by tracking individual magnetic elements. The analysis reveals a strong spin down near the pole, which is greater than the Doppler and magnetic rotation rates estimated by Snodgrass and Ulrich (1990), and rotation rate inferred from helioseismology (Birch and Kosovichev, 1998).

7.3: **Monitoring the Sun with the ESA PROBA2 mission**
David Berghmans (*SIDC - Royal Observatory of Belgium)*
Jean-Francois Hochedez (ROB/SIDC), Jean-Marc Defise (Centre Spatial de Liege) and the SWAP and LYRA instrument teams

PROBA2 is an ESA microsatellite scheduled for launch in May 2008. Its scientific payload includes solar remote sensing instruments such as an EUV imager (SWAP, Sun Watcher using APS and image Processing) and a UV radiometer (LYRA, Lyman alpha radiometer); supplemented with in-situ instruments such as DSLP (plasma charge Langmuir probe), TPMU (a thermal plasma instrument) and a vector magnetometer (SGVM). In line with the design philosophy of the PRoject for OnBoard Autonomy (PROBA) platforms, both the satellite and instruments will incorporate numerous autonomous operational capabilities, innovative design features and technology demonstrations. The SWAP and LYRA instruments contain innovative detector technolgy that will be essential for future missions such as Solar Orbiter. SWAP has a APS CMOS detector, LYRA is based on wide-bandgap detectors that are blind to the optical light. LYRA will monitor the UV solar irradiance at a subsecond time-resolution, in 4 channels that have been chosen for their relevance to solar physics, space weather and aeronomy. SWAP will image the solar corona in a 17.5nm bandpass at a 1 min cadence. SWAP is dedicated to track all major events in the solar corona with space weather impact (coronal holes, flares, eruptions, dimmings and EIT waves).

The PROBA2 mission is supported by the ESA Science Directorate and proposed as a contribution to ILWS. SWAP and LYRA will have a full open data policy.

14.1: **Flare and associated phenomena in AR 10486 on October 24, 2003**
Lokesh Bharti (*Dept. of Physics, University college of Science, MLSU, India)*
Chandan Joshi (MLSU), S.N.A. Jaaffrey(MLSU)

Multiwavelength study of flare and associated phenomena in AR 10486 is presented. Surges observed after flare peak time. RHESSI data shows upward moving source in 3-12 keV band. Bright mass ejection seen in TRACE 1600 images well correlated with this upward moving source. Observations of TRACE 195 reveals that the surge ejected from foot point of a flaring coronal loop. Magnetic reconnection may be plausible mechanism to supply sufficient energy for surges and coronal loop heating.

4.3: **Solar Coronal Heating and Building up of Magnetic Energy in a Tectonics Model**
A. Bhattacharjee (*Institute for the Study of Earth, Oceans, and Space, University of New Hampshire)*
C. S. Ng (University of New Hampshire)

Recent observations have shown that the solar surface is covered with a so-called "magnetic carpet", in which small-scale magnetic flux loops are continually emerging and interacting. The magnetic flux at the photosphere is thus being replaced in every 10-40 hours. This magnetic carpet may have important implications for the heating problem of the solar corona. We have extended a tectonics model of coronal heating [Priest, Heyvaerts and Title, ApJ 576, 533 (2002)] and shown, based on analysis and numerical simulations, that the heating rate is independent of the Lundquist number, as well as the photospheric

coherence time, if the magnetic footpoints are subject to random photospheric motion. We have also found that magnetic energy can be built up to a statistically high level before the energy is released by some mechanisms, such as instabilities and/or magnetic reconnection. We have also shown that even if such processes limit the build-up of magnetic energy, the overall heating rate is still independent of the Lundquist number.

This work is supported by NASA and National Science Foundation.

4.4: **EPO for the SDO Extreme Ultraviolet Variability Experiment (EVE)**

Susan Buhr (*CIRES/University of Colorado, Boulder)*
Mark McCaffrey (CIRES/University of Colorado), Maria Murillo (Skyline High School)

The SDO Extreme Ultraviolet Variability Experiment (EVE) project has successfully engaged high school students in learning about space weather and Sun-Earth connections. Through a partnership with the Math, Engineering and Science Achievement (MESA) program, English Language Learner (ELL) students doubled their achievement on a pre- and post-assessment on the content of the course. Students learned scientific content and vocabulary in English with support in Spanish, attended field trips, hosted scientist speakers, built and deployed space weather monitors as part of the Stanford SOLAR project, and gave final presentations in English, showcasing their new computer skills. Teachers who taught the students in other courses noted gains in the students' willingness to use English in class and noted gains in math skills. Most of the students were recent immigrants who did not have another option to take a science class. The MESA-EVE course won recognition as a Colorado MESA Program of Excellence and is being offered again in 2007-08. The course has been broken into modules for use in shorter after-school environments, or for use by EVE scientists who are outside of the Boulder area. Other EVE EPO includes professional development for teachers and content workshops for journalists.

URL: `http://cires.colorado.edu/education/k12/eve/`

12.4: **RESOLVING THE AZIMUTHAL AMBIGUITY IN VECTOR MAGNETOGRAM DATA WITH THE DIVERGENCE-FREE CONDITION**

Ashley Crouch (*NWRA/CoRA)*
Graham Barnes (NWRA/CoRA), Tom Metcalf (NWRA/CoRA), K.D. Leka (NWRA/CoRA)

We demonstrate that the azimuthal ambiguity that is present in solar vector magnetogram data can be resolved with line-of-sight and horizontal heliographic derivative information by using the divergence-free property of magnetic fields without additional assumptions. We discuss the specific derivative information that is sufficient to resolve the ambiguity away from disk centre, with particular emphasis on the line-of-sight derivatives of the various components of the magnetic field. Conversely, we also show cases where ambiguity resolution fails because sufficient line-of-sight derivative information is not available. We will explore implementations of this method, with tests on both synthetic and observational data.

This work was supported by funding from NASA under contracts NNH05CC75C and NAS5-02139.

4.5: **A Model of Non-Force Free magnetic Field for Solar Corona**

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