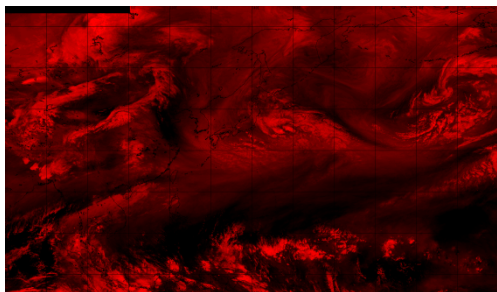


Airmass RGB

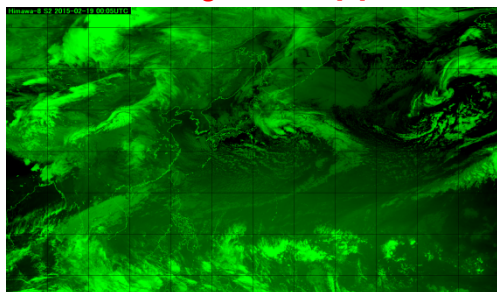
Analysis of air mass and jet stream

Meteorological Satellite Center, JMA

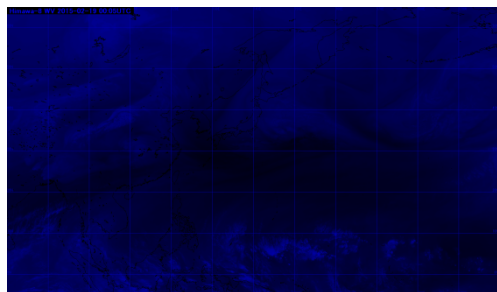
What's Airmass RGB?



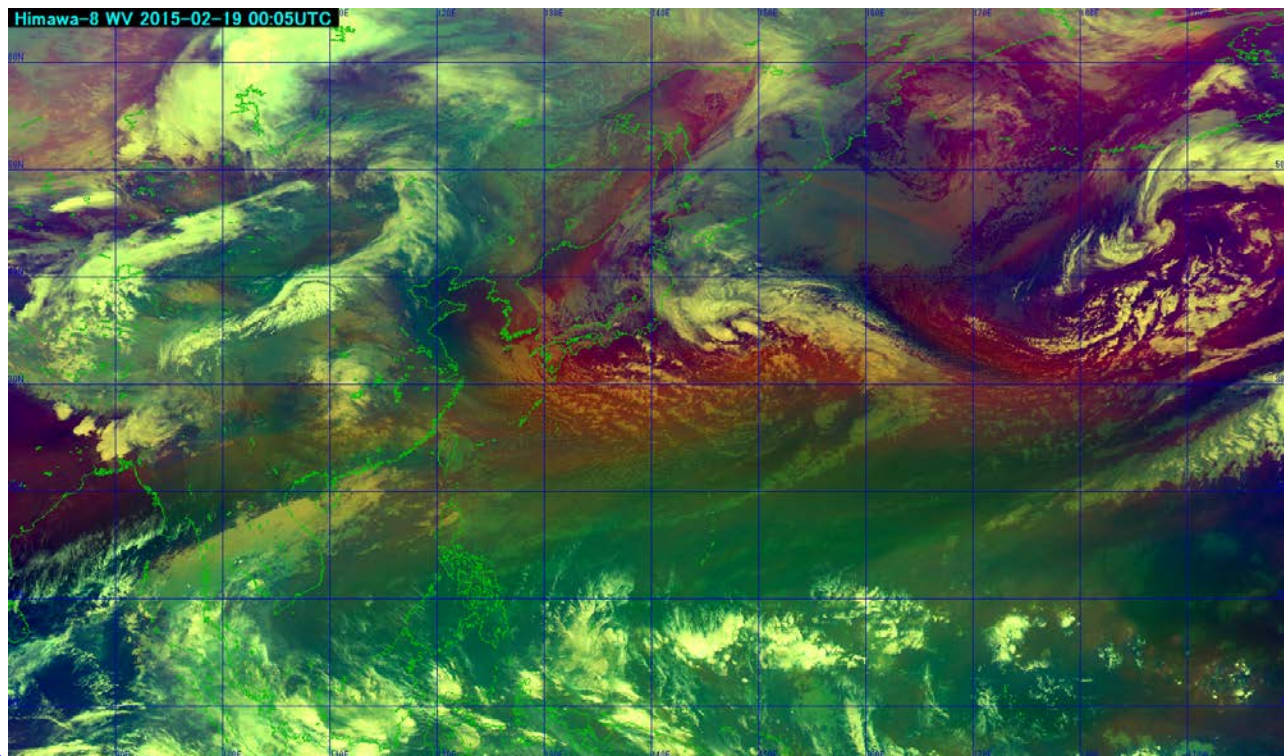
R : B08(WV6.2) – B10(W3 7.3)
Range: -25~0 [K] Gamma: 1.0



