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The Gulf Stream Beat

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Transcribed with updated references by Jan-Erik Solheim[2]

This talk is devoted to the science of the oceans with special reference to the Gulf Stream Beat. Forcing of the ocean circulation system is controlled by the planetary beat on the Sun, Moon, and the Earth. The sea is not at all in a rapidly rising mode.

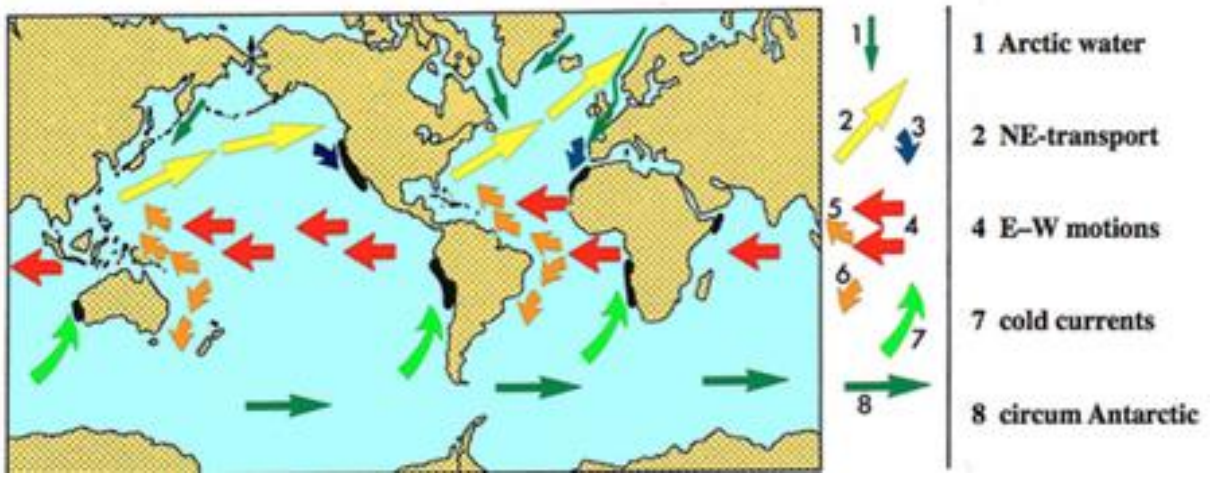

Figure 1. Main global ocean surface circulation patterns: The main equatorial currents are lagging the Earth's rotation. The Kuroshio and Gulf Stream systems bring warm equatorial water to mid and high latitudes, and the circum Antarctic currents bring cold water to low latitudes and are responsible for significant coastal upwelling.

1. Ocean circulation changes

The ocean circulation can be simplified in 8 dominant systems and their directions of motions (Figure 1). The system is supersensitive to changes in Earth's rate of rotation in a feedback coupling and interchange of angular momentum (Mörner, 1984, 1996, 2019). The most dominant system is the equatorial system that moves from East to West, in the opposite direction of the Earth's rotation. If rotation changes, this will have an immediate response in the current system.

The Gulf stream and the Kuroshio stream brings equatorial warm water to the north and make livable conditions at our northern latitudes. On the figure we also see the costal upwellings of nutrient rich waters which are extremely productive for marine life.

2. The Gulf Stream Beat

The Gulf stream is divided into a northern (NB) and southern branch (SB) as shown in Figure 2. The volume of water flowing in the two branches changes with the Earth's rate of rotation. When one is strong - the other is weak. This is what we call the Gulf Stream Beat (GSB). Since this is a result of changes in the Earth's rate of rotation, we observe similar beats in other currents worldwide. It is a global phenomenon.

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[1] Nils-Axel Mörner died in Oct. 2020. The talk can be seen here: https://www.youtube.com/watch?v=g_n2bzjQetM (Recorded by Yngvar Engebretsen)

