THE CAUSE OF GLOBAL WARMING STAGNATION IN THE 21ST CENTURY

Yoshiaki Fujii[1]

[1]Rock Mechanics Laboratory, Division of Sustainable Resources Engineering, Hokkaido University, N13W8, Sapporo, 060-8628, JAPAN, Tel: +81-11-706-6299, E-mail: fujii6299@frontier.hokudai.ac.jp

Date received: Sep. 15, 2014

Abstract

The global surface temperature is not rising in the 21st century, although the CO_2 concentration continues to increase and there have been no giant eruptions. Dr. James Hansen, who advised the United States Congress in 1988 of the global warming threat, thinks that the cause is La Niña and predicts a record temperature in 2014 and again in 2015. However, it is impossible to explain the stagnation in global warming for more than 10 years since the period of ENSO is several years in length. Prof. Judith Curry at Georgia Tech. thinks that the cause is the long-term cycles of ocean temperature. She predicts an imminent glacial period. The author does not deny the possibility of the cycles, but thinks that the primary cause is the inactivity of the sun. The more active the sun is, the greater the number of sunspots that are observed. The sun became less active at the end of the 20th century and has been markedly inactive in the 21st century. The sun is changing from dipole to quadruple pole and its magnetic field is becoming weak. The sunspots are predicted to disappear in 2022. This situation is the same as the Maunder minimum in which almost no sunspots were observed between 1650 and 1700. It was so cold during that period that farmers in New England experienced 20 cm of snow in June and had nothing to harvest. It also has been determined that the sun has been inactive for the most of the last 13,000 years based on isotope analyses of beryllium. This suggests that the sun's activity in the late 20th century was rather abnormal.

Keywords: Global Warming Stagnation, Sun Spot Number, Maunder Minimum, Little Ice Age, Quadruple Pole

Introduction

It is a well-known fact that the global surface temperature has not been rising in the 21st century (Revkin, 2009, Hansen et al., 2012, Fujii, 2012, etc.), although some people have stated, "Recently, global warming is accelerating." This paper reports the facts and explains the causes of global warming stagnation and predicts the climate of the future.

The Global Surface Temperature is NOT Rising!

The CO_2 concentration is increasing and reached 397 ppm in Dec. 2012 at Mauna Loa Observatory in Hawaii (Fig. 1). The GST (Global Surface Temperature), however, has not been rising in the 21st century (Fig. 1). Giant eruptions can cause the GST to become lower, reflecting insolation by sulfate aerosol. However, there have been no giant eruptions since Pinatubo in 1991 (Fig. 1). Scientists are interested in the reason for the stagnation of global warming.

