水星ナトリウム大気光観測

亀田真吾[1]、鍵谷将人[2]、岡野章一[2]、
大六隼人[1]、布施川綾花[1]
[1]立教大学, [2]東北大学

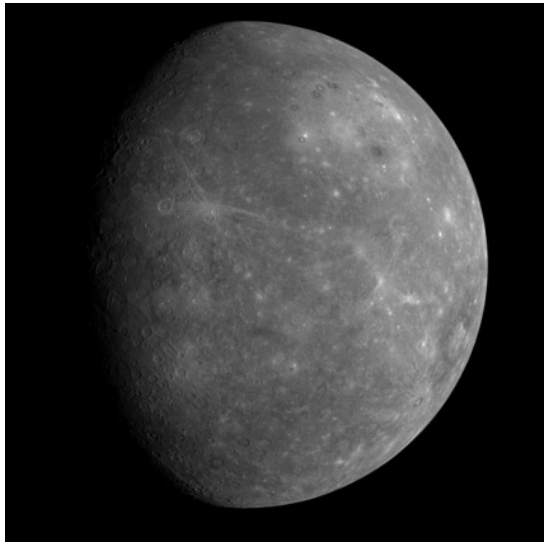
Mercury

--Just 3 Flyby by Mariner 10 in 1973-1974.

No observation by any orbiter

until March 18, 2011 (MESSENGER)

--Like Moon?

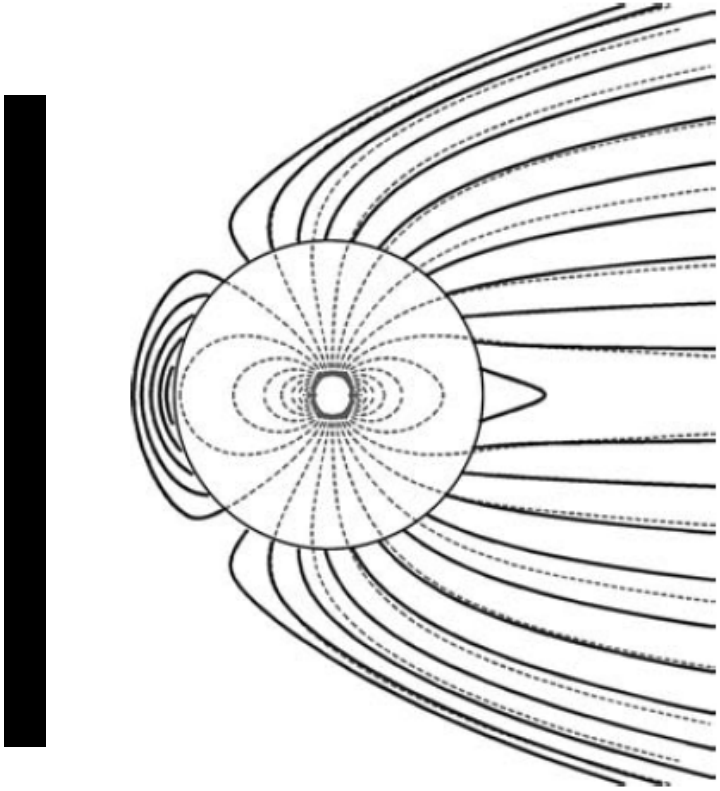


Mercury

--Like Moon? → Several differences.

1, Intrinsic magnetic field

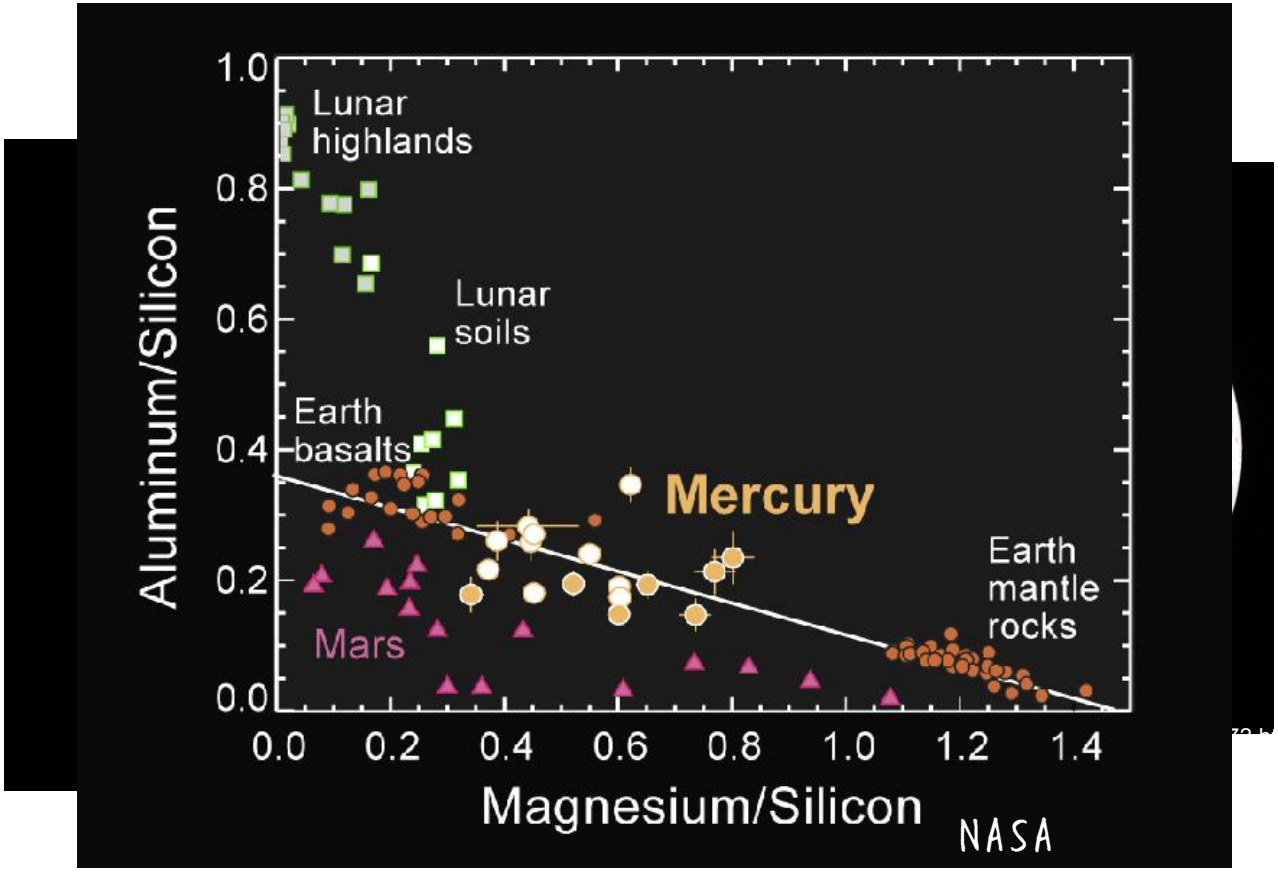
Found in 1973 and its origin is still under discussion.



