CLIMATE PATTERN RECOGNITION IN THE MID-TO-LATE HOLOCENE (1650 BC TO 1 AD, PART 5)

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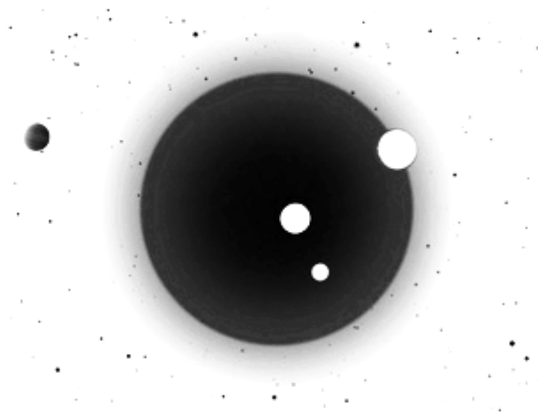

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JUNE 2016

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Abstract. We continue with the climate pattern analysis for this time interval, in which a large number of temperature spikes, upward and downward are visible. As usual, we use the GISP2 time series and place, as the first procedure, the pattern recognition grid over this Holocene time span. Features of this grid are explained in the Holocene (part 1) paper. The grid starts at 8500 BC and continues all along the Holocene. The analyzed time interval contains two major features: A very large cosmic bolide impacting Earth at 1628 BC, which produced as all cosmic impacts a Z-shaped temperature swing, and, in this case, a very wide swing downwards, after rebounding into a heat peak and stabilizing thereafter. The second feature is the return of the Taurids Stream, which occurs about every 3000 years. Its recognizable characteristics is the bombardment of Earth with a multitude of small-to-medium sized cosmic bolides, producing numerous impact craters on Earth, which is accompanied by small-to-medium sized Z-shaped temperature spikes in the GISP2 record. This Taurids Stream commenced at 1200 BC and lasts 1000 years. We compare this time span to the previous Taurids episode about 3000 years earlier and show the almost identical appearance of both. We identify seven Taurids impacts on Earth, and two unknown impacts are recognizable in the GISP2 temperature graph. The Taurids period is the time with the largest number of cosmic impacts on Earth in fast succession. This cosmic bombardment kept the temperature evolution relatively horizontal over 900 years, by preventing the formation of steep century-long temperature drops and, along with it, preventing century-lasting drought periods, which, for example, occurred previously from 3000 BC on and 2250 BC on known as "Bond cycles". Cosmic impacts are described in detail. The following paper, part 6, will deal with the time span 45 BC to 1150 AD, and two additional papers afterwards will show the application of the Pattern Recognition method for the Common Era and further beyond, to the new Glacial Inception.

Citation. Seifert, J., Lemke, F.: Climate pattern recognition in the mid-to-late Holocene (1650 BC to 1 AD, part 5), 2016, http://www.knowledgeminer.eu/climate_papers.html

1. INTRODUCTION

In figure 1, the GISP2 temperature time series (Alley, 2000), transformed into equidistant time steps, and the selected time span of this paper is shown.

The pattern recognition analysis, as explained in part 1 of this Holocene series, at first, places vertical lines for the periods of Earth Orbital Oscillation (EOO). For completing the recognition grid, the three horizontal lines (the central Milankovitch line, the upper and the lower orbital oscillation line) have to be added as continuation from the previous time interval. A sine temperature curve connects top and bottom EOO boundary lines (Seifert, 2010), as shown in figure 2.

The distance between vertical periodicity lines grows at a rate of 6.95 years per period and the periodicity dates are 1994 BC, 1619 BC, 1236 BC, 846 BC, 449 BC and 45 BC.

Figure 2 shows that, this time, temperatures of GISP2 do not follow much the regular EOO-sine curve, but at

