Research Highlights

Changing optical properties of black carbon and brown carbon aerosols during long-range transport from the Indo-Gangetic Plain to the equatorial Indian Ocean

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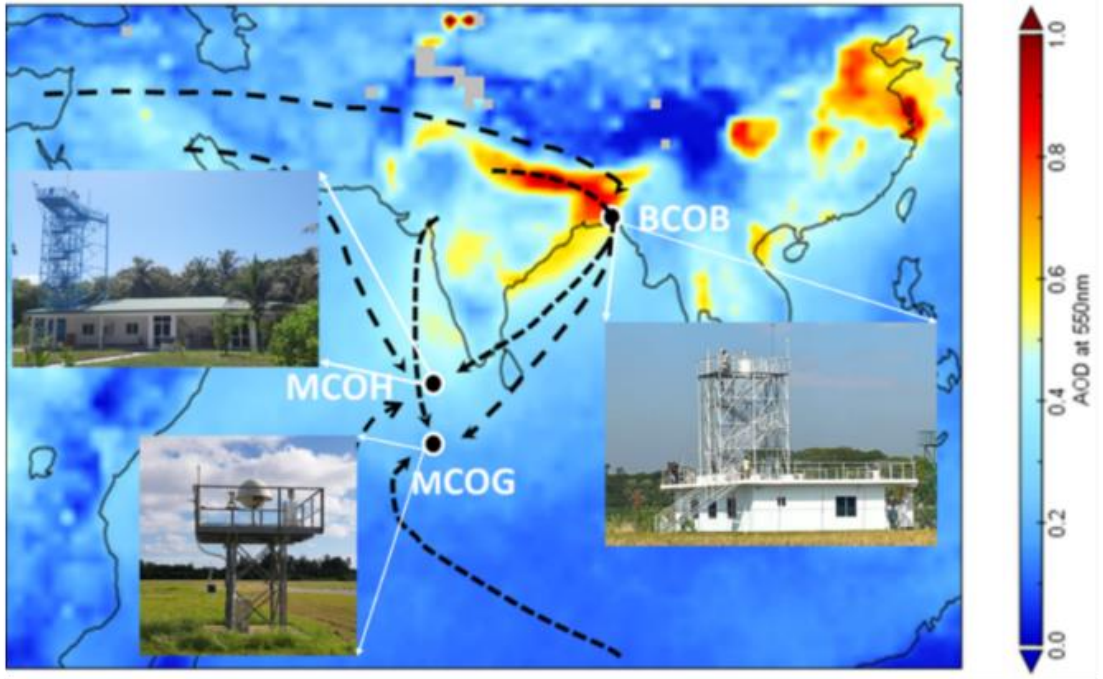
Atmospheric Chemistry and Physics Open Access EGU

As pollution spread, black carbon particles became stronger absorbers of sunlight, while brown carbon faded. We also found chemical changes, such as chlorine loss, that demonstrate how pollution transforms as it moves and impacts the climate.



PNAS RESEARCH ARTICLE | ENVIRONMENTAL SCIENCES

Black carbon aerosols over Indian Ocean have unique source fingerprint and optical characteristics during monsoon season

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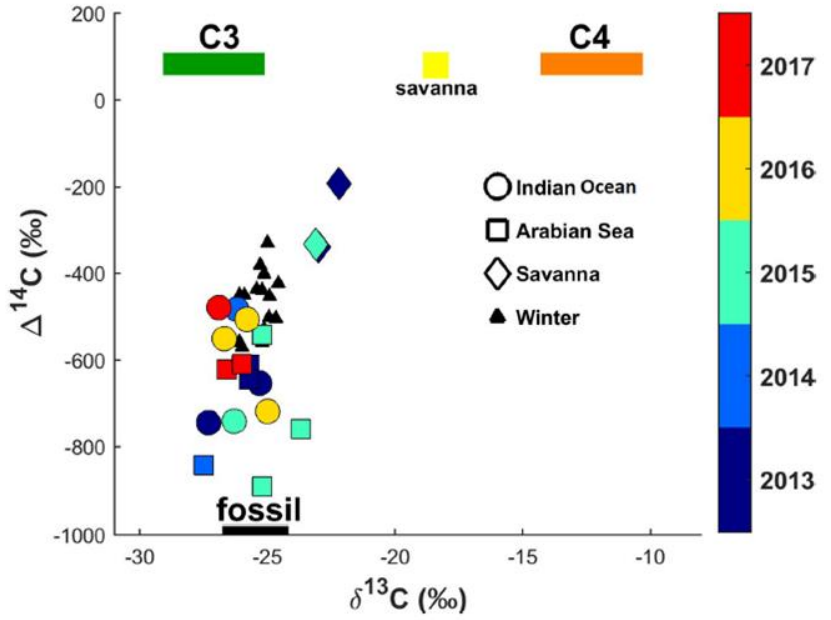
Our analysis of BC aerosols over five years at a remote Indian Ocean site revealed that their sources and properties vary significantly between the summer monsoon and winter seasons. Fossil fuels contributed approximately two-thirds of black carbon, with African savanna fires sometimes accounting for nearly half of the total. Unique optical signatures indicate that monsoon aerosols influence sunlight and cloud interactions differently than winter aerosols.



