

Kick-off meeting of joint research program between France and Japan: “Coordinated observational and theoretical researches for Jovian and Kronian auroral radio emissions“

Date: 25 May (Wed) 12:30-13:30

Room: 301A (International Conference Hall 3F)

1. Welcome, on this program (A. Kumamoto)
2. Research plan and tool developments schedule at Obs Paris (B. Cecconi)
3. Research plan with Iitate DAM data archive (A. Kumamoto)
4. Research plan with Hisaki data archive (T. Kimura)
5. Solar wind data archive based on the model (C. Tao)
6. Joint seminar schedule (in Japan (July) and France)

Related schedule:

JUICE/RPWI meeting (Sendai) July 11-15

→ July 15(Fr) (if impossible, July 16(Sat.))

PRE VIII (Graz) Oct. 25-27

→ Oct. 24(Mo) or 28(Fr)

Tao-san: 28NG / Imai-san:20NG / France team: T.B.C.

JSPS Bilateral Program for Joint Research Project with France (MAEDI)
<SAKURA Program>

**Coordinated observational and theoretical researches for
Jovian and Kronian auroral radio emissions**

(April 2016 - March 2018)

Joint research on

- (1) Jovian auroral radio emissions (Nancay, Itate, etc.)
- (2) Kronian auroral radio emissions (Cassini)
- (3) Comparison with spectroscopic obs. (Hisaki)
- (4) Models (Solar wind, Jovian MTI coupling)

<France>

*B. Cecconi, L. Lamy, P. Zarka (LESIA, Observatoire de Paris)
N. Andre, M. Blanc (IRAP)

<Japan>

*F. Tsuchiya, Y. Kasaba, A. Kumamoto, H. Misawa, Y. Katoh,
H. Kita (Tohoku Univ.), K. Fukazawa (Kyoto Univ.), T. Kimura (RIKEN),
M. Yagi (Univ. of Tokyo), Y. Miyoshi (Nagoya Univ.)
K. Imai (Kochi National College of Tech.), M. Imai (Univ. of Iowa)
T. Nakajo (Fukui Univ. of Tech.), C. Tao (NiCT)

“Integrated observatory on which Jupiter never sets” for JUNO collaborative ground-based observation

Jovian DAM

Useful for monitoring Jovian magnetosphere and auroral activity

Merits of Ground-based obs.

Possible to use enough facilities

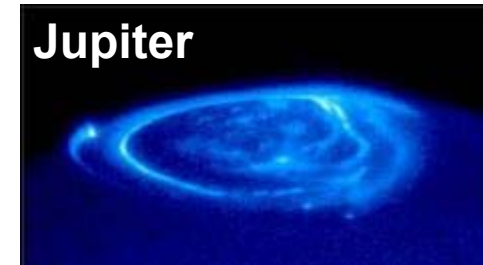
- Large array antenna
- Receivers with high frequency & time resolutions
- High-speed networks & huge storages

Demerits of Ground-based obs.

- Weak signal due to distance
- Artificial noises on the Earth
- Possible only while the Jupiter is above the horizon

Avoidable by observation with multiple ground stations

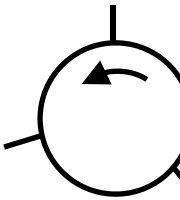
→ **Integrated data archives like VO will be an effective solution.**



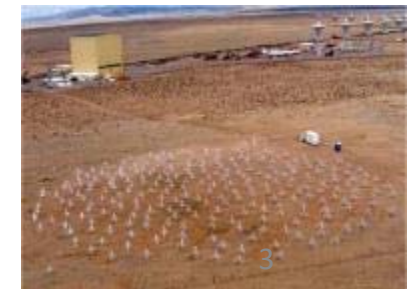
litate
(140°E)



Nancay
(2°E)



LWA
(107°W)



