衛星データに見られるヤマセ雲の特徴の時空間変動について

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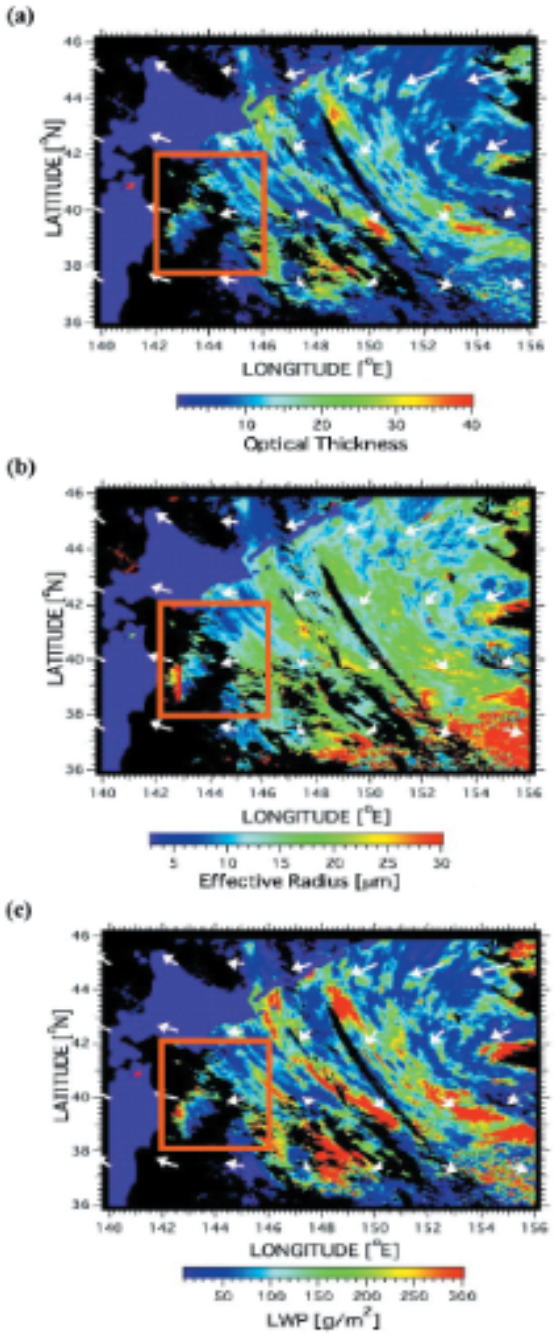
衛星観測からわかること

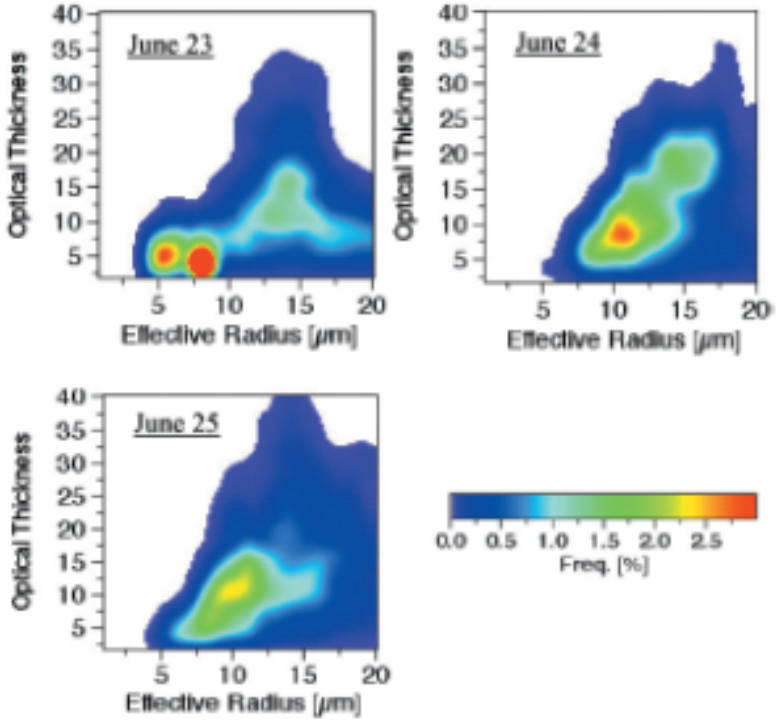
- 雲量
- 光学的厚さ
- 雲頂高度（気圧／温度）
- 雲粒有効半径
- 雲水量
- 幾何学的厚さと形状
- 水と氷の判別、氷粒子の種類の判別

- 放射収支

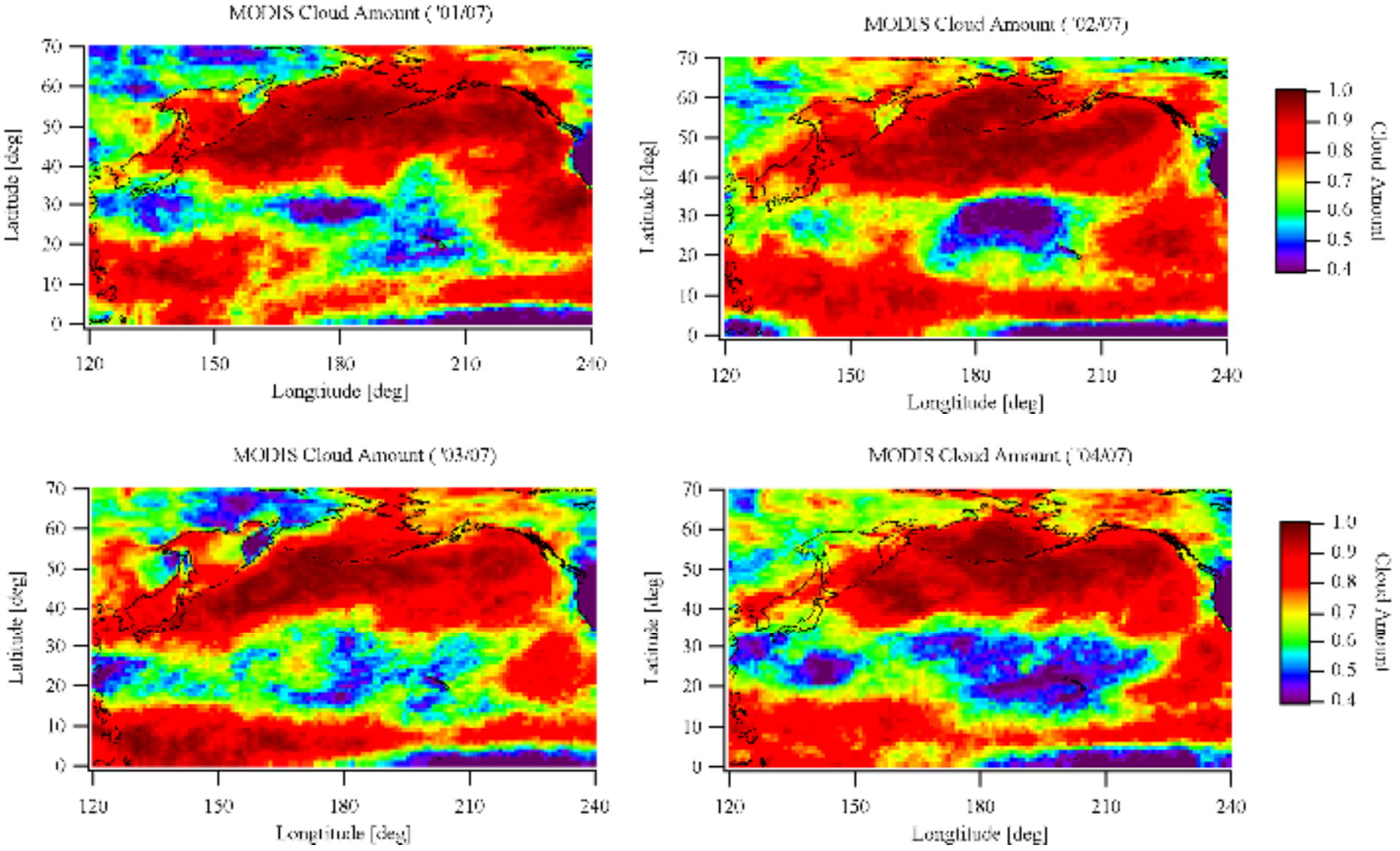
AVHRR3/NOAA17によるヤマセ雲の光学的厚さ、有効半径、雲水量（Kojima et al., SOLA2006）

