5.4 95GHz cloud profiling radar

(1) Personnel (*: Leg-1, **: Leg-2, ***: Leg-1+2)

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NISHIZAWA Tomoaki*	(NIES)	
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(2) Objective

Main objective for the 95GHz cloud radar named FALCON-I is to detect vertical structure of cloud and precipitation and Doppler spectra of the observed targets. Combinational use of the radar and lidar is recognized to be a powerful tool to study vertical distribution of cloud microphysics, i.e., particle size and liquid/ice water content (LWC/IWC).

(3) Observations and products

Observation with FALCON-I was done continuously with 10 sec repetition cycle during the cruise. Basic output from data is cloud occurrence, radar reflectivity factor, and Doppler spectra. Sensitivity of FALCON-I is about -32 dBZ and its spacial resolution is about 15m at 5 km height. Doppler spectra were also obtained with 10 sec temporal resolution in ±3.1 m/s.

Detectabilities of clouds, however, were degradated during the cruise in 10-20 dB because of decrease of radar output power.

In order to derive reliable cloud amount and cloud occurrence, we need to have radar and lidar for the same record. Radar / lidar retrieval algorithm has been developed by H.Okamoto, Kyushu University. The algorithm is applied to water cloud in low level and also cirrus cloud in high altitude. In order to analyze the radar data, it is first necessary to calibrate the signal to convert the received power to radar reflectivity factor, which is proportional to backscattering coefficient in the frequency of interest. Then we can interpolate radar and lidar data to match the same time and vertical resolution. Finally we can apply radar/lidar algorithm to infer cloud microphysics.

(4) Example of Data

An example of the time height cross-sections of radar reflectivity power is shown in Fig.5.4-1.

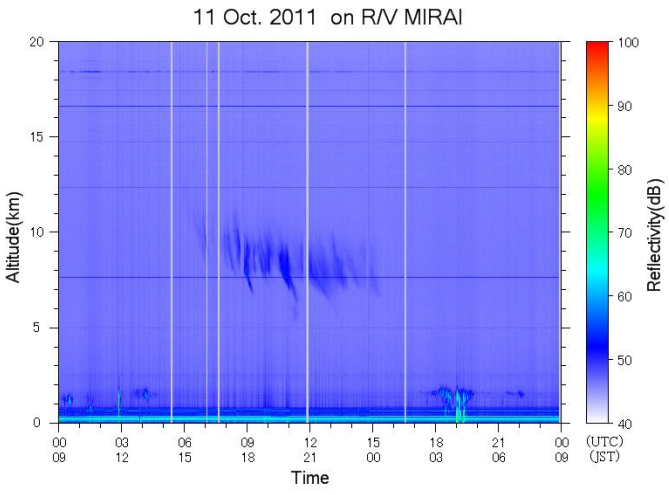

Fig 5.4-1. Time height cross section of radar reflectivity power in arbitral unit of dB on 11 October, 2011. The location of MIRAI was around 8S, 80.5E. We can recognize clouds at 7-11 km in height.