

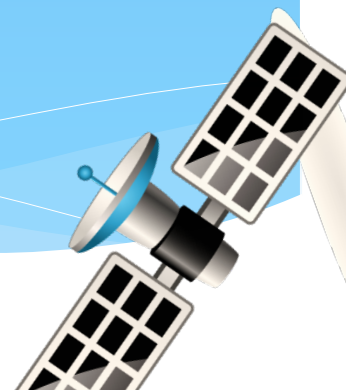
地球同步衛星之可見光及紅外線 頻道衍生產品

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中央氣象局 氣象衛星中心¹

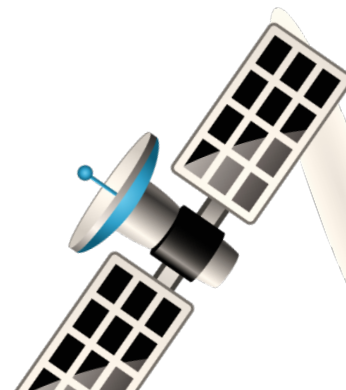
NOAA/NESDIS Center for Satellite Applications and Research (STAR)²

資拓宏宇國際股份有限公司³



衛星影像的新變革

- * 新一代的地球同步衛星
 - * 日本的向日葵8號衛星 HIMAWARI-8
 - * Advanced Himawari Imager (AHI)
- * 地球同步衛星的衍生產品
 - * The Clouds from AVHRR Extended (CLAVRx) processing system
 - * NOAA的Dr. Heidinger提供協助




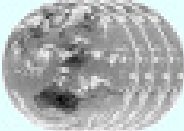
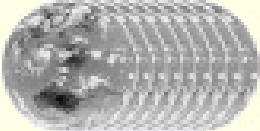


Enhancement of Himawari-8/9's observation function over that of MTSAT-1R/2

Higher spatial resolution

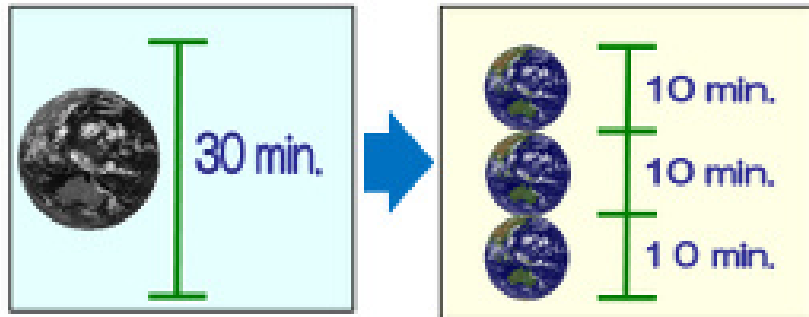
MTSAT-1R/2 VIS 1km IR 4km	➔	Himawari-8/9 VIS 0.5 - 1km NIR 1 - 2km IR 2km
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More spectral bands

	MTSAT-1R/2	➔	Himawari-8/9
VIS	1 band (black/white image) 		3 bands (color image) 
NIR	N/A		3 bands 
IR	4 bands 		10 bands 
	5 bands		16 bands

More frequent observation

Full disk observation with 10-minute intervals



Rapid scan observation

New

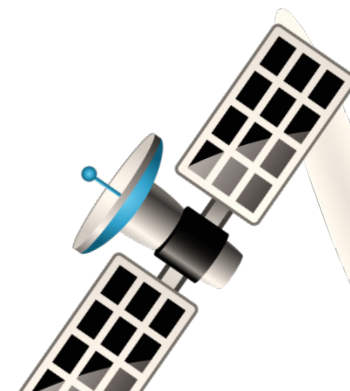
Every **2.5 minutes**
around Japan

AHI Band	Central Wavelength [μm]	Type	FOV [km]	Nickname
1	0.47	Vis	1	Blue
2	0.51	Vis	1	Green
3	0.64	Vis	0.5	Red (traditional visible)
4	0.86	NIR	1	Vegetation
5	1.6	NIR	2	Snow/Ice
6	2.3	NIR	2	Cloud-top phase
7	3.9	IR	2	Shortwave IR window
8	6.2	WV	2	Upper-level tropospheric water vapor
9	6.9	WV	2	Upper/mid-level tropospheric water
10	7.3	WV	2	Lower mid-level water vapor
11	8.6	IR	2	Cloud-top phase
12	9.6	IR	2	Ozone (total)
13	10.4	IR	2	Clean IR longwave window
14	11.2	IR	2	Traditional IR longwave window
15	12.4	IR	2	“Dirty” longwave window
16	13.3	IR	2	CO ₂ longwave

