Assignment 5 Shijing Liang 11712638

PART 1 Surface weather map analysis

This assignment was developed by Chuck Weidman at University of Arizona and used in this course with his permission. http://www.atmo.arizona.edu/students/courselinks/fall14/atmo170a1s3/HOME.html

The surface weather map that you will be analyzing is on the next page. Temperature, dew point, cloud cover, wind direction & wind speed, pressure & pressure tendency, and present weather (rain, snow, etc) are all shown.

Perform an isobaric analysis by drawing in isobars to reveal the pressure pattern. Isobars are drawn at 4 mb intervals beginning with a base value of 1000 mb. Allowed values for isobars include: . . . 988, 992, 996, **1000**, 1004, 1008, 1012, 1016, . . . Depending on the actual pressure values plotted on your map, you may use only some of these values or you may need to use values that are larger or smaller than the values shown on the list.

1a. The highest pressure value on the map is 1011.1 hPa, the lowest pressure is 998.0 hPa.

1b. **Draw these isobars on the map. Be sure to label each isobar and, with an L, indicate the center of low pressure.**

2a. **Next you should try to locate the cold front on the map.** Would you expect to find the invading mass of cold air on the eastern or western side of the Low? Eastern.

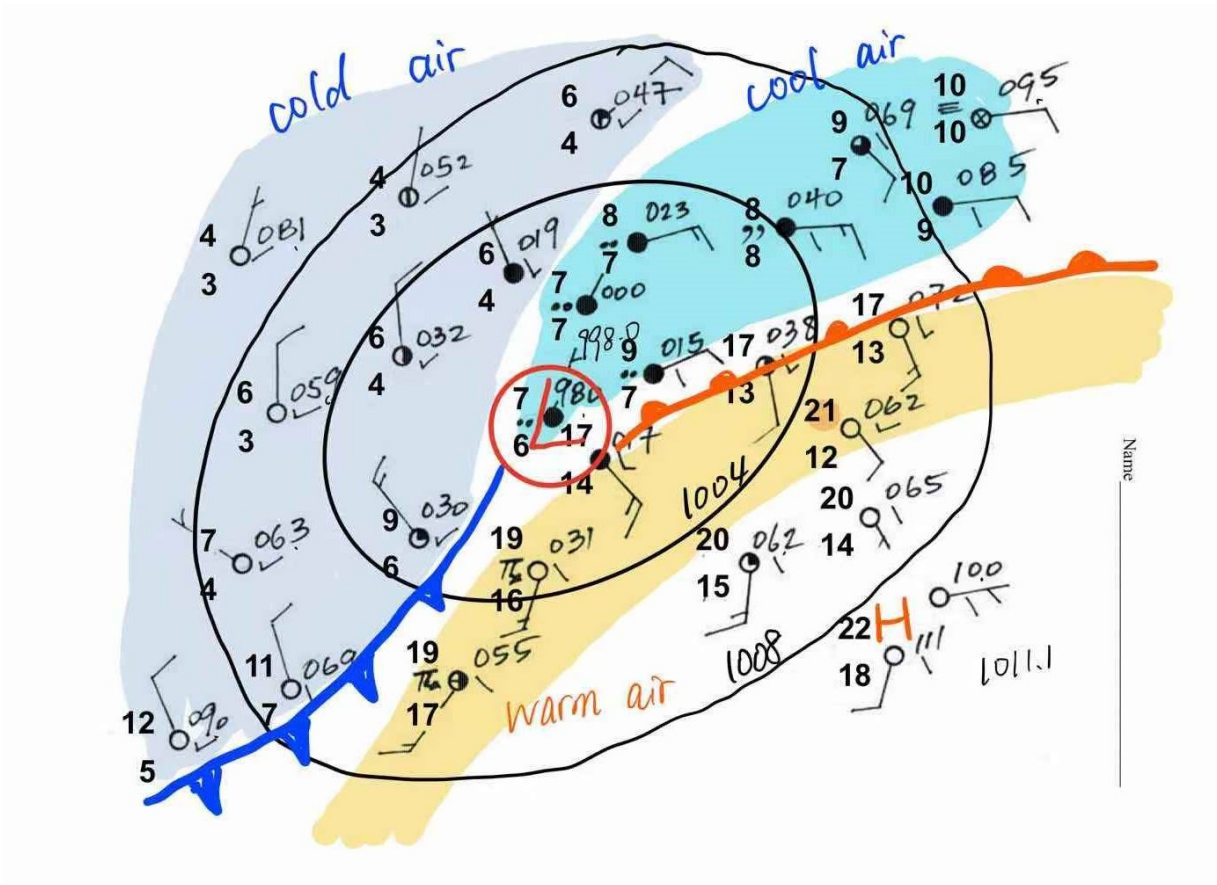
2b. Once you have located the **cold front** fill in the blanks below to indicate where the warmest, the coldest, the driest, and the moistest air is found ahead or behind the front. Is the pressure ahead and behind the front rising or falling? Indicate the direction of the winds ahead and behind the front.

