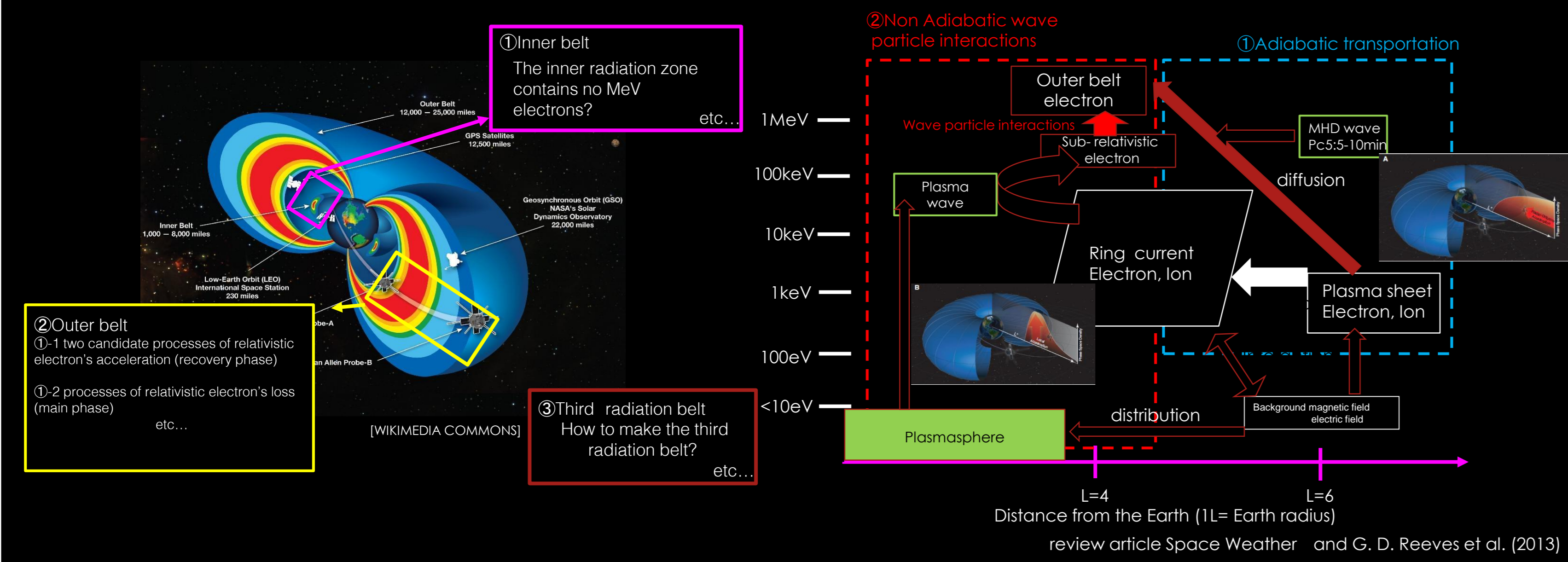


# Energy dependence of relativistic electron variations in the outer radiation belt during the recovery phase of magnetic storms: Arase/XEP observations

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## 1. Motivation

➢ What is the relative contribution of two candidate processes of relativistic electron's acceleration (solar wind conditions, CIR/CME, plasma sheet condition, etc)?