2003年6月

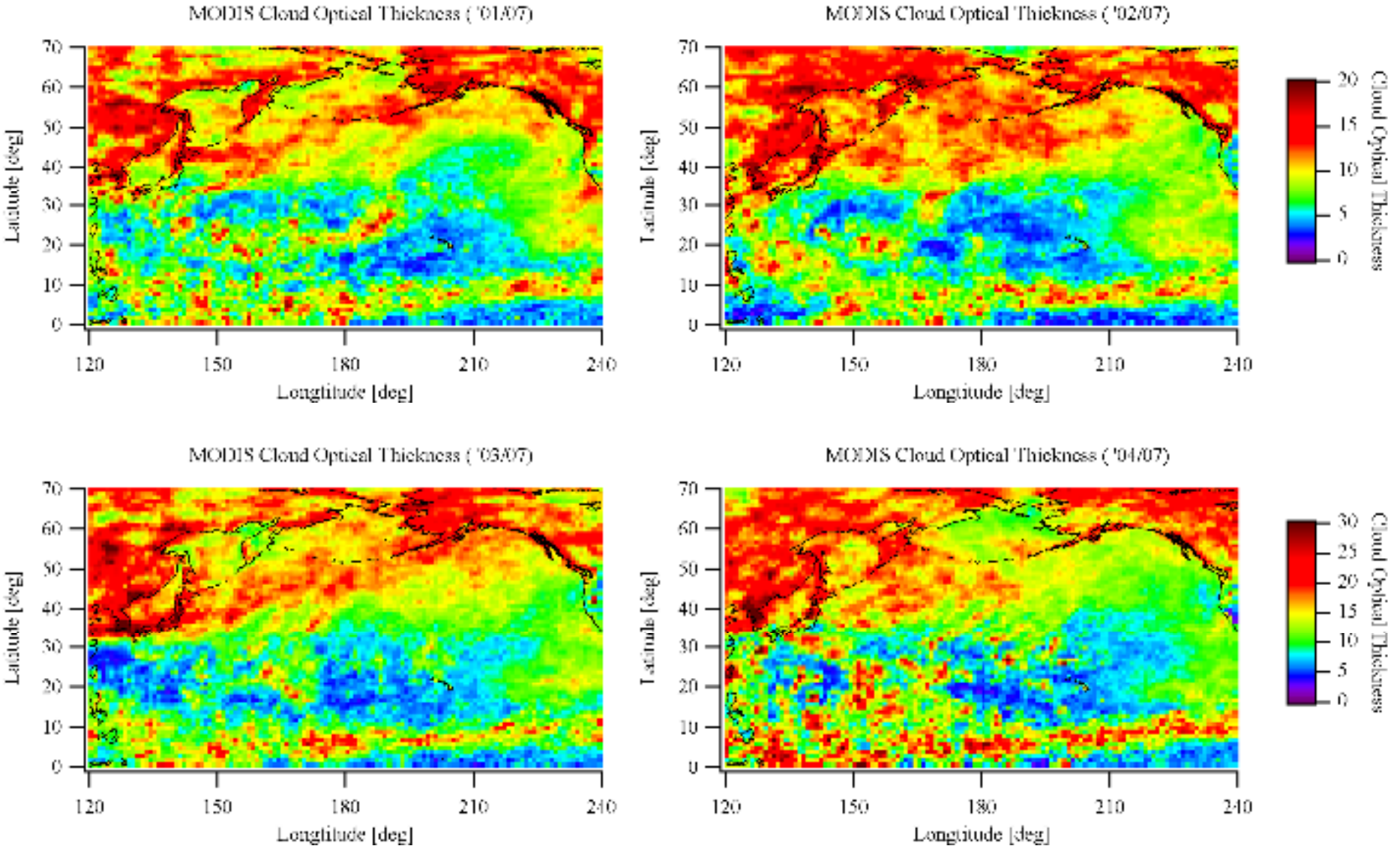




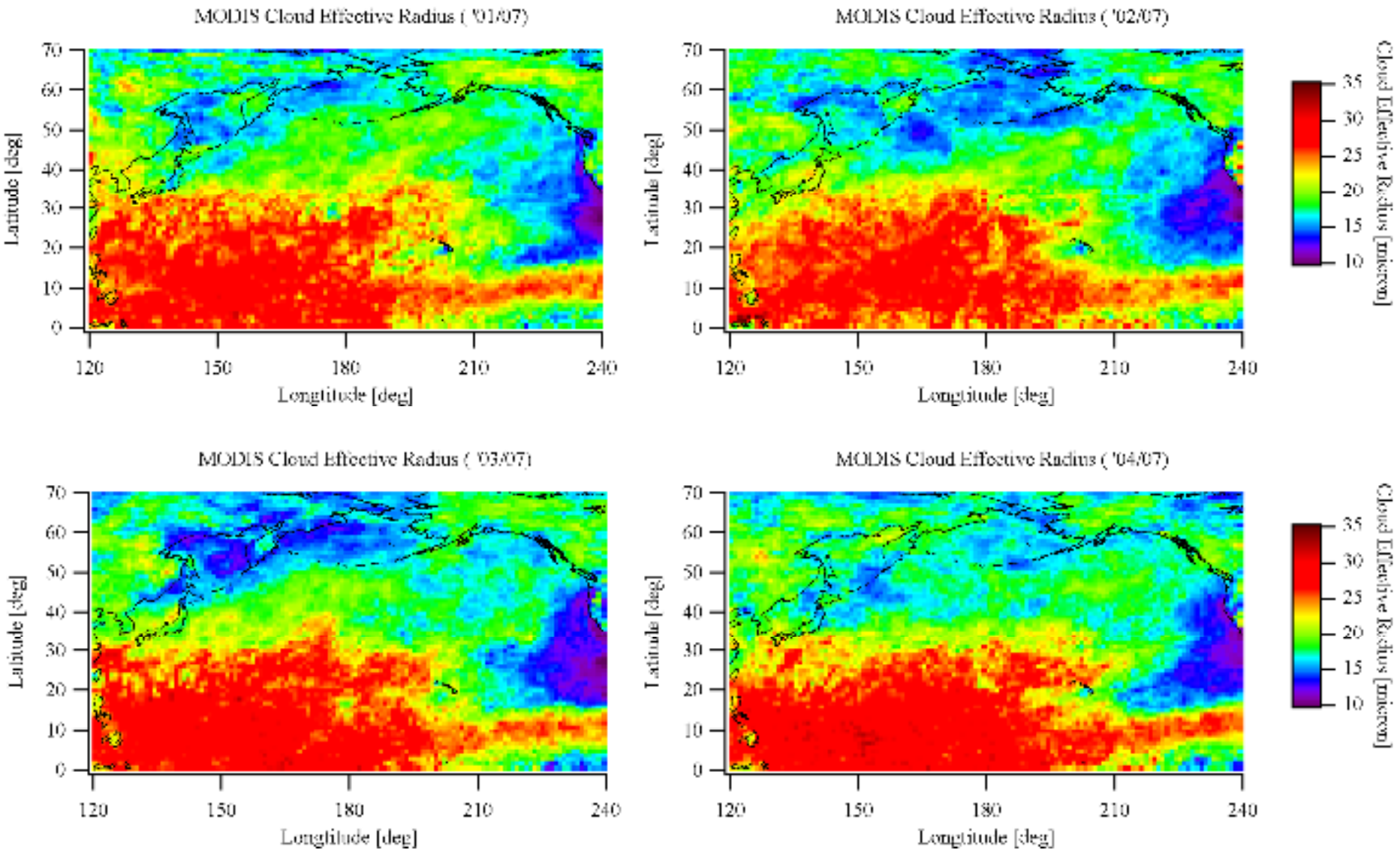
7月の雲量（2001~2004）



