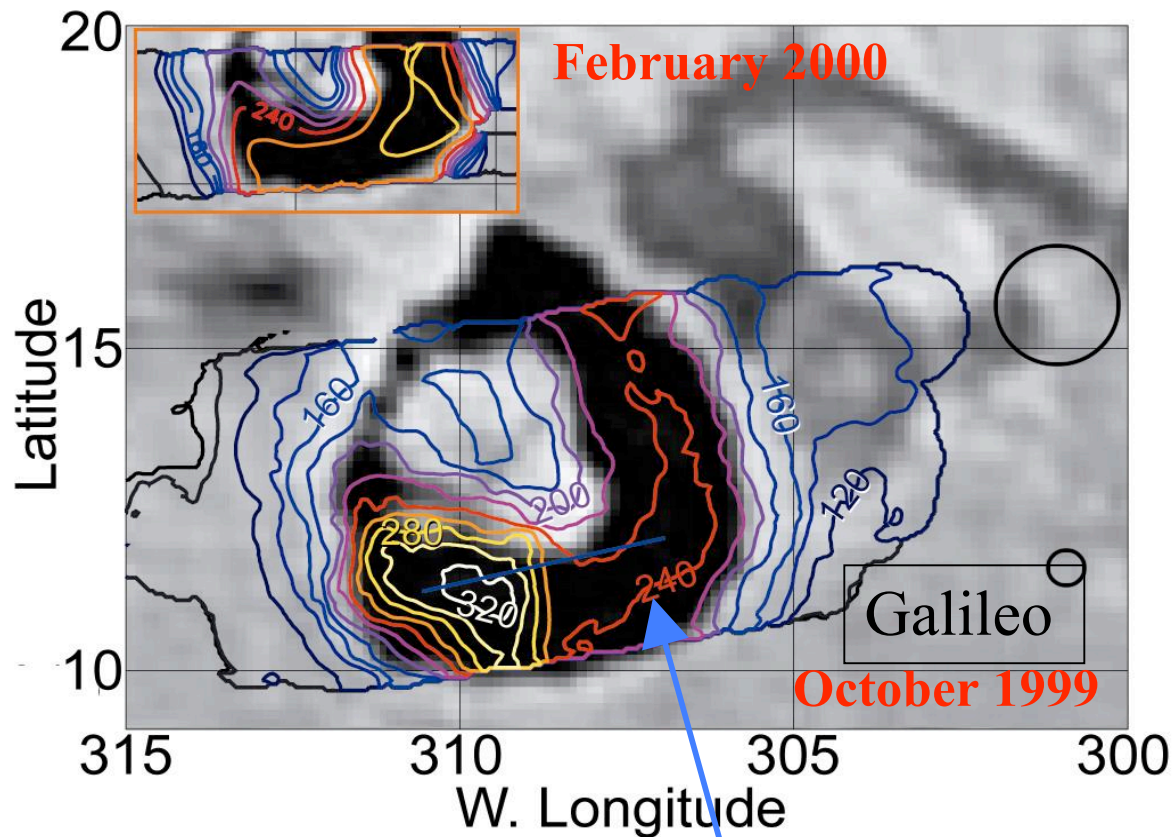


Loki, Io: Observations and Model

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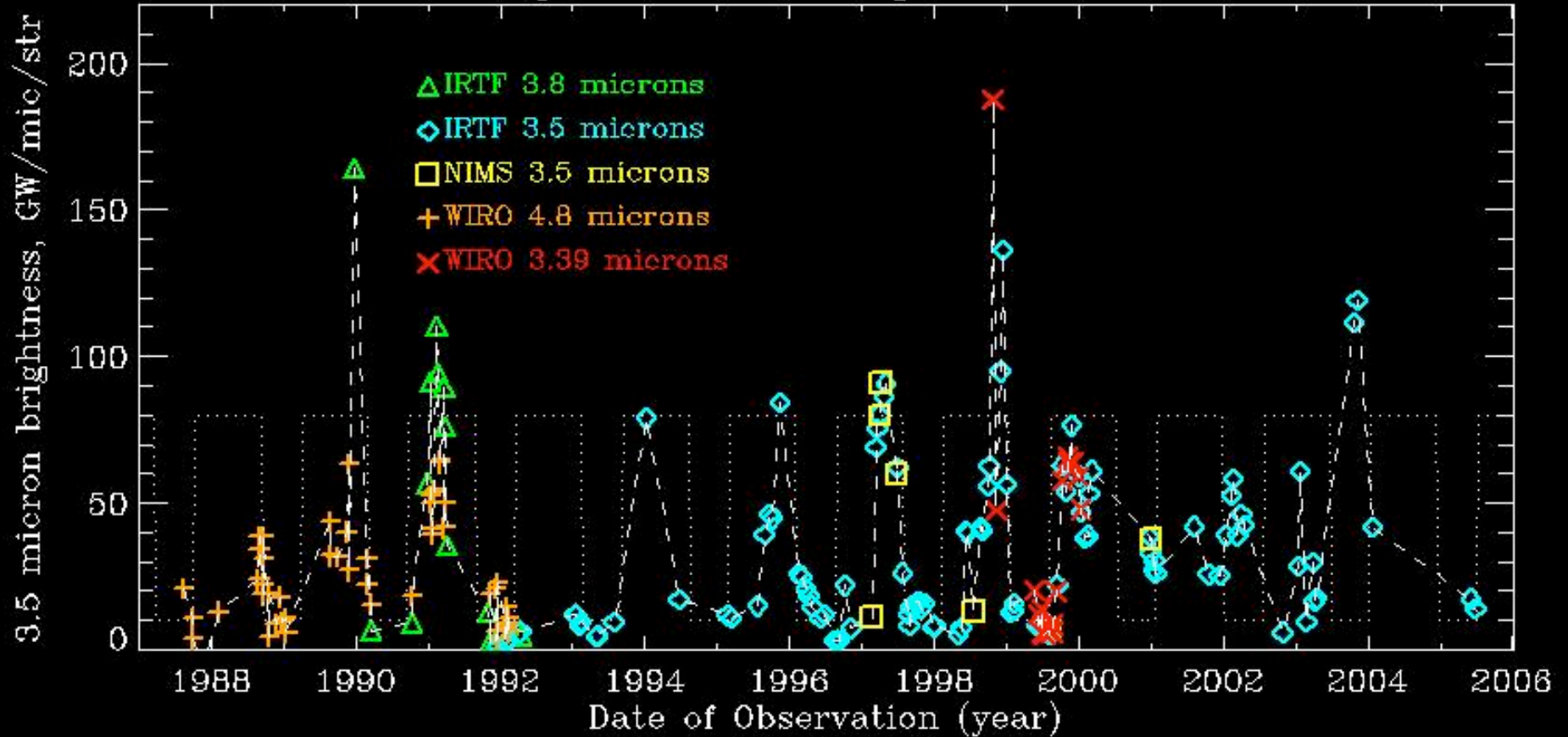
Propagation direction



