

Water Vapor deformation field analysis

기상기후인재개발원

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- 1 Water vapor imagery
- 2 What make weather change dynamically?
- 3 Deformation zone
- 4 WVI vs weather map

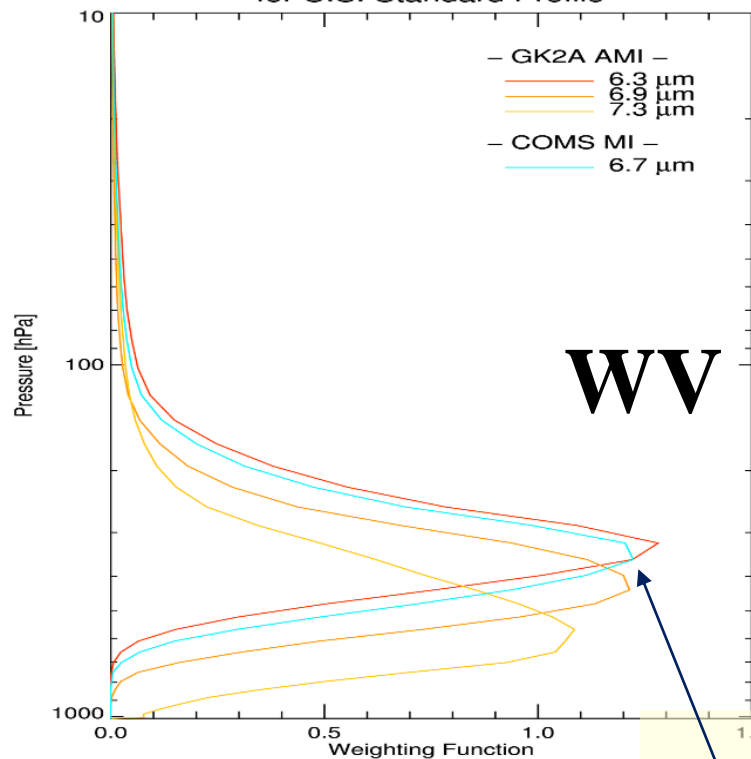
1. Water Vapor imagery

What to know?

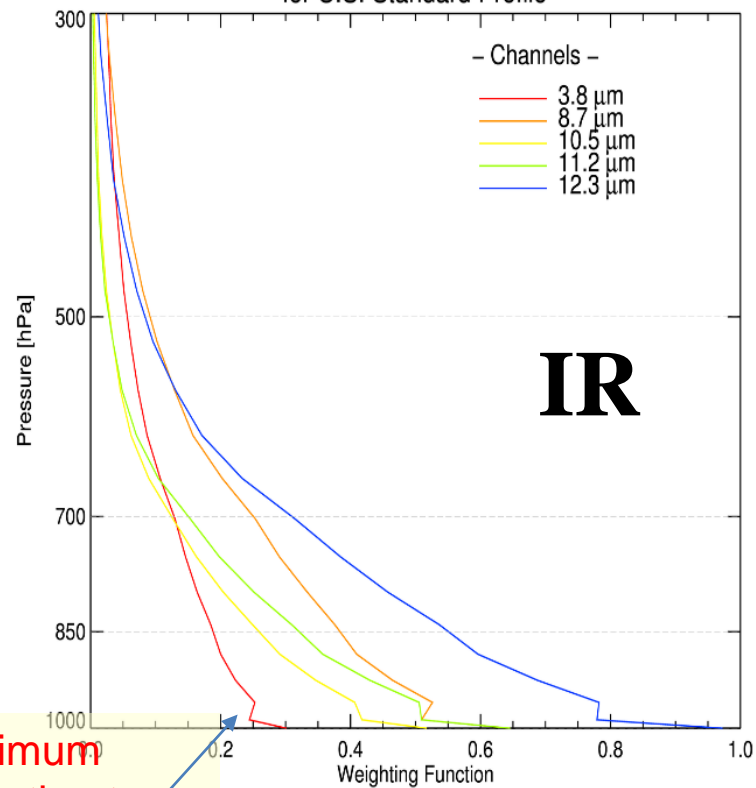
- What is water vapor imagery?
- What is different of WVI from other images?



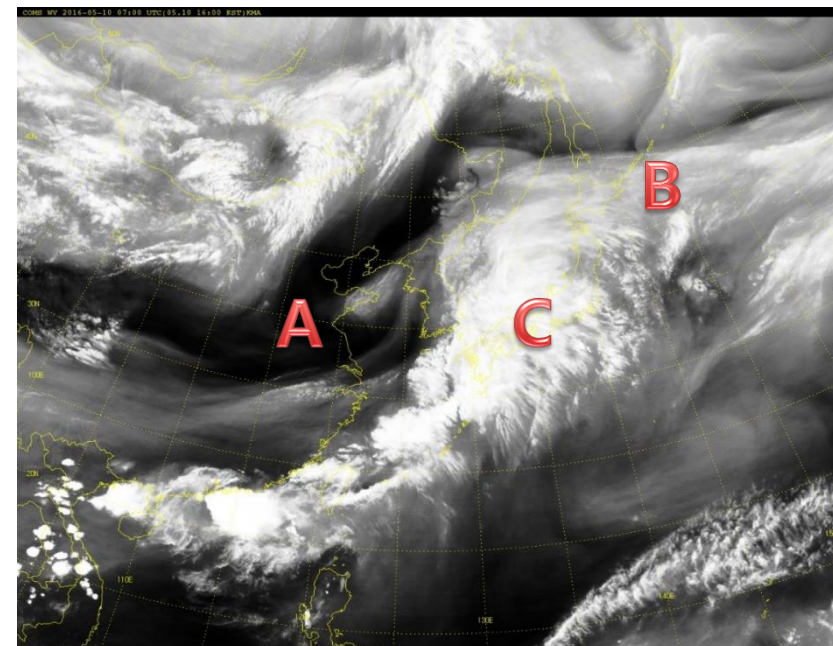
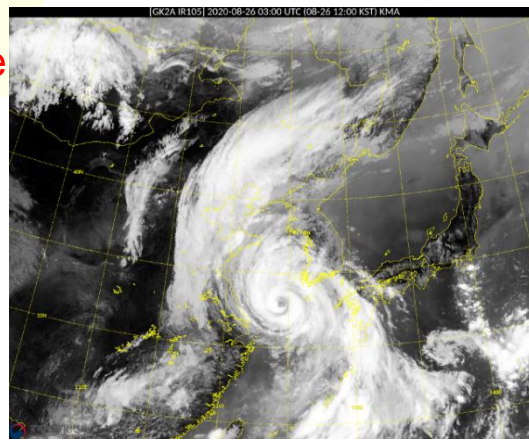
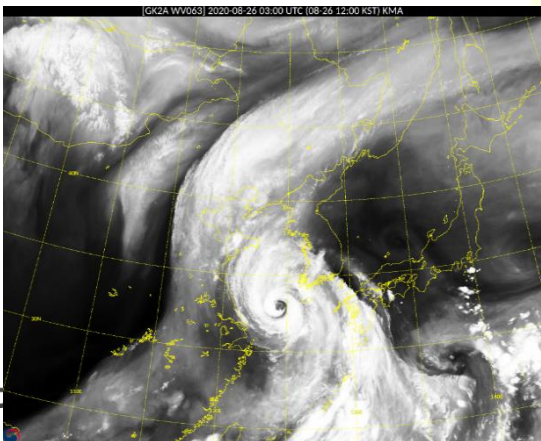
GK2A AMI & COMS MI Weighting Function for U.S. Standard Profile



