

Satellite flux tube crossing opportunity

<http://lasp.colorado.edu/home/mop/missions/juno/trajectory-information/>

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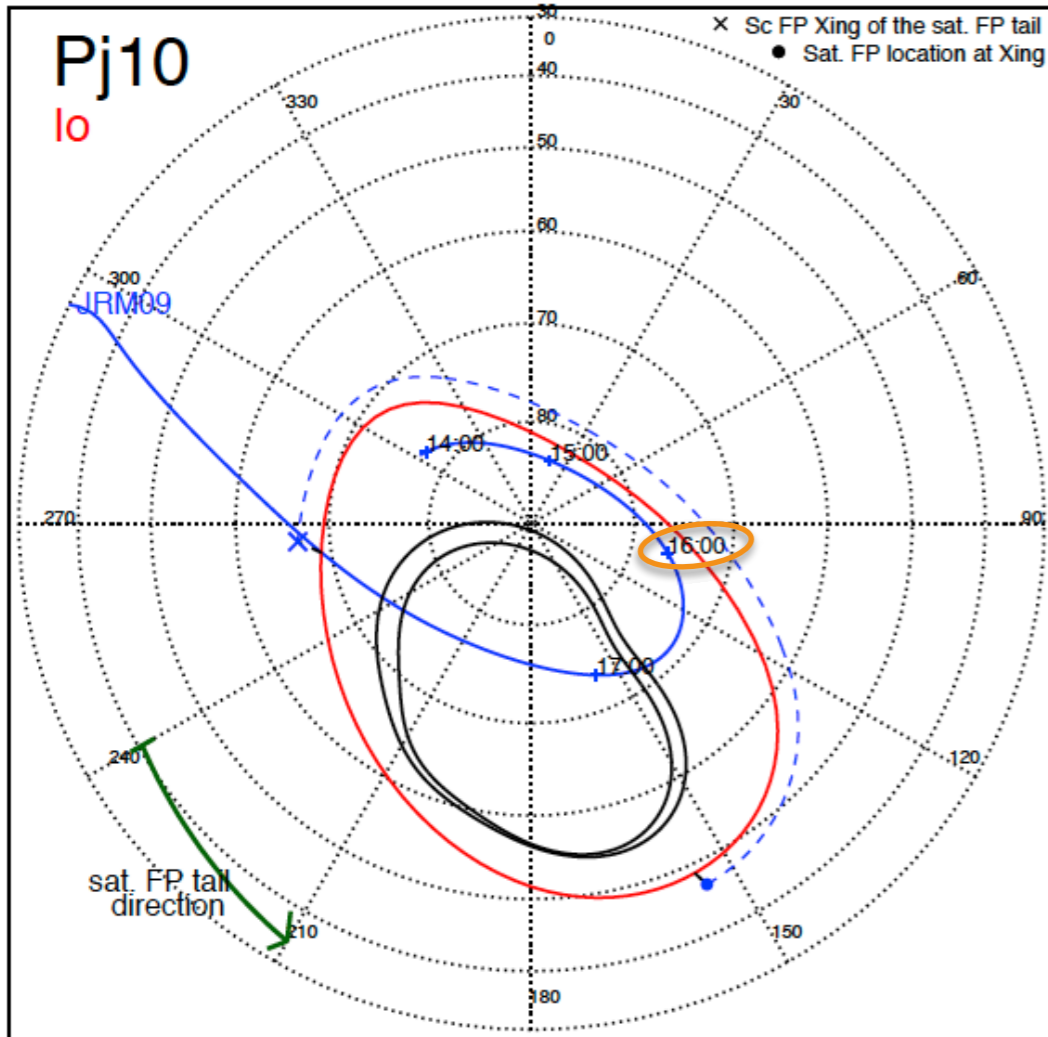
Jamey Szalay