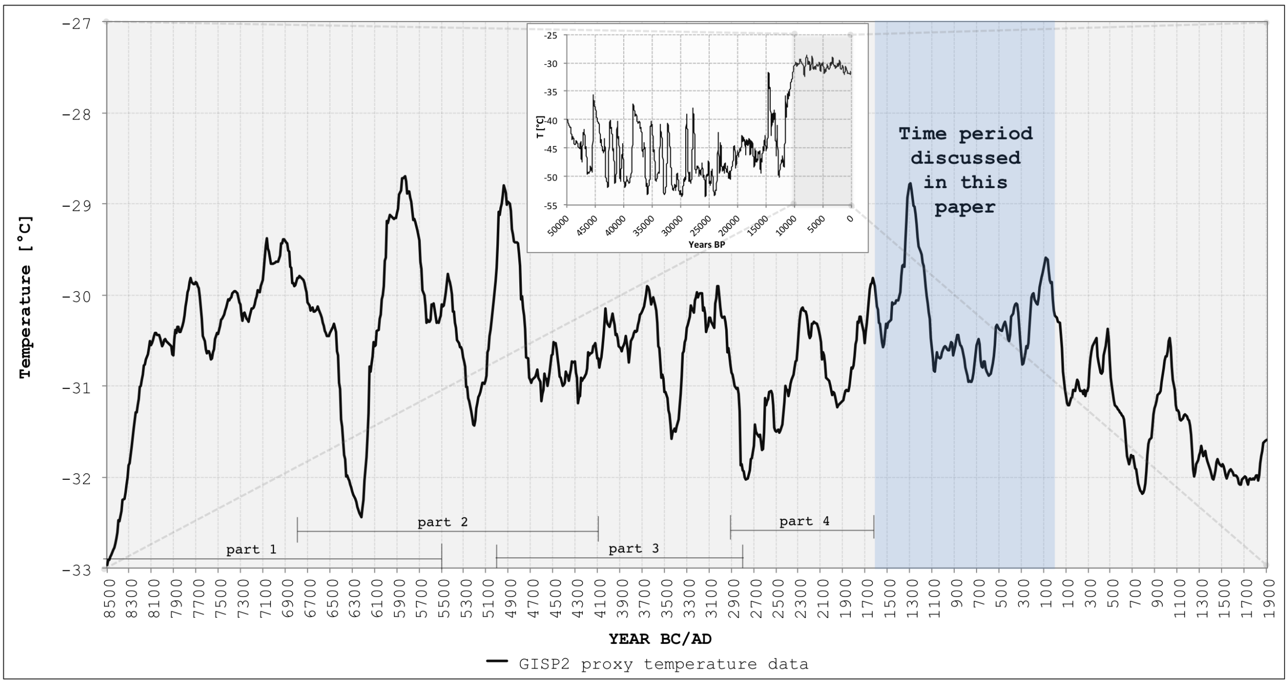

Figure 1. The Holocene GISP2 data (transformed into equidistant time steps) and the period discussed in this paper

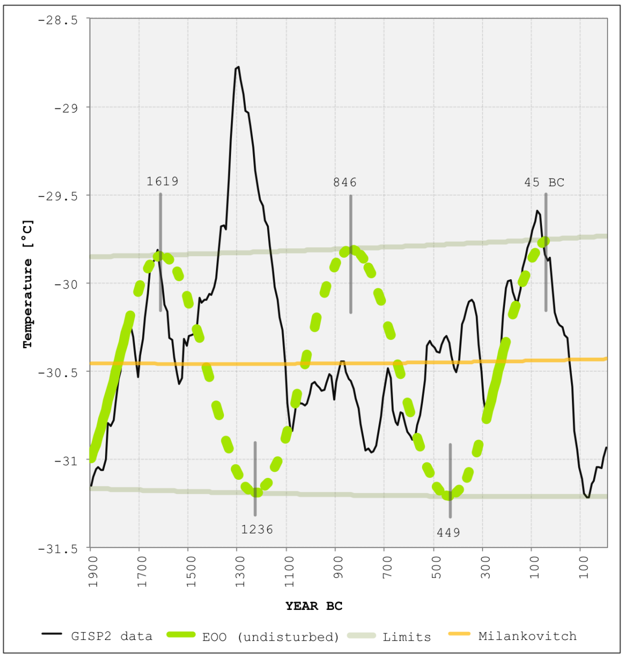

Figure 2. Undisturbed (solid line) and disturbed (dotted) periods of the EOO wave

