

Megadroughts – How frequent they are and what Causes Them

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Toby Ault and Scott St. George published recently the article: “Unraveling the Mysteries of Megadroughts” in the journal *Physics Today* of August 2018 [1]. They claim US and Mexico experienced their worst droughts (in the last 150 years) between the years 2000 and 2014. They did a lot of measurements of tree rings in the American West, which provide the most complete record of droughts. The results of their measurements are interesting, but they don’t deliver the promise in their title - they don’t unravel the mysteries of megadroughts. We do unravel the mysteries of megadroughts based on study of the glaciers.

According to their measurements, the most severe droughts were between 11 and 15 centuries with the most pronounced megadrought in the mid 1100s. They assume that increased solar activity caused the megadrought, but do not provide any additional evidence. Study of the glaciers shows (Figure 2) that this was the time of the third and most substantial maximum of temperatures before the temperatures starting falling down after the year 1350 AD, which marks the beginning of the last Ice Age (Figure 2). The authors even admit that droughts might be a mere coincidence. They are not a mere coincidence [2].

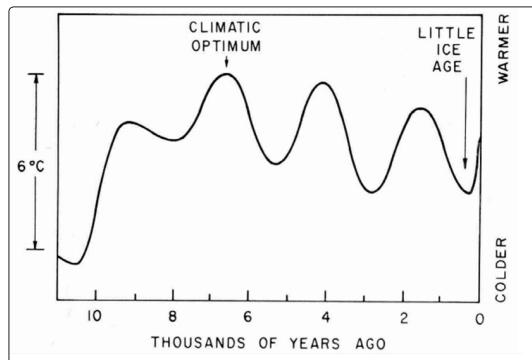


Figure 1: Temperature variations in the last 11,000 years according to the study of the glaciers [2]

According to studies of local cypress trees, Southwest Asia was wracked by two prolonged megadroughts - one in the late 14 century and a second in the early 15th century. This explains why the prosperous Angkor in Cambodia, which was on a territory larger than contemporary Paris, was abandoned in the early 15 century. According to Figure 2 from study of the glaciers [2], this is the time of sudden increase of temperature right in the middle of the Ice Age.

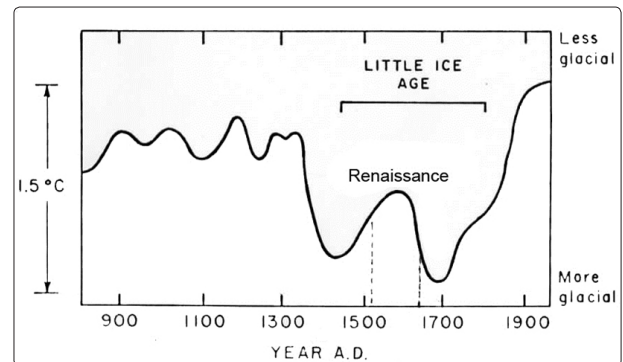


Figure 2: Temperature variations in the last 1,000 years according to the study of the glaciers [2].

The sudden increase of temperature in the 15th century marks the beginning of the Renaissance. Thus, the “Renaissance”, which in French means “born again” was caused by the increased solar activity in the middle of the Ice Age. Since solar activity means stronger magnetic activity, the stronger magnetic field of the Sun stimulated the human brain, which manifested itself in increased creativity and new discoveries

Obviously, the megadroughts took place when the temperature was rising up fast in the 11th century and during the period of sudden warming in the middle of the Ice Age at the beginning of the 15th century (which brought the Renaissance). The gradient of temperature increase, obviously, creates gigantic fluctuations in the air flux El-Nino over the tropical Pacific Ocean, which is the basis of the observed megadroughts in the American West and South East Asia.

References

1. Toby Ault, Scott St George (2018) Unraveling the Mysteries of Megadroughts, *Physics Today* 71: 44-50.
2. John Imbri, Katherine Imbri (1979) *Ice Ages - Solving the Mystery*.

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