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Title: Using Satellite Measurements to study the Influence of Sun Activity on Terrestrial Weather

Abstract: The time rows of Terrestrial Climate Components (TCC) since the Eighties have shown some strong Influences by Extraterrestrial Components with the beginning of the 22. Sunspot period. Therefore the increase of ground near temperature on earth and oceans (2 –3 m above ground), called Global Temperature, during the warming period between about 1980 and 2008 seems to be not anthropogenic but caused by natural activities of Sun's surface.

Some Extraterrestrial Components (EC) can be destined by measurements on the earth's surface directly or indirectly: (a) The Reduction of Cosmic Rays by the magnetic fields of the sun-winds (Forbush-Reduction) by measuring the neutrons, which are secondary particles (Höhenstrahlung) of Cosmic Rays, and (b) the influence of the sun-winds on earths weather system by calculating the Sun-Wind-Index (SWI) from the difference of magnetic field in antipodal Stations.

The link between TCC and EC is the "Svensmark – Effect". It describes the formation of terrestrial clouds by the secondary particles of Cosmic Rays (Similar to Wilson's Fog Chamber 1911). This effect modulates the North Atlantic Oscillation Index (NAO). It can be shown by using measured data, that the secondary particles of cosmic rays are controlling the NAO and therefore the weather in the Northern Hemisphere especially very strong since 1975. GOES – Satellites, geostationary stationed at about 35,800 km (22,300 miles) in equatorial plane above earth, measure the components of Sun-Wind that earth is exposed. These components are Flares, protons, alphas, electrons and magnetic fields. By correlating these extraterrestrial as well as terrestrial components, one can determine the strength and impact of sun's activity on the weather on the earth. Applying this method by using the by NOAA published Data it will be explained that the warming period on earth, that started about 1980 and seems to be ending about 2010, in deed was caused and modulated by sun's activity: Since 1975 GOES Satellites measured increasing strong flux of solar protons, which penetrated earths magnetic field and influenced the stratospheric O3 layer. Especially in 1989 the components of sun-winds caused strong disturbances of electricity and telemetric networks in the

Northern Hemisphere. The magnetic fields reduced the Intensity of Cosmic Rays (Forbush Reduction) in this year partly of about 30% at 56 ° N (Moskau). From 1980 to 2009 Cosmic Rays and Cloudiness, which are delayed about 10 to 12 month, correlated with K~0,8 (Svensmark-Effect). The NAO correlates with Cosmic Rays (K~0,7) and confirms these connections between extraterrestrial and terrestrial components. That leaded finally since 1990 to increasing Sunshine-Duration of about 0,5 h/d and global rays of about 10 W/m2 in yearly averages around 50° N (Mainz) in Central Europe during this warming period. The ground near temperature increases of about 0,9 +-2 °C of the Yearly Averages. The Global Temperature increased since about 1980 more continuously to about 0,6 °C in 2006. With the end of sun's activity in December 2006 (Sunspot Nr. 930 with "sun-tsunami") the increase of ground near Temperature ended and weather started to become colder again in winter 2009 to 2010 in Europe and USA. Even the Sun-Wind-Index confirmed these development, it decreased very quick to values beneath 10 nTesla, which was never found since 1910, when it was very cold.
That means, that Measurements of sun wind components by Satellites like GOES help to understand and to forecast terrestrial weather development.
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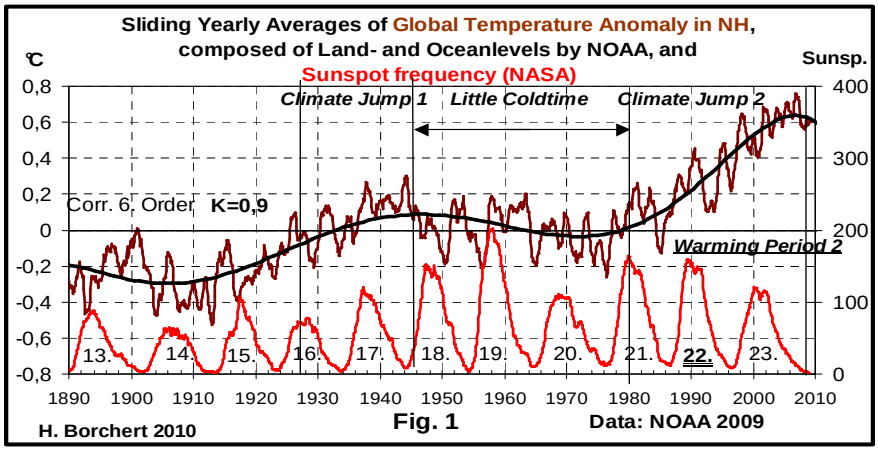
Boulder, USA