Mercury

--Like Moon? → Several differences.

2, Composition (Observed by MESSENGER)

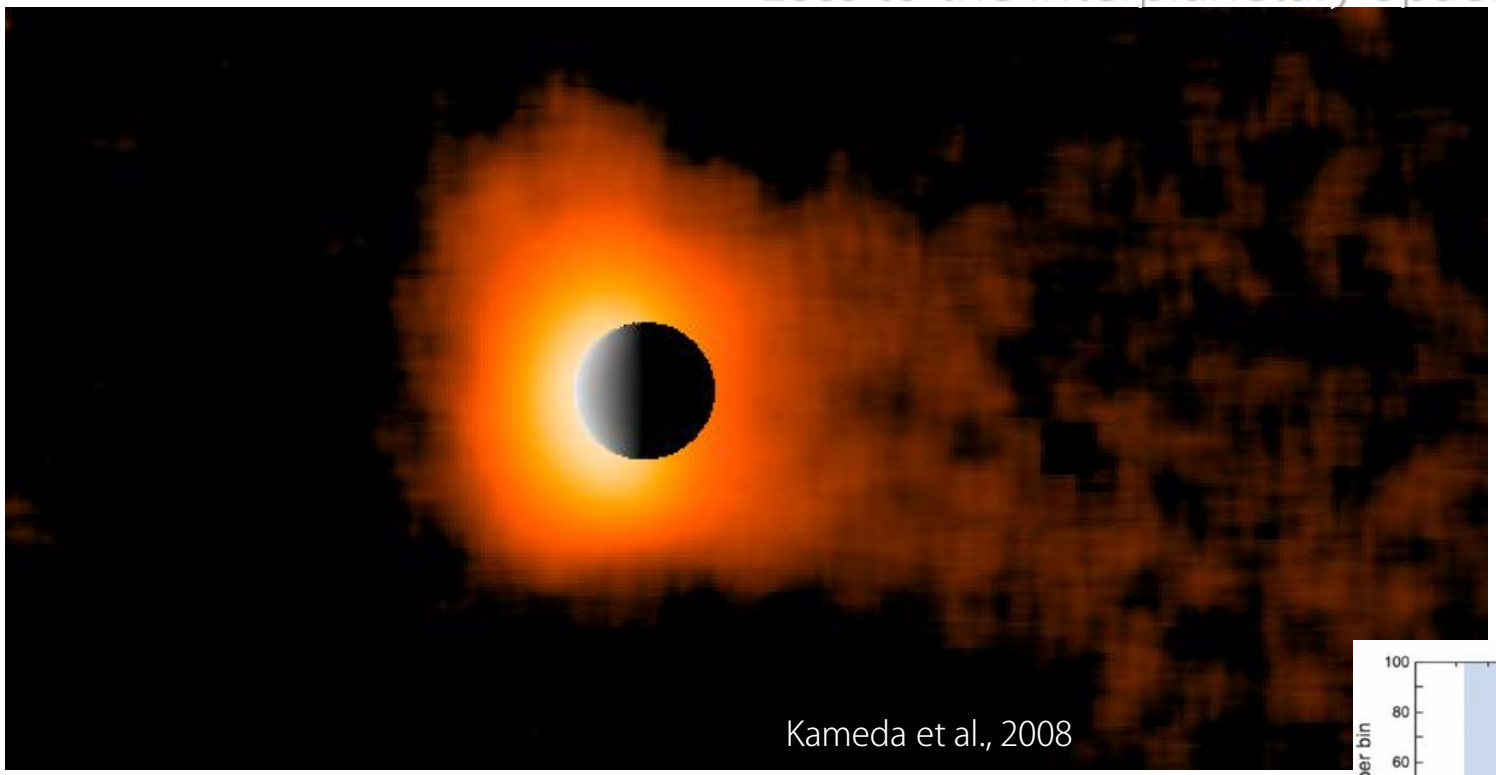


Mercury's atmosphere

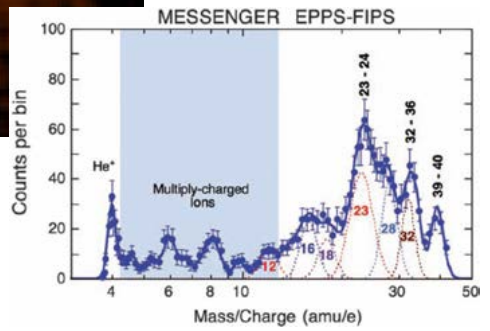
Collisionless atmosphere P~10^{-12} atm

Released from the surface ・Impact to the surface (SP, SW, IPD)