G : B12(O3 9.7) – B13 (IR10.8)
Range: -40~5 [K] Gamma: 1.0



B : B08(WV6.2)
Range: 243~208 [K] Gamma: 1.0



Components of "Airmass" RGB

Channel	Himawari-8/ -9	MTSAT-1R/-2	MSG	Physical Properties	
1	0.46 μm			vegetation, aerosol B	Visible
2	0.51 μm			vegetation, aerosol G	
3	0.64 μm	0.68 μm	0.635 μm	low cloud, fog R	
4	0.86 μm		0.81 μm	vegetation, aerosol	Near Infrared
5	1.6 μm		1.64 μm	cloud phase	
6	2.3 μm			particle size	
7	3.9 μm	3.7 μm	3.92 μm	low cloud, fog, forest fire	
8	6.2 μm	6.8 μm	6.25 μm	mid- and upper level moisture	Infrared
9	7.0 μm			mid- level moisture	
10	7.3 μm		7.35 μm	mid- and upper level moisture	
11	8.6 μm		8.70 μm	cloud phase, SO2	
12	9.6 μm		9.66 μm	ozone content	
13	10.4 μm	10.8 μm	10.8 μm	cloud imagery, information of cloud top	
14	11.2 μm			cloud imagery, sea surface temperature	
15	12.3 μm	12.0 μm	12.0 μm	cloud imagery, sea surface temperature	
16	13.3 μm		13.4 μm	cloud top height	

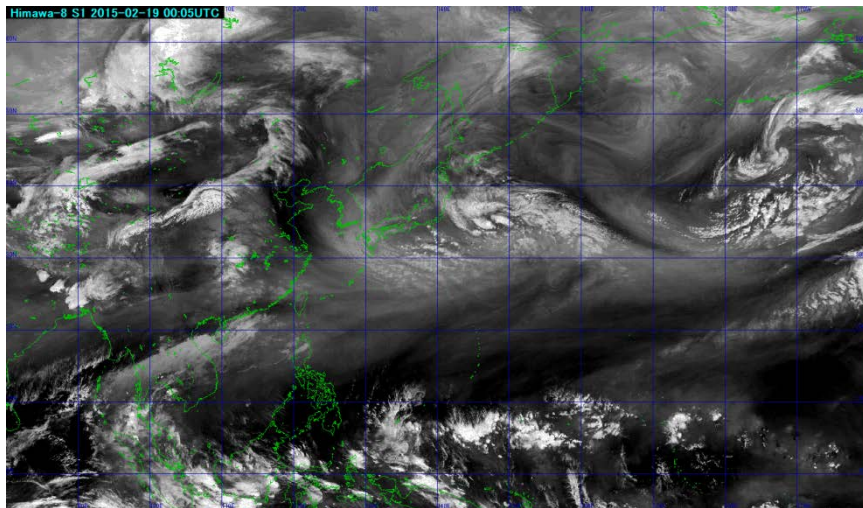
This scheme is displayed by compositing difference of two water vapor channels (B08(WV6.2), B10(W3 7.3)), difference of (absorbing ozone) B12(O3 9.7) and (traditional) IR channel (B13 (IR10.8)), and (traditional) WV channel (B08(WV6.2)).

The Airmass RGB image is available for analysis of air mass and jet stream on the upper layer

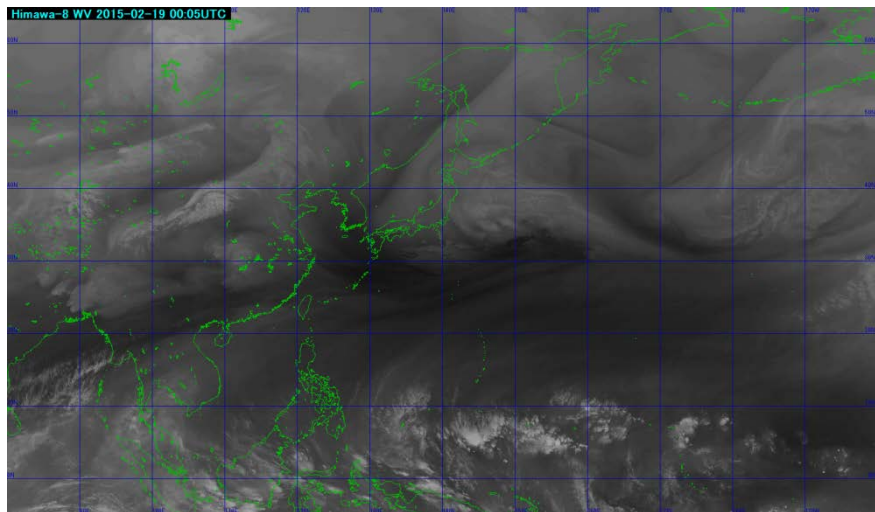
A set of RGB "Airmass" scheme (RGB:B08-B10/B12-B13/B08)