GK2A AMI Weighting Function for U.S. Standard Profile



Maximum contribution to Outgoing radiance

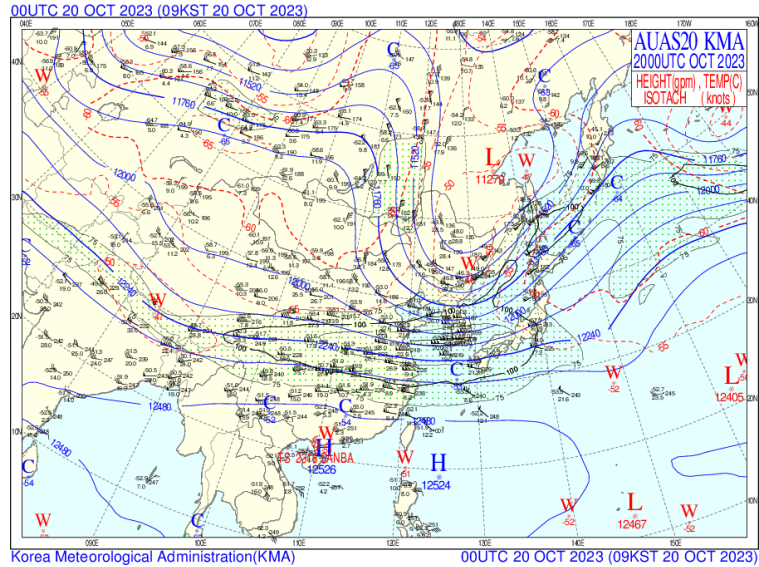


- A: Dry Atmosphere
- B: Moist Atmosphere
- C: Cloud(Noise)

What do water vapor image see?

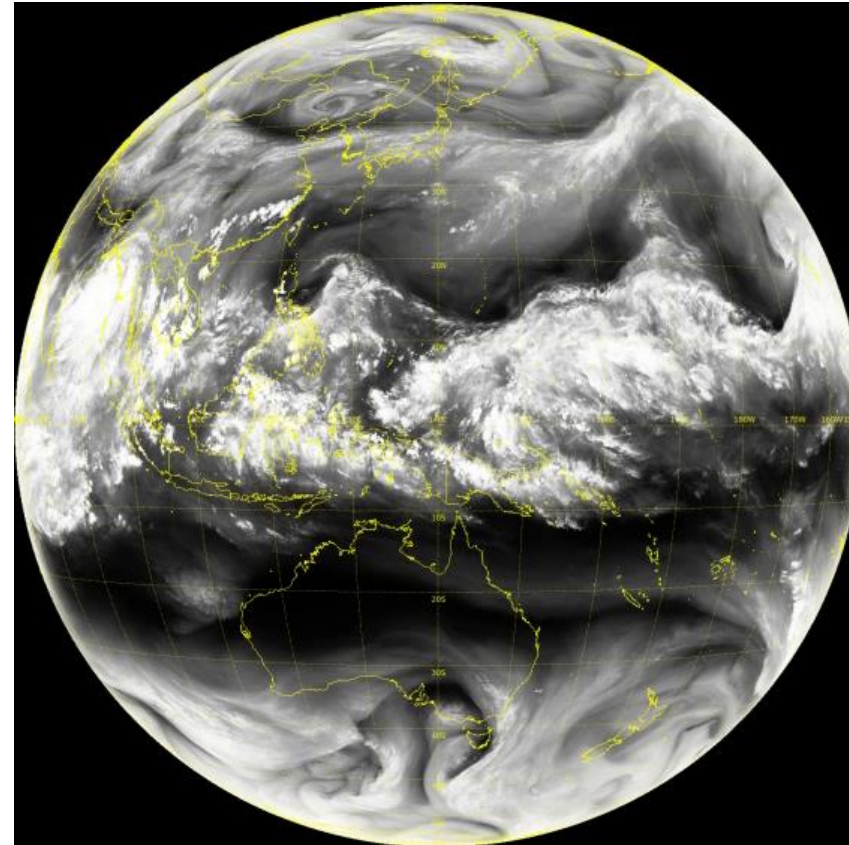
하늘을 친구처럼
국민을 하늘처럼

Traditional weather map (200 hPa)

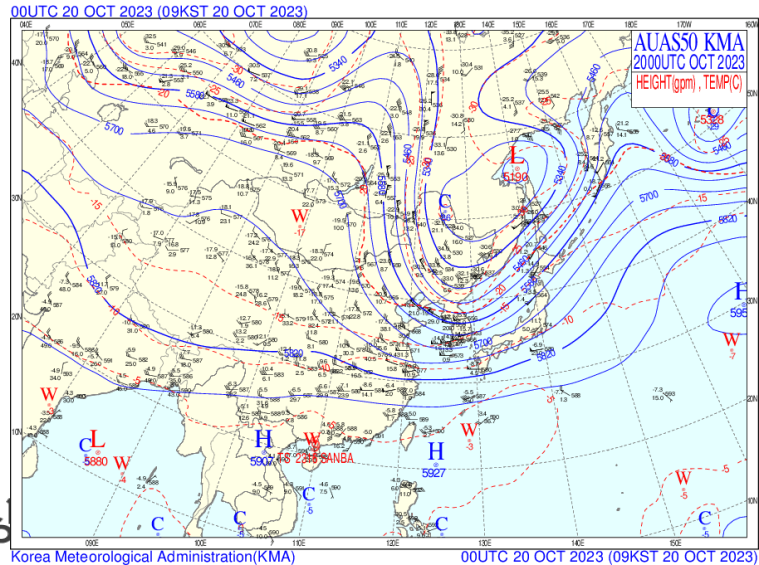


Atmosphere move like water flow.