Loki Patera is a horseshoe shaped dark region that is generally the brightest hotspot on Io.

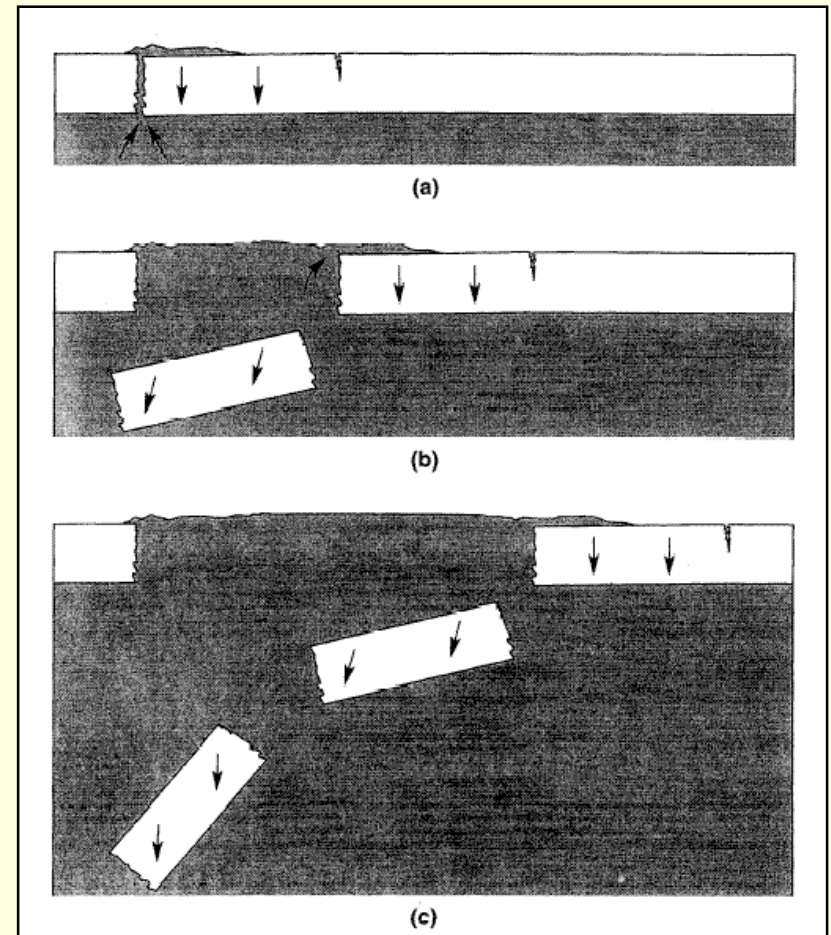
Voyager 1 and 2 (March and July 1979) Show coherent progression of “younger” material moving from SW corner

