

The activities of *the Astronomical Institute of the Slovak Academy of Sciences (AISAS)*, Tatranská Lomnica (<http://www.astro.sk>), related to COSPAR, were devoted to the research in solar and stellar physics using different satellite observations, mainly in the UV, XUV and X-ray spectral regions. Mainly data of the current SOHO mission, the TRACE and the RHESSI satellites and previous satellites of the NOAA and GOES series were used for solar research. Stellar data of several satellites like e.g. IUE or HST were used for research of various variable stars.

The most important management event in the reported period is creation of the Center of excellence named “Center of space studies: effects of space weather” approved by the Ministry of Education of Slovakia and funded by the Structural funds of the EU for support of science in Slovakia. This center is led by the AISAS but the following partners are members of the center as well: Institute of Experimental Physics, SAS, Košice (group of space physics led by prof. Dr. K. Kudela) and Faculty of Science, Pavol Jozef Safarik University, Košice (group led by doc. Dr. S. Parimucha).

Results on particular manifestations of the solar activity (spicules, flares) and their consequences in the heliosphere (coronal mass ejections) and on nature of symbiotic star AG Draconis, consisting of a cool giant and a compact star, were selected hereafter as examples of solar/stellar research performed recently at AISAS.

We used high-resolution images of the Sun taken by the Very high Angular resolution ULtraviolet Telescope (VAULT) in the spectral line of neutral hydrogen Ly α at 121.6 nm for analysis of dynamic fibrils in the solar atmosphere. The rocket with the VAULT on board was launched from White Sands Missile Range in New Mexico (USA) on June 14, 2002. The VAULT was flown as a payload of sounding rocket Black Brant with a parabolic trajectory reaching maximum altitude of about 294 km. We analyzed the VAULT Ly α images to find whether H α dynamic fibrils widespread in the solar chromosphere are also observed in the spectral line Ly α mapping the upper chromosphere and transition region. We found many extending and retracting Ly α jets measuring top trajectories of the best-defined ones. The similarities between dynamic Ly α jets and H α fibrils suggest that the magnetoacoustic shocks causing dynamic H α fibrils also affect dynamic Ly α jets. [2]

Using a variety of solar telescopes at different satellites we studied two well-observed, fast halo CMEs, allowing to cover the full CME kinematics including the initiation and impulsive acceleration phase, and their associated flares. We

found a close synchronization between the CME acceleration profile and the flare energy release as indicated by the RHESSI hard X-ray flux onsets, as well as peaks occur simultaneously within 5 minutes. These findings indicate a close physical connection between both phenomena and are interpreted in terms of a feedback relationship between the CME dynamics and the reconnection process in the current sheet beneath the CME. [4]

We studied the multi-wavelength characteristics at high spatial resolution, as well as chromospheric evaporation signatures of solar microflares. To this end, we analyzed the fine structure and mass flow dynamics in the chromosphere, transition region and corona of three homologous microflares (GOES class 3 keV) using several different types of the satellites in EUV and X-rays and ground based observations. We found the flow dynamics associated with the events to be very complex. For all three microflares, multi-component fitting is needed for several profiles of He i, O v, and Ne vi lines observed at the flare peaks, which indicate spatially unresolved, oppositely directed flows of < 180 km/s. We interpreted these flows as twisting motions of the flare loops. RHESSI X-ray spectra showed evidence of non-thermal bremsstrahlung for two of the three microflares. The electron beam flux density deposited in the chromosphere for these events is estimated to straddle the threshold heating flux between gentle and explosive evaporation. Data were acquired thanks to EU 6thFP funds of the OPTICON Trans-national Access Program. [1]