Advanced Himawari Imager (AHI)搭載於HIMAWARI-8上，相較於上一代衛星能力提升許多：

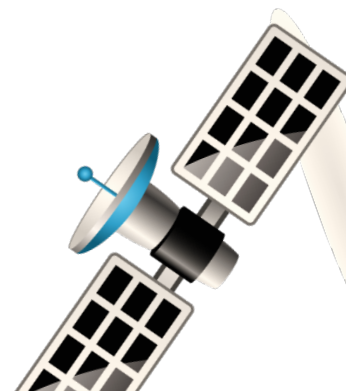
- 頻道數增加
- 空間解析度增加
- 時間解析度增加

HIMAWARI衛星各頻道資訊

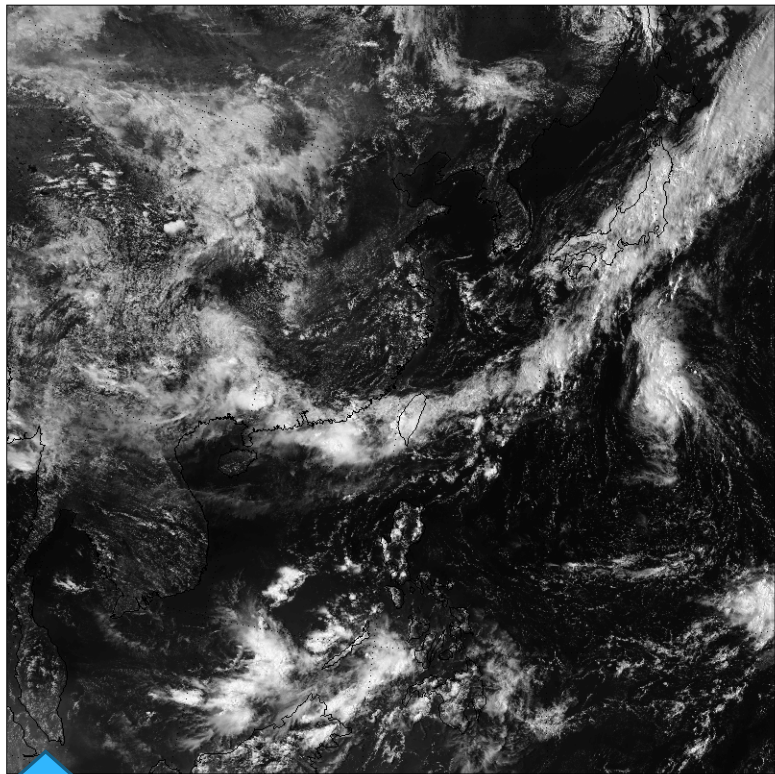


同步衛星的衍生產品

- * 定性的分類
 - * 雲遮 Cloud Mask
 - * 雲頂相態 Cloud Phase和雲類Cloud Type
- * 定量的估計
 - * 雲頂溫度
 - * 雲頂高度、雲頂氣壓
- * 雲的光學和物理特性
 - * 雲光學厚度、雲放射率、雲滴有效半徑



CWB CLAVRx HIMAWARI-8 VIS 2015-09-07 06:00

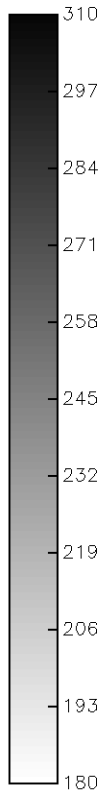
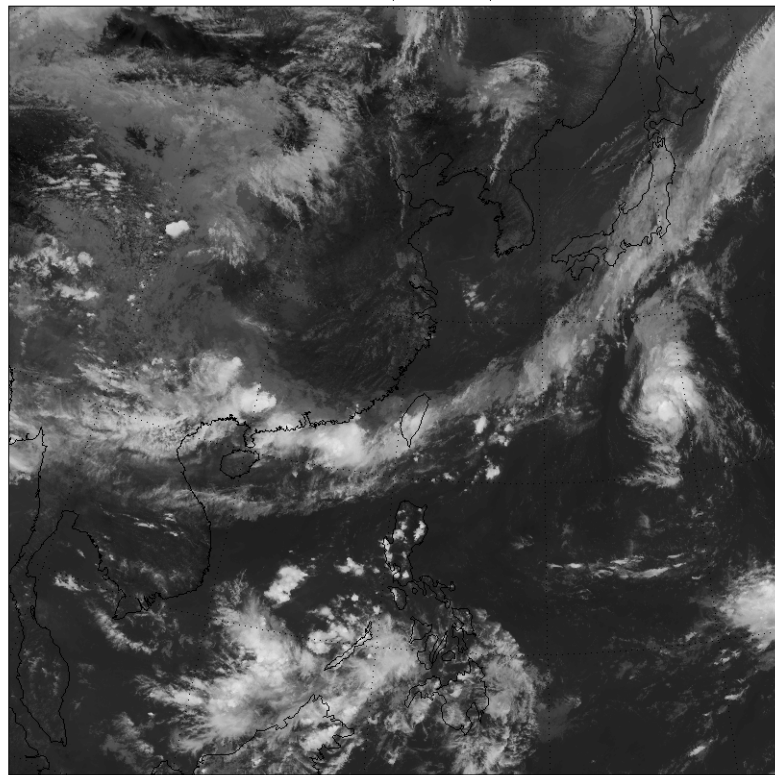