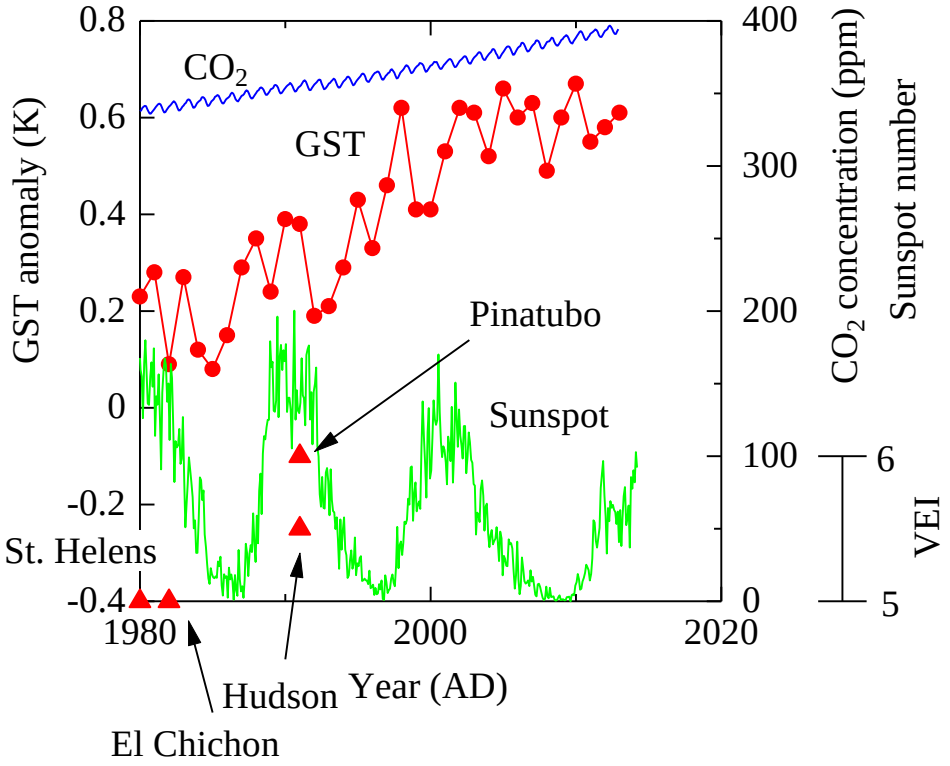

Figure 1. GST (Global-mean Surface Temperature, source: NASA Web site, http://data.giss.nasa.gov/gistemp/graphs/Fig.A2.txt), CO_2 concentration at Mauna Loa, Hawaii (source: National Oceanic and Atmospheric Administration Web Site, ftp://ftp.cmdl.noaa.gov/data/greenhouse_gases/co2/in-situ/surface/mlo/co2_mlo_surface-in situ_1_ccgg_month.txt), sunspot number (source: SIDC - Solar Influences Data Analysis Center Web Site, http://sidc.oma.be/sunspot-data/yearssn.dat) and giant eruptions (Source: Natural Smithsonian Institution, Museum of Natural History, Global Volcanism Program Web Site, http://www.volcano.si.edu/)

Why is Global Warming Stagnating?

Dr. Hansen (ex NASA), who warned the United States Congress of the threat of global warming in 1988, explained that the slowdown of global warming was due to La Niña. (Hansen et al., 2012). However, it is impossible to explain the stagnation of more than 10 years by ENSO (El Niño-Southern Oscillation), which lasted only for a few years.

It should also be pointed out that the global warming theory has lost its scientific backbone. The global warming theory that assumes the anthropogenic CO_2 emission as the cause of the rise in GST was based on a prediction using the GCM (Global Climate Model) by Hansen et al. (2006, Fig. 2). The prediction of Scenario A (on the high side of reality with rapid exponential growth of GHG, Greenhouse Gases) deviated from actual observations from the beginning. It for Scenario B (the most plausible CO_2 emission) also deviated from the reality. Even it for Scenario C (a more drastic curtailment of emissions than has generally been imagined, specifically GHGs were assumed to stop increasing after 2000) is slightly higher than the observation although GHGs emission has not stopped. Thus, it can be pointed out that the prediction by the GCM is apparently unreliable and the global warming theory has no scientific backbone now.

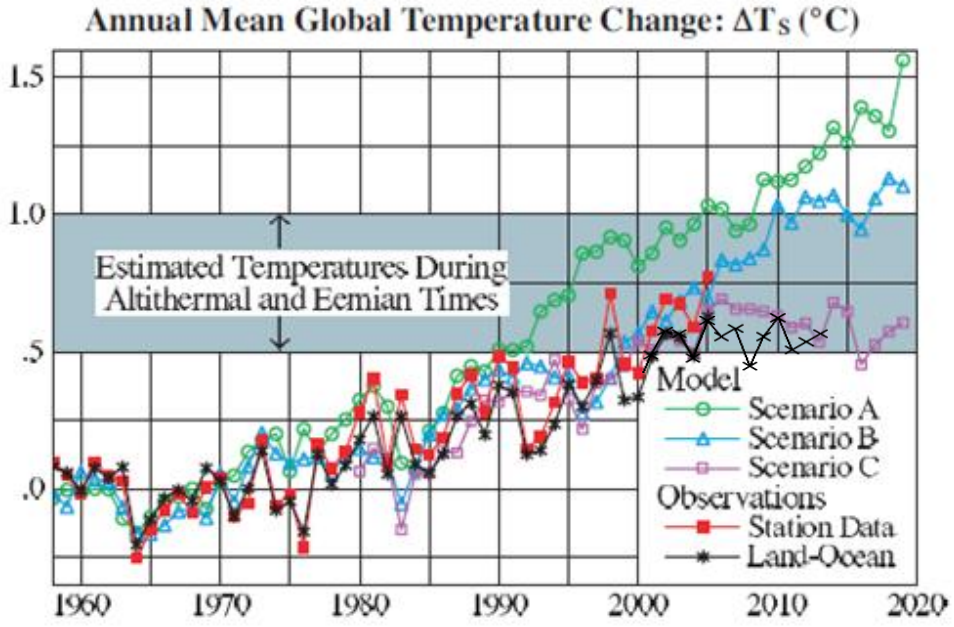

Figure 2. Prediction of GST by GCM (Hansen et al., 2006. Observed data after 2006 were added by the present author using as source a NASA website, http://data.giss.nasa.gov/gistemp/graphs/Fig.A2.txt)

