

Title: Conversations

Subtitle: 2012 Confirmed as the Day, Who Needs Help

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Quote:

"March 10, 2006: It's official: Solar minimum has arrived. Sunspots have are nonexistent. The sun is utterly quiet.

Like the quiet before a storm.

This week researchers announced that a storm is coming--the most intense years. The prediction comes from a team led by Mausumi Dikpati of the National Atmospheric Research (NCAR). "The next sunspot cycle will be 30% to 50% of the previous one," she says. If correct, the years ahead could produce a burst only to the historic Solar Max of 1958.

see captionThat was a solar maximum. The Space Age was just beginning in Oct. 1957 and Explorer 1 (the first US satellite) in Jan. 1958. In 1958 a solar storm was underway by looking at the bars on your cell phone; cell phone people knew something big was happening when Northern Lights were sighted in Mexico. A similar maximum now would be noticed by its effect on cell phone satellites and many other modern technologies.

Right: Intense auroras over Fairbanks, Alaska, in 1958. [More]

Dikpati's prediction is unprecedented. In nearly-two centuries since the sun was discovered, scientists have struggled to predict the size of future maximums. It can be intense, as in 1958, or barely detectable, as in 1805, obeying no known laws.

The key to the mystery, Dikpati realized years ago, is a conveyor belt on the sun.

We have something similar here on Earth - the Great Ocean Conveyor Belt. In the movie The Day After Tomorrow. It is a network of currents that carry water around the ocean--see the diagram below. In the movie, the Conveyor Belt stopped and global weather into chaos.

see caption

Above: Earth's "Great Ocean Conveyor Belt." [More]

The sun's conveyor belt is a current, not of water, but of electrically-charged particles flowing from the sun's equator to the poles and back again. Just as the Great Ocean Conveyor Belt controls weather on Earth, this solar conveyor belt controls weather on the sun. So the sunspot cycle.

Solar physicist David Hathaway of the National Space Science & Technology Center explains: "First, remember what sunspots are--tangled knots of magnetized plasma in the sun's inner dynamo. A typical sunspot exists for just a few weeks. Then it decays and is replaced by new fields of weak magnetic fields."

Enter the conveyor belt.

see caption "The top of the conveyor belt skims the surface of the sun, sweeping up magnetic fields of old, dead sunspots. The 'corpses' are dragged down at the poles, where the sun's magnetic dynamo can amplify them. Once the corpses (magnetic fields) are reincarnated (amplified), they become buoyant and float back to the surface."

Right: The sun's "great conveyor belt." [Larger image]

All this happens with massive slowness. "It takes about 40 years for the belt to complete one revolution," says Hathaway. The speed varies "anywhere from a 50-year pace (slow) to a 10-year pace (fast)."

When the belt is turning "fast," it means that lots of magnetic fields are being swept up. The next future sunspot cycle is going to be intense. This is a basis for forecasting solar activity. "In 1986-1996," says Hathaway. "Old magnetic fields swept up then should show up again in 2010-2011."

Like most experts in the field, Hathaway has confidence in the conveyor belt. He agrees with Dikpati that the next solar maximum should be a doozy. But he disagrees with the current forecast puts Solar Max at 2012. Hathaway believes it will arrive sooner, around 2010 or 2011.

"History shows that big sunspot cycles 'ramp up' faster than small ones," says Hathaway. "The first sunspots of the next cycle appear in late 2006 or 2007 - and Solar Max follows in 2010 or 2011."

Who's right? Time will tell. Either way, a storm is coming.

[NASA - solar storm warning](#)

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