Star AG Draconis produces a strong supersoft X-ray emission. The X-ray and optical-UV fluxes are in a strict anticorrelation throughout the active and quiescent phases. To understand this relationship we modeled the X-ray/near-IR energy distribution at different levels of the star's brightness, and provided a profile-fitting analysis of the broad wings of OVI 1032,1038 Å and HeII 1640 Å emission lines by Thomson scattering. By this way we confirmed the observed flux anticorrelation quantitatively, and showed that the optical bursts are associated to an increase in the nebular component of radiation. These results led us to a conclusion that the supersoft X-ray/optical-UV flux anticorrelation is caused by the variable wind from the hot star. The enhanced hot star wind gives rise to the optical bursts by reprocessing high-energy photons from the Lyman continuum to the optical-UV. Understanding the inverse relationship between optical and X-ray fluxes represents an important ingredient in the investigation of the Z And-type outbursts. [3]

In the period Oct 6–20, 2008 the new run of the SOHO joint observing program JOP171 (SOHO, TRACE, RHESSI) was performed and supported by the ground-based observations of the Dutch Open Telescope (Observatorio del

Roque de los Muchachos, La Palma) and the Kanzelhoehe (Austria) and Hvar (Croatia) Solar Observatories. Details are given at the dedicated web page of the campaign http://www.astro.sk/~choc/open/08_dot/08_dot.html. The best data of this campaign will be utilized in the near future. Additionally, a special observing program was prepared and run at the CORONAS-PHOTON satellite using the TESIS/FET instrument.

References.

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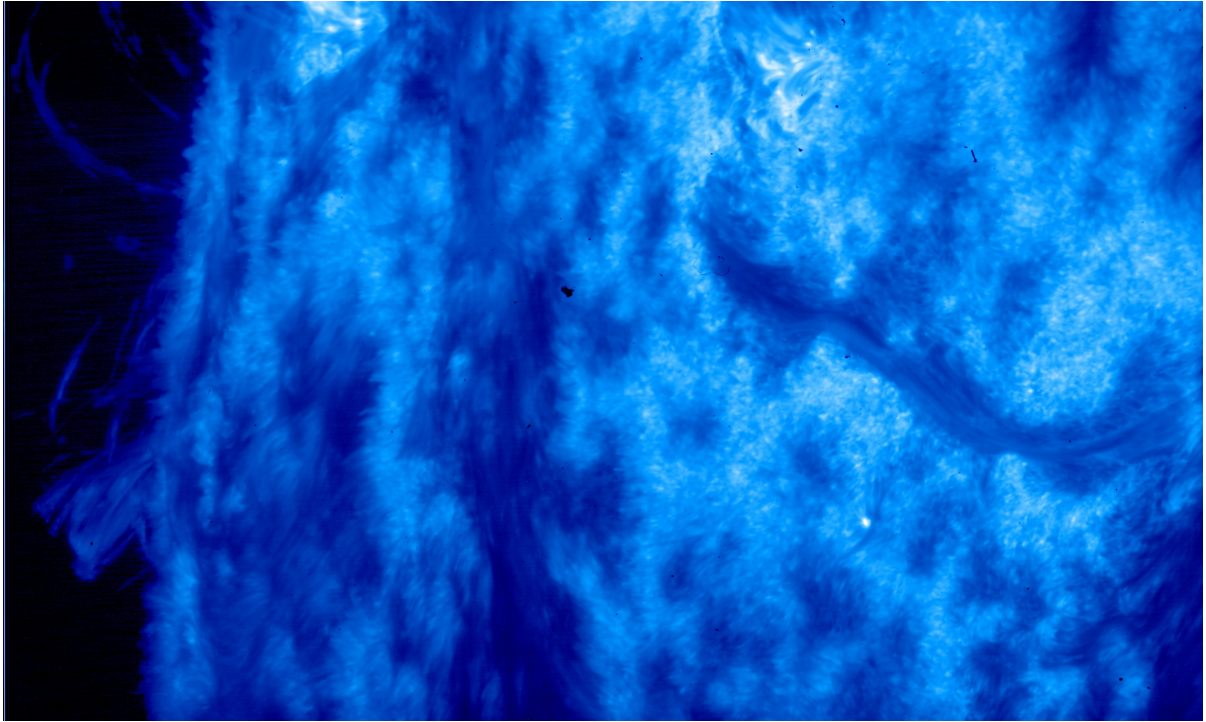


Fig.1. Ly α image taken by the VAULT telescope showing thick hedgerows of elongated Ly α jets and a prominence at the east solar limb.