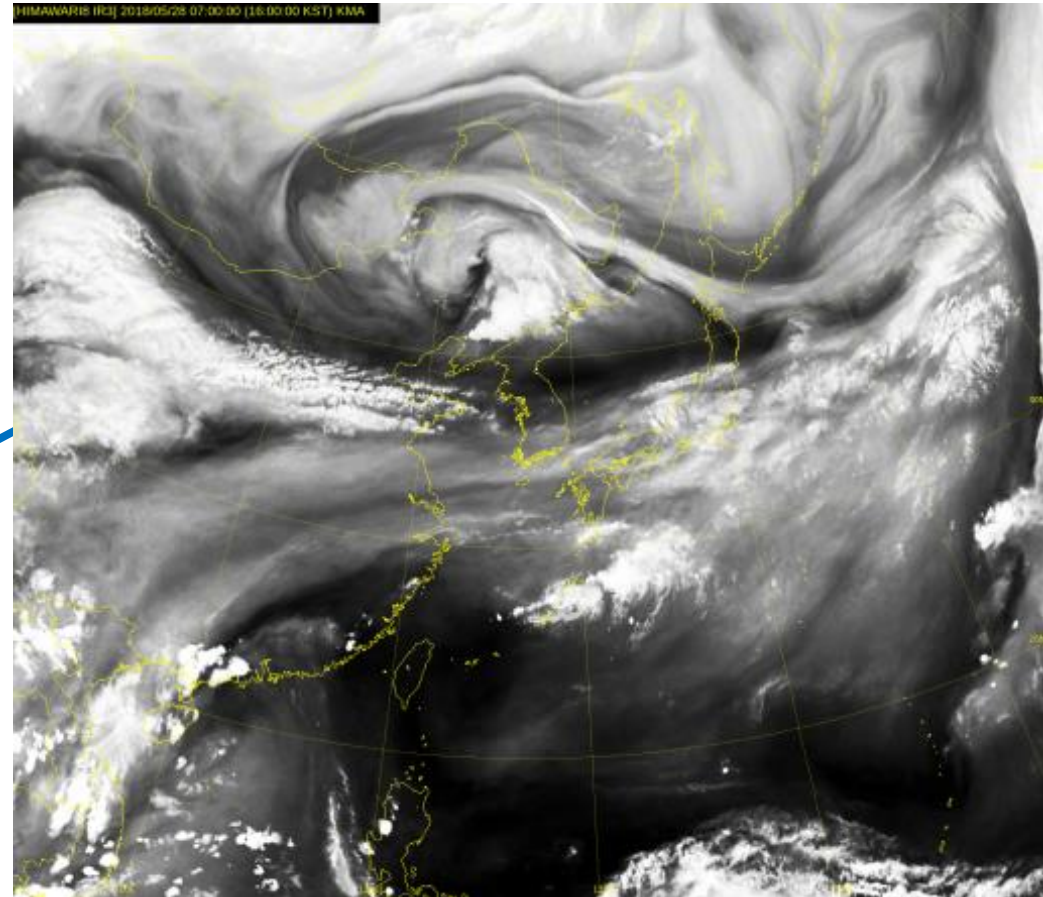
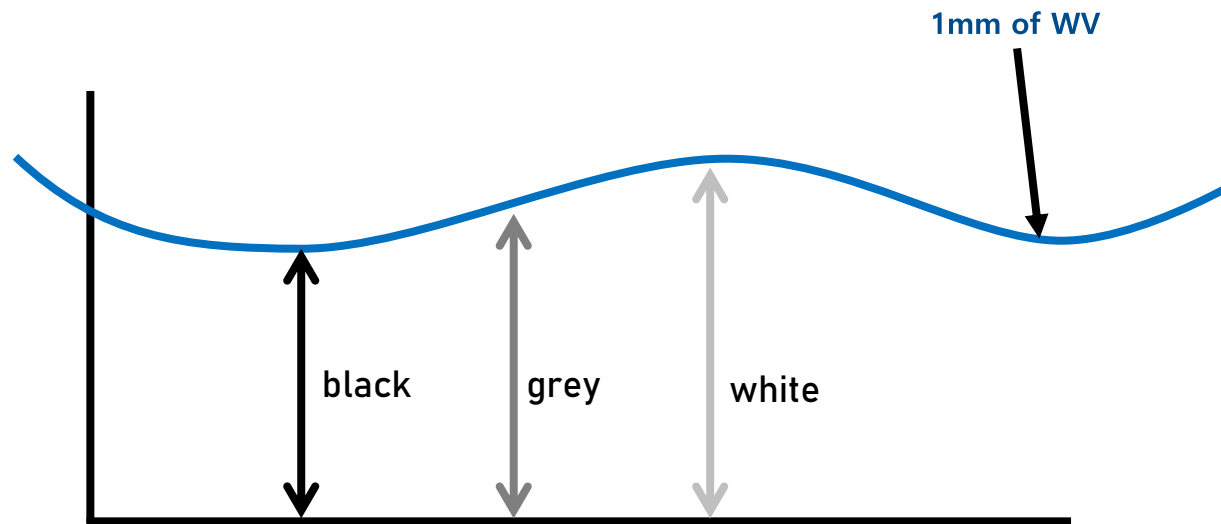
We need to know the flow of atmosphere



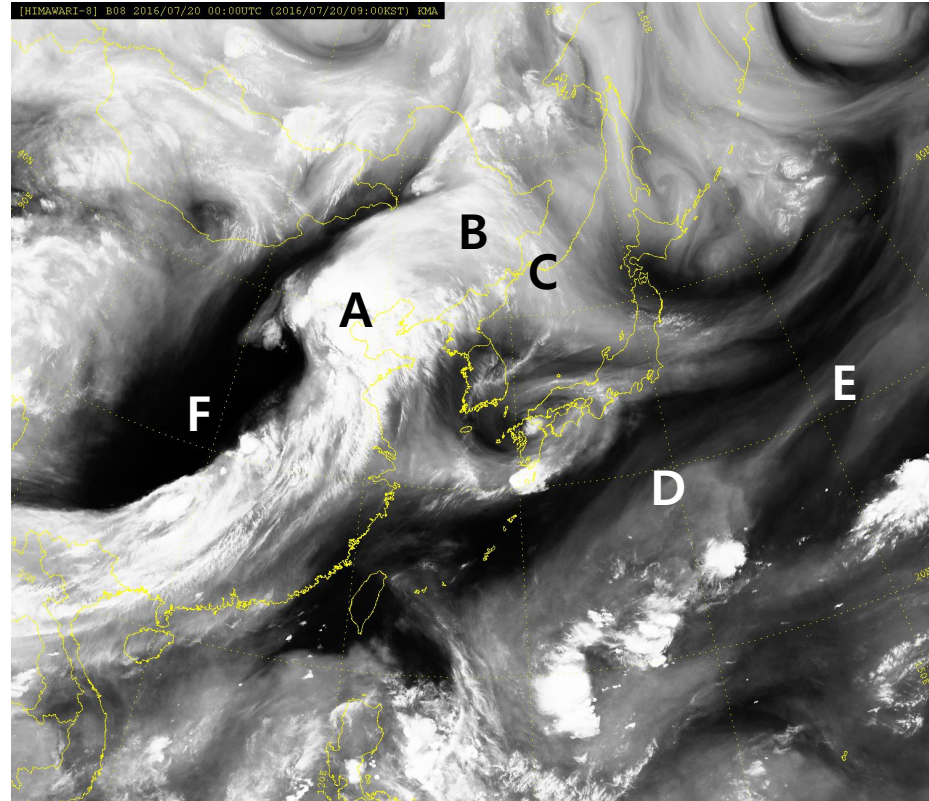
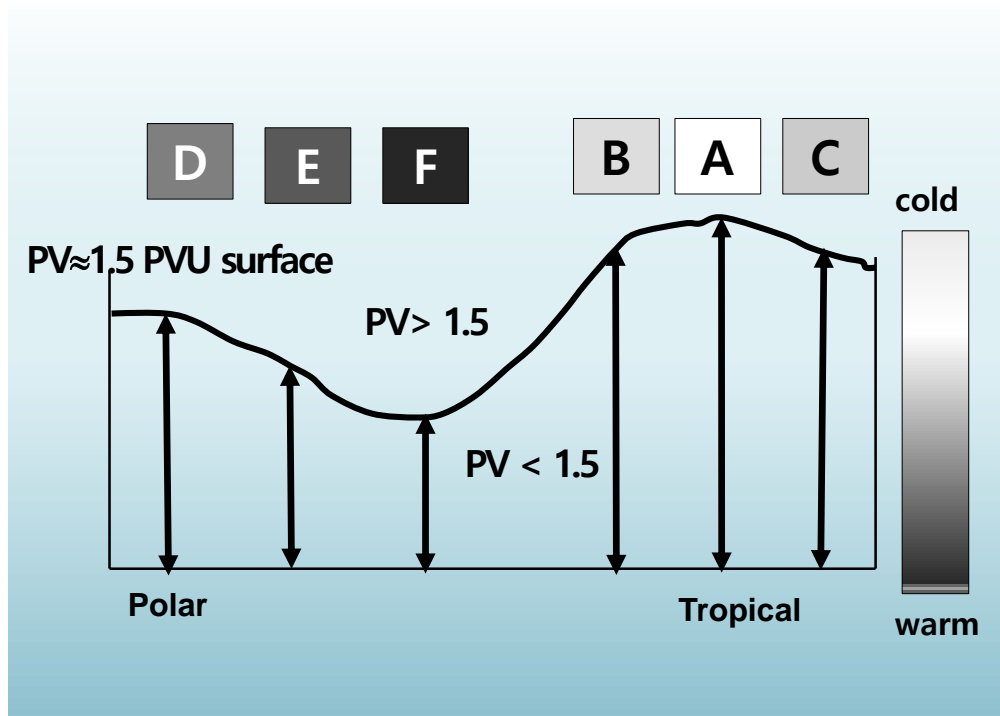
Traditional weather map (500 hPa)



- Most meteorological maps consist of planes in the horizontal or vertical.
- Water vapor satellite imagery is really showing a three-dimensional isosurface of 1 mm of water vapor as viewed from the satellite.



