CLIMATE PATTERN RECOGNITION OVER 2700 YEARS OF THE EARLY HOLOCENE (6800 BC TO 4100 BC, PART 2)

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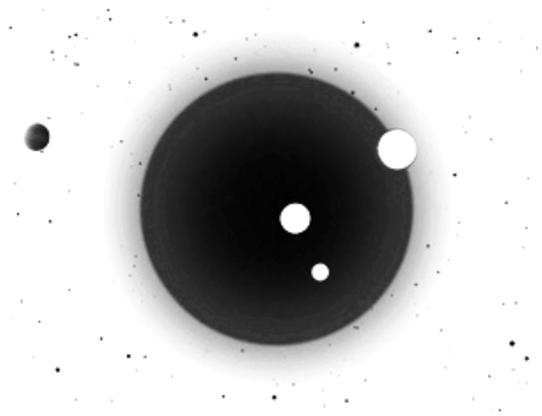

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JANUARY 2015

Abstract. We continue with the second paper of Climate Pattern Recognition for the Early Holocene, the time span 6800 BC-4100 BC. We emphasize that the pattern analysis has features, which produce consistent results over 10,000 years, able to explain each single temperature spike within the Holocene. We selected the GISP2 graph for this time span and determined four major climate drivers, active in this time. Each Holocene temperature spike is discussed, after placing a reference grid of vertical and horizontal identification lines over the GISP2 temperature evolution. This system allows us to spot the course of the regular Earth Orbit Oscillation line, which moves in a sine wave around the millennial central Milankovitch line of global temperatures, as well as cosmic meteor impact dates and volcanic cooling effects. This Early Holocene time span is governed to 90% by two large cosmic meteor impacts, which override and mask the regular EOO-wave line within the Holocene from 6450-4700 BC. Two small cosmic impacts govern the course of temperature in 4700-4100 BC. The previous time span, 8500 to 6500 BC, does not show a single meteor impact. The time span 6500-4000 BC is the Holocene time that is most meteor disturbed and with impact alternated temperatures. The previous Holocene paper 1 determined existing Holocene cycles with a celestial pacing and period growth of 6.95 years. We incorporated this 6.95 year growing cycle as part of the pattern recognition grid for the GISP2 temperature graph. The following third paper will focus onto 4800 to 2800 BC, when regular celestial Holocene cycles will visibly be better evident and the cosmic impact masking will lose its overriding dominance.

Citations. Seifert, J., Lemke, F.: Climate Pattern Recognition over 2700 Years of the Early Holocene (6800 BC to 4100 BC), 2015, http://www.knowledgeminer.eu/climate_papers.html

1. INTRODUCTION

The Holocene Onset of 8500 BC-5500 BC was analyzed in the first part of Climate Pattern Recognition; this second part continues with the analysis of the GISP2 temperature evolution of the Early Holocene until the beginning of the Mid-Holocene (Alley, 2000), the time span 6800 BC-4100 BC. Four climate forces can be recognized and are separately discussed. Figure 1 shows the Holocene time span presented in this paper.

We can see that this period contains two large temperature swings, which dominate the general impression of this Holocene time section. These are the effects of two large cosmic impacts on Earth. The recognition system requires us to adhere to Climate Pattern Recognition procedures and to prepare the recognition system with vertical and horizontal grid lines. Patterns cannot be detected without an appropriate reference system. We request readers to acquaint themselves with relevant background information, as provided in our other papers and in the climate oscillation wave calculation booklet (Seifert, 2010). For sake of progress in analyses, we cannot develop analysis basics over and over within each successive paper and rather refer to our given information sources. In part 1, we also mentioned the dismal performance of regular GMC CMIP3/5 models, and save repeating to point to their latest 2014 model-data comparisons.