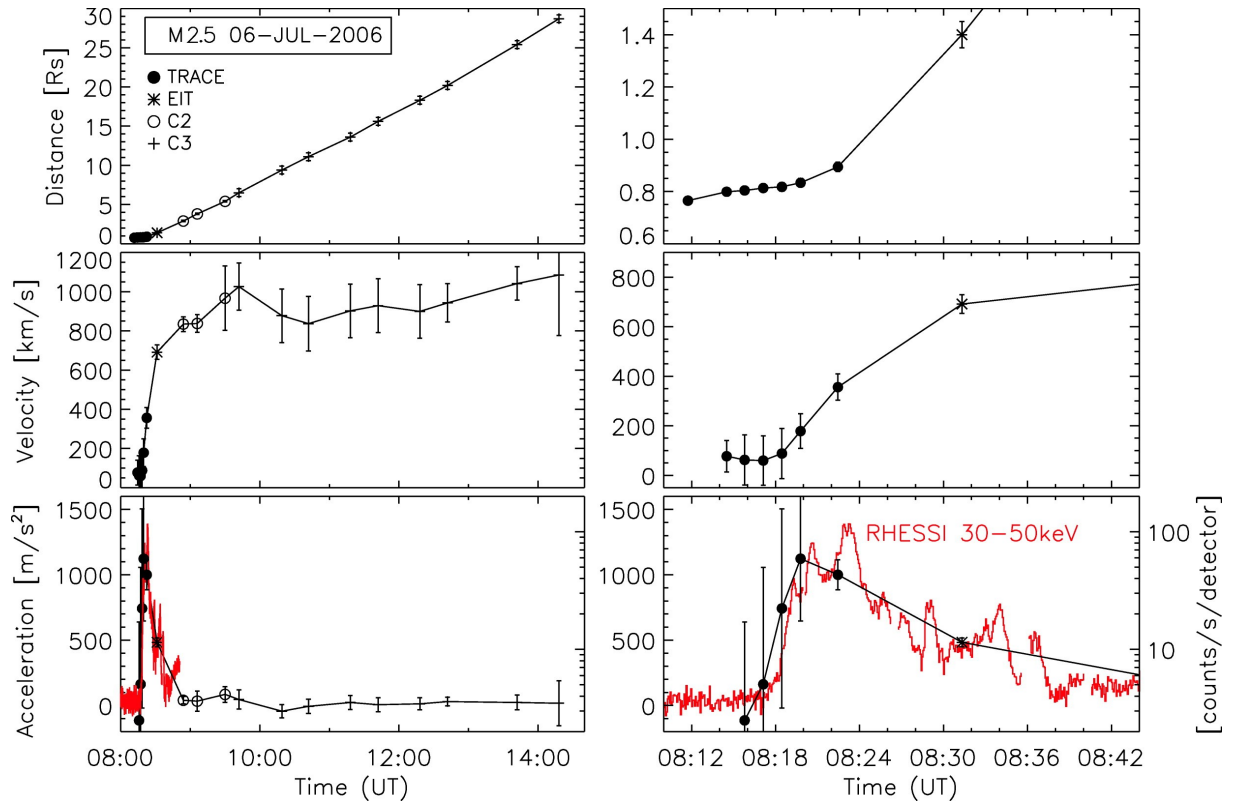


Fig.2. CME/flare event of 2006 July 6. From top to bottom, distance-time profile, velocity, and acceleration of the CME as observed by different instruments (different plot symbols specified in the legend). In the bottom panel, we plot also the *RHESSI* 50-100 keV HXR flux of the associated flare. The left panels show the full CME height range covered by the LASCO FOV. The right panels zoom into the early acceleration phase of the CME as observed by *TRACE* and *EIT*. The solid curves connects the black features measured in the *SXI* running ratio images and subsequent LASCO measurements, the dashed curves refer to the white features.