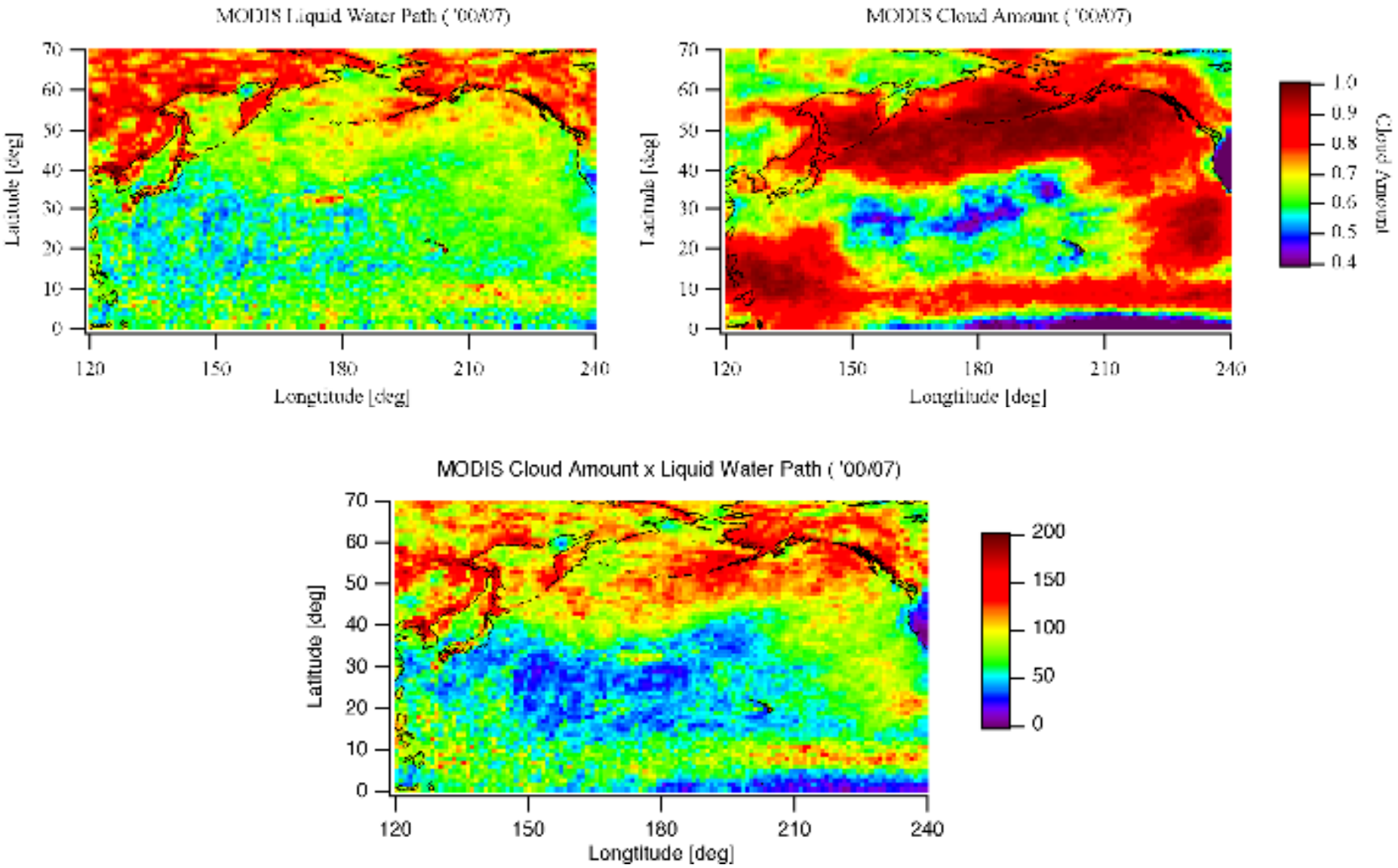
7月の雲の光学的厚さ(2001~2004)



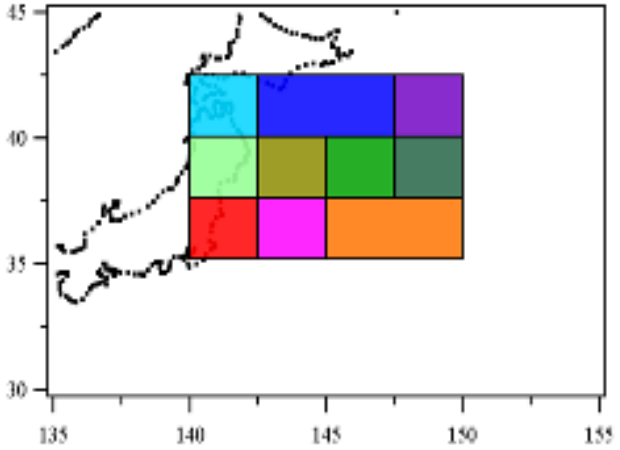
7月の雲粒有効半径(2001~2004)

