

Outstanding Results of Romanian Researchers in Solar and Solar-Terrestrial Physics (2000-2006)

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The valuable results of the Romanian researchers in different fields of solar and solar-terrestrial researches are revised. A new index, Q_x , was defined by us in order to give an evaluation of the Soft X-Ray (SXR) flare energy, similarly to the Q index for H_α flares. The Q_x indices are available for the interval 1 January 1976-30 June 2006 for the whole solar disk as well as separately for the two solar hemisphere, North and South, and they will be periodically up-dated (COST Action 724, WG 1). Seismic emission from solar flares is distinguished by its origin in plain view above the photosphere, as opposed to convective emission, which is hidden beneath the photosphere. To understand the physics of the acoustic radiation responsible for solar quakes a systematic survey covering a large number of X-class some M-class solar flares observed by SOHO/MDI during 1996 and 2006 have undertaken. A number of papers present the dynamics of the solar corona in the minimum phase (1996) and during the ascending phase (1998) of the 23rd solar cycle, using spectral data of LASCO-C1/SOHO experiment. In particular, the emergence of the slow solar wind at the above mentioned solar cycle phases was studied. A series of contributions subscribe to ongoing efforts to resolve plasma's fine-scale structure and dynamics at the base of coronal holes, aiming to better identify the fast solar wind origin in the Sun's low atmosphere. Data from the highest resolution solar spectrograph, SUMER/SoHO, in EUV emission lines from transition region and corona were analyzed. We have also analyzed the cyclic distribution of high-speed plasma streams in solar wind during the 1964-1996 interval (Solar Cycles nos. 20-22) as compared to the classical aspect of the 11-year cycle by sunspot relative numbers (Wolf numbers). Obvious differences in the high-speed stream dynamics in respect to their solar origin (flares or coronal holes) have been established taking into account the stream parameters: the duration, velocity gradient and importance. The presence in heliosphere of the cool neutral Helium, among the other interstellar neutrals,

was analyzed. The neutrals are ionized by charge exchange, photo ionization, and electron impact. Helium is focused by the Sun's gravitational field on the downwind side. The forecasts of the 24th solar cycle activities using the neural network method were made. We choose to attempt the forecasts of several solar (R , $F_{10.7}$, Q_x) and geomagnetic (Ap , Kp , aa , Dst) indices of the 24th solar cycle using the neural network method although the method still suffer from basic problems such as data pre-processing, architecture selection and parameterization. Our forecasts are in good agreement with the other ones for both solar and geomagnetic level of activities during the 24th solar cycle.