

Home | Print edition | Headline news | In depth | Physics Jobs | Events | Buyer's guide | Webinars | Contact us

Search Go

Browse by subject area

Atomic, molecular & optical physics | Nuclear & particle physics | Condensed matter | Astronomy, astrophysics & cosmology | Education |

RELATED STORIES

- ▶ [Sound check for the Sun's magnetic dynamo](#)
- ▶ [Where are the sunspots? \(blog\)](#)
- ▶ [Mild forecast for next solar cycle](#)
- ▶ [Lagging behind the solar cycle](#)
- ▶ [Ulysses probes the solar maximum](#)

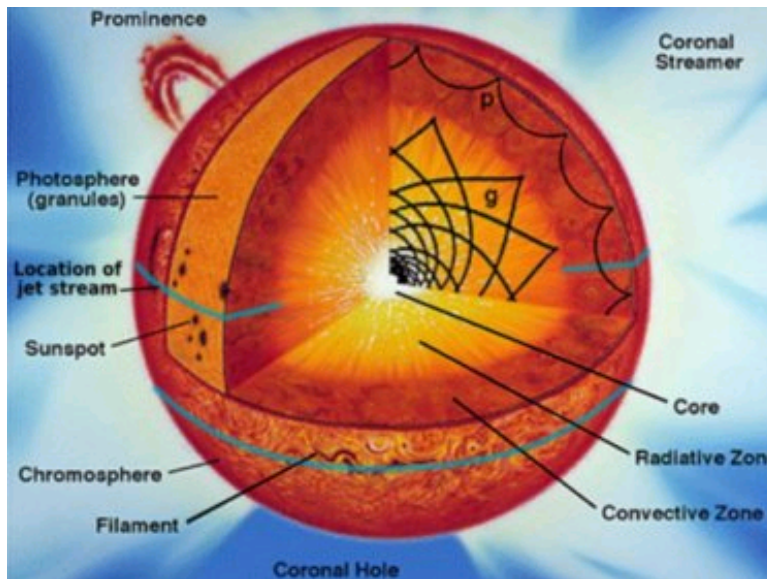
RELATED LINKS

- ▶ [Frank Hill](#)
- ▶ [Solar Physics Division meeting](#)
- ▶ [GONG](#)
- ▶ [SOHO](#)

NEWS

Jun 18, 2009

'Sluggish' jet streams linked to quiet Sun



Inside the sun: more than just a glowing ball

The unusually long quiet period of the Sun's present activity may be due to the motion of "sluggish" jet streams beneath the solar surface, according to scientists at the National Solar Observatory (NSO) in Arizona, US.

The scientists' observations, which show an east-west jet stream has taken a year longer to migrate south by 10° than in the previous solar cycle, also indicate that the sun is moving into its next cycle.

"We need to continue these observations for many, many more years to fully understand what is going on," said NSO researcher [Frank Hill](#) yesterday at a meeting of the solar-physics division of the American Astronomical Society in Boulder, Colorado, adding: "We cannot at this point definitively say [the jet stream] is a real cause, but I think it is quite clear that it is associated."

Charting activity

It is important to be able to forecast the Sun's activity because it governs the space "weather" that surrounds Earth. During high solar activity, satellites and astronauts run the risk of being showered with lethal radiation.

KEY SUPPLIERS



[More companies](#) ▶

CORPORATE PARTNERS



For maximum exposure, become a Corporate Partner. [Contact our sales team.](#)

[Buyer's Guide](#)

Scientists have long known that the activity rises and falls in cycles that are roughly 11 years long. Having charted the number of sunspots, solar flares and interplanetary storms, they know that we are presently in a minimum or “quiet period” of activity towards the end of cycle 23. But this quiet period has already gone on for a year longer than scientists had anticipated, which raises the questions of what is causing the delay – and when we can expect cycle 24?

Hill, together with Rachel Howe, who is also at the NSO, employed two primary instruments in a relatively new science called helioseismology that traces sound waves to reveal conditions in the Sun’s interior. The first instrument, known as the Global Oscillation Network Group, or **GONG**, is a collection of six observatories located around the globe that can make 24-hour solar observations. The second, which is aboard NASA and the ESA’s Solar and Heliospheric Observatory (**SOHO**) spacecraft and which is called the Michelson Doppler Imager, or MDI, measures movement in the Sun’s outer layer.

Slow stream

The sound waves recorded by both GONG and the MDI enabled the researchers to track an east-west jet stream several thousand kilometres beneath the Sun’s surface. Such jet streams are generated at the poles every 11 years in accordance with the solar cycle, and gradually – over about 17 years – migrate towards the equator. When they reach a latitude of 22° , the jet streams coincide with the generation of new sunspots, and a new solar cycle begins.

Hill and Howe found that the present east-west jet stream has taken an extra year to cover the past 10° latitude, although it is now reaching 22° . The researchers inferred from this that the jet stream must be linked to – and possibly causes – the onset of solar cycles, and that therefore that the next cycle will soon begin.

“What we believe it means for the coming cycle – and I’m speculating a bit here, I would say – is that it will not be as strong as the previous one,” continued Hill at the Boulder meeting. “That is an active topic of discussion within the solar-physics community.”

Dean Pesnell of NASA’s Goddard Space Flight Center said in a press statement that the study finds another piece in the solar-activity puzzle. “It shows how flows inside the Sun are related to the creation of solar activity and how the timing of the solar cycle might be produced,” he added. “None of the forecasting research groups predicted the current long extended delay in the new cycle. There is a lot more to learn in order to understand how the Sun creates magnetic fields.”

SHARE THIS

E-mail this article to a friend

Add to Connotea

Add to Cite-u-like

Add to del.icio.us

Digg this

Share on Facebook

1 COMMENT

Add your comments on this article

Oliver K. Manuel
Jun 18, 2009 10:05 PM
United States

MAGNETIC FIELD STREAMS START DEEP

Solar surface activity is an indication of deep-seated magnetic fields protruding through the visible solar surface as sunspots. These magnetic fields accelerate a stream of protons upward from the solar core, where the protons are produced by neutron-decay.

"The present magnetic fields are probably deep-seated remnants of very ancient origin. These could have been generated from two mechanisms. These are: a) Bose-Einstein condensation of iron-rich, zero-spin material into a rotating, superfluid, superconductor surrounding the solar core and/or b) superfluidity and quantized vortices in nucleon-paired Fermions at the core. [See abstract of "Superfluidity in the solar interior: Implications for solar eruptions and climate," Journal of Fusion Energy 21 (2002) 193-198]. arxiv.org...0501441

With kind regards,
Oliver K. Manuel
www.omatumr.com...

[Reply to this comment](#) ▶ [Offensive? Unsuitable? Notify Editor](#) ▶

Add your comments on this article