R : B08(WV6.2) – B10(W3 7.3)
 Range: -25~0 [K] Gamma: 1.0
 G : B12(O3 9.7) – B13 (IR10.8)
 Range: -40~5 [K] Gamma: 1.0
 B : B08(WV6.2)
 Range: 243~208 [K] Gamma: 1.0

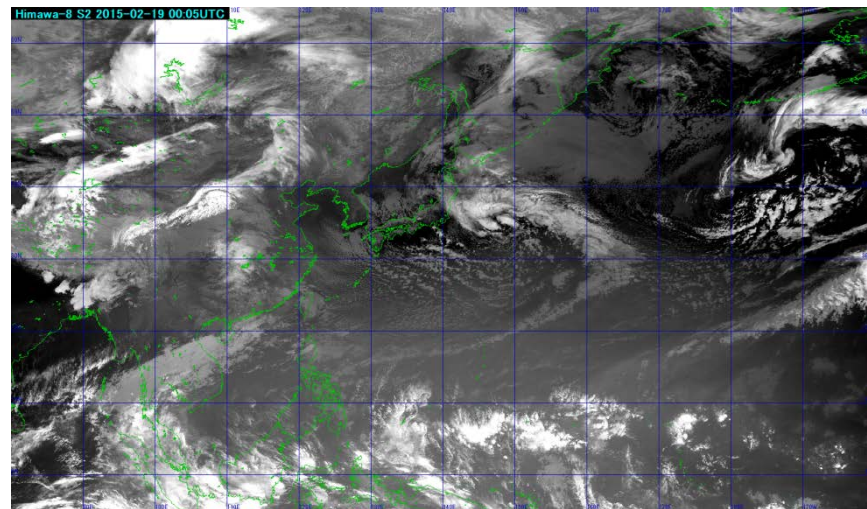
Characteristics and Basis of Three Components



