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## Rain Droplets Size Distributions Statistical analysis for pre-Monsoon and Monsoon Season over the Western Ghats

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Four years (2015-2018), Joss-Waldvogel disdrometer (JWD) data are utilized for the statistical analysis of Raindrop size distribution (RSD) of pre-monsoon and monsoon season over the Western Ghats. JWD Instrument installed at High Altitude Cloud Physics Laboratory (HACPL, 17.92°N, 73.66°E), Mahabaleshwar in the core of heavy rainfall region of Western Ghats. Variation in raindrop size distribution characteristics features in pre-monsoon and monsoon season for convective and stratiform precipitation of windward side of Western Ghats analysis, using long-term in-situ JWD instrument data done. Convective and stratiform rainfall classification is based on the number of concentrations of rain droplets and rain rates. Tropical Rainfall Measuring Mission (TRMM) and ERA-Interim data sets are also integrated with disdrometer data to establish microphysical and dynamical features of pre-monsoon and monsoon season rain. Long-term trends of rain droplet size spectra are not studied until now over the Western Ghats. Rain droplet spectra of pre-monsoon and monsoon seasons show notable differences. The rain droplets of monsoon display considerably higher divergence compared to pre-monsoon rainfall. Monsoon rainfall has a higher concentration of smaller drops, while pre-monsoon rainfall contains a significantly higher concentration of large droplets. RSD classified on the rain rate demonstrates a higher mass-weighted mean diameter ( $D_m$ ) and a lower normalized intercept parameter ( $\log_{10}N_w$ ) in monsoon than winter. Similarly, the Diurnal variation of RSD reveals higher  $D_m$  with a lower value of  $\log_{10}N_w$  in pre-monsoon season. Also, in both seasons, the higher value of mean  $D_m$  in convective precipitation than stratiform. Convective activities with increased ground temperature alter RSD in pre-monsoon season rather than monsoon season through droplet classification, evaporation, and collision-coalescence processes.