"Using Satellite Measurements to study the Influence of Sun Activity on Terrestrial Weather"

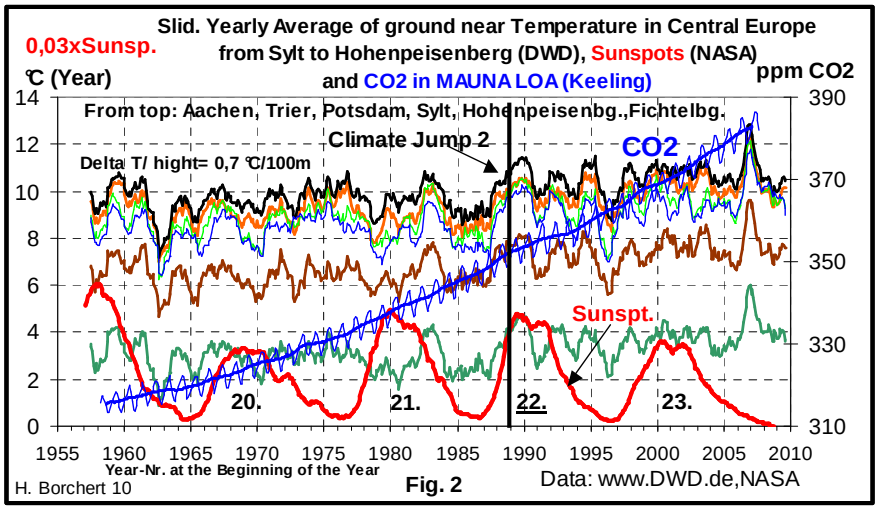
Physic Director ret. Dipl.Phys. Dr. Horst Borchert 1)

Key-Note:
Climate Change, Global Temperature (NH), Cloudiness, Cosmic Rays, Sun-Wind-Index, GOES-Satellites, Forbuch –Reduction, Svensmark-Effect, Stratospheric Ozone-Depletion.

The simplest Method to describe climate change is to study time rows of ground near Temperature: With starting of human Industry Global Temperature in Northern Hemisphere (NH) showed the first warming periods from 1920 to 1940 and the second since 1980. Between 1940 and 1980 was a little Cold Period. „Warming Period 2" is object of this task.



In Central Europe ground near Temperature shows with beginning of 22. Sunspot Period (1989) a Jump of about 0,9 °C +-0,2 °C in all measuring stations. After that Temperature averages slightly increasing at this new level until 2008, then it shows tendency to decrease:



But CO2 increases continuously: CO2 could not be cause of this climate change. Therefore we have to look for another cause of climate change during this period and perhaps before.

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Between 1940 and 1975 we observed in all stations of Central Europe a little cold period with decreasing Temperature and Sunshine-Duration and increasing Cloudiness. With beginning of the 22. Sunspot period in 1989 the yearly average of cloudiness was suddenly reducing about 4%, Sunshine duration increased about 0,5 h /d and Temperature about 0,9 °C, starting a „Warming Period“. This Climate Change seems to be caused by extraterrestrial influence.

