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The Black Sea impact on the severe snow episode over the city of Istanbul

T. Kindap and O. M. Gokturk

Eurasia Institute of Earth Sciences, Istanbul Technical University, Maslak, 34469, Turkey
(kindap@itu.edu.tr / Fax: +90 212 2856210 / Phone: +90 212 2857141)

The prediction of sea-effect heavy snowfall that develop over and downwind of the Black Sea will be one of the major forecast challenges facing meteorologists in Turkey. Occurring in February, 2005, the North-West Black Sea snowstorm lasted a few days at changing intervals producing up to 50 cm snow-fall on the city of Istanbul. The city located in the south-west coast of the Black Sea is exposed to northerly weather currents all across the sea from north to south. During this transition period, cold weather might be influenced by the sea, which is a big source of heat and moisture. As a result, the sea-effect snowstorms could be developed when the cold air flows over the relatively warm sea in winter.

While many studies have documented various aspects of sea or lake-effect snow storms, the Black Sea-effect heavy snowfall over the south coastline of Turkey has not been studied. In this study, as a case study, a sea-effect heavy snowfall was researched in terms of the event characteristics, synoptic-scale aspects and sounding statistics. Environmental conditions during the event were characterized by a lake–700-hPa temperature difference of up to 20˚C and by a lake–850-hPa temperature difference as large as 10˚C.

Before forming the sea-effect snow over Istanbul, high-altitude winds caught the air masses over interior mainland of Siberia and pushed them toward the south and west as a hugely high pressure system. Because of its extremely low temperature, the air within these masses became very dense and thus forced surface pressures to 1040 mb and higher. Sea surface temperature (SST) is an important parameter in many operational and research activities, ranging from weather forecasting to climate research. In addition, one of the goals of this study was to demonstrate the effect of the changes

in the Black Sea SST during the snow events. As the SST got warmer (increasing 2˚), the model was able to capture more accurate results in terms of location and amount of snow prediction during the event.

The Pennsylvania State University–National Center for Atmospheric Research fifth-generation Mesoscale Model running on a triple nested grid was used to simulate the sea-effect snow event of 5–10 February 2005.