Earthquake Update:
The Solar Connection

by Benjamin Deniston

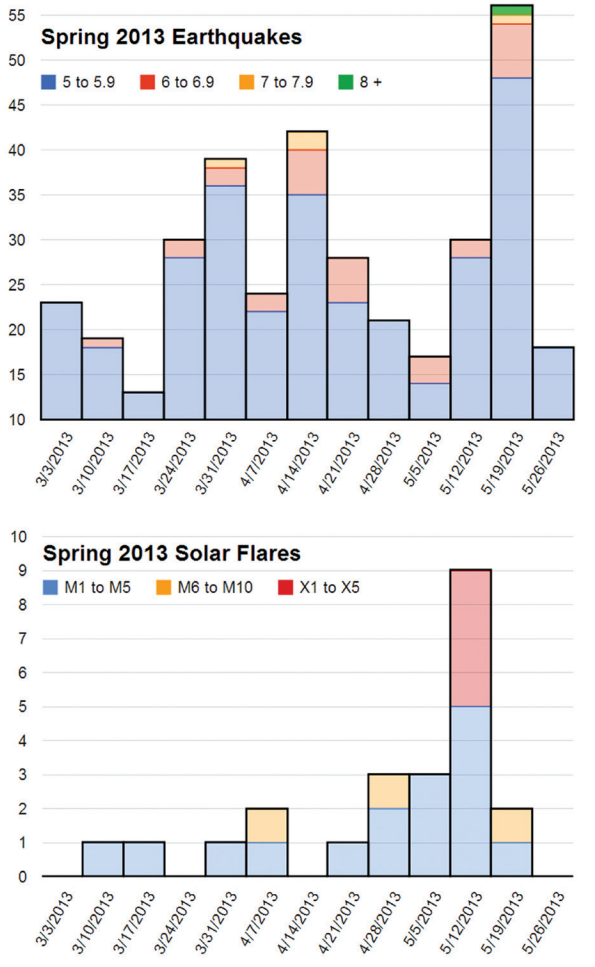
Mid-May featured a period of intense earthquakes and solar activity, bringing some long-standing questions into focus. The largest earthquake in over a year occurred on the morning of Friday, May 24, an 8.3 off the Pacific coast of Russia, in the Sea of Okhotsk. Just over a week earlier, the Sun unleashed two of the largest solar flares of the current solar cycle, an X2.8 on May 13, and an X3.2 the next day. However, these were only the most intense outbursts, which appear to have been part of a broader two-week period of increased Solar System activity, underscoring the need to move beyond simple Earth-based views, and situate processes on Earth within the larger context of our Solar System.

Solar-Earthquake Correlations

As a result of the Sun's flaring up, the Earth experienced two geomagnetic storms, one on May 18 and a second on May 25. A geomagnetic storm occurs when the Earth's magnetic field enters a period of intense fluctuation due to the impact of jets or clouds of plasma unleashed from the Sun.

Interestingly, starting one week prior to the earthquake spike, there was an intense flare-up of solar activity. The Sun released ten large flares between May 12 and May 25, with four of them being the larger X-class flares. These four were the first X-class flares since October 2012, and the X2.8 and X3.2 flares on May 13 and 14 were the largest in over a year, being the third and fourth largest of the entire solar cycle so far (which started in January, 2008). Some of these flares launched high-speed clouds of plasma (called coronal mass ejections) towards the Earth, which can generate disturbances in the Earth's magnetic field, affecting all kinds of Earth systems, biological and otherwise. Over this period two geomagnetic storms shook the electromagnetic systems of the Earth, one on May 18, and a second on May 24, the same day as the large 8.3 earthquake cited above.

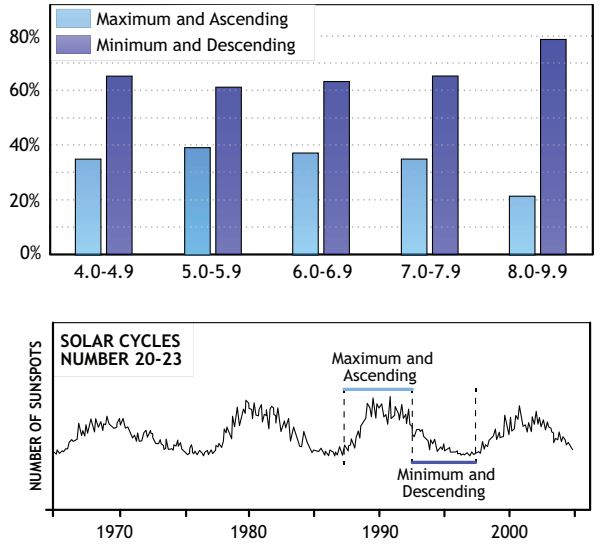
A direct, one-to-one relationship between solar activity and earthquake activity has not been found to exist. However, stepping back and viewing the larger picture, the evidence certainly points to a general relationship. For example, recent studies have shown that the period of the descending half and minimum of the eleven-year solar cycle appears to bring significantly more earthquakes than the ascending half and maximum of the solar cycle. The discrepancy is greatest for large earthquakes.