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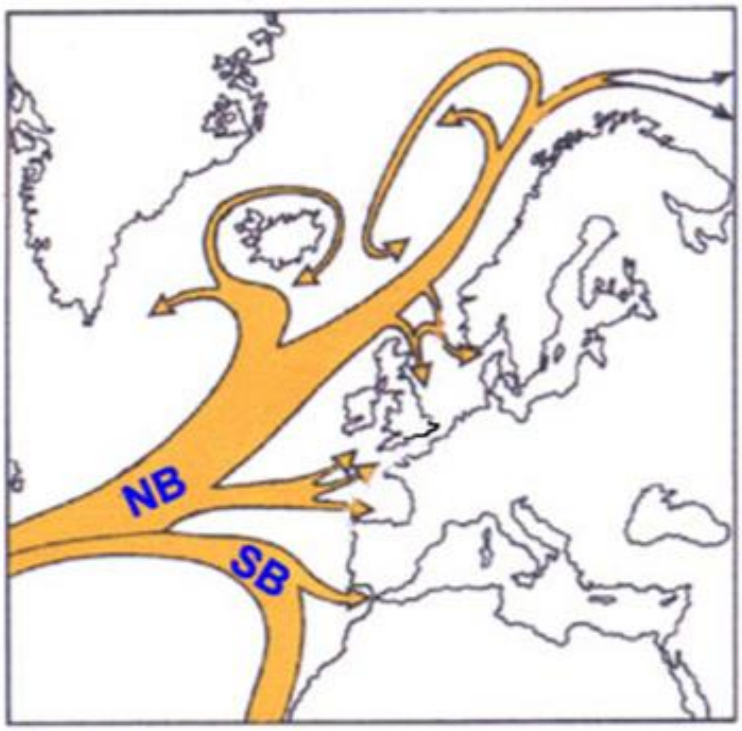

Figure 2. The Gulf Stream and its division into a Northern (NB) and a Southern branch (SB).

An example of the GSB is demonstrated in Figure 3 for the period 1672-1702, which was the coldest part of the Little Ice Age. Then the SB became stronger, while the NB is weaker. The upper left panel shows 8 red dots from the Baltic to North Africa. In the right panel we have temperature graphs showing warm periods in yellow and cold periods in blue. Observations show how it gets colder at locations 1-7, and warmer at location 8 which is off the coast of North Africa. My interpretation is that cold surface water from the Arctic is flowing far south by the western coast of Europe. This was the coldest part of the little ice age. During this period the solar activity was extremely low. Very few spots were observed on the Sun during the period 1640-1720, which was named the Maunder grand solar minimum (Usoskin 2007).

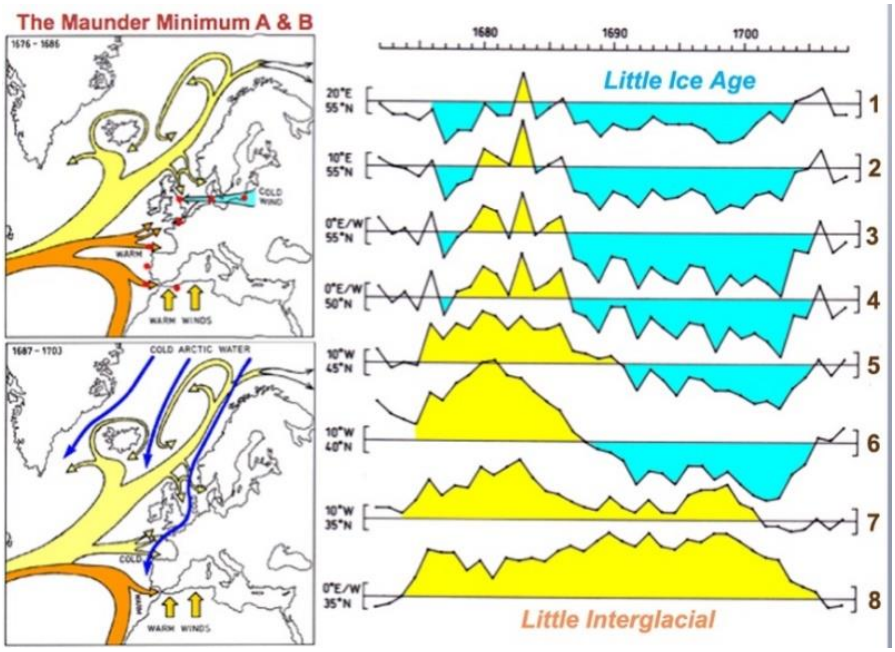

Figure 3. An example of GSB during the period 1672-1708. The left panels show ocean currents, Orange is strong, yellow is weak, and blue is cold. The right panels show temperature variations, where yellow is warm and blue is cold.

A similar beat was observed 1435-1460 during the Spörer minimum, and 1808-1821 during the Dalton minimum. The Nordic inhabitants of Greenland got problems with ice and agriculture during the deep Wolf minimum 1270-1340 and had to change the sailing routes from Iceland and Norway.

After 1900 we have had a long period of high solar activity and the NB has been strong. An example of the difference in NB and SB was observed between 1930 and 1940 when a warm period developed in the North while the south was cooling.

After 2000 the solar activity is decreasing and we observe decreasing temperatures in Circum-Arctic Oceans, while the equatorial surface water is warming up as shown in Figure 4. This may be the indication of a coming Gulf Stream beat development.

The observed temperature record from Mallorca provides an interesting documentation of the N–S anti-correlations in temperature due to the Gulf Stream beat.