Prof. Judith Curry at Georgia Tech. explains the stagnation by the long-term cycles in ocean temperature over a period of several decades. She points out that the situation is similar to that during the global cooling period that lasted until 1975 and that we may be facing an imminent glacial period (Source: http://www.dailymail.co.uk/news/article-2415191/And-global-COOLING-Return-Arctic-ice-cap-grows-29-year.html#ixzz2ww0rs1QV).

On the other hand, those whose specialty is the sun are paying attention to the sun's inactivity. The sunspots are the areas of lowest temperature and decrease when the sun is inactive. The number of sunspots also varies at 11 year period. The variations indicate a reversion of the poles. The period becomes longer when the sun is inactive. The sun was less active during the 23rd solar period, which began in 1996, and is very inactive in the 24th solar period (Fig. 1).

The sun has been dipolar since modern observations began. However, it is now going to have quadruple poles (Sokoloff & Nesme-Ribes, 1994). This is similar to the situation in the Maunder minimum during 1650 and 1700 in which almost no sunspots were observed. It was so cold then that the period is called the Little Ice Age. For example, farmers received 20 cm of snow in June in New England. They had no crops to harvest and had to move westward. People enjoyed skating on the frozen Thames River. In Edo City in Japan, people experienced difficulty in transporting goods because the Sumida River was frozen.

Hansen et al. (2012, 2014) stated that the effect of the variation of the solar activity was not neglected, but small, since the solar energy varies less than 0.1%. In fact, a 0.1% change in insolation corresponds to a 0.07 K GST change based on the Stefan-Boltzmann law. However, when the sun becomes inactive, the solar wind becomes weak, the incidence of cosmic rays increases and clouds increase (Svensmark & Christensen, 1997, Fig. 3). The clouds reflect the insolation and cause the GST to be lower.