・Loss to the Interplanetary Space



Kameda et al., 2008



Zurbuchen et al., 2008

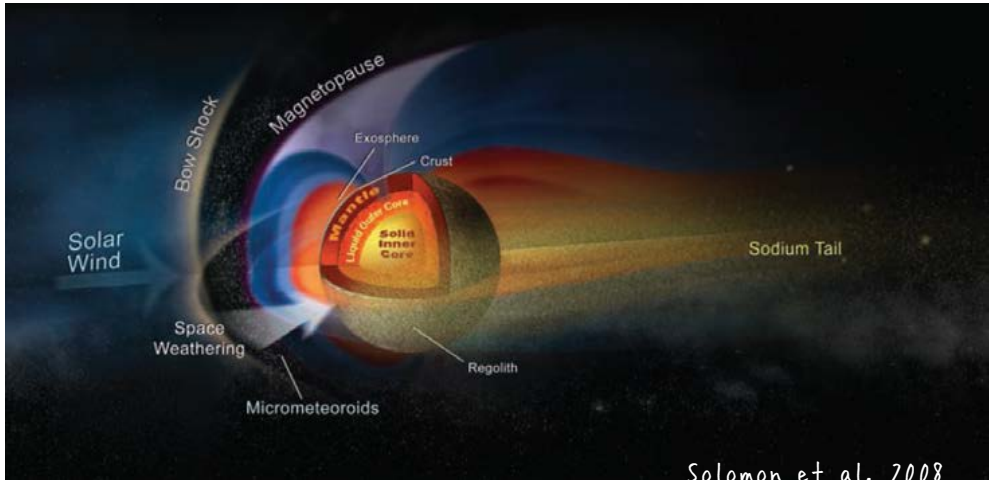
Remote Sensing: H,He,O,**Na**,K,Ca,Mg,Ca+,Al?,Fe?

In Situ : H^+,He^+,**Na^+**(Mg^+),O_2^+,K^+(Ca^+,Ar^+), etc.

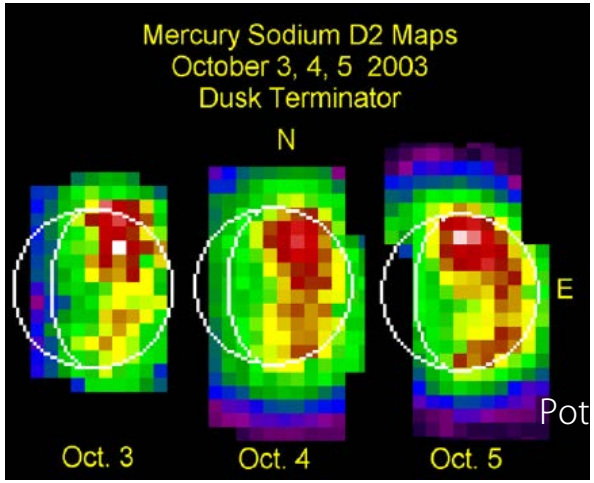
Mercury's Atmosphere

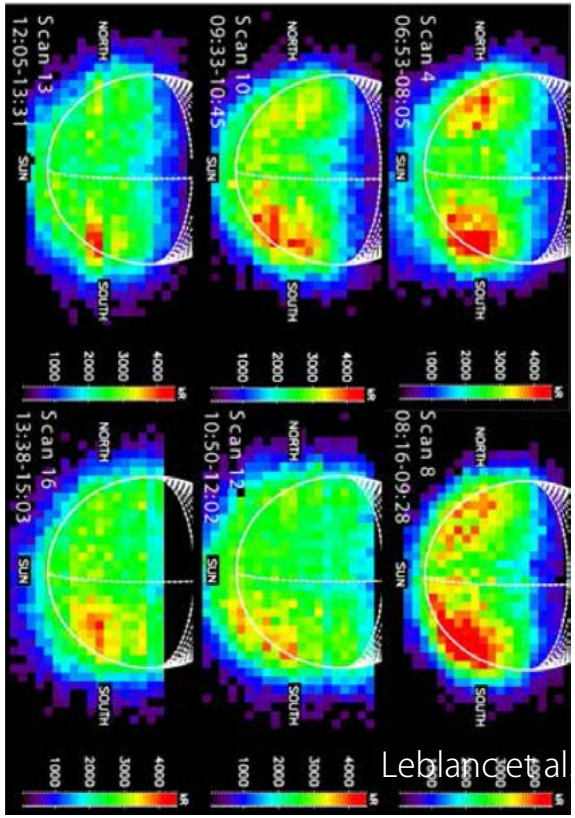
- Interaction between the solid surface and Mercury's environment

diffusion

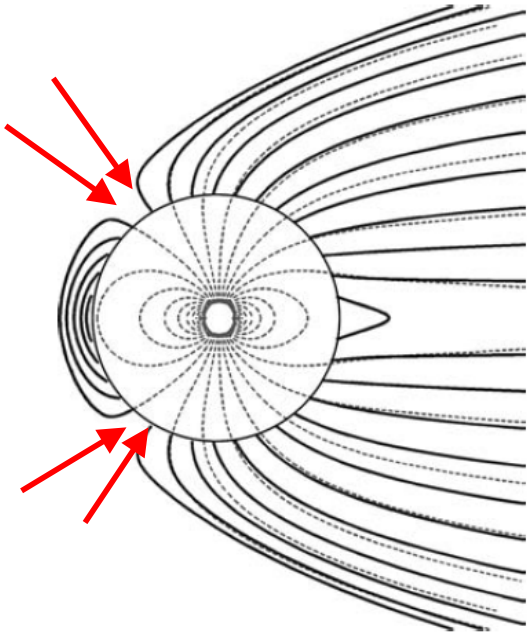


Source process of Mercury's exosphere?

