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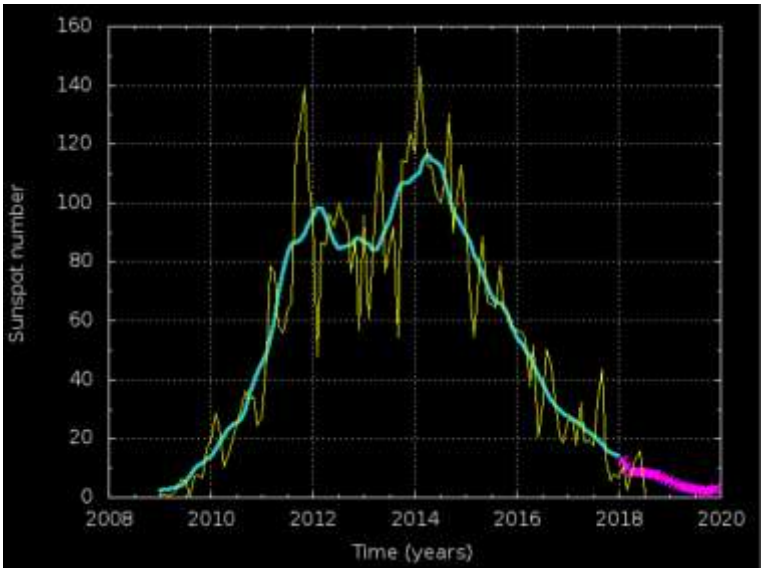
Climate Update

On trend and on forecast, the Sunspot Number for July was down, confirming that Solar Cycle 24 remains unusually weak. Declining activity was predicted in the 1990s by solar physicists, Livingston and Penn. Additionally, we should mention Nir Shaviv, an astrophysicist. In 2007, he was asked about global warming and CO2 and said: ***"A few years ago if you would ask me I would tell you it's CO2. Why? Because just like everyone else in the public I listened to what the media had to say."***

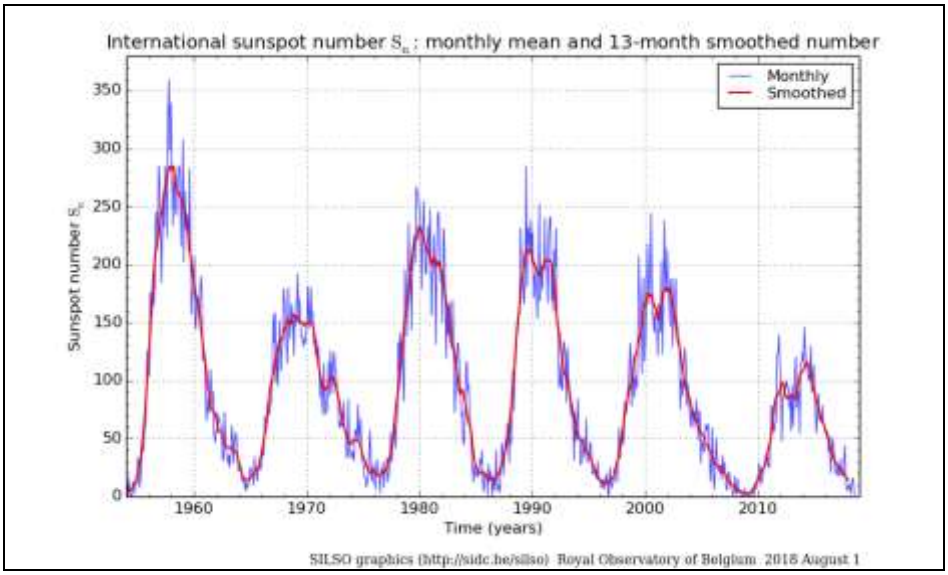
He has done some significant work on the link between diminished solar activity and global cooling. In 2014 he was awarded the IBM Einstein Fellowship, Institute for Advanced Study, Princeton.

The Sunspot Number for July was 1.6, which compares to the most recent low of 2.5 for March of this year. As we say in the markets "A new low for the move." The high for SC 24 was 146 in February 2014. The low for SC 23 was 0.0 in August 2009. The high for SC 23 was 244 in June of 2000. The first chart shows SC 24 to date:



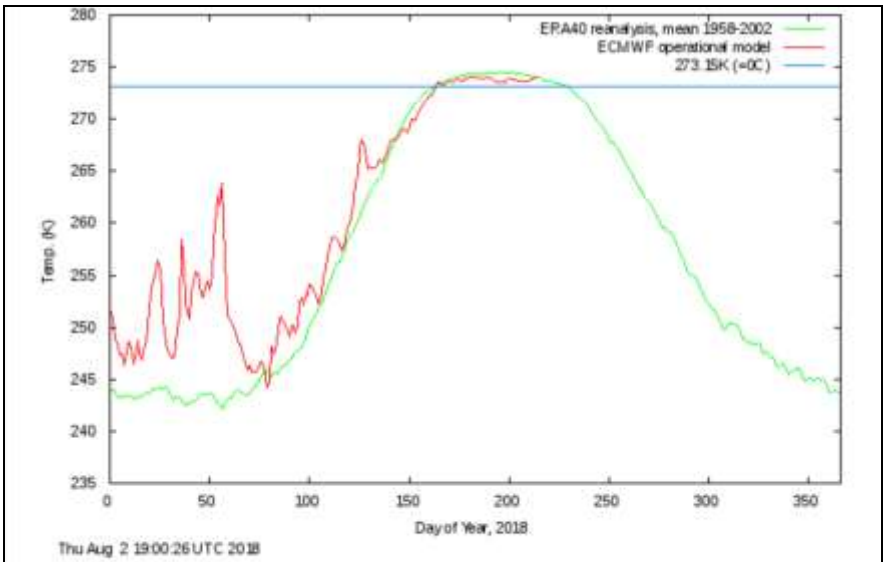
The following chart shows the overall decline in solar activity, which due to the link to cosmic rays and clouds represents a long-term cooling force. The highs were the highest in thousands of years, and of course, associated with the Modern Maximum in temperatures. Physicists consider that declining solar activity could continue to a Modern Minimum. The last such solar low was the Maunder Minimum that was associated with the Little Ice Age that reached its worst in the late 1600s. And is considered to be over in

the mid-1800s. The academic tragedy and scandal of today is Michael Mann's effort to "disappear" the Little Ice Age and the Medieval Warm Period.



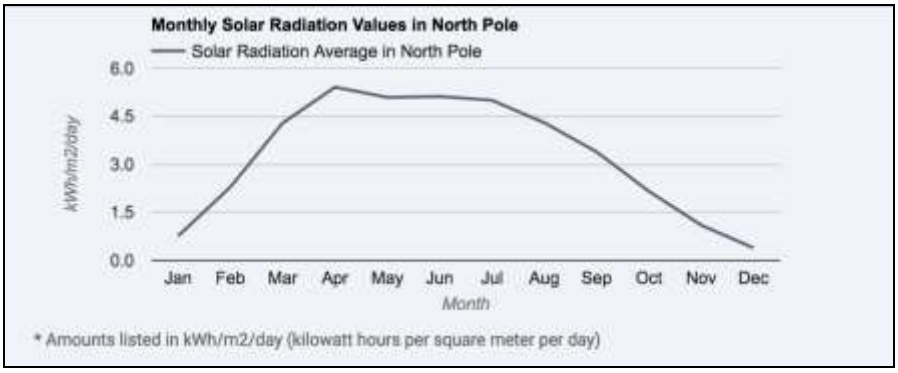
There have been headlines about some hot weather, which seem to due to high pressure areas "parking" and elevating temperatures, regionally. Less widely reported, have been stories about unusual cold numbers being clocked in both hemispheres. As with last winter's "Polar Vortices", this is weather. However, the El Nino is over and the sea ice extent is back to normal in Antarctica. In the Arctic, sea ice extent is below normal but sea ice thickness is above the numbers of the last few years. Greenland's Surface Ice Mass Balance is well above the mean.

This chart shows that the temperature for "North of 80" summer has been below the mean. Typically, the temp declines below freezing at around August 23.