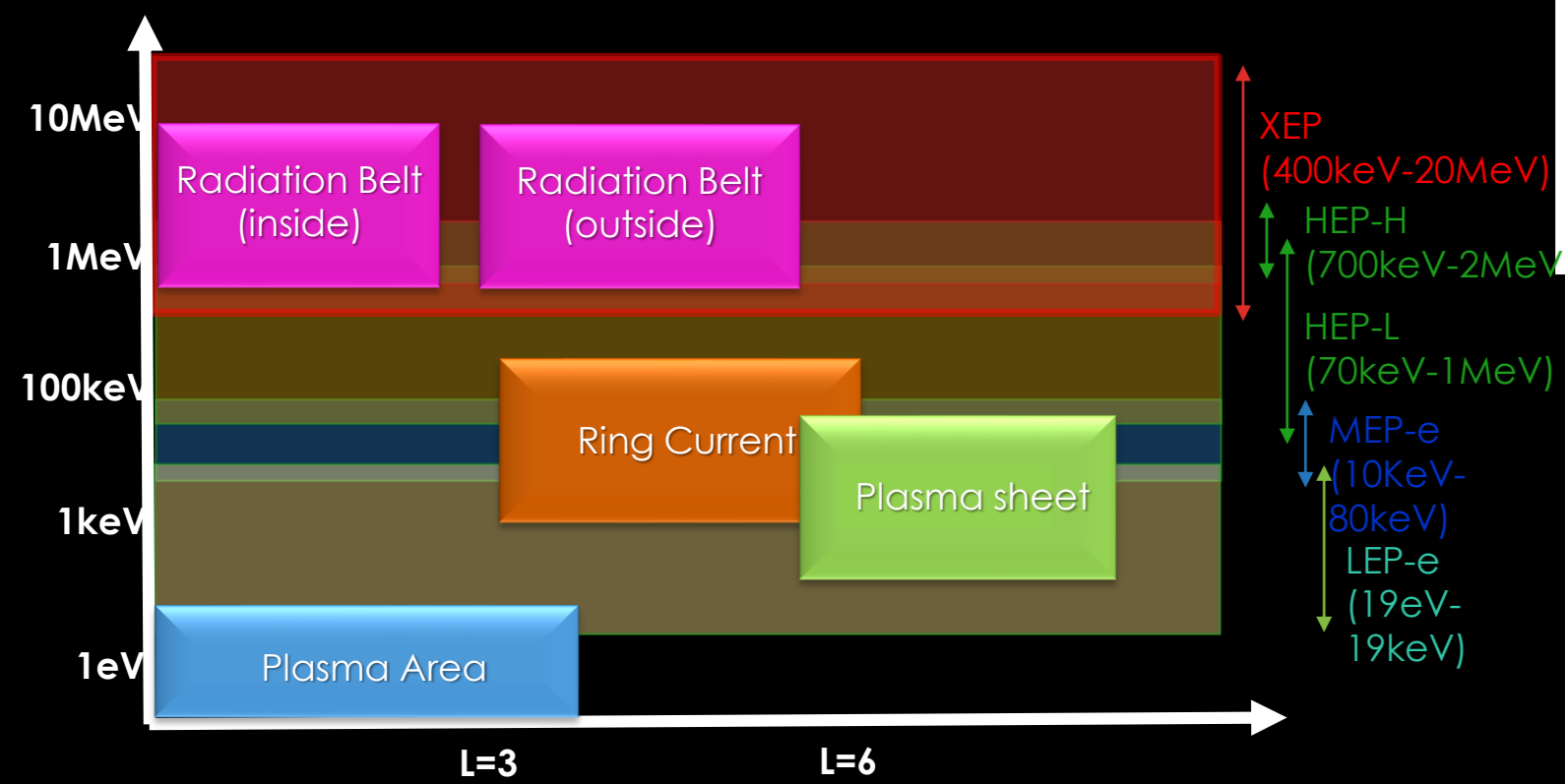


## 2. EXTREMELY HIGH-ENERGY ELECTRON EXPERIMENT (XEP)

➢ ARASE(ERG) was launched on December 20, 2016 from Uchinoura Space Center

