

Murakami, M., Y Yamada, and K. Iwanami, 2024: Precipitation mechanisms in stratiform snow clouds associated with a mid-level trough over the Sea of Japan. *J. Meteor. Soc. Japan*, **102**, <https://doi.org/10.2151/jmsj.2024-017>

Plain Language Summary: Snowfall in the western coast of Japan is influenced by various cloud systems that are formed over the Sea of Japan. Off the western coast of the Tohoku region, the occurrence frequency of clouds with a mixture of convective and stratiform properties is much lower than that of convective clouds (consisting of isolated, longitudinal-mode, transversal-mode convective clouds), but the amount of precipitation from them is comparable to that from the convective clouds according to the previous study. In this paper, we investigated their internal structure and precipitation mechanism based on the results of an instrumented aircraft and dual Doppler radar observations.

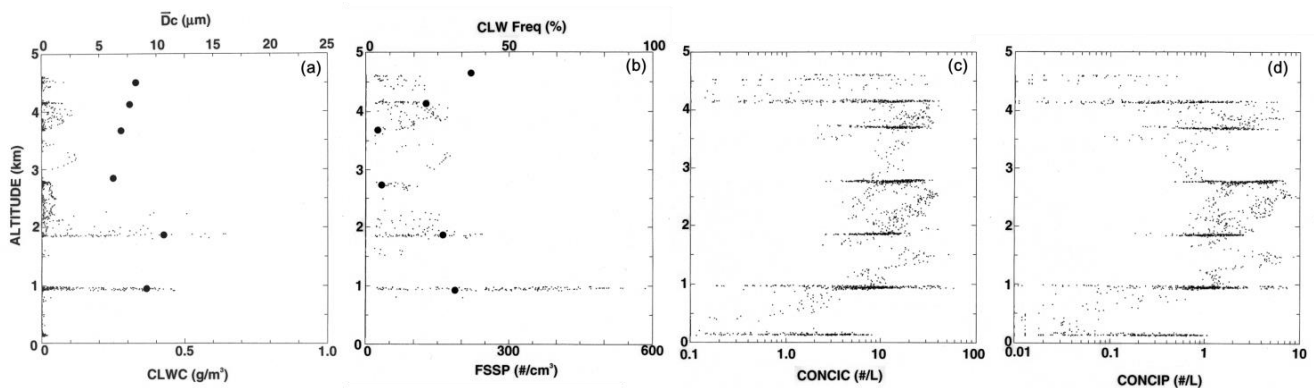


Figure 1. Vertical profiles of (a) cloud water content measured with King's probe and mean diameters of cloud droplets measured with FSSP, (b) number concentrations of cloud droplets and mean ratios of cloud droplet regions to total cloud region, (c) ice crystal concentrations measured with 2D-C probe, and (d) snow particle concentrations measured with 2D-P probe.

Highlights:

- The cloud system with a cloud top height of 4.5 km exhibited a double-layer structure consisting of upper shallow stratiform clouds associated with a mid-level trough and lower shallow cumulus/stratocumulus clouds formed by heat and moisture fluxes from warmer sea surface.
- The upper and lower clouds, which would not produce significant amounts of snowfall on their own yet, caused substantial amount of snowfall through the seeder-feeder mechanism.
- Snow particles grown by vapor deposition in the upper clouds further grew into denser particles like graupel through riming process in the lower clouds.