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Coordination of observations and data analyses for CORONAS-F, SOHO and related projects

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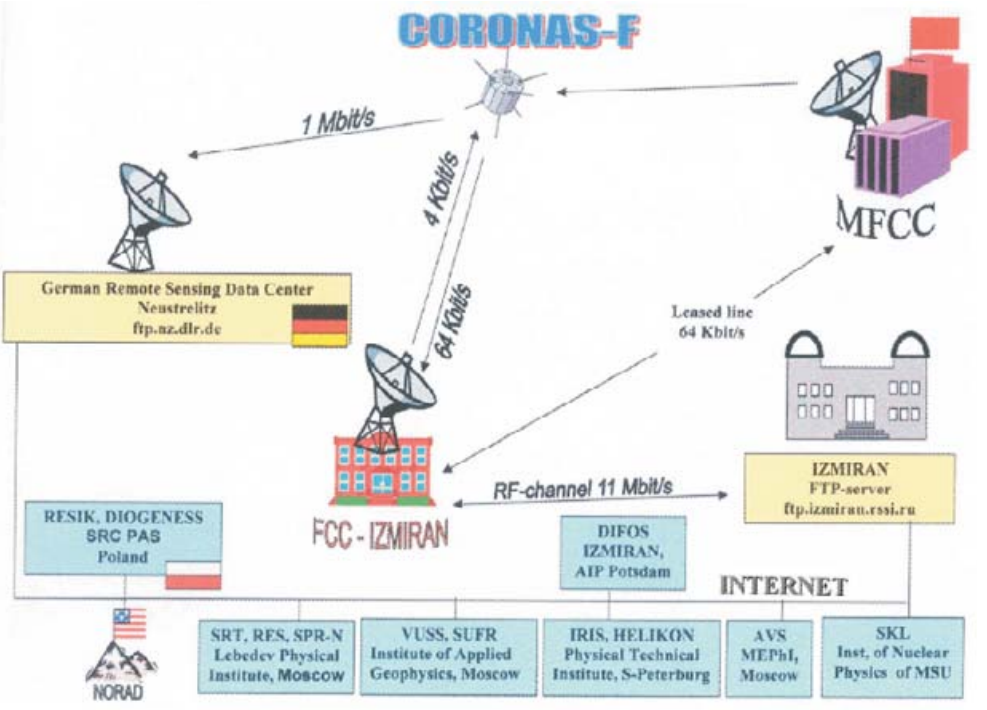

Figure 1. Scheme of reception and transmission of data from the CORONAS-F satellite

To begin with, I would like to say a few words about the CORONAS-F mission, about what observations are carried out onboard and what is the present state of the obtained scientific data. Then, we shall briefly discuss the proposals on coordinated observations with other projects and on collaboration in data analysis.

