

**Correlation between
Increases of Magnetic
Fluxes and Brightenings of
Coronal Structures around
*Emerging Flux Regions***

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Introduction

One of the main topics about Solar-B sciences should be the discussions about relationships between various magnetic features on the photosphere and coronal diverse structures.

An example of a clear correlation between total magnetic flux in an emerging flux region (EFR) and brightness of coronal structures close to the EFR is shown in this presentation.

Data

- TRACE EUV (171Å, 195Å)
- SoHO MDI Magnetogram
- YOHKOH SXT

Observational facts

of the long-lived features in EUV images near some EFRs

- Appeared almost concurrently with the development of new emerging fluxes
(See figure 2 and 3)
- Last for several hours (See figure 3)
- Time scale of the radiative cooling are estimated to 1-10hrs
($T_e \leq 1\text{MK}$, $N_e \leq 10^9 \text{ cm}^{-3}$)
- Height of the structure is comparable with scale height (See figure 4)
- Locate apart ($\geq 5000\text{km}$) from the edge of the emerging flux (See figure 5)

What's going on?

- Activities around EFR?
- Reconfiguration of coronal magnetic structure?
- Motions/flows in photosphere or lower atmosphere?
- No causal relationship.
Two phenomena occurred at the same time just by accident?

Solar-B

- Time variation of coronal 3-d structure extrapolate
- Detail magnetic measurement around foot points of the feature
- Physical parameters derived from the observation with XRT