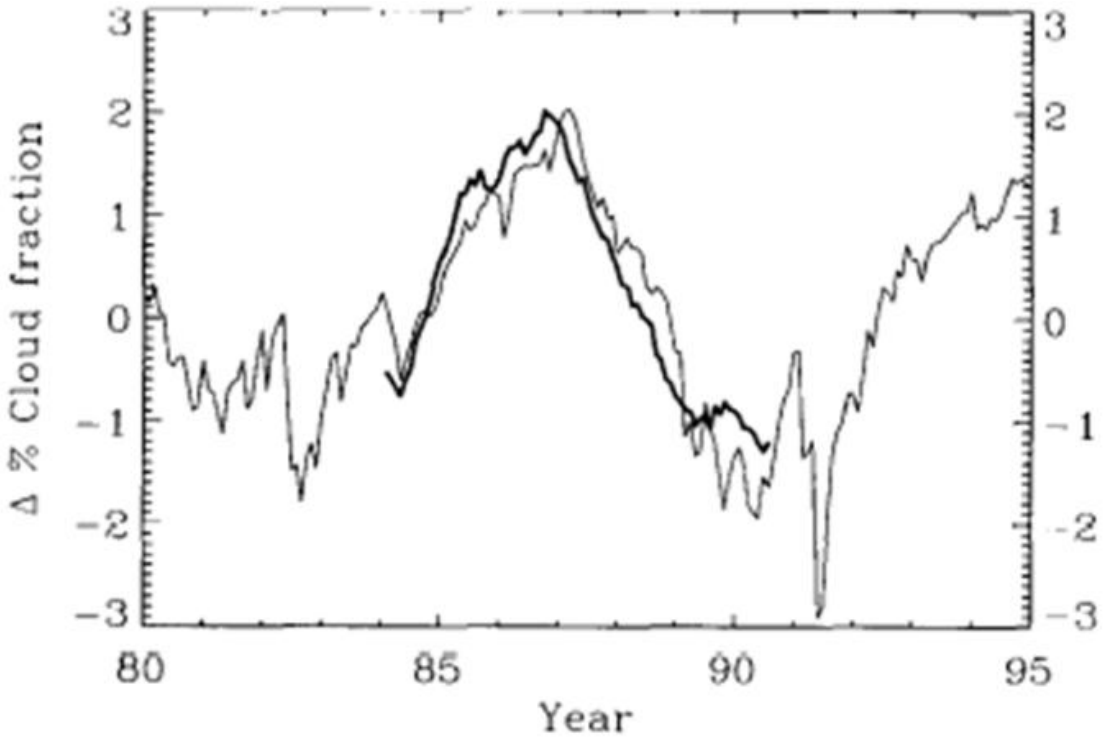

Figure 3. Changes in cloud cover from ISCCP-C2 (thick line) and cosmic ray intensity at Climax, Colorado (Svensmark & Christensen, 1997).

What Will the Future Be?

The magnetic field of the sun is becoming weak and the sunspots will disappear in 2022 (Fig. 4). Observation of the sunspots was begun by Galileo Galilei in 1600s. The number of sunspots, however, can be estimated back to the year 13,000 BP from beryllium isotope analyses. The results imply that the sun's activity in the late 20th century was unusual and the present inactivity of the sun is rather normal (Fig. 5).

We can try to reduce CO_2 if the sun becomes active again. However, even in this case, it should be realized that a reduction by 50% in CO_2 will cause, if IPCC (2006) is correct, only a 0.7 K global warming mitigation, but a loss in the world's GDP of more than 5.5%, which corresponds to three Lehman shocks. This is apparently unreasonable.

We need do nothing if the sun remains inactive because the GST will be unchanged.

We must try to raise the GST if the sun becomes more inactive, because agriculture will suffer severe damage from cold weather. Burning as much coal as possible to warm the Earth would be a temporary solution.

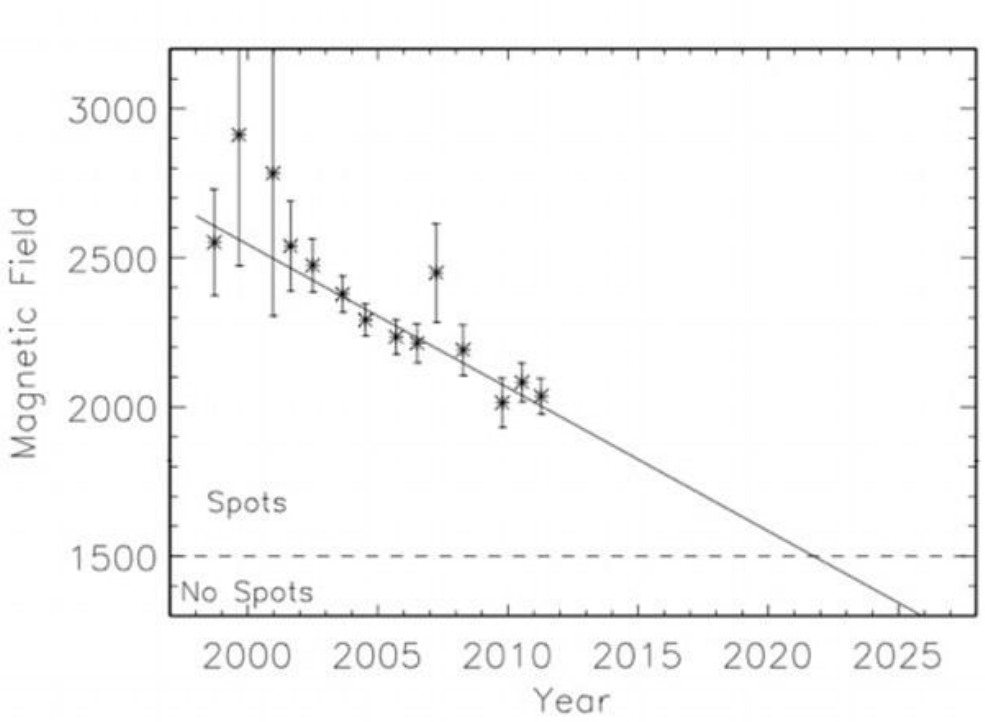

Figure 4. Sun's magnetic field (http://www.dailymail.co.uk/sciencetech/article-2003824/Earth-facing-mini-Ice-Age-years-rare-drop-sunspot-activity.html)

