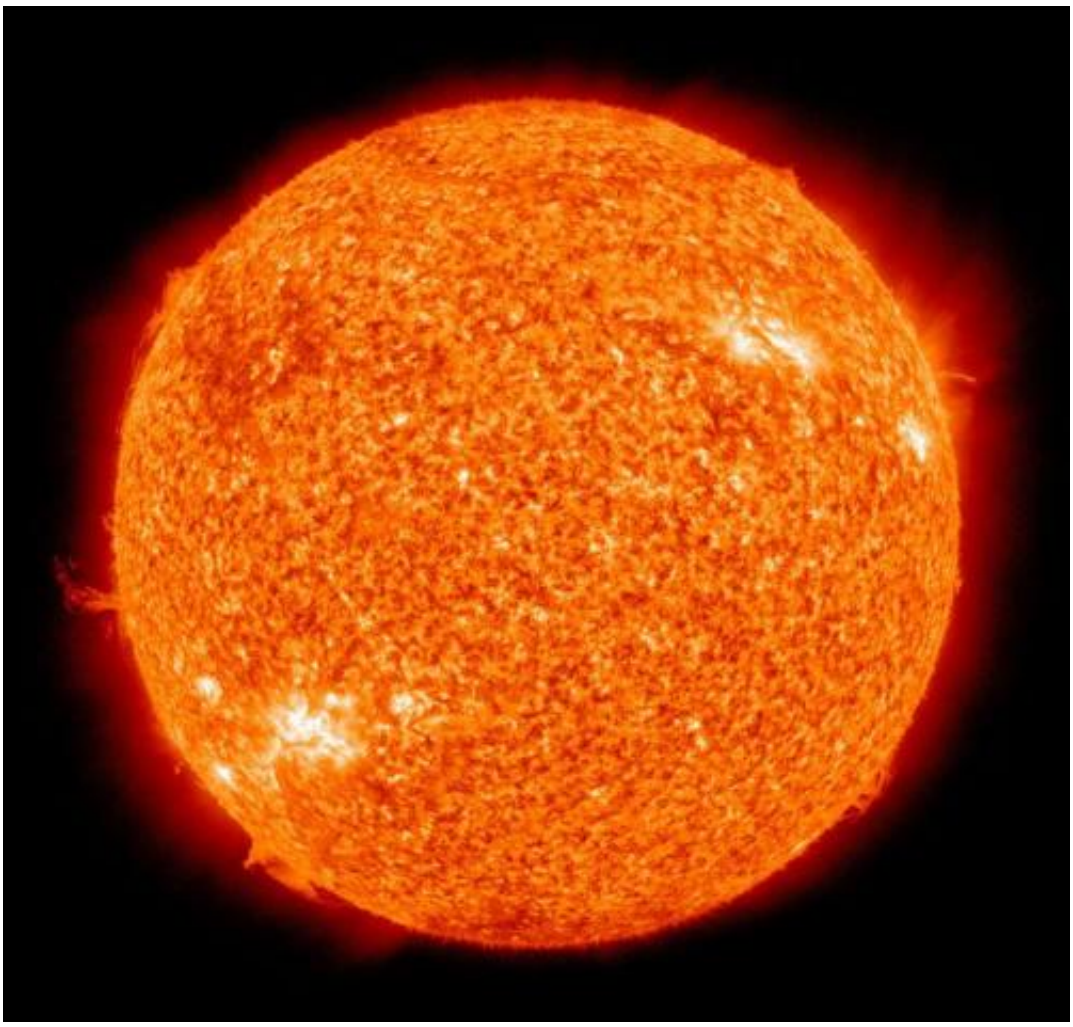
# Ancient tree rings suggest sunspot cycles have been ongoing for 290 million years

January 20 2017, by Bob Yirka



The Sun by the Atmospheric Imaging Assembly of NASA's Solar Dynamics Observatory. Credit: NASA

(Phys.org)—A pair of researchers affiliated with the Natural History Museum in Chemnitz and Technische Universität Bergakademie Freiberg, both in Germany, has found evidence in ancient tree rings of a solar sunspot cycle millions of years ago similar to the one observed in more modern times. In their paper published in the journal *Geology*, Ludwig Luthardt and Ronny Rößler describe how they gathered an assortment of petrified tree samples from a region in Germany and used them to count sunspot cycles.

Scientists know that the sun undergoes a sunspot cycle of approximately 11 years—some spots appear, grow cooler and then slowly move toward the equator and eventually disappear—the changes to the sun spots cause changes to the brightness level of the sun—as the level waxes and wanes, plants here on Earth respond, growing more or less in a given year—this can be seen in the width of tree rings. In this new effort, the researchers gathered petrified tree samples from a region of Germany that was covered by lava during a volcanic eruption approximately 290 million years ago (during the Permian period), offering a historical record of sun activity.

The research pair obtained 43 petrified tree specimens (tree-trunk slices) and report that they were able to count 1,917 rings which were preserved well enough to allow for observation under a microscope. Because the trees had all died at the same time, the researchers were able to establish a baseline between them which allowed for comparing tree ring growth between samples over the same time periods—which covered 79 years. Doing so, they report, revealed very clearly a cycle of growth similar to that seen in modern trees, though in this case, it was slightly different. Today the cycle is an average of 11.2 years, back then it was 10.6—close enough, the researchers suggest, to conclude that the sun has been behaving very predictably for at least 290 million years.

It should be noted that not everyone agrees with the theory that sunspot

activity leaves such a clear record in tree rings—other factors might be involved such as general global temperature, weather patterns or even outbreaks of insect populations.

**More information:** Ludwig Luthardt et al. Fossil forest reveals sunspot activity in the early Permian, *Geology* (2017). DOI: 10.1130/G38669.1

**Abstract**
Modern-day periodic climate pattern variations related to solar activity are well known. High-resolution records such as varves, ice cores, and tree-ring sequences are commonly used for reconstructing climatic variations in the younger geological history. For the first time we apply dendrochronological methods to Paleozoic trees in order to recognize annual variations. Large woody tree trunks from the early Permian Fossil Forest of Chemnitz, southeast Germany, show a regular cyclicity in tree-ring formation. The mean ring curve reveals a 10.62 yr cyclicity, the duration of which is almost identical to the modern 11 yr solar cycle. Therefore, we speculate and further discuss that, like today, sunspot activity caused fluctuations of cosmic radiation input to the atmosphere, affecting cloud formation and annual rates of precipitation, which are reflected in the tree-ring archive. This is the earliest record of sunspot cyclicity and simultaneously demonstrates its long-term stable periodicity for at least 300 m.y.



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