HIMAWARI-8 B03頻道，波長0.64um

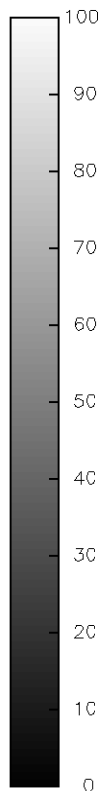
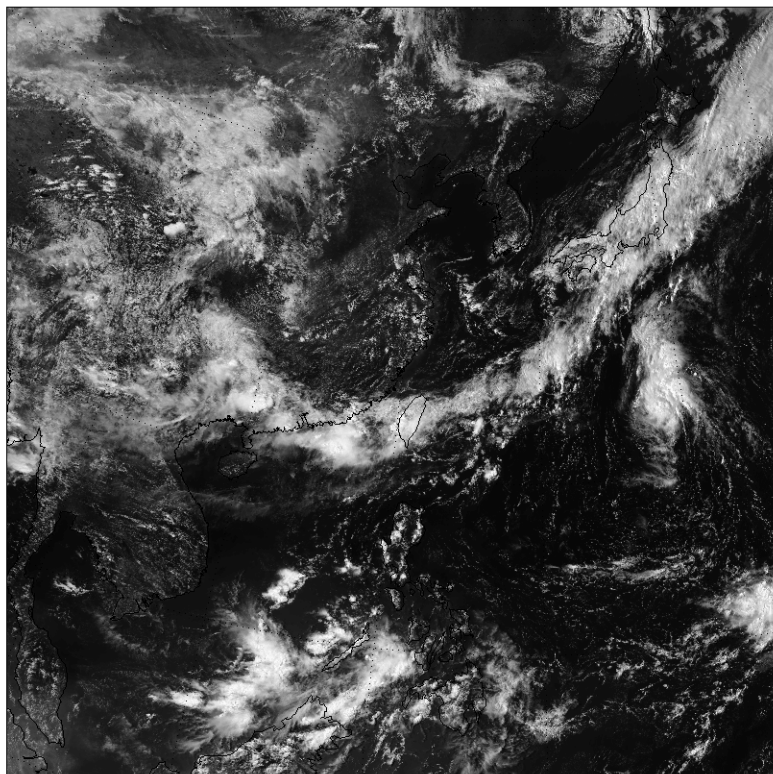


HIMAWARI-8 B13頻道，波長10.4um

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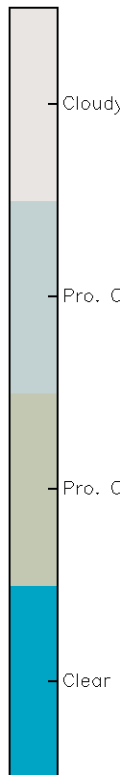
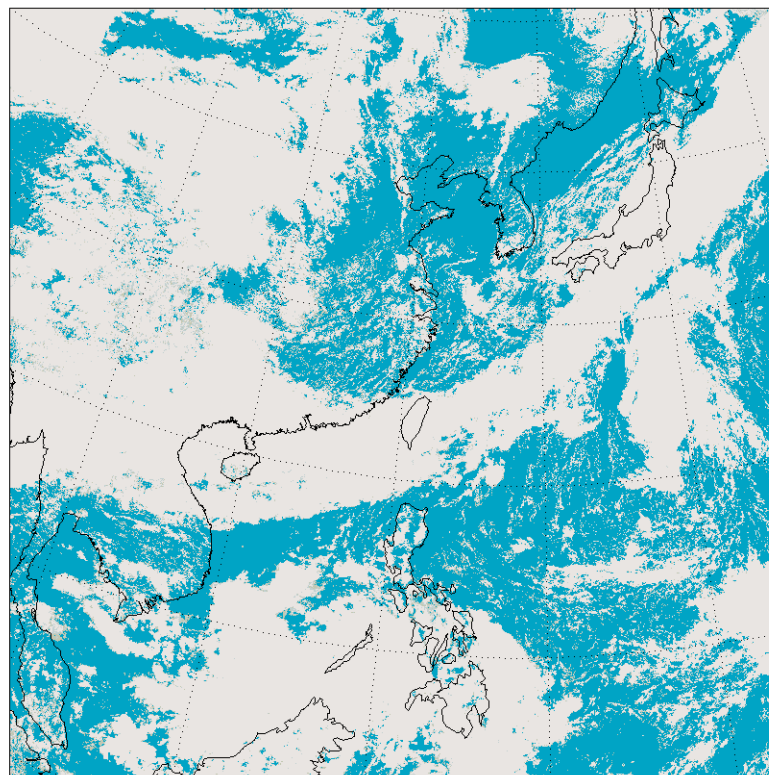
CWB CLAVRx HIMAWARI-8 VIS 2015-09-07 06:00



