Detailed Characteristics of Fog Occurrence in South Korea Using the recent 3 Years of Visibility Data

Tae-Ho Kang (1), Myeong-Seok Suh (1)

[1] Kongju National Univ., 32588 56 Gongjudaehak-ro, Kongju, Chung-Nam, 32588, Korea
Email: taeho4776@smail.kongju.ac.kr; sms416@kongju.ac.kr;

Abstract: Fog is a phenomenon in which water vapors near the surface condense or sublimate, as the result, horizontal visibility is less than 1 km. Satellite can observe the fog in a reasonable spatiotemporal resolution over the wide region, but the detection level is still not high due to the difficulty of distinguishing it from the low stratum or the obstacles such as the mid-to-high clouds. Since 2009, the Korea Meteorological Administration (KMA) has started to set up visibility meters that can simultaneously monitor current weather including fog, and has replaced the eye observations from 2017. In this study, to improve the accuracy and compensate the limitation of the fog observation data of the next geostationary meteorological satellite (GK-2A) launched on December 5, 2018, we analyzed the characteristics of the visibility data. For the recent three years data from March 2016 to February 2019, the fog occurrence characteristics in South Korea was analyzed through the two-step quality control (QC) method using 286 visibility observations data in the whole country. In the first step, the data with abnormal variations in short time are checked and the data with many missing data are removed from the raw data. As a second step, we carried out the QC using AWS data in consideration of the weather conditions that could reduce the visibility, such as the precipitation and yellow sands. After two-step QC, the average value was calculated every 10 minutes by considering the observation period of GK-2A. To analyze the fog occurrence in detail, we classified region (South Korea) into three regions, land, mountains, and coast, because of the different fog occurrence mechanisms according to the geographical characteristics. The coastal area has a long duration of fog, mainly in spring and summer, but the occurrence rate of the West Sea is higher than that of the East Sea and the South Sea. On the contrary, the inland area has a high frequency of occurrence of short duration fog in autumn, and it has appeared spatially in Gyeongbuk inland area. In mountainous areas, especially in Daegwallyeong, fog occurrence frequency was high due to the influence of advection of the lower stratum or upslope fog. Regardless of the region, the fog was mainly occured from night to early morning, and dispersed in the early morning. However, the coastal area was occured and dispersed during the day due to the influence of sea fog. In the inland area, seasonal fluctuations were observed in many time periods of fog discharge depending on the altitude of the sun. In this presentation, the detailed characteristics of fog occurrence, including the seasonal and diurnal variations, intensity, types, and spatial distribution of fog according to the geographic location, will be presented

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