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Microphysics of Coastal Fog from a Field Study on the Canadian East Coast

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The interactions between aerosols and water vapour can be a determining element in the formation, density and persistence of fog, which makes fog forecasting a challenge. Although fog is rather common, models fail at accurately predicting visibility, notably due to issues with the microphysical parameterization. The cold waters off the Canadian east coast are one of the foggiest places on the planet due to the close proximity of a warm current advecting a high amount of moisture in the lower troposphere. The development of a semi-permanent high pressure system over the North Atlantic combined with a high sea-surface temperature gradient makes May, June and July the foggiest months of the year in that region. Our research group conducted a field study near Halifax, on the Canadian east coast in the early summer of 2016 to collect data on the microphysics of coastal fog. Using back trajectories, we associated each of the 7 selected fog events with a continental or purely marine origin. We observed a bimodal droplet size distribution during all events, with a higher concentration of small droplets during events that were continentally influenced (more polluted). A comparison between dry particles before and after the events also revealed a scavenging of coarse mode aerosol and an enrichment of accumulation mode particles, proportional to the duration of each event. In one case, we hypothesize that a lack of large particles may have played a significant role in the dissipation of fog. Our results will be compared with past studies and their implications will be discussed.