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Application Research of Multi-source New Detection Data in Snow Depth Prediction for Beijing Winter Olympics

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According to the demand of the Winter Olympic Organizing Committee for snow depth prediction, the application of multi-source new data in snow depth was studied based on densely artificial snow-depth measurement, microscopic snowflake shape observation and PARSIVEL data. The specific conclusions are as follows: (1) Most of the Snow-Liquid-Ratio(SLR) in Beijing competition zone was between 0.69 and 1.43 (unit: cm/mm, the same below), while that in Yanqing zone was between 0.53 and 1.17. But 7.5% of the SLRs in Yanqing zone exceeded 3.5, which all occurred in the same period of the key service time of 2022 Beijing Winter Olympics, making it more difficult to predict new snow depth. (2) The higher the SLR, the lower the daily minimum surface temperature and lowest air temperature. Plate or column ice crystals, rimed snowflakes, and dendritic snowflakes were observed, whose corresponding SLRs increased. The average falling speed of particles falling below 2m/s can be used as an indicator of phase transfer. (3) The vertical distributions of temperature and humidity with SLR <1 or >2 were summarized. It was found that when the cloud area coincided with the dendritic growth zone with height close to Yanqing zone, the SLR would be more than 2, higher than that of Beijing zone. (4) A weather concept model generating large SLR was extracted. Snow in Beijing is often accompanied by easterly winds in boundary layer, which is easy to form a wet and ascending layer in the lower troposphere due to the blocking of western mountain. In the late winter season, helped by the temperature's profile, it tends to produce unrimed dendritic snowflakes, leading to a great SLR.