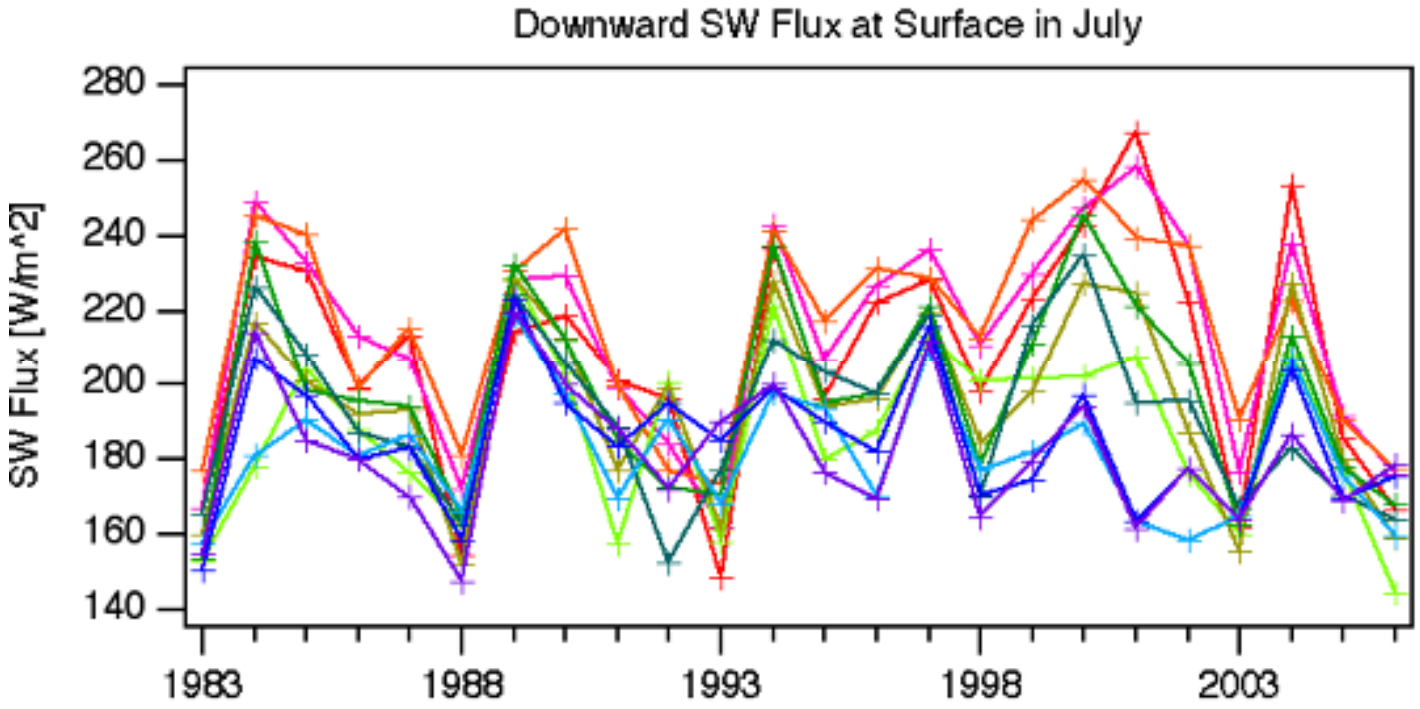


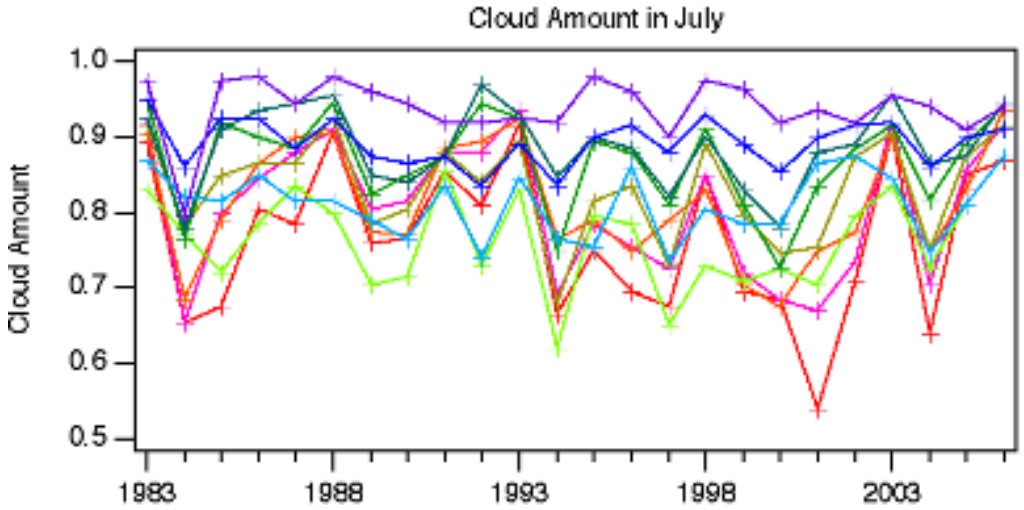
鉛直積算雲水量（2000年7月）



ヤマセ領域の7月の日射量の
年々変動（ISCCP-FDによる）

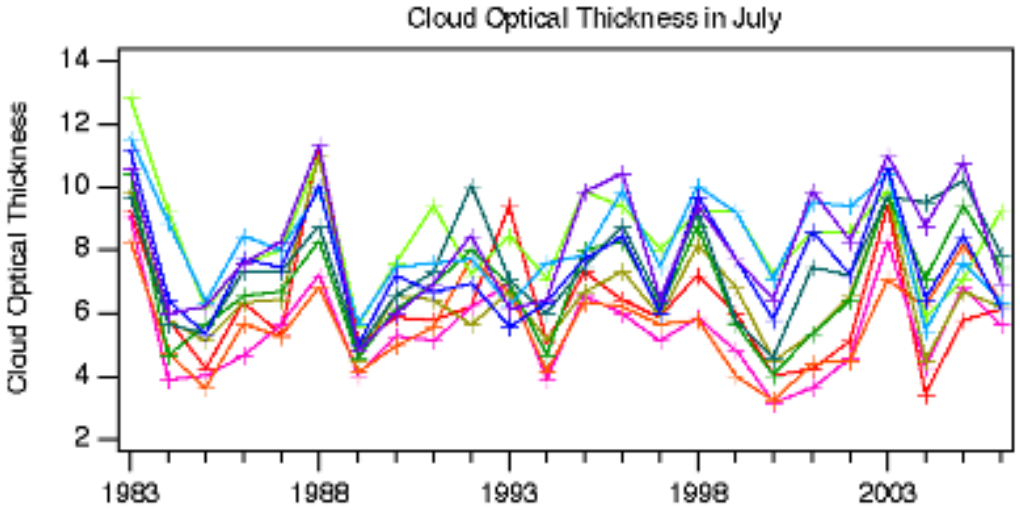


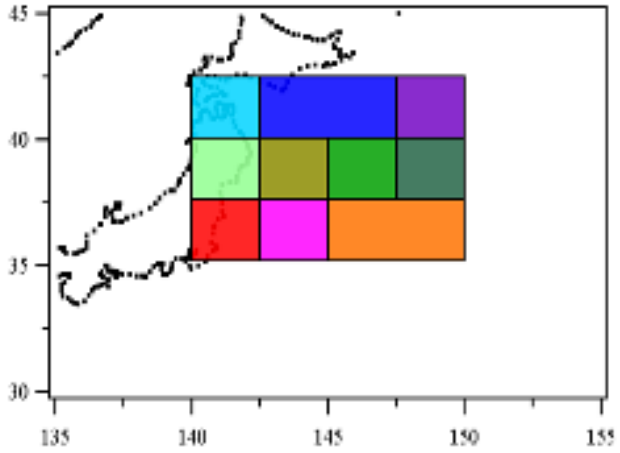


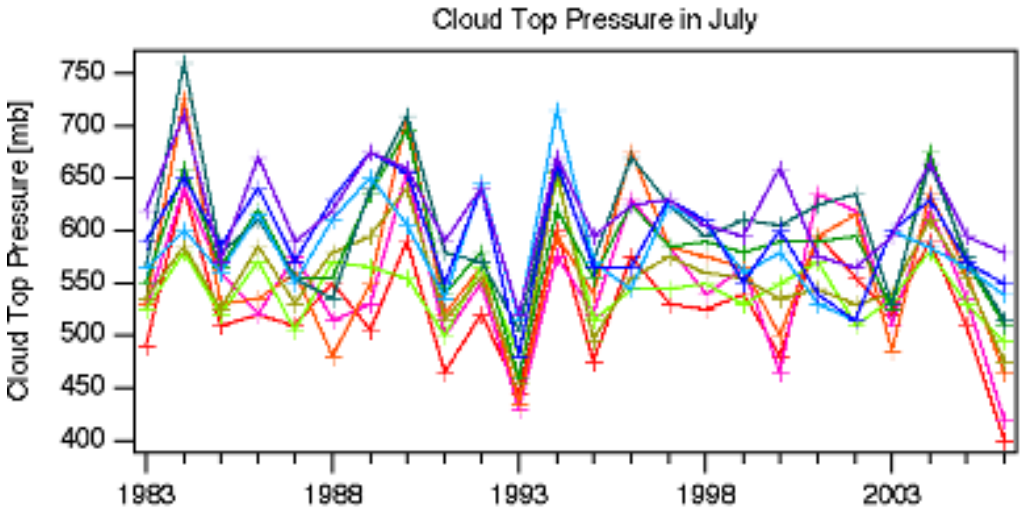


ヤマセ領域の
7月の雲量と
光学的厚さの
年々変動

(ISCCP)