2. INSERTION OF THE GRAPHICAL REFERENCE GRID

The recognition system, at first, consists of vertical period line divisions. Those vertical period divisions have been explained in part 1. The divisions are based on continuous celestial pacing, in which an oscillatory EOO

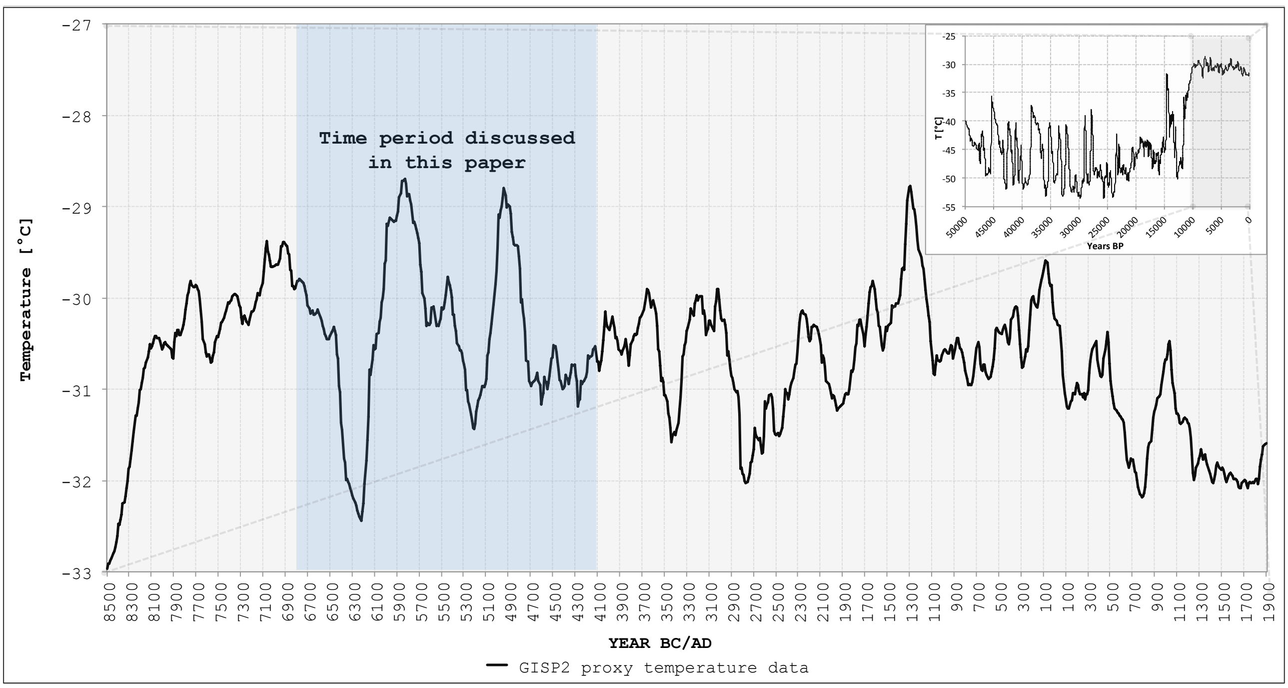

Figure 1. The Holocene GISP2 data and the period discussed in this paper (equidistant in time)

(Earth Orbit Oscillation line) of Seifert (Seifert, 2010) and Seifert and Lemke (Seifert and Lemke, 2012), of celestial origin, continuously prolongs by 6.95 years for each semi-oscillation or 13.9 years for each entire oscillation. Unfortunately, this growing period is highly masked in this particular 6500-4000 BC time span, but it will be increasingly visible, as the Holocene continues, once the heavy cosmic bombardment time span ends. Simultaneously, the periodic pacing continues unabated in the background, although not visible over multiple millennia. A background oscillation is very easily masked by cosmic meteor impacts. We place the by 6.95 years steadily growing vertical period lines into the picture with the dates of BC 7065, BC 6800,BC 6529, BC 6250, BC 5964, BC 5672, BC 5372, BC 5066, BC 4752, BC 4432 and BC 4105.