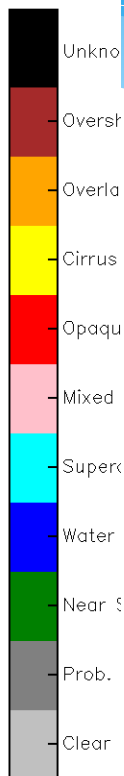
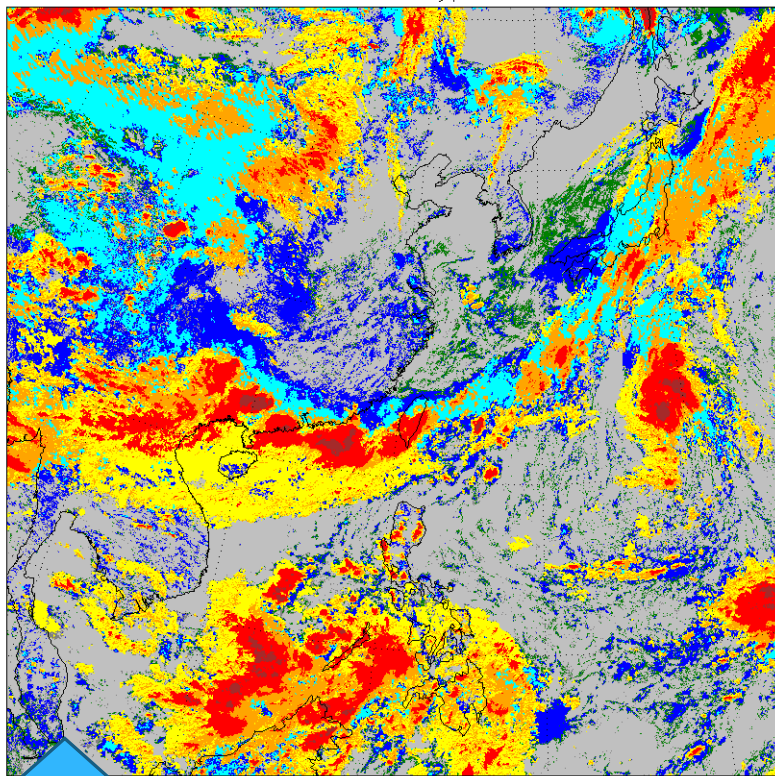
雲遮為將衛星資料區分為有雲(cloudy)和晴空(clear)，其中有些不太容易分辨的部份可分為可能有雲(Probably-cloudy)和可能晴空(Probably-clear)。



CWB CLAVRx Himawari-8 Cloud Mask 2015-09-07 06:00

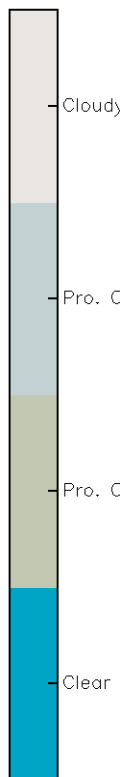
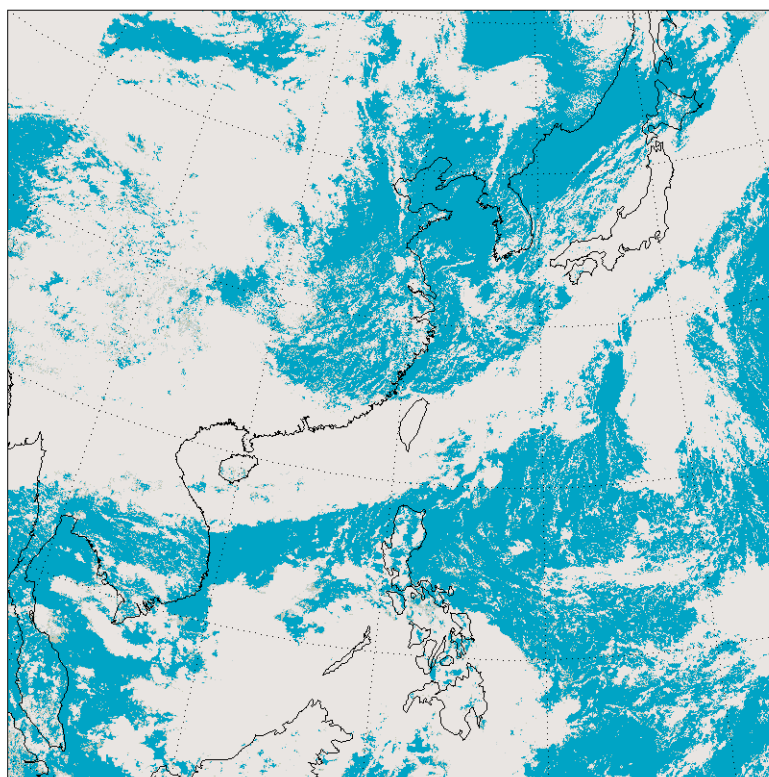


