

# **Biomass Burning is the Dominant Contributor to Carbon Aerosols in Rainwater over the Northern Indian Ocean**

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## **Abstract**

To gain a comprehensive understanding of the impact of carbon aerosols lifetime and radiation forcing, it is crucial to identify their sources and measure their wet deposition accurately. The northern Indian Ocean aerosol regime is particularly important as it has a large anthropogenic component and appears to significantly affect the regional radiation and monsoon systems. However, the full extent of the effect of carbon aerosols on the climate and the formation of the Indian Ocean monsoon remains unclear due to various natural and human-made sources. To bridge this knowledge gap, a dual isotope approach ( $\Delta^{14}\text{C}$  and  $\delta^{13}\text{C}$ ) are utilized in a study to investigate the sources and atmospheric processing of water-insoluble carbon (WIC) aerosols in rainwater. The study revealed that WIC has a highly variable but mostly biomass/biogenic contribution, comprising  $59 \pm 13\%$ .  $\text{C}_3$  plants are the primary source of WIC from biomass, accounting for around  $87 \pm 5\%$  of total emissions. The pH level of rainwater also experiences significant seasonal fluctuations, dropping to as low as 4.2 when air masses originate from the Indian subcontinent and increasing to as high as 6.9 when air originates from an oceanic background. During the winter monsoon, it was observed that the average concentrations of BC were 5 times higher, and WI organic carbon was twice as high in rainwater as compared to the summer monsoon. This suggests a substantial impact of concentrated pollutants during the winter monsoons. Overall, the study's findings have implications for both monsoon build-up and for global warming. The study emphasizes the importance of understanding the sources and atmospheric processing of carbon aerosols to better comprehend their impact on the environment.

## **Early Career Scientist**

NO, I am not an early career scientist.

## **IGAC Activities**

ACAM: Atmospheric Chemistry and the Asian Monsoon

## **IGAC Regional Working Groups**

MANGO: Monsoon Asia and Oceania Networking Group