Application Library: Air Mass
Hurricane Force Low over Bering Sea

Contributed by:
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Region:
North Pacific

Office:
NWS Ocean Prediction Center

Date:
22 February 2017

Product(s):
Air Mass

Application Area:
Marine/Ocean

Feature:
Mid-Latitude Cyclone

Instrument(s):
Himawari -8 AHI

Works well with:
ASCAT wind vector retrievals
Water Vapor Channels
NUCAPS Soundings
SPoRT Ozone Products

Related Links:
SPoRT Air Mass RGB Introduction

SPoRT Air Mass RGB Interactive Quick Guide

Event Description:

A series of intense and expansive low pressure systems moved across the west Pacific and into the Bering Sea from 20-22 February 2017. The series of intense low pressure systems culminated in a large 950 mb hurricane force low over the Bering Sea.

Product Impact:

The Air Mass RGB product is used to observe the evolution of a storm over time and anticipate rapid cyclogenesis. The temperature and moisture characteristics of the mesoscale and synoptic scale environment as well as stratospheric air influence on the storm are monitored to support confidence of modeled data and influence forecast decisions in regard to rapid cyclogenesis and production of hurricane force winds. Additional products such as ASCAT wind vector retrievals, NUCAPS Soundings, and SPoRT ozone products can be used with the Air Mass RGB to further diagnose near-surface features such as high winds and low-level temperature/moisture characteristics. The SPoRT ozone products can provide users with more confidence in interpreting stratospheric air influence and lowering tropopause heights.

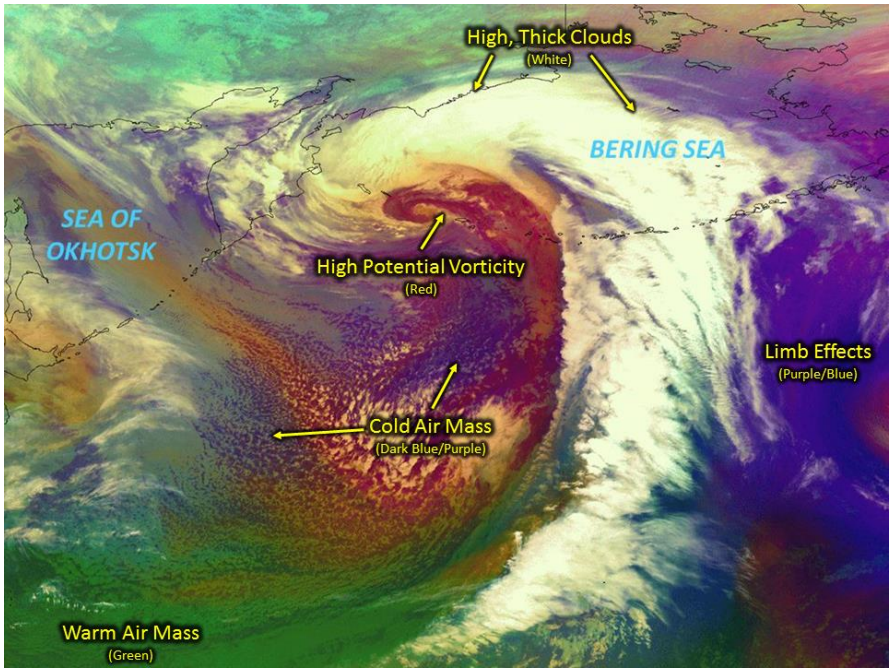

Figure 1. Himawari-8 Advanced Himawari Imager Air Mass RGB from 22 February 2017 1150UTC over the northern Pacific Ocean.

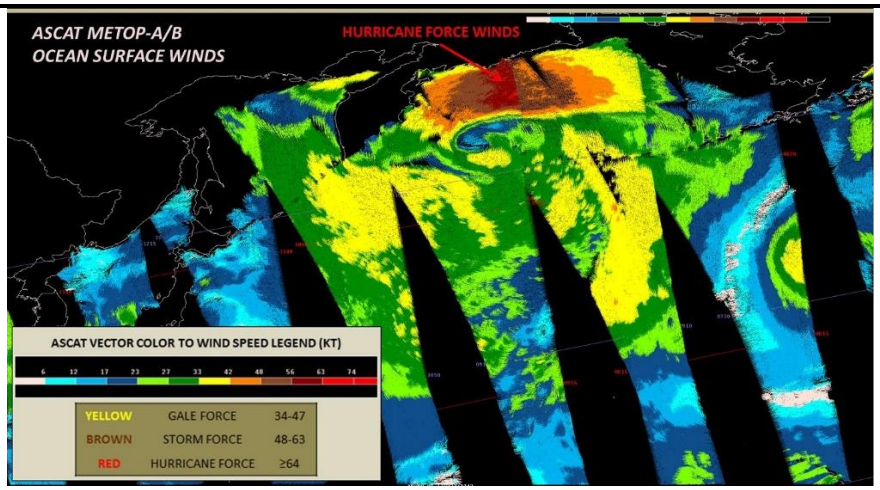

Figure 2. Advanced Scatterometer (ASCAT METOP-A/B) ocean wind vector retrievals from NWS Ocean Prediction Center, 22 February 2017.

Interpretation:

The red/orange coloring indicates a region of anomalous potential vorticity as dry upper level air is pulled downward by the jet stream circulation. These regions have a strong red contribution since high ozone and low water vapor concentrations lead to weak green and blue inputs respectively. High thick clouds are shown as bright white because of a large contribution from all 3 RGB components. Cold, polar air masses appear as shades of blue and purple due to weak green contribution of the ozone-rich air mass with low tropopause height, strong blue contribution due to cold temperatures, and weak red influence due to dry upper level air. It can be difficult to distinguish cold, polar air towards the outer edge of the image where limb effects (which are an inaccurate indication of cool temperatures in blue and purple), are created due to the atmospheric absorption of the longer wavelengths at high viewing angles. This can be problematic near the edge of the full disk at low- and mid-latitudes where warm, moist tropical air masses appear blue instead of green. Notice the hurricane force winds, observed by ASCAT, correlate with the region of high potential vorticity (red) on the Air Mass RGB. Forecasters can use the Air Mass RGB to identify regions of warm, dry, ozone-rich, high potential vorticity in orange or red to anticipate stratospherically driven high impact wind events.