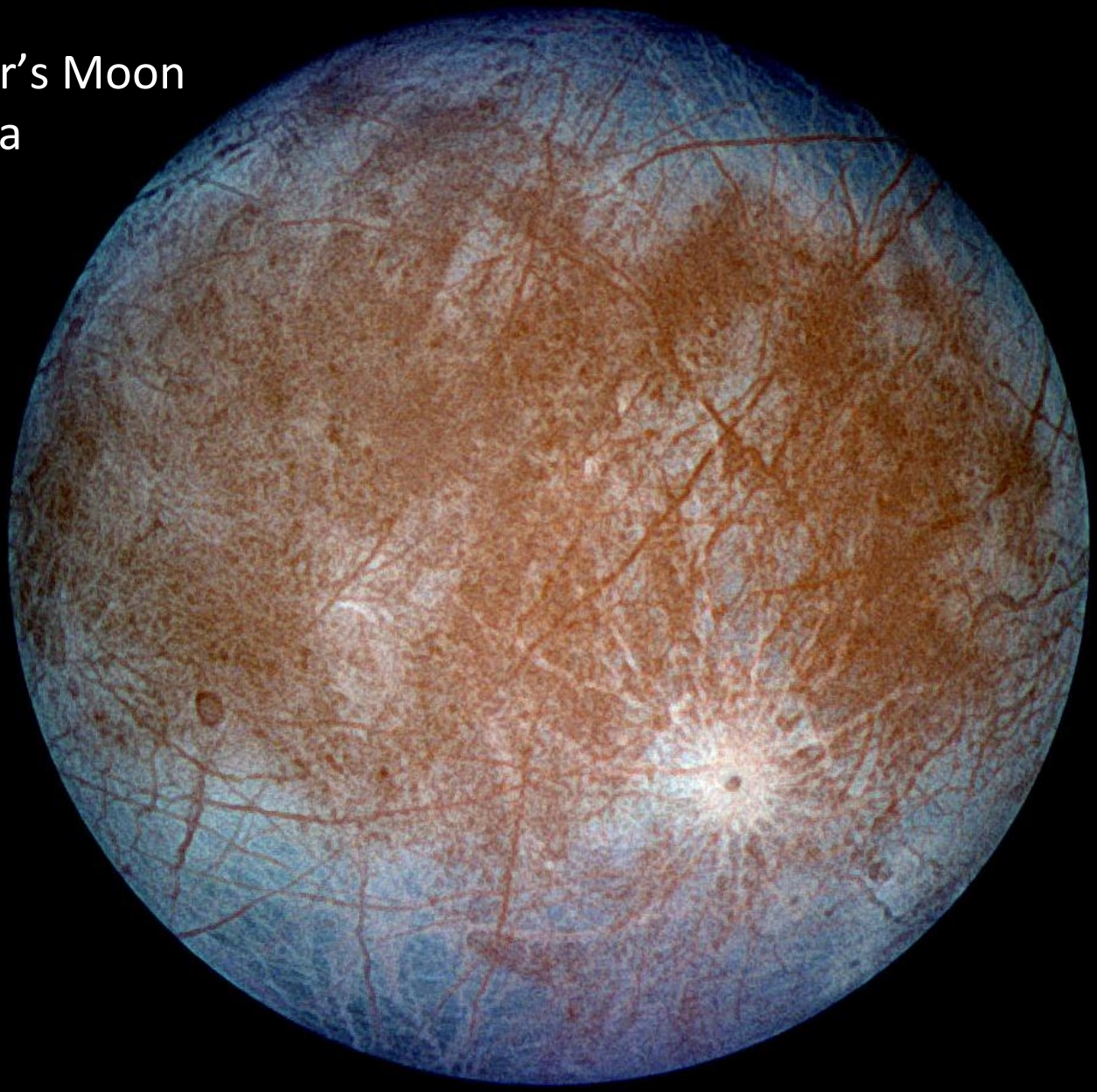
December 12, 2013

Participants:

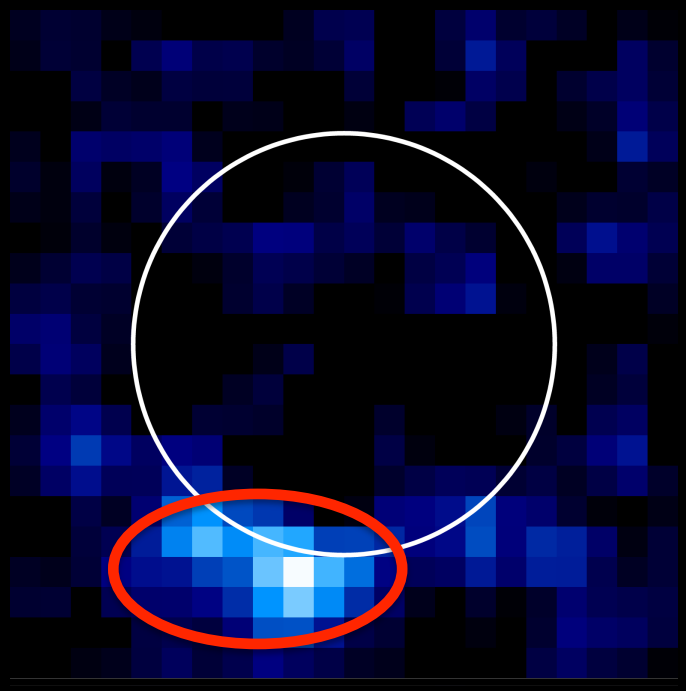
- James Green
- Lorenz Roth
- Joachim Saur
- Kurt Retherford