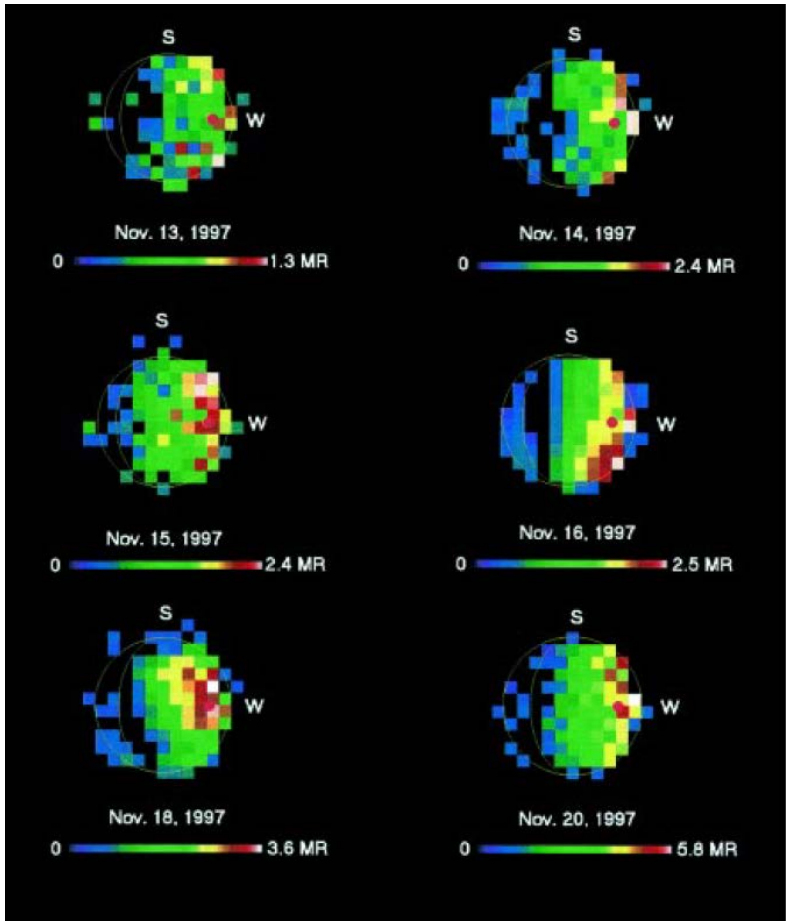


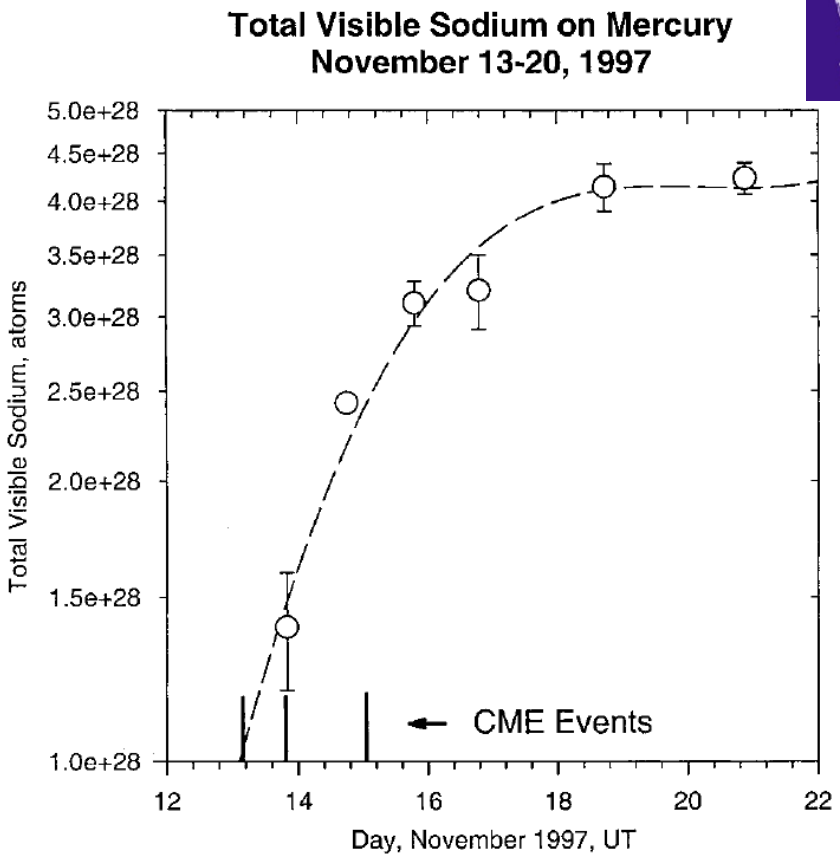


→ Effect of Solar wind impact??