After the insertion of the vertical lines, we need to prolong the three horizontal grid lines from the previous paper, 8500-5500 BC, until 4100 BC. This extension has two good marker or anchor points for the bottom EOO-line:

One, at 6529 BC, and moving horizontally to the second, at 4700 BC, where the forcing of the cosmic Macha impact ends, and the temperature line reverses upward directly as a EOO wave line. As next, we place the upper EOO-boundary line and the central Milankovitch line, again in yellow, as in study, part 1, into the picture.

The resulting reference system, with the grid added is shown in figure 2.

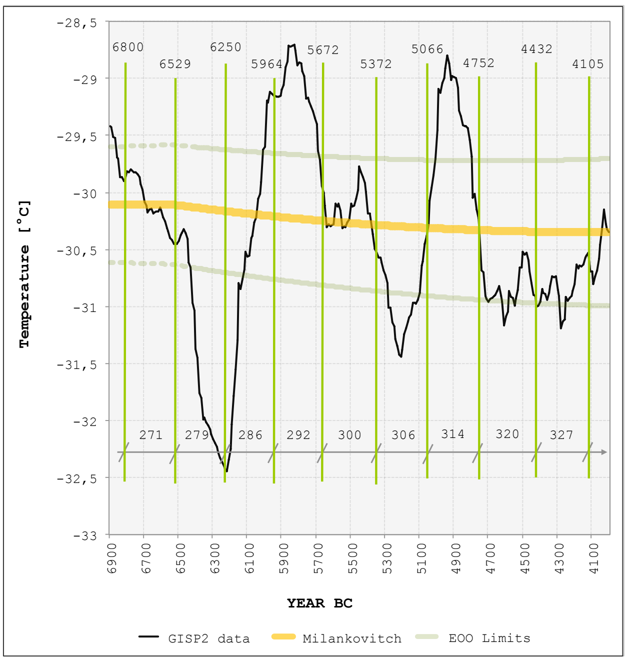

Figure 2. Grid of EOO cycle lengths

The yellow Milankovitch line is the central line between the upper and the lower EOO line, and constitutes the clean temperature evolution, exclusively produced by Milankovitch forcing, freed from all other climate drivers effects. The numerical calculation of the EOO-line is explained in detail in Seifert (Seifert, 2010).

3. THE COSMIC METEOR IMPACT PATTERN

The third picture contains the predominant feature of this Holocene time section: The effect of two large cosmic meteor impacts. Each meteor impact on Earth always produces an empirically proven Z-shaped back and forth-temperature swing on Earth: At first, a steep down-cooling, followed by a steep temperature rebound to much above the initial impact temperature level, and a final return to initial impact date temperatures. Many other Holocene studies exist, but all discuss solely the cooling section, such as the Bond cycle study, and always ignore the steep temperature rebound to exceeding high temperature spikes immediately following the initial cooling phase. The mechanisms of the cosmic meteor impact and the necessarily produced Z-shaped temperature swing on Earth will be described in detail in a separate, end of 2015 paper.

To the cosmic meteor impacts on Earth between 6800-4100 BC (fig. 3): The first impact, at 6450 BC, is the Storegga impact into the shallow waters of the Norwegian continental shelf. Details are already given in the previous paper, part 1 of the Holocene, and in (Solheim, 2005). The second impact, at 5330 BC, is the Macha impact on the Yamal peninsula in Siberia. The literature presents following details: Five craters, the two largest 300 and 180 m in diameter, coordinates 60°06´N, 117° 35´E (Gurov, 1998).