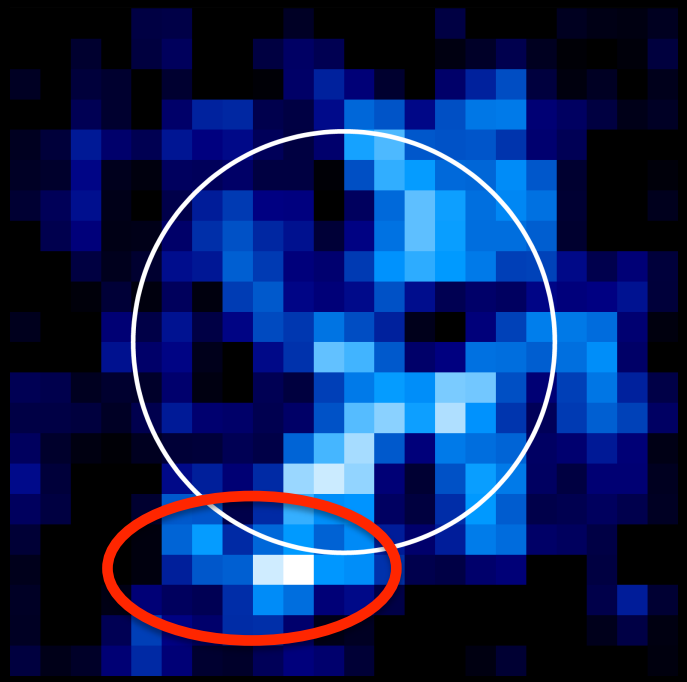
Jupiter’s Moon
Europa



Hubble Observations: December 2012



Hydrogen

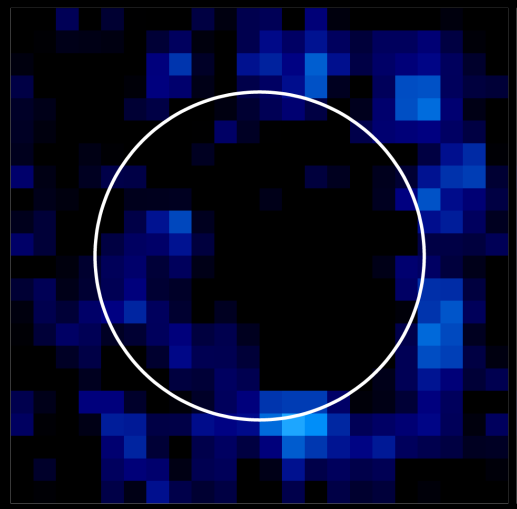


Oxygen

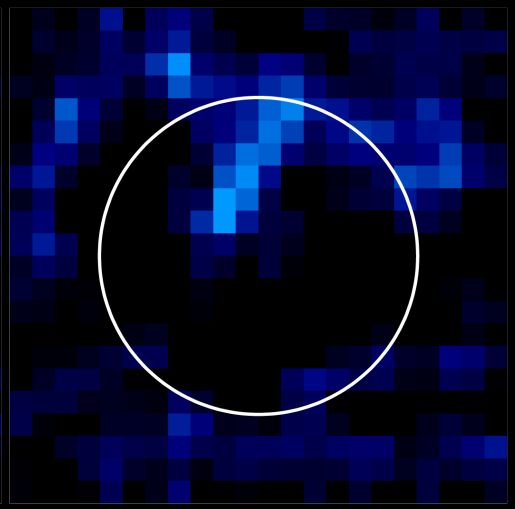
The plumes are variable