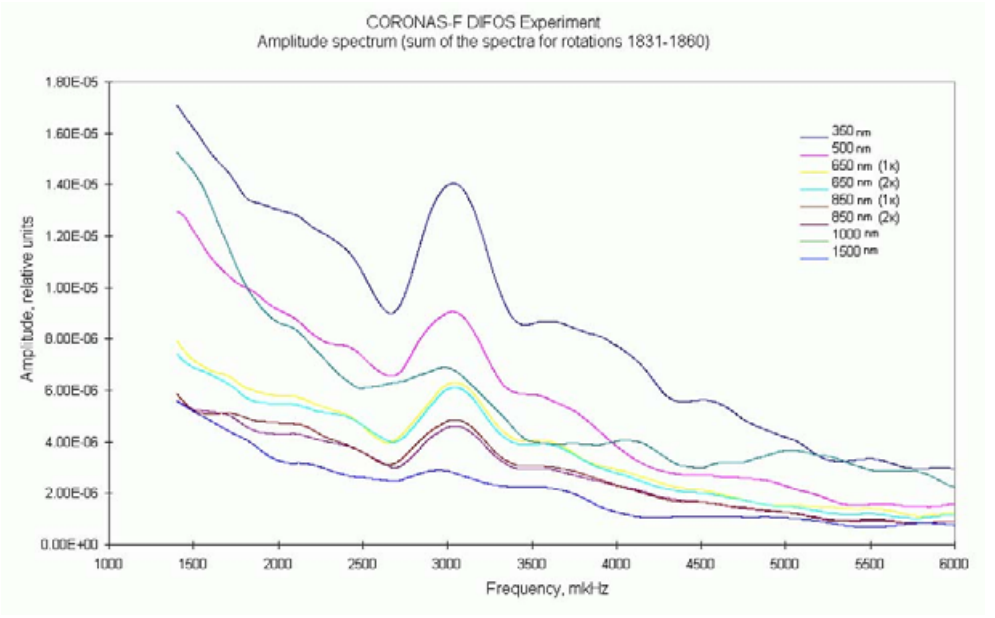

Figure 2. The global oscillation amplitudes (without separation of modes) as measured in different spectral channels. One can see that the amplitude of the global oscillations depends on the observation wavelength. (CORONAS-F DIFOS Experiment)

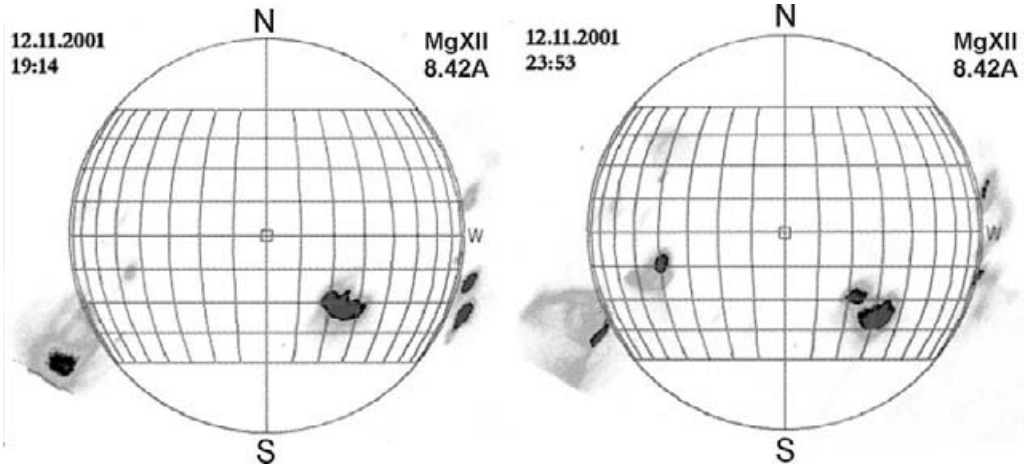

Figure 3. Hot flare plasma in the corona (up to 20° million.). The hot plasma emission outlines various magnetic configurations in the solar corona, such as loops, spider-like forms, etc. (CORONAS-F SPIRIT Experiment)

CORONAS-F satellite and its orbit. The CORONAS-F satellite was launched on July 31, 2001. By now, it has been staying on orbit for about three years. The satellite moves on nearly circular orbit at a height of about 500 km with an orbital period of about 95 min. Due to its large inclination (about 83 deg.), the satellite orbit becomes occasionally solar-synchronous, which allows continuous observations of the Sun for nearly 20 days. The orbit is lowering because of the satellite braking in the upper atmosphere. The lifetime

