Chiba Campaign 2023

1st report

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2023 12.3

My plan

Final goal (be able to..)

- Understand instruments to observe water vapor property especially, radiosonde
- Evaluate weather model prediction by using radiosonde observation
- Understand meteorological properties in vertical direction (including comparison)

	Goal (be able to..)	Task
1st 12/1 12/2	Understand and handle the radiosonde observation data (plot the mixing ratio, wind speed, temperature)	Plot the observation
	Analyze mixing ratio, wind speed, and temperature (T)	
2nd 12/5	Evaluate GFS, ECMWF, and ICON and analyze mixing ratio, wind speed, T	
3rd 12/8	Evaluate models and Analyze water vapor (mainly precipitable water)	

Observation data

Radiosonde observatory 47646

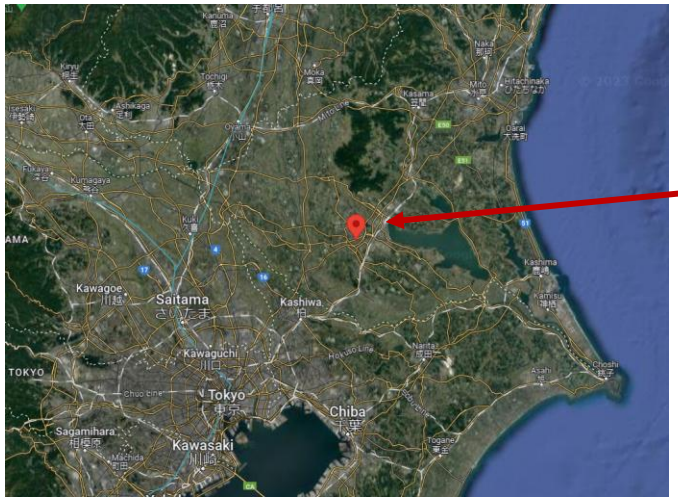
(Tateno 36.05N, 140.13E)

Get from: https://weather.uwyo.edu/upperair/sounding.html

・Directly observable meteorological parameter:

Atmospheric pressure, Air temperature, Humidity, Wind velocity

・Observe frequency: Twice per a day (00UTC and 12UTC).



Tateno
(Tsukuba city)

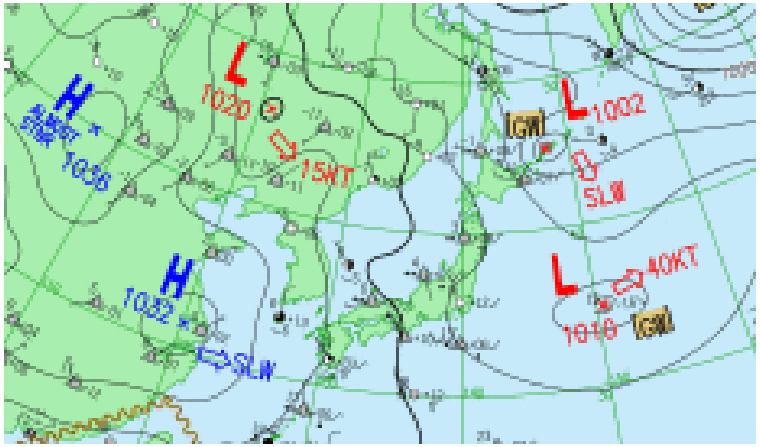
JMA radiosonde obs.
(https://www.jma-net.go.jp/daitou/shosai/kansoku/koso/ABL_about.html)

Experimental setting

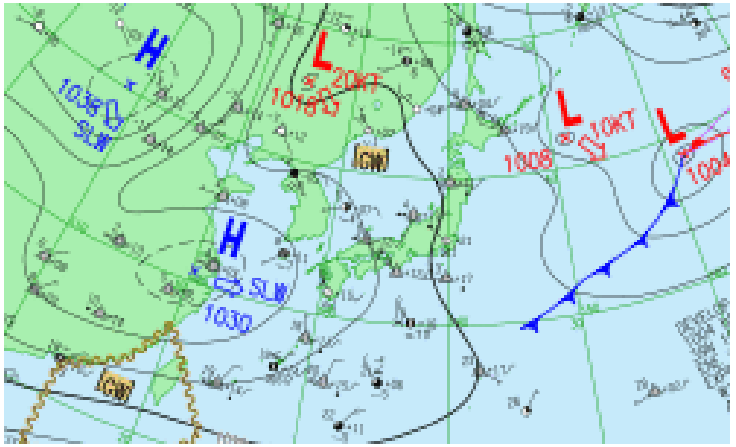
- 2023 12/1 12UTC and 12/2 00UTC
- Mixing ratio, Wind speed, and Air temperature

