Area Forecast Discussion: Vladivostok and Sapporo
Date: Tuesday 07 February 2019
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Big Picture Perspective

Low height anomalies associated with a TPV shown by low potential temperature at the dynamic tropopause replaces a ridge feature over the Sea of Japan bringing in colder than average temperature anomalies (3 to 4 sigma at 850-hPa). The trough is able to dig into the region through CAA, CVA and positive f advection for the v component of the wind. Going forward the low pressure tracks north northeast as it gets picked up by the ridge building over the Pacific. The main source of precipitation remains to be in the form of ocean-effect and upsloping as frigid air flows over warm SSTs and gets lifted over the high terrain in Japan. By the end of the period a high pressure system that developed over the center of the continent moves towards the east with forcing from the poleward entrance region of the jet and AVA. High uncertainty exists when determining temperature anomalies in the extended period as ensemble members diverge. The determining feature for temperatures during this range will be the extent and strength of the low pressure system situated to the north.

Extended Range: Day 7-10

A low pressure systems track into the North Pacific causing ridging due to latent heat release and warm air advection. Upstream of the low a trough is becoming negatively tilted from cyclonic vorticity advection creating an upper level low that digs into the region northwest of Japan. The placement of this upper level low will influence the predominate flow pattern for the forecast region affecting what type of temperatures that can be expected. There is large ensemble spread in the GEFS with some members suggesting ridging and others troughing, meaning there is large uncertainty in the forecast. Anticyclonic wave breaking occurs over Western Asia causing warm air advection in the region leading to ridge building. As the ridge builds, it propagates an existing shortwave trough westward bringing a potential of precipitation across the northeast of the Continent and into Japan.

Medium Range: Day 4-6

The parade of shortwave troughs within the greater trough continues into this period, keeping Vladivostok and Sapporo in the thermal trough with westerly winds advecting the very cold Russian air. Very small shortwave troughs near the surface are forecasted

to bring slightly heavier precip to southern Japan towards the begin of the period and eventually intensify into a surface low downstream. Vladivostok will continue to be dry with near climatological temperatures and Sapporo will remain slightly colder than climatology with snow throughout the period.

Short Range: Day 0-3

Sapporo and Vladivostok continue to be dominated by the cold core low to the north for the first half of the period, bringing some snow to Sapporo in the wake of the cold front, despite cold air advection and anticyclonic vorticity advection, the warm SSTs and a shortwave trough create large instability. As the upper-level cyclone starts to propagate to the east due to the thermal ridge created in the warm sector of the surface low increasing the Q-vector forcing in the east, another tighter trough will dig in behind it. Sapporo remains cold with frozen precipitation throughout the period while Vladivostok remains dry with near climatological temperatures.

Probabilistic Forecast

Vladivostok, Russia:

Day 0-3:

Max Temp: -5ºC (10th), -7ºC (50th), -8ºC (90th)
Min Temp: -14ºC (10th), -15ºC (50th), -17ºC (90th)
Precip: 0 mm (10th), 1 mm (50th), 2 mm (90th)

Day 4-6:

Max Temp: -3ºC (10th), -4ºC (50th), -5ºC (90th)
Min Temp: -11ºC (10th), -12ºC (50th), -13ºC (90th)
Precip: 0 mm (10th), 1 mm (50th), 2 mm (90th)

Day 7-10:

Max Temp: -1ºC (10th), 1ºC (50th), 2ºC (90th)
Min Temp: -5ºC (10th), -8ºC (50th), -10ºC (90th)
Precip: 0 mm (10th), 1 mm (50th), 2 mm (90th)

Sapporo, Japan:

Day 0-3:

Max Temp: -2ºC (10th), -6ºC (50th), -8ºC (90th)

Min Temp: -10ºC (10th), -11ºC (50th), -12ºC (90th)
Precip: 3 mm (10th), 5 mm (50th), 6 mm (90th)

Day 4-6:

Max Temp: -2ºC (10th), -3ºC (50th), -4ºC (90th)
Min Temp: -5ºC (10th), -8ºC (50th), -10ºC (90th)
Precip: 0 mm (10th), 1 mm (50th), 2 mm (90th)

Day 7-10:

Max Temp: 0ºC (10th), -1ºC (50th), -2ºC (90th)
Min Temp: -2ºC (10th), -4ºC (50th), -6ºC (90th)
Precip: 5 mm (10th), 7 mm (50th), 10 mm (90th)