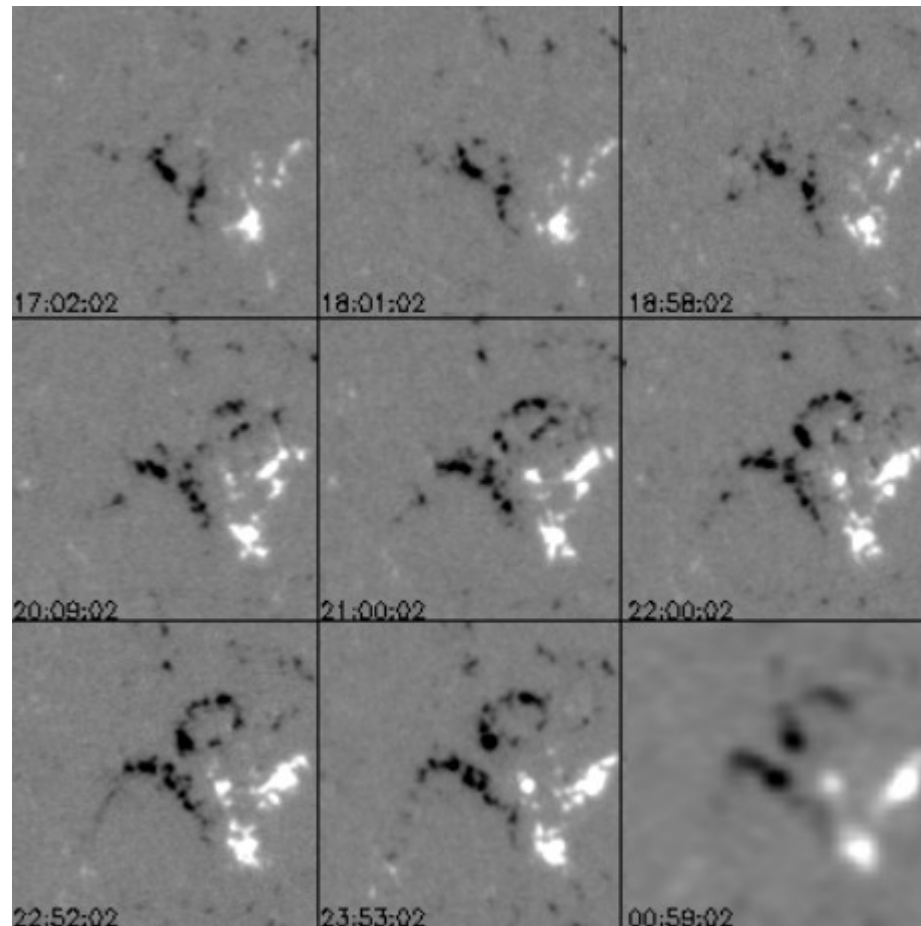
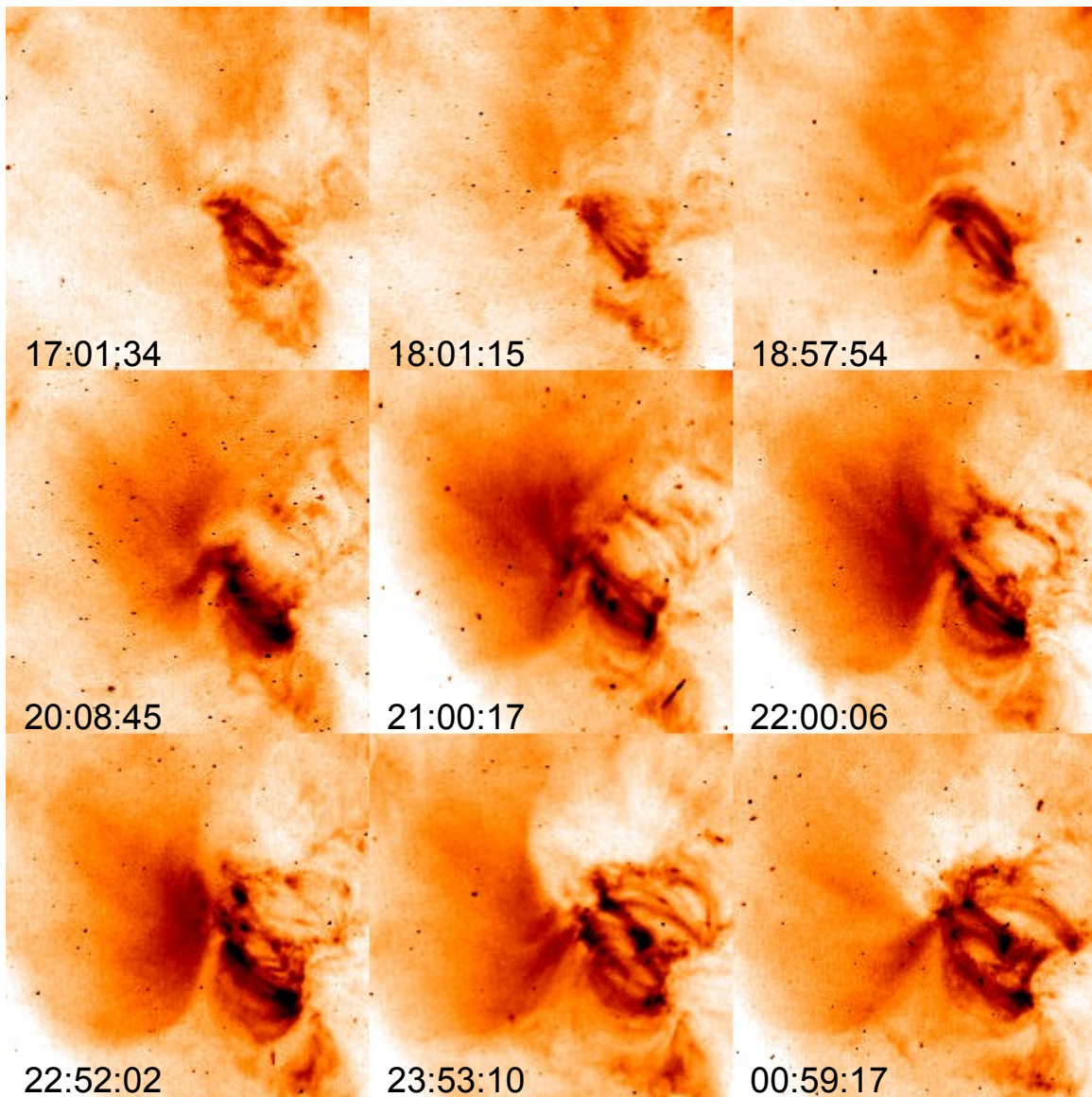