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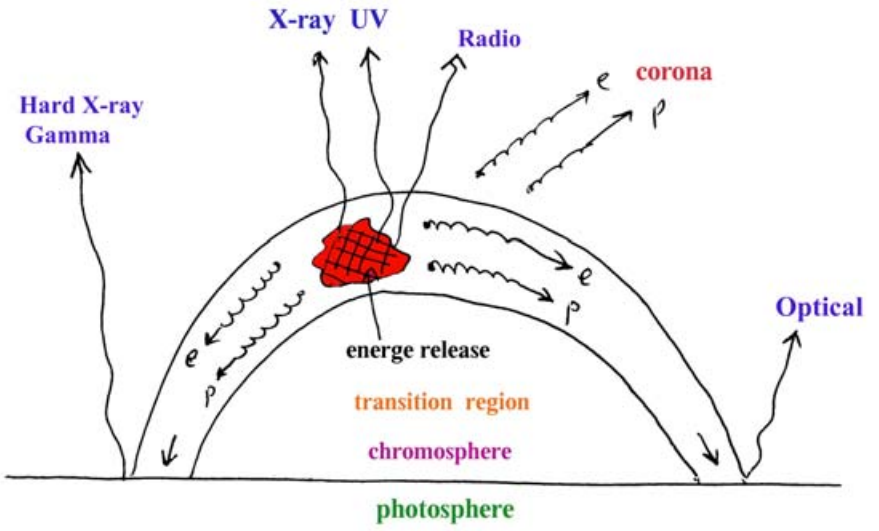

Figure 4. The various kinds of the emission generated by solar flares.

of the mission is difficult to estimate since it depends on the state of the atmosphere and the level of solar activity. However, it is not long anyway - from half a year to 1-2 years.

The scientific payload of the CORONAS-F mission comprises 15 instruments: Helioseismology - Spectrophotometer DIFOS (PI - V.D.Kuznetsov and Yu.D.Zhugzhda); Monochromatic Imaging with a High Angular Resolution - Solar X-Ray Telescope SRT-K (PIs - I.I.Sobelman and I.A.Zitnik), X-Ray Spectroheliograph RES-K (PIs - I.I.Sobelman and I.A.Zitnik), Spectrophotometer DIOGENESS (PI - J.Sylwester); Electromagnetic Fluxes and Polarization Measurements (from UV to -) - X-Ray Spectrometer RESIK (PI - J.Sylwester), Solar Spectropolarimeter SPR-N (PIs - I.I.Sobelman, I.P.Tindo, and S.I.Svertilov), Flare Spectrometer IRIS (PI - G.E.Kocharov), Gamma Spectrometer HELIKON (PI - E.P.Mazets), X-Ray Spectrometer RPS (PIs - V.M.Pankov and Yu.D.Kotov), Amplitude-Time Spectrometer AVS (PI - Yu.D.Kotov), Solar UV Radiometer SUFR-Sp-K (PI - T.V.Kazachevskaya), Solar UV Spectrophotometer VUSS-L (PI - A.A.Nusinov); Study of Solar Corpuscular Fluxes - SCR Complex (PI - S.N.Kuznetsov) (Gamma-Ray and Neutron Spectrometer SONG, Cosmic Ray Monitor MKL, and X-Ray Spectrometer SKI-3). At present, all devices are operating. A natural degradation of some ultraviolet channels of the DIFOS instrument and the UV photometers VUSS and SUFR is taking place.

The examples of the CORONAS-F observation data one can see on the figures of this and others papers of the book. A number of the CORONAS-F devices are designed for the study and diagnostics of solar flares. Fig.4 illustrates various kinds of the emission generated by solar flares.

The integral spectrum of a flare with the measuring ranges of onboard instruments marked on it is shown on Fig.5. One can see that the flare emission spectrum is covered completely from the lowest to the highest energies.

The scheme on Fig.1 illustrates the acquisition of data from the satellite, their preliminary treatment, and delivery to the experimenter. The data from the satellite are received at the station at Neustrelitz and are transmitted automatically to the server

