MON. AFTERNOON: "ACTIVE REGION FLUX" SESSION SUMMARY

LEADERS: HOLLY GILBERT AND NICK ARGE

This half day session began with a talk by **Jack Harvey** titled, **"**What is the Evidence for Open Field Lines from Active Regions?" in which he addressed near-Sun (indirect) observational evidence that some open field lines do in fact emanate from active regions. Principle signatures include morphology & inferred physical properties of coronal loops in ARs, absence of hot, high-density corona in some ARs, and doppler and proper motions of coronal features. Jack pointed out that the supposition that various observational signatures indicate open magnetic flux is based mainly on conjecture, but he feels there is convincing evidence that some magnetic flux from many active regions is open to interplanetary space.

Marcia Neugebauer gave the second invited talk, "The Quasi-Stationary Solar Wind from Active Region Sources" in which she presented properties of the solar wind emanating from active regions and asked whether those properties tell us anything about the source. Mapping solar wind data from ACE and Ulysses back to the Sun occasionally shows a credible AR origin. On average, the AR wind differs from other quasi-static wind in only two respects: (1) at a given speed, it has a higher ionization temperature (as determined from the O7+/O6+ ratio), and (2) the high speed AR streams are not monolithic, but are often broken into a series of substreams.

In **Roberto Lionello's** talk, "MHD Evolution of Bipolar Active Regions through Differential Rotation" he presented the evolution of two small active regions in simulations created by his 3D MHD code in spherical coordinates. His code starts from a potential field extrapolation and 1D solar wind solution. He then relaxes the configuration until coronal holes, streamers, and the heliospheric current sheet are formed, and introduces differential rotation.

These three talks stimulated many questions:

LARGER ISSUES:

- CANNOT DIRECTLY SEE OPEN FIELD LINES… HOW CAN WE TELL WHEN FLUX IS OPEN?
    - POSES REAL PROBLEM FOR OBSERVERS- NEW DATA…. HELP!
    - MODELERS…. HELP! WHAT SHOULD WE BE LOOKING FOR??
    - HOW TO VALIDATE MODELS?

INITIAL QUESTIONS AND SOME ANSWERS (?)

- DOES OPEN MAGNETIC FLUX COME FROM/NEAR ACTIVE REGIONS?
    - YES…BUT WHAT IS THE DEFINITION OF ACTIVE REGION (AR)?

- IF OPEN MAGNETIC FLUX COMES FROM ARS, THEN HOW MUCH?
    - ~10% DURING MIN. AND UP TO 50% AT MAX?

- How does it change over the solar cycle?
  - Seems to reach a constant minimum?
  - A floor in the total open flux?

- Is there a good observational way to identify the open flux in Active Regions?
  - Very difficult!!

- Are models actually capturing open regions?
  - Yes

- What is the relationship between open and closed regions?
  - Roberto's simulation showed interchange reconnection, but no intermittent open flux in closed regions

- Composition and charge states…. how else can these help?
  - AR flows are similar to CH flows except for ionization state (higher) and fine structure

Challenge for next year: HOW MUCH OPEN FLUX COMES FROM ACTIVE REGIONS?