AGU100 ADVANCING EARTH AND SPACE SCIENCE

JGR Atmospheres

RESEARCH ARTICLE
10.1029/2019JD031246

Enhanced Light-Absorption of Black Carbon in Rainwater Compared With Aerosols Over the Northern Indian Ocean

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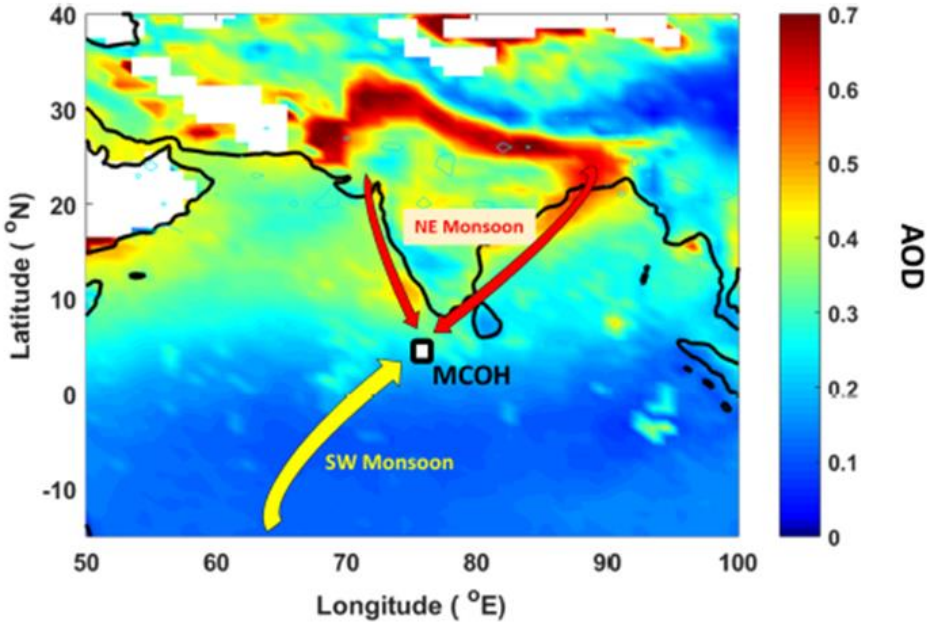
Key Points:

- Year-round black carbon mass absorption cross sections were simultaneously constrained for

Over the northern Indian Ocean, we found that BC in rain absorbed nearly twice as much light as in the air, likely due to organic coatings. We also observed that brown carbon absorption varied based on the origin of the air mass and was stronger from South Asia. BC is removed less efficiently than organic carbon or sulfate, leading to a longer atmospheric lifetime. Winter wet deposition of BC was three times higher than in summer, highlighting seasonal variations in the transport and removal of pollution.



SCIENCE ADVANCES | RESEARCH ARTICLE

ATMOSPHERIC SCIENCE

Photochemical degradation affects the light absorption of water-soluble brown carbon in the South Asian outflow

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Brown carbon (BrC) is a light-absorbing aerosol that partially offsets cooling effects from other aerosols but is underrepresented in climate models. Our research showed that in South Asia, water-soluble BrC loses about 84% of its light absorption during long-range transport due to photochemical bleaching, with a bleaching rate of 0.20 day^{-1}.