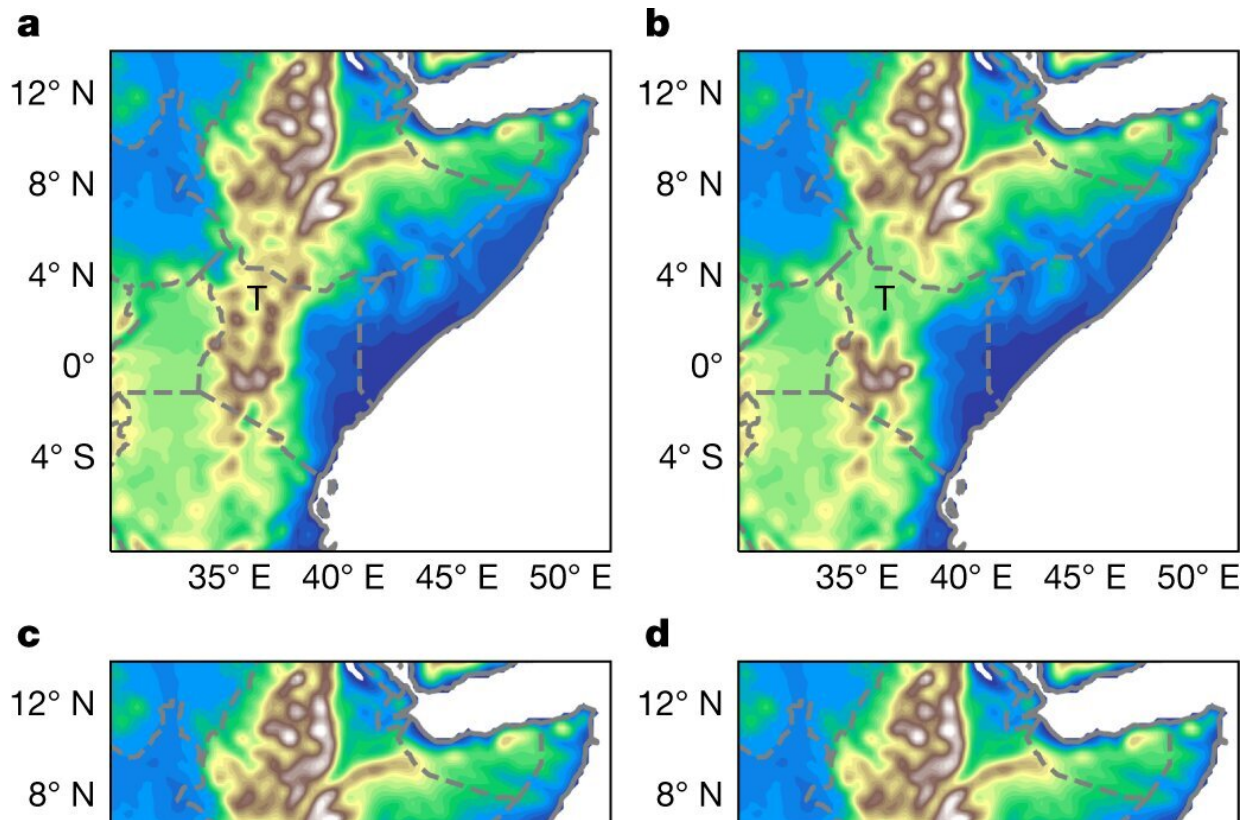


# 'Rivers in the sky' shape African climate

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Overview of model experiments. Credit: *Nature* (2023). DOI: 10.1038/s41586-022-05662-5

East Africa is much drier than other tropical land regions, including the Amazon and Congo rainforests. The geography of East Africa was always thought to make the region dry and susceptible to drought, but the precise mechanism has been elusive until now. This research

demonstrates the east to west river valleys are a crucial factor in the low annual rainfall.

Dr. Callum Munday, from the REACH program at Oxford's Smith School, who led the study, explains, "Normally, when we think of [valleys](#) and water, we think of the rivers that flow along the ground. In East Africa, deep valleys, such as the Turkana Valley, channel [strong winds](#) and create invisible rivers in the sky. These invisible rivers carry millions of tons of water vapor, the key ingredient for rainfall."

The team, which had previously traveled to Kenya to measure the 'invisible rivers' with weather balloons, wanted to see how the valleys affect climate across the whole of Africa. To do this, they devised a series of model experiments which changed the geography of the rift system by progressively filling in the [river channels](#).

Co-author Professor Richard Washington explains, "The experiments show the valleys affect climate on a continental scale. It can't rain equally everywhere, and the valleys help to sustain high rainfall in the Congo basin, while leaving East Africa prone to drought."

Understanding the climate trade-offs in rainfall between different regions at a continental scale can help us improve our ability to predict future rainfall patterns across Africa, say the authors. This is especially important given the policy implications of changing climate across Africa. The Congo basin is also a key biodiversity hotspot and carbon store.

The Horn of Africa to the east of the valleys is currently experiencing its longest and most severe drought on record. While the valleys do not affect year-to-year variability in rainfall, Professor Washington notes "by creating a setting where the [rainfall](#) is so unusually low to start with, the valleys make East Africa much more drought prone."

On longer time-scales, the experiments may help to explain environmental pressures facing our earliest hominin ancestors millions of years ago.

According to Dr. Munday, "The drying and expansion of savannah-type ecosystems over millions of years is considered a crucial factor in the evolution of early hominin species, leading to adaptations such as bipedalism (walking on two feet). The model experiments show the formation of valleys and associated drying is a plausible mechanism which could have led to this savannah expansion."

The work is published in the journal *Nature*.

**More information:** Callum Munday et al, Valley formation aridifies East Africa and elevates Congo Basin rainfall, *Nature* (2023). [DOI: 10.1038/s41586-022-05662-5](https://doi.org/10.1038/s41586-022-05662-5)

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