Arase(ERG) satellite Orbit

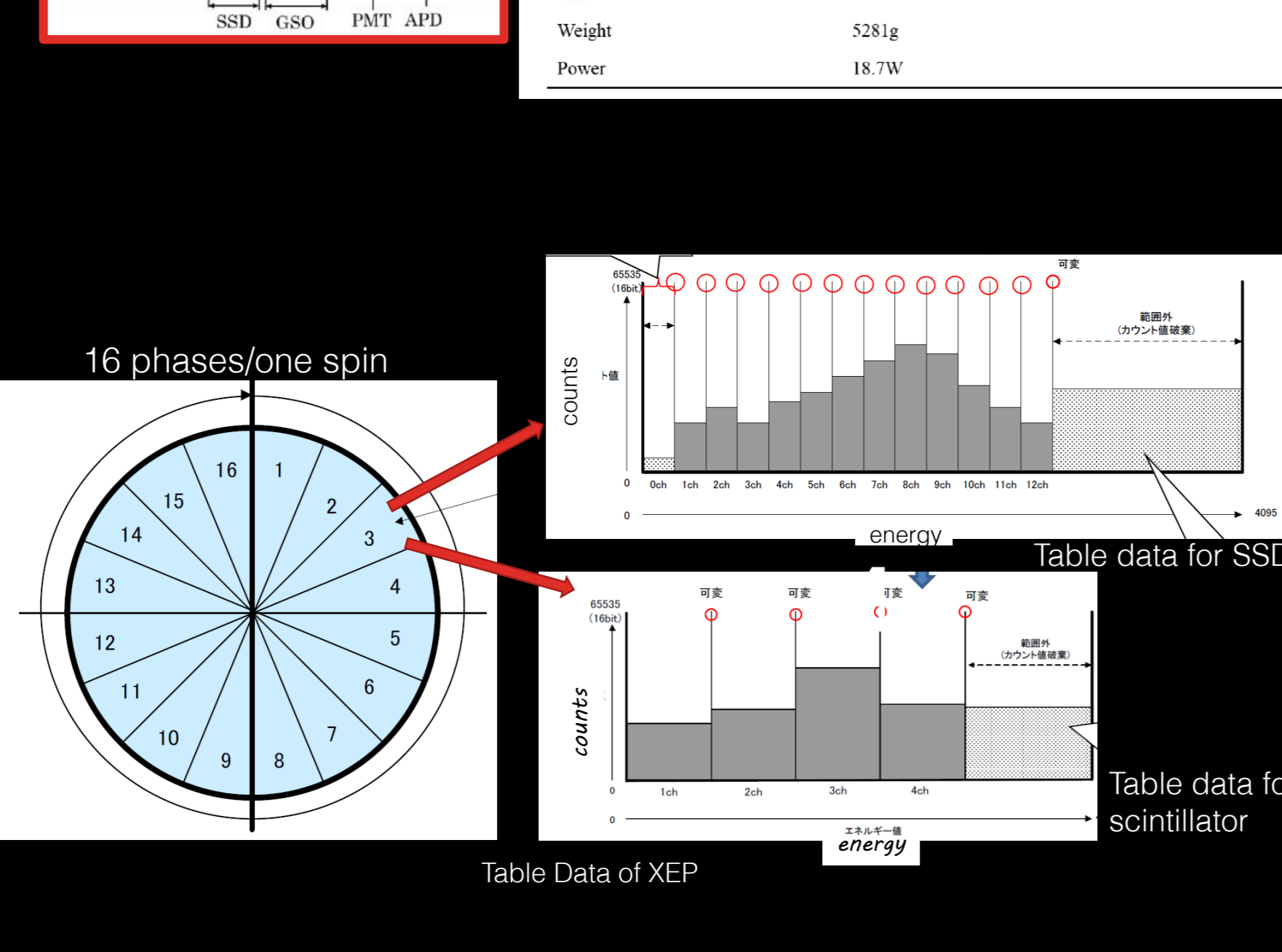
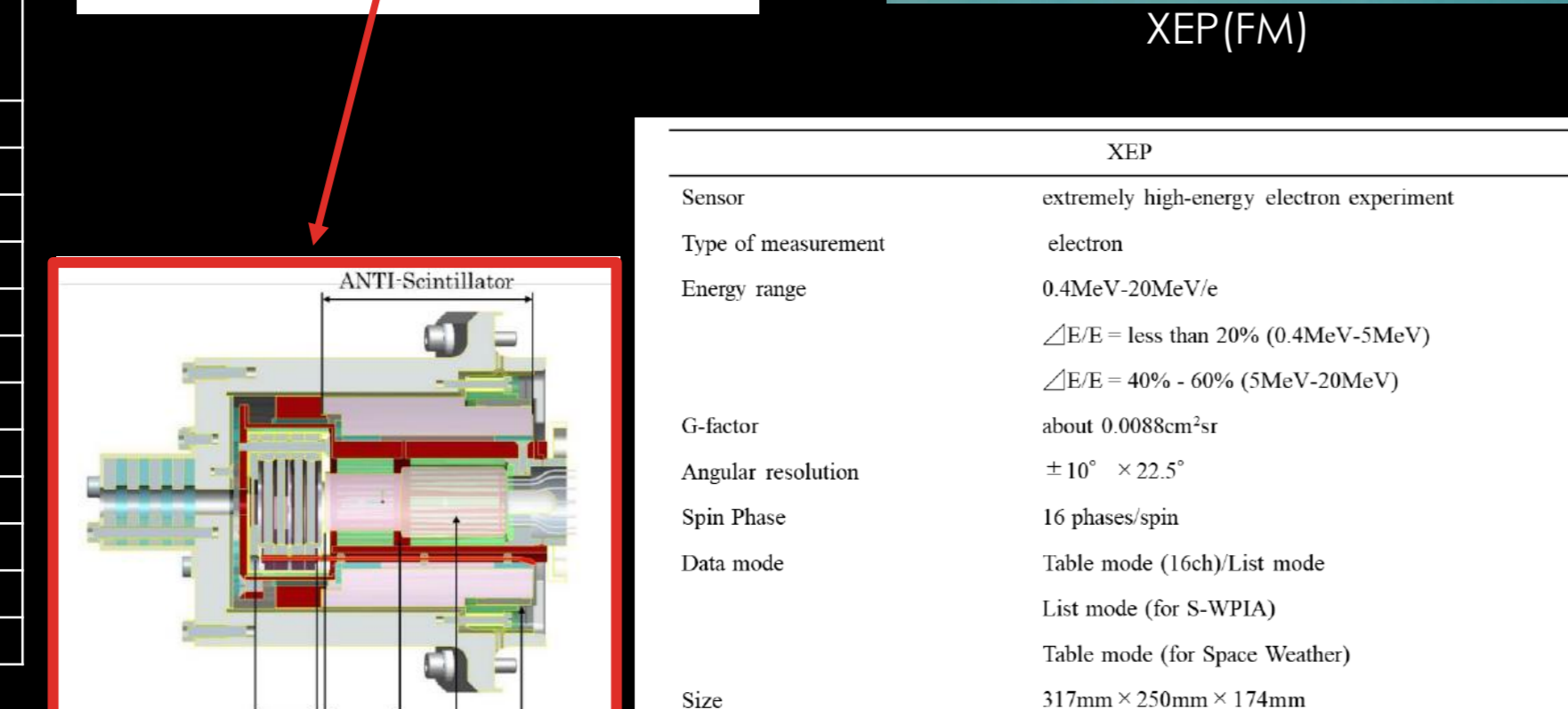
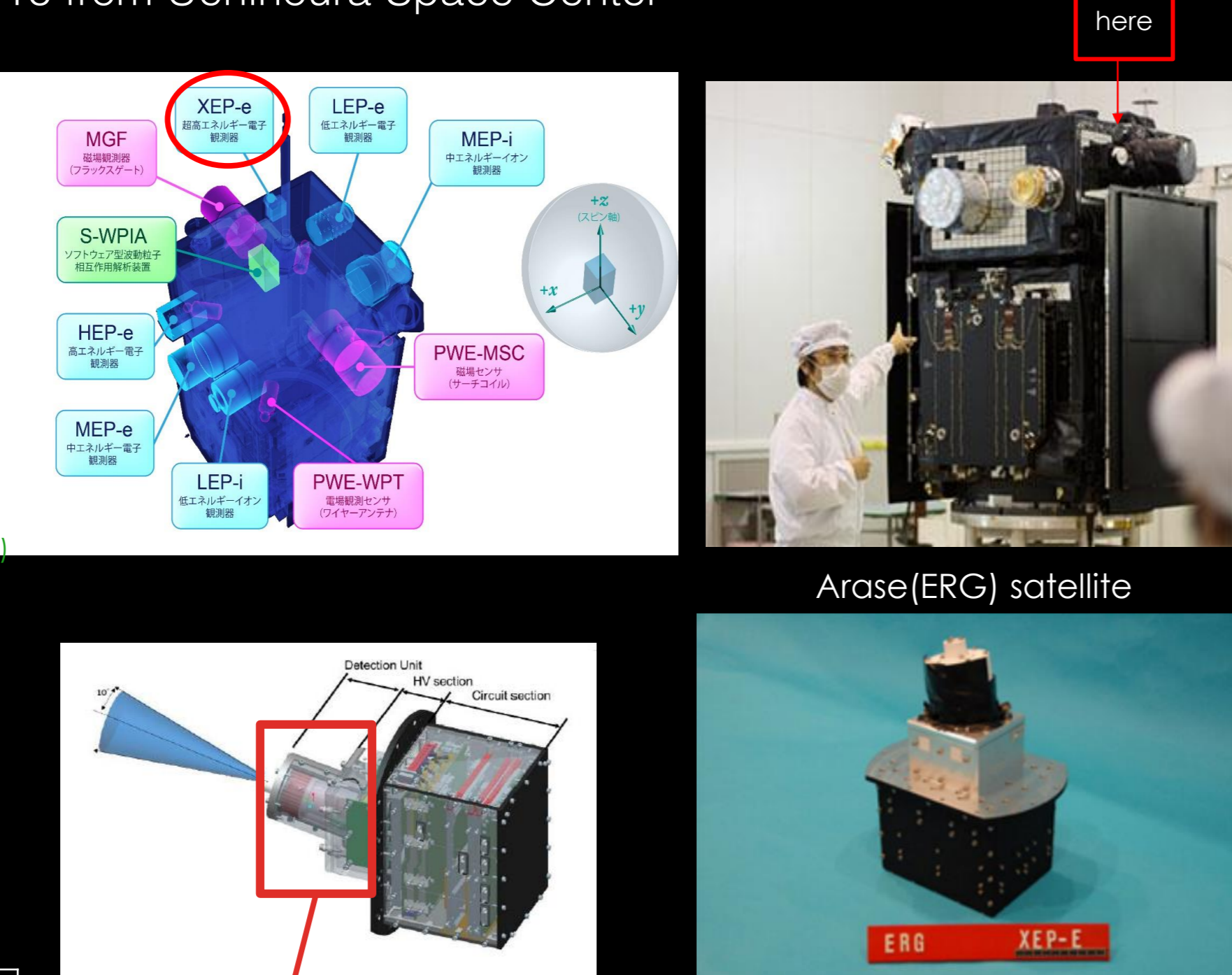
Orbital Altitude	Perigee: about 300 km, Apogee: about 33,200 km
Orbital Inclination	about 31°
Type of Orbit	Elliptical orbit
Orbit Period	about 538 min