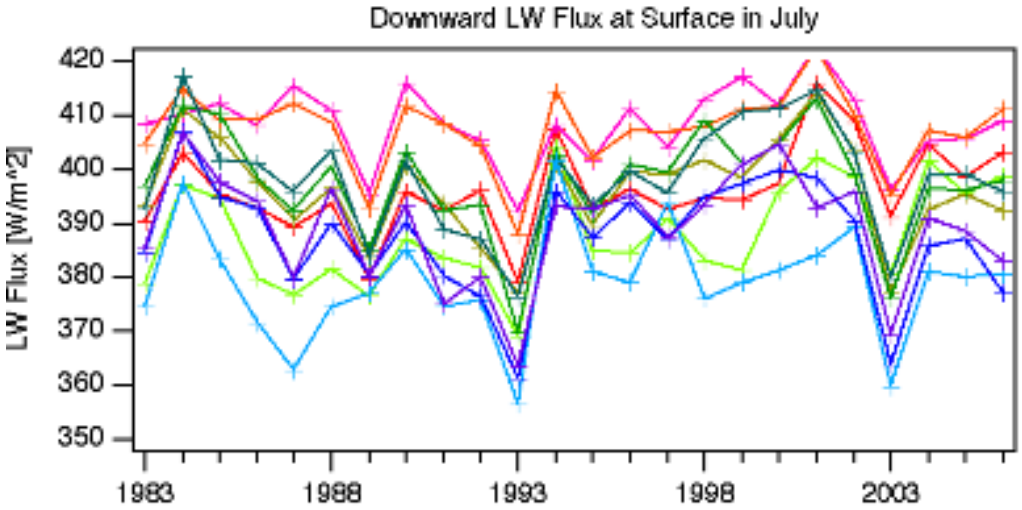


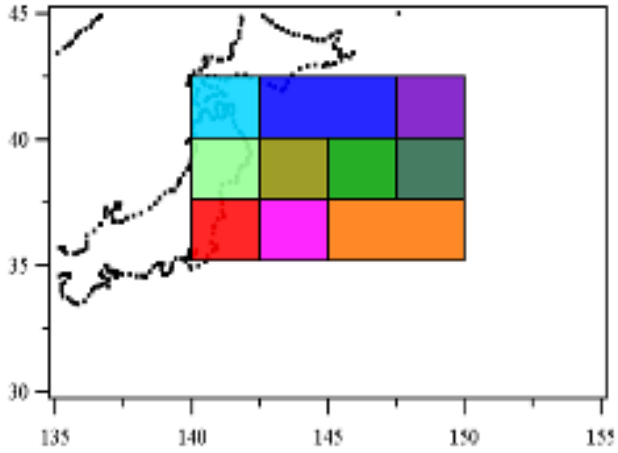




ヤマセ領域の7月の雲頂気圧と地表面下向き長波放射の年々変動

(ISCCP)





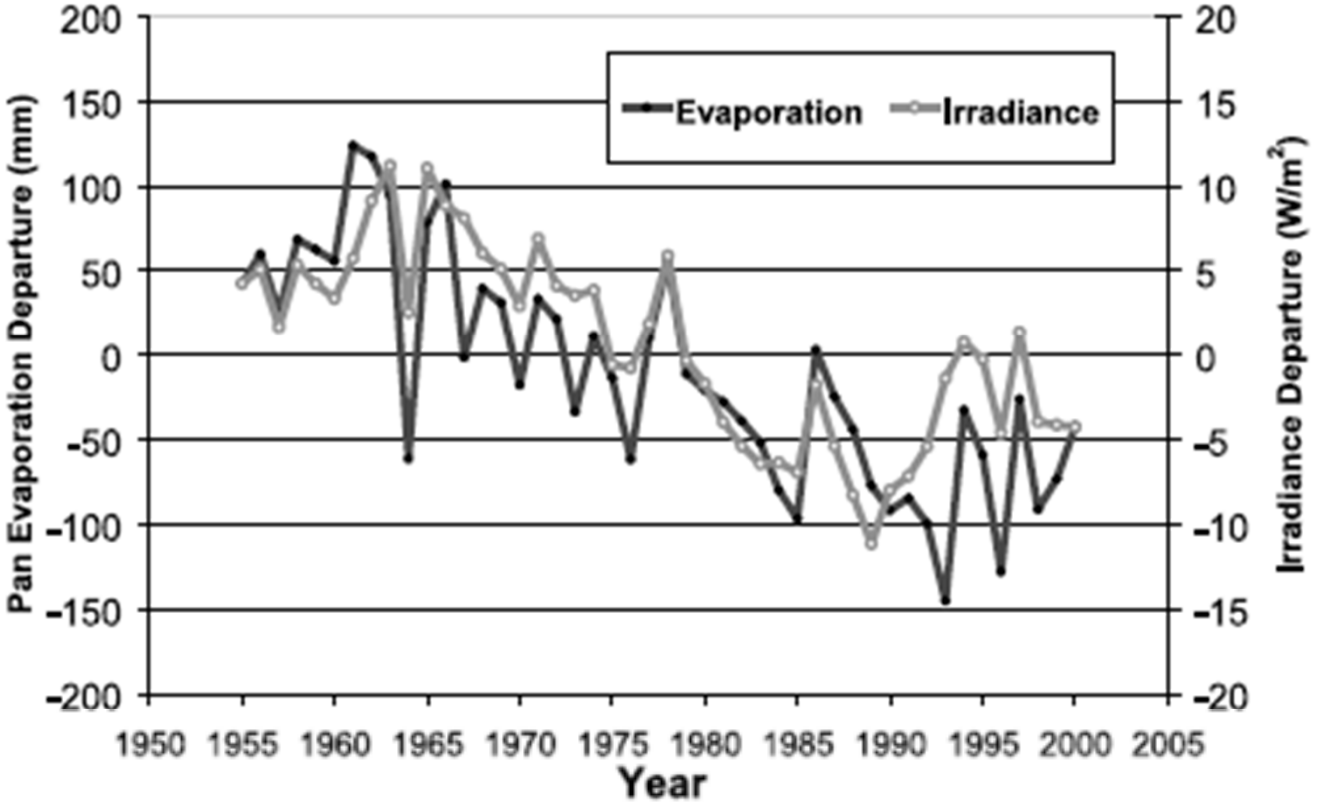


Figure 2. Time series of annual departures of pan evaporation and solar irradiance for 1955–2000, averaged over all stations in China.

Qian et al. (2006)