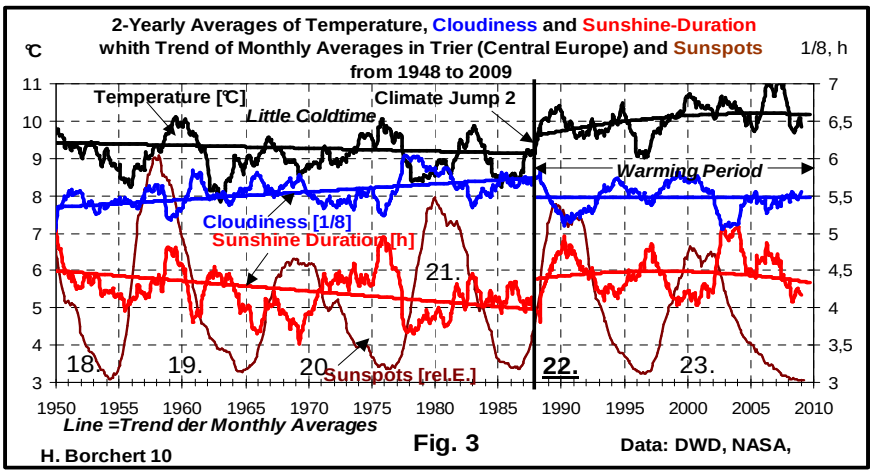


Fig. 3

In 1989 also Global Rays (direct and indirect Sunshine, 4 Pi , all frequencies) increased suddenly about 10 % (~1 mW/cm2) in Central Europe (~50°NH) with increasing tendency in the following Years until 2007 (Fig.4). This jump of sunshine started as well within the 22. Sunspot-Period, when big sunspots, positioned on the Sun equator, emitted extreme strong sun winds in direction to earth. They influenced strongly electricity and telecommunication on Earth (NH). Northern lights could be observed even in Africa.

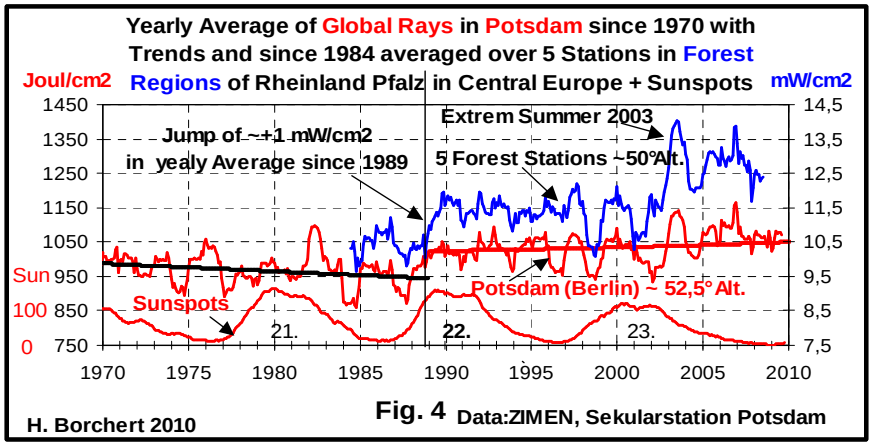


Fig. 4

Several Institutes worldwide started 1958 to measure Neutrons, which are secondary Particles of Cosmic Rays, mainly to study inaccuracies of C14-Production.in Earth's atmosphere:

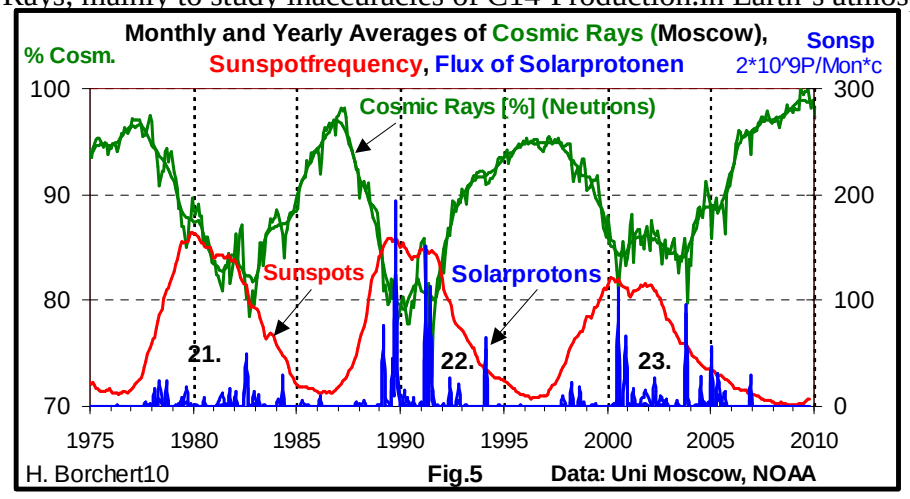
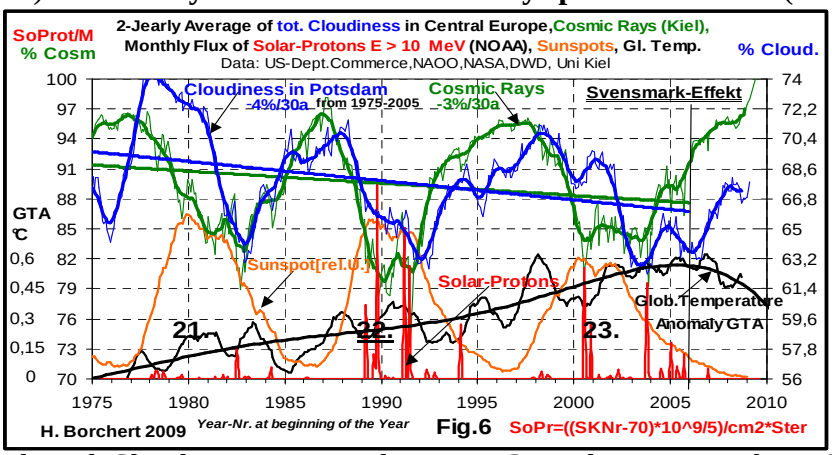


Fig.5

Cosmic Rays are modulated by the magnetic fields of Solar-Protons (Forbush-Reduction). Solar-Protons are measured by geostationery GOES-Satellites in the 36000 km Orbit. In the 22. Sunspot-Period the Forbush-Reduction of Cosmic Rays reached 27 %, caused by extreme Flux of Solar protons from greatest Sunspots never seen before.

The Link between extraterrestrial and terrestrial Components delivers the „Svensmark-Effect“ (1991): **Secondary Particles of Cosmic Rays produce Clouds** (estimated:20 - 30%)



Neutrons and total Cloudiness are correlating in Central Europe with K>0,7 from 1980 to 2005 . Averaged long time reductions of Cloudiness and Neutrons were 3-4% in 30 Years. That results by increasing Global Rays in an increase of Global Temperature of about +0,6 °C in the NH.