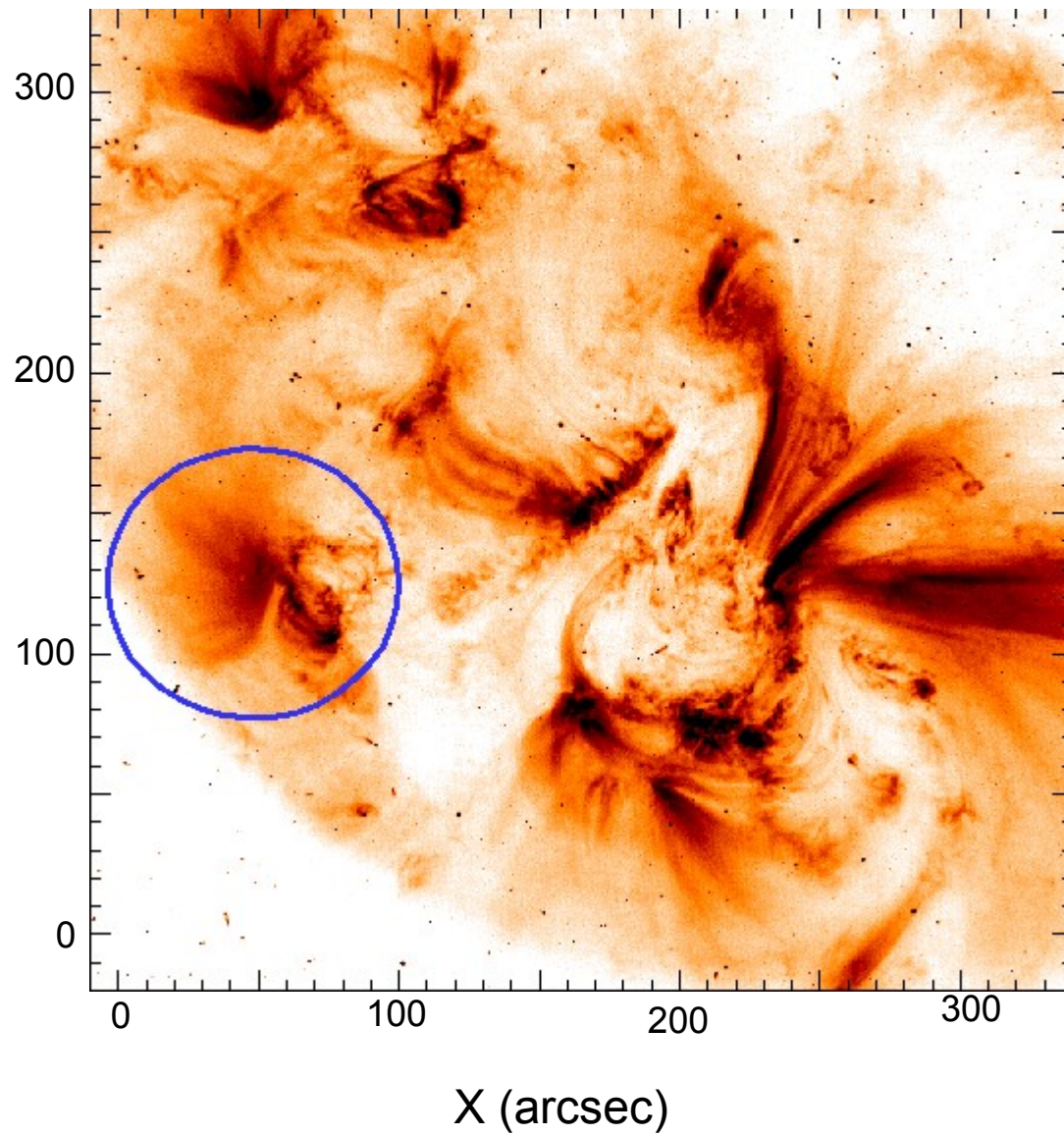


