International Heliophysical Year 2007

Building the foundation for broader growth in science

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- International Heliophysical Year 2007 promoted advanced research in heliophysics.
- Heliophysics is the study of the Sun and its effects on the Solar System and beyond.
- The United Nations Office for Outer Space Affairs established workshops around the effort, bringing together research organisations worldwide.
- They also laid the foundation for broader growth in scientific research beyond 2007.

The march of science is slow. It must be to remain methodical. But now and then, it gets a shot in the arm via a burst of collaboration between scientists from diverse fields. The energy and focus this produces have significant long-term benefits. Such an event occurred around an important year for science, 2007, and what happened laid the foundation for a broader growth in science's reach.

International Heliophysical Year 2007, also known as IHY 2007, was an internationally coordinated effort to promote and advance research in heliophysics – the study of the Sun and its effects on the Solar System and beyond. The year was not a random choice; it coincided with a period of heightened solar activity known as solar maximum. During this period, the Sun's activity, such as solar flares and sunspots, peaks in the 11-year solar cycle. 2007 was also the 50th anniversary of the International Geophysical Year, which triggered an accelerated study of geospace – the region of space surrounding Earth influenced by solar wind and Earth's magnetic field – and helped trigger the space age. However, the importance of the heliosphere extends beyond scientific enquiry.

Friend and foe

Our nearby star controls a significant extent of space around Earth and is both a friend and foe. It provides light and heat, without which there would be no life, but it can just as easily seriously disrupt humanity on Earth. So much of our everyday life relies on information and connectivity, which depends on a healthy balance within the various layers of geospace, especially the ionosphere-thermosphere – where most satellites

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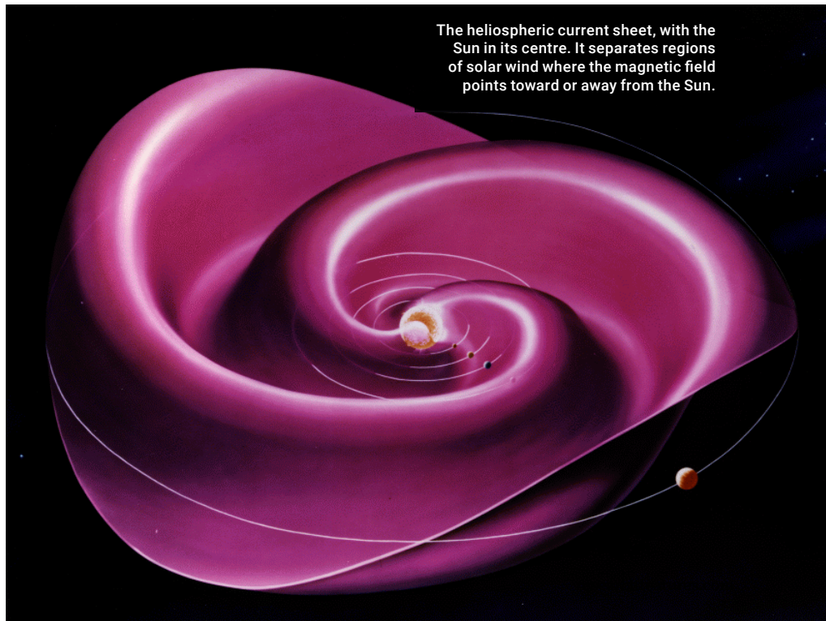
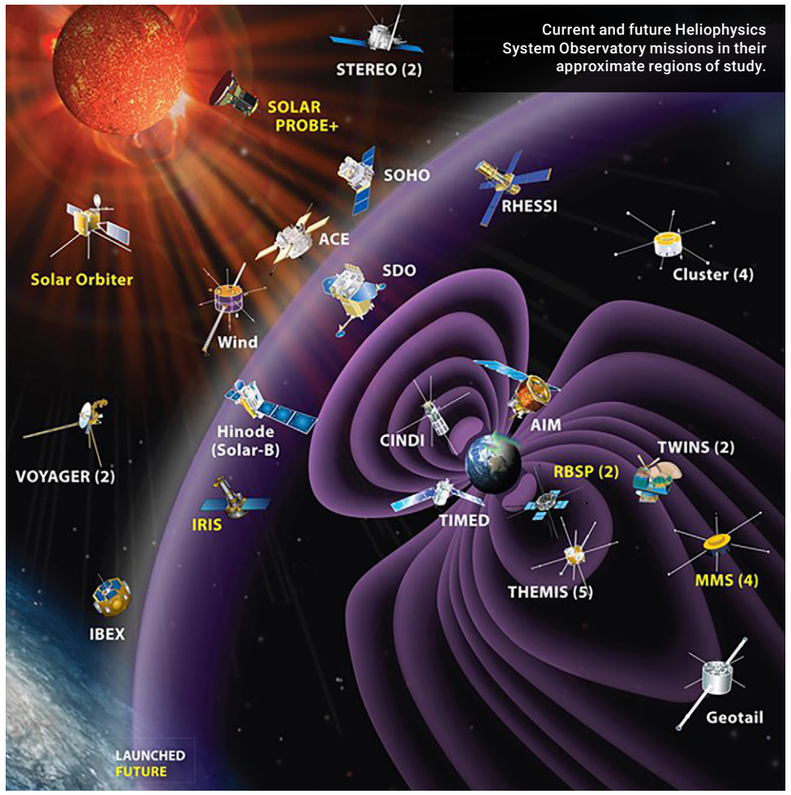
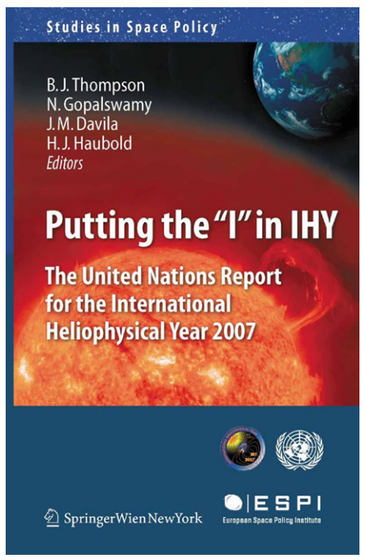


