

On the outflow at coronal heights or the way I learned to listen to Philippe

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Outline

- 1 Previous works
- 2 Observations
- 3 Highlight the network
- 4 Tools needed
- 5 Results
- 6 Relation to the magnetic field
- 7 Summary and Future plans

Outline

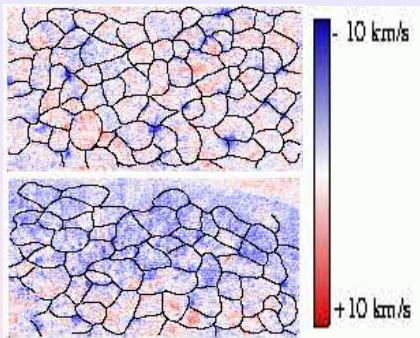
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Previous works

- Gebbie et al. (1981): Si_{IV} and C_{IV} with res $\sim 3''$ (SMM/UVSP)
 – bright regions relative red-shifted.
 – dark region relative blue-shifted.
- Athay et al. (1983): C_{IV} with res $\sim 3''$ (SMM/UVSP)
 – no correlation found between doppler shifts and intensity.
- Dere et al. (1984): C_{IV} with res $\sim 1.2''$ (HRTS)
 – no correlation found between doppler shifts and intensity.
- Peter (1999): with res $\sim 1''$ (SUMER/SOHO)
 – bright areas are redshifted in C_{IV}.
 – No correlation in Ne_{VIII}.
- Hassler et al. (1999): Ne_{VIII} with res $\sim 1''$ (SUMER/SOHO)
 – strong outflow occurs along QS lanes.
- Wilhelm (2000): Ne_{VIII} with res $\sim 1''$ (SUMER/SOHO)
 – strongest blueshift appears in the dark region.

Outflow vs. Network

from the position of the outflow

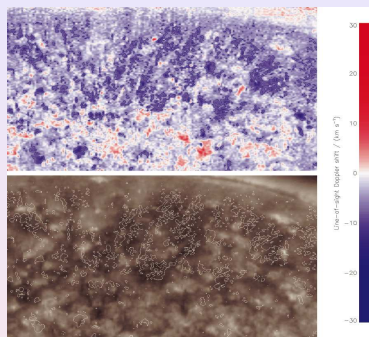


Hassler et al. (1999):

- Strong outflow (blueshift) occurs along QS lanes especially where lanes come together.

Outflow vs. Intensity

from the correlation with the intensity

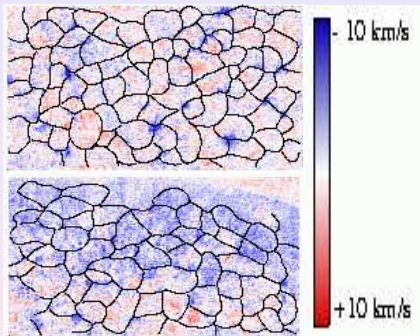


Wilhelm (2000):

- Strongest blueshift appears in the dark region in Ne VIII line intensity.

Outflow vs. Network

from the position of the outflow



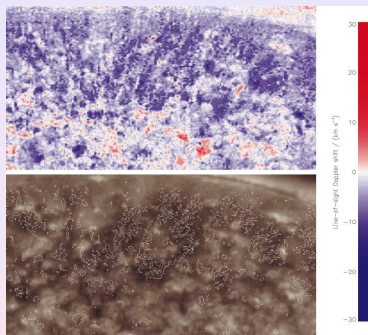
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→ network defined per hand?

Outflow vs. Intensity

from the correlation with the intensity

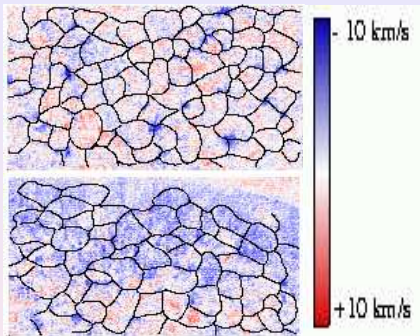


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Outflow vs. Network

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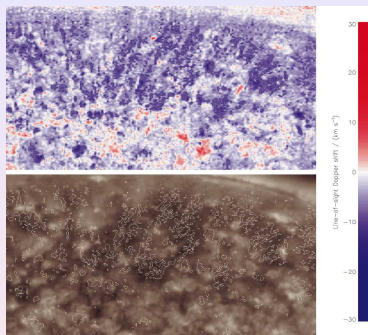
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→ maybe better ways than contour plots?