Hydrogen

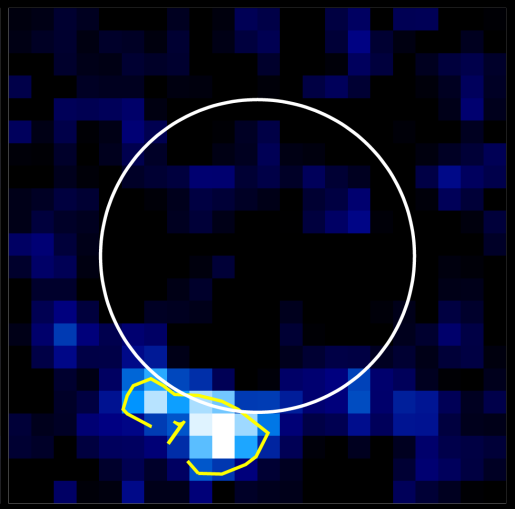
Oct. 1999



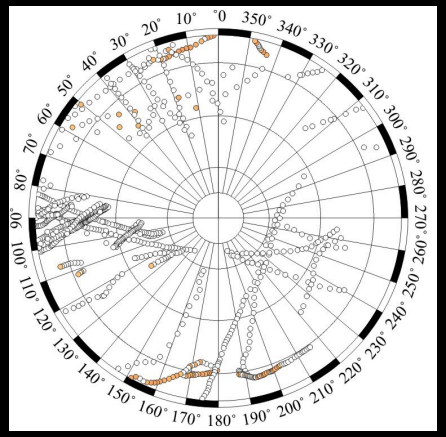
Nov. 2012



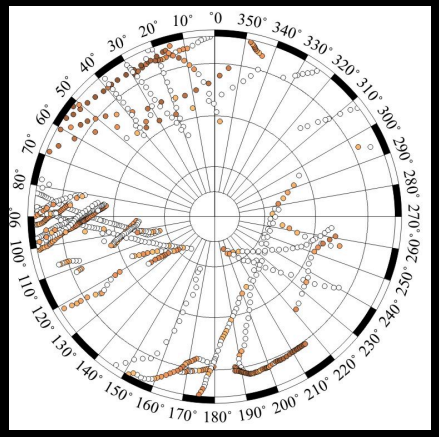
Dec. 2012



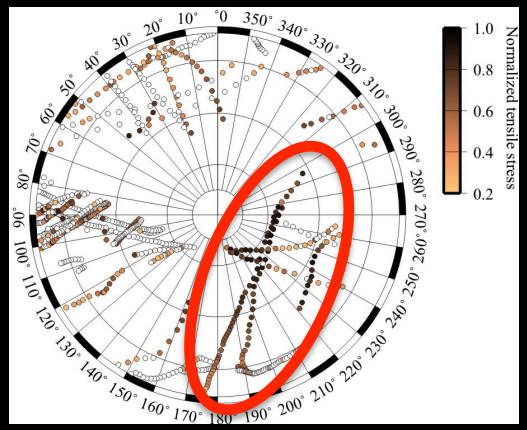
