IVO

IO VOLCANO OBSERVER

A Phase A study for NASA's Discovery mission program

#TeamIo #Discovery2020

https://ivo.lpl.arizona.edu/

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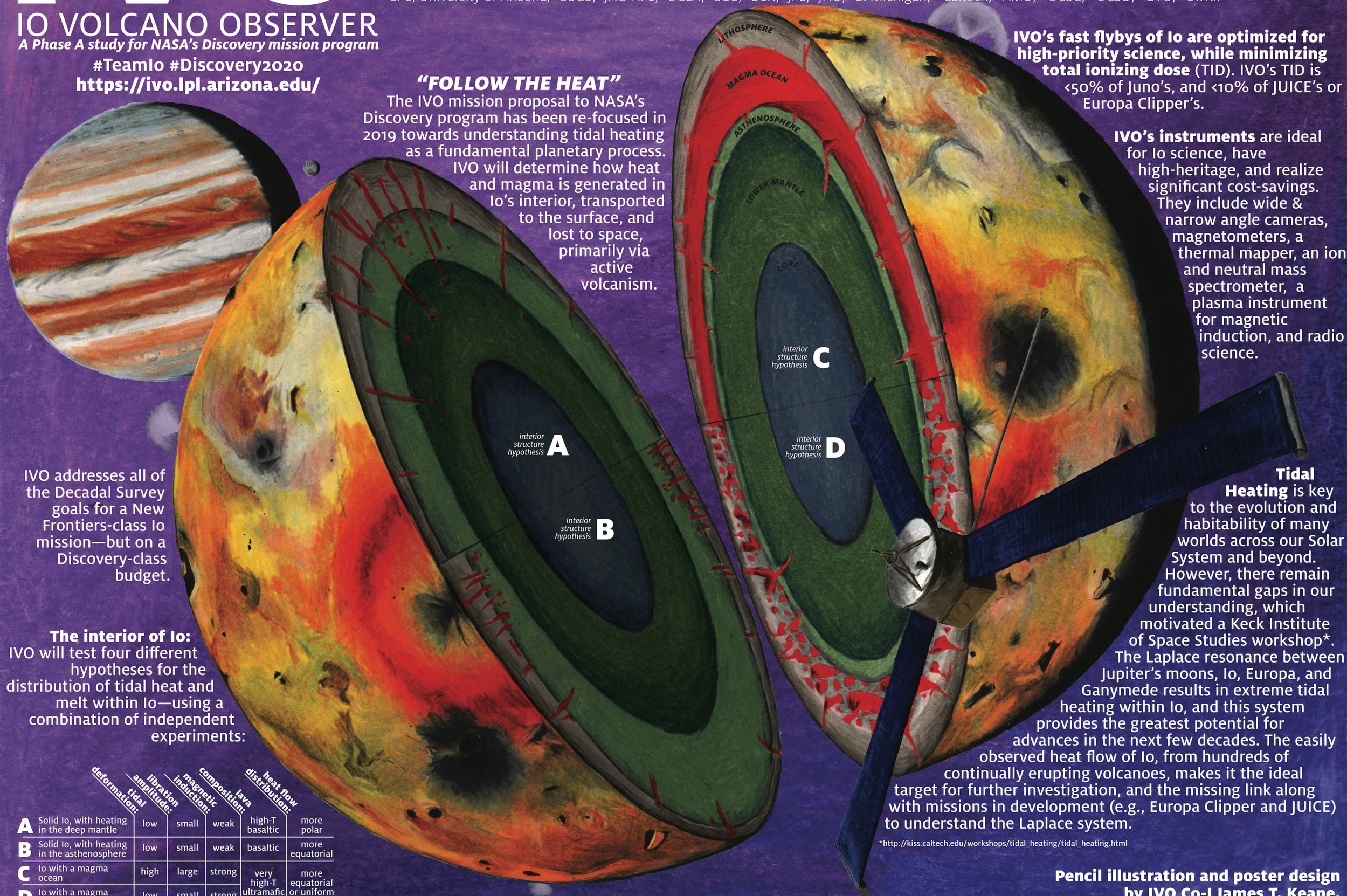
"FOLLOW THE HEAT"

The IVO mission proposal to NASA's Discovery program has been re-focused in 2019 towards understanding tidal heating as a fundamental planetary process. IVO will determine how heat and magma is generated in Io's interior, transported to the surface, and lost to space, primarily via active volcanism.

IVO's fast flybys of Io are optimized for high-priority science, while minimizing total ionizing dose (TID). IVO's TID is <50% of Juno's, and <10% of JUICE's or Europa Clipper's.

IVO's instruments are ideal for Io science, have high-heritage, and realize significant cost-savings. They include wide & narrow angle cameras, magnetometers, a thermal mapper, an ion and neutral mass spectrometer, a plasma instrument for magnetic induction, and radio science.



IVO addresses all of the Decadal Survey goals for a New Frontiers-class Io mission—but on a Discovery-class budget.

The interior of Io:
IVO will test four different hypotheses for the distribution of tidal heat and melt within Io—using a combination of independent experiments:

		tidal deformation:	libration amplitude:	magnetic induction:	composition:	lava heat flow distribution:	
A	Solid Io, with heating in the deep mantle	low	small	weak	high-T basaltic		more polar
B	Solid Io, with heating in the asthenosphere	low	small	weak	basaltic		more equatorial
C	Io with a magma ocean	high	large	strong	very high-T ultramafic		more equatorial or uniform
D	Io with a magma "sponge"	low	small	strong			

Tidal Heating is key to the evolution and habitability of many worlds across our Solar System and beyond. However, there remain fundamental gaps in our understanding, which motivated a Keck Institute of Space Studies workshop*. The Laplace resonance between Jupiter's moons, Io, Europa, and Ganymede results in extreme tidal heating within Io, and this system provides the greatest potential for advances in the next few decades. The easily observed heat flow of Io, from hundreds of continually erupting volcanoes, makes it the ideal target for further investigation, and the missing link along with missions in development (e.g., Europa Clipper and JUICE) to understand the Laplace system.

*http://kiss.caltech.edu/workshops/tidal_heating/tidal_heating.html

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