

# Magnetic field of active region filaments observed with DST/Hida

Shinpei Sawada<sup>1</sup>, Tetsu Anan<sup>2</sup>, Kiyoshi Ichimoto<sup>2</sup>, Satoru Ueno<sup>2</sup>, Akihito Oi<sup>2</sup>,

Satoshi nozawa<sup>1</sup>, Akihiro Ohkawa<sup>1</sup>

<sup>1</sup>Ibaraki University, <sup>2</sup>Kyoto University

09s2015t@gmail.com

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## 1. Abstract

Using spectropolarimetric data of an Active region filament, we have carried out inversions by HAZEL in order to infer vector magnetic field in the chromosphere (He line) observed with DST/Hida and in the photosphere (Fe line) observed with Hinode/SOT/SP.

This filament presents strong Zeeman-like signatures in the He line. The magnetic structure of the filament in He line (chromosphere) and Fe line (photosphere) is very sheared.

## 2. Observations

Days : 13th May 2012

Target : AR filament in NOAA11476( $\mu=0.89$ )

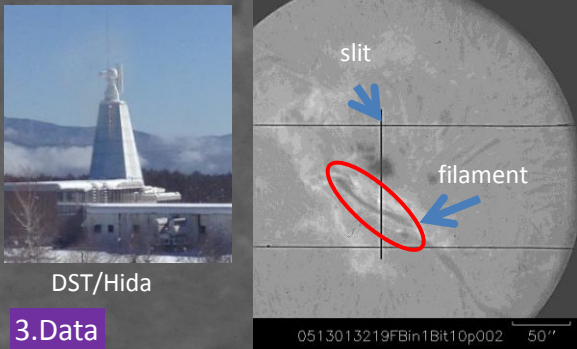
Observation time 01:03 – 03:46 (UT)

Cadence : 14 sec

Instrument : the spectropolarimeter (Anan et al, 2012) on the Domeless Solar Telescope (DST) at Hida

Wave length range : from 10825 to 10833A

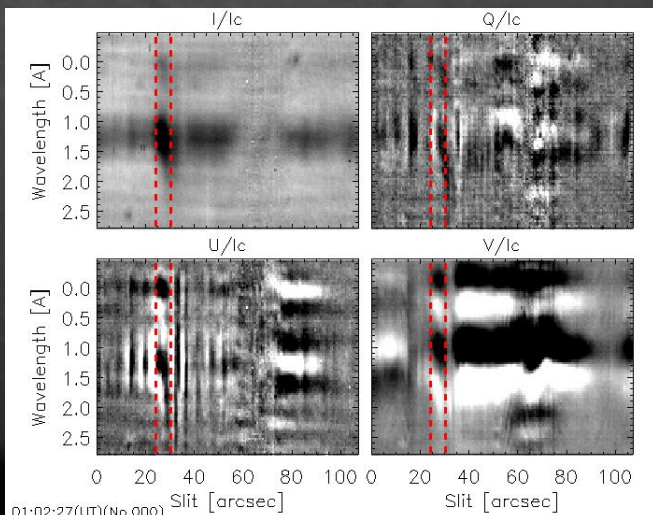
Slit :  $0.2 \times 20$  mm (It was fixed)



DST/Hida

## 3. Data

Following data is IQUV stokes vectors. Red dashed line is the edge of filaments. Wavelength 0 A displays He 10829.09 A. Note that this spectrum presents strong Zeeman – like signatures. It was binning of 3pix in the spectral domain, 3pix along to slit.



## 4. Result

inversion code : HAZEL(Hanle and Zeeman lights) (Asensio and Trujillo and Landi .2008)

B : modulus magnetic field strength[G]

$\theta$  : inclination which is measured with respect to the solar local vertical.

$\chi$  : azimuth which is measured from the disk center toward target.

(>0 is a counter clock)

$v_{th}$  : doppler width[km/s]

tau : optical depth

vmacro : doppler velocity[km/s] (> 0 is a redshift)

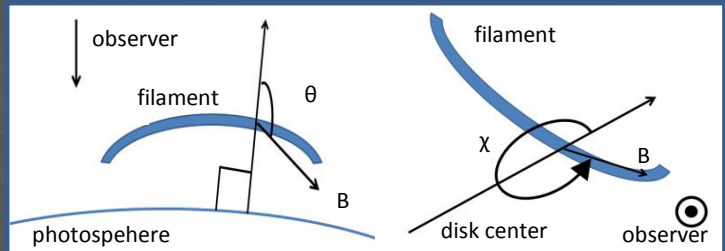
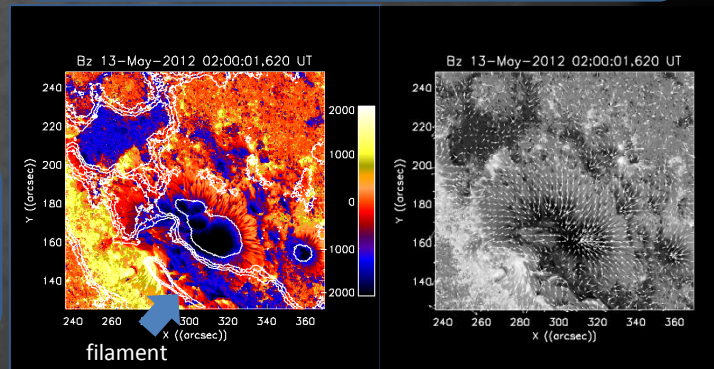


Table : Inversion results of filament spine. (This result is mean of 650 data inversion)

parameter	B	$\theta$	$\chi$	$v_{th}$	tau	vmacro
value	588	120	301	8.16	1.74	3.07

Following image is Hinode/SOT/SP data. Images show magnetic field structure in the photosphere(Fe 6302.5A).



Left image shows the line-of-sight(LOS) magnetic field strength which is lapped over Ha intensity contour (Smart/Hida). Note that the filament is located above the region whose the LOS field strength is about 0 G, that is in the polarity inversion line (PIL). Right image shows the LOS magnetic field strength. In addition, the arrows show direction magnetic field and the length of the arrows show the strength of the horizontal field. Note that horizontal magnetic field is along the filament.

## 5. Summary

We studied AR filament. Its magnetic field strength is very strong. The magnetic structure of the filament in He line (chromosphere) and Fe line (photosphere) is along the filament spine, in other words it is very sheared.

We must resolve 180-deg ambiguity in future work, then will decide the more detailed magnetic structure of the filament.