CWB CLAVRx Himawari-8 Cloud Type 2015-09-07 06:00

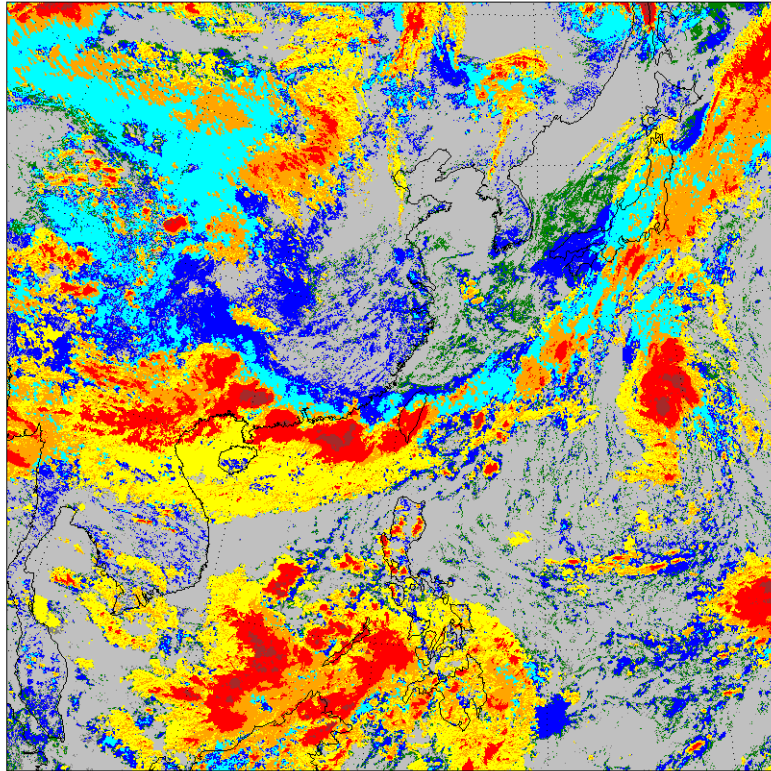


Cloud Type 將有雲的部分分為近地面的低雲 (Near Surface Cloud)、水雲 (Water)、過冷水 (Supercool Water)、不透明冰雲 (Opaque Ice)、卷雲 (Cirrus)、雙層雲 (Overlapping) 及過衝雲 (Overshooting)。

CWB CLAVRx Himawari-8 Cloud Mask 2015-09-07 06:00



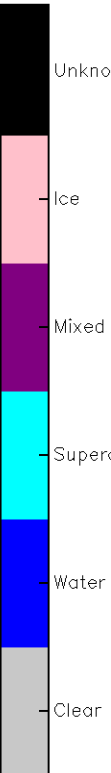
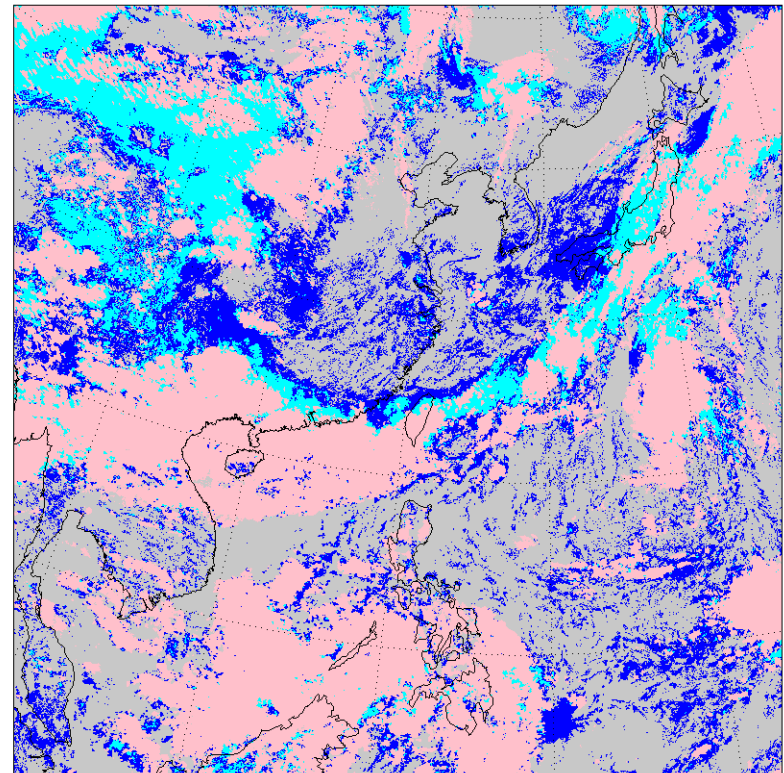
CWB CLAVRx Himawari-8 Cloud Type 2015-09-07 06:00