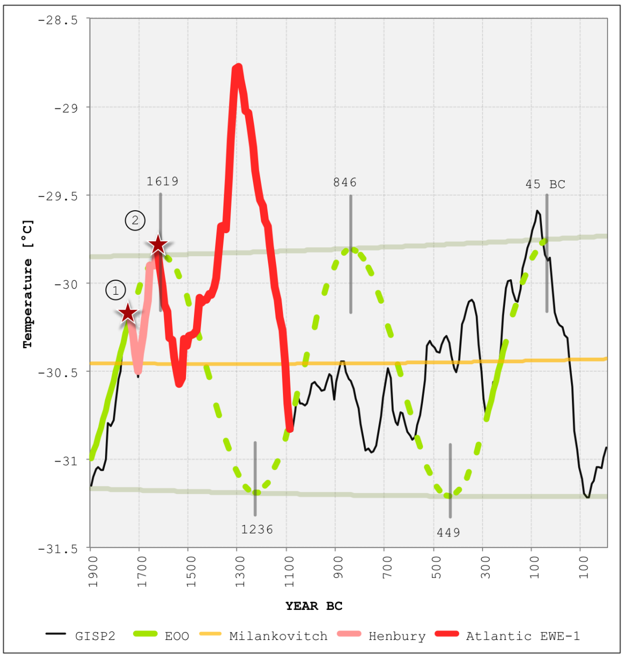

Figure 3. Cosmic EWE-1 mega-impact at 1628 BC
① *Henbury*, ② *Atlantic EWE-1*

only intervals before and after this 1650 BC - 1 AD time span. There must be reasons for this divergence from the regular EOO sine temperature evolution. The first reason is the major disturbance of the EOO-line by one cosmic bolide mega-impact at 1628 BC. Afterwards, after 1200 BC, a 1000 year period with small scale cosmic bombardment by the Taurids Stream commences. Global temperatures much better followed the sine EOO-line in the previous time span (Holocene part 4) and will follow again much better the sine-line within the successive time spans (Holocene part 6 and 7) until the Common Era. Since cosmic meteor impact overpower the effect of the EOO-sine line, this sine line of the periodicity, notwithstanding, continues invisibly from 1600 BC to 100 BC and regresses visibly afterwards (Seifert, 2012).

2. THE COSMIC MEGA IMPACT OF 1628 BC

The cosmic impact into the Atlantic ocean occurred at 1628 BC is called EWE-1 impact (fig. 3).

Tree ring analyses in the United States., Ireland and Sweden determined this date 1628 BC. It produced a huge Z-shaped temperature swing of global extent. The cosmic impact went into Atlantic waters, from direction East to the West. It is described as one Extreme Wave Event, of which only three exist in Atlantic waters for an over 5000 years timespan (Engel, 2012). This extreme mega-tsunami event ripped out coral boulders up to 165 tons out from the reef and deposited them on the shore in a level of 3 to 8 meters above the sea. This “ripping out of coral” is the major characteristics of cosmic impact waves, because they are so-called “collapse” waves, 100 meters and higher, which shatter coral reefs into pieces. This is impossible by the action of earthquake tsunami “long” waves, which only may wash already loose large boulders on shore. This impact can be recognized in GISP2 by the large Z-shaped temperature swing, which overpowers the regular sine Earth orbital oscillation curve. Concerning “Bond events”: Mr. Bond was only able to identify the cooling spike of the Z-shaped impact pattern by studying ice rafting in Lawrence stream waters. The ensuing upwards heat spike and the sharpness of both, the top and bottom temperature spikes have been, lamentably, ignored by all Bond-authors.

3. THE 1000 YEAR LONG TAURIDS STREAM PERIOD

The next distinctive pattern is the Taurids Stream impact pattern (fig. 4). The very first visible occurrence of this pattern within the Holocene was 4700 - 3700 BC. This Taurids Stream regresses about every 3000 years, and now, as the GISP2 comparison shows, 1200 BC - 200 BC. We may count on its future recurrence from 2400 AD to 3400 AD, which we should take into account for long-term climate forecasts.

The impacts here are:

1. The EWE-2 Atlantic impact (1100 BC)
2. The Panela impact (1000 BC)
3. Unknown event
4. Unknown, global mega-floods documented
5. Rio Cuarto impact (800-400 BC)
6. SE-Australia event (500 BC)
7. Kaalijaerv impact (400 BC)