Rapid change observed in the past

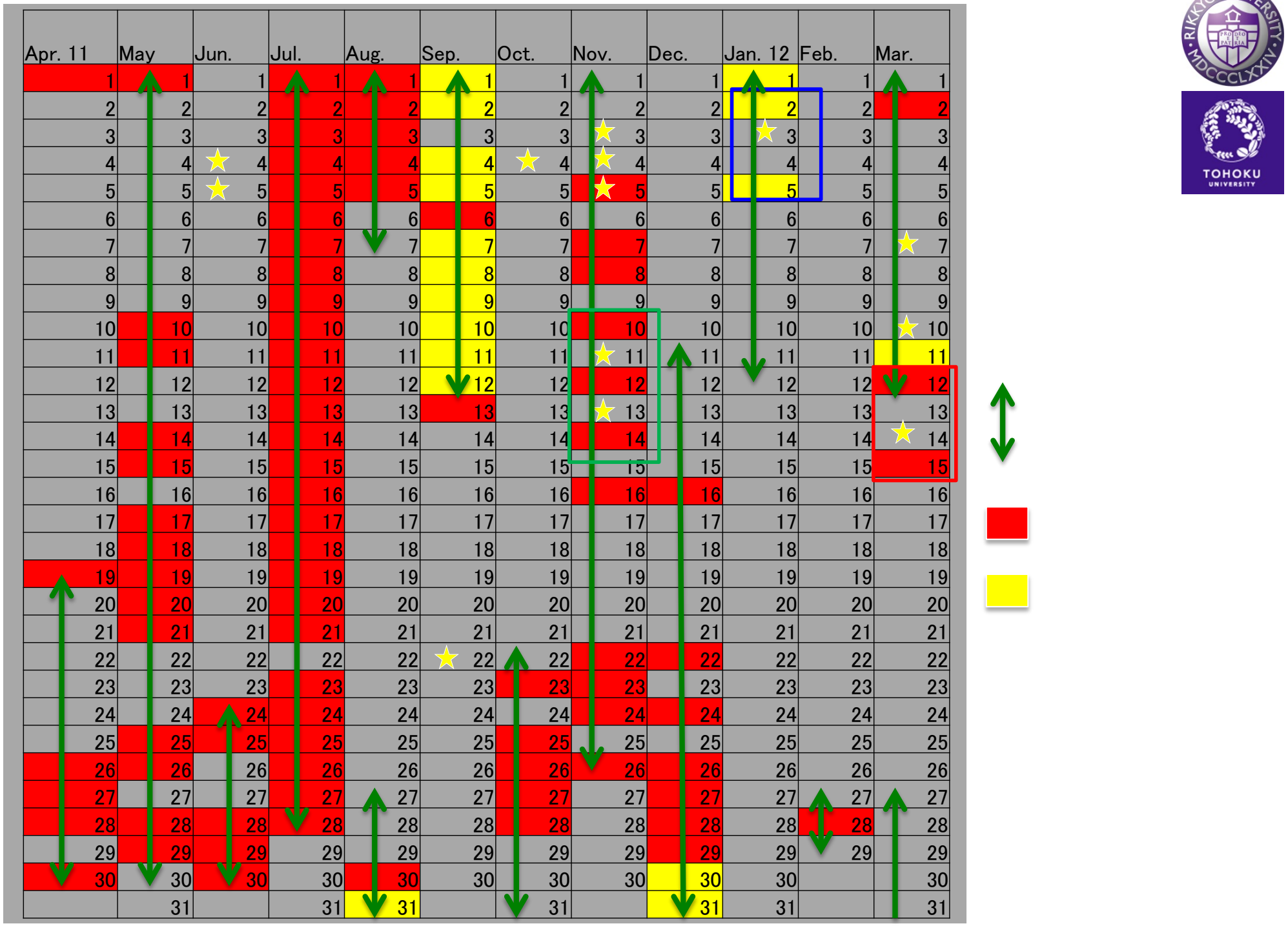


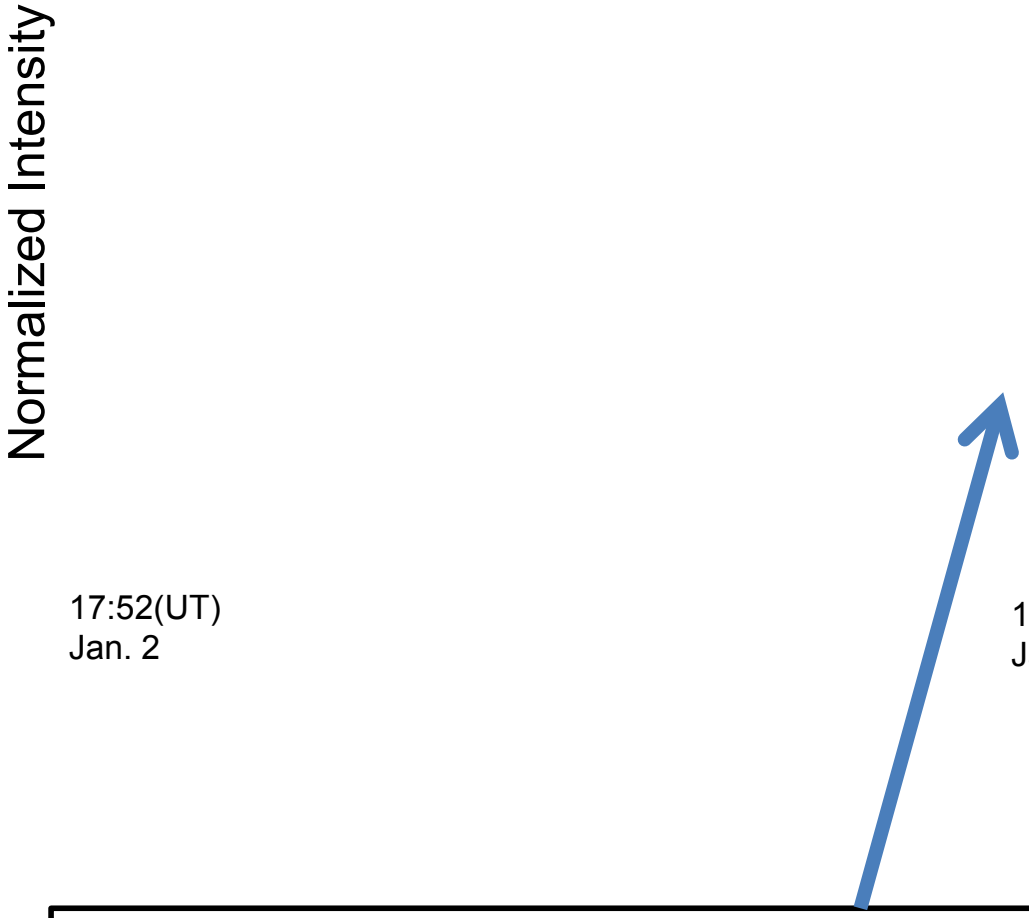


Potter et al., 1999 explained that the increase was possibly caused by CME. (and no other candidate)

2011年の観測

- マウイ・ハレアカラ観測所
- 2010年よりリモート観測可能
- 2011年夏から伸縮式遮光フードを設置し、日中の観測
- 岡山では、、、

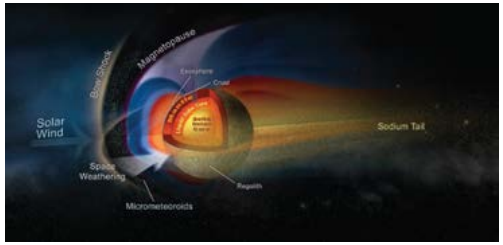

Apr. 11
May
Jun.
Jul.
Aug.
Sep.
Oct.
Nov.
Dec.
Jan. 12
Feb.
Mar.