Pericenter



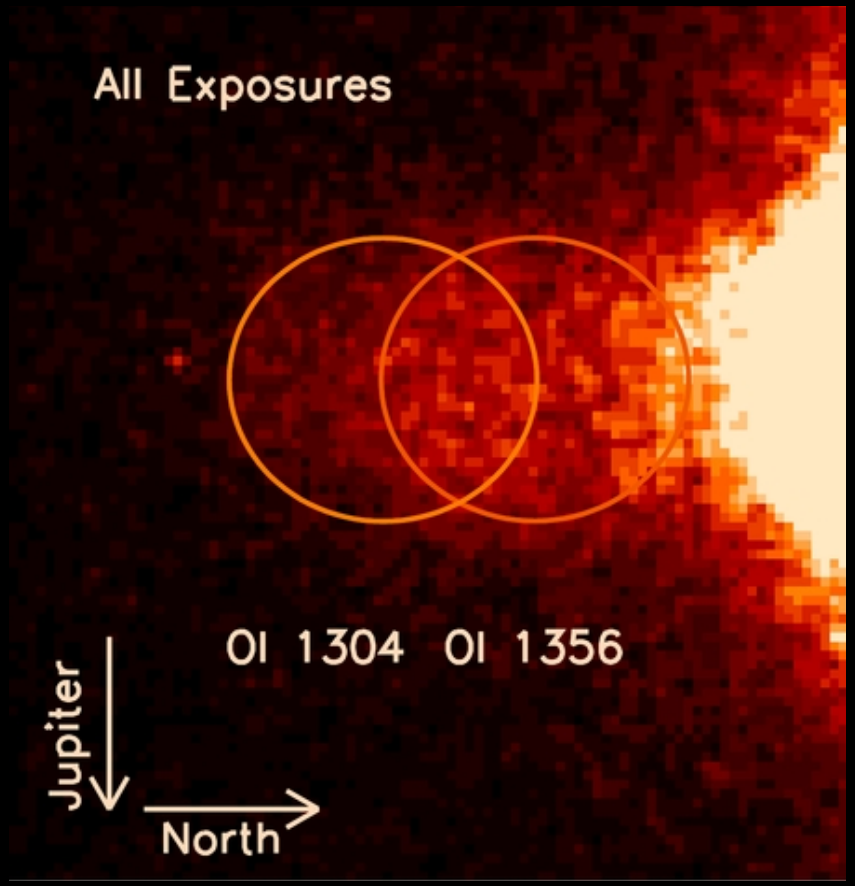
Near Pericenter

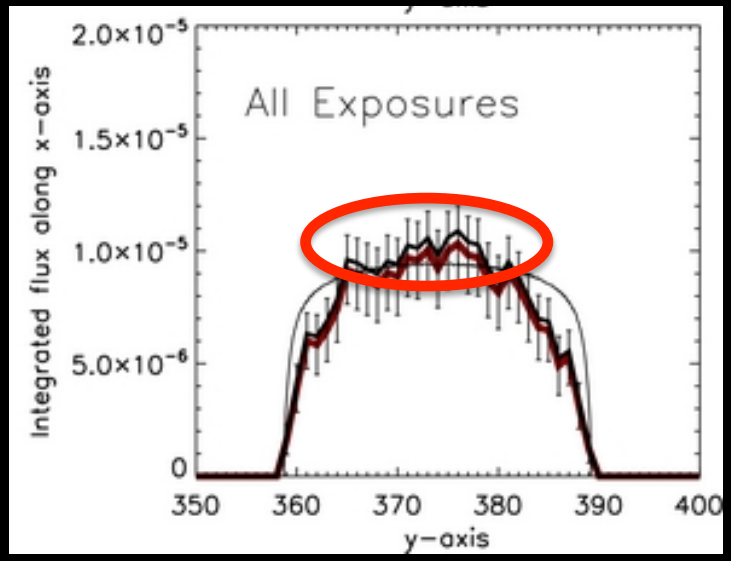


Apocenter



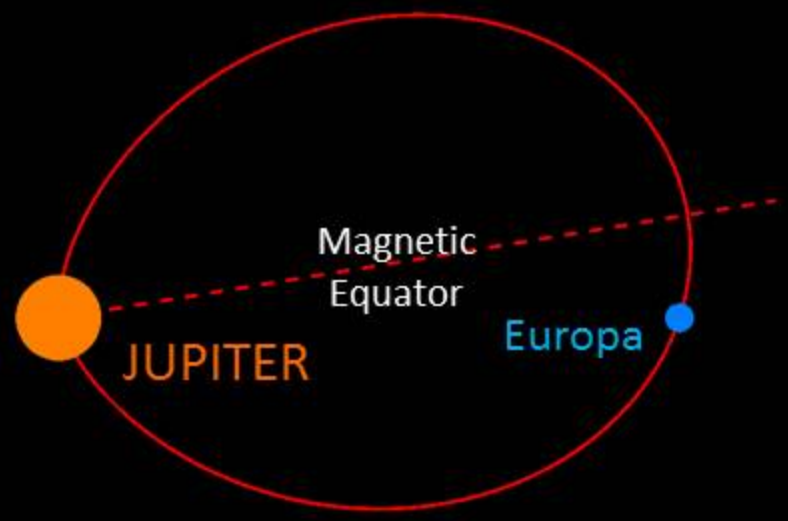
Hubble 2009: Hints of plumes

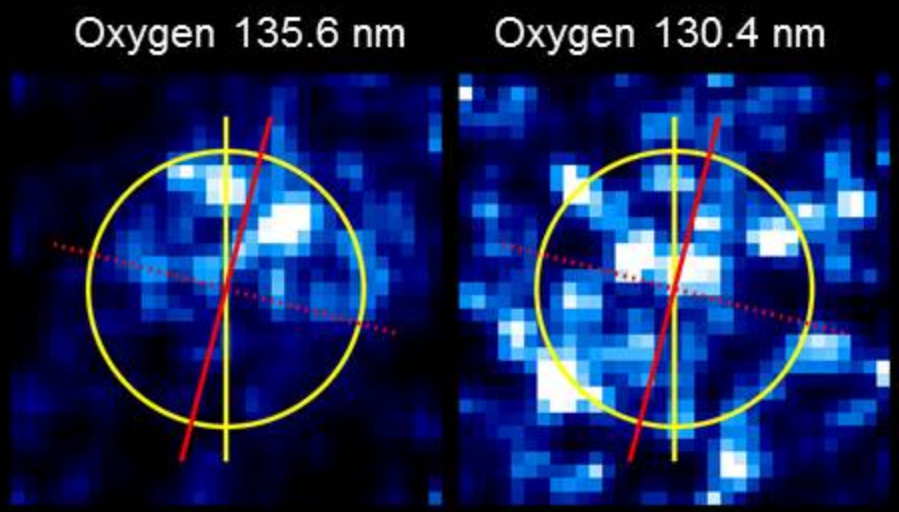




