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Supplement of

Seasonal contrast in size distributions and mixing state of black carbon and its association with PM_{1.0} chemical composition from the eastern coast of India

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Supplementary Figures

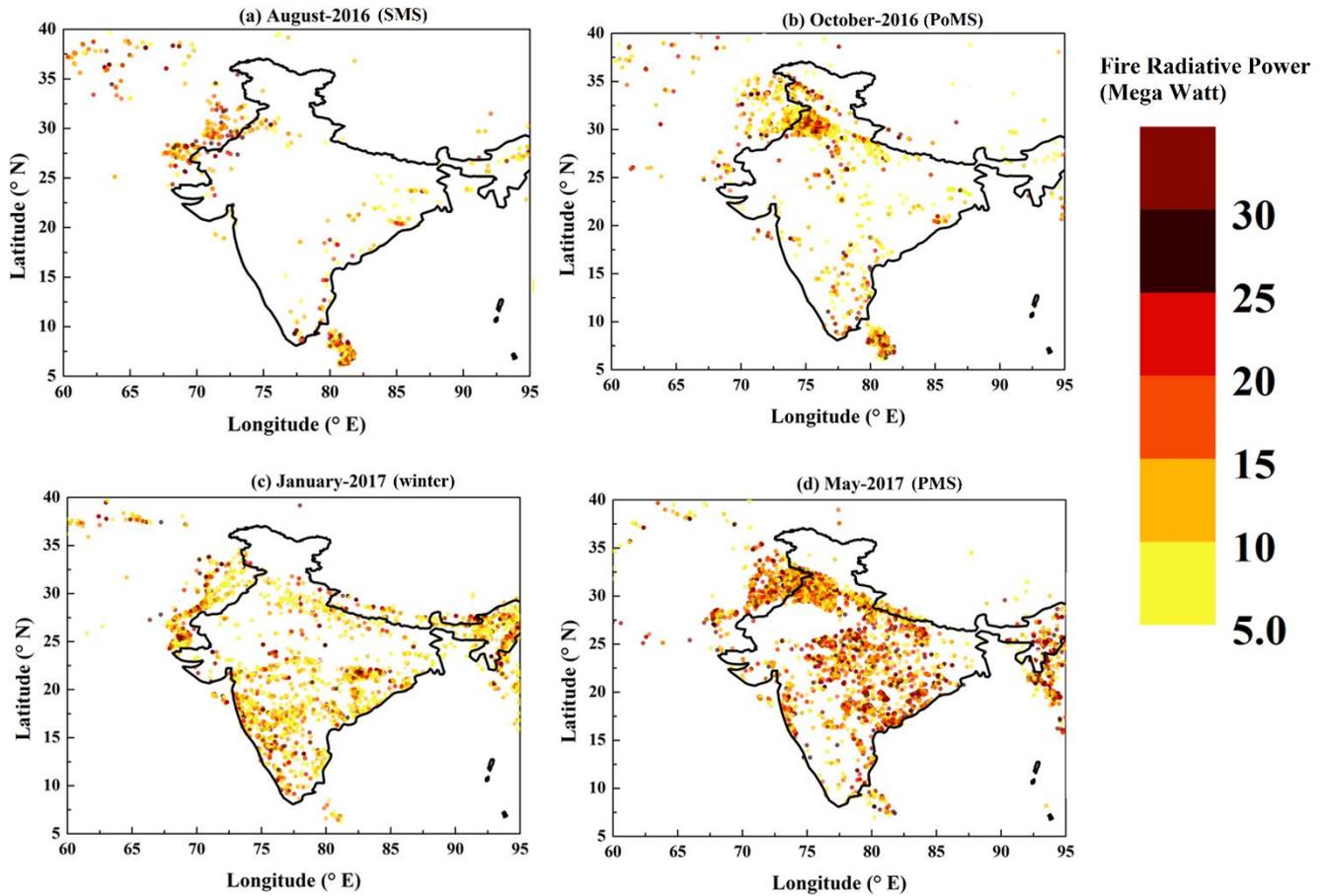


Figure S1: Spatial distribution of Moderate Resolution Imaging Spectroradiometer (MODIS) fire radiative power (MODIS Thermal Anomalies / Fire locations Collection 6 product obtained from <https://earthdata.nasa.gov/firms>) for the representative months of different seasons; (a) August -2016 (SMS), (b) October -2016 (PoMS), (c) January -2017 (winter) and (d) May -2017 (PMS). A significant amount of fire events during PMS are seen over the Indian region. During the PoMS (fire events to confined to northwest IGP) and winter (fire events to confined to western, northeastern regions of India) less intense regional fire events are noticeable. During SMS (and PoMS as well), a considerable amount of fire events are noticeable below south of India (over Srilankan region).