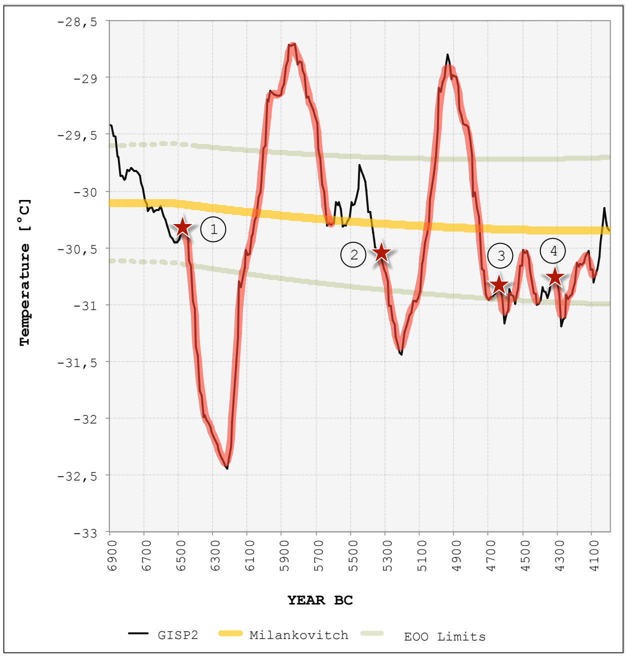

Figure 3. Z-shaped cosmic impacts

Figure 3 shows the first Storegga impact pattern is lasting from 6450-5600 BC and the second, Macha impact pattern from 5330-4700 BC. Two smaller impacts follow between 4600 and 4100 BC.

4. THE EOO OSCILLATION

The celestial oscillations started out of the Milankovitch line in 8055 BC, with a period length of 237 years, increasing by 6.95 years each successive period. This oscillation system continues until the present day (fig. 4).

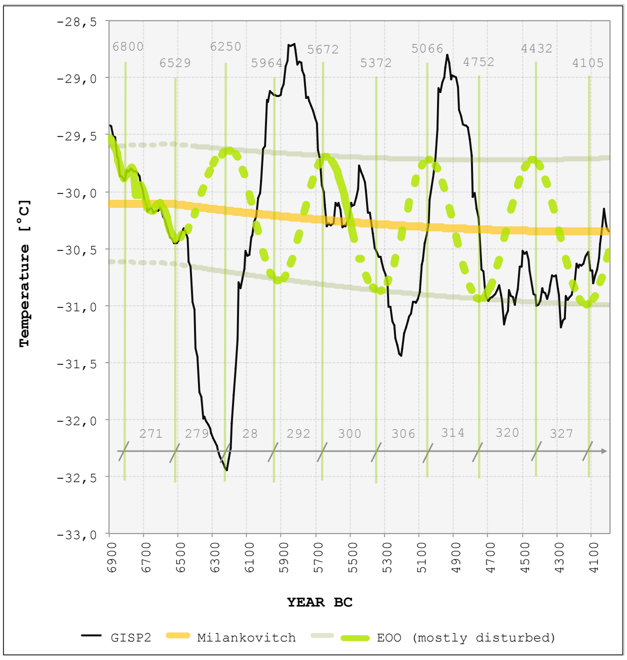

Figure 4. EOO wave masked by cosmic impacts

- At the left side, we can observe the EOO-line as part of the GISP2 line from 6800 BC until the cosmic impact date of 6450 BC.
- After the Storegga impact effect ends in 5700 BC, the EOO-line can be seen for a short time, 5600 to 5330 BC. The visibility has a 100 year delay and is masked again by the 5330 BC Macha impact.
- After the Macha impact effect ends in 4700 BC, the EOO-line continues exactly on the proper GISP2 temperature line, from 4700 to 4600 BC.
- A mini-cosmic impact follows in 4600 BC, with its impact forcing ending in 4400 BC. Afterwards, GISP2 temperatures move upward for 100 years toward the still invisible, masked EOO-line.
- At 4300 BC, a second cosmic mini-impact occurred, lasting from 4300 to 4100 BC. Both mini-impacts are still open for geological identification: There still exist undated impact craters on land; and underwater impact craters are difficult to detect. Clear are unmistakably the two Z-shaped impact patterns in the temperature evolution.

