# MUレーダーとライダー同時観測で捉えられた巻雲にともなう晴天大気乱流

# 深尾 昌一郎 [1]; Luce Hubert[2]; 中村 卓司 [3]; 山本 真之 [4]; 山本 衛 [5]
[1] 福井工大; [2] LSEET, Toulon Univ.; [3] 極地研; [4] 京大・生存研; [5] 京大・生存圏研

# Concurrent MU radar and lidar observations of cirrus-related clear-air turbulence

# Shoichiro Fukao[1]; Hubert Luce[2]; Takuji Nakamura[3]; Masayuki Yamamoto[4]; Mamoru Yamamoto[5]
[1] Fukui Univ. Technology; [2] LSEET, Toulon Univ.; [3] NIPR; [4] RISH, Kyoto Univ.; [5] RISH, Kyoto Univ.

http://www.rish.kyoto-u.ac.jp/

Turbulence generation mechanisms prevalent in the Earth’s atmosphere are mainly shear instabilities, breaking of internal buoyancy waves and convective instabilities. In the stably stratified atmosphere, many evidences have been presented to show that turbulence is often confined within layers as thin as a few ten meters or less However, details of the formation mechanism of such thin layers have not yet been understood well.

During observations performed on 07-08 June 2006, the VHF (46.5 MHz) MU radar (Shigaraki; 34.85N, 136.10E) revealed 0.5- to 2-km-deep turbulent layers with roll-like appearance developing downward below 8.0 km above sea level. Concurrent observations with a Rayleigh/Mie/Raman (RMR) lidar showed the presence of a 4-km-deep layer of cirrus above 8.0 km. Downward penetrating structures of ice crystals with horizontal and vertical extents of 1.0-4.0 km and 200-800 m, respectively, have been detected by the lidar at the cirrus cloud base for about 35 min. At the same time, the MU radar data revealed clear air turbulence layers developing downward from the cloud base in the environment of the protuberances. They were associated with oscillatory vertical wind perturbations of up to +/-1.5 ms-1. Downward clear air motions measured by the MU radar were associated with the descending protuberances and updrafts were observed between them.

One of the plausible hypotheses is that the observed turbulence was likely the result of convective instability due to cooling by sublimation of ice crystals beneath the cirrus cloud base. It is strongly presumed that these features are caused by mamma as already reported from other lidar observations, although no visible direct identification of mamma was available. Details will be discussed based upon these data and in the light of previous theoretical studies.