Figure 2

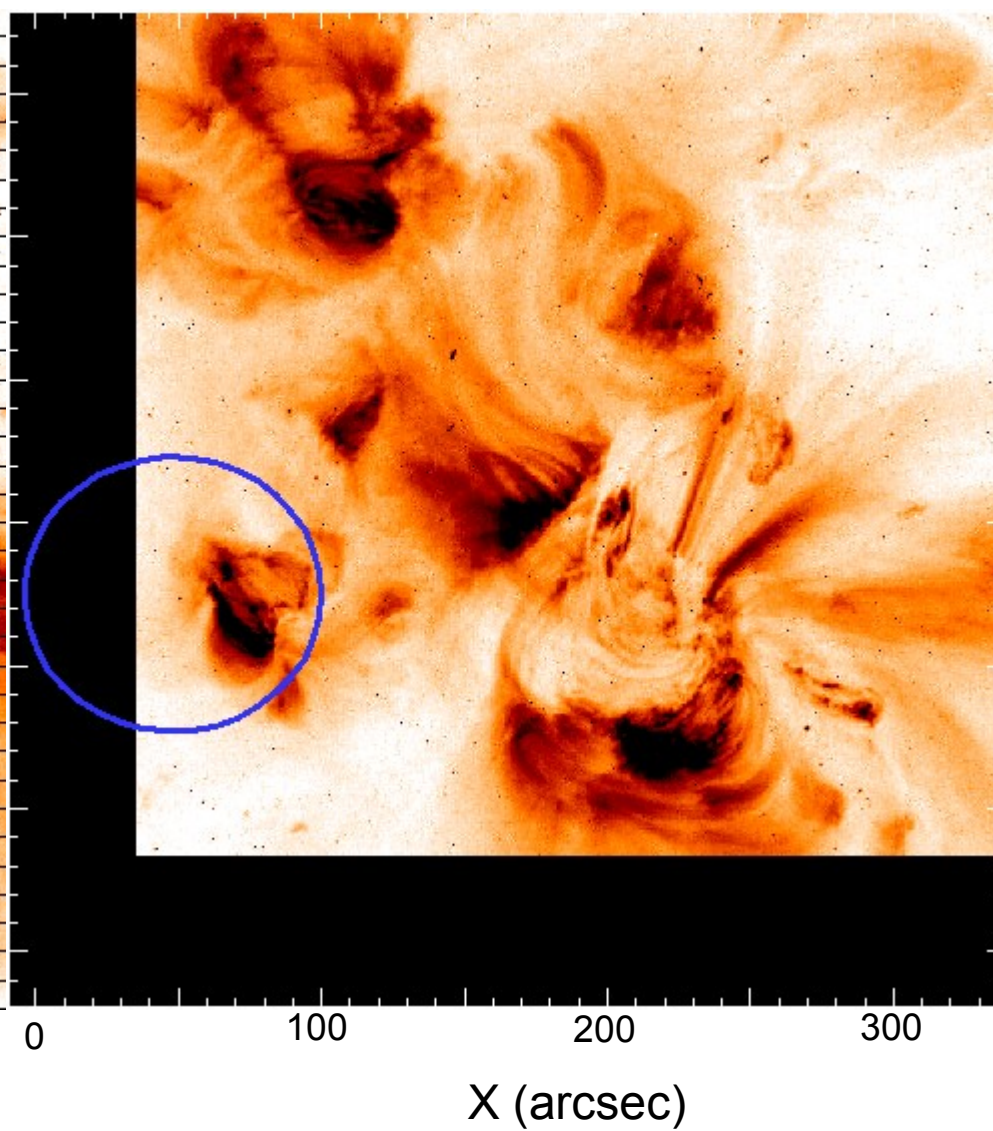
Sequential EUV images (TRACE 171Å)
Sequential Magnetogram (MDI)
1999/07/18 17:00 – 1999/07/19 01:00

These images show how the coronal feature and the emerging flux region developed.

