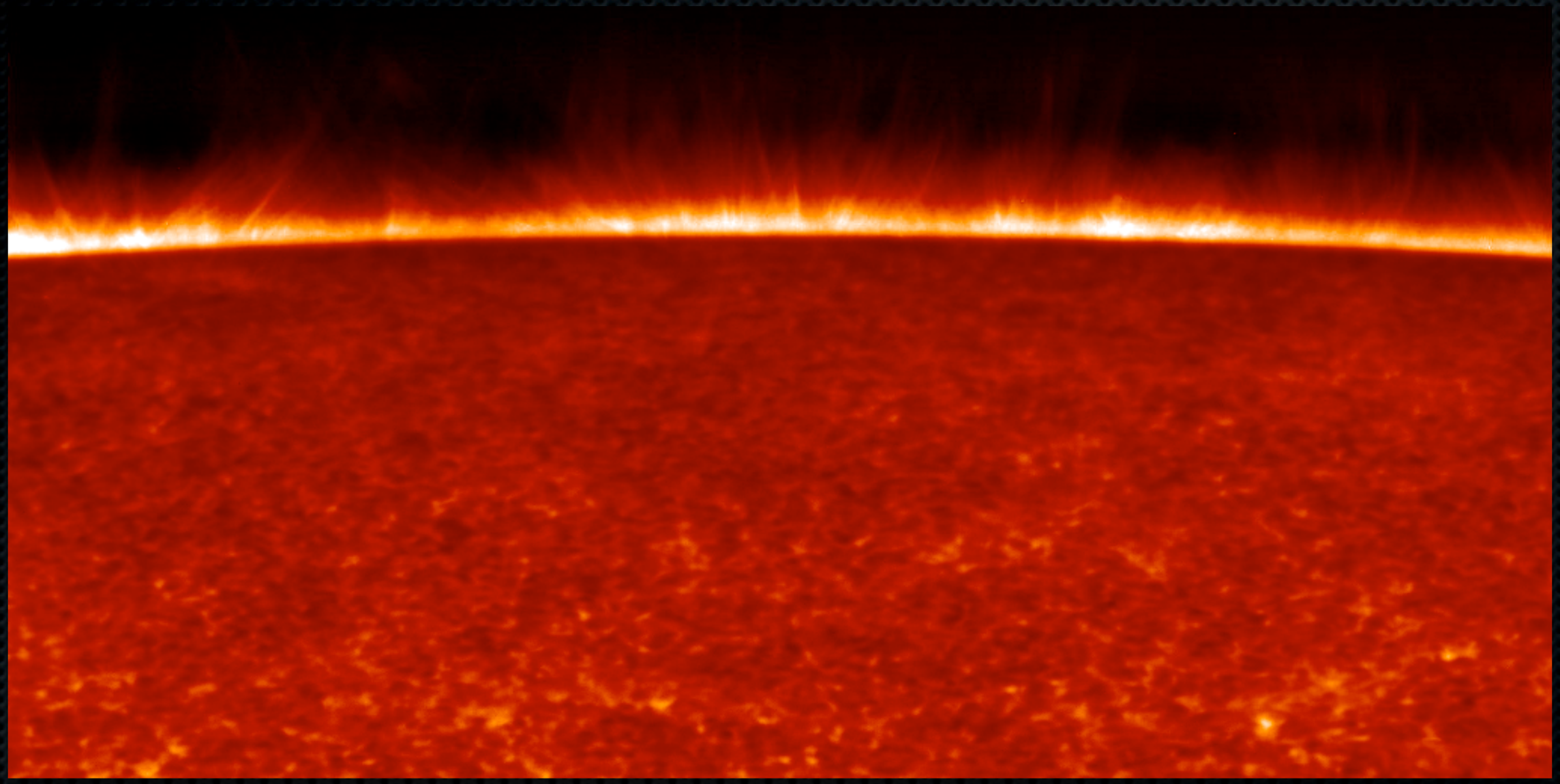

Section H

The Chromosphere

Objective

This working group will assess the current state of our understanding of the dynamics and energetics of the chromosphere, and the coupling between the chromosphere, transition region and corona.

Chromospheric research has moved to the magnetic atmosphere & activity.

Questions and topics

1. How have recent observations and numerical models changed our views of chromospheric heating?
2. How does the plasma $\beta=1$ surface affect the chromosphere and particularly the propagation and properties of waves?
3. How have recent numerical models improved our understanding of the chromosphere?
4. What kind of observations and modeling are needed to better understand the impact of chromospheric dynamics and energetics on the transition region and corona, and vice versa?

How have recent observations and numerical models changed our views of chromospheric heating?

- Just how much energy do we need?
- High-frequency acoustic waves: still open
- Internal (Atmospheric) gravity waves: promising, but unclear how and where they dissipate.
- How is the magnetized chromosphere heated? Type II spicules? How are these driven?
- Connection of chromospheric and coronal heating?

How does the plasma β=1 surface affect the chromosphere and particularly the propagation and properties of waves?

- *p*-mode propagation: inclined field or radiative damping? Disagreement between observations/ interpretation.
- Is chromospheric seismology really possible? (dynamics, wave mode coupling/propagation)
- How are the Alfvén waves generated? Reconnection, magnetic element dynamics, coupling of other modes?
- How much of that Alfvénic power makes it to the corona?

How have recent numerical models improved our understanding of the chromosphere?

- Neutrals cannot be ignored; some problems require multi-fluid and/or kinetic approach.
  - Which problems require multi-fluid?
- Current radiative transfer “synthetic observations” are OK in the photosphere, but discrepancies exist in the chromosphere.
  - Discrepancies result from issues with the simulation.
- No really believable chromospheric models yet.

How does the magnetic free energy traverse the chromosphere?

- Significant impact on field extrapolations from the non-force free nature of the chromosphere.
- Is the chromosphere a “force-free factory”: Perpendicular resistivity very high in chromosphere (neutrals)?
- So maybe measuring **B** at top of chromosphere offers hope?

Chromosphere and flares

- Can we diagnose properties of particle beams from chromospheric observations?
- What happens to the chromosphere as a result of a flare?

What kind of observations and **modeling** are needed to better understand the impact of chromospheric dynamics?

- Cannot treat the whole problem, so solve suitable sub-problems.
- Multi-fluid approach required for at least some problems.
- “Believable” chromospheric models are on the horizon.

What kind of **observations** and modeling are needed to better understand the impact of chromospheric dynamics?

- Need to measure **B** in the chromosphere.
- Time-resolved integral field spectropolarimetry (X,Y,**λ**,**S**,t), sub-arcsecond resolution, second cadence.
- Need a better handle on polarimetry in chromospheric lines.
- Observations in the transition region and corona at compatible resolution required (integral field spectropolarimetry also).