The relationship between WVI and its colors



PV=Potential Vorticity

1.5 PVU height = dynamic tropopause height

2. What make weather change dynamically?

What to know?

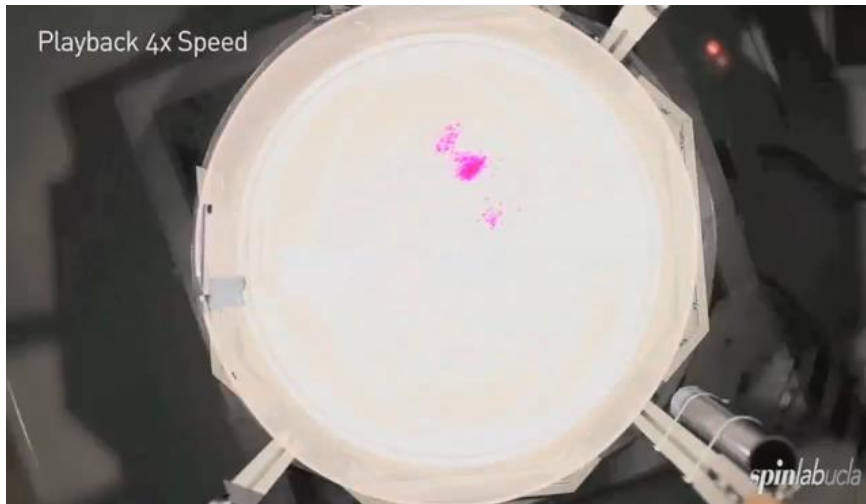
- 3 types of wind changes
- Conceptual model of low pressure system

<p>Divergence</p>	<ul style="list-style-type: none"> • Area change • NO shape change 	
<p>Vorticity</p>	<ul style="list-style-type: none"> • No area change • No shape change 	
<p>Deformation</p>	<ul style="list-style-type: none"> • No area change • Shape change 	

What is the deformation?

