

## Drought in the Sahel: a canary in the coal mine of climate change?

Ale Giannini (alesall@iri.columbia.edu)

The semi-arid Sahel is known to be particularly sensitive to year-on-year variations in climate, for a combination of physical and socio-economic reasons (e.g. Clay and Benson 1998). At the northern edge of the annual north-south excursion of the African monsoon, Sahel climate is characterized by a highly variable, short and intense rainy season - typically centred around August and no more than 4 months long - and a prolonged dry season. Failure of the monsoonal rains to reach the Sahel is a threat to rural livelihood systems highly dependent on agricultural production and vulnerable to commodity market volatility. Numerous studies have related migration patterns (e.g. Findley 1994) and the occurrence of civil strife (e.g. Miguel et al. 2004) to climate variability.

*Drought in the Sahel* - In recent decades, the Sahel has experienced one of the most striking shifts in climate, from an anomalously wet period in the 1950s and 1960s to progressively drier conditions in the 1970s and 1980s. Though rainfall has since shown sign of recovery, understanding the causes of past climate change remains key to improving the credibility of scenarios of future change.

*Oceanic forcing of drought* - In recent years, studies with state-of-the-art climate models have shown that the cause of persistent drought in the Sahel in the 1970s and 1980s lay in the oceans. Drought in the Sahel is related to a generalized pattern of warming of the global tropical oceans, especially the Indian Ocean (e.g. Lu and Delworth 2005) which, in combination with enhanced warming of the southern compared to the northern tropical Atlantic Ocean (e.g. Hoerling et al 2006), weakened the African monsoon. The current scientific debate is centred on understanding the role of anthropogenic forcings - especially the emissions of aerosols and greenhouse gases - in determining such patterns of change in global sea surface temperatures and in Sahel rainfall (e.g. Biasutti and Giannini 2006; Cook and Vizzy 2006). Will the African monsoon strengthen under global warming, as continental warming surpasses that of the oceans (e.g. Haarsma et al. 2005)? Or will it weaken as the enhanced moisture evaporated from the oceans fuels strengthened convection locally, at the expense of continental moisture convergence (e.g. Held et al. 2005)? The uncertainty in future scenarios of Sahel climate is undoubtedly a testament to the complexity of the climate system, and to the necessity of continuing to support efforts to improve our understanding of it.

### References

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