A-Train

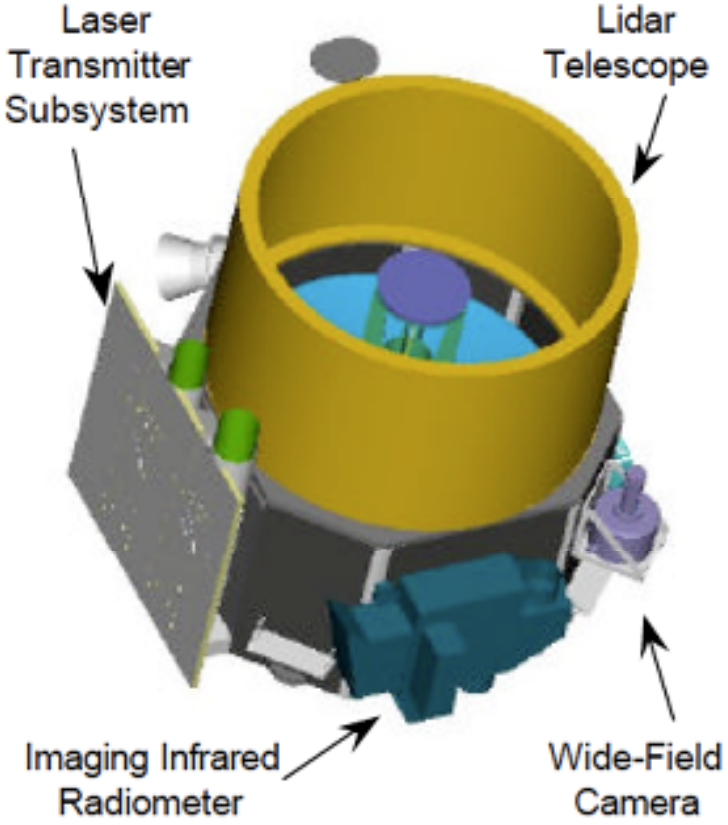


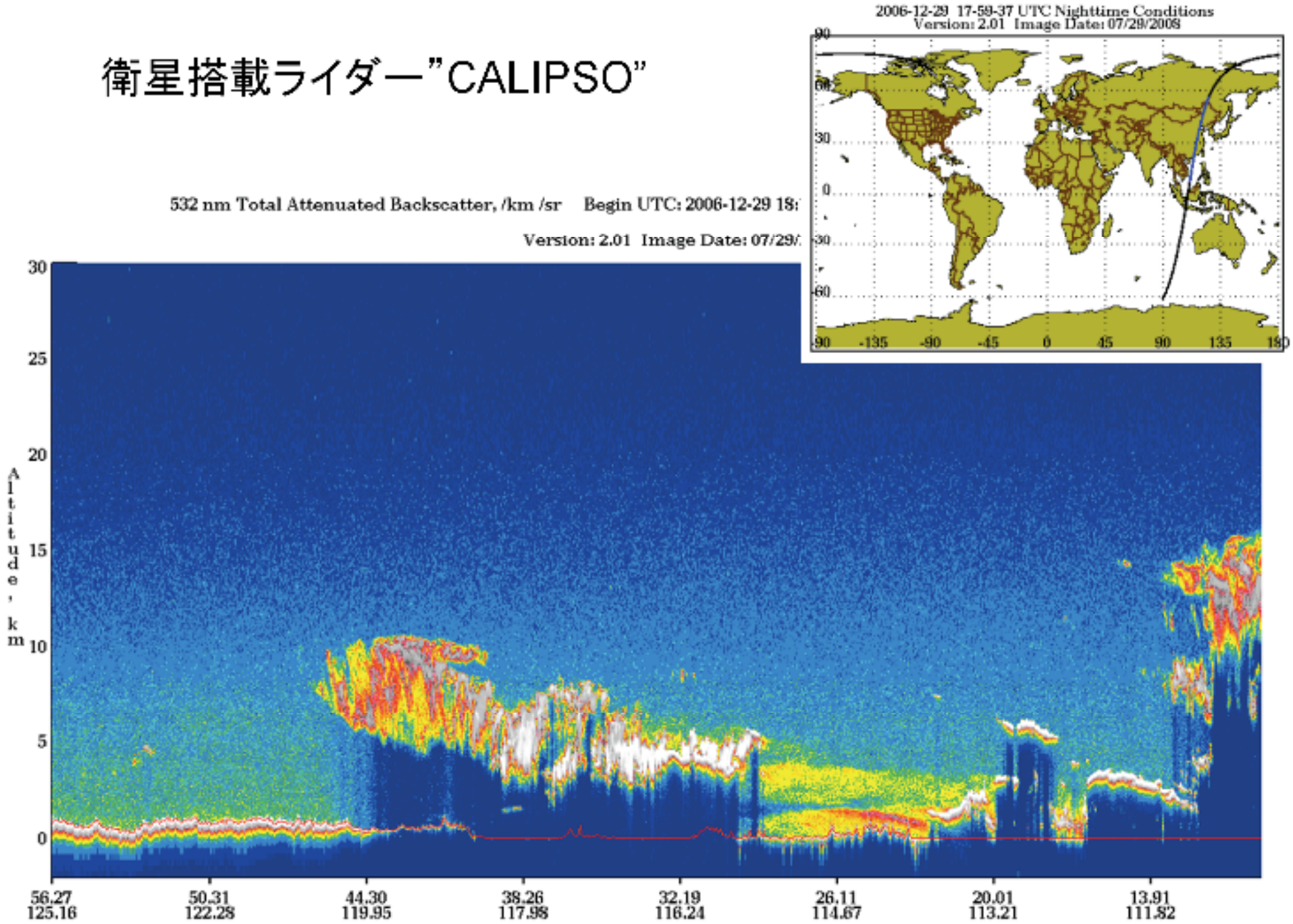
Figure 1. The CALIPSO Payload.

Characteristic	Value
CALIOP	
wavelengths	532 nm, 1064 nm
polarization	532 nm, || and ⊥
pulse energy	110 mJ each wavelength
footprint	100 m
vertical resolution	30-60 m
horizontal resolution	333 m
WFC	
wavelength	645 nm
spectral bandwidth	50 nm
IFOV/swath	125 m/ 61 km
IIR	
wavelengths	8.65 μm,10.6 μm,12.0μm
spectral resolution	0.6 μm – 1.0 μm
IFOV/swath	1 km/64 km

Table 2. CALIPSO Instrument Characteristics

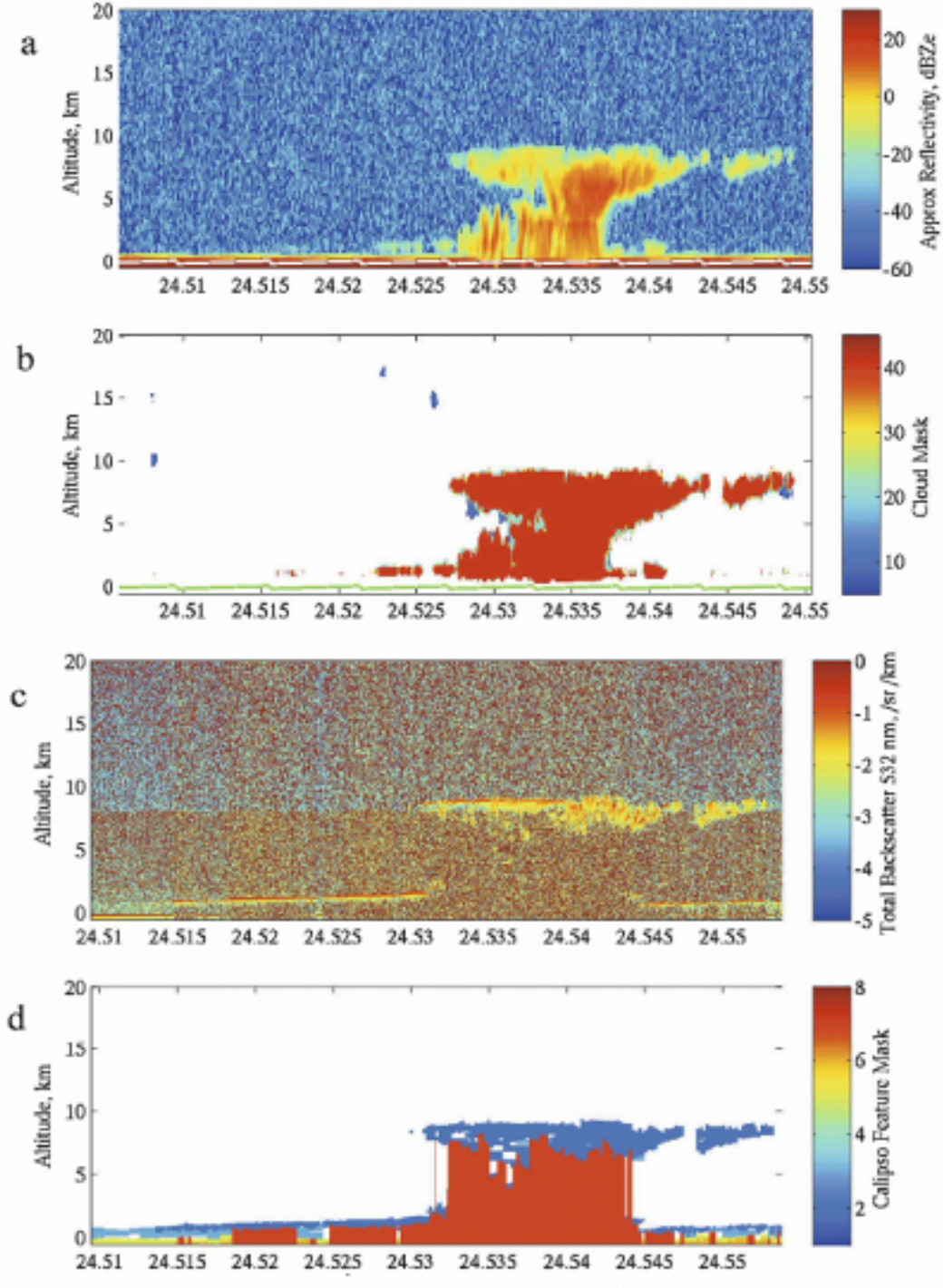
its

衛星搭載ライダー”CALIPSO”



Cloudsat
CALIPSOも低層雲の観測には限界がある。

(Marchand et al., 2008)



GEWEX Cloud System Studies (Randall et al., BAMS2004)