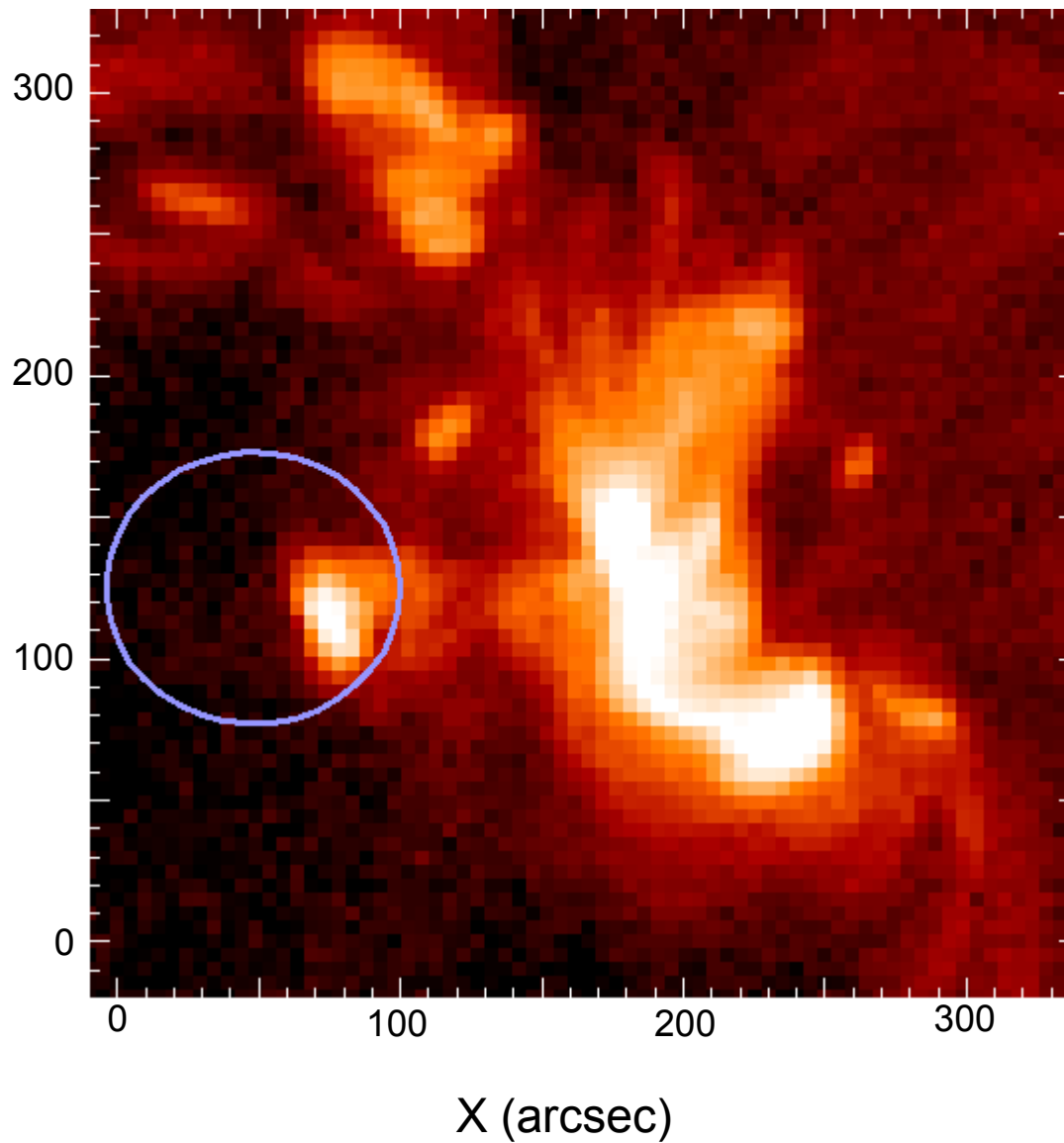
TRACE 171 Å 18-Jul-1999 22:25:18 UT



TRACE 195 Å 18-Jul-1999 22:52:45 UT



SXT Al.1 18-Jul-1999 22:52:30 UT



MDI 18-Jul-1999 22:25:02 UT

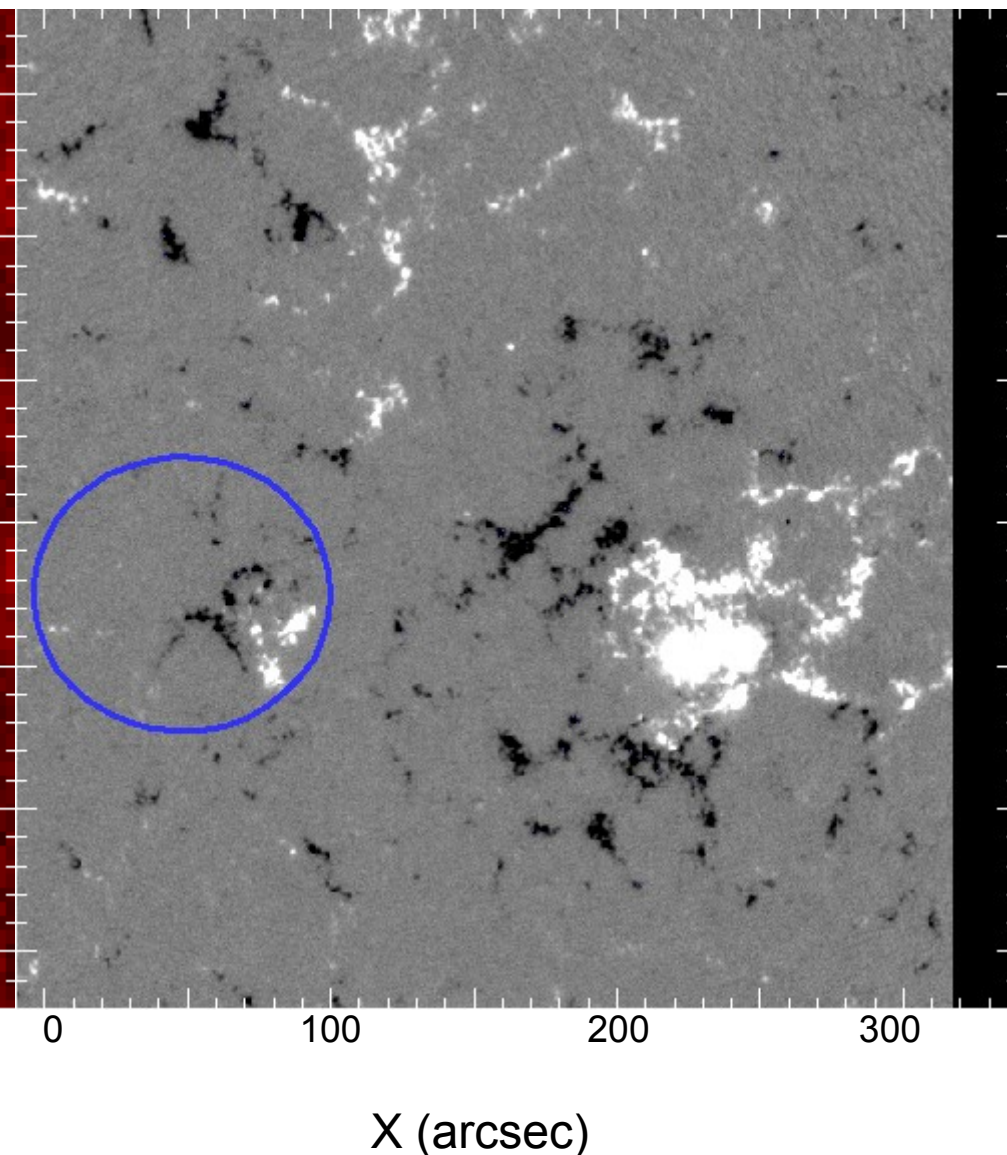


Figure 1

These show how the EUV long-lived feature looks like with different observation.