May 2009

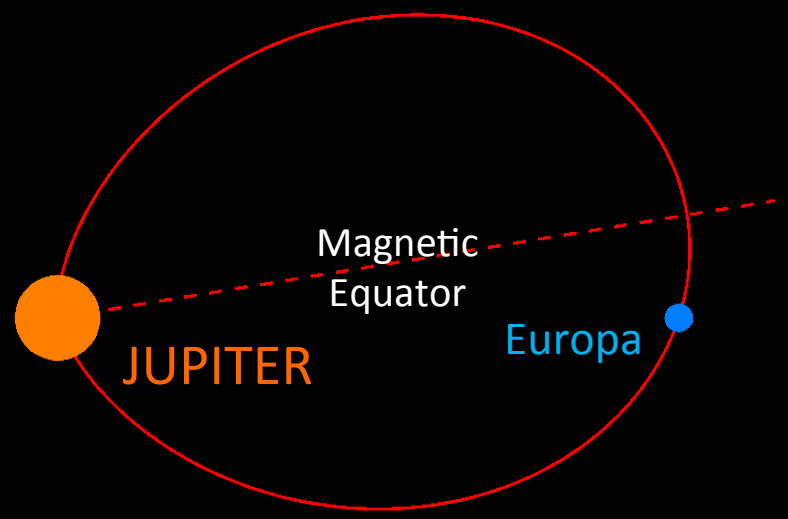
Europa's Plasma Environment

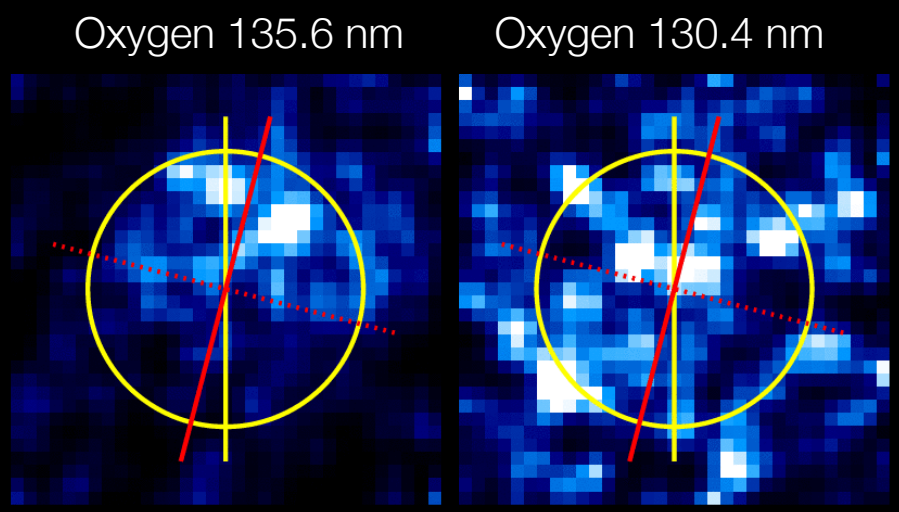




We needed to separate the time-variable emission patterns to identify the plumes.