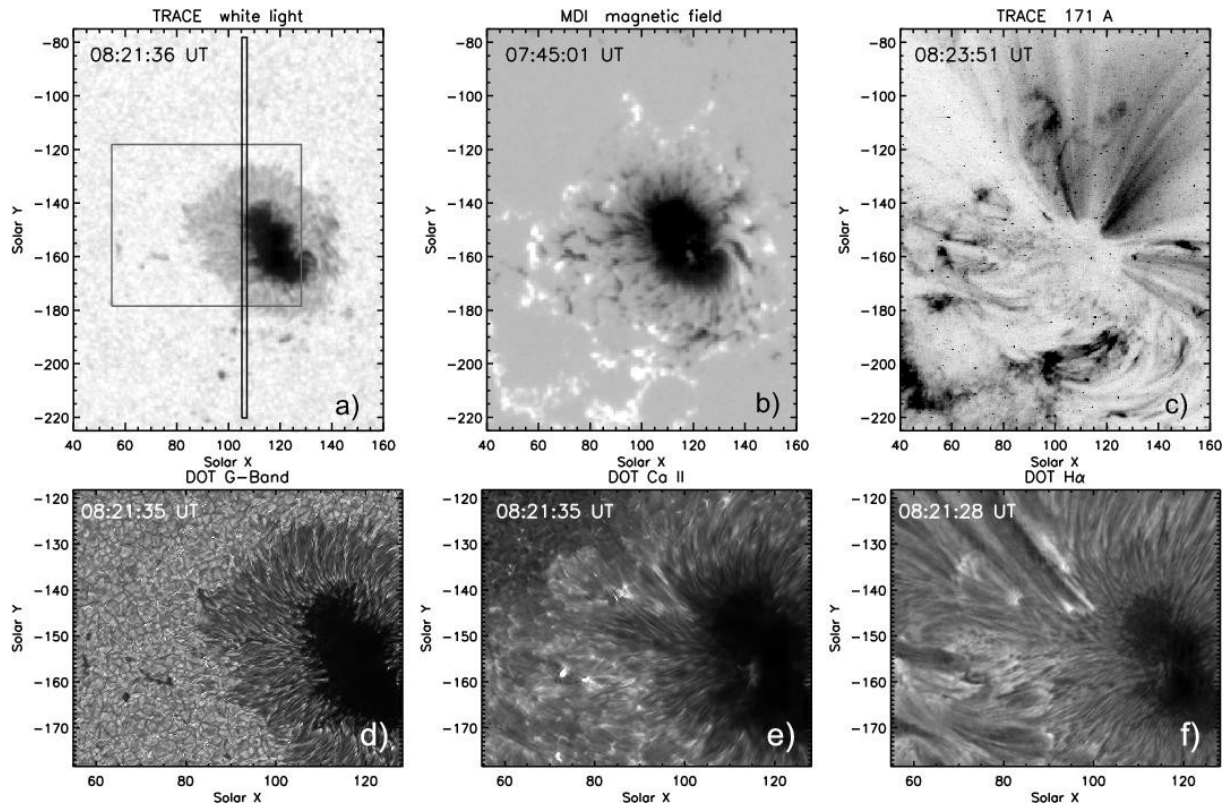


Fig.3. The solar active region AR 10898 as observed by TRACE, MDI instruments and DOT telescope before the 08:26 UT microflare occurred. Panel a): TRACE white light image with the position of the CDS slit and the DOT FoV indicated by a black and grey frame, respectively. Panel b) shows an MDI high resolution longitudinal magnetogram recorded 45 min before the other images and rotated to 08:21:36 UT. In Panel c), a TRACE 17.1 nm image (inverse grey scale) with the same FoV as the white light map is shown. Panels d) to f) show the DOT G Band, Ca II H and H alpha images nearest in time to the TRACE white light map. In each panel, the image recording time is indicated in the top left corner.