(See vertical distribution using atmospheric pressure)

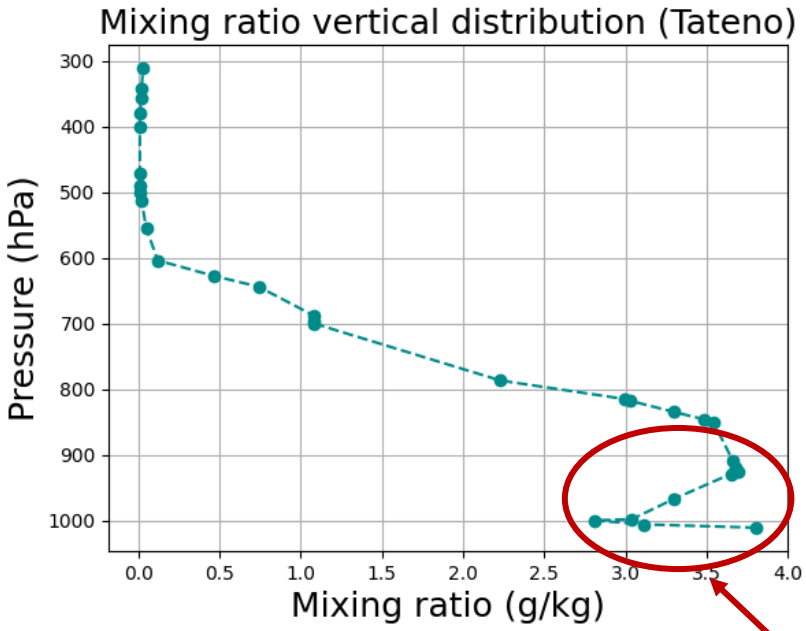
Weather map (JMA)
12/1 12UTC

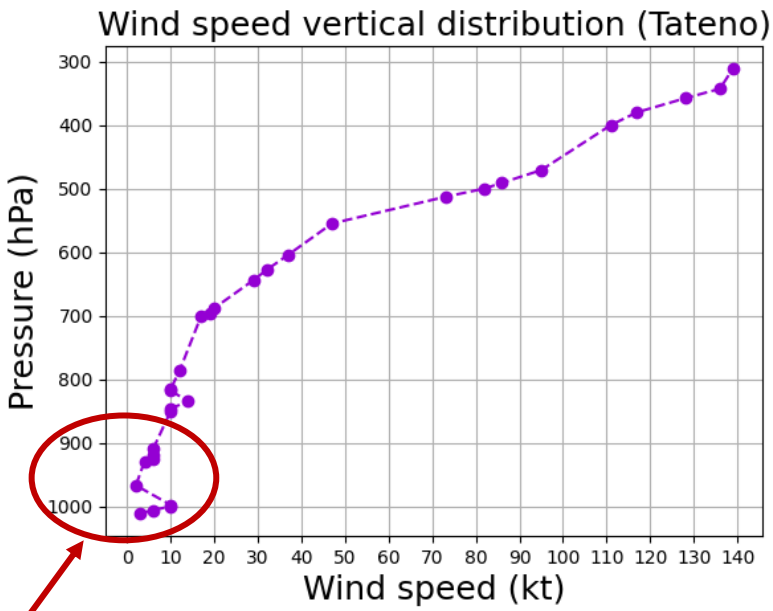


Weather map (JMA)
12/2 00UTC

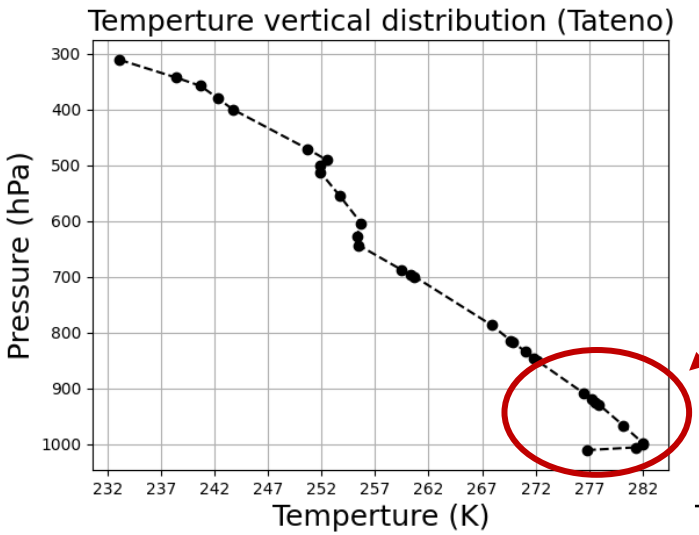


Plot the Obs. in Tateno (12/1 12UTC)





Similar feature (Z-shape)