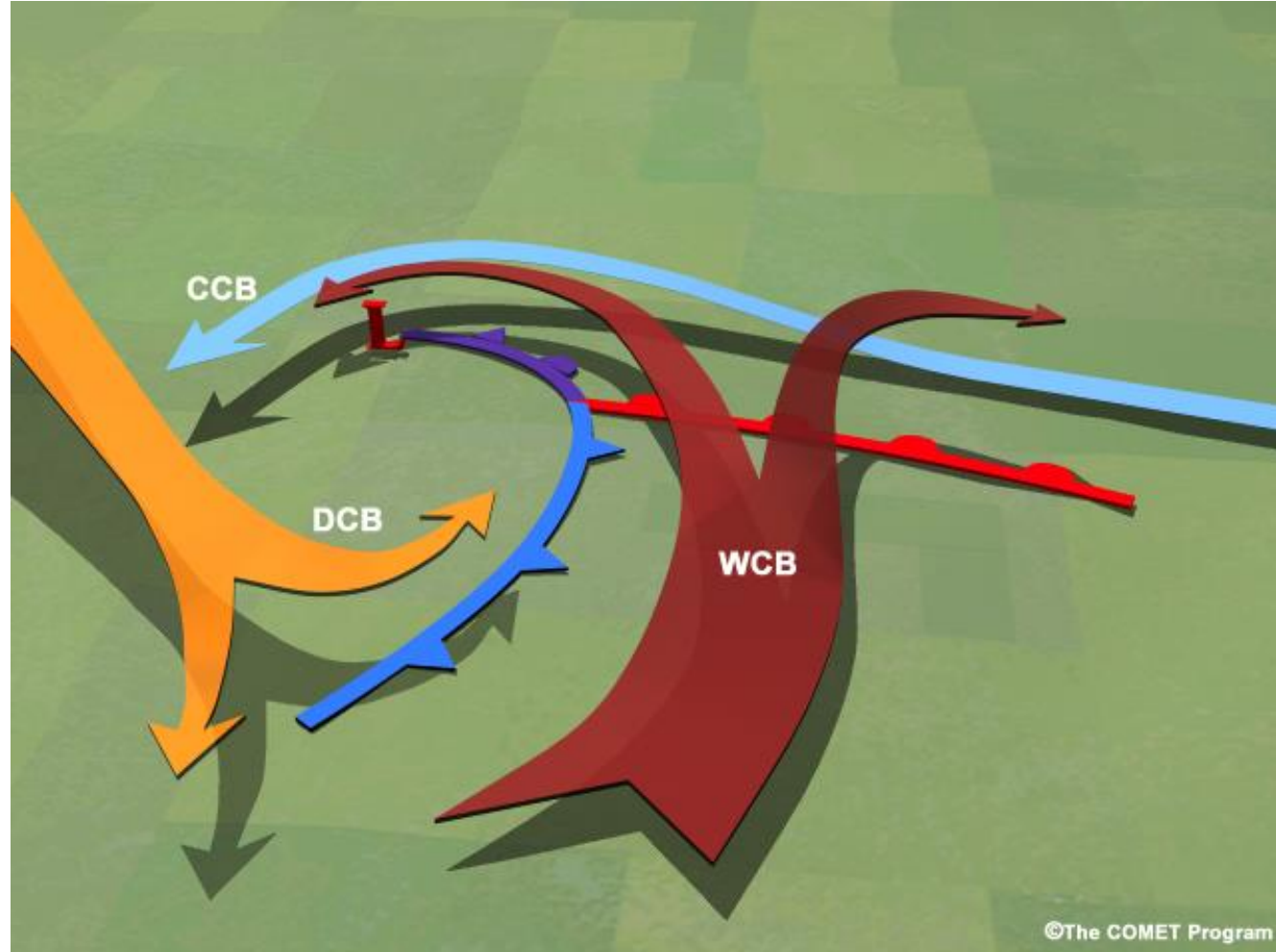
하늘을 친구처럼
국민을 하늘처럼

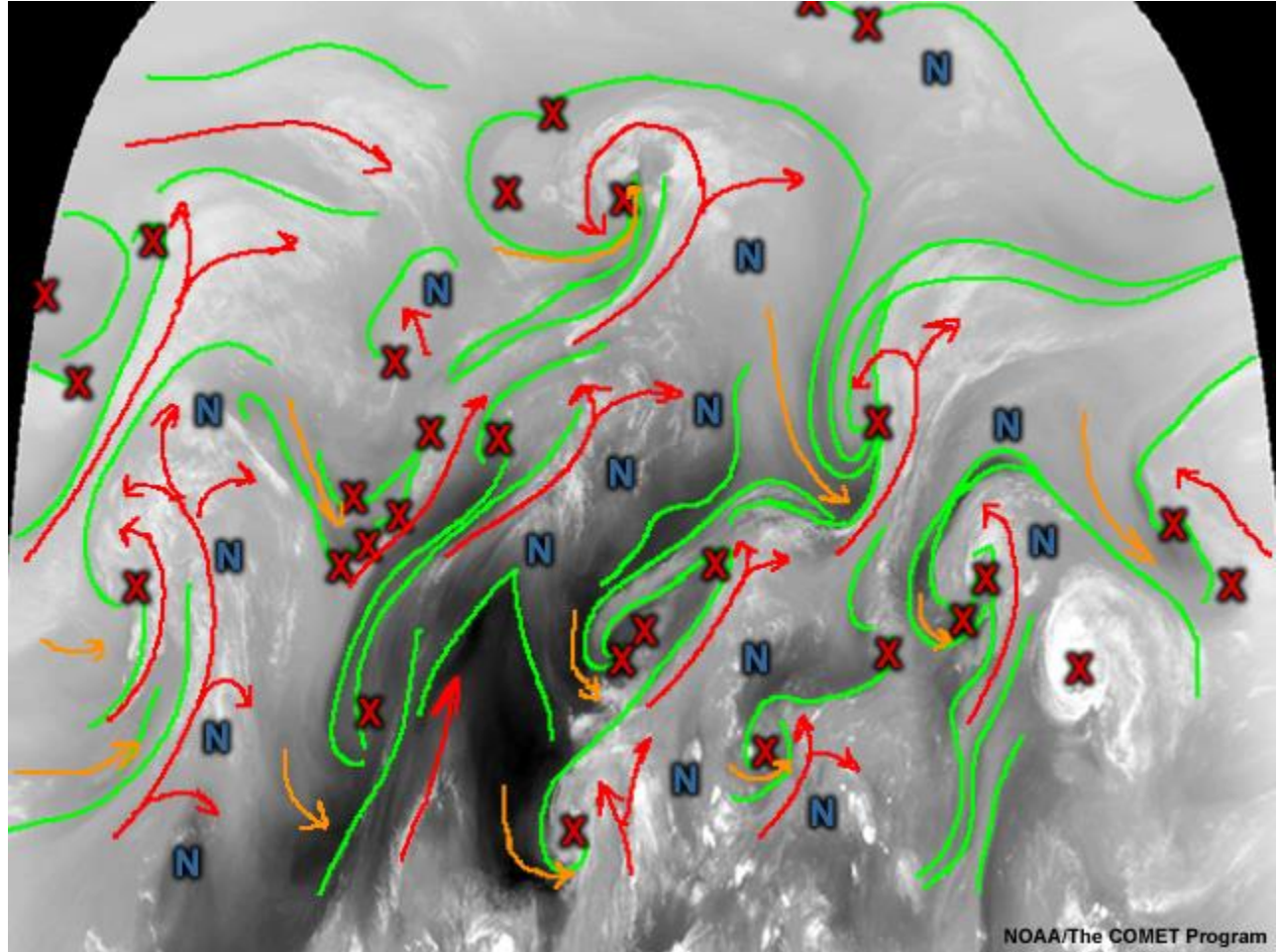
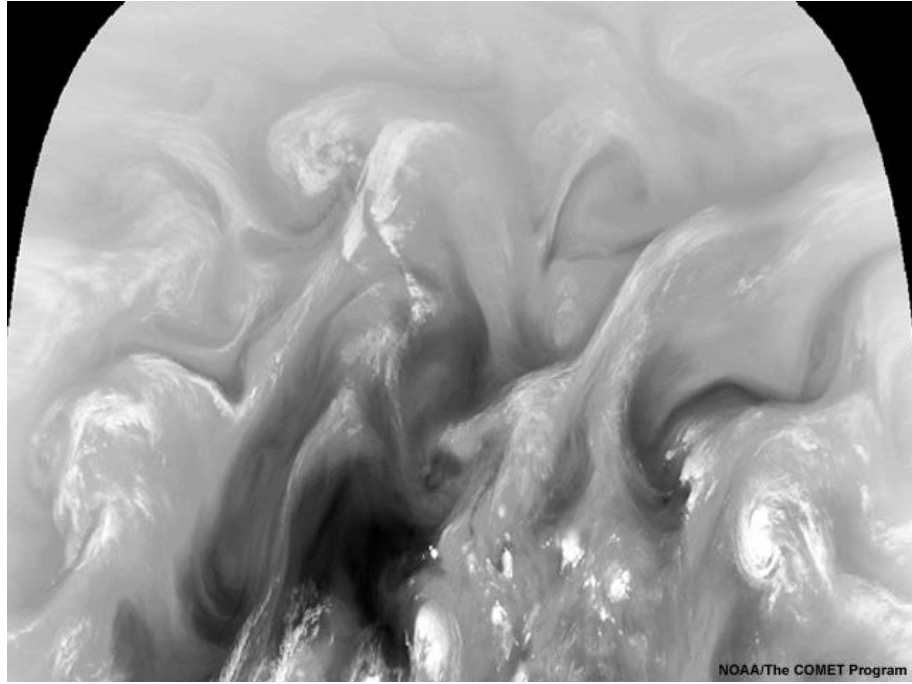
A deformation zone can be thought of as a front → That is an area where two air masses meet, yet have little exchange of energy