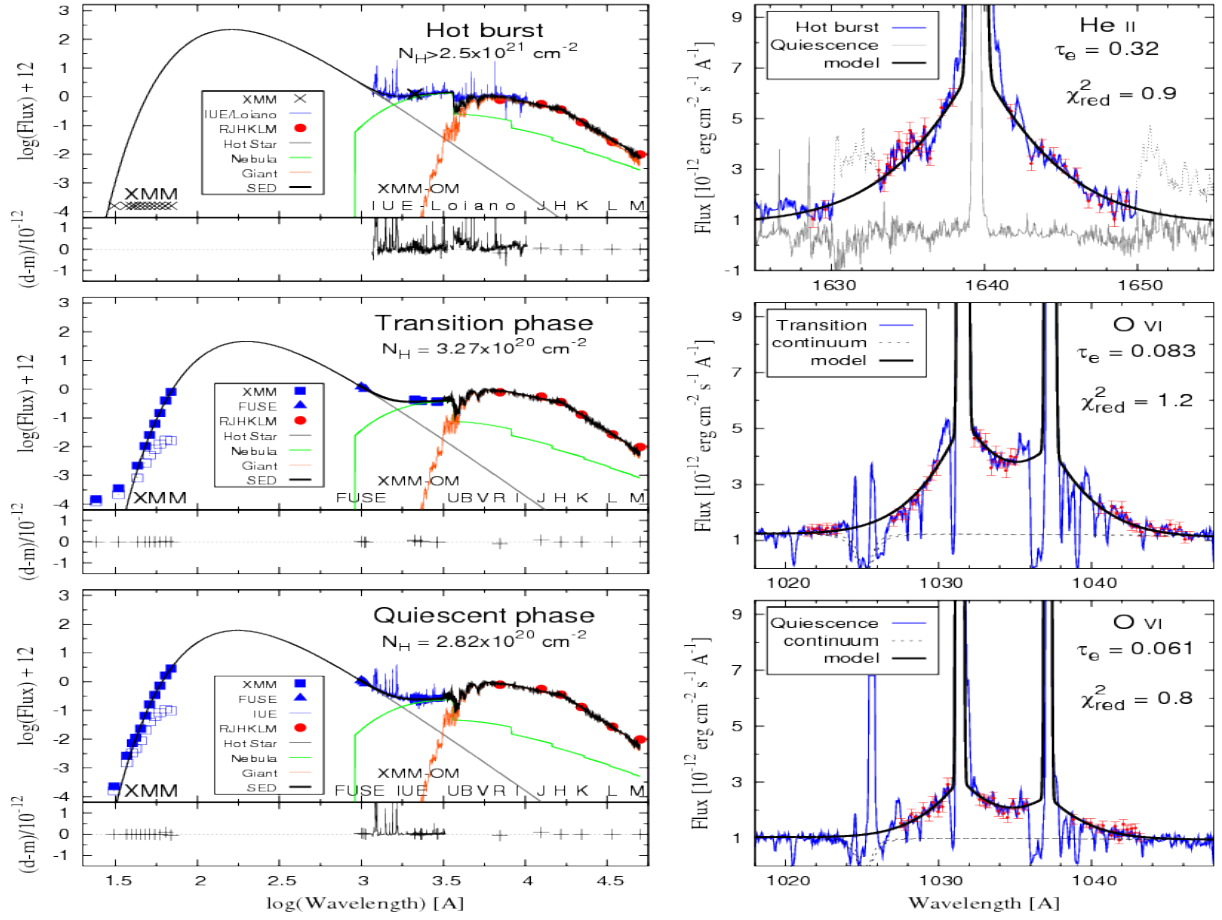


Fig.4. AG Dra in different phases of its activity. Left panels show a comparison of the observed and modeled SEDs of AG Dra during the hot burst (top), transition phase (middle), and quiescent phase (bottom). Fluxes are in units of $\text{erg/s/cm}^2/\text{\AA}$. Right panels compare the observed and modeled broad wings of the OVI 1032, 1038 Å doublet and the HeII 1640 Å line at these stages of activity.