

UCAR Africa Initiative Seminar

Heart of Drought: Long-term Changes in Rainfall and Wildfires in Central Africa

Yan Jiang

School of Global Policy & Strategy
University of California, San Diego

Date: Tuesday, Aug 1st, 2023, 10:00 am – 11:00 pm (MT)

Location: FL2-1001, NCAR foothills

Webcast: <https://operations.ucar.edu/live-africa-initiative>

ABSTRACT

Central Africa stands out for its rich biodiversity and strong precipitation gradient between the Sahara, the world's largest desert, and the Congo, the world's second-largest rainforest. Referred to as the 'fire continent', it is also a crucial hot spot for blazes. An unprecedented long-term drying trend has emerged over the Congo Basin since the 1980s, exposing local ecosystems and society to increasing climate risks. To promote the sustainability of rainforests and savannas, my research combines Earth Observation (EO) and Artificial Intelligence tools to study erratic rainfall patterns and wildfires in Central Africa.

First, using multiple datasets measuring precipitation, vegetation greenness, canopy water content, and photosynthesis, I assessed variations in dry season length, which directly influences vegetation composition and structure, over the Congo Basin. The length of the boreal summer dry season (primarily during June-August) has significantly increased by ~8% per decade during 1979-2015. The prolonged dry spell not only jeopardizes the conservation of the rainforest but also escalates the risk of wildfires.

To address these pressing concerns, I leveraged satellite-derived burned area data, computer vision, and machine learning techniques to investigate fire activities in Central Africa. Consistent with the drying trend, increased wildfires have been observed over the southern edge of the Congo rainforest. Nevertheless, the total burned area has surprisingly declined by ~1.3% per year over surrounding savannas and grasslands during 2003-2017, particularly for large fires (>100 ha).

Further studies integrating EO data and model simulations are essential to attribute the causes of changes in rainfall and wildfires over Central Africa as they involve complicated interactions among land-ocean-atmosphere. Moreover, collaborative efforts addressing water resources, energy, and emissions from fires are pivotal in ensuring ecosystem conservation and public health.

For more information, please contact Wenfu Tang (wenfut@ucar.edu), Anna del Moral Mendez (delmoral@ucar.edu), or Kelly Nunez Ocasio (knocasio@ucar.edu).