EPN-TAP protocol and VO

Operated since July 2015

Since 2000

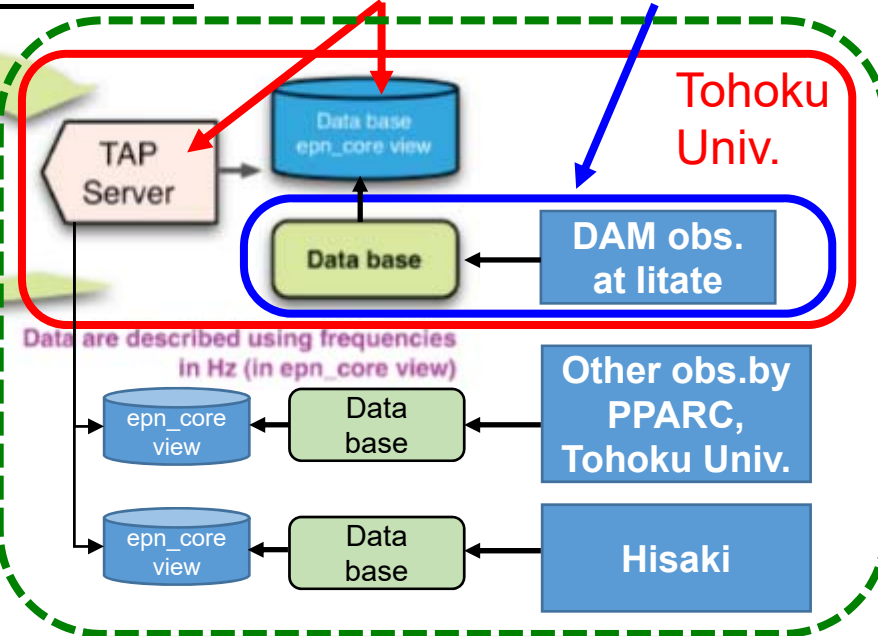


User types queries using cm-1 or μ m, as preferred

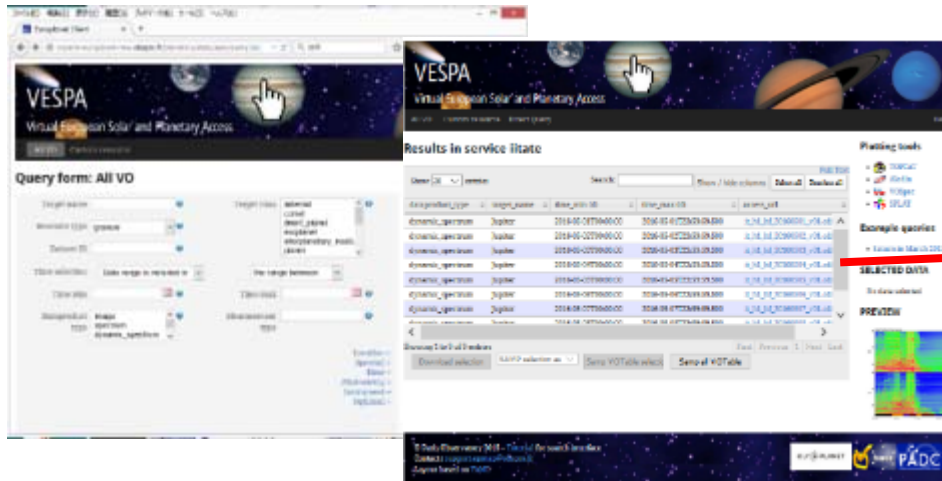
EPN-TAP Client

Queries / answers use frequencies in Hz

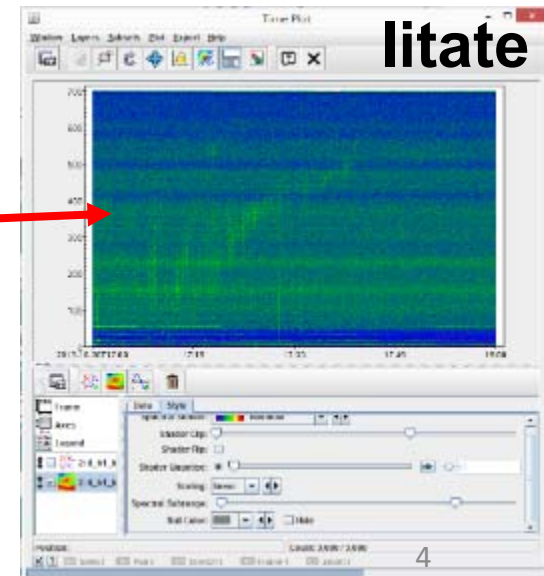
[modified from Erard et al., 2014]



