

## Some meteorological comments from each mission period - Sienkiewicz, NOAA/NWS Ocean Prediction Center

### Descriptions:

**GDAS** - [NOAA Global Data Assimilation System](#) - a component of the NOAA Global Forecast System model for the purpose of serving as the initialization, or starting, weather forecasts with observed data. The system is available 6 hourly, 00, 06, 12, and 18 UTC and data fields defining the atmosphere and ocean surface are available in hourly timesteps from 00 to 09 hours from synoptic time. The GDAS data is the best representation of conditions in the western Atlantic during the period of interest from NOAA with the lack of

**Peak or Primary Wave Period** - The peak wave period in seconds determined from the spectral energy of the NOAA wave components of the GDAS. Peak or primary wave period can represent swell or wind wave energy, dependent on the wave field distribution.

**Peak or Primary Wave Direction** - The direction in which the peak wave energy is moving and plotted as direction towards. Similarly, peak or primary wave direction can represent either swell or wind wave energy. In the plots, direction is that to which the energy is traveling. Here is the definition to Primary Swell Direction from NWS Glossary - [Primary Swell Direction](#)  
[Prevailing direction of swell propagation.](#)

**Significant Wave Height** - The mean or average height of the highest one-third of all waves in a swell train or in a wave-generating region. It approximates the value an experienced observer would report if visually estimating sea height. When expressed as a range (e.g. Seas 2-4 ft), indicates a degree of uncertainty in the forecast and/or expected changing conditions (not that all waves are between 2-4 ft). Generally, it is assumed that individual wave heights can be described using a Rayleigh distribution.

**Wind Speed and Direction**- from GDAS - winds at 10m above the surface

The linked slides contain graphics of conditions from the four mission or cruise transits. Included for each mission period are two plots of the cruise tracks with GDAS significant wave heights and primary wave direction (top left) and wind direction and speed (lower left). Plots of Significant Wave Height, Primary Wave Period, and Wind Speed are shown on the right (blue lines on each plot) as a timeline with vertical lines projected for 0000 UTC for each day at sea.

Values were derived from the GDAS hourly files for matching times of AIS position from Polar Prince via the Seavision web application. Some time, distance, and data interpolation were required to acquire representative data points. The orange and green lines represent remotely sensed data from the Copernicus Marine Services and the NOAA NCEI Blended Seawinds product. Gaps in the data are due to close proximity to land and no corresponding data point.

### May 20 - 28, 2023 - Slides 2 - 7

#### Mission #2

Wind speed and wave height matchup points show three distinct peaks in wave heights and wind speeds on the 21st, 24th, and 26th. The 21st SW winds between a high to the SE and low

pressure tracking ENE across Labrador well to the N. 23rd - low pressure was beginning to pass to the W and NW of the position and had a Gale Warning associated with it. On the 24th the low was N of position of interest with a second peak of both wind speeds and wave heights. Winds veered rapidly from Sly to N to NE and E over the next day. A second area of low pressure on the 24th was located near 43N 70W with Gale conditions and anticipated to move NE. On the 26th the low mentioned on the 24th impacted the vessel of interest with SEly and SSWly winds and waves becoming westerly. Per the GDAS the highest winds and waves experienced during the 4 missions was on the 26th associated with this low pressure system with winds veering from SSE to WSW and primary wave directions from the S and SSW.

#### **May 29 - June 6, 2023 - Slides 8 - 11**

**Mission #3** - On the 29th a low tracked NNE over Newfoundland and moved into the Labrador Sea. GDAS estimates were challenged as this part of the mission was within the immediate coastal waters for Newfoundland where the resolution of GDAS has gaps. When the passage to the SE was initiated, WSW waves persisted through June 1st and became ENE as significant wave heights increased to 2.3 m on the 4th. Slide 10 from 1200 UTC 3 Jun shows low pressure to the ESE near 40N 42W with a large area of N to NNE winds extended from 40N to N of 50N. GDAS matchups show winds to the N, gradually veering to more ENE for the transit back. Wave heights remained at about 1.5 m through the 5th.

#### **June 7 - 15, 2023 - Slides 12 - 16**

**Mission #4** - On the 8th between 12-18Z on the 8th strengthening low pressure passed over the vessel of interest on the outbound leg of the transit to the SW. A series of low pressure systems consolidated to the E of Newfoundland with peak significant wave height late on the 11th in W winds as the circulation from strong low pressure E of NFLD at 988 mb persisted and the circulation expanded westward to S of Nova Scotia W winds increased on the 11th to approximately 13 m/s with significant waves heights to 2.5 m.

#### **June 16 - 18, 2023 - Slides 17 - 20**

**Mission #5** - Departure in ESEly winds with low pressure 1005 mb over New Brunswick. On the 17th seas approached 2 m with increasing period to 8.5 sec likely result of SW winds from the low passage and secondary low development E of NFLD. There was a long fetch of SW winds from 40N southward W of 50W. It appears that weak high pressure passed early on the 18th with SWly filling back in as the 18th progressed.