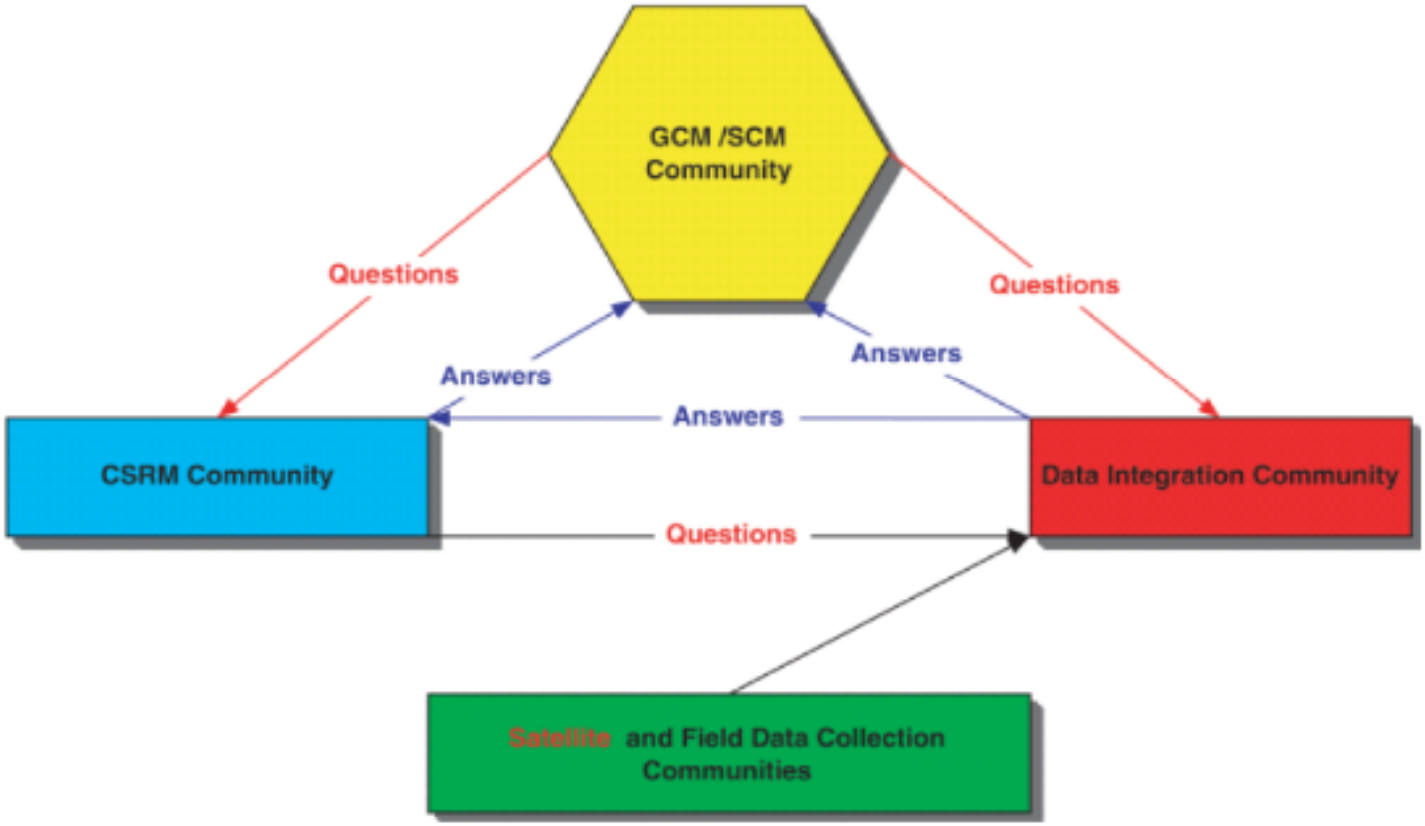
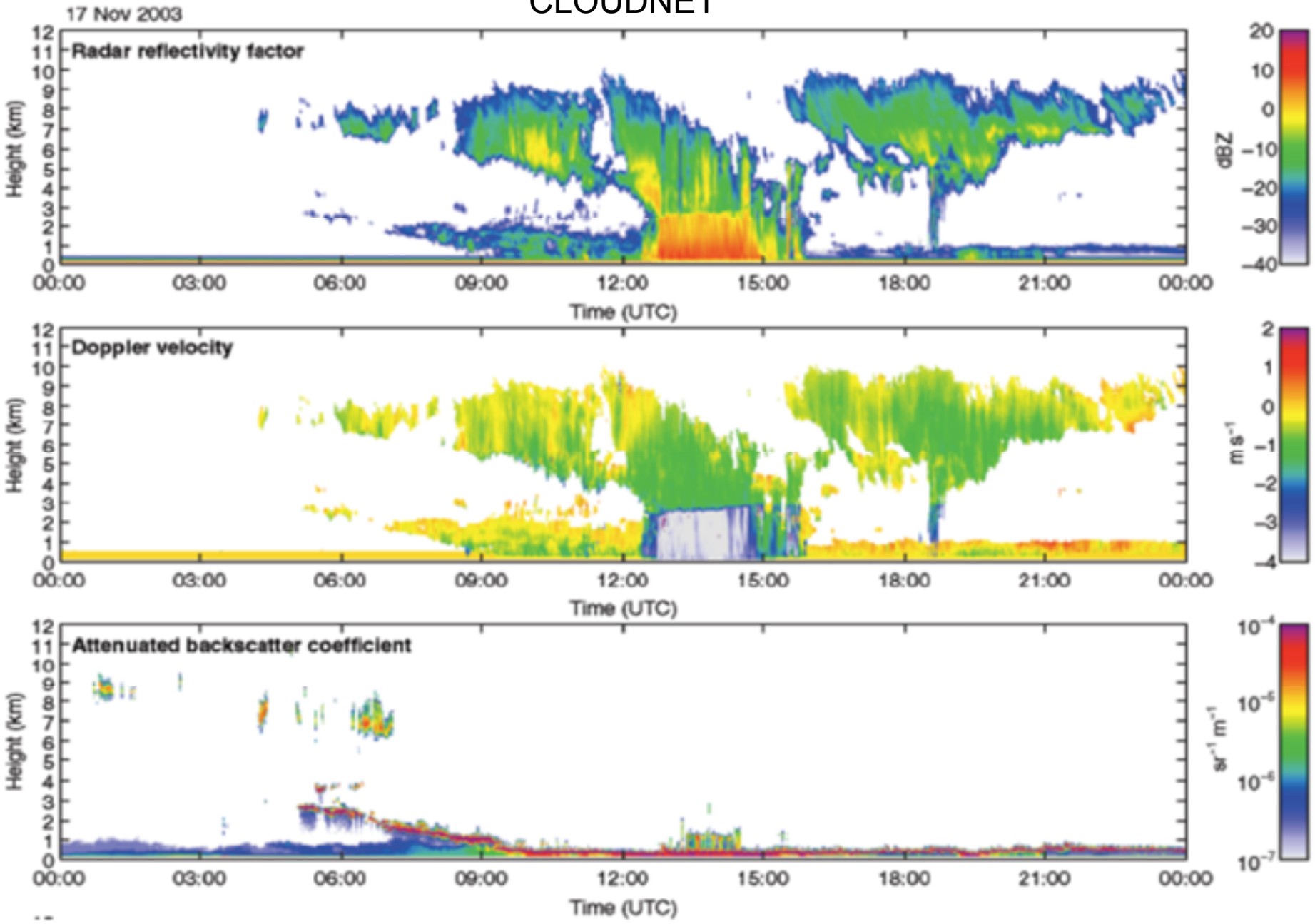


FIG. 5. A revised GCSS process; cf. Fig. 4. The key differences from Fig. 4 are indicated by the red and blue items in the present figure. Satellite data are recognized as having an importance comparable to that of field data. Data integration is now recognized as a key activity distinct from the others. The scientific questions that are posed in the process of parameterization development are now shown to originate within the GCM/SCM community and/or the CSRM community. Answers to these questions are obtained through the use of CSRMs together with data.