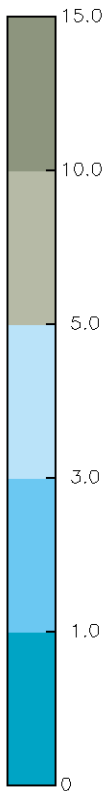
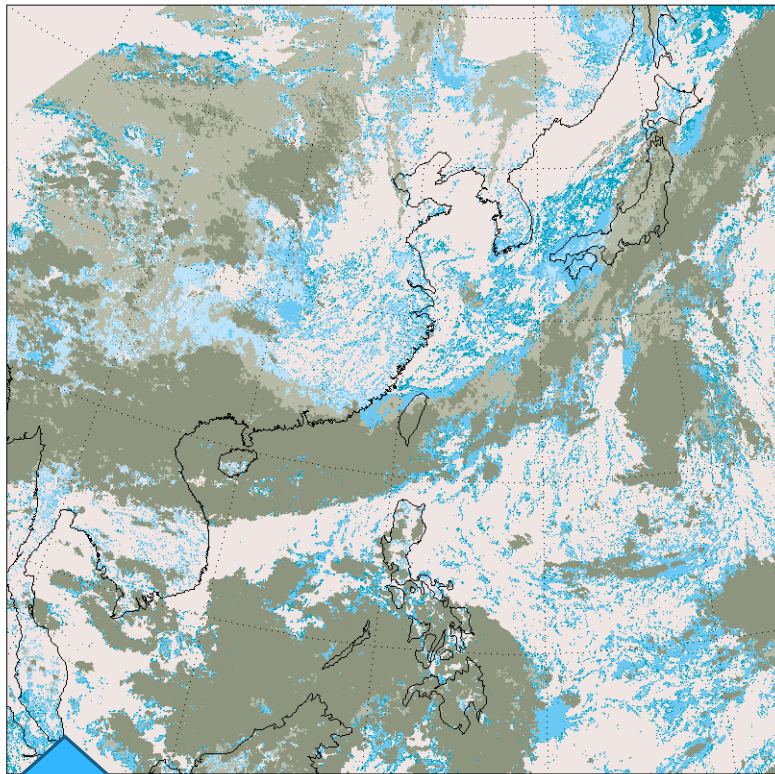
雲頂的相態 (Cloud Type) 將雲頂區分為水 (Water)、冰 (Ice) 和過冷水 (Supercool) 三類。



CWB CLAVRx Himawari-8 Cloud Phase 2015-09-07 06:00



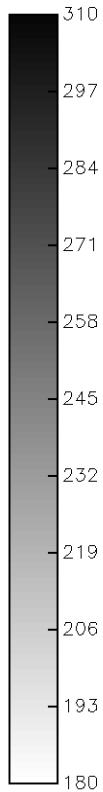
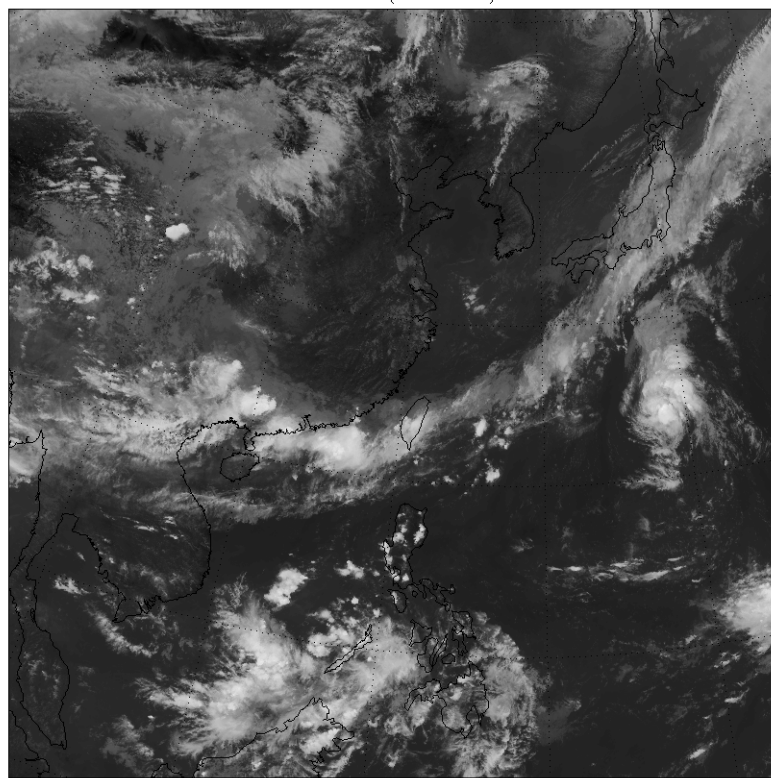
CWB CLAVRx Himawari-8 Cloud Top Height 2015-09-07 06:00