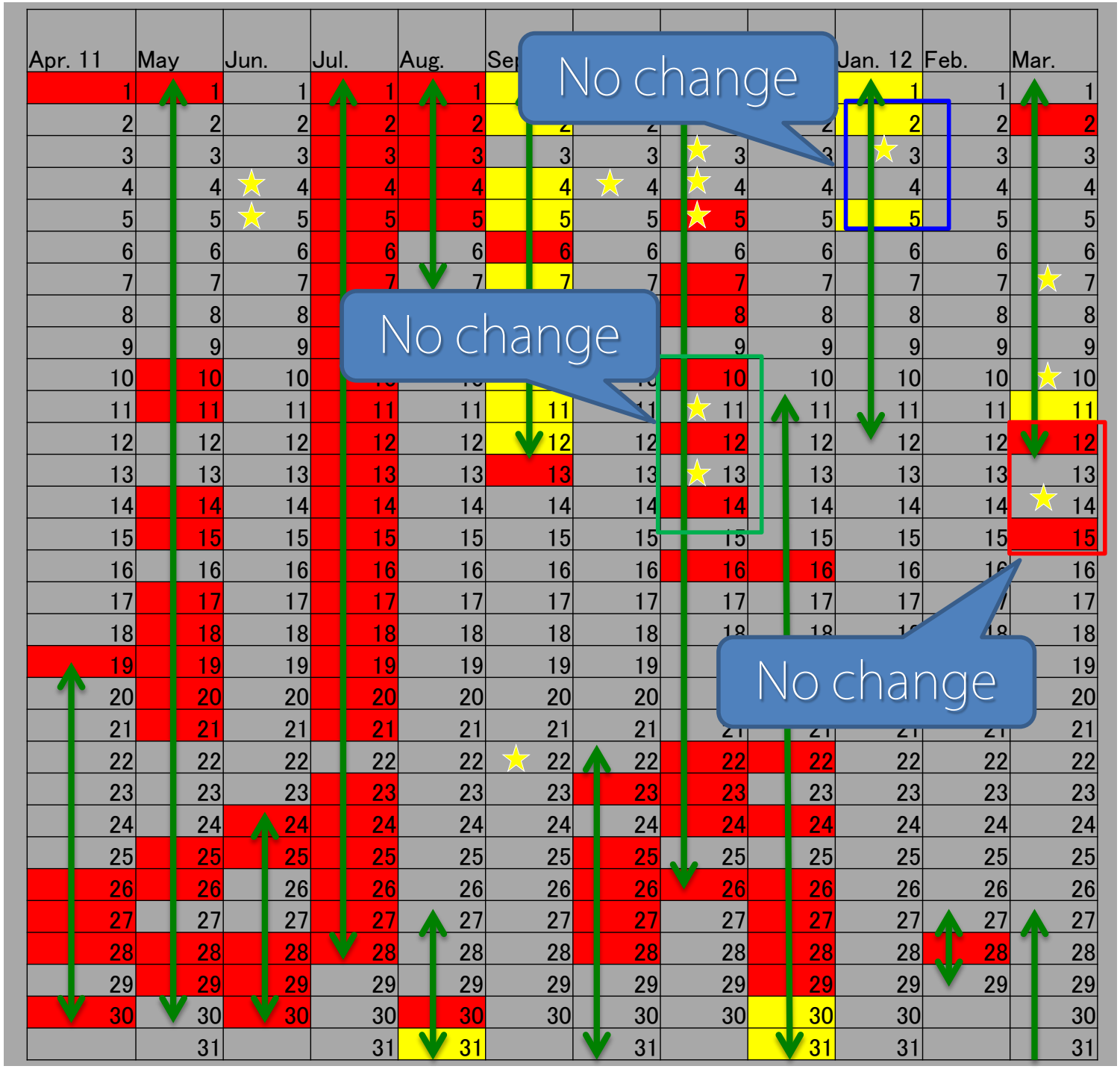


	Jan. 2	Jan. 5
γ	0.37116	0.30123

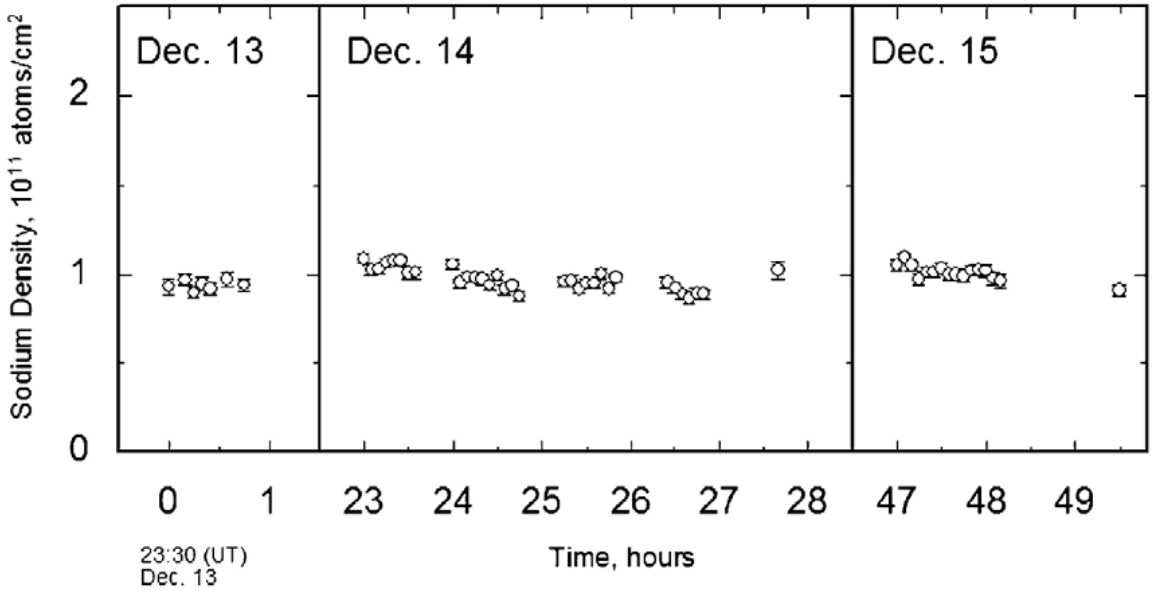
CME EVENTS AT MERCURY MESSENGER

- March 12
- March 15




Apr. 11
May
Jun.
Jul.
Aug.
Sep
Jan. 12
Feb.
Mar.
No change
No change
No change
when elongation is grater than 15°
Before sunrise or After sunset
daytime
☆=CME EVENTS AT MERCURY MESSENGER