8. Helike (373 BC)
9. Tuettensee impact (207 BC)

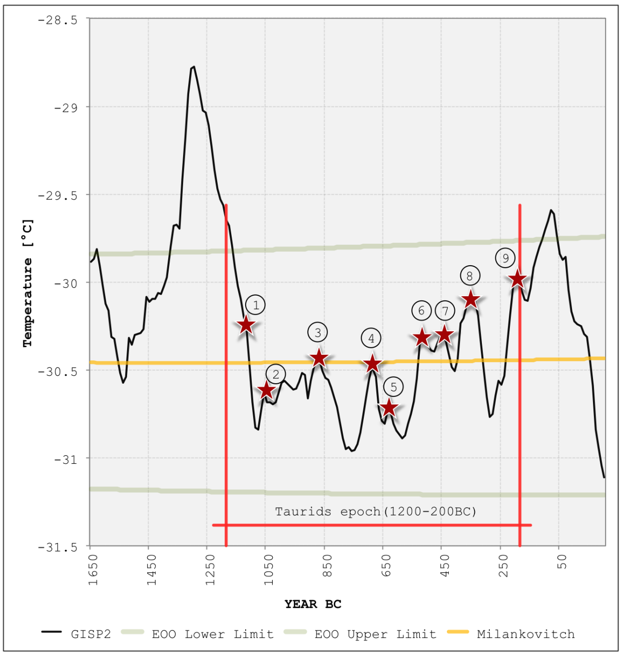

Figure 4. The small-to-medium-scale Taurids Stream impacts ① *Atlantic EWE-2*, ② *Panela*, ③ *unknown*, ④ *unknown*, ⑤ *Rio Cuarto*, ⑥ *SE-Australia*, ⑦ *Kaalijaerv*, ⑧ *Helike*, ⑨ *Tuettensee*

Details of Taurids Stream meteor impacts:

1. The Atlantic ocean EWE-2 impact at about 1100 BC. This second Extreme Wave Event within this Taurids Stream, was dertermined to be "within 3.2-3.0 kyr BP" (Engel, 2012), considered "to correspond to periodic events, recurring on the order of decades to centuries".

2. The Panela impact, Brazil, of 1000 BC. The literature is (Barretto, 2016). Impact location in Brazil at 7°51´23.46´´S, 38°9'29.88´´W; the main crater diameter is 600 x 500 m. Starting 1000 BC for 200 years to 800 BC, there follows a cluster of minispikes, which disturb and inhibit rising temperatures to follow the sine curve, with the sine peak in 846 BC.

3. The location for this impact at 800 BC is unknown. The temperature moves deep down, only a cosmic impact of medium size is capable to send temperatures into this so-called "Homeric Minimum".

4. Location unknown, but at 700 AD, a very steep temperature spike with an ultrafast temperature descend, typical for a cosmic impact can be noted. As in our Holocene paper, part 3, elaborated in detail, a strong cosmic impact always produces a global deluge.

This principle must apply as well in this case. An extreme mega-flood was revealed for the Southern hemisphere and pointed out as "also observed in other regions of the world" (Moreira-Turcq, 2014), as well as in the Northern Hemisphere (Armit, 2014). The impact kept temperatures low within this "Homerian Minimum" also called "Iron Age Cold Period".

5. The Rio Cuarto impact into Argentina at 800-400 BC. The literature is Barrientos and Masse (Barrientos, 2014). The study shows the "intensity of the archaeological signal," being high within the Taurids range 1200 BC to 200 BC, and the impact range proposed is the time span 800 - 400 BC.

6. SE-Australian impact at Old Punt Bay, at about 500 BC, "a high energy sediment deposition event," demonstrated by "raising shells into elevated sheltered pockets (Switzer, 2011).

7. The Kaalijaerv impact at 400 BC in Estonia. The literature is (Veski, 2002), setting an impact range to 800 - 400 BC. Additional literature studied the cosmic Iridium content and determined the peat with elevated Ir to 400 BC (Rasmussen, 2000).

8. The Helike tsunami of 373 BC in Greece. The Helike tsunami literature is (Alvarez-Zarikian, 2008; Papadopoulos, 2014). The bolide impact into the water next to this historical city bears a unique feature: Mega-tsunami waves suddenly and violently pounded this entire city Helike - to below the sea level. Considering regular, earthquake/seaquake type tsunamis: Those types exclusively produce a smooth and "long" wave-type, which is not capable to press a city below the water level line. Geological studies calculated that a maximum earthquake with tsunami "long waves" in this area could only be maximum 1.10 m in height and it was absolutely impossible to put an entire town by an earthquake tsunami to below the water level. Additionally, the town was located in substantial distance to the shore line. This pounding of a city to underwater can only be possible by a more violent wave type, which has nothing to do with an earthquake tsunami and which smashes with a height of 100 m and higher right onto the shoreline. Soft river sediments, on which this town was built, were liquefied by this force and an entire large area disappeared under the water level. Two more examples of cities, which were pounded to below the water line do exist.

The city of Kaveriputtinam, on the East coast of India, and a second town, regarded as Harappian settlement, at a much older unknown date, in the Gulf of Cambray (Gulf of Khambhat) on the West coast of India. Both locations were built on soft river sediments. More underwater archaeology, today in infancy, is needed to provide exact details.