R : B08(WV6.2) – B10(W3 7.3) Range: -25~0 [K] Gamma: 1.0



B : B08(WV6.2) Range: 243~208 [K] Gamma: 1.0

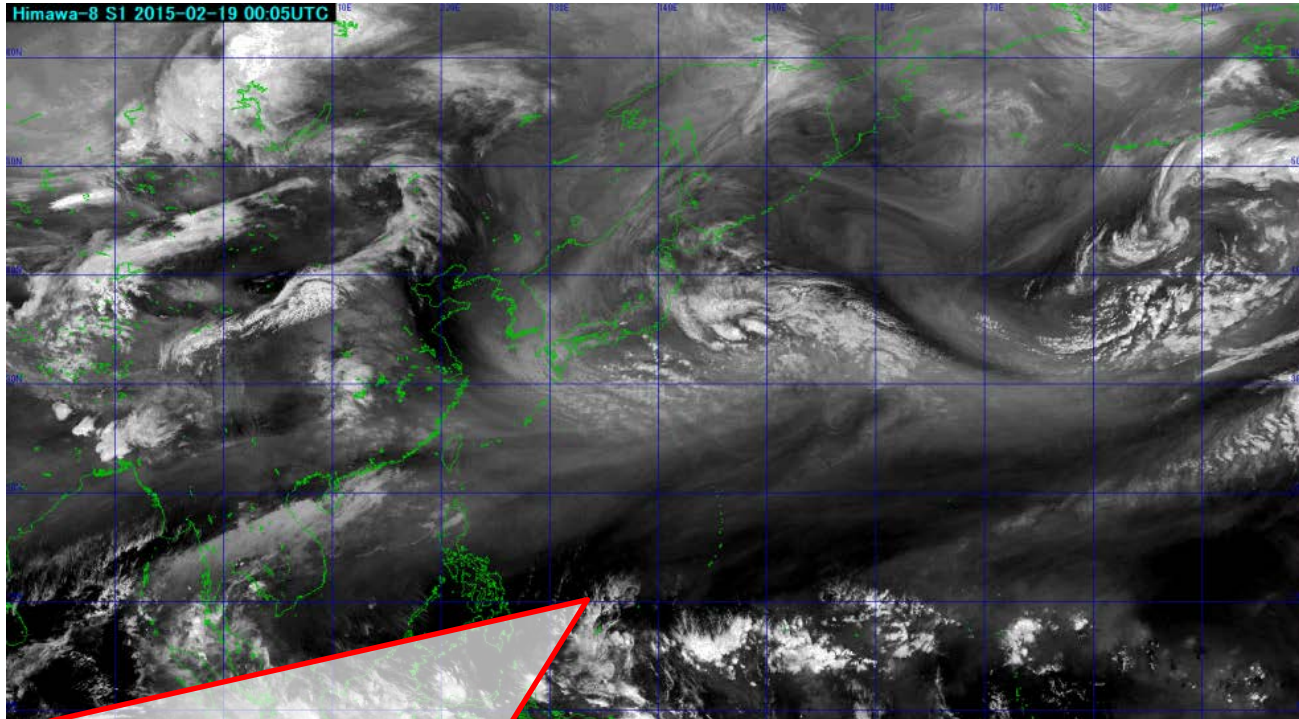


G : B12(O3 9.7) – B13 (IR10.8) Range: -40~5 [K] Gamma: 1.0

Characteristics and Basis of Three Components

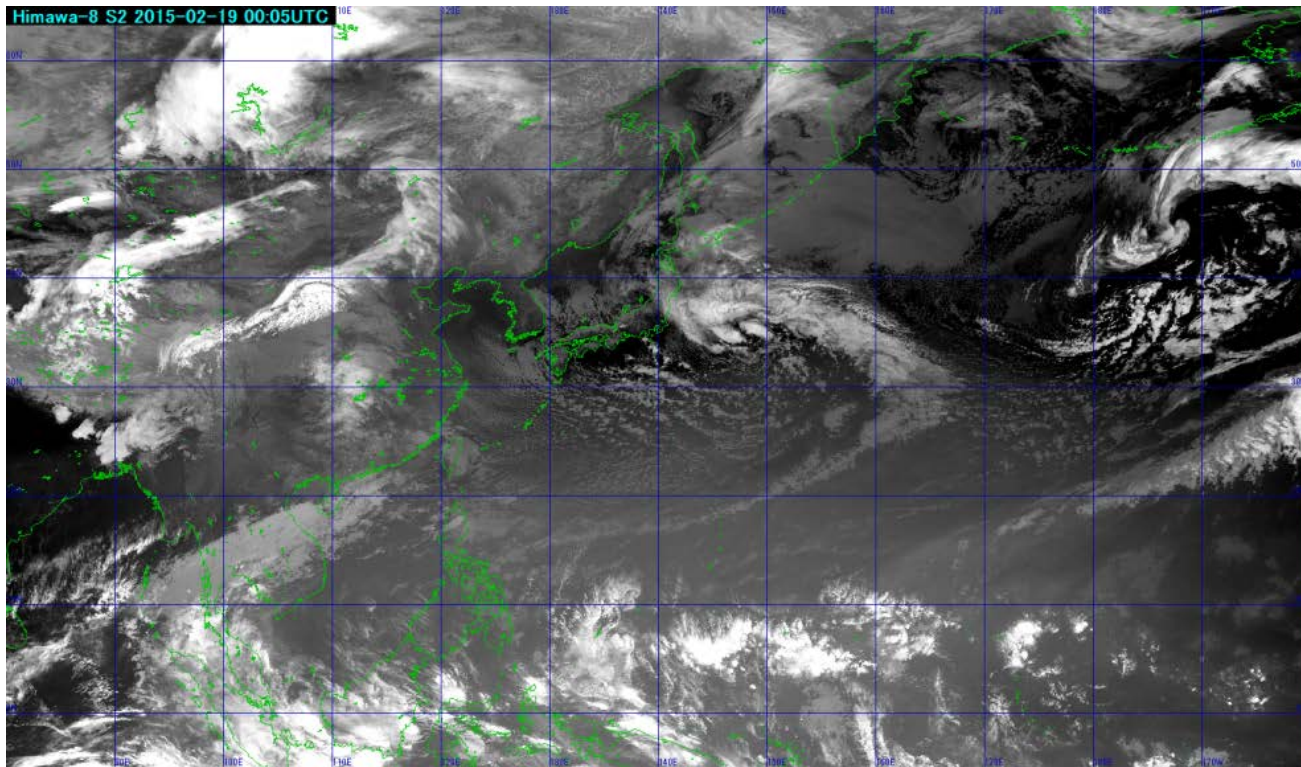
Red Beam

R : B08(WV6.2) – B10(W3 7.3) Range: -25~0 [K] Gamma: 1.0



- B08 is similar to the traditional WV channel, it has the information on water vapor of the tropospheric upper/middle layer
- On the upper layer, water vapor transparency of B10 is higher than B08, therefore it has the information on water vapor of the middle-lower part of the upper layer
- On difference image, the larger difference value area appear in black (dark), the smaller difference value area appear in white (bright).
- On difference image,
 1. the cloud area, 2. cloudless, dry area in the upper-lower part of the upper layer, 3. humid area in the upper-lower part of the upper layer appear in “white”
 4. areas of humid in the upper part of the upper layer and dry in middle-lower part of the upper layer appear in “black”
 - Tracing of deep dry area and thick humid area are available (note that both dry and humid area appear in whitish, so checking of the single band images (B08, B10) is required)
 - Dry whitish area relates to dry air sedimentation or boundary, and jet stream
- On RGB image, in general, cloud area looks white and the area of cloudless, large difference value is displayed in red