Temporal variability of average density

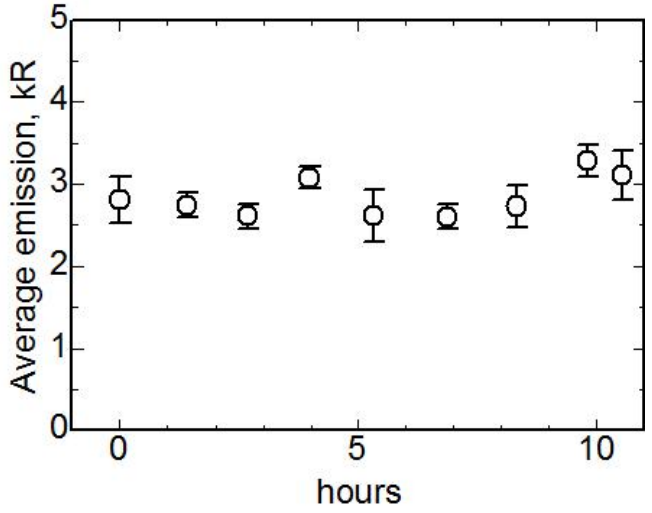


Kameda et al., 2007

Dec 2005 & Aug 2008 (OAO in Japan)

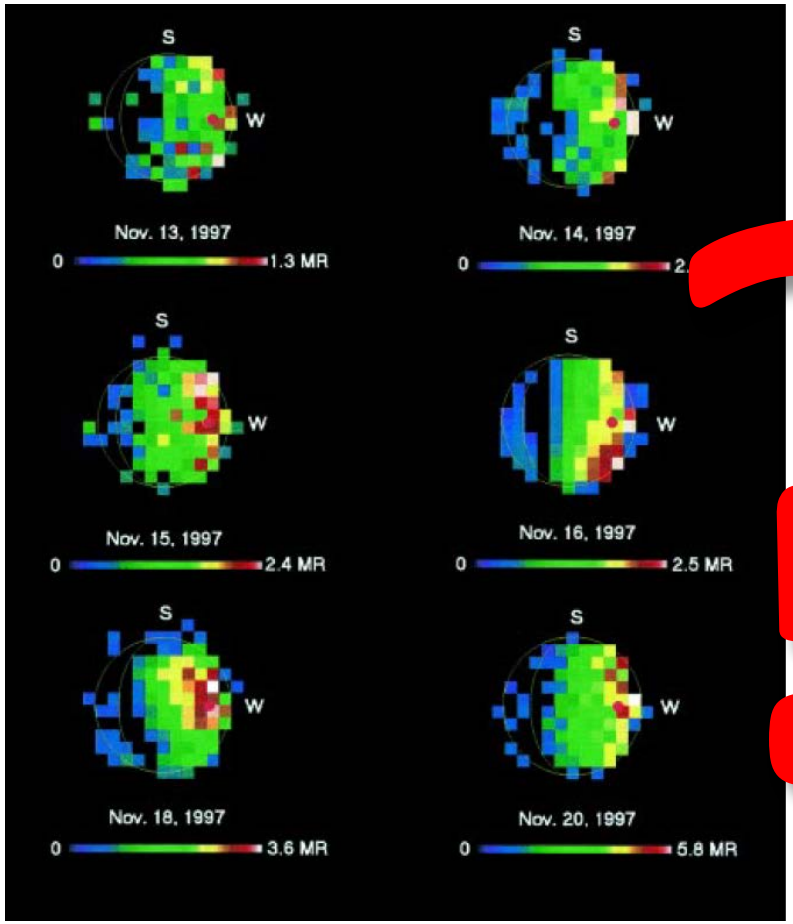
Temporal variability of Average density <~10%

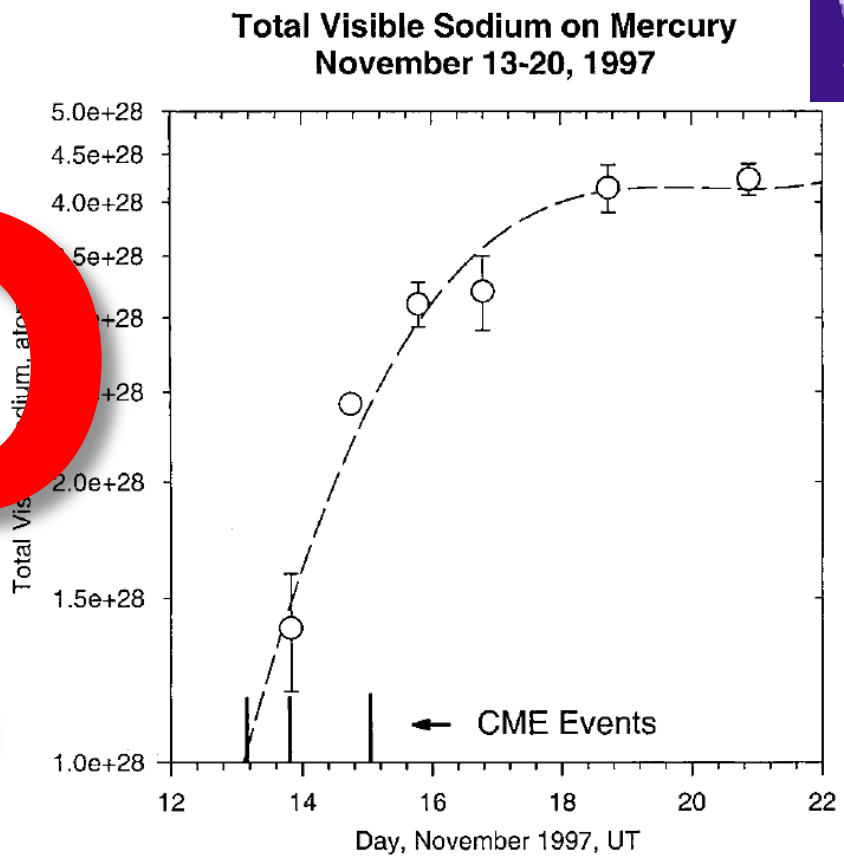
→SW variability should be higher... >> ???