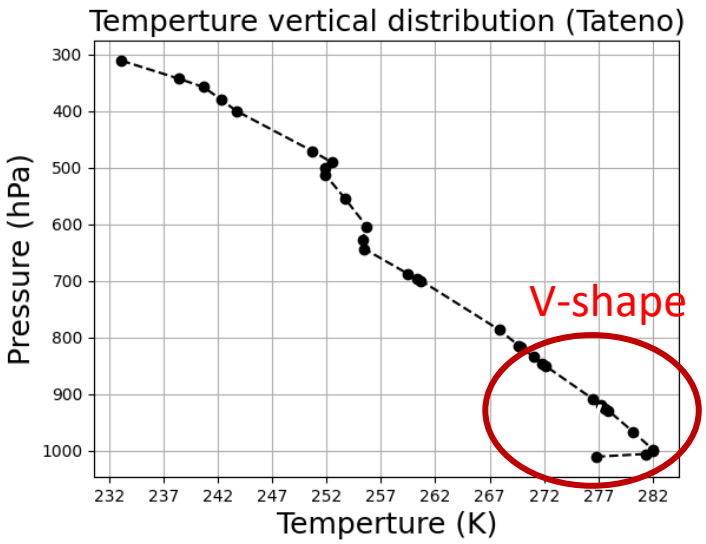


Surface temperature inversion
(∵1000hPa≒120m (from obs. data))

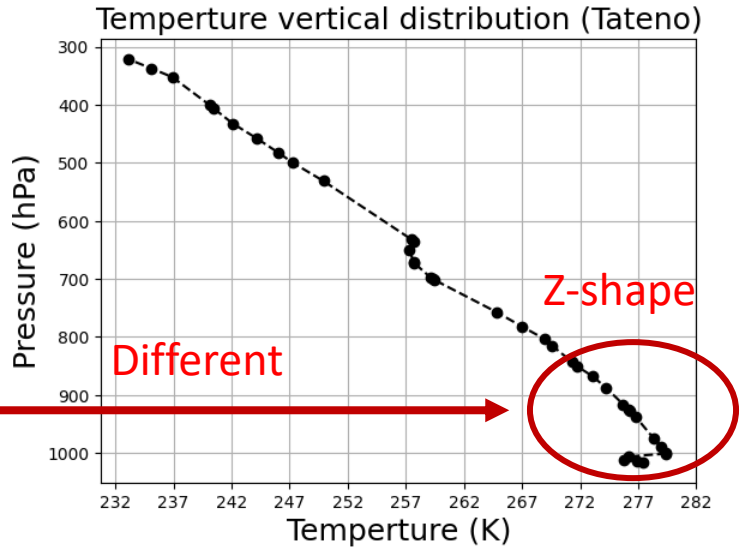
→The temperature inversion may relate the shape

Plot the Obs. in Tateno (12/2 12UTC)

12/1 21:00 (JPN)



12/2 9:00 (JPN)

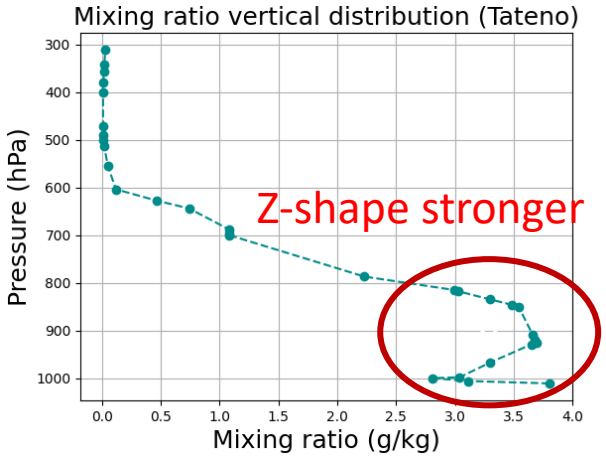


Reason of the difference (may):

