Area Forecast Discussion: Kamchatka, Russia and St. Paul Island, AK Date: Tuesday 28 March 2019 Forecasters: Chelsea Snide and Brennan Stutsrim

Big Picture Perspective

The stratospheric polar vortex continues to show a trend in warming toward the end of the period, hinting at a final warming event in the coming week or two due to increases in radiational warming as the season transitions. This trend is accompanied by the GFS ensemble members starting to agree on a transition to a negative AO index at the start of April, possibly associated with the warming. Early April may be a start of a regime change as the warm season approaching. It is possible the regime change will result in the collapse of the North Pacific high pressure blocking pattern that will remain throughout the forecast period. The pacific jet appears to be the major influencer to the downstream weather pattern in our forecast region. Minimal sea ice extent over the Bering Sea may contribute to ridge building through added heat flux from the water due to warm sea surface temperature anomalies.

Extended Range: Day 7-10

During this period, the anticyclone is forecasted to get cutoff by the anticylonic wavebreaking over Alaska, allowing it to propagate even further into Russia and slightly more poleward. This will cause positive temperature anomalies in eastern Siberia and the northern Kamchatka peninsula and 5-6 sigma positive precipitable water anomalies in eastern Siberia. The jetstream coming out of Asia will continue to strengthen with a very strong jet streak making its way eastward during the period. This positive 3-4 sigma anomalous windspeed will cause a robust west to east atmospheric river running up against the west coast of the U.S. The heights over Alaska will fall during the period because of cyclonic vorticity advection, allowing a cyclonic circulation aloft which is not forecasted to produce a surface low in Alaska. Saint Paul Island will have warm anomalies throughout the period will very little precipitation, mostly at the beginning of the period because of the atmospheric river. Kamchatka will have some snow at the beginning of the period but warm anomalies throughout the period.

Medium Range: Day 4-6

The current ridge that was built into Alaska will start to break up when a low pressure center develops in on the southern coast. Meanwhile, a trough in the central Pacific will propagate underneath the ridge and become very negatively tilted by the end of the period. An anticyclonic wave breaking event will cause the anticyclone to move northwestward towards Russia at the end of the period. The combination of the anticyclone in the very northern Bering Sea and strong cyclone to the south of the Kamchatka Peninsula will create an easterly jet into the Peninsula, and a resulting atmospheric river from the tropical Pacific onto Kamchatka. This atmospheric river will help the cyclone to the south to produce mixed precipitation, especially in the northern half of the Peninsula. The increasingly southeasterly flow will help produce anomalous warm temperatures throughout the period in Kamchatka with mixed precipitation, phase based on orography. Saint Paul Island will also stay anomalously warm throughout the period with some rain moving in at the end because of the atmospheric river.

Short Range: Day 0-3

The period starts off with a rapidly intensify low pressure, reaching a minimum pressure of 948-hPa, that is situated in the poleward exit region of a 160 kt pacific jet. Cyclonic wave breaking occurs downstream of the Bering Sea, related to the W. Pacific cyclone, aiding in ridge building over Alaska. Three main factors can be attributed to the developing blocking pattern, diabatic heating from warm SSTA, advection of low *f* values, and warm air advection. This block contributes to the divergence of the jet pattern, part of the pattern extends poleward while the second part remains zonal south of the block. Southerly wind on the upstream side of the ridge axis acts as a mechanism to transport water vapor poleward creating an atmospheric river that extends into Western Alaska.

Probabilistic Forecast

Kamchatka, Russia:

Day 0-3:			
Max Temp:	2°C (10th),	3°C (50th),	4°C (90th)
Min Temp:	-4°C (10th),	-8°C (50th),	-11°C (90th)
Precip:	1 mm (10th),	2 mm (50th),	3 mm (90th)
Day 4-6:			
Max Temp:	6°C (10th), 8	3°C (50th),	10°C (90th)
Min Temp:	-1°C (10th),	-2°C (50th),	-3°C (90th)
Precip:	3 mm (10th),	5 mm (50th),	8 mm (90th)
Day 7-10:			
Max Temp:	4ºC (10th),	6°C (50th),	10°C (90th)

Min Temp:	-2ºC (10th),	-4°C (50th),	-5°C (90th)
Precip:	4 mm (10th),	8 mm (50th),	9 mm (90th)

St. Paul Island, AK:

Day 0-3:				
Max Temp:	1ºC (10th),	2ºC (50th),	3°C (90th)	
Min Temp:	-1°C (10th),	0°C (50th),	1°C (90th)	
Precip:	4 mm(10th),8 mm (50th),10 mm (90th)			
Day 4-6:				
Max Temp:	2°C (10th), 3°C (50th), 4°C (90th)			
Min Temp:	0°C (10th), 1°C (50th), 1°C (90th)			
Precip:	3 mm (10th), 4 mm (50th), 5 mm (90th)			
Day 7-10:				
Max Temp:	2°C (10th),	4°C (50th),	5°C (90th)	
Min Temp:	-2°C (10th),	-1°C (50th),	0°C (90th)	
Precip:	3 mm (10th),	5 mm (50th),	8 mm (90th)	