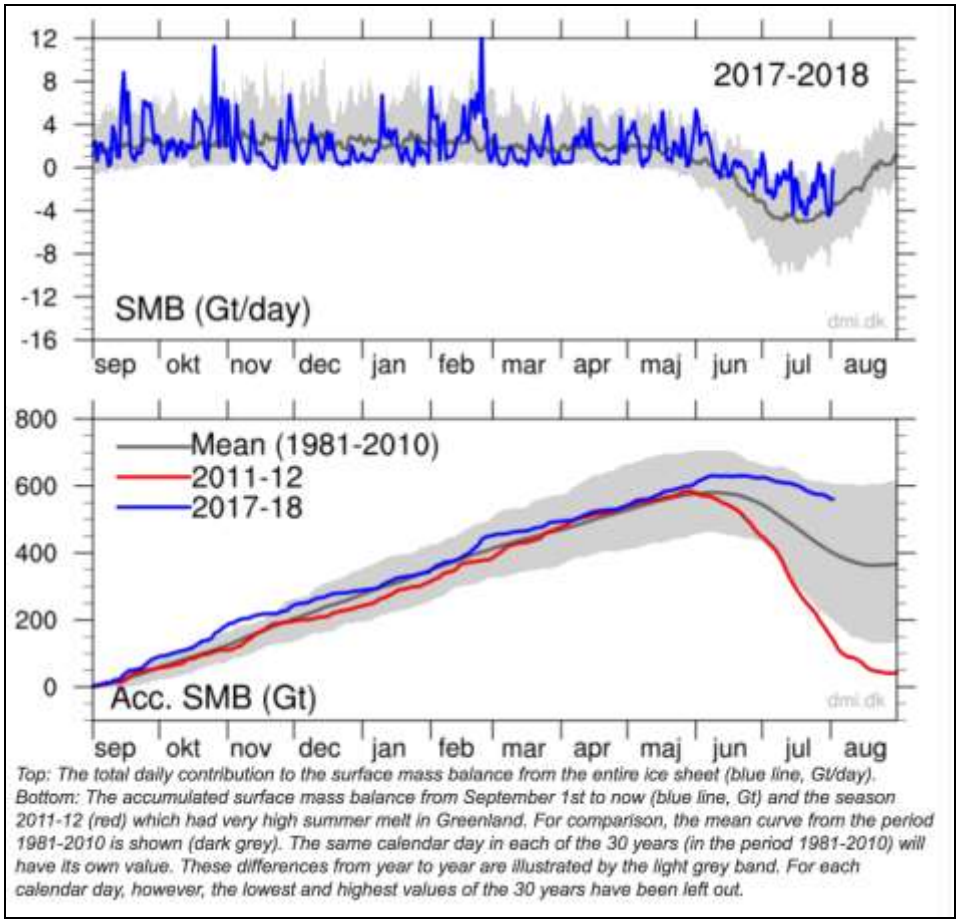


Daily mean temperature and climate north of the 80th northern parallel, as a function of the day of year.

Our fourth chart shows the amount of solar energy received at the "North Pole" during the melt season. It suggests that that big ball of fire in the sky is the main driver of their brief summer warming. And then, when it is night all day it is cold.

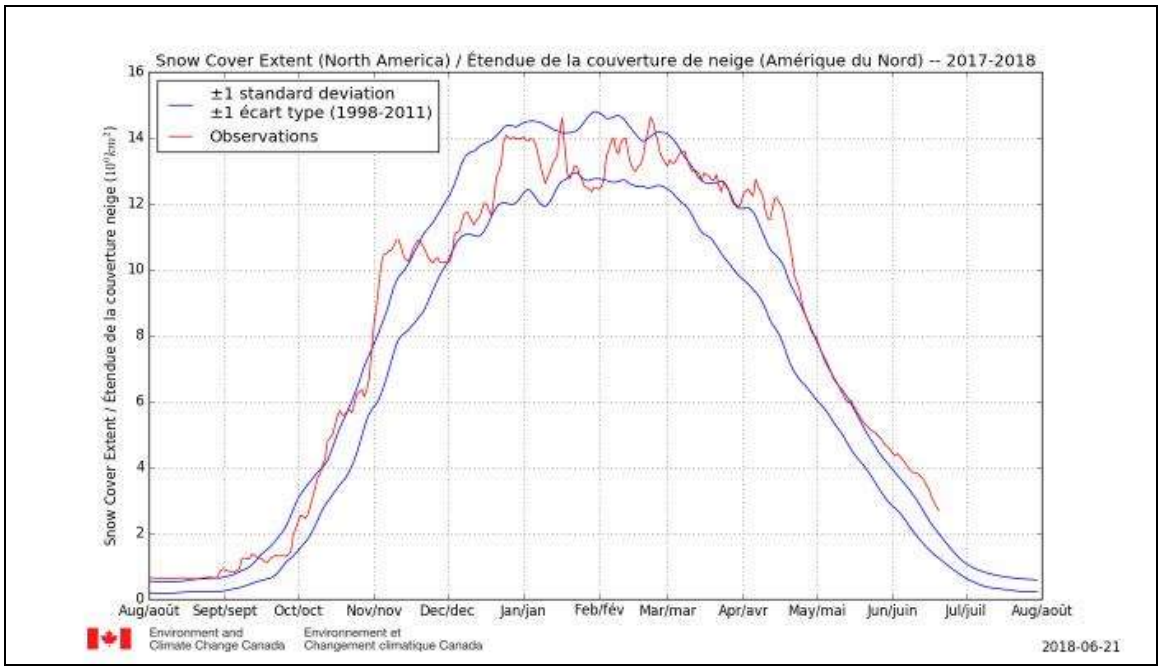


The DMI chart on Greenland's ice conditions shows the SMB continues well above the mean. Note that the "low" is typically set in the middle of August.



Top: The total daily contribution to the surface mass balance from the entire ice sheet (blue line, Gt/day). Bottom: The accumulated surface mass balance from September 1st to now (blue line, Gt) and the season 2011-12 (red) which had very high summer melt in Greenland. For comparison, the mean curve from the period 1981-2010 is shown (dark grey). The same calendar day in each of the 30 years (in the period 1981-2010) will have its own value. These differences from year to year are illustrated by the light grey band. For each calendar day, however, the lowest and highest values of the 30 years have been left out.

Snow cover extent was above normal during last August and into October. Then above normal since early April. The importance, beyond the extent increasing is that it reflects more heat back to outer space. Increased cover during the seasons of highest output from the sun reflects the most energy.



On a solar decline, the other count is of the days with no sunspots. This year the count is out to 121 days or 56%, which compares to all of last year at 104 days or 28%. For 2016 it was 32 days, or 9%. Prior to that there were no spotless days until back to 2011.