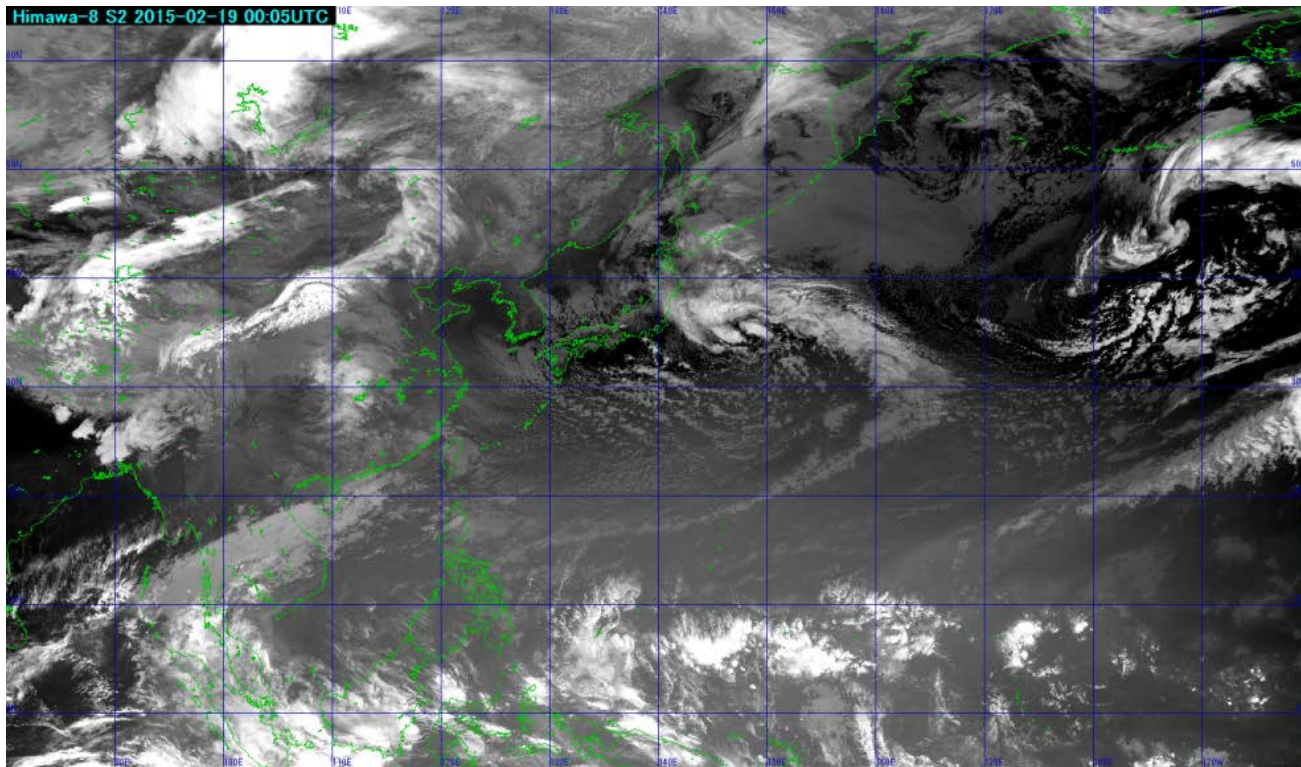
Characteristics and Basis of Three Components Green Beam



G : B12(O3 9.7) – B13 (IR10.8) Range: -40~5 [K] Gamma: 1.0

- B12 is ozone absorption band
 - Difference image shows atmospheric ozone contents
 - Ozone content: high latitude, cold air > low latitude, warm air
 - Much ozone in the stratosphere (the ozone layer)
- Height of tropopause is high on warm area, so stratosphere is thin
 → Few ozone on warm area
- Warm, few ozone content area appears in green

Characteristics and Basis of Three Components Blue Beam



B : B08(WV6.2) Range: 243~208 [K] Gamma: 1.0

- B08 is similar to the traditional WV channel, it has the information on water vapor of the tropospheric upper/middle layer
- Patterns of bright/dark show the locations of the upper/middle layer trough , ridge, vorticity and jet stream
- Changes of bright/dark pattern over time show the strengthening/weakening of the upper/middle layer trough