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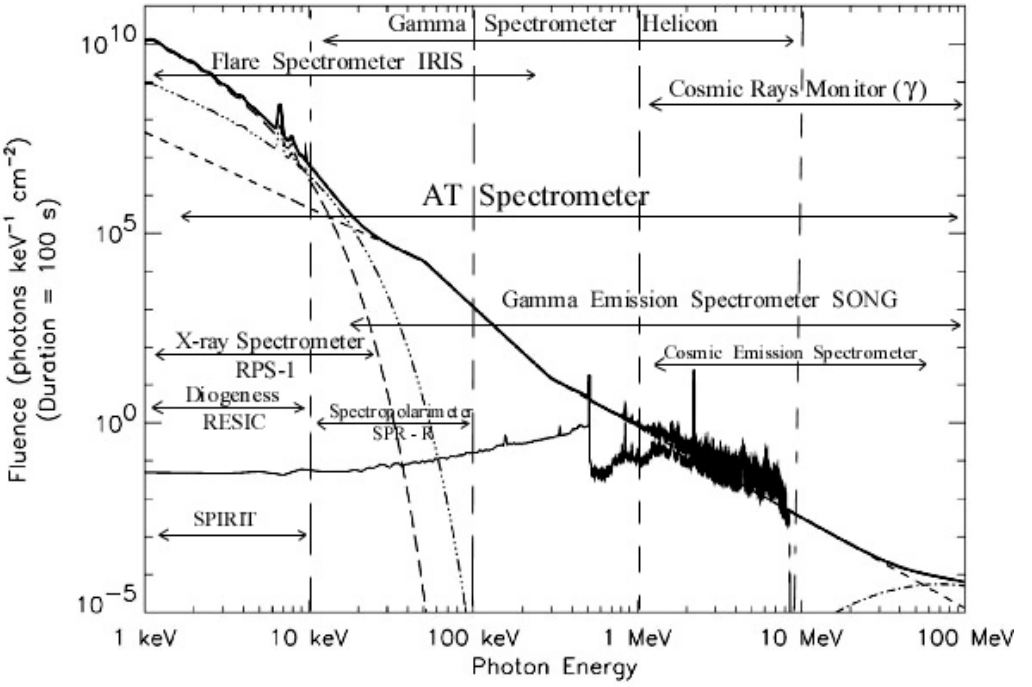

Figure 5. CORONAS-F Energy Range and Composite Flare Spectrum.

at IZMIRAN. Here, they undergo preliminary automated treatment, are dispatched to different directories, and, then, are collected by the principal investigator (PI) for final processing.

The state of the art of the CORONAS-F data is as follows. There are no special problems as far as the reception of data from the satellite is concerned, except, maybe, the memory limitations onboard (about 100 Mb), but there is a problem associated with the efficiency of final processing and, accordingly, with on-line access to the data. It is, partly, due to the subjective reasons. The former management of the Project lost time and did not create necessary conditions for efficient work. On the other hand, there are also some objective difficulties associated with a large volume of data, the necessity of their correct cleaning, the lack of qualified personnel, etc. These difficulties are being gradually overcome. At this conference, you will see 14 reports (papers) based on the CORONAS-F data.

The proposals on coordinating observations on different satellites are as follows:

- To create a coordination team consisting of representatives of all acting solar space missions.
- To develop an observation program aimed at the best use of all capabilities of the instruments of the available solar satellites.
- To coordinate observations within the frames of the plan developed by the coordinating team.

The proposals (or a plan) for coordinating the analysis of data from CORONAS-F, SOHO, HESSI, TRACE, Yohkoh are as follows:

- To establish contacts between the PI of the allied experiments and to organize international research teams (following suggestions of the coordinating team).

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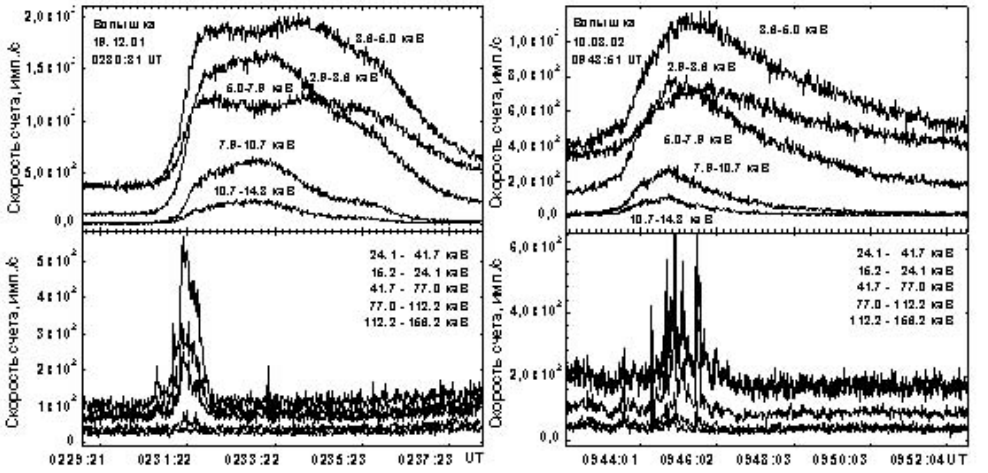