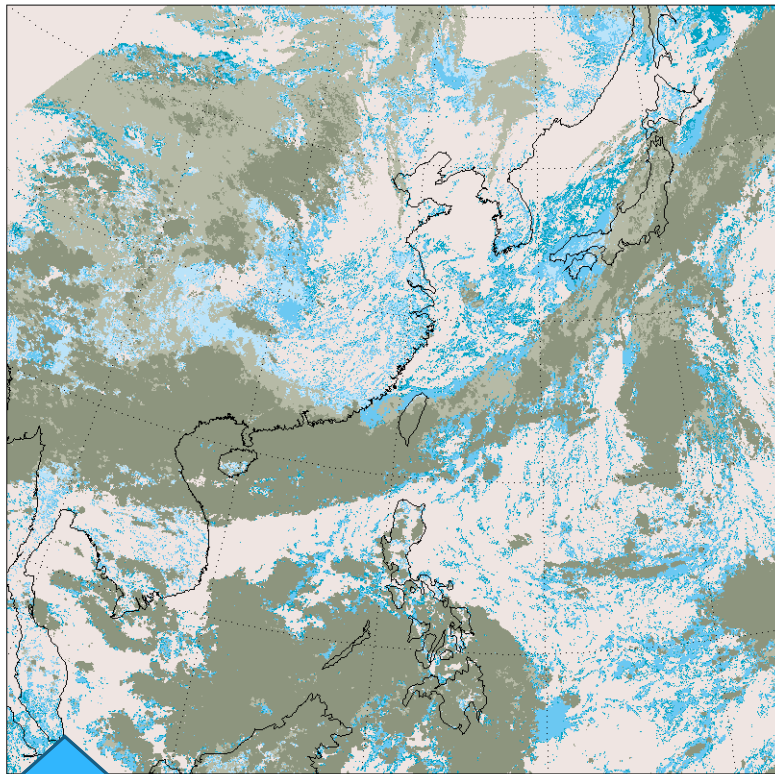
雲頂高度，單位：公里



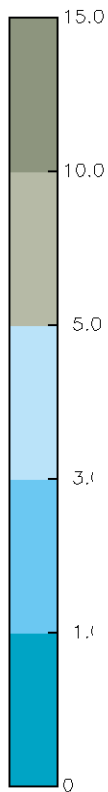
CWB CLAVRx HIMAWARI-8 IR1 (11um) 2015-09-07 06:00



CWB CLAVRx Himawari-8 Cloud Top Height 2015-09-07 06:00

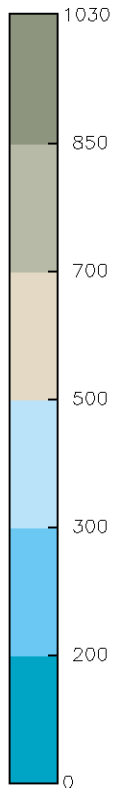
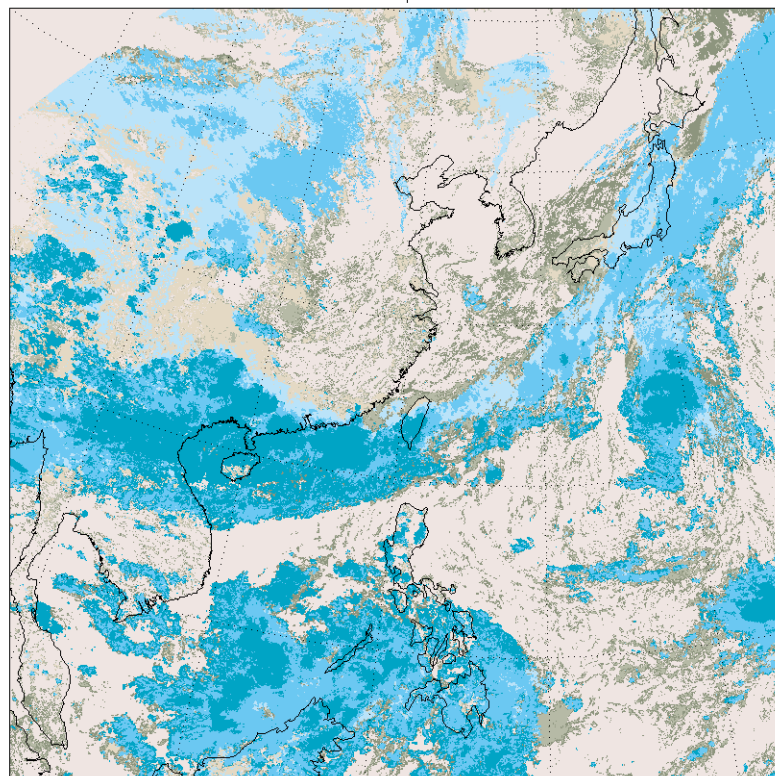