	behind	Ahead
warm & cold air	cool, cold, colder	Warm
moist & dry air	Dry	May be moist
Rising & falling pressure	rising	Falling
Wind direction	northwest	southwest

3a. **Locate the warm front on the map.**

3b. Once you have located the **warm front** fill in the blanks below to indicate where the warmest, the coldest, the driest, and the moistest air is found ahead or behind the front. Is the pressure ahead and behind the front rising or falling? Indicate the direction of the winds ahead and behind the front.

	behind	ahead
warm & cold air	warmer	cool
moist & dry air	May be moister	drier
Rising & falling pressure	rising	Falling
Wind direction	Southwest, South, Southeast	East, Southeast, even South


cold air
cool air
warm air
1004
1008
H
Name

PART 2 Relationship between surface and upper-level weather

Data:

Daily surface weather map: Korean Meteorology

Daily 500 hPa Geopotential Height (m): Korean Meteorology

Daily 200 hPa Wind speed: ECWMP European Centre of Medium-Range Weather Forecasts

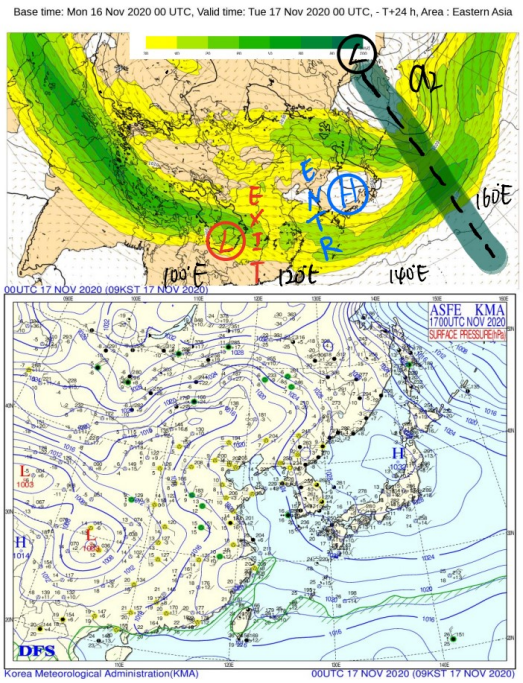
Date range: 00UTC 2020.11.17 – 00UTC 2020.11.19

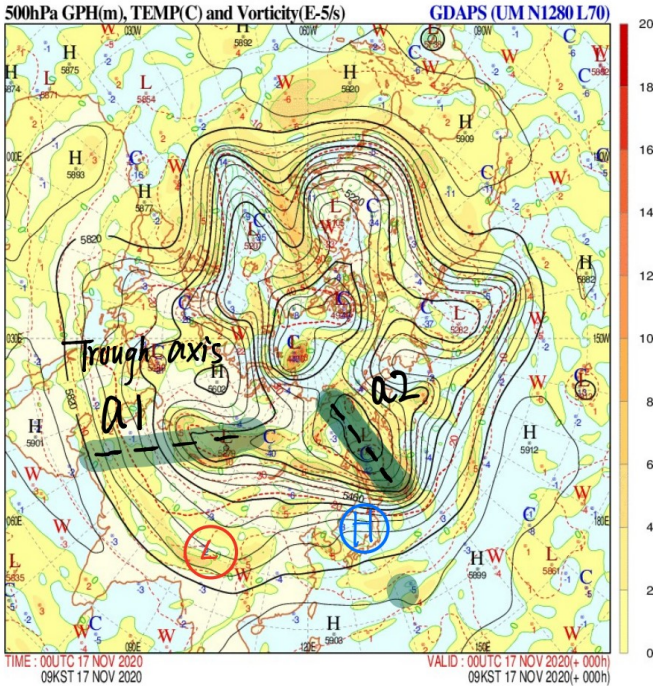
DAY 1: 00UTC 2020.11.17

In the 200 hPa wind speed figure, the jet stream could be clearly observed for its narrow band-shaped and high wind speed that even reaches 60 m/s (green shading). In the 500 hPa geopotential height figure, the Rossby waves meanders around the North Pole, and two troughs were found and marked by dark-green shading band.