Conceptual Model of low pressure system





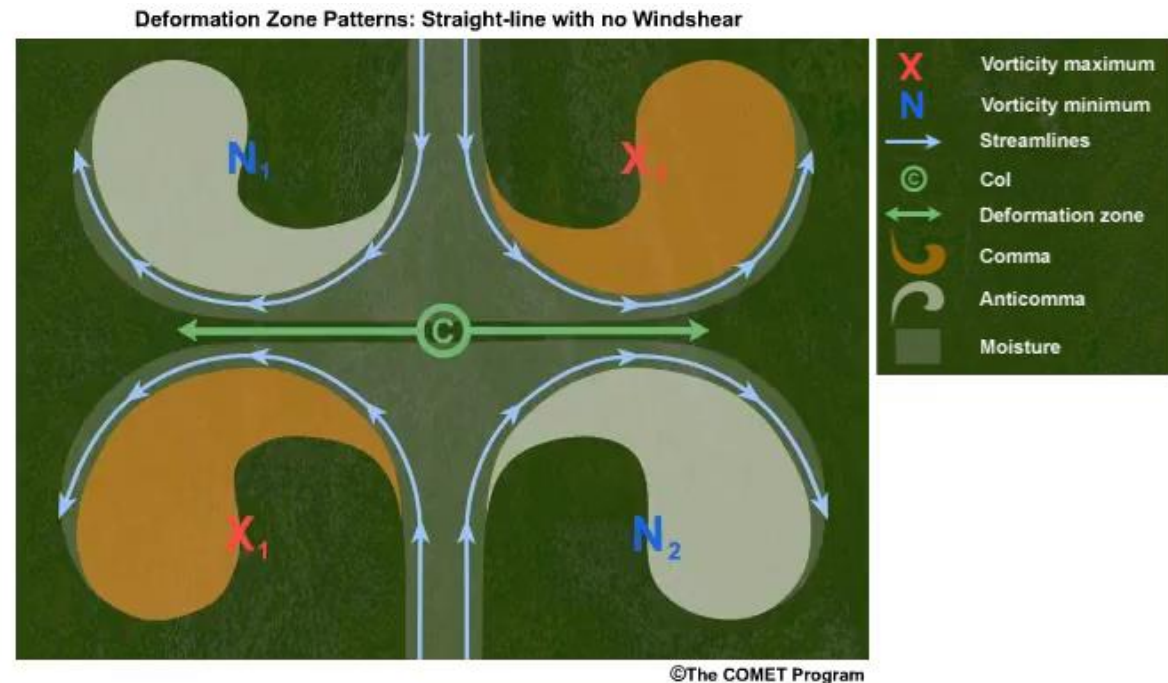
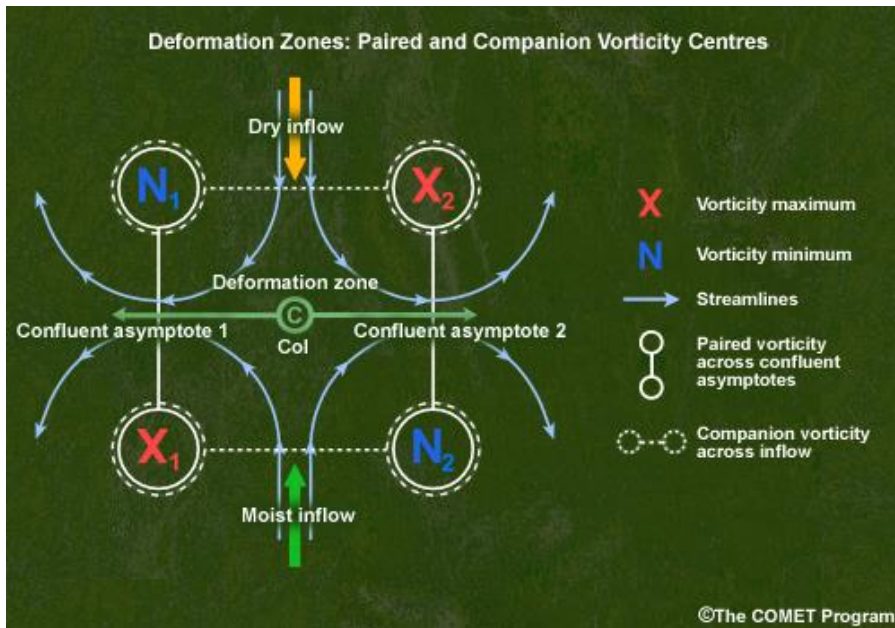
3. Deformation zone

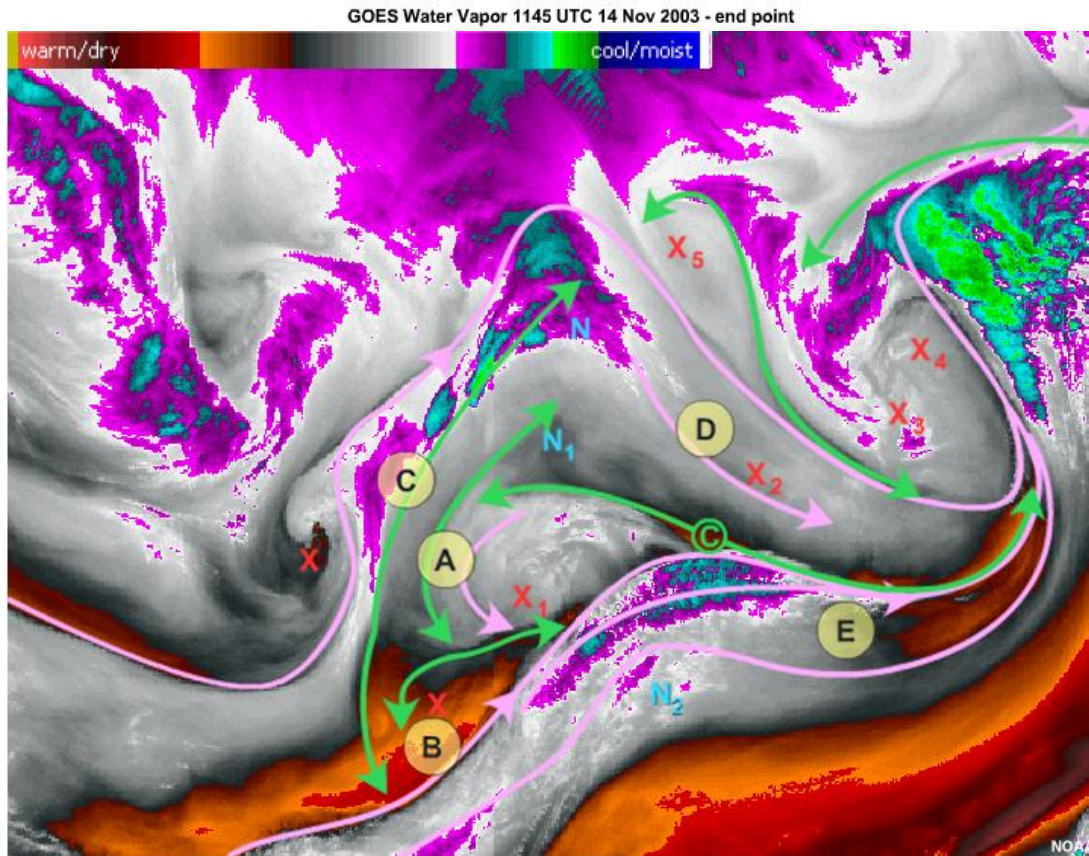
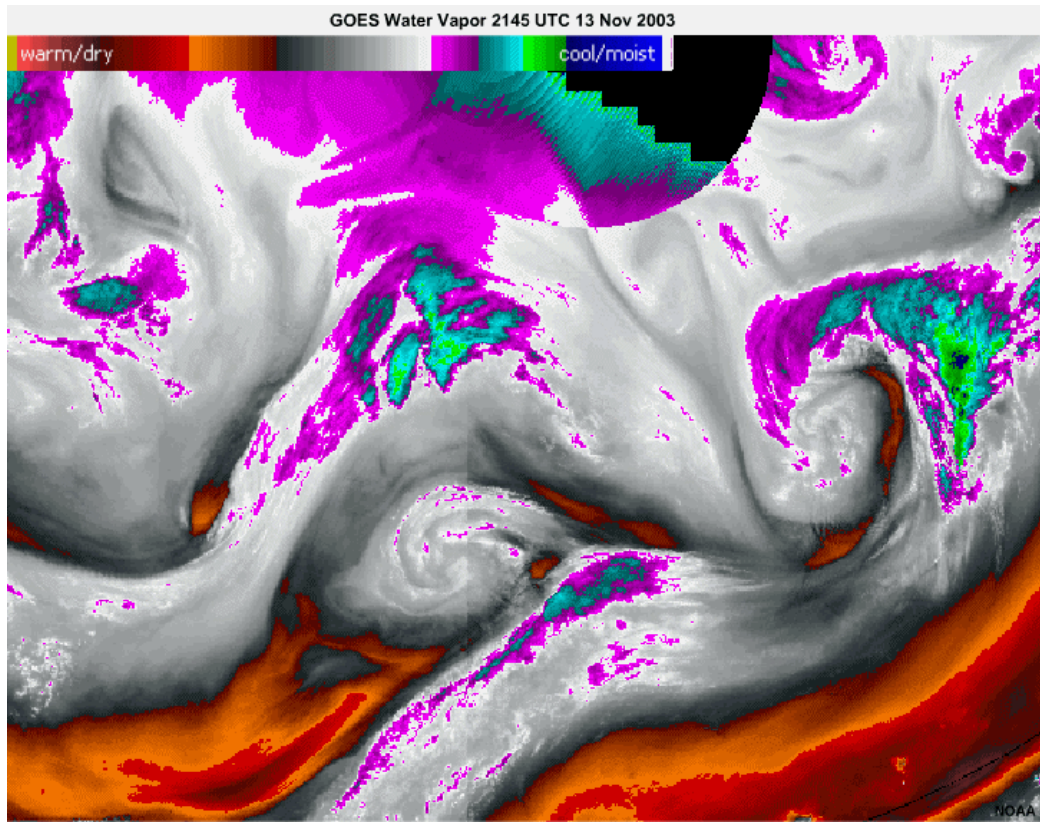
What to know?