Developing

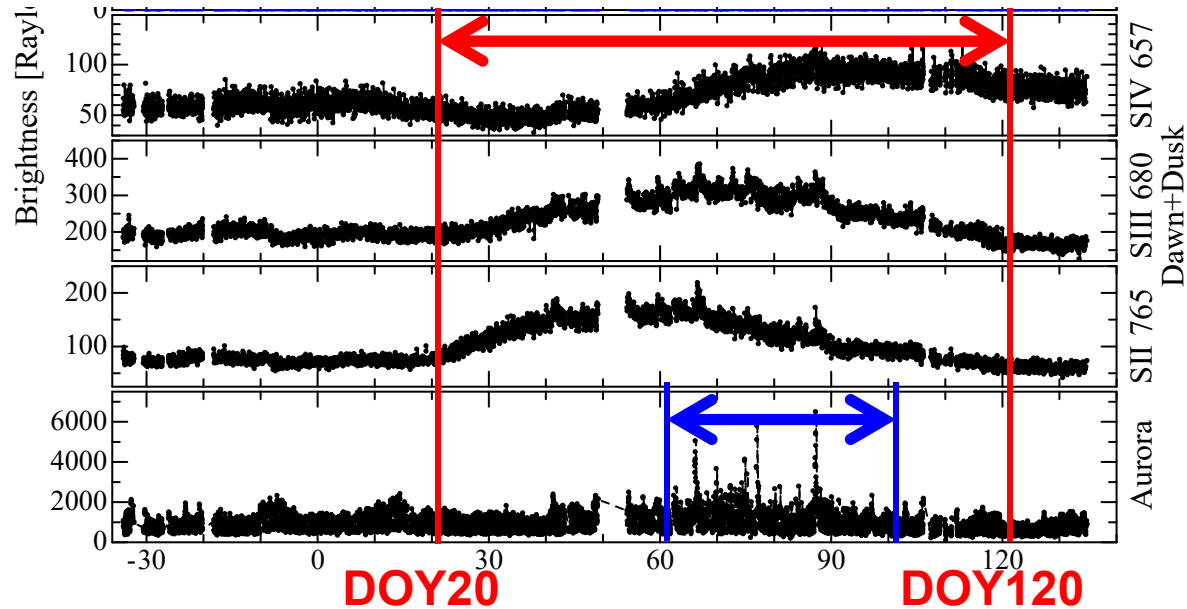


Display (TOPCAT)



Portal web site for VO query
<http://voparis-europlanet-new.obspm.fr/>

Possible use case: Jovian DAM during Volcanic activity detected by Hisaki



Io plasma torus (SII&SIII):

Increase from DOY20 to DOY120
due to volcanic activity

Aurora:

Increase from DOY60 to DOY100

Jovian DAM:

??? → Analysis of Iitate HF data

Expected relation between Jovian DAM & plasma density

Intensity of Alfvén waves

$$I = 4R_{Io} v_{Io} B \Sigma_A$$

$$= 4R_{Io} v_{Io} B \frac{1}{\mu_0 V_A} \propto \sqrt{n}$$

[Neubauer, 1980]