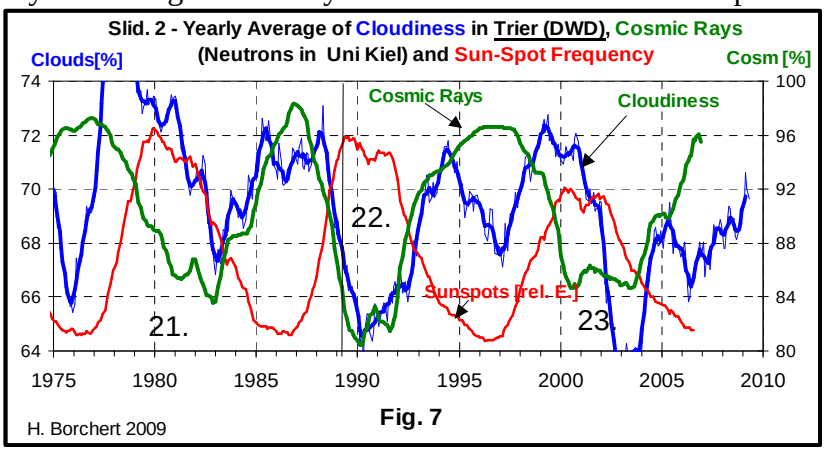
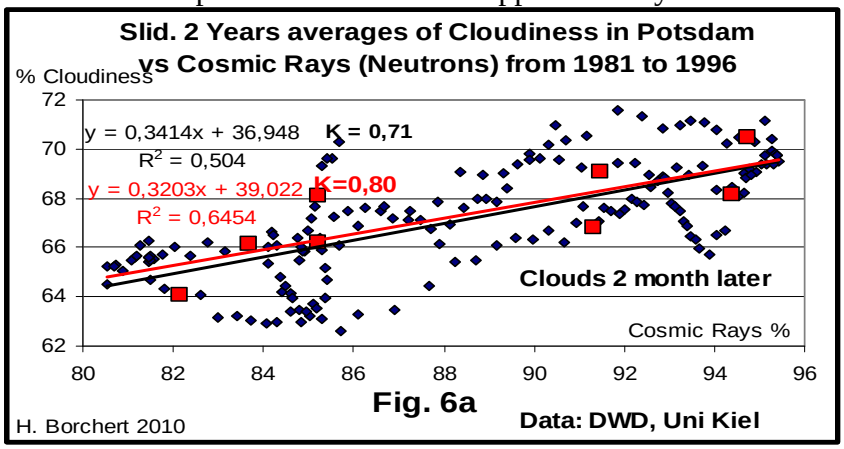
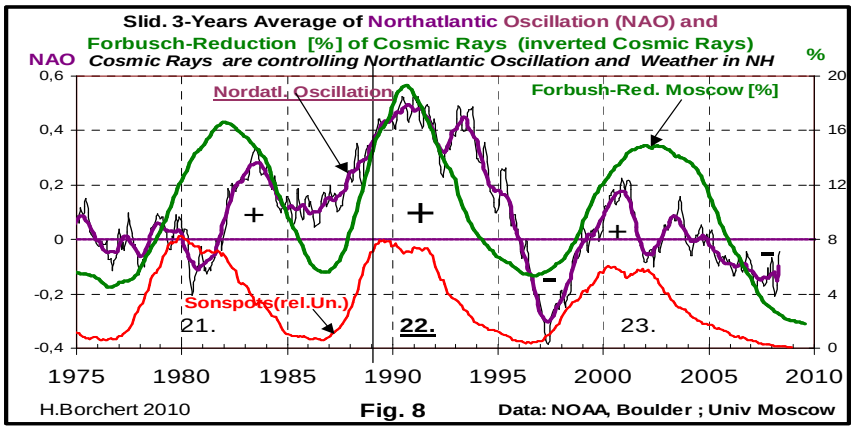


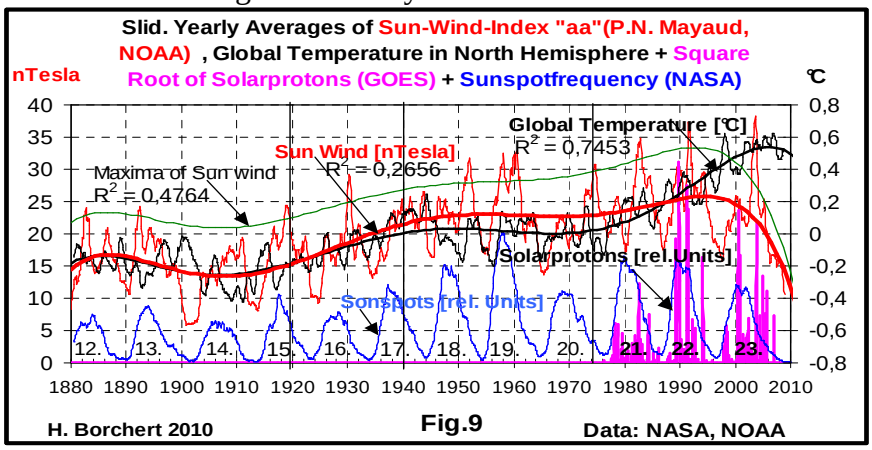
Fig.7 shows another example of a typical correlation between Cloudiness and secondary particles of Cosmic Rays for instance in Trier in Central Europe. The best correlation exists between 1982 and 1995 during the end of the 22. and with in the 22 Period, when strongest sun winds of the century enter Earth’s orbit and influence Earth’s weather. Between Forbush-Reduction and Cloudiness exists a delaying time from 2 to 10 month in relation to sun activity. It follows that the production of clouds happens mainly earlier in the Atlantic region.



