3D Structure of Arctic Cyclone and the Trajectory Analysis

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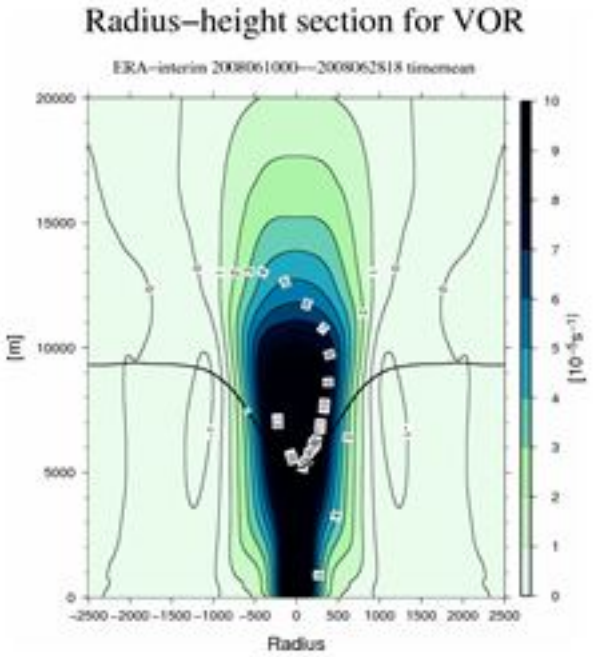
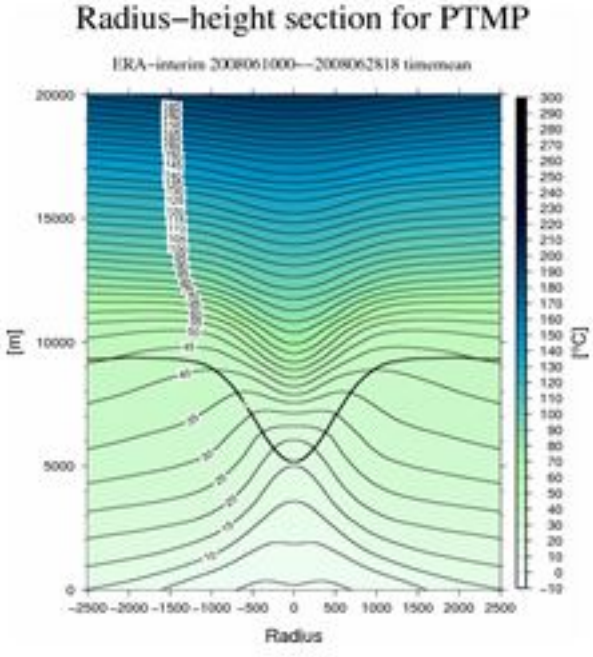
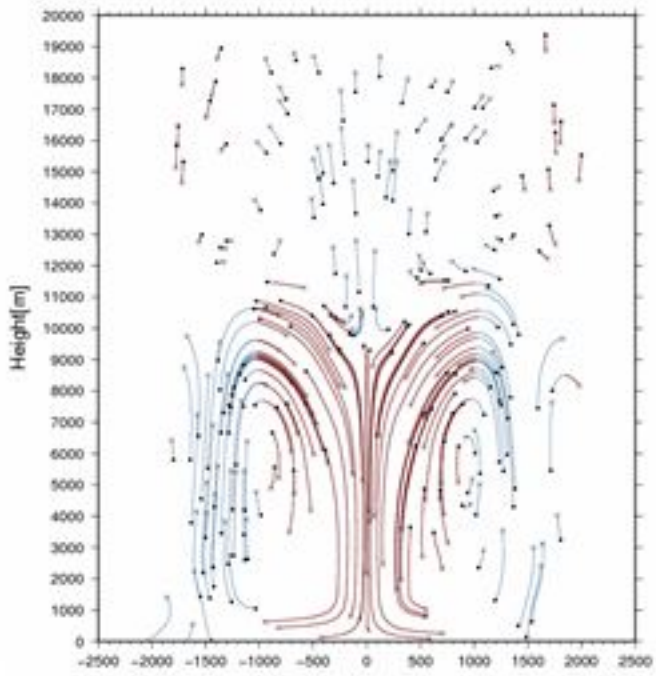
In this study, a trajectory analysis is conducted for the 3D structure of the Arctic cyclone during the life-cycle and the time mean motions using PUFF model developed at the University of Tsukuba. As a result, it is found that a merging of extra-tropical cyclone moving into the Arctic and the upper air polar vortex is important. When a vorticity of the cyclone merges with that of polar vortex, indicating an enhanced tropopause folding, the vortex is intensified showing a barotropic structure. The resulting secondary circulation in a vertical section of the vortex enhances the upward motion at the vortex center by the surface friction, which produces the cold core structure of the Arctic cyclone.

Keywords: Arctic cyclone, Vortex merging, Tropopause folding, Ekman friction, Secondary circulation, Cold core







Vertical section of trajectories for AC (red: upward, blue: downward).