About the XEP

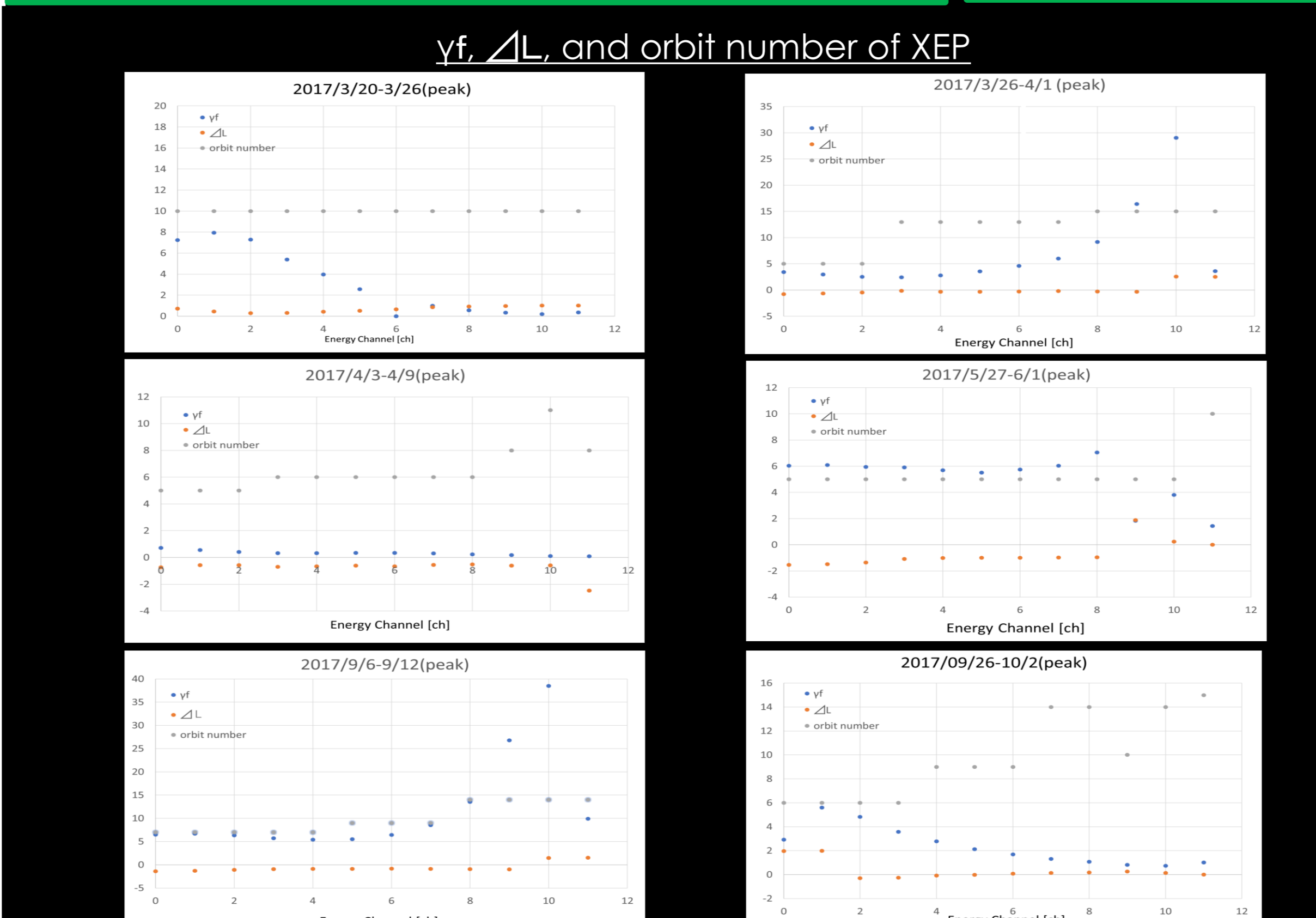
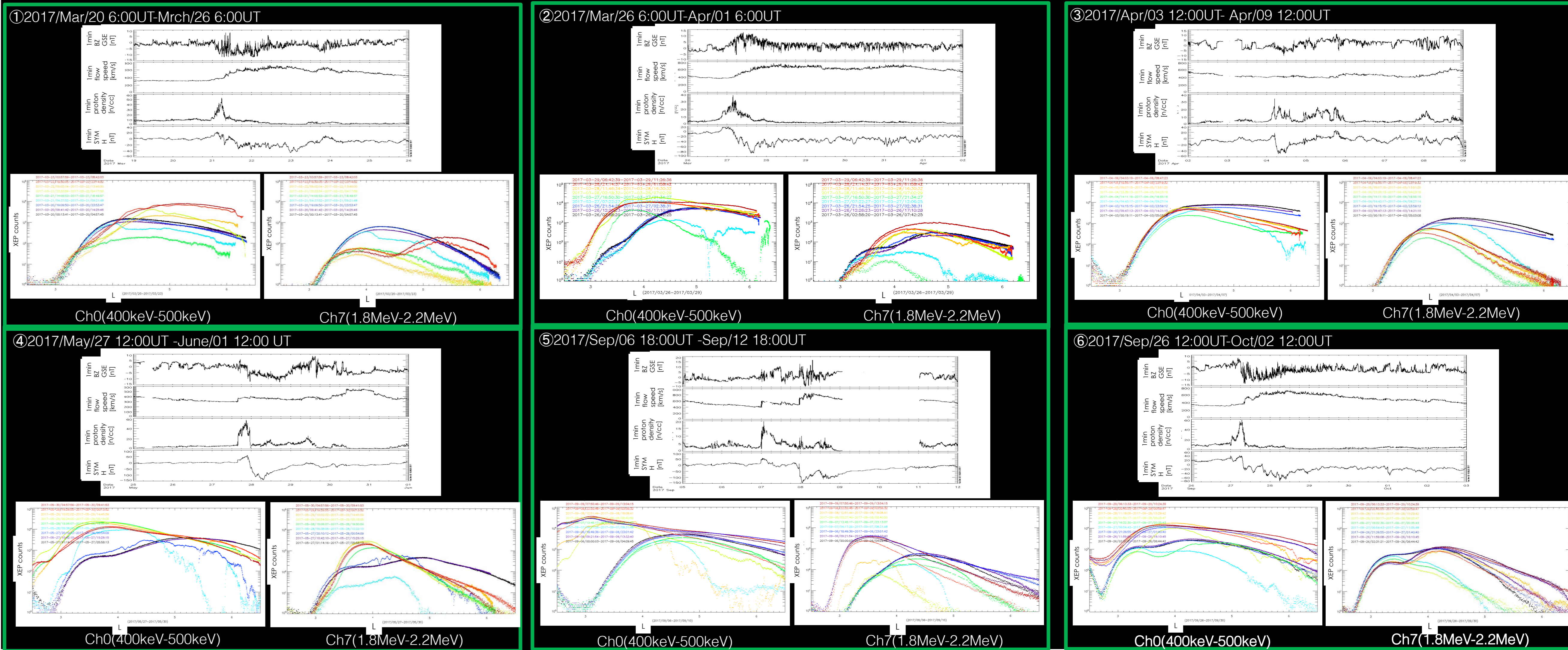
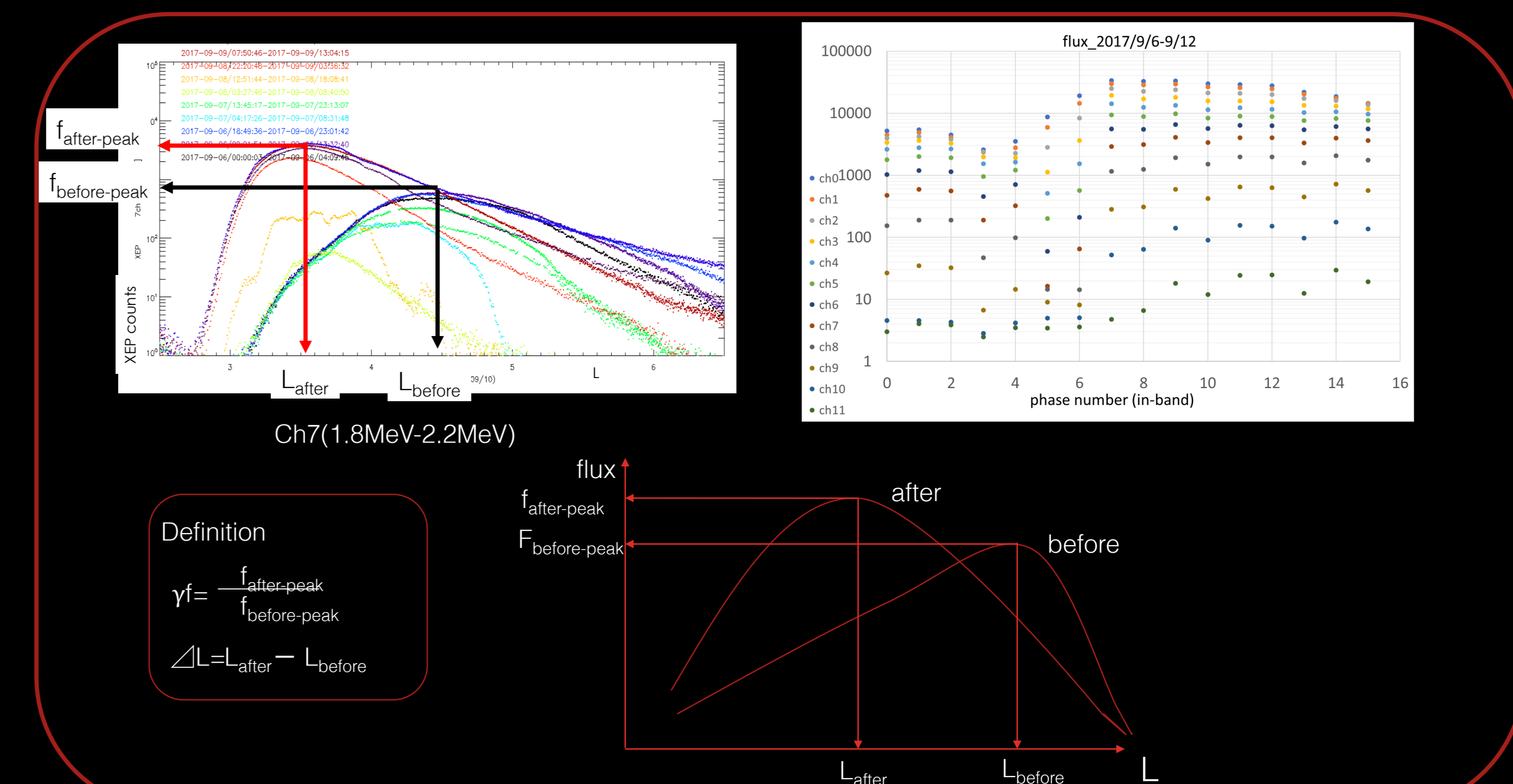
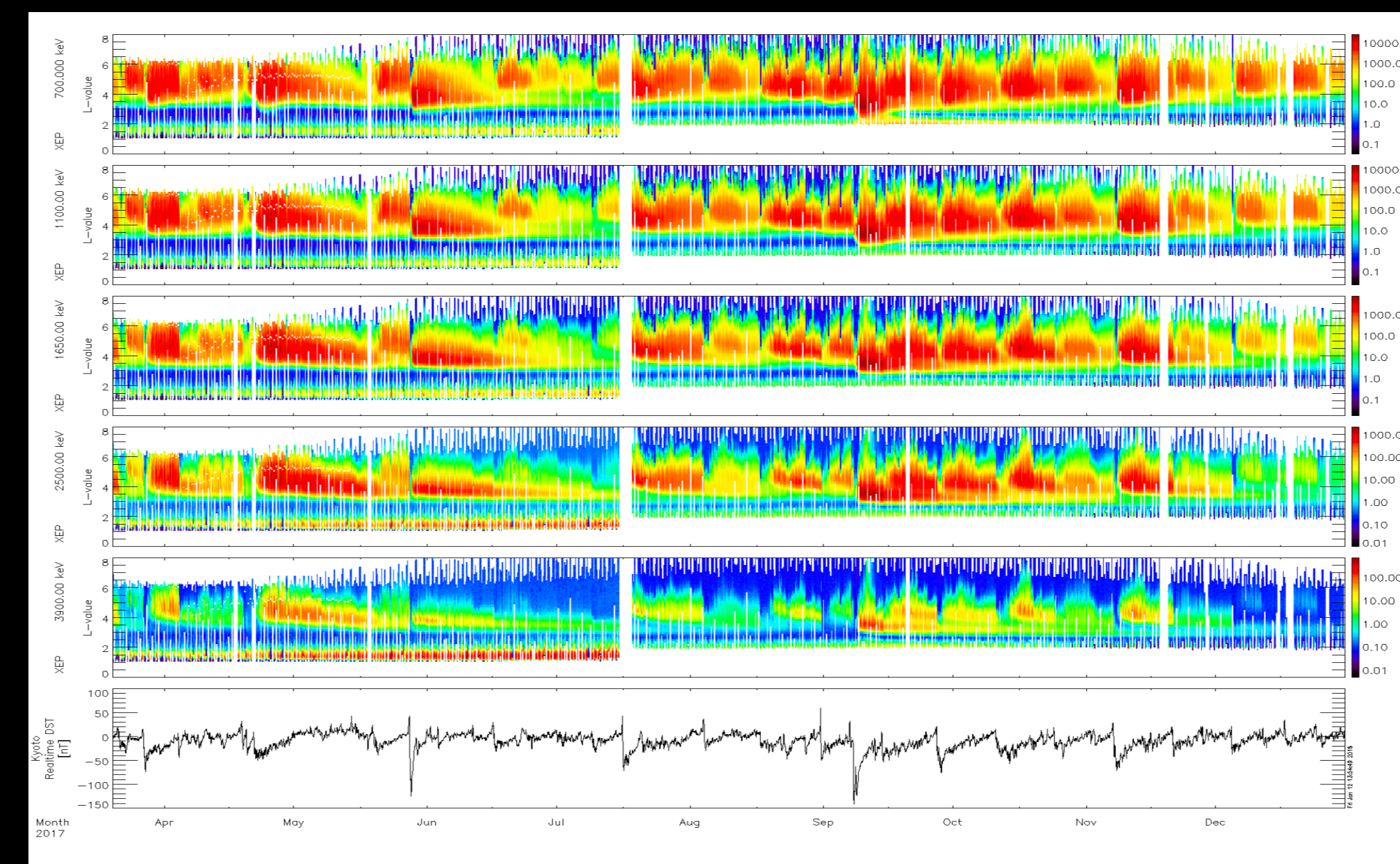
- XEP is one of instruments for electron onboard Arase satellite
- XEP's role is to measure variation of relativistic electrons in outer belt directly with HEP
- Energy ranges of HEP and XEP overlap each other (400keV-2MeV)
- It has one field of view ( $\pm 10^\circ$ )
- The XEP consists of three parts: the detection unit, HV section, and circuit section
- XEP has five SSDs, one scintillator(+PMT) and one anti-scintillator(+APD)