Interpretation of Colors for “Airmass”

Thick,
high-level clouds

Thick,
mid-level clouds

Thick,
low-level clouds
(low latitude)

Thick,
low-level clouds
(high latitude)

JET

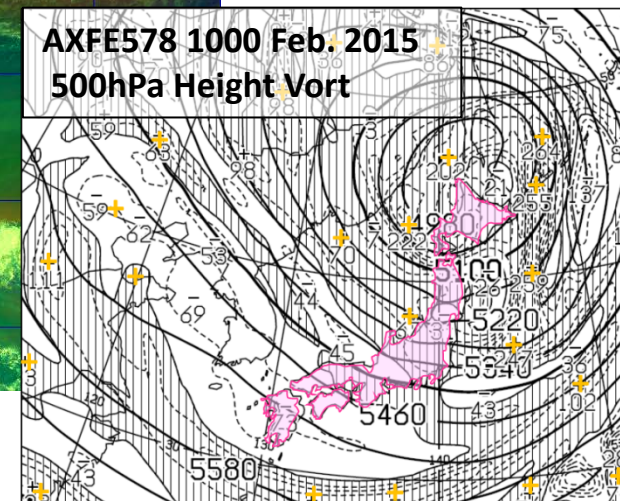
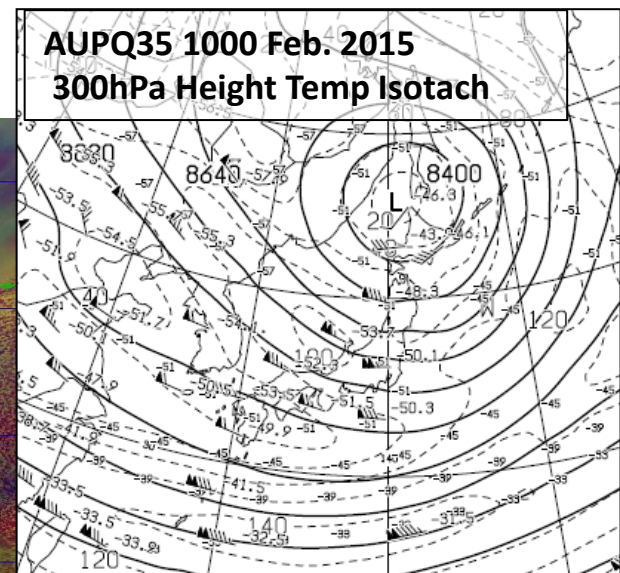
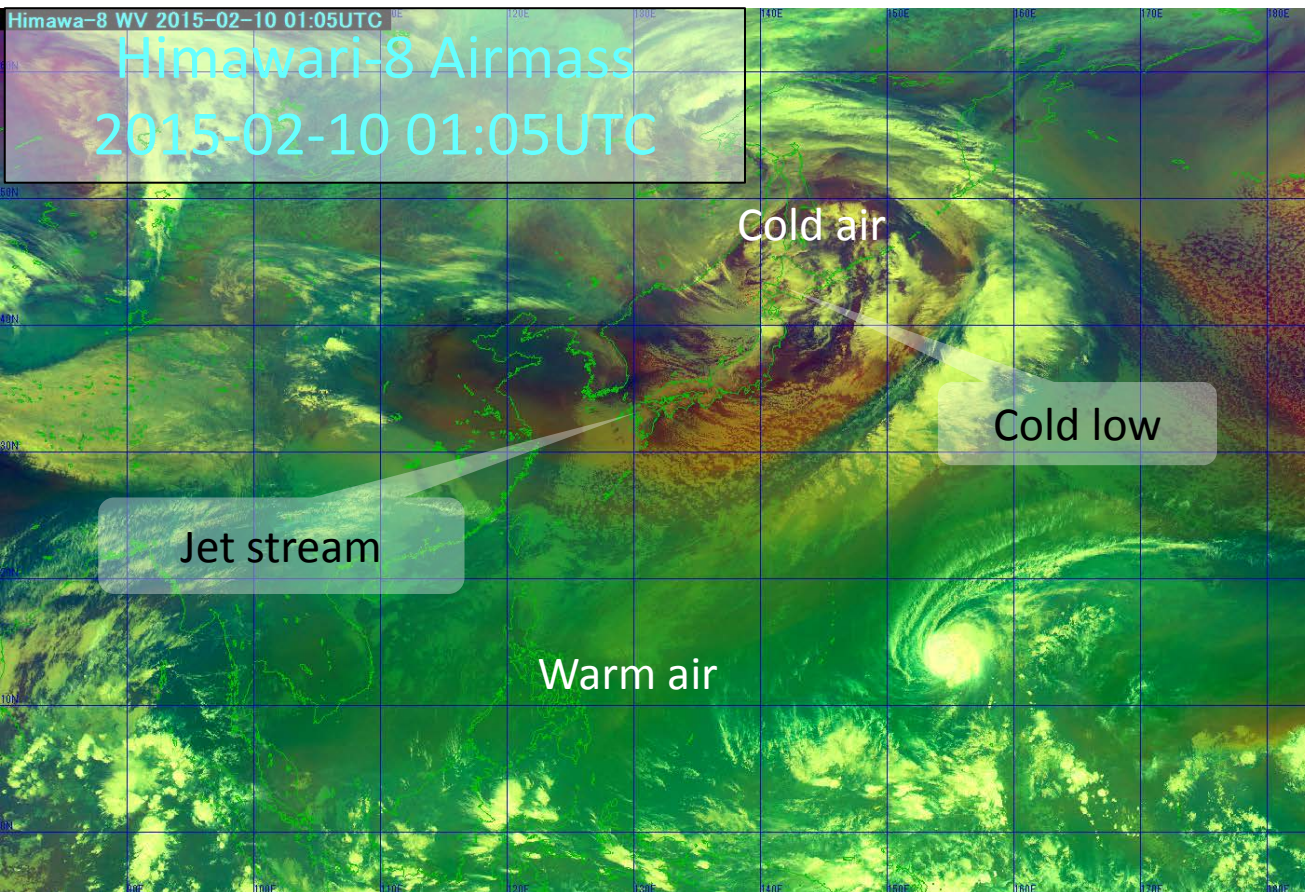
Cold Airmass

