Continuous upflow of material in an AR filament from the photosphere to the corona

Christoph Kuckein 1,2, Rebecca Centeno 3 and Valentin Martinez Pillet 1

1Instituto de Astrofísica de Canarias, E-38205 La Laguna, Tenerife, Spain
2Departamento de Astrofísica, Universidad de La Laguna, E-38206 La Laguna, Tenerife, Spain
3High Altitude Observatory (NCAR), Boulder, CO 80301, USA

Abstract

Using spectropolarimetric data of an Active Region (AR) filament we have carried out inversions in order to infer vector magnetic fields in the photosphere (Si I line) and in the chromosphere (He I line). Our filament lies above the polarity inversion line (PIL) situated close to disk center and presents strong Zeeman-like signatures in both photospheric and chromospheric lines. Pore-like formations, see below (Fig. 4), with both polarities are identified in the continuum under the PIL. The azimuth ambiguity is solved at both heights using the AZAM* code. A comparison between the photospheric and chromospheric vector magnetic fields revealed that they are well aligned in some areas of the filament. However, especially at chromospheric heights, the magnetic field is mostly aligned with the dark threads of the filament. Velocity signatures indicating upflows of field lines are found at both heights.

The combination of all our results strongly suggest an emerging flux rope scenario.

Future work

- Nonlinear force-free field extrapolations
- Time evolution of the filament

Contact: ckuckein@iac.es

References

MmSAI, in press (arXiv:1001.2434)
Socas-Navarro, H. 2001, ASPC, 236, 487

Table 1: Observations.

# Maps |
<table>
<thead>
<tr>
<th>FOV</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>MELAINE (SIR)</td>
</tr>
</tbody>
</table>

Table 2: NIST atomic data.

<table>
<thead>
<tr>
<th>Atomic Line</th>
<th>Wavelength (Å)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Si I</td>
<td>10830.09</td>
</tr>
<tr>
<td>He I</td>
<td>10827.09</td>
</tr>
</tbody>
</table>

Table 3: Used inversion codes.

<table>
<thead>
<tr>
<th>Code</th>
<th>MILNE-EDDY (linear)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Si I</td>
<td>10830.09</td>
</tr>
<tr>
<td>He I</td>
<td>10827.09</td>
</tr>
</tbody>
</table>

Table 4: Criteria used for calculating the mean velocities of the filament and faculae.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filament</td>
<td>He I 10830.09</td>
</tr>
<tr>
<td>Faculae</td>
<td>Si I 10830.09</td>
</tr>
</tbody>
</table>

He I 10830.09

 velocity map  with respect to the mean faculae velocities  

Future work

- Nonlinear force-free field extrapolations
- Time evolution of the filament

Contact: ckuckein@iac.es

Abstract

Using spectropolarimetric data of an Active Region (AR) filament we have carried out inversions in order to infer vector magnetic fields in the photosphere (Si line) and in the chromosphere (He line). Our filament lies above the polarity inversion line (PIL) situated close to disk center and presents strong Zeeman-like signatures in both photospheric and chromospheric lines. Pore-like formations, see below (Fig. 4), with both polarities are identified in the continuum under the PIL. The azimuth ambiguity is solved at both heights using the AZAM* code. A comparison between the photospheric and chromospheric vector magnetic fields revealed that they are well aligned in some areas of the filament. However, especially at chromospheric heights, the magnetic field is mostly aligned with the dark threads of the filament. Velocity signatures indicating upflows of field lines are found at both heights.

The combination of all our results strongly suggest an emerging flux rope scenario.

Future work

- Nonlinear force-free field extrapolations
- Time evolution of the filament

Contact: ckuckein@iac.es

Abstract

Using spectropolarimetric data of an Active Region (AR) filament we have carried out inversions in order to infer vector magnetic fields in the photosphere (Si line) and in the chromosphere (He line). Our filament lies above the polarity inversion line (PIL) situated close to disk center and presents strong Zeeman-like signatures in both photospheric and chromospheric lines. Pore-like formations, see below (Fig. 4), with both polarities are identified in the continuum under the PIL. The azimuth ambiguity is solved at both heights using the AZAM* code. A comparison between the photospheric and chromospheric vector magnetic fields revealed that they are well aligned in some areas of the filament. However, especially at chromospheric heights, the magnetic field is mostly aligned with the dark threads of the filament. Velocity signatures indicating upflows of field lines are found at both heights.

The combination of all our results strongly suggest an emerging flux rope scenario.