For a better visible evaluation, we present an enlargement in figure 5.

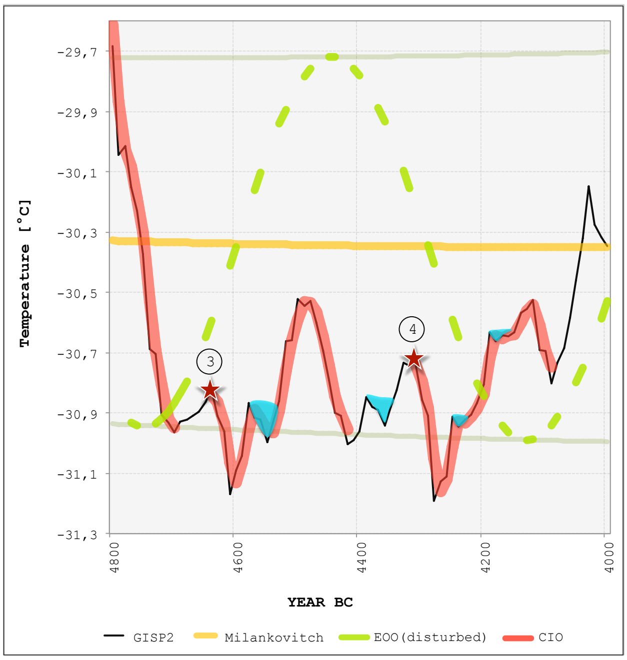

Figure 5. Two mini impacts 4800-4100 BC

We observe:

- Two giant cosmic impacts mask both the EOO-line and the cosmic period growth pattern.
- Two ensuing mini-impacts disturb the GISP2 temperature line to stay on the invisible masked EOO-sine-shaped line, 4600 to 4100 BC. Both mini-impacts knocked temperatures down to a low level preventing a temperature recovery as paced by the sine-shaped EOO-line.

5. POSSIBLE VOLCANIC STRATOSPHERIC DIMMING

An additional small climate forcing pattern is stratospheric volcanic dimming, which could be detected as short decadal dips in the GISP2 temperature line. According to various authors, the temperature line dips with the force of volcano eruptions, for example in Wahl (Wahl et al., 2014) with "a robust 3-5 years La Nina-like signal", or in Ridley (Ridley et al., 2014) with "post-volcanic cooling since 2000 of 0.05-0.12°C", or in Santer (Santer et al., 2014) with "volcanic forcing change between 1989 and 2011 of 0.02-0.07°C". The study of Kurbatov (Kurbatov et al., 2006) found that „the time interval BCE 4001-BCE 6000 shows increased volcanic event series […], with 15 glaciochemical signals," compared to „only 8-10 volcanic events" before and after this time interval.

Volcanic mega-eruptions in the analyzed time span are the Mount Takahe eruption of 5550 BC, the Kikai-Caldera eruption of 4550 BC, Japan (VEI 8, 150 km^3 ejecta, one of the strongest 6 Holocene eruptions), the Macauley Island mega-eruption of 4360 BC +/-200 years, New Zealand (VEI 7, 100 km^3 ejecta) and others.

We indicate five temperature cooling dips in figure 6 with blue color, which could be attributed to volcanic stratospheric cooling.