Masafumi Imai

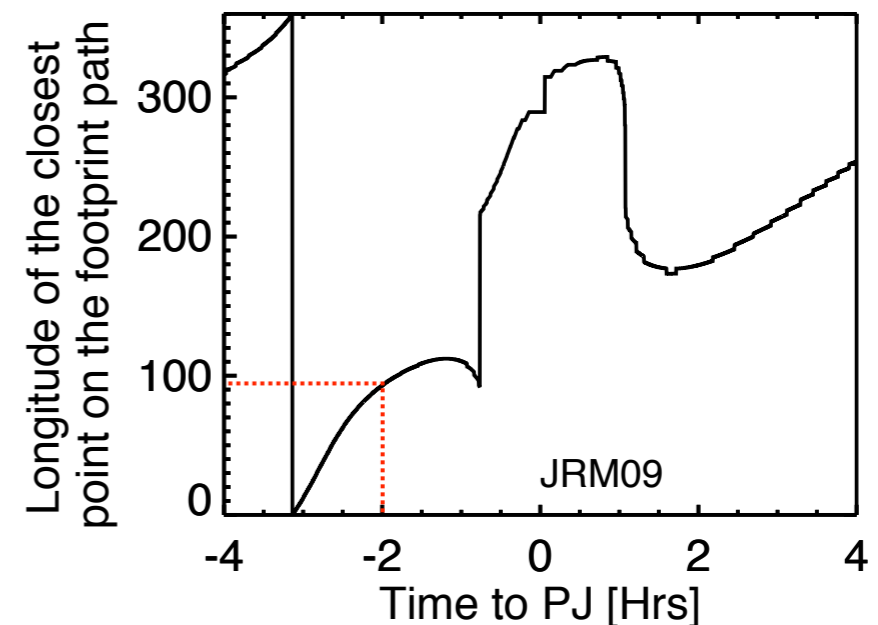
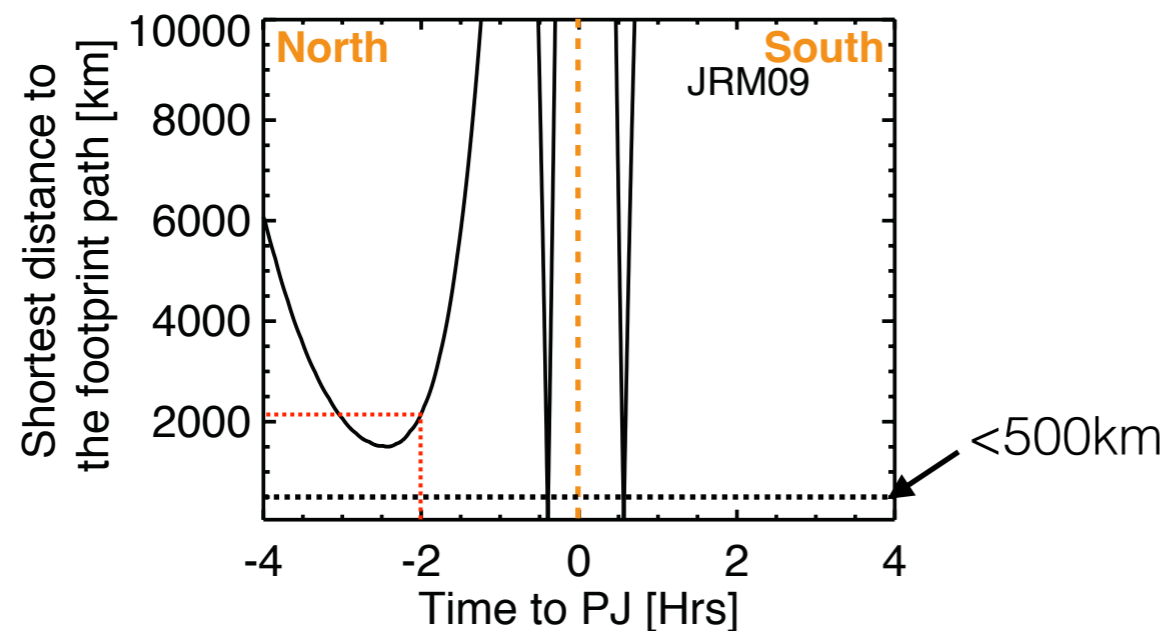
29 Dec 2022

