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Multilevel Cloud Structures above Svalbard

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The presentation focusses on the reslts recently published by the authors under the heading "picture of the month" in Monthly Weather Review. The presented picture of the month is a superposition of space-borne lidar observations and high-resolution temperature fields of the ECMWF integrated forecast system (IFS). It displays complex tropospheric and stratospheric clouds in the Arctic winter 2015/16. Near the end of December 2015, the unusual northeastward propagation of warm and humid subtropical air masses as far north as 80°N lifted the tropopause by more than 3 km in 24 h and cooled the stratosphere on a large scale. A widespread formation of thick cirrus clouds near the tropopause and of synoptic-scale polar stratospheric clouds (PSCs) occurred as the temperature dropped below the thresholds for the existence of cloud particles. Additionally, mountain waves were excited by the strong flow at the western edge of the ridge across Svalbard, leading to the formation of mesoscale ice PSCs. The most recent IFS cycle using a horizontal resolution of 8 km globally reproduces the large-scale and mesoscale flow features and leads to a remarkable agreement with the wave structure revealed by the space-borne observations.