雲頂高度，單位：公里

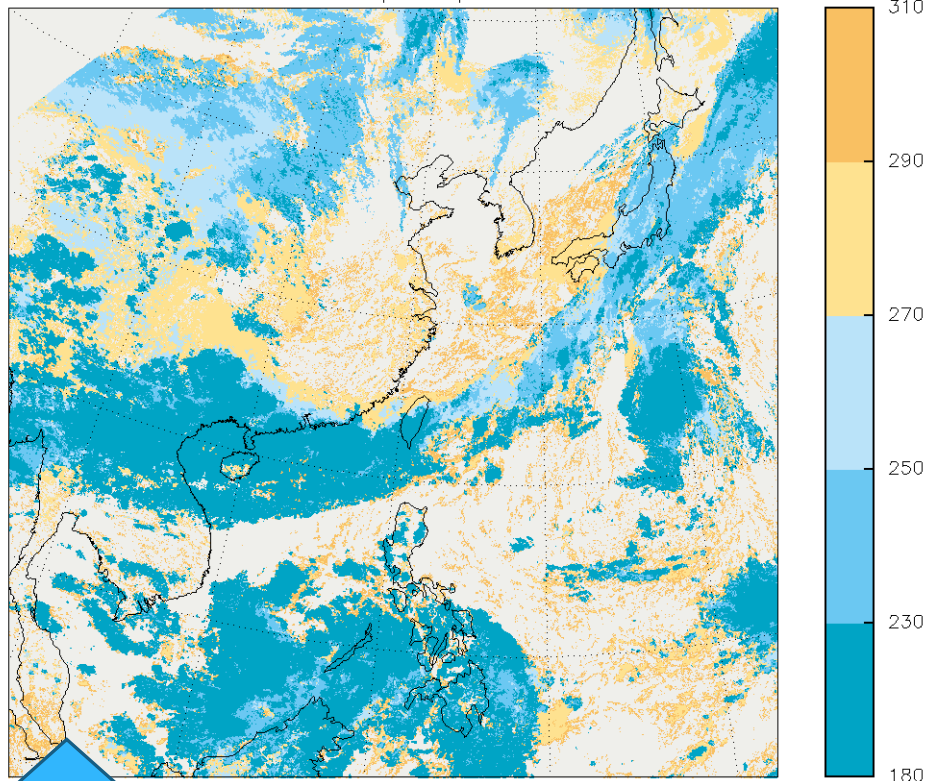


↓ 雲頂氣壓，單位：百帕

CWB CLAVRx Himawari-8 Cloud Top Pressure 2015-09-07 06:00



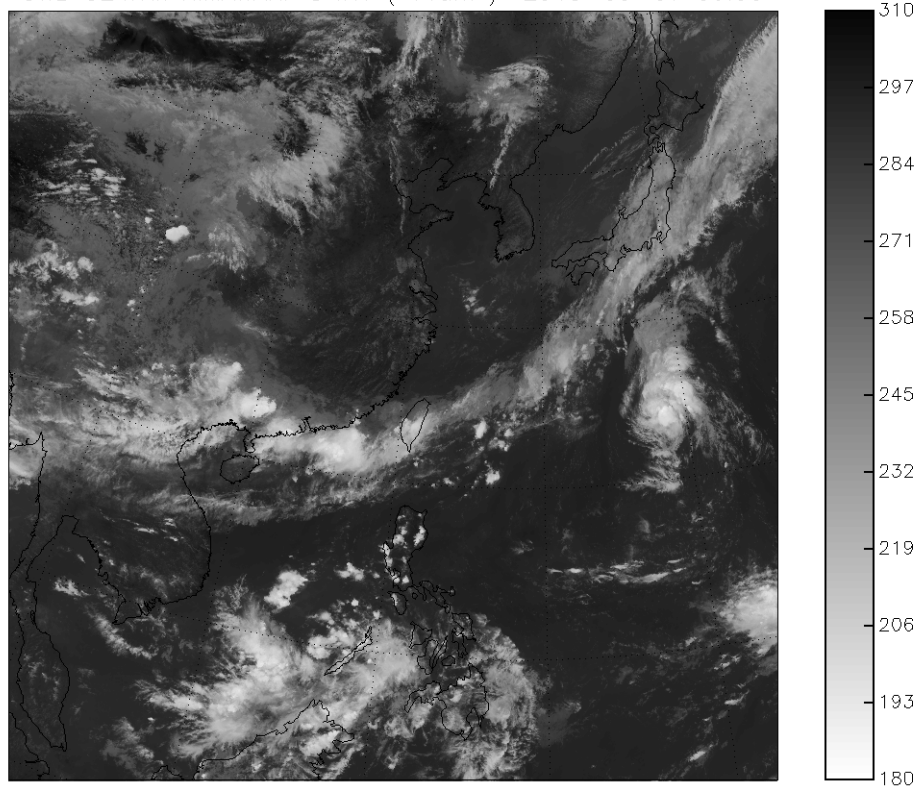
CWB CLAVRx Himawari-8 Cloud Top Temperature 2015-09-07 06:00



雲頂溫度有別於紅外線頻道的亮度溫度，是雲頂所在高度的實際溫度，若雲厚且結實，完全阻擋進下層紅外輻射向上传遞，則衛星觀測的亮度溫度接近實際的雲頂溫度。若雲呈現半透明，地表的長波輻射穿透雲層，則亮度溫度會較雲頂溫度高。

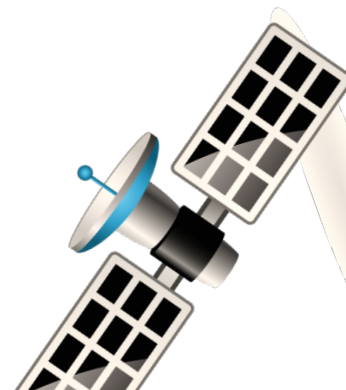


CWB CLAVRx HIMAWARI-8 IR1 (11um) 2015-09-07 06:00



討論

- * 新一代衛星的影響
- * 衍生產品的功用



報告結束

感謝大家耐心聆聽