Channel	Minimum energy [MeV]	Maximum energy [MeV]
Ch0	0.4	0.5
Ch1	0.5	0.6
Ch2	0.6	0.8
Ch3	0.8	1
Ch4	1	1.2
Ch5	1.2	1.5
Ch6	1.5	1.8
Ch7	1.8	2.2
Ch8	2.2	2.8
Ch9	2.8	3.5
Ch10	3.5	4.3
Ch11	4.3	5.4



## 3. Observation

L-T Graph of the XEP (2017/03/20~ 285days) L>3



## 4. Summary

- ✓ XEP has observed more than 12 geomagnetic storms.
- ✓ The results for analyzed 6 events are summarized as below:

NO	date	DST index(min)	Storm type	XEP observations
1	2017/3/21-3/23	-35nT, -35nT	CIR	Flux: increase ( $\leq 1.5$ MeV) Timing: no energy dependence Peak location: outside
2	2017/3/27	-74nT	CIR	Flux: increase (all energy) Timing: Low energy faster Peak location: inside
3	2017/4/4	-44nT	CME(?)	Flux: decrease
4	2017/5/27-5/29	-125nT	CME	Flux: increase (all energy) Timing: no energy dependence Peak location: inside
5	2017/9/7-9/13	-142nT, -122nT	CME	Flux: increase (all energy) Timing: Low energy faster Peak location: inside
6	2017/9/27	-76nT	CIR	Flux: increase ( $\leq 2.2$ MeV) Timing: Low energy faster Peak location: no change