Europa's Plasma Environment





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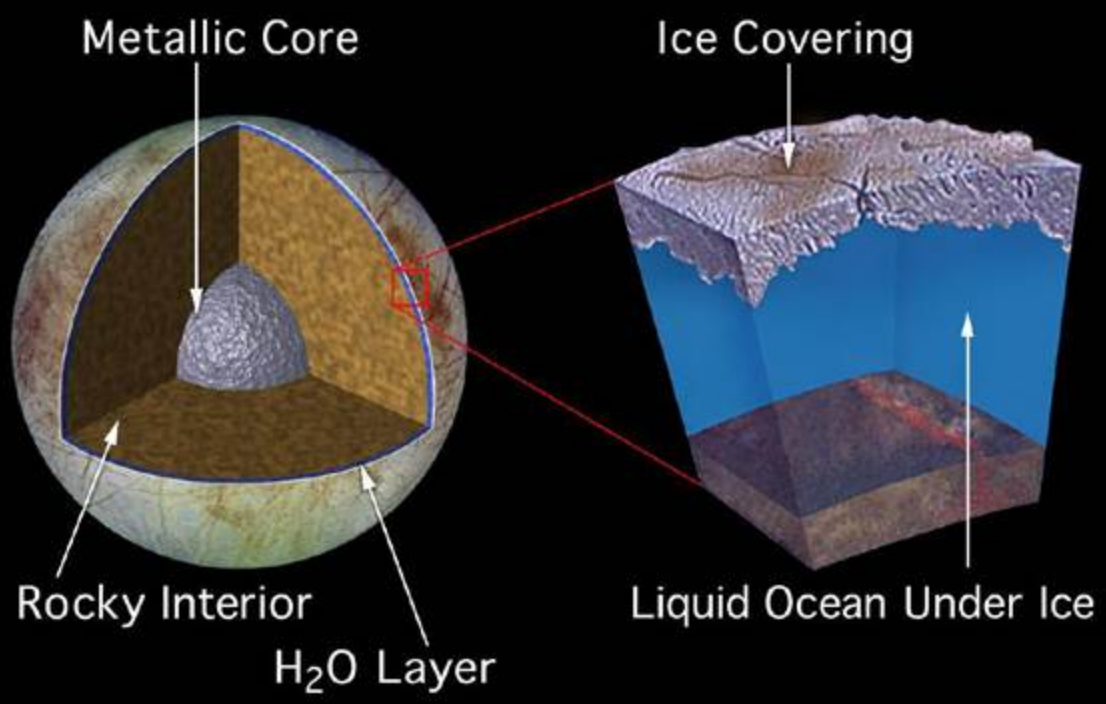
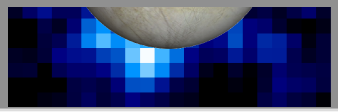
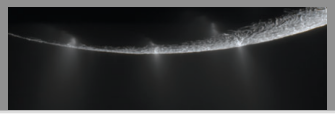
Interior of Europa

OUR CURRENT UNDERSTANDING



EXCITING NEW QUESTIONS

Europa – Enceladus Plume Comparisons

Characteristic	EUROPA 	ENCELADUS 	Ratio Europa/ Enceladus
Radius	1561 km	252 km	6.2
Gravity	1.314 m/s²	0.114 m/s²	12
Plume Height/Extent	200 km ± 100 km	~500 km	0.4
Plume Column Density	~1.5 × 10^{20} m^{-2}	~0.9 × 10^{20} m^{-2}	1.66
Plume Variability	>3	~4 ± 1	~1 ?
Gas Velocity	~700 m/s	300 - 500 m/s	~1.75
Gas Outflow Rate	~7000 kg/s	~200 kg/s (vs. dust at 50 kg/s)	35
Total Number of Water molecules	~10^{32}	~10^{32}	1
Measurement Sets To Date	1 detection 1 Hubble instrument	10's – 100's detections w/ several Cassini inst's	~0.01