1 σ ~9% [Leblanc et al. 2009]

Rapid change in the past?





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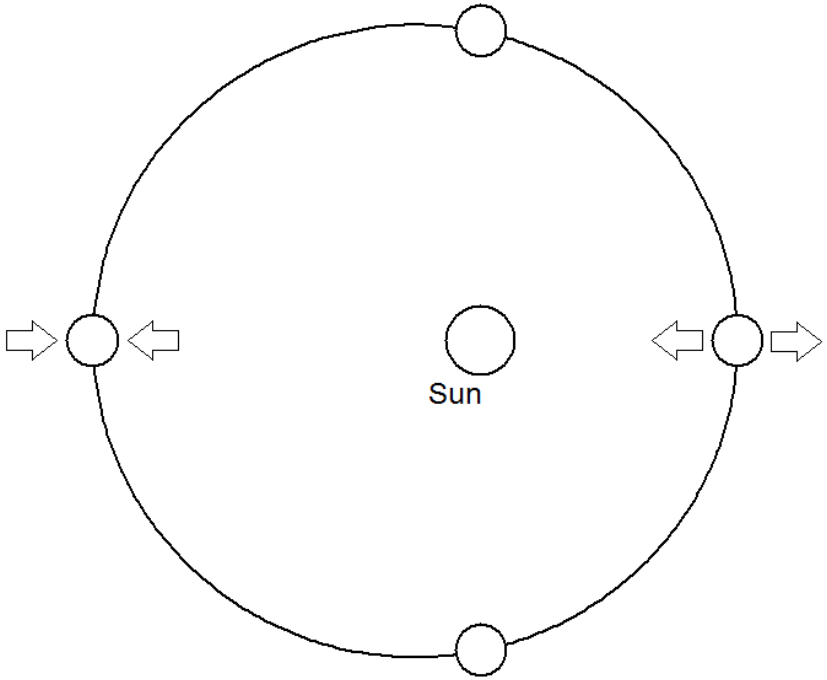
6. Solar tides



Tidal force is always outward.

→Relative tidal force is inward at aphelion and outward at perihelion.

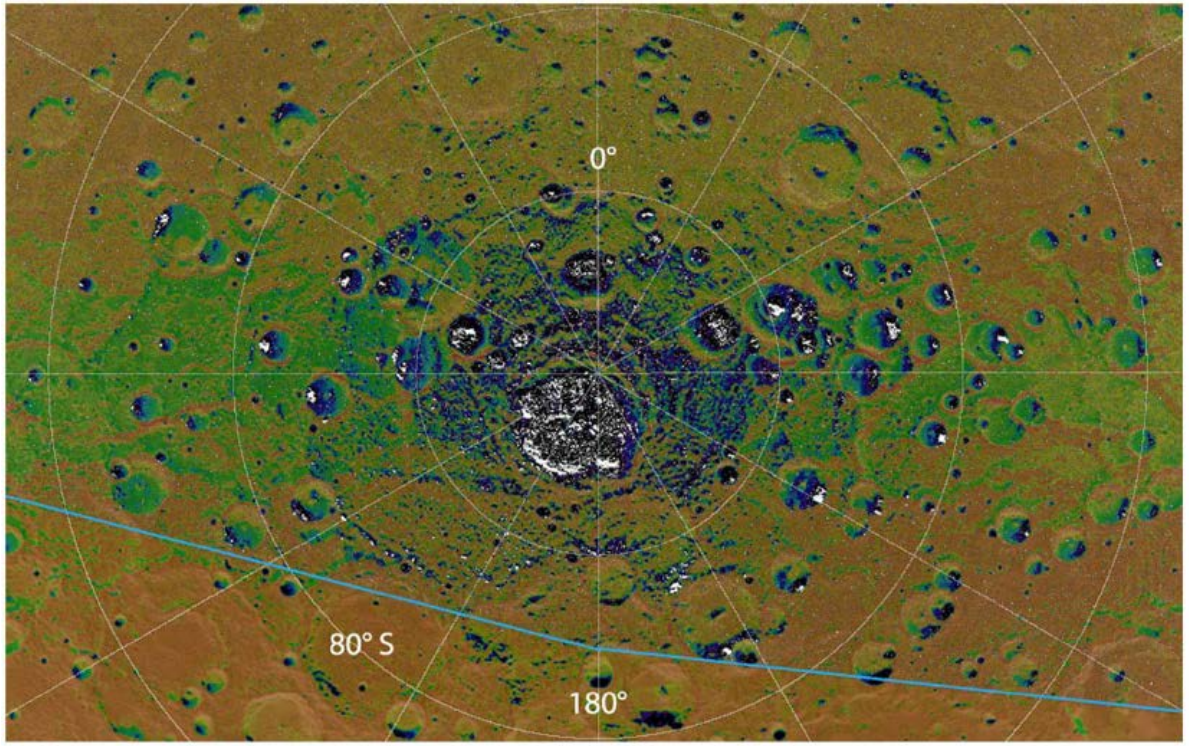
→Distortion is greatest at perihelion and aphelion.

6. Solar tides

Tidal force is not a release process, however,,,

Tidal force will possibly increase the source rate, e.g., refreshing the surface layer.

高緯度の濃集→永久影



Chabot et al., 2012

- 高緯度域には日照がほとんどない地域が多い。吸着した揮発性物質が地震その他により放出される(ということも考えられる?)

Apr. 12	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan. 13	Feb.	Mar.
1	1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6	6
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	31		31	31		31		31	31		31