Trough location. Now trough **a2** was near the Japan (around 155°E), trough axis **a1** was far away from East Asia.

Jet Stream exit/entrance region. The exit of jet stream (related to **a1**) contributed to the formation of surface cyclone (low pressure center) at Southeast China (marked by red circle). The entrance of jet stream (related to **a2**) favored the formation of the anticyclone (high pressure center) around the sea of Japan (marked by blue circle).

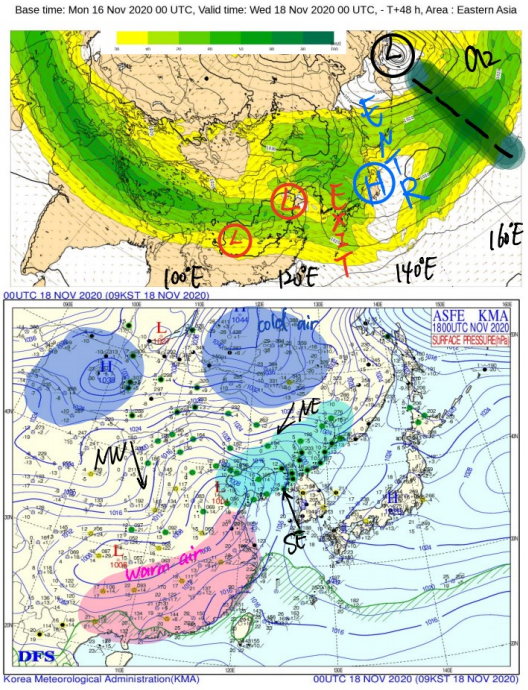


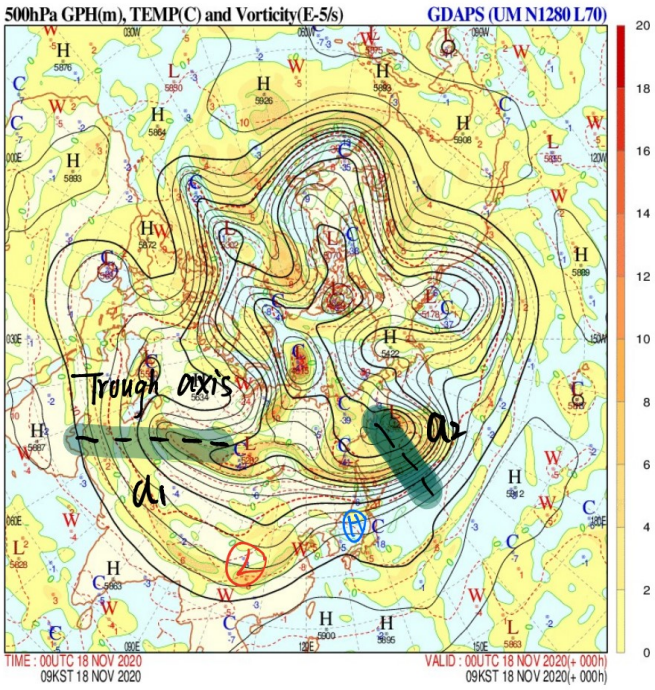


DAY 2: 00UTC 2020.11.18

Jet stream exit/entrance location: the exit of jet stream (associated with **a1**) tended to collapse with the entrance of jet stream (associated with **a2**). It may indicate that the trough **a1** was slowly propagating eastward. Surrounding the exit of jet stream (aloft **a1**), even two low pressure systems were produced.

Surface: Cold air coming from the north started moving southward, bringing precipitation to large area in the inland area of North China. In particular, coastal area in North China had heavier precipitation contributed by the warm moist air from the ocean, which was considered as a warm font. Since the surface temperature in North China was relatively low, extreme weather events such as freezing rain and snow were observed in some regions.





DAY 3: 00UTC 2020.11.19

Location of trough axis: trough axis **a1** and **a2** both slowly moved eastward. Today the axis was located around 80°E, and trough axis **a2** was still near 160°E.

Location of jet stream exit/entrance: near the exit region of jet stream (related to **a1**), a strong surface cyclone system occurred in Northeast Chin. Along with the eastward shifting of **a2**, the aloft turbulation reproduced another low-pressure system in the adjacent ocean (marked by black circle with thinner line) due to different wavelengths and wave speeds of Rossby waves propagation. From this, we could expect that the surface cyclone system will tend to dissipate.

Surface: the surface cyclone largely impacted the rainfall in Northeast China today. The surface cyclone favored the cold air from the north to intrude toward south, and contributed to the precipitation in many areas in the North China. Due to the low surface temperature, many stations observed snowflakes.