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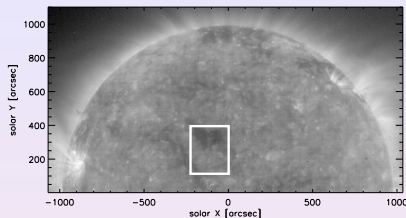
Observations

Date: March 7, 1997

Solar Region: ECH & QS

Emission line: Ne VIII(770.428Å)

Step size: 1.0''

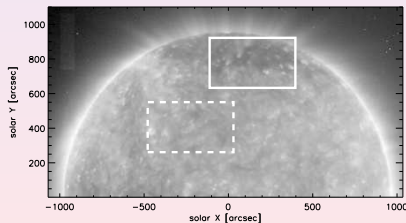


Date: September 21,
1996

Solar Region: PCH & QS

Emission line: Ne VIII(770.428Å)

Step size: 3.0''



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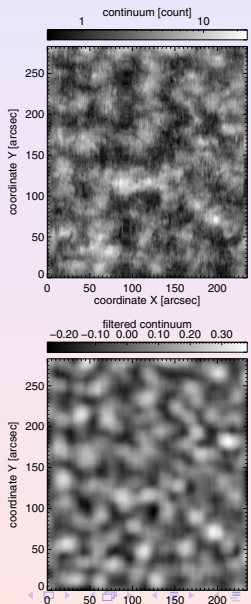
Median filtering

What do we want:

- Reveal the cellular pattern of supergranulations.
- ↪ Remove strong local brightenings.
- Easy to do.
- ↪ using MEDIAN function from IDL.
- Keep the transition between network and internetwork.
- ↪ Keep the lognormal distribution of the images.

Exact Method:

Aiouaz, Peter, Lemaire A&A 2005

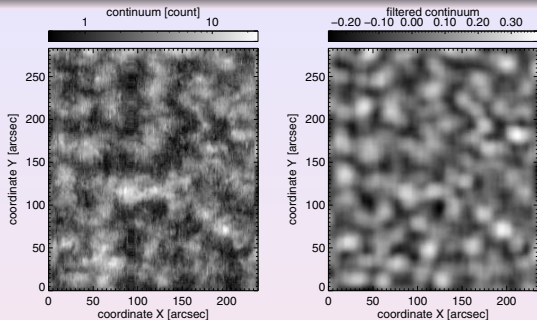


Outline

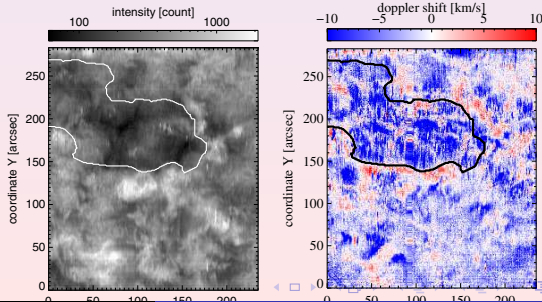
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What are the "tools" needed?

Continuum image:



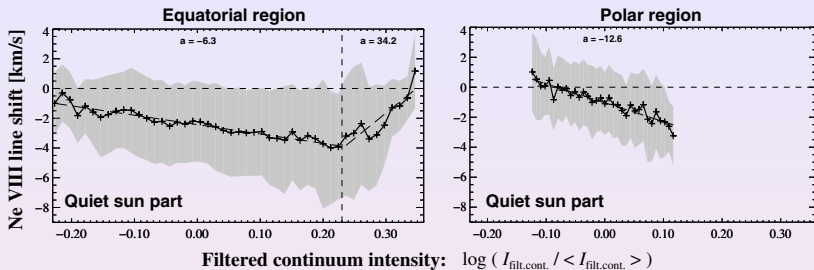
Low corona line : Ne VIII



Outline

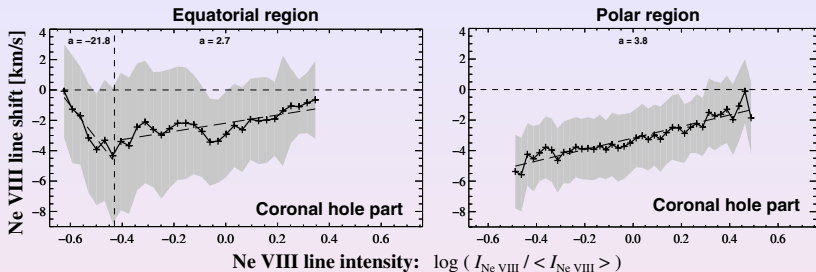
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Outflow vs. chromospheric network



- **Hassler, 1999:** Strong outflow (blueshift) occurs along network lanes.
- ↪ Outflow (blueshift) increases within the network.
- **Aiouaz, 2005:** show blueshift increasing with increasing filtered continuum intensity.
- **Aiouaz, 2005:** In high intensity range: Decrease of the blueshift with increasing filtered continuum intensity.
- ↪ *No maximum outflow at network center but rather a network boundaries.*

Outflow vs. line intensity

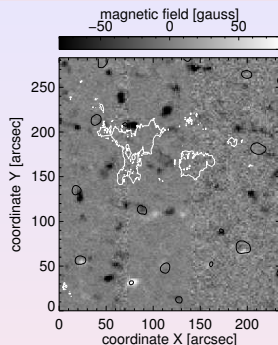
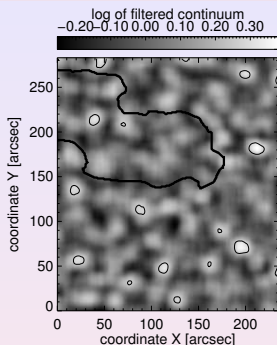
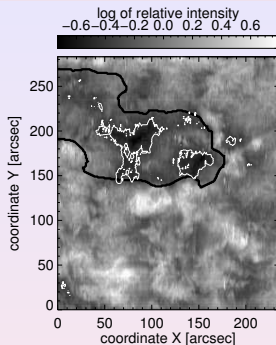


- **Wilhelm, 2000:** Strongest blueshift appears in the dark region in Ne VIII intensity.
- ↪ Outflow energy goes to radiation \Rightarrow Energy balance
- **Aiouaz, 2005:** Show blueshift decreasing with Ne VIII line intensity.
- **Aiouaz, 2005:** In low Ne VIII line intensity range: Increase of the blueshift with increasing line intensity.
- ↪ *Less outflow and less radiation \Rightarrow Another regime for the Energy balance: Lack of heating.*

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Relation to the magnetic field



Outflow vs. network

- Maximum outflow *not* at network center, rather at network boundaries.
- Regions of maximum blueshift well correlated to the magnetic field concentration.

Outflow vs. intensity

- No magnetic field concentration in regions of very low intensities: seems to confirm the lack of energy.
- For very low intensities: not enough energy to either accelerate the solar wind or to create any detectable radiation.

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Summary

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- Outflow stronger in the network than in the internetwork.
- More plasma acceleration (wind): less radiation.
- Lack of heating: no radiation, no acceleration
- Maximum blueshift *not* at the network center:
 - Higher activity at network boundaries?
 - Funnel outflows?

Future plans

- Coronal vs. Transition region lines.
- Quiet Sun vs. Coronal Holes .

Bibliography

- Athay, R. G., Gurman, J. B., Henze, W., & Shine, R. A. 1983, Astrophysical Journal,, 265, 519
- Dere, K. P., Bartoe, J.-D. F., & Brueckner, G. E. 1984, Astrophysical Journal,, 281, 870
- Gebbie, K. B., Hill, F., November, L. J., et al. 1981, Astrophysical Journal, 251, L115
- Hassler, D. M., Dammasch, I. E., Lemaire, P., et al. 1999, Science, 283, 810
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- Wilhelm, K. 2000, Astronomy and Astrophysics, 360, 351