So what did the IPCC proponents do? They did ”data *adjustment”*- Now the official temperature record for Mallorca shows increasing temperature from 1880 until 2000, just as shown by models. *And by that they killed the dynamics of climate change and ocean circulation.*

3. Sea level beats during Grand Solar Minima and Minima

Oceanographers say that the ocean currents are forced by thermohaline circulation. That is explained as heavy salt water downwelling in cold regions of the North Atlantic and in the Antarctic current. When the Gulf Stream runs by the coast of Svalbard its heavy salt water is forced down by fresh water from Russian rivers and melting ice on top of it. The warm water that enters the Arctic from the south pushes cold water out through the Fram strait down the East coast of Greenland (Mörner et al. 2020)

Based on my own observations in many regions of the world, I claim that the Earth’s rotation also changes the sea level (Mörner 2013a, 2019). During grand solar maxima the North Atlantic current is slightly stronger and sea level is a little higher. In North Africa the sea level is slightly lower and the sea a little colder. The most notable difference takes place around the coasts of India and in Polynesia where the sea level can be 60-70 cm lower. According to models the sea level should now be high because of ice melting. This is not observed.

At grand solar minima the SB is strengthening. Sea level is lower in the north and slightly higher at the coast of North Africa. However, around India and in Polynesia we observe an increase in the sea level of the order 60-70 cm.

The sea surface is irregular, it is not flat and parallel like a perfect globe. I will give you an example: The sea-level at Tenerife was stable before 1940, then rising 1945-1960, falling 1970-2000, and now rising after 1995.

4.The forcing function behind the Gulf Stream Beat

The GSB is a function of changes in the Earth’s rate of rotation. This can be forced by external and internal forcing as shown in figure 4 (Mörner et al. 2020). The solar wind controls the Earth’s shielding and controls Grand Solar Cycles in rotational eustacy and GSB. The solar wind consists of electric charged particles which carry a magnetic field with it. With a strong and steady solar wind the Earth’s rotation will slow down by the pressure on the ocean surface and the magnetic torque on the Earth’s magnetic core (Solheim et al. 2021).