The feature in 171Å image extends to the area of no prominent magnetic features from the edge of EFR.

No correspondings in SXT images.

Faint feature in 195Å images.

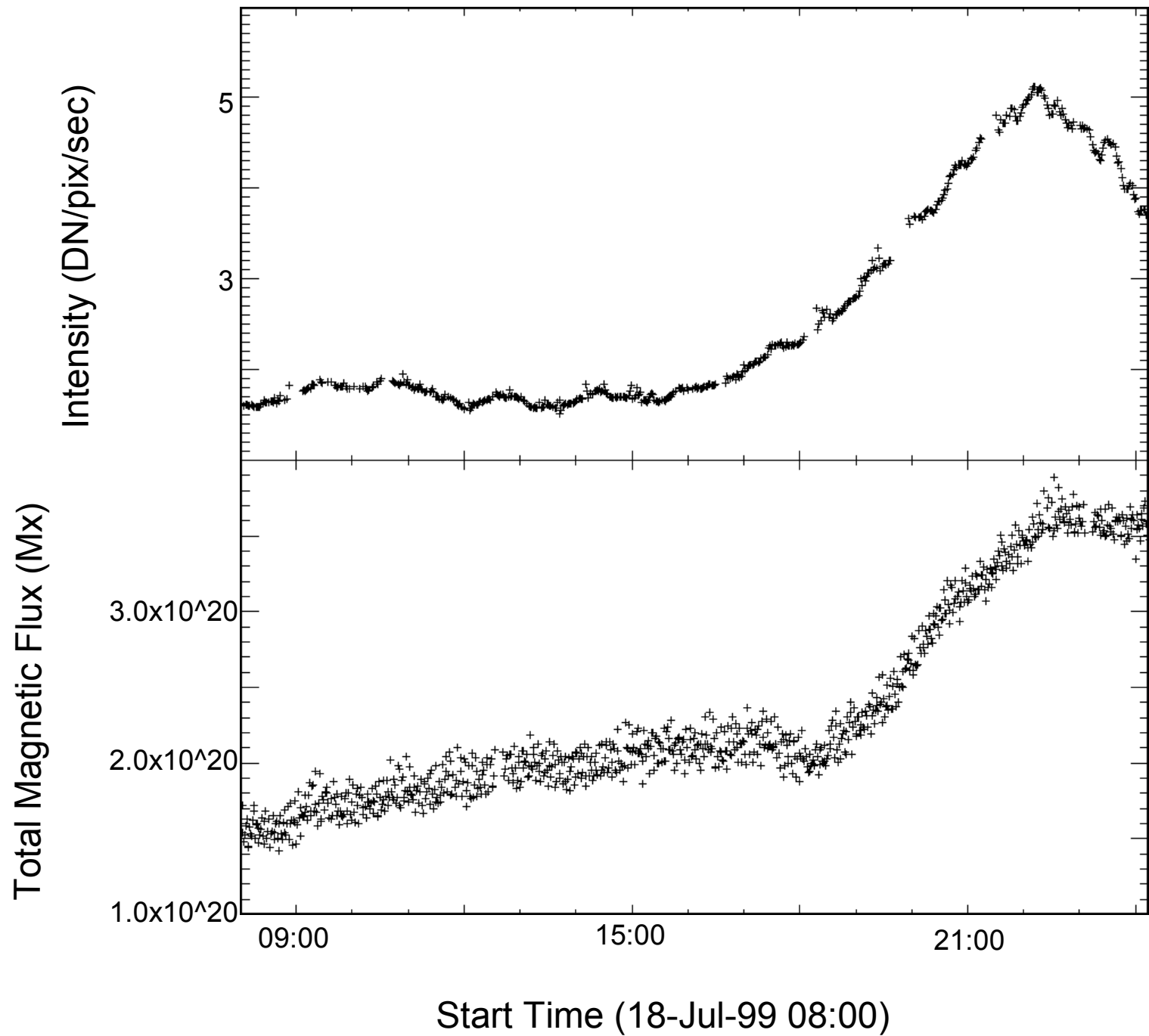


Figure 3

Time variation of averaged intensity of the feature in EUV 171Å (upper panel)
Time variation of total positive magnetic flux of the EFR (lower panel)

