

1998 NATIONAL ACTIVITY REPORT FOR CHINA

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Two major developments in solar observational studies took place in China in 1998. First, a major project on Solar Maximum 23 studies – STORM 23, were funded by Chinese Academy of Sciences; secondly, the key project of Solar Broadband Microwave Spectrometer made great progress this year.

1. STORM 23

A major project, Solar Activity and its Terrestrial Effects: Observations and Research in the Maximum Phase of the 23rd Solar Cycle (STORM 23), were funded by Chinese Academy of Science. The principle investigators of this project is Jingxiu Wang and Weiqun Gan.

The primary objective of this project is to coordinate systematic observations on catastrophic solar events and their consequences in the space environment – magnetic topology, magnetic energy storage and release, particle acceleration and propagation in solar events, and effects of solar events on interplanetary space, magnetosphere, ionosphere, geomagnetic field, thermosphere and mesosphere, by taking the advantage of the key instruments of solar physics, geophysics and space science of The Chinese Academy of Sciences, to make extensive and coordinative analysis of data sequences, thus, to achieve fundamental progress in understanding the mechanisms of catastrophic solar events and their influence on geomagnetic field, ionosphere, thermosphere, and mesosphere, to develop models of solar activity and space environment forecasts.

There are 7 research groups in the project covering working areas of solar physics, geophysics, atmospheric and space sciences. They are:

1. Solar magnetic and velocity fields, and magnetism of catastrophic solar events (Leader: Yuanyong Deng, Beijing Astronomical Observatory, dyy@sun10.bao.ac.cn)
2. The studies on solar radio and high energy radiations (Leader: Weiqun Gan, Purple Mountain Observatory, ganwq@public1.ptt.js.cn)
3. Study on geomagnetic disturbance during the maximum years of the 23rd solar cycle (Leader: Keyun Tang, Institute of Geophysics, kytang@mail.c-geos.ac.cn)
4. Ionospheric disturbance associated with solar activity (Leader: Weixing Wan, Wuhan Institute of Physics and Mathematics, wxw@msg.whcnc.ac.cn)
5. The study of the thermospheric and mesospheric response to the solar variation (Leader: Jiyao Xu, Center for Space Science and Applied Research, xjy@ns.lhp.ac.cn)
6. Solar activity forecast and space environment service (Leader: Guiqing Zhang, Beijing Astronomical Observatory, zgq@public.east.cn.net)
7. Studies on Responses of the Upper Polar Atmosphere to Catastrophic Solar Events (Leader: Ruiyuan Liu, Polar Research Institute of China, pric@stn.sh.cn)

Most of the group leaders are excellent young scientists. Their participation in the leadership of the project is extremely important, since they are responsible for future solar and solar-terrestrial physics.

Two types of observation campaign are encouraged: one is guided by a particular active region, often a superactive regions; the other is aimed by a particular scientific topic, say coronal response to the magnetic flux emergence and cancellation.

The team of this project will actively take part in the international collaboration for the solar maximum studies, and will welcome friends and colleagues to work with them in all the ways.

2. Broadband Spectrometer for Decimeter and Centimeter Wave Burst

Under the support of Chinese Academy of Sciences, a project for setting up "A Broadband Spectrometer for Decimeter and Centimeter Wave Burst" has been carried on since 1994. It is a key project for the investigation of solar activity in the 23rd solar activity cycle. This project is a joint project of Beijing (BAO), Purple Mountain (PMO), Yunnan (YAO) Astronomical Observatories, and Nanjing University.

The main performance of the spectrometer is as follows:

- Frequency coverage: 0.7 - 7.6 (or 12.0) GHz;
- Frequency resolution: 1 - 10 (20) MHz;
- Temporal resolution: 1 - 10 ms (related to the sensitivity);
- Observation sensitivity: $\Delta s/s \leq 2\%$ (s - solar background radiation);
- Polarization: Dual-circular polarization;
- Accuracy of polarization degree: 5 ~ 10 %;
- Dynamic range: 10 db above the quiet solar background radiation.

The frequency coverage of this instrument will be achieved with several component spectrometers. The frequency for each spectrometer falls in the range which is listed below.

1. 0.7 - 2.4 GHz (YAO, with a dish of 10 m)
2. 1.0 - 2.0 GHz (BAO, with a dish of 7.3 m)
3. 2.6 - 3.8 GHz (BAO, with a dish of 3.3 m)
4. 4.0 - 5.2 GHz (PMO)
5. 5.2 - 7.6 GHz (BAO, sharing the 3.3 m dish)

Now the 2nd and 3rd component spectrometers are in full operation and generate very good scientific output; the 4th and 5th ones will put into operation before the end of 1998; the 1st spectrometer will be in operation early 1999.

Very new scientific results have been obtained with the spectrometers operated. Among them, the followings are most intriguing and important:

Microwave type III burst group is identified in the rising phase of a small burst on November 25, 1996. Each type III burst consists of at least 9 - 10 subcomponents. the frequency drift rate (FDR) is about 9.0 GHz/s.

A microwave type II burst pair characterized by two branches with FDR of -0.23 GHz/s and +0.22 GHz/s, respectively, and separatrix frequency between 1.66 - 1.76 GHz, superimposed on the microwave burst of January 5, 1994, was found for the first time.

A pair of microwave spike emission is identified in the event of November 2, 1997, and 2 *mini-U bursts* are found in the event of April 15, 1998 in the wave band of 2.6 - 3.8 GHz.

3. Further Coordination

Further coordination of solar observations in China is undertaken. The facilities of solar radio observations at Shahe station will be shifted to Huairou Solar Observing Station of BAO. This will make Huairou station become a real solar observatory, and a part of National Astronomical Observatories of China.

Nation-wide selection of chief professors together with their scientific research groups will be made in a few months from now on. It is possible that those groups will get stronger support from the Chinese Academy of Sciences. The selection will take place in the frame of National Astronomical Observatories.