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INFLUENCE OF METEOROLOGICAL FACTORS ON FOG DEVELOPMENT

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ABSTRACT

Fog has been getting more frequent, more intense, and staying around for longer periods of time, which has increased socioeconomic concerns about IGP. The low-lying terrain of the IGP and the northern Himalayan peaks create an ideal environment for the prolonged retention of fog. A number of meteorological factors, including air temperature, soil moisture, wind speed, and others, significantly impact how fog develops over the IGP. Foggy winters are cooler than clear ones, according to this study. The two main monsoon systems in India are the southwest monsoon (summer) and the post monsoon (winter). Unlike the latter, who only lasts from October to November, the former lasts for four months, from June to September. Much of the precipitation that falls on the IGP comes from these two monsoon systems. Furthermore, at the start of winter, the high soil moisture content caused by the Ganga and its tributaries, along with the irrigated wheat fields in this area, contributes to atmospheric moisture and creates ideal circumstances for the development of radiation fog over the IGP. In addition to impacting feedback between land surface and atmospheric processes, surface soil moisture is a key player in the hydrological cycle. Radiation fog also forms as water vapor rises from the ground and cools the Earth's surface. For a large-scale analysis of the geographical and temporal change of soil moisture, the in-situ data are inadequate. The full geographical and temporal variability of soil moisture can be better characterized with the help of satellite remote sensing. For a long time, researchers have been studying soil moisture retrieval with passive microwave remote sensing. Through the measurement of the soil's dielectric characteristics, passive microwave remote sensing has been able to offer information about soil moisture. Fog detection, monitoring, and forecasting systems rely heavily on precise soil moisture and surface temperature estimates. For fog forecasting, a sensitivity analysis was conducted using a one-dimensional model of the nighttime boundary layer. Surface temperature, soil moisture concentration, wind speed and direction, and other relevant meteorological data have been fed into the model. By using SMAP data from 2018 to 2021, this study examines how soil moisture and surface temperature influence fog development over the IGP.