- Conceptual model of deformation
- How to find deformation zones from WVI



- A deformation zone is a region in the atmosphere with significant stretching or shearing
- Spatial variations in the velocity field between two converging air masses cause a change in the shape of these air masses
- Deformation is a primary factor in the processes of frontogenesis and frontolysis





- Deformation zone analysis is an art as well as science.
- The small deformation zone can be inferred using the conceptual models

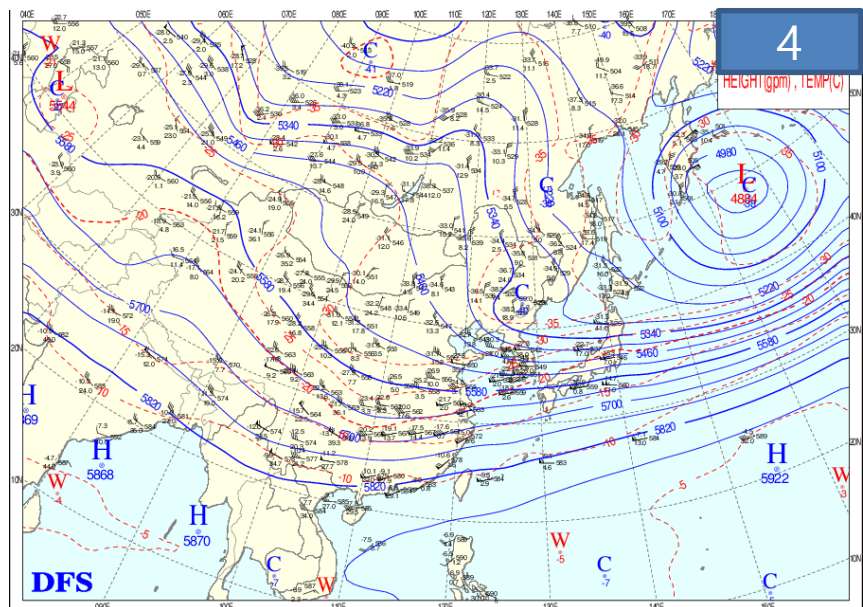
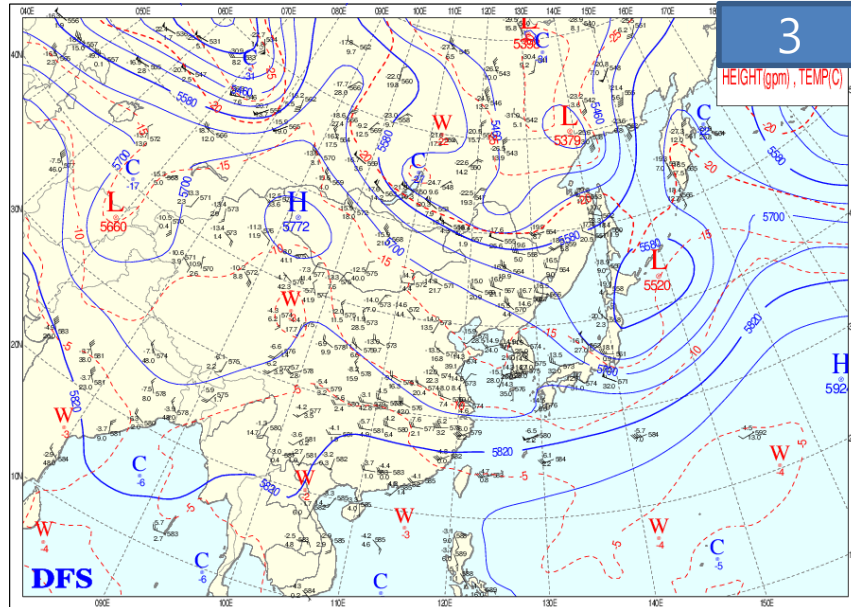
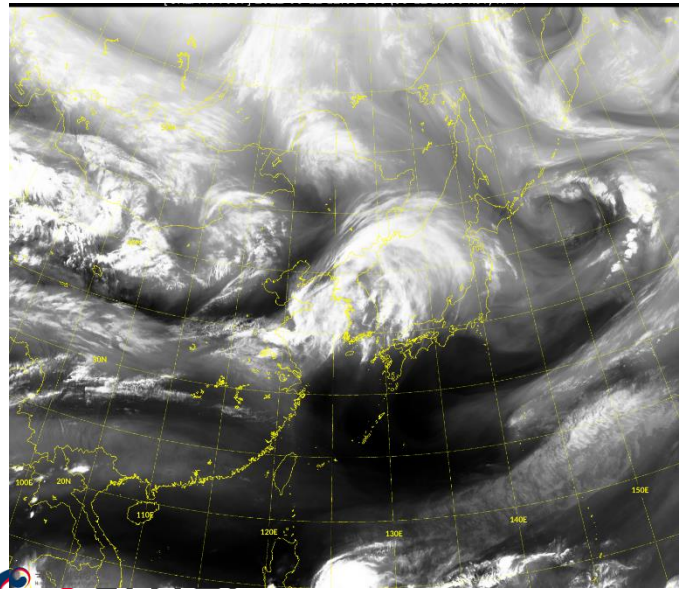
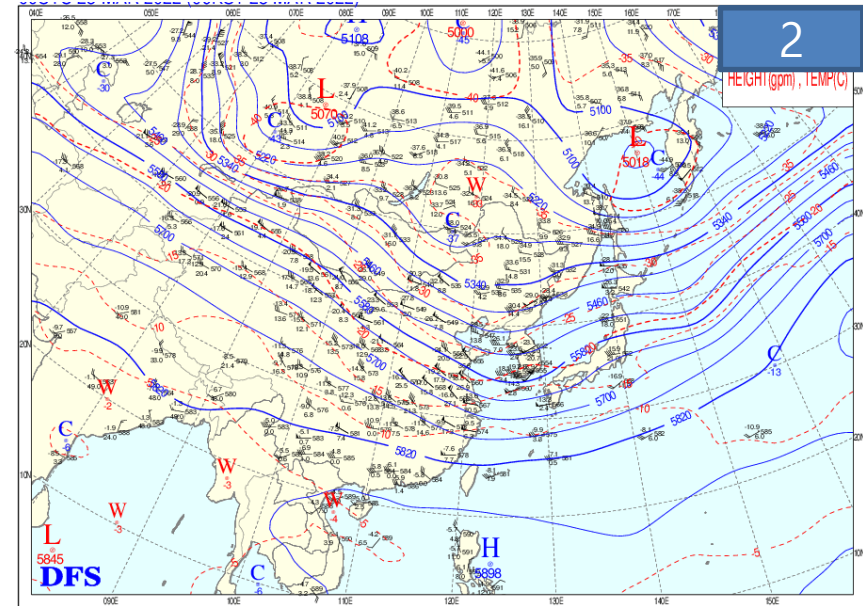
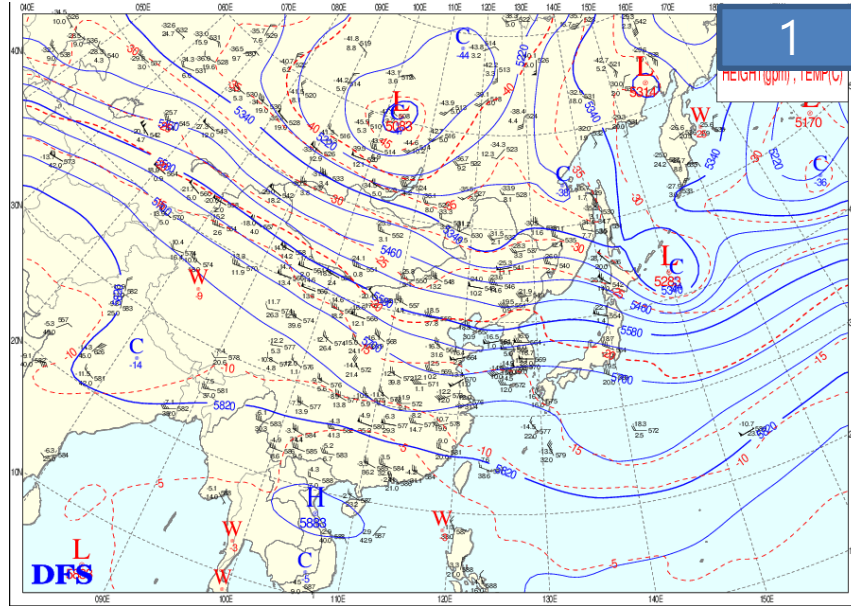
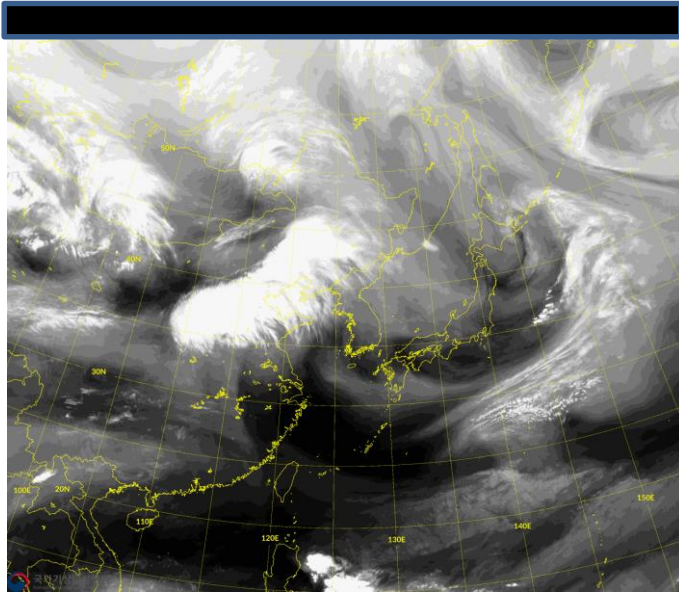
4. WVI vs weather map