研究課題

- 雲微物理特性（雲粒粒径分布、雲水量等）
- 雲・放射収支の詳細な時空間スケール変動→３次元構造、３次元放射特性？
- 北太平洋全域スケールの雲・放射収支の変動
- 雲・放射収支の長期変動→全球気候変動との関係
- 放射収支と海面熱収支の関係→雲の生成、維持、消滅
- その他

CLOUDNET



Illingworth et al. (2007)

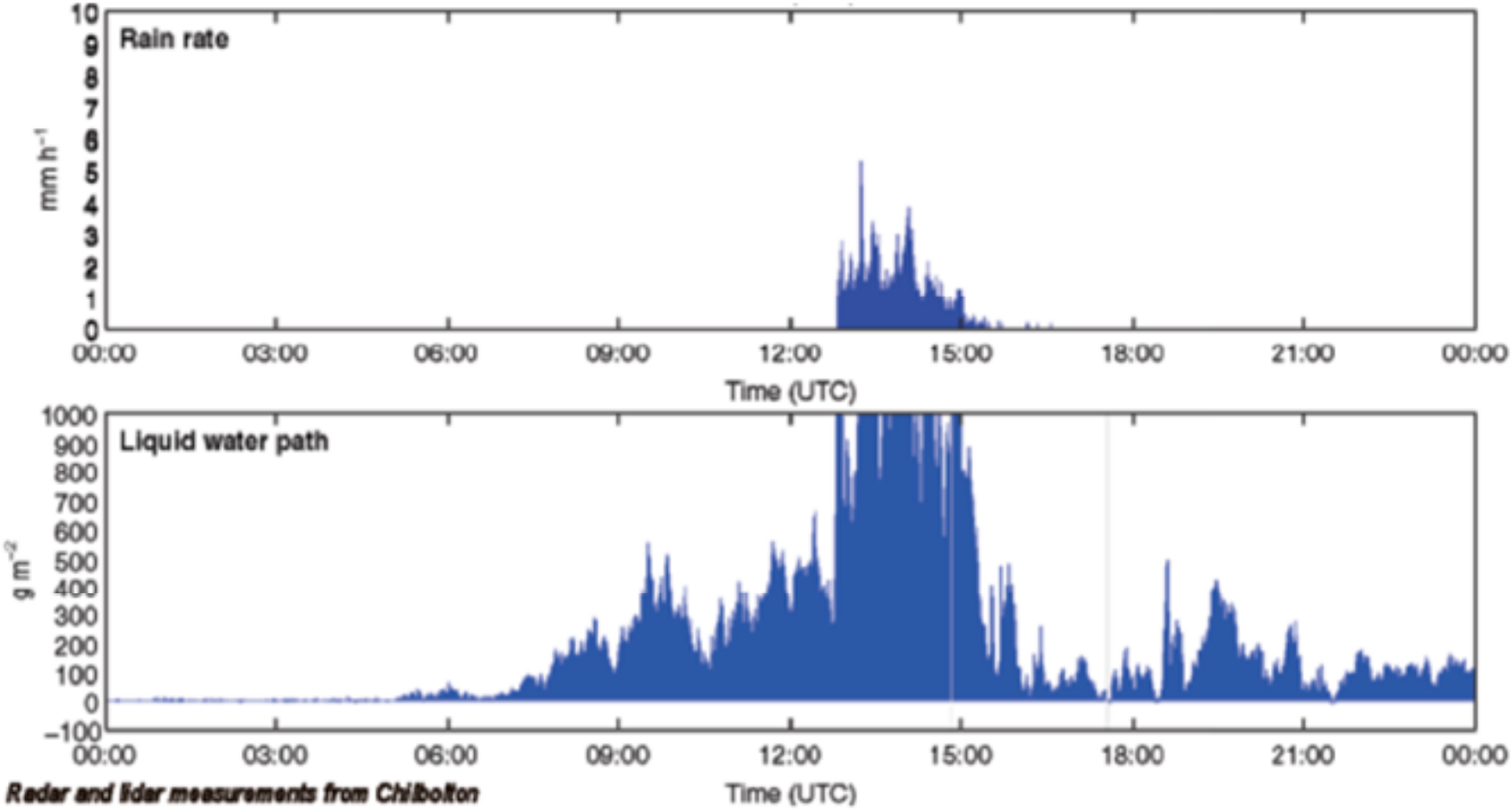


FIG. 2. One day's calibrated observations at 30-s resolution from Cloudnet: 17 Nov 2003, Chilbolton.

Illingworth et al. (2007)

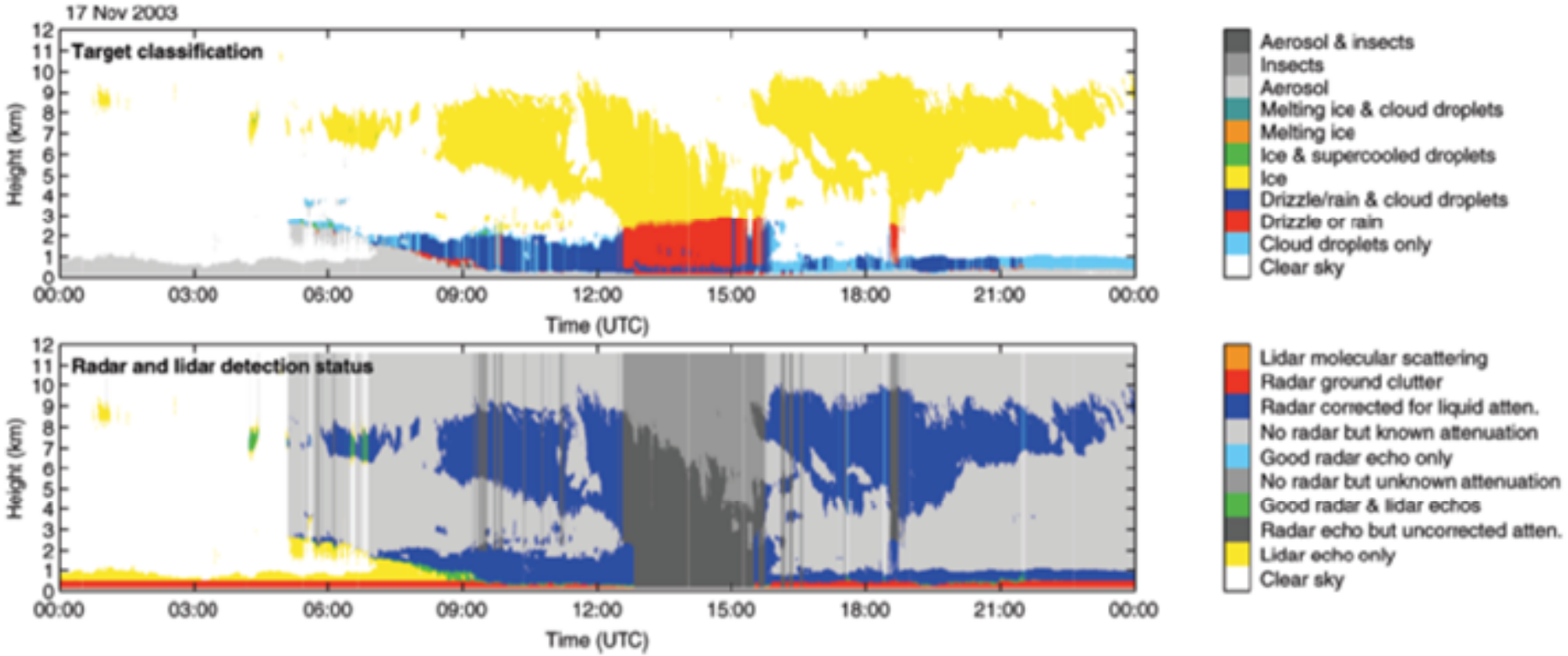


FIG. 3. An example of the classification of the targets in Fig. 2 and the data quality field from Chilbolton for 17 Nov 2003, as held in the instrument synergy/target categorization dataset of Table 2 (Hogan and O'Connor 2006).

Illingworth et al. (2007)