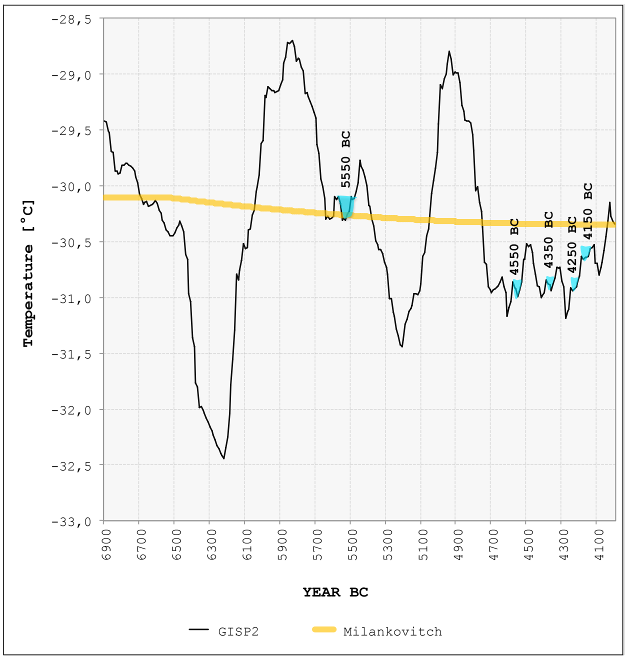

Figure 6. Volcanic mega-eruptions 6800-4100 BC

6. SYNOPSIS

The synopsis in figure 7 shows the entire GISP2 temperature line in four colors, in order to mark the effects of all explained climate drivers.

At left, the picture shows 300 years of (green) EOO-oscillation. At 6450 BC, the first large cosmic impact struck, masking the continuation of the green EOO-line until 5600 BC. From 5600 BC on, temperatures recover and move higher to meet the EOO-line. Temperatures after 5400 BC follow with a 100 year delay the green EOO-line. At 5330 BC, the second large cosmic impact struck and its Z-shaped effect lasts until 4700 BC. From 4700 to 4600 BC, the temperature is back on the EOO-line for 100 years. After 4600 BC, two smallish cosmic impacts struck, visible in two small successive Z-shaped impact patterns. As volcanoes in this time span, 6000-4000 BC, were very active, we may place five decadal temperature dips into the graph, in order to account for volcanic cooling effects. Comparing to the preceding 2000 years, the previous Holocene Onset, 8500-6500 BC, was virtually without any cosmic meteor impacts. But this time span, 6500 to 4100 BC, on the other hand, is the Holocene time span, the most

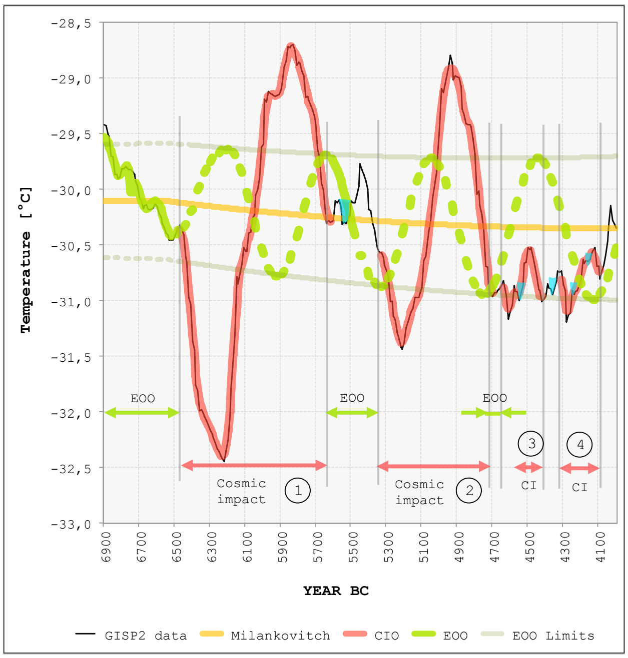

Figure 7. Synopsis

affected by meteor impacts, and therefore as the time span with the highest amount of masking of the continuously ongoing EOO-wave. All following Holocene time spans are much less alternated and masked by meteor impacts and will therefore produce much more EOO-sine shaped patterns. Coming to the final remark, we should not forget to mention that no single GCM CMIP3/5 model exists today, which is capable of detecting one single climate driver of the four explained active Holocene climate drivers, less capable of detecting the growing Holocene climate cyclicality, nor capable of identifying Z-shaped climate effects of meteor impacts on Earth.

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