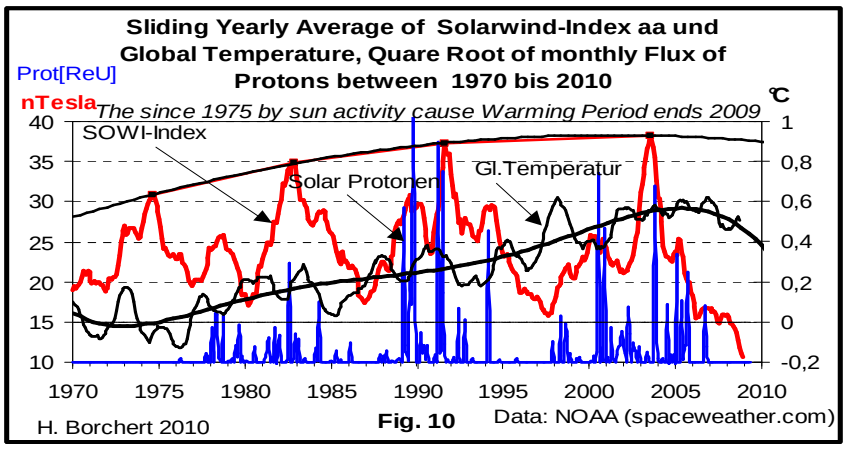
Therefore should be a correlation between North Atlantic Oscillation (NAO) and Forbush-Oscillation of Cosmic Rays. The **North Atlantic Oscillation** (NAO) is the Index of Weather in NH (Europe + USA). If Cosmic Rays produce Clouds, than there must be a correlation between Forbush Reduction of Cosmic Rays and NAO especially since 1980. In deed: **Cosmic Rays are controlling NAO and Weather in the northern hemisphere** especially since 1980: + = Warm-, - = Cold Weather: **The Forbush-Reduction, controlled by sun activity, caused the terrestrial warming Period since 1980 in NH.**



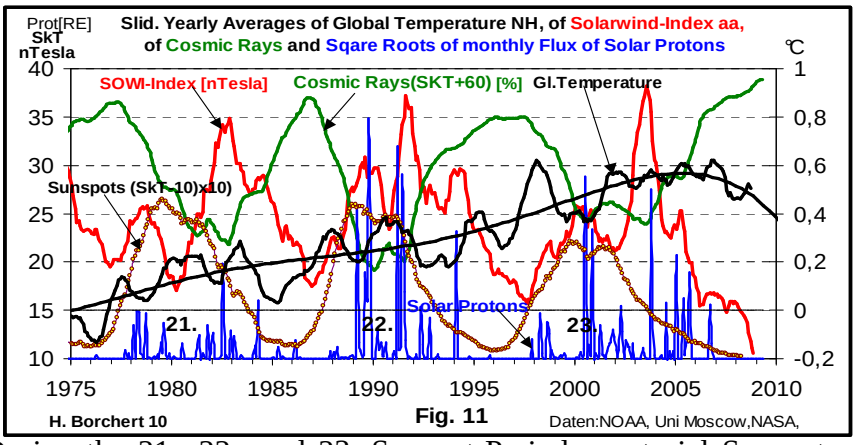
Sunwind-Index „aa“ is the difference between the **antipodal** magnetic fields of Earth. It shows the influence of the magnetic field by the sun winds on Earth and on its weather.