Warm Airmass
(High humidity
at upper tropopause)

Warm Airmass
(low humidity
at upper tropopause)

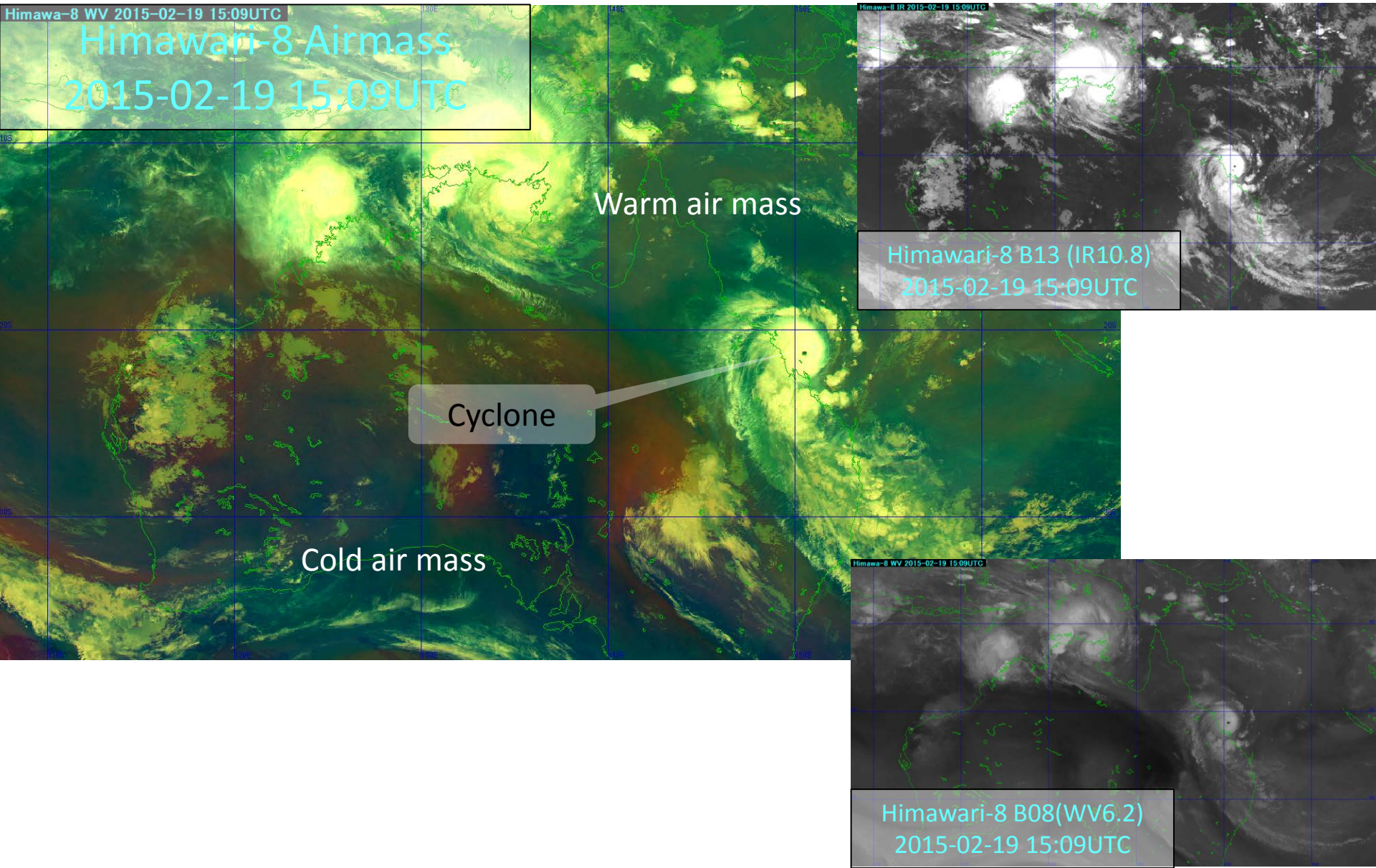
Case Study of Airmass RGB

Cold Low



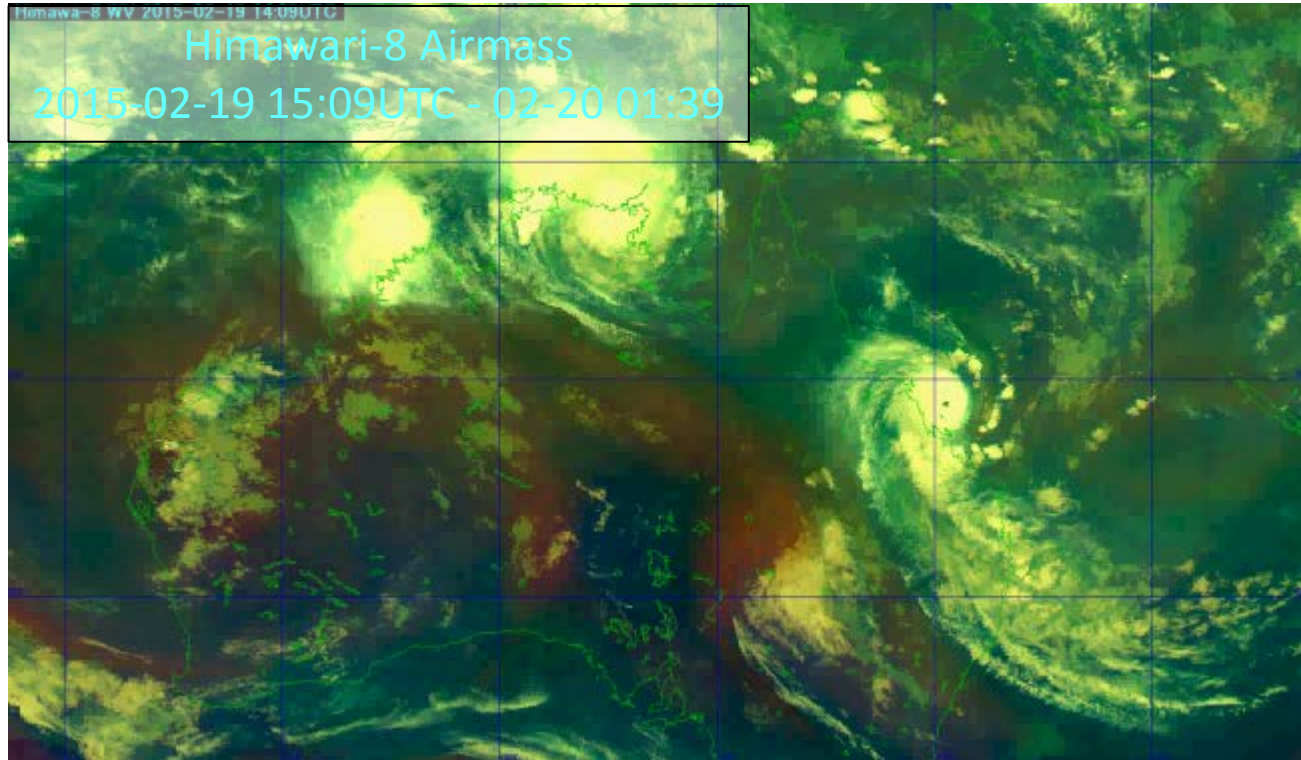
Case Study of Airmass RGB

South Hemisphere, Cyclone and warm air



Case Study of Airmass RGB

South Hemisphere, Cyclone and warm air (animation)



Movement of the “warm” air mass with the cyclone to the south is clear!

Airmass

Analysis of air mass and jet stream

Summary

- ✓ available for air mass analysis
- ✓ available for jet stream analysis
- ✓ available for day and night