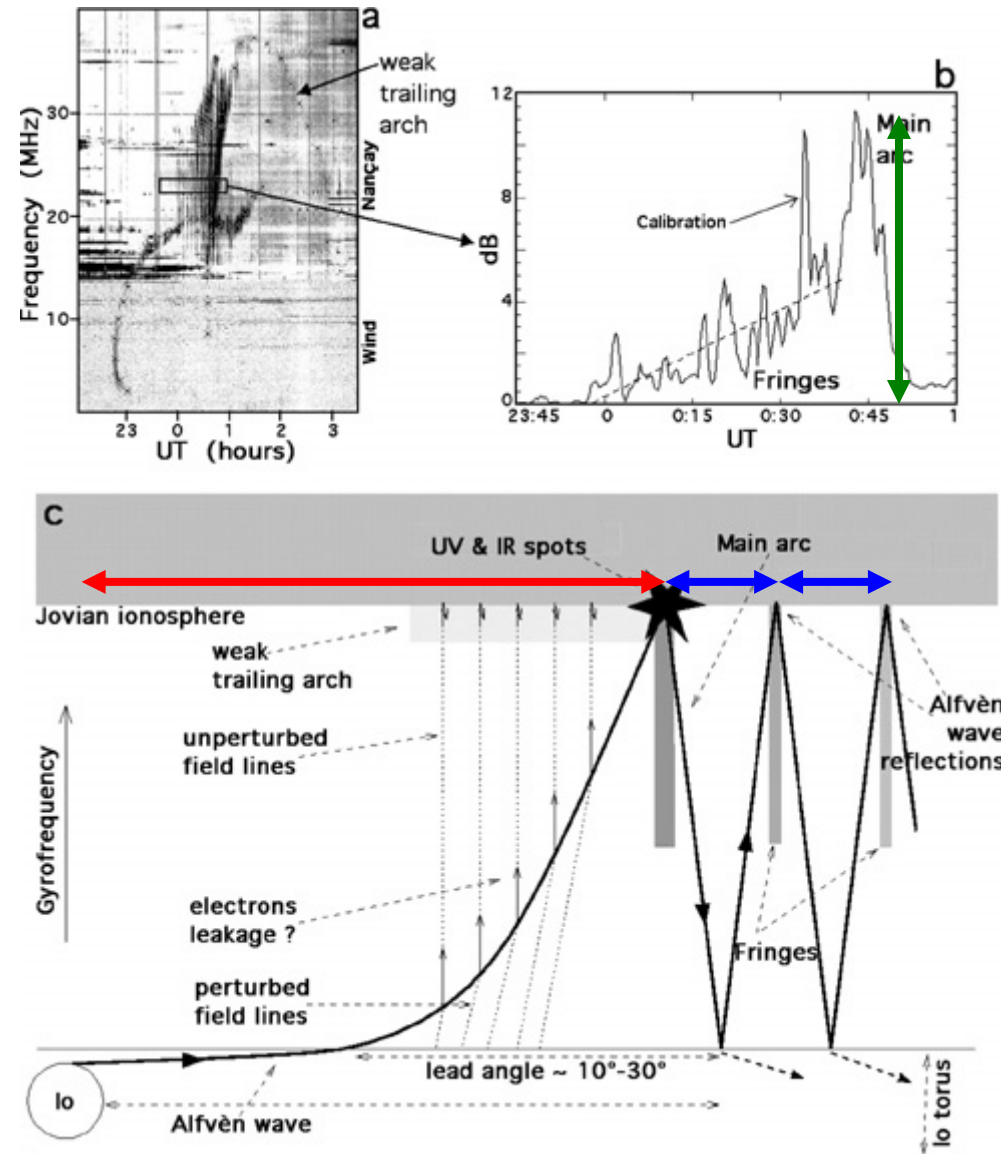
→ Intensity, occurrence probability (increase)

Alfvén velocity

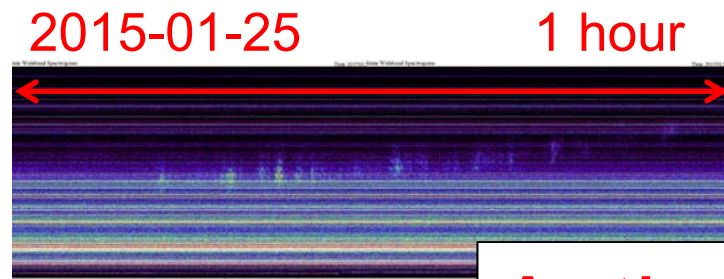
$$V_A = \frac{B}{\sqrt{\mu_0 m n}} \propto \frac{1}{\sqrt{n}}$$