Figure 6. Time profiles of intensity of the hard X-ray emission of flares 19.12.01 and 10.08.02 The flares started with an impulsive energy release (CORONAS-F IRIS Flare Spectrometer).

- To ensure on-line access to the data (CORONAS-F).
- To carry out joint analysis of data from different satellite and complex studies.

CORONAS-F oral report and posters belonging to the round table 2.

Oral presentations.

- A review of the solar results from CORONAS-F satellite (V.D. Kuznetsov, Russia)
- Observations of solar flares from CORONAS-F (J. Sylwester, Poland)
- Spectral and temporal characteristics of X-ray radiation of solar flares measured by spectrometer "IRIS" (Yu.E. Charikov, P.B Dmitriev, I.V. Koudriavtsev, G.A. Matveev, M.I. Savchenko, D.V. Skorodumov, Russia)
- Multi-wavelength observations of CME-associated structures on the sun with the CORONAS-F/SPIRIT EUV telescope (V. Slemzin, I. Chertok, V. Grechnev, A. Ignatiev, S. Kuzin, A.Pertsov, I. Zhitnik, Russia, J.-P. Delaboudiniere, France)

Poster presentations.

- B.V.Agalakov , T.P. Borisevich , N.G. Peterova , B.I. Ryabov , N.A. Topchilo, I.N. Myagkova, S.N. Kuznetsov, B.Yu. Yushkov, K. Kudela, Microwave study of coronal active regions from the CORONAS-F list of solar flares observed in Gamma- and X rays
- A.A. Nusinov, T.V. Kazachevskaya, V.V. Katyushina, Observation of the ring-shaped Solar eclipse in extreme ultraviolet spectral region on May 31 2003
- A.V. Bogomolov, Yu.I.Denisov , Yu.I. Logachev, O.V. Morozov , I.N. Myagkova, S.I. Svertilov, I.A. Zhitnik, A.P. Ignatiev, S.N.Oparin, A.A. Pertsov, Polarization of Hard X-Rays in October-November, 2003 Solar Flares Observed Onboard CORONAS-F Satellite

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• S. Bozhenkov , I. Zhitnik , S. Kuzin , A. Perzev, A. Ignatiev, O. Bugaenko, I. Sobeliman, A. Urnov, S. Oparin, Properties of solar flare plasma measured by RES-C spectroheliograph on CORONAS-F

• A. Kepa, J. Sylwester, B. Sylwester, M. Siarkowski, First Determinations of Differential Emission Measure Distribution based on RESIK X-ray Spectra

• I.N. Myagkova, S.N. Kuznetsov, V.G. Kurt, B.Yu. Yushkov, K. Kudela, Gamma-ray observations of solar flares from august 2001 to november 2003 - song experiment onboard coronas-f satellite results

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• I.N. Myagkova, S.N. Kuznetsov, V.G. Kurt, B.Yu. Yushkov, K. Kudela, Gamma-ray observations of solar flares from august 2001 to november 2003 - song experiment onboard coronas-f satellite results

• A.A. Nusinov, T.V. Kazachevskaya, V.V. Katyushina, EUV and X-ray Solar flares observed on-board the "CORONAS-F" satellite

• M. Kowalinski, J. Sylwester, W. Trzebinski, D. Lisin, Solar Forced Variations of Terrestrial High Energy Particle Environment as Seen by RESIK Detectors on CORONAS-F

• S. Bogachev, O. Bugaenko , S. Bozhenkov , S. Kuzin, V. Slemzin, I. Zhitnik, A. Perzov , V. Grechnev , On the methods of primary data processing during the XUV experiment SPIRIT/CORONAS-F