Astrophysicists find fractal image of Sun's 'Storm Season' imprinted on Solar Wind

May 24 2007

Plasma astrophysicists at the University of Warwick have found that key information about the Sun's 'storm season' is being broadcast across the solar system in a fractal snapshot imprinted in the solar wind. This research opens up new ways of looking at both space weather and the unstable behaviour that affects the operation of fusion powered power plants.

Fractals, mathematical shapes that retain a complex but similar patterns at different magnifications, are frequently found in nature from snowflakes to trees and coastlines. Now Plasma Astrophysicists in the University of Warwick's Centre for Fusion, Space and Astrophysics have devised a new method to detect the same patterns in the solar wind.

The researchers, led by Professor Sandra Chapman, have also been able to directly tie these fractal patterns to the Sun's 'storm season'. The Sun goes through a solar cycle roughly 11 years long. The researchers found the fractal patterns in the solar wind occur when the Sun was at the peak of this cycle when the solar corona was at its most active, stormy and complex – sunspot activity, solar flares etc. When the corona was quieter no fractal patterns were found in the solar wind only general turbulence.

This means that fractal signature is coming from the complex magnetic field of the sun.

This new information will help astrophysicists understand how the solar corona heats the solar wind and the nature of the turbulence of the Solar

Wind with its implications for cosmic ray flux and space weather.

These techniques used to find and understand the fractal patterns in the Solar Wind are also being used to assist the quest for fusion power. Researchers in the University of Warwick's Centre for Fusion, Space and Astrophysics (CFSA) are collaborating with scientists from the EURATOM/UKAEA fusion research programme to measure and understand fluctuations in the world leading fusion experiment MAST (the Mega Amp Spherical Tokamak) at Culham. Controlling plasma fluctuations in tokamaks is important for getting the best performance out of future fusion power plants.

Source: University of Warwick

Citation: Astrophysicists find fractal image of Sun's 'Storm Season' imprinted on Solar Wind (2007, May 24) retrieved 25 April 2024 from https://phys.org/news/2007-05-astrophysicists-fractal-image-sun-storm.html