The heliospheric current sheet, with the Sun in its centre. It separates regions of solar wind where the magnetic field points toward or away from the Sun.




Solar wind is a continuous stream of charged particles from the Sun.

are – and the magnetosphere. Solar wind – a continuous stream of charged particles from the Sun – causes dynamic interactions and disturbances within these layers. Understanding these was one of the priorities of IHY 2007, and a significant responsibility fell onto the United Nations Office for Outer Space Affairs (UNOOSA),



Published in 2009, this book reports on IHY 2007.

an office within the UN that coordinates and facilitates international cooperation in the peaceful use and exploration of outer space. Part of its mandate involves promoting basic space science capabilities and knowledge in developing countries through workshops coordinated by the United Nations Basic Space Science Initiative (UNBSSI).

While instruments in space are vital for monitoring the effects of solar wind, the complete picture requires a wide array of instrumentation on Earth. Notably, such instrumentation needn't be high cost; their diversity and spread make them effective. The UNOOSA IHY workshops helped develop partnerships between countries, organisations, and equipment manufacturers

Building long-term relationships

One of the most significant developments to emerge from IHY 2007 was from workshops arranged by the UNBSSI. The initiative has a three-part framework: instrumentation, observation, and education. Applied to the IHY 2007 workshops, this took the form of science teams to coordinate study programmes using instruments in an array. Collaboration was a key priority of these workshops, specifically between research scientists in what UNBSSI considered scientifically interesting geographic locations – developing countries that could host equipment arrays – and researchers in countries with expertise in building such scientific instrumentation. A case in point was a North African AWESOME (Atmospheric Weather Electromagnetic

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to encourage the rollout of arrays of small instruments such as magnetometers, radio antennas, GPS receivers, all-sky cameras, and particle detectors worldwide – especially across developing countries – to provide global measurements of heliospheric phenomena. However, while data may help build a picture of an area of science, scientific progress requires relationships.

System for Observation, Modelling, and Education) VLF (very low frequency) receiver array delivered to the University of Tunis in Tunisia in October 2005 in collaboration with Stanford University in the United States. Through similar collaborations, research organisations in Algeria and Morocco received AWESOME instruments the following year in preparation for IHY 2007.

The IHY/UNBSSI instrumentation projects may have been designed to help measure and map heliophysical anomalies, but they had a longer-term vision. For this, they were guided by core principles. Firstly, the projects should produce significant and publishable results. Secondly, by making developing countries host nations, the projects would boost scientific research in those nations. Thirdly, the costs and technical requirements should be compatible with available resources; this ensured the sustainability of the projects. Fourthly, students should be involved as much as possible – education is a UNBSSI priority. Finally, the projects should lead to a beneficial long-term relationship for participants in developing nations.

Through such joint projects, scientists from diverse countries could participate in instrument operation, data collection, analysis, and publication of scientific results to build a clearer and arguably more accurate picture of solar-terrestrial relations, specifically of the global ionosphere and its linkage to the near-Earth space environment.

While science enjoys pockets of such collaboration, they can be temporary. However, in the case of the UNBSSI IHY workshops, the scale, geographic reach, and focus of the themed collaboration created long-term networks of study cooperation, especially between research organisations in developed and developing nations, that exist to this day. Through UNBSSI, IHY 2007 punched above its weight.

A long-term shot in the arm

IHY 2007 was a shot in the arm for science – a rare opportunity to bring together scientists, researchers, and experts from around the world to share knowledge, exchange ideas, and collaborate on a field of scientific study. For UNOOSA and UNBSSI, there was a broader purpose. The IHY 2007 workshops may have played a critical role in furthering our understanding of heliophysics and space weather research, but the impacts have reached beyond the years immediately around it. The workshops laid the groundwork for growing the reach of scientific study.

Research into our natural world should not be reserved. This is as true for research's appetite as for its scope. Heliophysics is a critical area of study; so much life relies on understanding the impacts of the Sun on our planet. This is why IHY 2007 was such an essential event in science. But what we know should not be the reserve of the few. Hence, we should also recognise the role UNOOSA and UNBSSI played in ensuring the global reach of the research and sharing what it learned.

Details

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