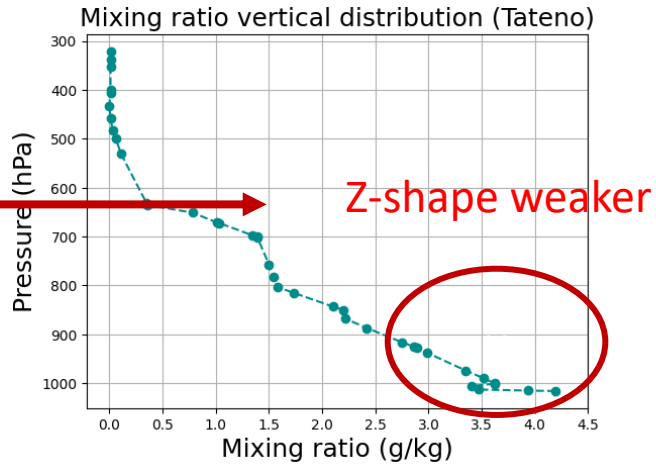
Sunset and radiation cooling→ Surface temperature inversion formed (V-shape)→ Sunrise
→ Sun heats surface → Surface heats near-surface air temperature
→ Temperature inversion weakened → Z-shape formed

Compare Obs. in Tateno (12/1 and 12/2)

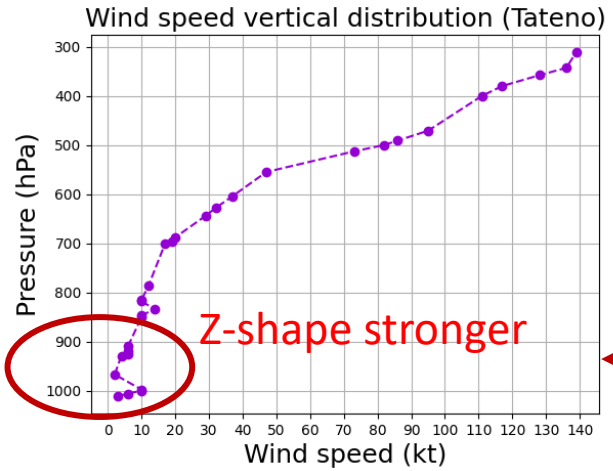
12/1 21:00 (JPN)



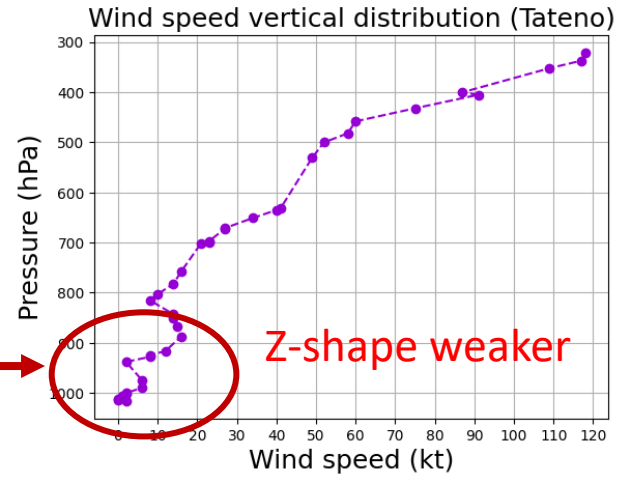
12/2 9:00 (JPN)



Different



Different



Reason of the difference (may):

If the surface temperature inversion relates the Z-shape then,

Weakened surface temperature inversion relates weakened Z-shape

Next Report will be …

1. Water vapor, wind speed, temperature analysis
   -- Daily obs. plot
   -- Compare several regions (including temperature inversions)
   -- Deepen the discussion of the surface temperature inversion

2. Evaluate GFS, ECMWF, and ICON model prediction
   -- Plot the model predictions (wind speed)
   -- Compare with the radiosonde obs. data