

Hinode scientists' stellar effort keeps sun mission 'burning bright'

EurekaAlert!

Whilst the most powerful earthquake since records began hit Japan in 2011, triggering a massive tsunami which devastated much of the country, space scientists involved in one of the 'brightest' international Sun missions continued working tirelessly at the Institute of Space and Astronautical Science in Sagami-hara, Japan, to capture new data from our turbulent star.

These latest Hinode results, to be discussed in a meeting at the University of St Andrews this week (Tuesday 14 August), include new data on the structure of the Sun's coronal magnetic field, obtained whilst studying a violent solar eruption, and the observation of an unusual asymmetry in our star's magnetic field – a finding that could have a significant impact on the behaviour and prediction of the next solar cycle. The new results will be presented by David Long (UCL Mullard Space Science Laboratory) and Masumi Shimojo (National Astronomical Observatory of Japan) respectively.

The Hinode mission is led by the Japanese Aerospace Exploration Agency (JAXA) in collaboration with the UK, USA and European Space Agency. The UK Space Agency funds the operation of the Extreme ultraviolet Imaging Spectrometer (EIS) - a UK-led instrument, building on the UK's long history of pioneering work in solar ultraviolet spectroscopy. The Mullard Space Science Laboratory (MSSL) is the lead institute for EIS, and STFC's RAL Space provided the calibration and observing software.

Louise Harra, UK Principal Investigator for the Hinode EIS instrument and Professor of Solar Physics at UCL Mullard Space Science Laboratory, said, "The latest Hinode results will allow us to probe the Sun's activity both on short time scales of minutes, and on the longer scales of years, both of which are critical to understanding our nearest star."

Solar flares and associated coronal mass ejections have a wide range of effects on technology infrastructure and our day to day lives, potentially disturbing the Earth's magnetic field, knocking-out orbiting satellites and disrupting satellite signals. The impacts are wide-ranging, affecting radio communication, navigation and power systems. With its three advanced and highly sensitive telescopes (visible, X-ray and ultraviolet), the Hinode spacecraft is studying the solar magnetic field at scales smaller than ever before and revealing new information about these colossal explosions in the Sun's atmosphere.

In recent years there have been disruptions to power grids, spacecraft have been lost completely and more than half the Earth orbiting spacecraft were affected in their operation by high energetic particles that bombard the Earth's atmosphere during a storm. We are dependent on spacecraft for everything from navigation to

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using credit cards, so predicting the impact of such storms is important for a technology- driven world.

The Hinode mission acts as a microscope on the Sun. The instruments onboard probe in detail the generation, transport, and dissipation of magnetic energy from the photosphere to the corona and are recording how energy stored in the Sun's magnetic field is released as the field rises into the Sun's outer atmosphere.

This magnetic field can unleash huge amounts of energy in only tens of minutes. An example of this was observed on the 12th July, where a huge flare exploded on the Sun, leading to disruption to radio communications and a reduction in the power output of a nuclear power station on the east coast of the US. The data from Hinode are being analyzed in order to determine quantitative measurements of the pre-flare Sun to assist in predicting activity.

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