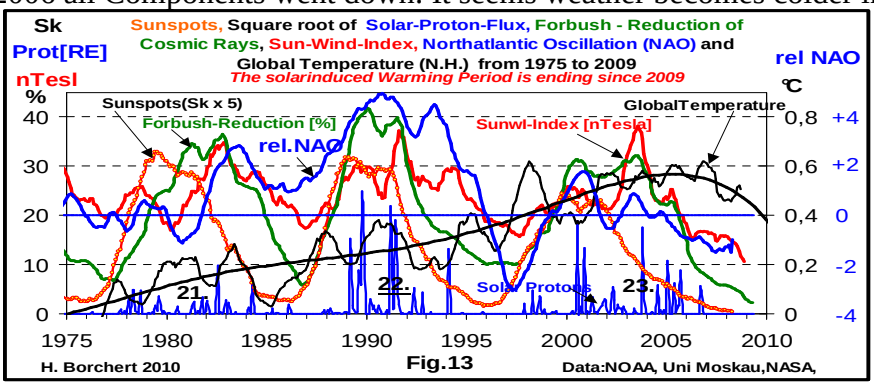
During last Century time rows of Global Temperature (NH) shows the same structure like Sun Wind – Index (K~0,5): Coldest Weather around 1910, warming Period from 1920 to 1940 and the last warming Period since 1980, caused by intrusion of strong flux of Protons in the 36000km Orbit of the Earth and reduction of Clouds by strong Forbush-Reduction of Cosmic Rays. The maxima of Sun-wind-Index are increasing together with global Temperature:



Since 2007 the Sun-wind-Index degreased under 10 nTesla, a value, which was never found since 1910, when it was very cold.Cosmic Rays, measured by Neutrons in Moscow, increased in 2009 against maximum Values never reached since1958. Solarwind-Index decreased in 2009 against minimum Values never measured since 1910, when it was very cold. Sun-Activity ends and the increase of Global Temperature stops.

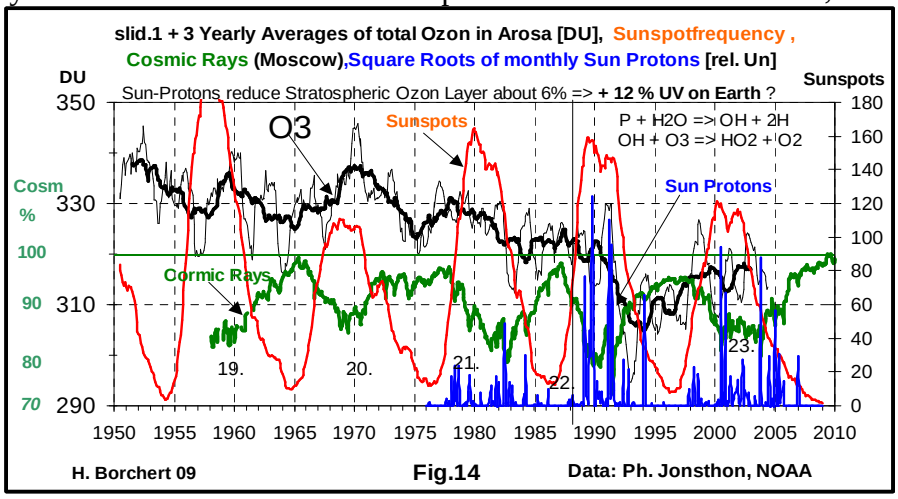


Summery: During the 21., 22., and 23. Sunspot-Period equatorial Sunspots emitted strong Sun-winds to the earth‘s orbit, analysed by GOES-Satellites. Magnetic fields of Solar-Protons reduced Cosmic Rays (Forbush-Reduction), which controlled NAO by reducing Global Cloudiness (Svensmark). NAO controlled Weather in NH. With the last Sunspot Nr. 930 in December 2006 all Components went down: It seems weather becomes colder in next time.



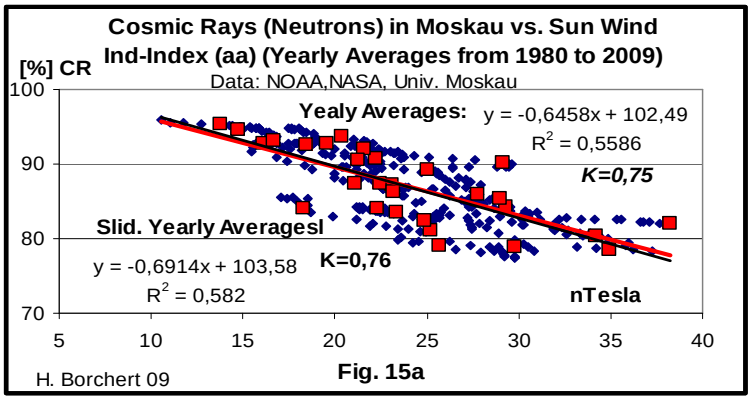
The Warming-period was caused by <u>Sun-activity</u> and not anthropogenic.