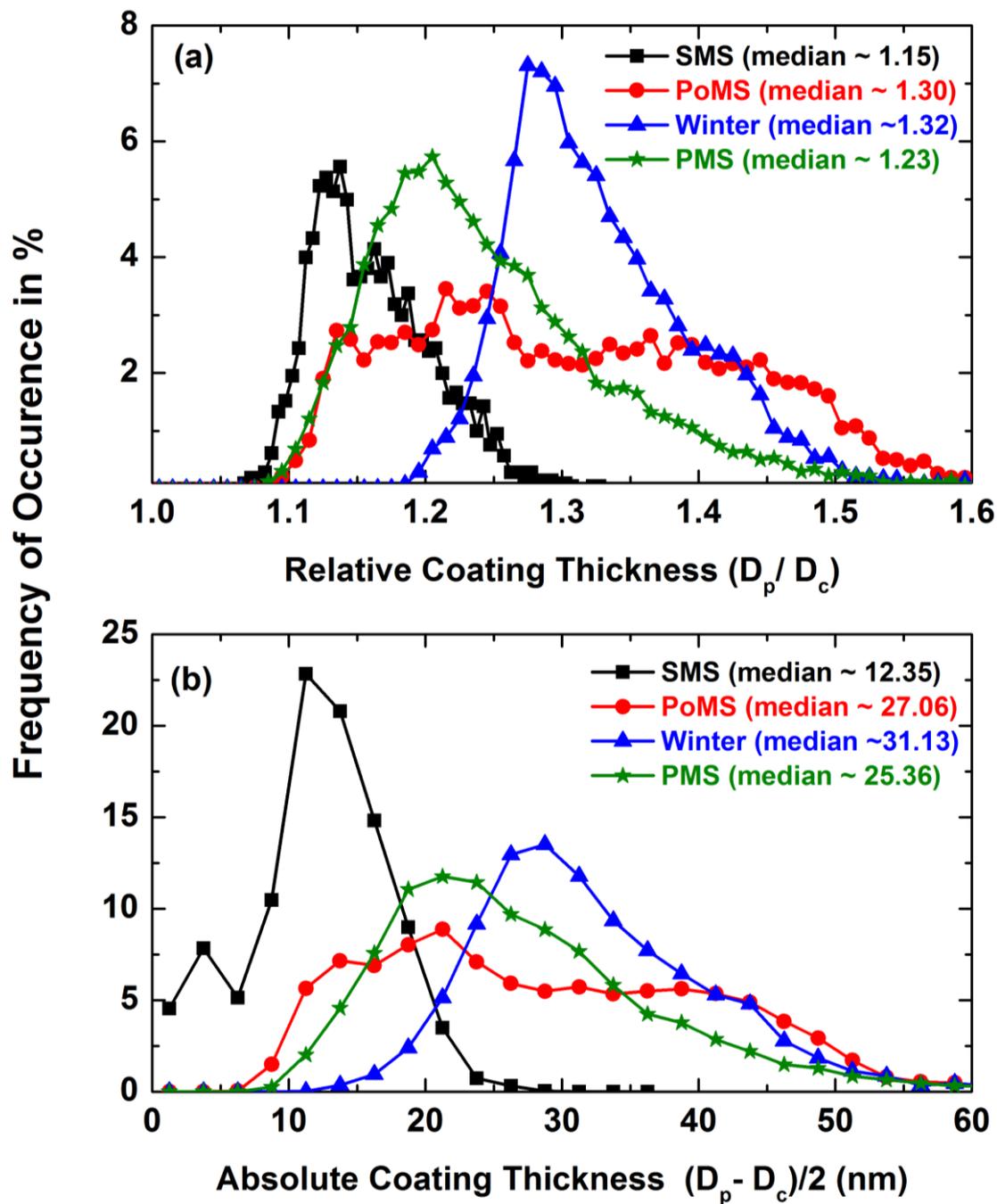


Figure S2: Frequency of occurrence of (a) relative coating thickness and (b) absolute coating thickness in different seasons.