Top: weekly earthquake totals from early March through the end of May, divided by magnitude range.

Bottom: Weekly solar flare totals. Solar flares are measured by the intensity of the x-ray flux produced, classified on a logarithmic scale as A, B, C, M, or X-class. An X-class flare is ten times more energetic than an M-class, and 100 times more than a C-class.

This is a practical matter, as we are currently rounding the peak of the present solar cycle (number 24), and soon entering the descending phase. What will the next years bring for large earthquakes?



Data from: "Possible Correlation between Solar Activity and Global Seismicity," by J. Huzaimy and K. Yumoto, 2011.

The division of earthquakes occurring in the maximum and ascending half of the solar cycle vs. those occurring in the minimum and descending half.

Earthquake Forecasts

Starting the week before the 8.3 earthquake off the Pacific coast of Russia on May 24, the Russian press was filled with warnings of the possibility of a large earthquake in that region. A series of smaller quakes was catching the attention of local scientists and officials, and although nothing conclusive was declared, some, such as Victor Chebrov (the Director of the Kamchatka branch of the Russian Academy of Science's Geophysical Service) were noting that this could be signs of a larger event to come, as reported by RIA Novosti.

As noted by Chebrov, this activity came in the context of longer-term forecasts for the region. In 2010, Sergei Fedotov and a small team with the Institute of Volcanology and Seismology of the Russian Academy of Sciences, issued a forecast that a large earthquake (magnitude 7.7+) would strike the Kamchatka region some time between September 2011 and August 2016. This was based on a method developed and successfully utilized by Fedotov since the 1960s, analyzing cycles and gaps in seismic activity of a particular region. Alexey Lyubushin, with the Institute of Physics of the Earth, has issued a different long-term forecast for the pacific ocean near Tokyo, Japan. Based on examining patterns in smaller earthquakes, Lyubushin is warning that the next Japan mega-earthquake could occur off the coast of Tokyo in the 2013–2014 period.1

These longer-term forecasts have made the Kamchatka–Japan region a focus for short-term forecasting, using "non-seismic" methods, such as monitoring infrared emissions, irregularities in the ionosphere, earthquake clouds, etc., which can serve as precursor signals, warning of a coming earthquake days or weeks away. For example, the Moscow-based Research Center for Earth Operative Monitoring recently completed a year long short-term forecasting trial program for the Kamchatka–Japan region (eng.ntsomz.ru/projects/earthquake). They were testing a system that could become part of the proposed International Global Monitoring Aerospace Systems (IGMASS) program.2

However, it is not clear that the 8.3 earthquake on May 24th has satisfied the forecast for the Kamchatka region, and as of June 1, some are still warning of an upcoming large earthquake. Yevgeni Rogozhin, the deputy director of the Institute of Physics of the Earth, Russian Academy of Sciences, noted that this was one of the deepest earthquakes ever recorded (over 600 kilometers), and cited the work of Kiyoo Mogi (a leading Japanese authority on earthquake prediction), who has said that very deep earthquakes can be a sign that shallower earthquakes are to follow in the same region. Sergey Pulinets, a Principal Scientific Researcher with the Space Research Institute, Russian Academy of Sciences, told Russian Channel 1 television that the concern for future earthquakes in the Kamchatka region has not been removed, and that generally earthquakes that used to occur once every 100 years are now occurring every 40 years. "The Earth is evolving … the processes are ongoing," said Pulinets.

This is the time to put serious support into non-seismic earthquake forecasting programs, which hold promise for saving countless lives by providing days or weeks of warning time that an earthquake may occur in a given area.3 Unfortunately the development of such systems have been slowed or blocked for political and ideological reasons.

The proposed IGMASS system mentioned above would be an excellent step in international collaboration to develop natural disaster forecasting systems, giving mankind a leg-up on these threats before they strike. For threats we cannot yet stop, forecasting allows us to control our pre-response and the consequences—before we can think about controlling the processes themselves.

1. See http://alexeylyubushin.narod.ru/EGU_2013_Extended_Poster_Lyubushin.pdf

2. See the conference report, "International Global Monitoring Aerospace Systems: Toward Collaboration in the Defense of Mankind," by Benjamin Deniston, Pavel Penev, and Jason Ross, in the Fall/Winter 2012-2013 issue of *21st Century Science & Technology*.

3. See the Winter 2011-2012 issue of *21st Century Science & Technology*, "Science Can Predict Earthquakes," and the interview report with Dr. Sergey Pulinets, "A Multi-Parameter Approach to Earthquake Forecasting," http://larouchepac.com/node/17944