End of the African Humid Period

Following the last glacial period and the Younger Dryas, climate warmed around much of the world and human settlements expanded.

In Africa, the monsoon rains grew stronger and spread northward into the Sahara. Instead of being the sandy desert we now know, the Sahara was a steppe, covered in grasses and shrubs. In this inviting environment, hunters domesticated buffalo and goats and developed an early system of symbolic art.

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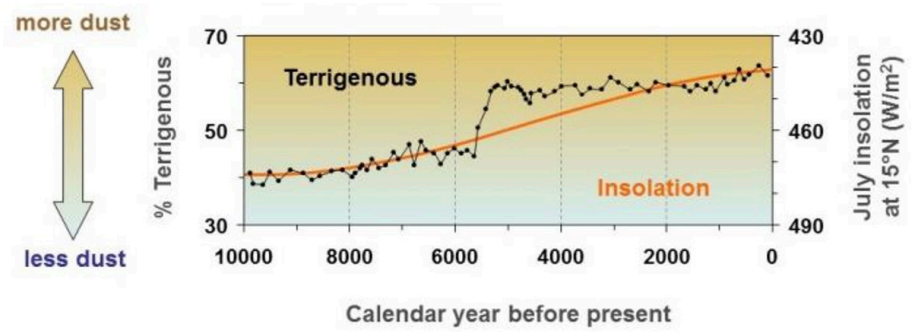
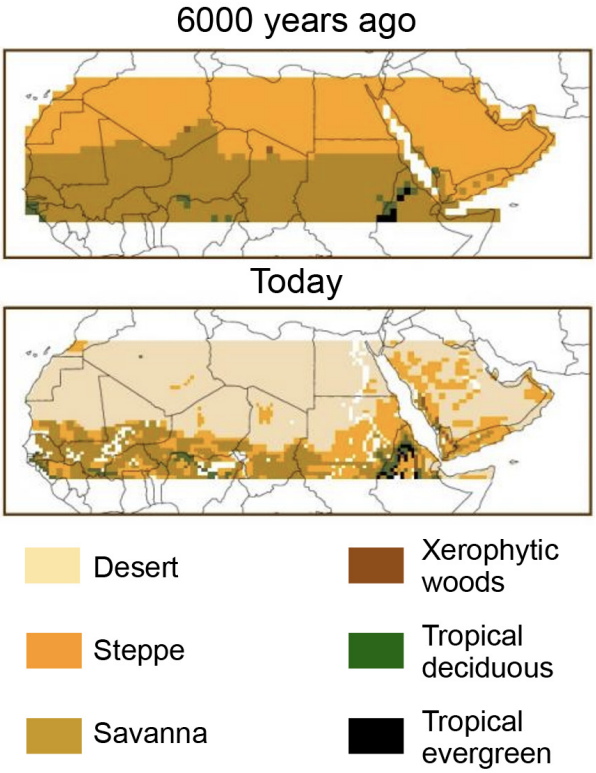
Marine sediment records from off the western coast of Africa indicate an abrupt decrease in Saharan vegetation around 5,000 years ago, however (deMenocal et al. 2000; McGee et al. 2013). The scientists who generated these records measured the terrigenous flux, or dust that is transported off Africa into the Atlantic Ocean. This variable is inversely related to the amount of vegetation. Prior to 5,000 years ago, vegetation was more extensive in northern Africa and there was little loss of sediment from the land. The reverse is true after 5,000 years ago. Scientists observed a similar abrupt change in rainfall proxies preserved in sediment cores from the Gulf of Aden off eastern Africa (Tierney and deMenocal 2013).

Pollen records show that vegetation in North Africa has two stable states. Since 5,000 years ago, this area has been in a "desert" state, with little to no vegetation in the Sahara and mixed steppe and savanna to the south in the Sahel. However, pollen records from this area show that a "green" state prevailed during most of the time between 14,500 to 5,000 years ago. Steppe vegetation expanded across the Sahara, and the Sahel was covered by savanna. One exception is during the Younger Dryas, when conditions in North Africa were drier and the vegetation was more desertlike.



Terrigenous (dust) flux from Africa into sediments offshore (deMenocal et al. 2000) and July insolation (incoming solar radiation) at 15°N (Berger and Loutre 1991). Note that the insolation axis is reversed because there is an inverse relationship between insolation and dust flux.

Slow variations in Earth's orbit caused a gradual decrease in summer solar radiation in the tropics from the early to the mid Holocene. This decreased the amount of summer monsoon rainfall in Africa and other parts of the tropics. Scientists hypothesize that as monsoon precipitation gradually decreased, at some point conditions became too dry for plants and a rapid transition to dusty, desert conditions resulted. In fact, similar abrupt changes are not commonly observed in paleoclimate records from parts of Africa that did not experience large-scale vegetation shifts (Fleitmann et al. 2003; Weldeab et al. 2007; Shanahan et al. 2015). Understanding the feedbacks associated with this transition continues to be an active area of research.



Vegetation in Africa at 6,000 years ago and today from Hoelzmann et al. (1998). Prior to about 5,000 years ago, vegetation had expanded across what is now the Sahara desert.

Some important datasets related to the African Humid Period:

- Street-Perrott et al. (1989), global lake status database for 18 ka, 15 ka, 12 ka, 9 ka, 6 ka, and 3 ka
- Berger and Loutre (1991), calculated incoming solar radiation for the last 5 million years
- Hoelzmann et al. (1998), land surface conditions in North Africa at 6 ka from pollen and lake data
- deMenocal et al. (2000), sediment data for core ODP 658c off northwest Africa
- Fleitmann et al. (2003), speleothem record from Qunf Cave in Oman
- Weldeab et al. (2007), sediment data from the Gulf of Guinea
- McGee et al. (2013), sediment data from multiple cores off northwest Africa
- Tierney and deMenocal (2013), sediment data for core P178-15P off the Horn of Africa
- Shanahan et al. (2015), sediment data from Lake Bosumtwi in Ghana