Calculating the flux tube crossing times

Pj10 (PJ time: 12/16/2017 17:56:59) - North

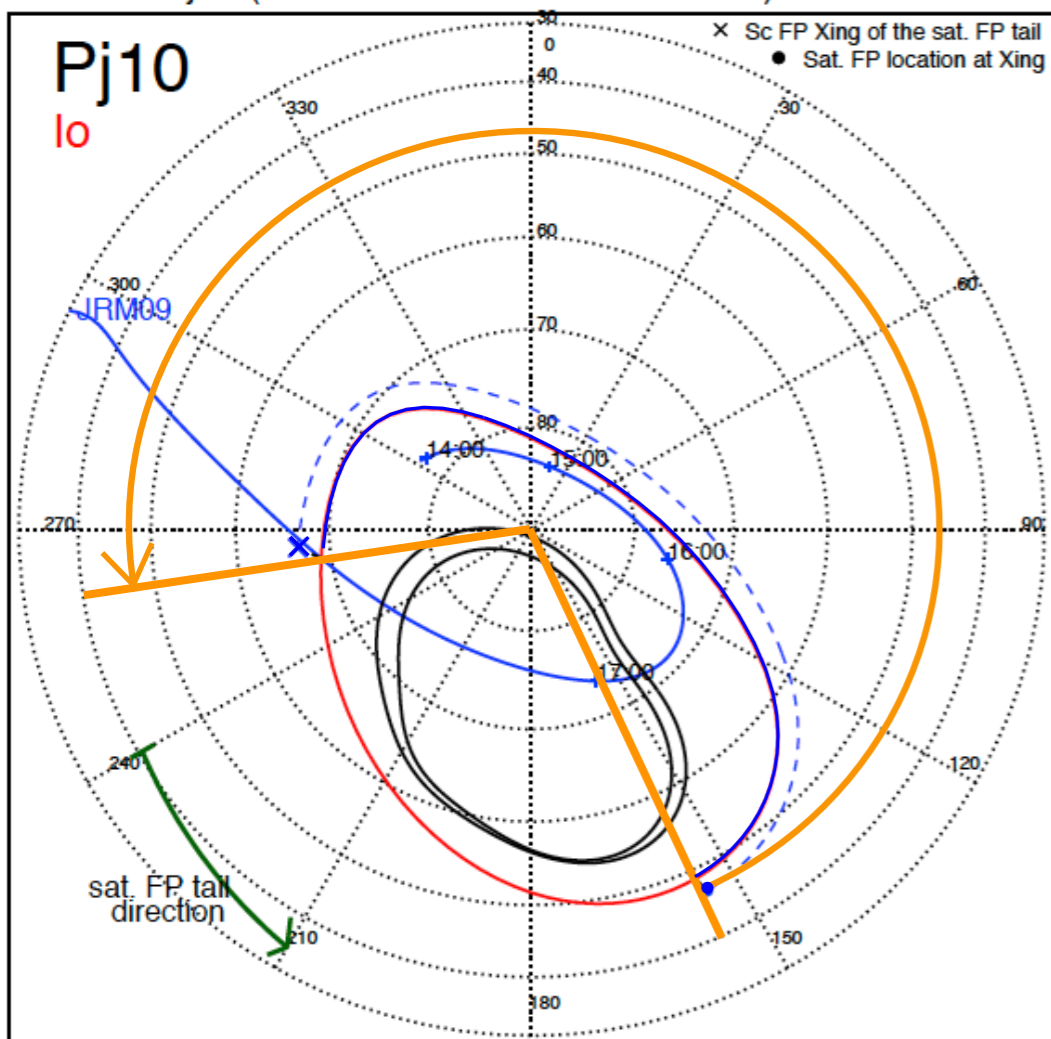


- Use of Masafumi's magnetic footprint data (<http://www-pw.physics.uiowa.edu/juno/mwg/hdf5/>)
- Use the instantaneous footprint positions (no Alfvén travel time) from JRM33 (Connerney et al. 2021)
- Use a 10sec resolution over the -4:+4 hrs about PJ, calculate the closest points on the footprint path
- E.g. at 16:00 (~2hrs before PJ):
 - ▶ longitude of the closest point on the FP path: ~95°
 - ▶ shortest distance: ~2000km
- Crossings are defined when the distance to the FP path is <500km

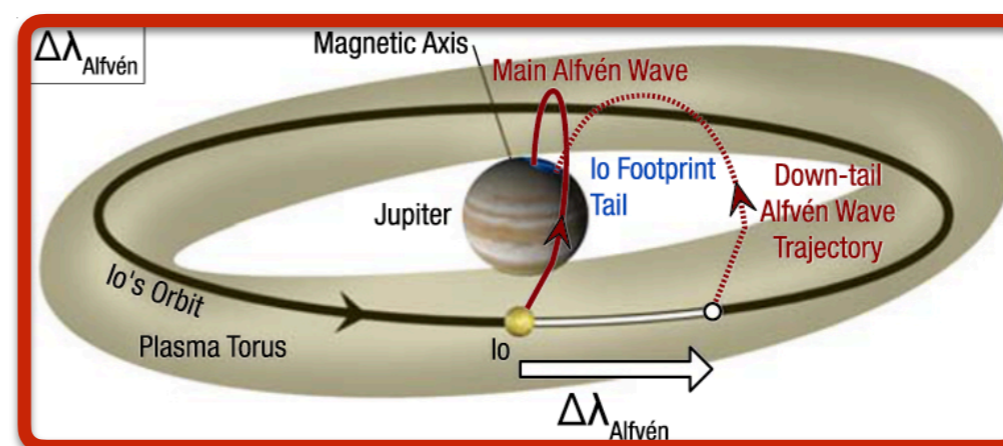


Spreadsheet of flux tube crossings

Pj10 (PJ time: 12/16/2017 17:56:59) - North



- Excel spreadsheet available at: <http://lasp.colorado.edu/home/mop/missions/juno/trajectory-information/>
- **Delta Long. (sat FP - ScFP)**: SIII longitude difference between the instantaneous satellite footprint position and the Juno footprint at flux tube crossing
- **Xing distance down the tail [km]**: integrated distance from the instantaneous satellite footprint position up to the crossing location
- **Duration crossing [s]**: Time during which the Juno magnetic footprint is located within 500km of the satellite footpath for a given crossing
- **Delta Ion Alfvén** (defined after Szalay et al., 2020)
 - ➔ Angular separation along Io's orbit between Io and an Alfvén wave trajectory back-traced from Juno's footprint
- **Delta Ion orbit**
 - ➔ Angular separation along Io's orbit between Io and the instantaneously-mapped position of Juno



PJ	Moon	Xing time (UTC)	Delta Long. (sat FP - ScFP)	Xing distance down the tail [km]	Delta Ion Alfvén	Delta Ion orbit	Sc Altitude [km]	Duration Xing [s]
Pj10	Io	2017-12-16T17:33:18	252.9	84083.1	203.5	208.4	26653.1	21.6