For explanations on wave dynamics, the literature is (Wuennemann, 2007): Every meteor impact into deep water (DWI) produces high "collapse waves," and a meteor impact into relatively shallow water (SWI) produces high "rim-waves" (RWS), both with extremely high wave amplitudes, more than 100 m in height. Greek historical sources report that Helike town could still be seen by fishermen and visitors located below the water surface for some centuries (Alvarez-Zarikian, 2008), also at (Wikipedia, 2016).

There is additional prove for this cosmic impact: The comet flight ("Aristotle comet") was documented by Greek historians Aristotle and Diodorus Siculus (Kronk, 1999): "The great comet appeared about the time of the earthquake in Archaea [Helike district] and the tidal wave" as "a great blazing torch in the sky" …which "cast shadows on the Earth, similar to the moon". Furthermore, bolide impacts produce impact fire columns, which often reach stratospheric heights of 2,000 km. The eyewitness scripts reported lights as "immense columns of flames," thus vertical fire columns, of which their stratospheric plume components even reached Greenland ice locations. A fresh analysis of Greenland ice borehole cores documents an exceptional high spike of biomass burning tracers, levoglucosan (1445 pg/ml), compared to other historical mega-forest fire events which deposit only between 50 to 600 pg/ml in north pole ice cores (Zennaro, 2014). Ammonia and black carbon values also prove the occurrence of mega-forest fires along the cosmic bolide flight path and of biomass burning fire columns at the impact site. There exist only two dates in the Greenland ice core with excessively high levoglucosan, carbon black and ammonium content: The 373 BC Helike cosmic impact and the 365 AD Crete cosmic impact; all other mega-forest fires over 2000 years produced less than a third of impact fire tracer spikes.

9. The small sized Chiemgau-Tuettensee impact of 207 BC in Bavaria, Germany, the last Taurids impact. The literature is (Ernstson, 2010). The crater field contains 100 small craters; the largest, the Tuettensee crater, has a 600 m diameter. It is a minor impact causing a small dip in temperatures.

4. COMPARISON OF THE TWO HISTORICAL TAURID STREAM IMPACT PERIODS

We group the two relevant time into one picture for comparison and obtain the following graphic in figure 5.

We recognize the following: After two cosmic impact of large scale (Macha and Atlantic EWE-1), wide swing Z-shaped temperature patterns occurred. Afterwards, the two Taurid Stream periods with their multitude of small impacts as well produce a common similar impact temperature pattern: Impacts instantly lower the temperature level, at the same time, the two EOO-sine curves produce an longterm upward temperature trend, therefore, the millennium trend of the Taurids period is moderately upwardly directed. At the end of both Taurids

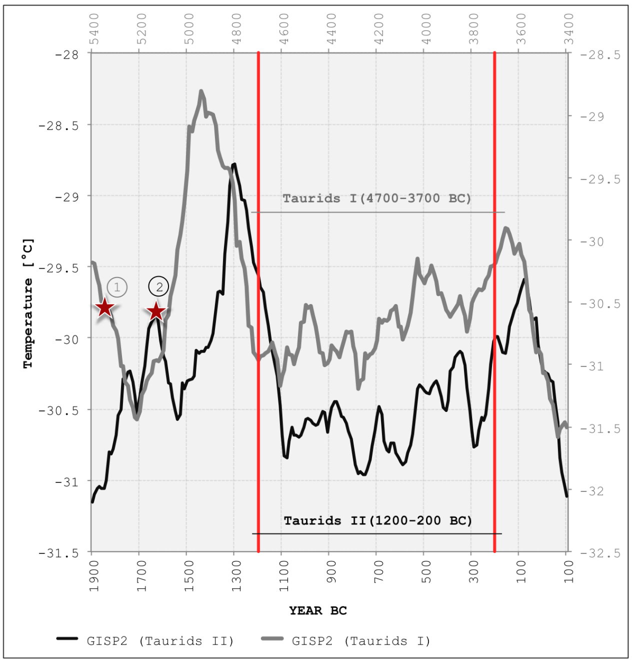

Figure 5. Comparison of the Taurids I and II epochs
① *Macha*, ② *Atlantic EWE-1*

periods, temperatures decline again, now following the two descending sine curves.

As resume, we conclude that the Climate Pattern Recognition method is superior to all other climate analysis methods. This is self-explaining by the recognition of recurring Taurids Stream periods. For the past 20 years, other methods could not produce a single paper on the Taurids period in the Holocene. The reason for this deficiency lie in computer simulations and modeling, which are unsuitable practices for Holocene climate science. Simulating and modeling is, as evident in the description of the Taurids period, inferior to analysis with sharpened pencil and eyes of the pattern recognition analysis.

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