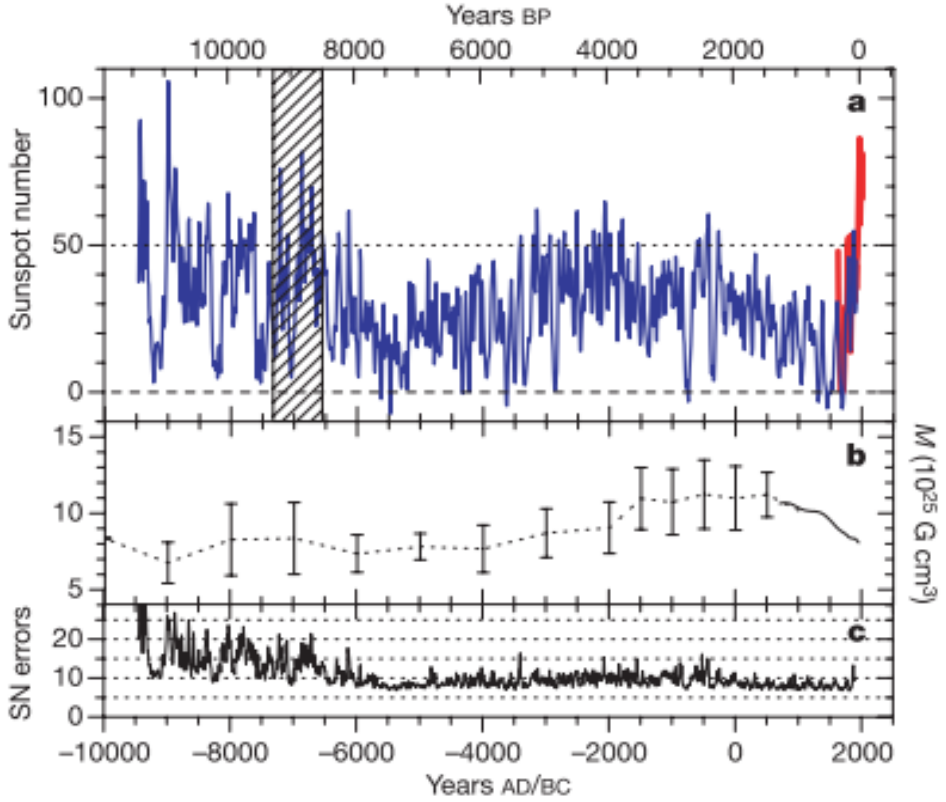

Figure 5. Estimated number of sunspots up to 13,000 years ago (Solanki et al., 2004)

Concluding Remarks

The GST is not rising in the 21st century and the main cause is the sun's inactivity. We should carefully observe the GST and solar activity rather than simply discussing blindly how to reduce CO_2 emissions.

References

Y. Fujii, "The earth is not warming in the 21st century!", In *Proc. MMIJ Spring Meeting*, pp. 83-84, Tokyo, 2012.

J. Hansen, R. Ruedy, M., Sato and K. Lo, "Global surface temperature in 2011, Trends, and prospects", Available at NASA Web Site, http://data.giss.nasa.gov/gistemp/2011/. [Accessed: Aug. 20124]

J. Hansen, M. Sato and R. Ruedy, "Global temperature update through 2013", Available at NASA Web Site, http://www.columbia.edu/~jeh1/mailings/2014/20140121_Temperature2013.pdf. [Accessed: Aug. 2014]

J. Hansen, M. Sato, R. Ruedy, K. Lo, D. Lea and M. Medina-Elizade, M., "Global temperature change", *PNAS*, Vol. 103, No. 39, doi:10.1073/pnas.0606291103, 2006.

IPCC, *Fourth Assessment Report: Climate Change*, 2007.

A. Revkin, "Momentum on climate pact is elusive", *New York Times*, Sep. 21, 2009.

D. Sokoloff and E. Nesme-Ribes, E., "The Maunder minimum: a mixed-parity dynamo mode?", *Astronomy and Astrophysics*, Vol. 288, pp. 293-298, 1994.

S.K. Solanki, I.G. Usoskin, B. Kromer, M. Schüssler and J. Beer, J. "Unusual activity of the sun during recent decades compared to the previous 11,000 years", *Nature*, Vol. 431, pp. 1084-1087, doi:10.1038/nature02995, 2004.

H. Svensmark and E. Christensen, "Variation of cosmic ray flux and global cloud coverage - A missing link in solar-climate relationships", *J. Atmospheric Solar-Terrestrial Phys.*, Vol. 59, No. 11, pp. 1225-1232, 1997.