→ Timing of main arc (decrease)

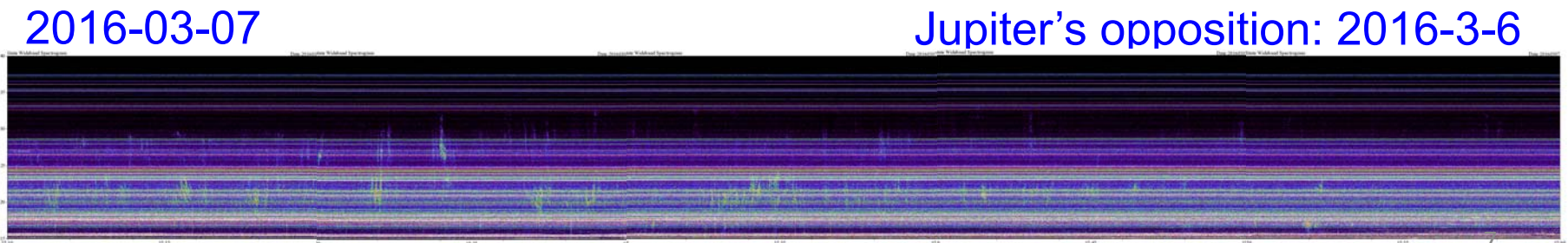
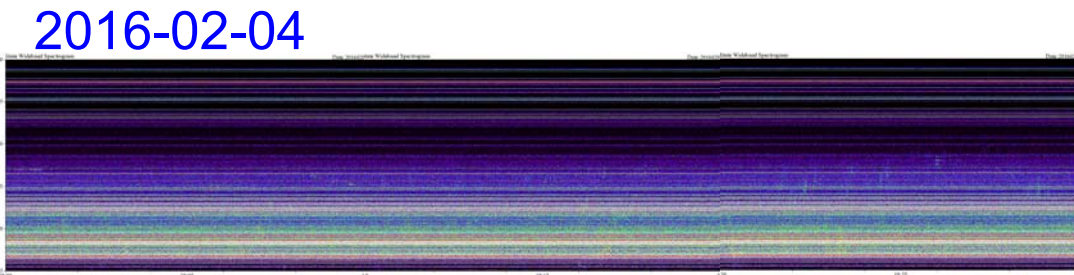
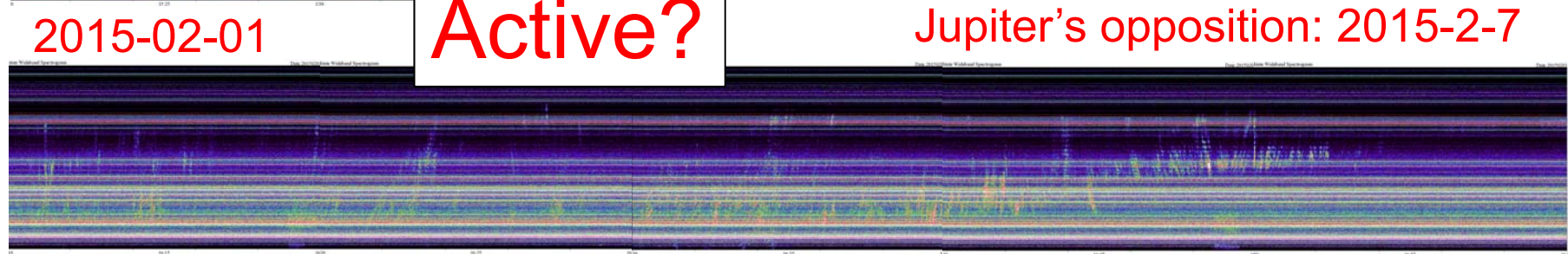
Repetition freq. of arcs (decrease)