Stratospheric O3-Layer is **periodic** depleted by sunspot-modulated Cosmic Rays within ~ 5 DU in ~ 11 Years. A **continuous** O3-Depletion started during the intrusion of strong flux of Sun-Protons within the 21. Period and reached a maximum Depletion of 20 DU during the 22. Period by maximum Proton-flux: Protons produce OH Radicals and NO, which reduce O3.

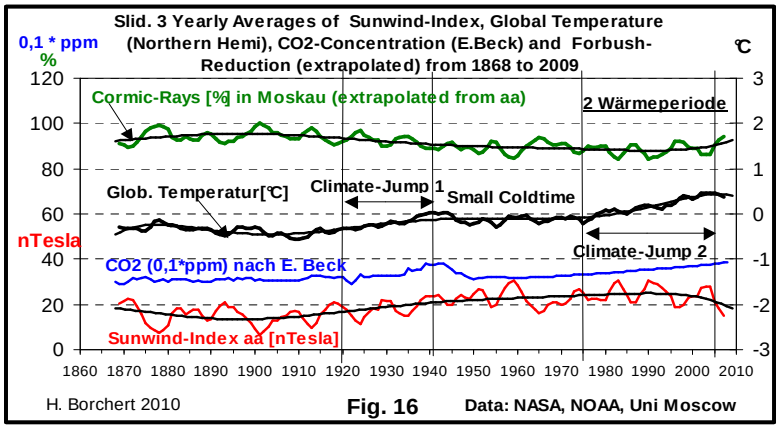


Earth‘s UV-Rays increase during this time over 12%. and deliver further Energy to warm up Earth during this Period, which now seems to be finished.

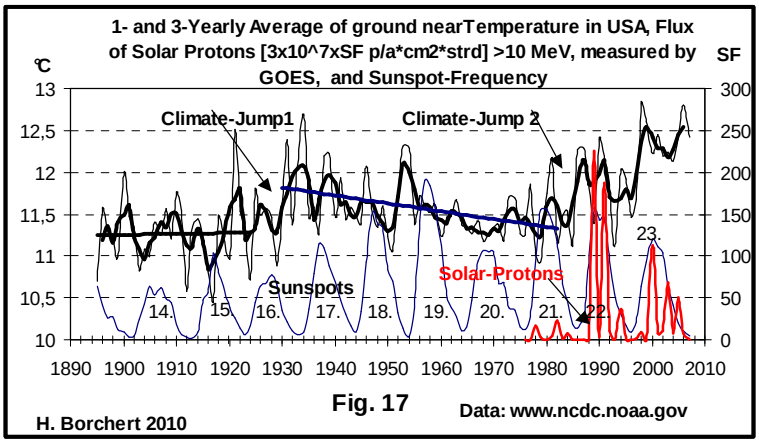
Between Cosmic Rays, measured as Neutrons (Uni Moscow) and Sun-Wind Index exists with in 30 Years a good Correlation (K~0,75). With this relation one can calculate Cosmic Rays backwards until 1868



The Sunwind – Index aa correlates with the Global Temperature and with Cosmic Rays since 1870: Sunwind-Index aa prognoses a cold time in the next future. CO2 is not „clima-relevant“, it is further emitted from upwarmed oceans some years ahead.



Time rows of ground near temperatures in USA show structures similar to Central Europe: After cold temperatures around 1910 came the first „Climate Jump“ between 1920 and 1930.



It followed the “little cold time” and finally the „Warming Period“ since 1980, caused by Sun Activity, which now is ending: Sun activity controlled NAO, which controlled climate of NH.

Literature: see in www.drborchert, www.umad.de, www. Eike-klima-energie.eu