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7 February - Vladivostok and Sapporo

Big Picture

This forecast period will again be dominated by the position and structure of the jet and its evolution with time. By examining Andrew Winter's North Pacific Jet phase space diagram, the jet is forecasted to become more retracted and shifted toward the equator. Along with this, anomalously high precipitable water values across southern China and southeast Asia have helped to keep 500 mb heights across that area persistently in the +2-3 sigma range. This results in equally anomalous 200mb wind speeds to start the period, with more climatological values toward day 7 and onward. The general storm track for this time period extends northeastward from the coast of Hokkaido into the Pacific Ocean, shifting slightly with the variations in the jet and subsequently the poleward jet exit region. By day 5, ridge building occurs across central and north China after the passage of an anomalous shortwave trough across the Middle East and India. With -3 sigma 500 mb heights and +3 sigma precipitable water values, this cyclone will impact northern India on day 3 and the latent heat release as vapor condenses through orographic lift will help to build the ridge downstream. While not highly amplified, this ridge will help to move the jet further offshore into the Sea of Japan and the Pacific more broadly. After day 7, the pattern becomes fairly close to climatology across China, southern Russia, and Japan and less favorable conditions for cyclogenesis as a large scale high pressure sets up along coastal China.

Day 7-10

With almost perfectly zonal flow at the jet level, the end of the forecast period is for the most part very close to climatology. A high pressure center situated over eastern China slowly drifts into the western Pacific, leading to +2-3 sigma surface pressure anomalies in much of this region. The main storm track shifts from north of Japan to just east of Japan, meaning only the eastern coastline is expected to be impacted by any cyclones. The greatest threat of precipitation occurs on day 7 as the jet is shifting and a shortwave may be positioned in the favorable equatorward jet entrance region south of Kyushu. The western coast, however, may have some orographically-forced sea-effect snow with west-northwesterly flow dictated by the high pressure center situated to the southwest. While the wind shear profiles are favorable with next to no directional shear, the overall subsidence from the high pressure may act to dampen the instability. As with climatology, northern China and southern Russia are not expecting much precipitation due to persistent offshore flow.

Day 4-6

A slightly more climatological, yet amplified upper level jet will be centered over Japan for most of the forecast period coupled with a dominating zonal flow at the 500mb level. A surface cyclone forming on the poleward flank of the jet will aid in funneling cooler temperatures into the

lower troposphere of Sapporo, Japan, aiding in furthering the accumulation of frozen precipitation in the region along with below average temperatures. Upstream, anomalous high pressure from Siberia will build into region throughout the entire period, inducing a northwesterly-westerly flow regime through most of eastern Asia. Downsloping will be of significance in the planetary boundary layer in Vladivostok, Russia, allowing temperatures to remain around climatology for the period along with a lack of precipitation.

Day 0-3

The period begins with an upper-level polar jet at approximately 40N in close proximity to a subtropical jet equatorward near 35N. Large-scale ascent favored in the left exit regions of the jets due to an ageostrophic, indirect circulation that primes the tropospheric layer for low-level cyclogenesis creates thermal instability and steep nearly adiabatic lapse rates in the lower to mid-troposphere. From days 0-1, two consecutive cyclones form east of Japan and move northeast, forming in conjunction with precipitable water anomalies of +2-3 sigma with moisture originating from the East China Sea. Days 2-3 tell a similar story; though the upper level jet has retracted further west and become slightly more intense, this provides greater vertical motion to restore thermal wind balance. A third surface cyclone develops concurrently with a shortwave trough that can be traced back to eastern Asia before displacing its energy through the trough centered over eastern Russia. This combination of the previously mentioned factors throughout the entire period will favor persistent frozen precipitation for areas where lift is favorable along the west coast of Japan, particularly in enhanced regions of orographic upslope due to a dominating northwesterly flow regime. Vladivostok, Russia, will exhibit a northerly flow regime and clear conditions that favor below normal temperatures for the beginning of the period and transition to near climatology towards the end due to the equatorward displacement of Arctic air channeled from the slowly progressing Siberian surface high that builds into the region.

Probabilistic Forecasts for the period

Vladivostok, Russia

Day 0-3

High Temperature	10th: 16°F	50th: 18°F	90th: 20°F
Low Temperature	10th: 8°F	50th: 11°F	90th: 14°F
Precipitation	10th: 0.00"	50th: 0.00"	90th: 0.05"

Day 4-6

High Temperature	10th: 20°F	50th: 21°F	90th: 22°F
Low Temperature	10th: 15°F	50th: 16°F	90th: 17°F
Precipitation	10th: 0.00"	50th: 0.00"	90th: 0.05"

Day 7-10

High Temperature	10th: 22°F	50th: 25°F	90th: 29°F
Low Temperature	10th: 17°F	50th: 20°F	90th: 23°F
Precipitation	10th: 0.00"	50th: 0.05"	90th: 0.15"

Sapporo, Japan

Day 0-3

High Temperature	10th: 13°F	50th: 21°F	90th: 27°F
Low Temperature	10th: 8°F	50th: 12°F	90th: 16°F
Precipitation	10th: 0.30"	50th: 0.55"	90th: 0.70"

Day 4-6

High Temperature	10th: 20°F	50th: 23°F	90th: 26°F
Low Temperature	10th: 14°F	50th: 16°F	90th: 18°F
Precipitation	10th: 0.25"	50th: 0.40"	90th: 0.50"

Day 7-10

High Temperature	10th: 20°F	50th: 23°F	90th: 25°F
Low Temperature	10th: 17°F	50th: 20°F	90th: 23°F
Precipitation	10th: 0.30"	50th: 0.60"	90th: 1.10"