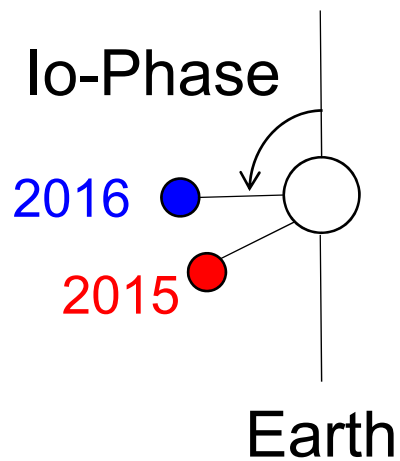
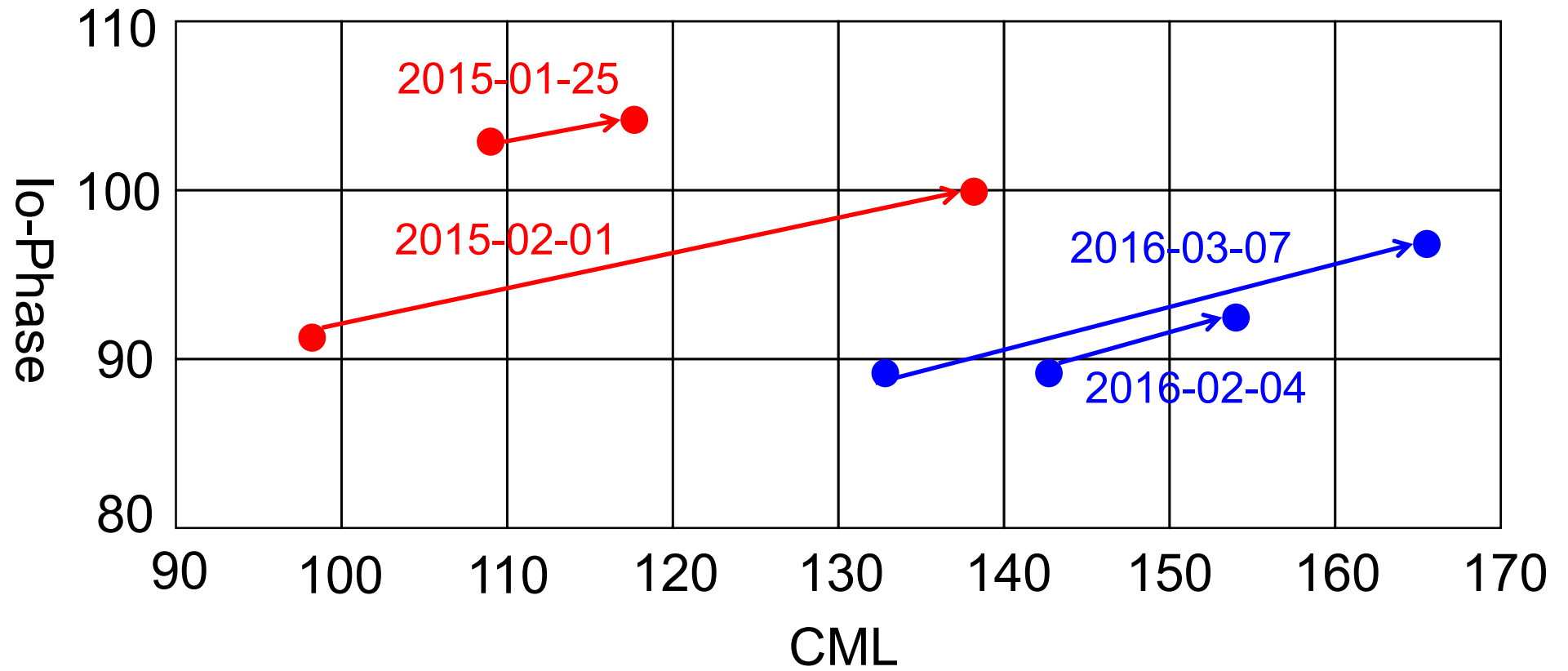


Jovian DAM detected at litate observatory



We found
2 Io-B events during Jan. & Feb, 2015, and
2 Io-B events during Feb. & Mar. 2016





Due to
increase of
Lead angle?