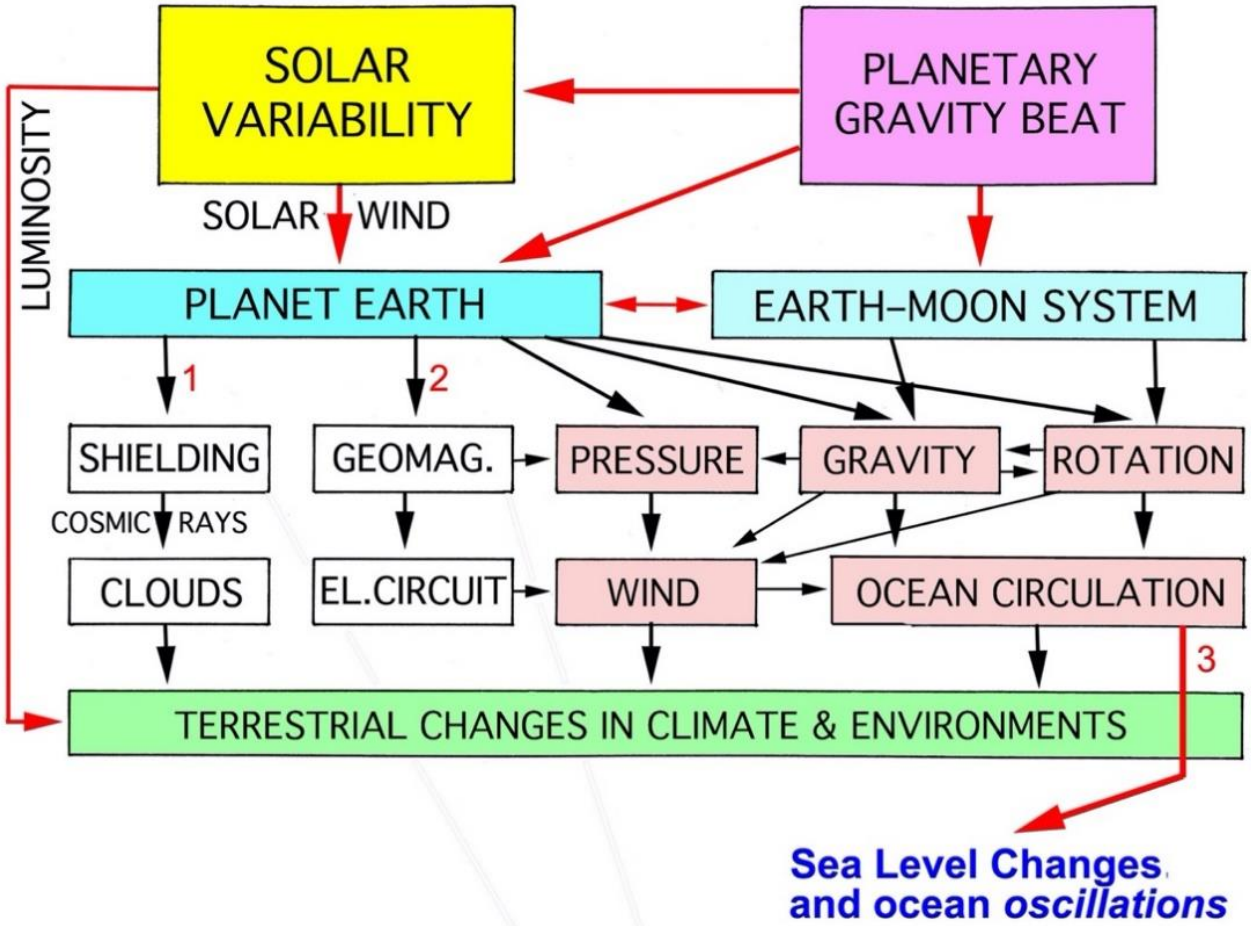

Figure 4. Integrated effects of the planetary beat on solar variability and, via the solar wind, on a number of fundamental terrestrial processes, and, via direct effects on the Earth-Moon system, on gravity, rotation, wind, ocean circulation, sea level changes, and oceanic oscillation systems (Mörner, 2013a, 2020).

The periodic variation in the solar wind generates the main 60-year geomagnetic cycles we observe in Earth's rotation and climate (PDO, NAO, etc.) and the integrated effect in the sea level and ocean oscillations.

The solar wind varies as a function of solar internal variability, which again is forced by the beat of the planets which modulate the solar energy production and the solar magnetic field variations (Mörner 2013b). The planets move in elliptical orbits as discovered by Johannes Kepler. The combined action of the planets forces the Sun into a very complicated orbit around the barycenter of the solar system. The main players are the large planets Jupiter and Saturn. They are in the same direction seen from the Sun every 20 years and are back at the same place relative to the stars after 60 years. This gives us the 60-year cycle.

The GSB is a function of the magnetic shielding of the Earth, which varies with the solar wind which carries a magnetic field with it. With a strong and steady wind the Earth's rotation will slow down by the pressure on the ocean surface and the magnetic torque on the Earth's magnetic core. This happens during Grand Solar Maxima. During Minima the Earth rotates faster, and the Gulf streams northern branch weakens while the soutern branch strengthen (Mörner 2010).

The planetary forcing also includes effects of the distance from the Sun, orbital velocity, angular momentum and electromagnetic field variations. Since the planets orbits are stable over millenia and millions of years, even small periodic variations will be amplified and lead to observable effects in the climate system. The Earth's climate experience both direct forcing from variations in solar

irradiance (TSI) (Connolly et al. 2021) and in magnetospheric shielding which controls the galactic cosmic ray flux and its subsequend cloud production (Svensmark et al. 2017).

There are signs that we are entering a Grand Solar Minimum in this century (Abdussamatov 2016, Miyahara 2021). This will most likely start during the coming decades and last for the rest of the century. How deep it will be, can only be guessed. Some scientists find it most likely that it will match the Maunder Minimum (1640-1720), while I find it to be somewhat less severe, like the Dalton minimum and with a GSB with cold Arctic water all the way down to Lisbon in 2030-2050 (Mörner 2010).

5. Global Sea level and the absence of a flooding treat

The integrated effect from changes in the Earth's rotation as a function of the magnetic shielding conrolled by the solar wind is observed in the sea level changes during the last 500 years. The eustatic sea level of the Equatorial oceans (i.e below ±30 deg latitude) has been stable for the last 50 years. It changed of the order. +70 cm around 1800, -140 cm around 1700, and probably +70 cm about 1550. In NW Europe a small rise of the order 1.1 mm/year has taken place since 1800. This follows the general climatic changes quite well and hence seems to be dominated by glacial eustasy. The equatorial changes are in opposite modes and have oscillations of much higher amplitudes, indicating that they are dominated by other forcing functions, viz. rotational eustasy. At the moment there is no treat of a flooding disaster.

6. Conclusion

1. The Gulf Stream Beat is a function of the planetary beat on the Sun, the Earth and the Earth-Moon system.
2. Sea level is not in a rapidly rising mode, and there is not a single point on Earth where a true acceleration in sea level has been observed.
3. The changes in sea level show an opposed trend between the northern hemisphere and the equatorial region on the Grand Solar cycle and the 60-year cycle.
4. Let us forget all the trouble about CO, which has:

   – no effects on ocean circulation,

   – no effect on sea level,

   – hardly any effect on temperature.

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