What to know?

- Can you match WVI to weather map?

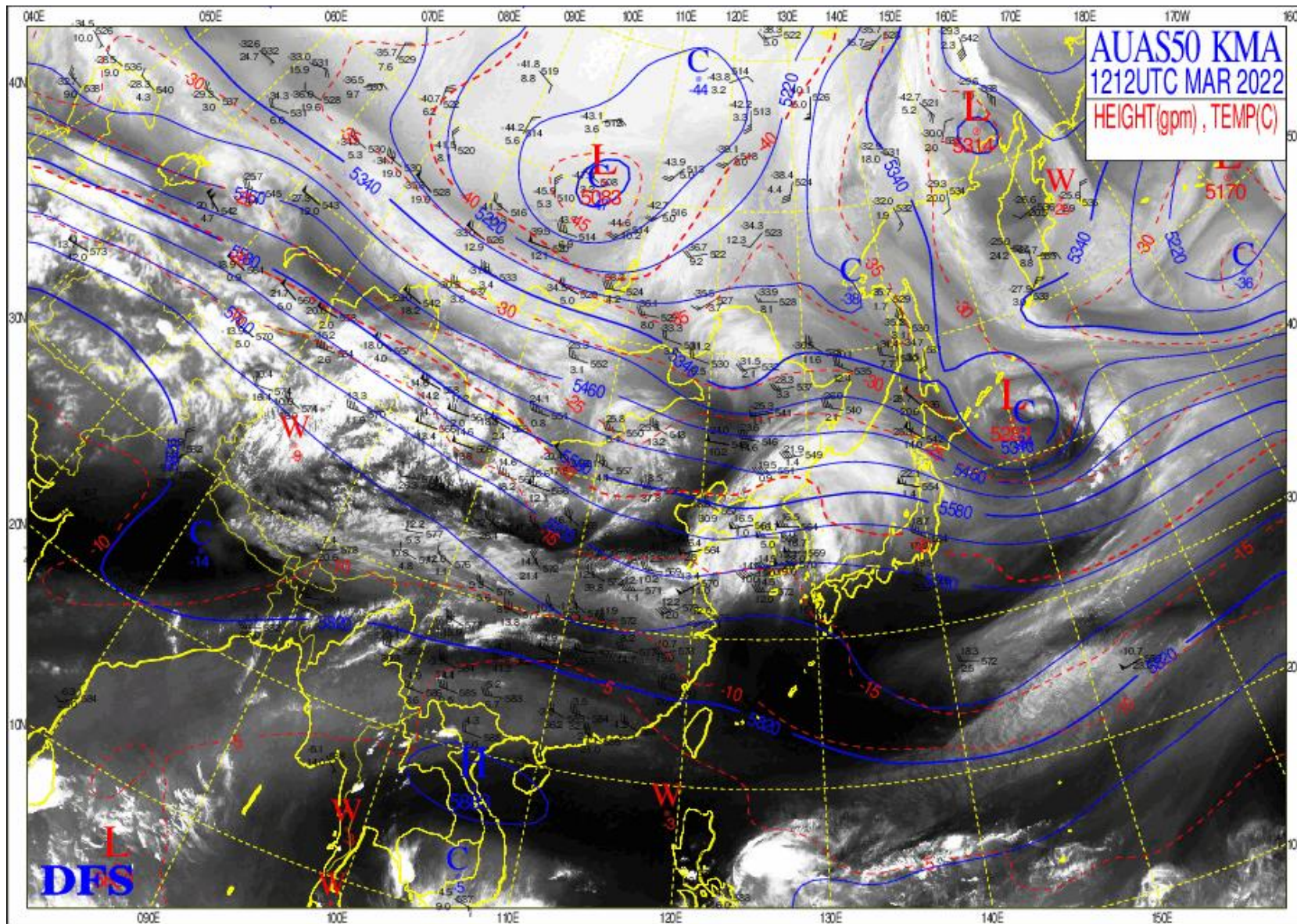
Which does weather map is matched with WVI?

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국민을 하늘처럼



500hPa + water vapor image

하늘을 친구처럼
국민을 하늘처럼



Thank you!(감사합니다!)