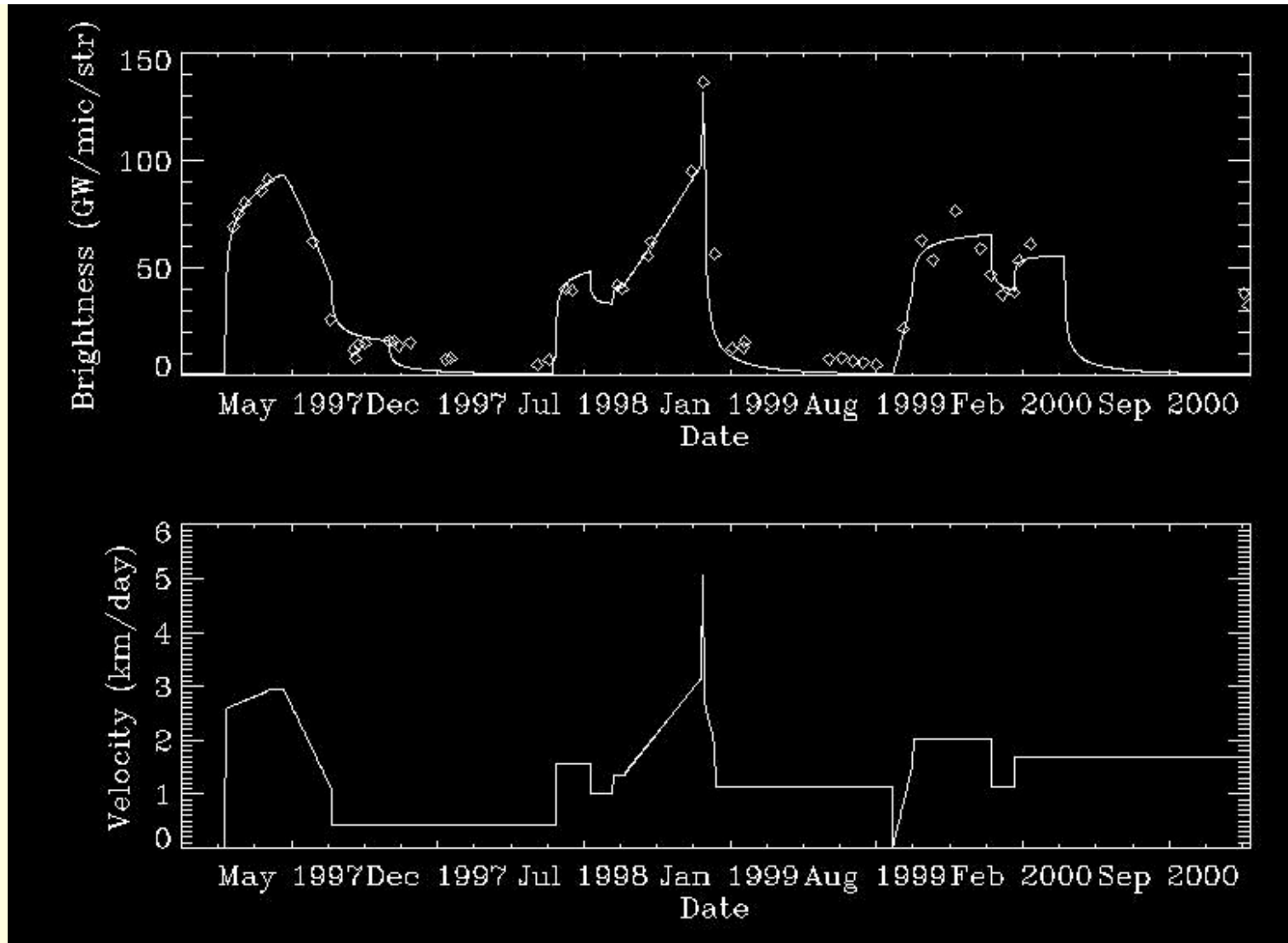
Loki Brightness from Jupiter Occultations



Ground-based observations show a semi-periodic change in the brightness of the volcanos on Io. These observations are made while Io is in the shadow of Jupiter. Brightening events occur when the crust on the lava lake overturns, revealing the hot magma underneath. Note the 18-year time span, with most of the data obtained with the IRTF.

To match data, Rathbun et al. (2002, GRL, 29j, 84) proposed that Loki is a lava lake. As the crust cools and solidifies, it becomes negatively buoyant and sinks. One piece sinks, causing the piece next to it to sink, thus creating a coherent resurfacing progression.





Best three-year period of data is matched by simple variations of velocity with time of the pieces of crust. The model works best if assume material is silicate, not sulfur.

Summary

- A simple model of an overturning lava lake matches the ground-based observations.
- Changes in the propagation velocity can explain the changes in brightness and the changes in periodic behavior.
- But, what causes the velocity to change? One possibility is that the density of the floating material might be variable. This could result from variations in the amount of volatiles in the magma.