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## 05.07.: Dusty Sahel

**E M B A R G O:** July 7th, 20:00 MEST

### Dusty Sahel – *Nature* paper reveals evidence of anthropogenic influence on African dust generation

Approximately one billion tons of dust are mobilized from soils in the Sahara and the adjacent Sahel annually. Trade winds carry dust particles to the Atlantic Ocean where they can be found in the sediments on the seafloor. A study published in *Nature* on July 8th by MARUM scientist Dr. Stefan Mulitza and colleagues, shows that humans have been sustainably influencing this process for more than 200 years. According to the Bremen scientists, erosion of West African soils increased significantly with the onset of agricultural export economies during the colonial period.

The evidence is provided by several marine sediment cores taken by MARUM scientists during an expedition onboard the German research vessel METEOR. The sediments were retrieved 30 kilometres off the coast of Mauritania in a water depth of 323 metres. One of the cores is about 5.5 metres long and provides a record of the environmental and climatic development of the Sahel over the last 3200 years. "Above all, the keyword "Sahel" reminds us of the terrible drought during the 1970s and 80s", says Stefan Mulitza, chief scientist of the expedition and lead author of the *Nature* paper. "Now we are able to demonstrate that humans contributed to soil erosion and dust production during the past 200 years."

From 1200 BC until 200 AD a more humid climate prevailed in the Sahel. Fine grained minerals, rich in aluminium and iron, were washed into the Atlantic Ocean via the Senegal River. Then the Sahel climate gradually became more arid, particularly between the 15th and 18th centuries. The vegetation cover became more patchy and therefore promoted erosion. Coarser dust particles rich in silicon were being mobilized and transported by the prevailing easterly winds to the Atlantic Ocean where they dominate marine sediments at the coring location.

"Less rain, more dust: this obvious relation can be observed at least until the 18th century", says Dr. Mulitza. During the last two centuries rainfall and dust deposition seem to be, at least partly, decoupled. "For the most recent interval of our core we observe a rise of dust deposition along with increased rainfall on land."

The reasons behind this change are logical: "Under colonial rule West African agriculture transformed into the export-oriented cultivation of cash crops" says Stefan Mulitza: "The steepest increase in dust deposition parallels the advent of widespread groundnut crops in Senegal, Nigeria and Gambia in the 19th century." The commercial groundnut cultivation caused a rapid expansion of agricultural lands, encroachment of forests and woodlands and exposure of the soil to wind erosion. Consequently more dust was mobilized and blown into the ocean.

"It is plausible that the increased human induced dust production also contributed to locally drier conditions in the Sahel. More dust in the atmosphere leads to less solar radiation and a cooler surface. This might cause a substantial reduction of rainfall during the monsoon period", Stefan Mulitza explains.

#### More information / interviews / photos:

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MARUM aims at understanding the role of the oceans in the Earth's system by employing state-of-the-art methods. It examines the significance of the oceans within the framework of global change, quantifies interactions between the marine geosphere and biosphere, and provides information for sustainable use of the ocean.

MARUM comprises the DFG research centre and the cluster of excellence "The Ocean in the Earth System".



Sand and dust storm in the Sahel.  
Photo: J. Leyrer, NIOZ



Satellite image NASA:  
Sand and dust is exported from the Sahel  
and North Africa into the Atlantic Ocean. On  
left: the Cape Verde Islands.



Expeditions like this one in Mauritania have  
to cope with the very mobile sand.