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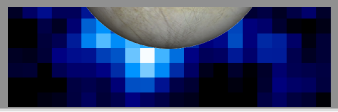
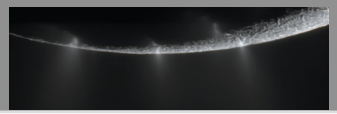
Characteristic	EUROPA 	ENCELADUS 	Ratio Europa/ Enceladus
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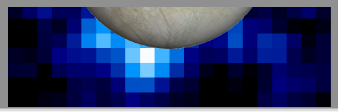
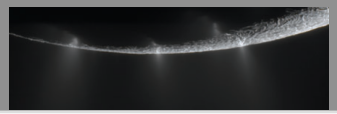
Characteristic	EUROPA 	ENCELADUS 	Ratio Europa/ Enceladus
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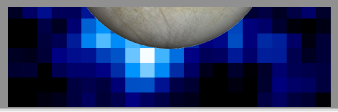
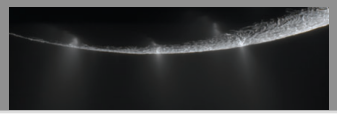
Characteristic	EUROPA 	ENCELADUS 	Ratio Europa/ Enceladus
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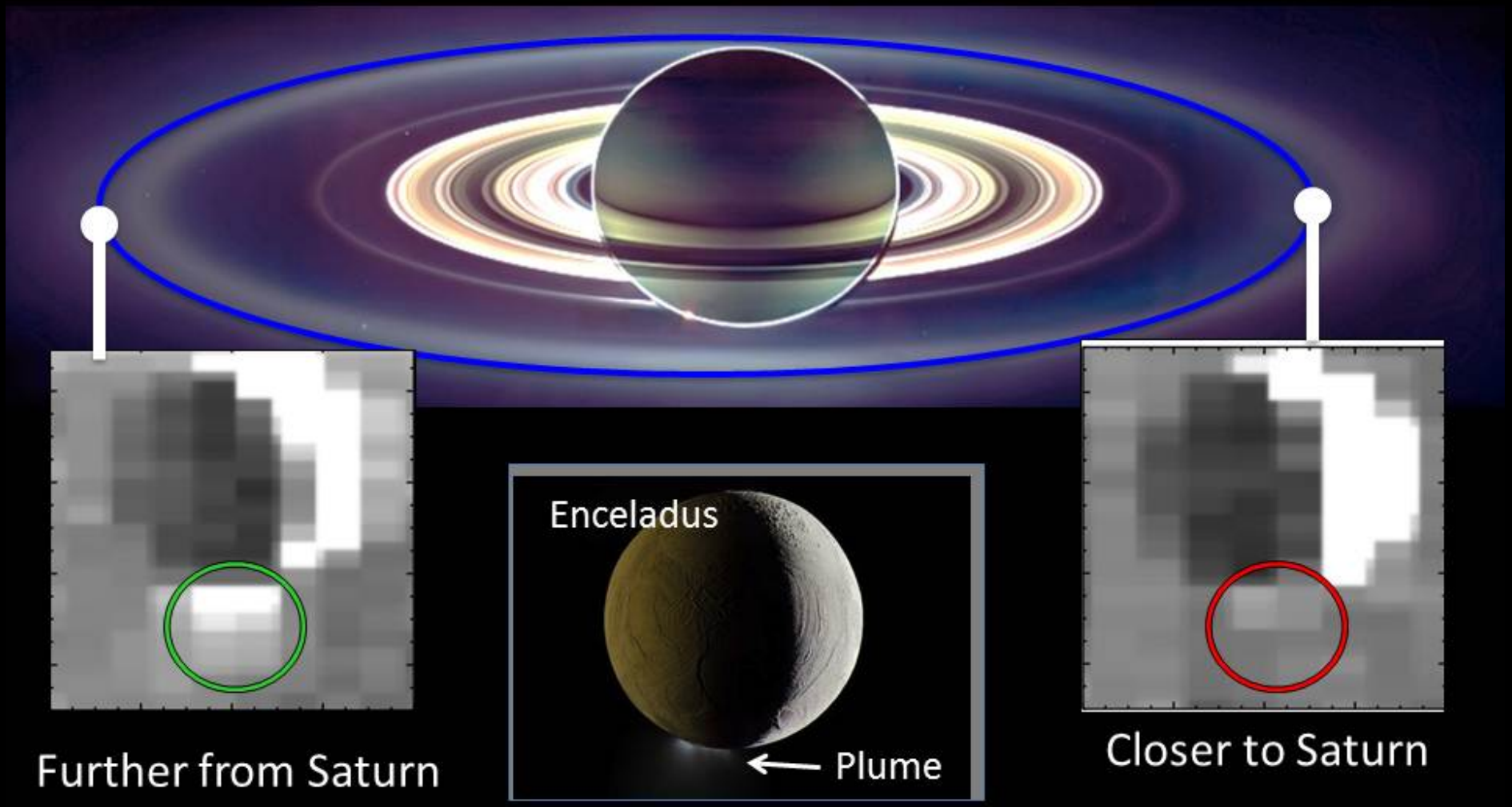
Europa

EXTRA SLIDE

Cassini Finds Tidal Forces Controlling Enceladus' Jets