The average intensity increase observed during the total magnetic flux increase

TRACE 171 Å 25-Aug-1999 17:34:15 UT

TRACE 171 Å 25-Aug-1999 22:30:08 UT

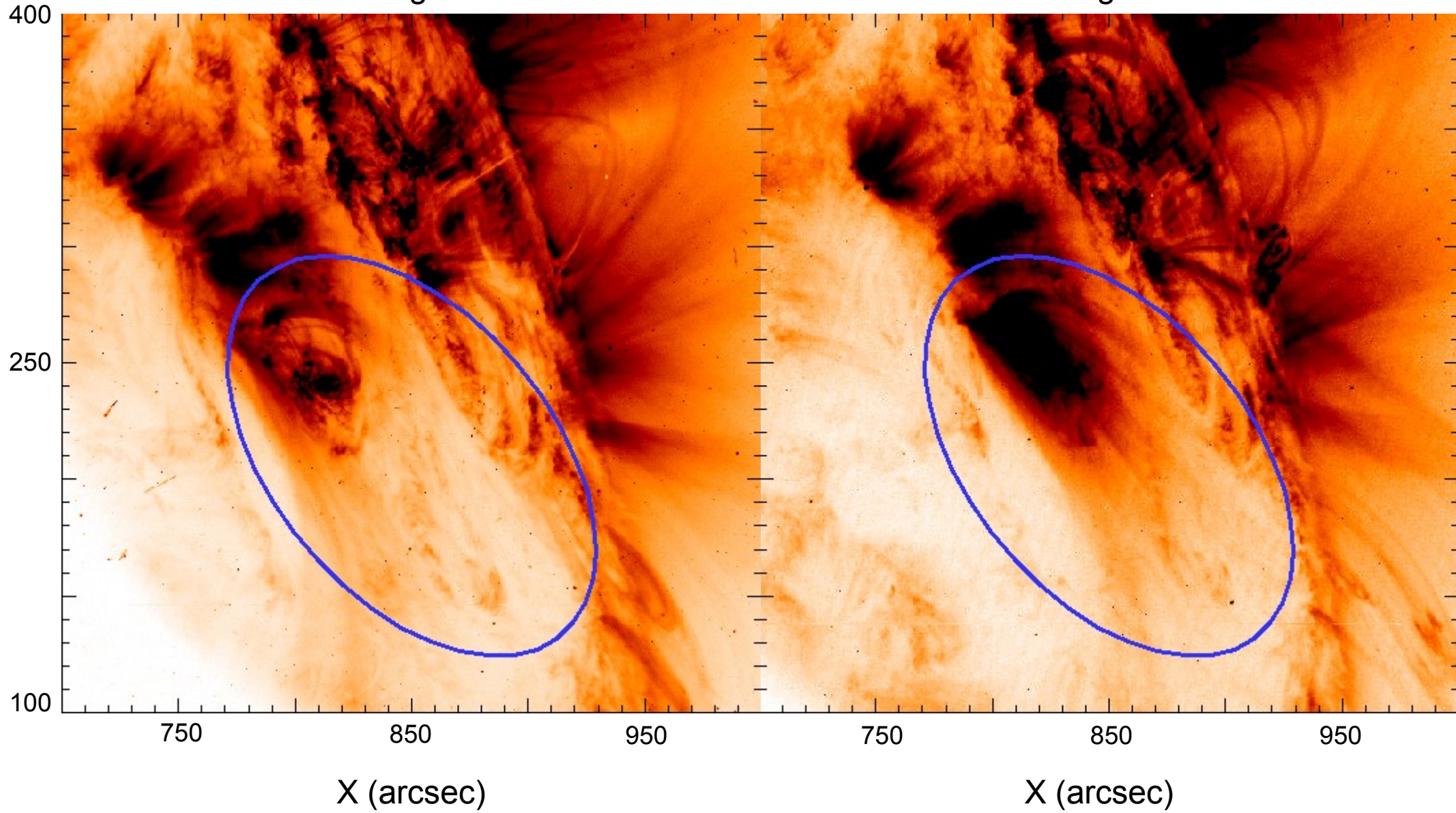


Figure 4

Another example of the long lived features near EFR.
Since it located near the solar limb, we can see the height of the structure
Although we cannot see the detailed magnetic evolution of it due to the poor time resolution of magnetogram observation through that time, the increase of the magnetic flux in the EFR was observed during the event.