The supplementary Figure S2, which shows the frequency distribution of the RCT and ACT values for each season (median values for each season are also shown in the figure) demonstrates the seasonality of the coating characteristics. The monsoon season was characterised by a narrow distribution, with the lowest median values for both RCT and ACT. Such thin coatings were seen due to the reduced life-time and absence of multiple processes which include: (a) decreased atmospheric life-time, leading to not having enough time to get thickly coated (as coating thickness depends on the particle life time also), (b) lowered concentration of advected anthropogenic precursor species, making lesser availability of coating material, and (c) fast wet-removal (of the core and the coating material) by extensive rainfall. South-westerly/westerly air masses prevailed during this period which advect cleaner marine air to the site, while wash-out due to large-scale precipitation removed aged aerosols. During the other seasons, the distributions are quite broad, and showed multiple maxima (especially during PoMS and winter). During the winter and PoMS, BC particles in the IGP outflow are characterised by extensive coating resulting from the enormous shift in the air mass from marine to continental at the end of the monsoon season bringing air from the most polluted central IGP, added with the associated change in the size distribution and residence time.

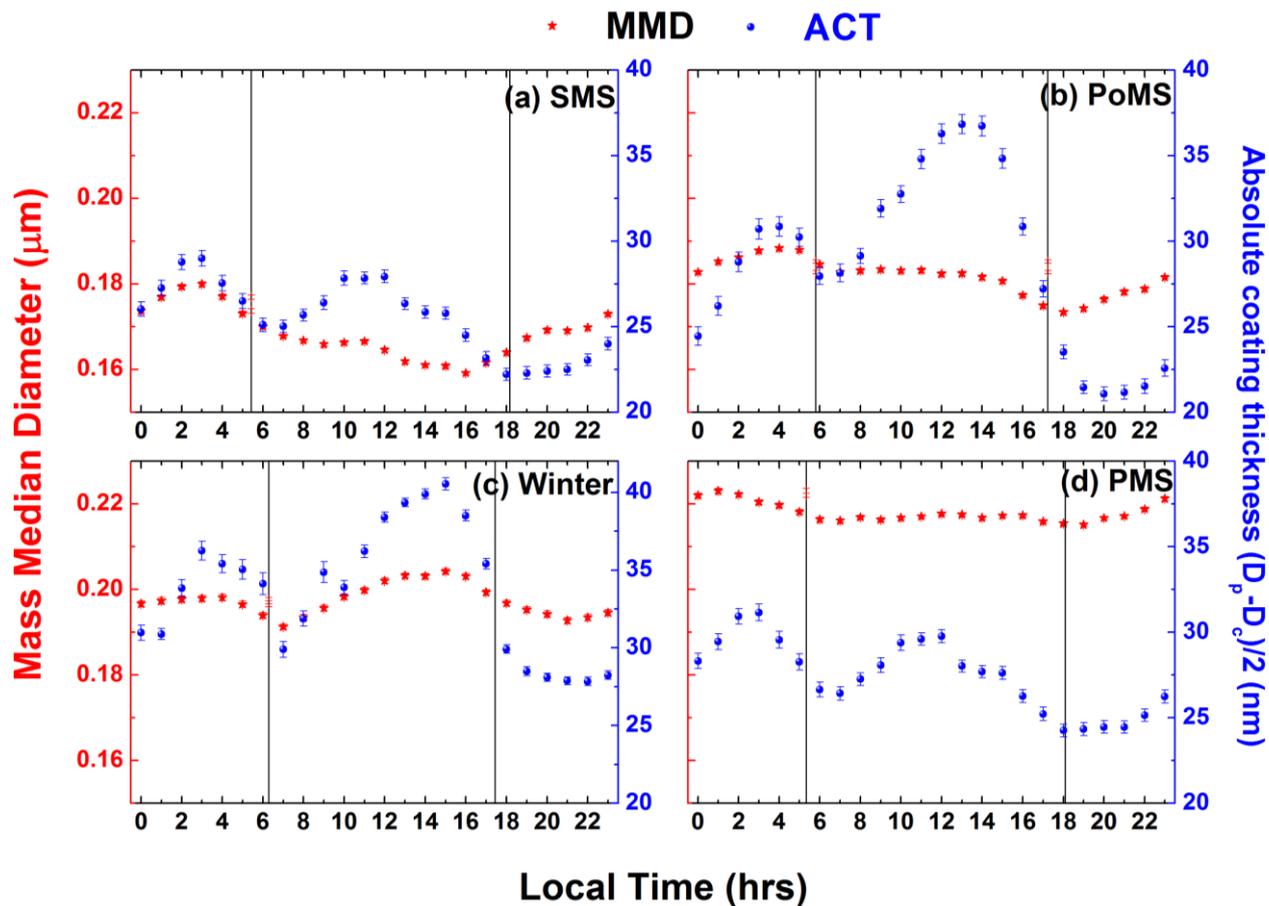


Figure S3: Diurnal variation of (a-d) rBC mass median diameter and absolute coating thickness (ACT) in different seasons. The vertical lines denote the Sunrise and Sunset. The vertical bars through solids points are the standard errors from the mean.

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