MDI 18-Jul-1999 22:25:02 UT

TRACE 171 Å 18-Jul-1999 22:25:18 UT

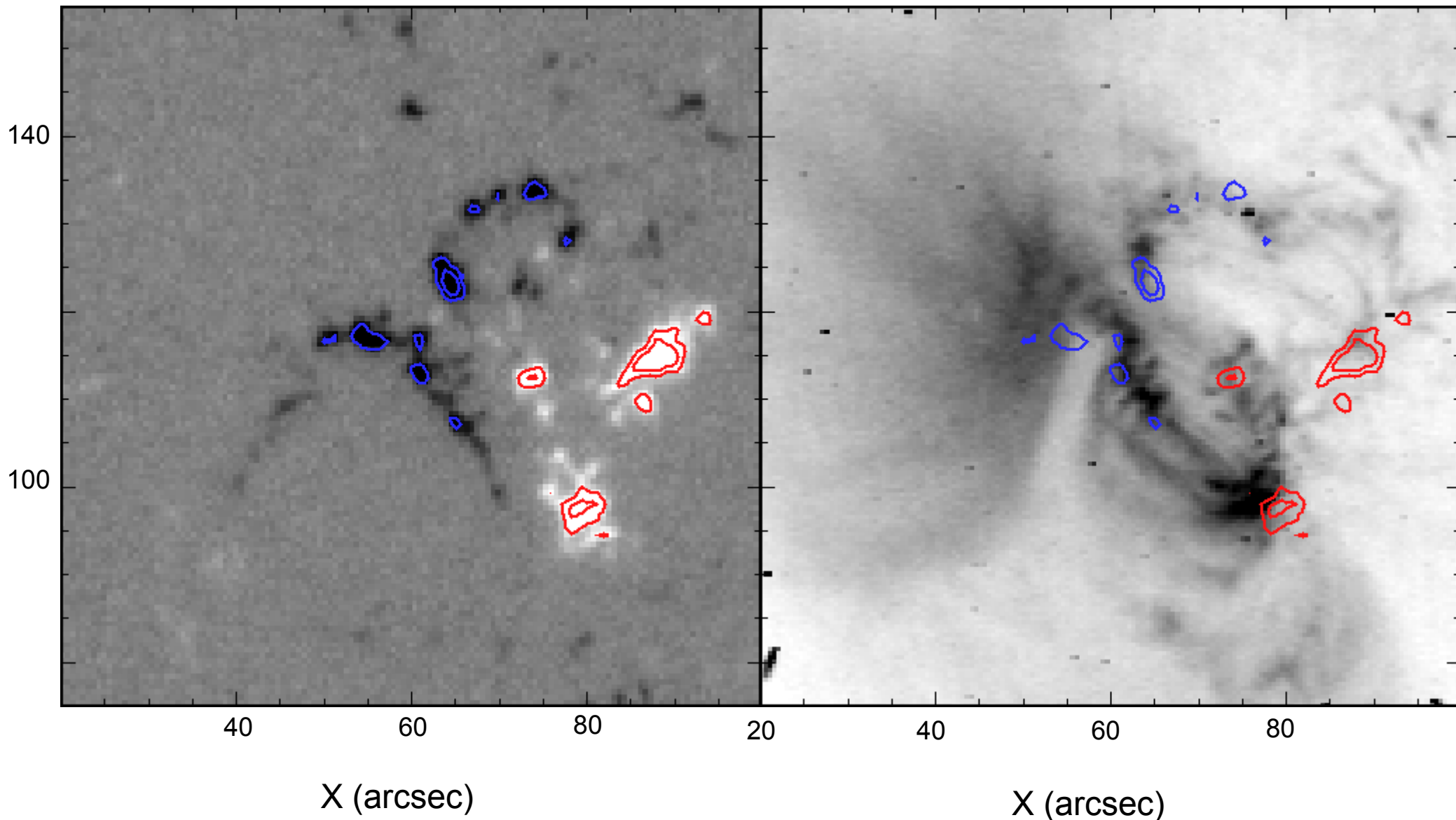


Figure 5

The foot points of the feature located
apart from the EFR ($\geq 5000\text{km}$).