



# Mariners

## Weather Log



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# Mariners Weather Log

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## Editor's Note

This issue of the Mariners Weather Log contains a wide variety of feature articles. There is a chronical of the annual VOS training for students at the Massachusetts Maritime Academy. There is also a synopsis of a 2018 Mariners Decision Makers' Workshop. We have also run an article about the NWS participation at the CMA 2018 conference in Stamford, Connecticut.

Also appearing is an article about this year's Lake Carriers Association meeting in Cleveland, Ohio. As a practical feature, the reader can discover the optimal placement for aneroid barometers.

Our regular features on the Tropical Atlantic and Tropical East Pacific, North Atlantic, and North Pacific Areas appear, along with an article about Buoy Measurements during Hurricane Jose. We also have our VOS Cooperative Ship Report.



**On the cover:** Photographer, Rob Niemeyer.



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The views and opinions stated herein are solely the opinions of the authors and should not be construed to reflect the views and opinions of NOAA or the Department of Commerce.

## VOS Maritime Training 2018

**Rusty Albaral**  
**PMO Louisiana**



Each year, a unique training opportunity takes place for more than 500 maritime academy cadets over the open ocean on the Massachusetts Maritime Academy (MMA) training ship, **T.S. Kennedy**.



The MMA is one of just a handful of U.S. maritime universities responsible for training, molding, and mentoring of future mariners of the U.S. shipping fleet. There is no better way to accomplish this mission than to deploy the cadets on a 6-week training cruise known as Sea Term. While underway, the cadets are taught many skills required to obtain their required licenses from the U.S. Coast Guard to begin their careers as commercial mariners. Among the many subjects and skills taught by permanent MMA staff members, mostly comprised of retired captains, there are required areas where training staff from outside organizations helps. One subject is weather.



For more than 15 years, the NWS has partnered with the MMA, the State University of New York, and the Maine Maritime Academy, providing weather instructors to assist with their Sea Terms. Through this partnership, NOAA has provided Port Meteorological Officers (PMOs) to serve onboard their training ships as a member of the deck-training staff. This year, Rob Niemeyer, PMO, Weather Forecast Office Jacksonville, Florida, and Rusty Albaral, PMO, Weather Forecast Office New Orleans/Baton Rouge, Louisiana, teamed up to provide support to the MMA staff aboard the **TS Kennedy**.

Each PMO provided 3 weeks of support and conducted a turnover at the midway point of the Sea Term. While underway, Rob and Rusty each provided instruction to nearly 300 cadets both in the classroom as well as on the bridge. They also provided assistance to the cadets and ship staff in the proper collection and transmission of real-time meteorological observations in support of the Voluntary Observing Ship (VOS) Program throughout the duration of the trip. Additionally, NOAA has significantly benefited from these cruises by having an opportunity to launch drifting buoys for the Atlantic Oceanographic and Meteorological Laboratory (AOML) and has become a popular event for both the academy staff and cadets. The maritime training program that Rob and Rusty developed over many years has evolved from basic VOS introduction and observation techniques to a standardized and structured curriculum that continues to evolve each year through collaboration with the academy staff.

The daily routine on the Sea Term can be long, but with only a single PMO onboard at a time, long hours are unavoidable. A typical day on the ship begins on the bridge, having the cadet on the “Weather Watch” debriefing or reviewing the night’s observations, reception, handling of

weather products, and, most significantly, a review of the pass-downs between each of the

watch teams through the night. With watch teams rotating every 4 hours, there is a large opportunity for important information to get missed or lost in their turnovers. Once this is complete, the daily training schedule begins at 0800 each morning, and the instructors make their way to the classroom for formal instruction.

The topics of the classes Rob and Rusty taught consisted of Basic Meteorology, VOS Introduction and Overview, Meteorological Observation Techniques, Weather Watch Procedures, Weather Bulletin Interpretation and Plotting, Tropical Weather and Avoidance, NOAA Product Familiarization, Chart Interpretation, and Advanced Meteorology. Although the daily classroom schedule varied for the Meteorology classes, on average Rob and Rusty spend between 12 and 15 hours in the classroom and an additional 30–35 hours on the bridge per week.



When not in the classroom, Rob and Rusty spent their time on the bridge providing real-time training, consisting of monitoring and reporting of the marine weather conditions. The bridge training is truly where the cadets begin to fully understand not only the proper collection of meteorological data, but also how the weather and ocean conditions impact the navigation of the vessel. The watches will learn how to properly read all weather equipment to the most accurate reportable values and unit conversions to format the information properly for dissemination. As a part of this data preparation, one of the more challenging procedures

required of the cadets is the conversion from relative winds to true winds.

Outside of monitoring the weather conditions and sending observations every 3 hours, Rob and Rusty have developed a weather-plotting board, which has become a part of the responsibilities of the weather watch. As a training exercise, but using NOAA's Ocean Prediction Center's (OPC) High Seas Bulletins, the cadets are required to plot warning areas each time that a new update comes from OPC. These plotting exercises, build on classroom instruction on product interpretation and advanced meteorology. In addition to an excellent training aid, the cadets' plots also provide a great graphic display of the large-scale weather and ocean picture for all ship staff, deck trainers, and additional crew members to have a quick glance at the updated weather every 6 hours.



Finally, as a part of the deck training staff and everyday life as a mariner at sea, we are able to instill in the cadets the importance of being weather aware and weather educated. As part of this awareness, our PMOs are able to stress the importance of VOS participation and the critical role these vessels play in NOAA's ability to provide the most accurate weather products to mariners. Over the course of the 6-week Sea Term, our instructors see the cadets transform from possessing little to no meteorological knowledge to seasoned observers, with a great understanding of why accurate weather observations are important and how the VOS

program's most basic goal is to keep mariners, vessels, and cargo safe at sea.

As an additional partnership with yet another NOAA entity, the AOML has provided our training staff with nearly a dozen drifting buoys that have been successfully deployed while our PMOs have sailed with the **Kennedy**. The AOML identifies the deployment areas, and Rob made arrangements with the ship's staff to coordinate launches off the Florida coast, the coast of Cape Hatteras, and on approach to Cape Cod during the final few days of the Sea Term. Leading up to the launches, staff and students line up to sign their names, class numbers, a tribute to a family member, birthday wishes, anything they like on the top of the buoys before we bring them out on deck for the launch. As a part of the launches each year, a brief presentation is given on the particulars of the drifting buoys, the data that we will receive, how long they last, and where they might end up. Although there are drifters that transmit additional meteorological conditions, these provide location and sea surface temperature for a minimum of 400 days if they remain in circulation and are not hit by ocean-going vessels. As a part of the launches each year, Rob and Rusty provide the tracking information to the instructor staff and cadets so they are able to track the buoys online over the course of their drifting journeys. While launching the drifting buoys has become a highly anticipated event on the Sea Terms, it is also yet another great example of how our team of maritime weather trainers has been successful at providing real-time weather and ocean data while serving as members of the academy's deck training staff. A few of the **Kennedy's** drifters continue to be actively reporting sea surface temperature

Over the course of the past decade, our VOS Maritime Training Program has become an integral part of the MMA's Sea Term training plan. While on this year's 6-week journey, Rob and Rusty provided more than 48 hours of formal classroom meteorology instruction and nearly an additional 250 hours of hands-on bridge training. As a part of the bridge training and participating as an active VOS program vessel, the **T.S. Kennedy** provided NOAA with more than 200 ship observations and an additional 1000+ observations thus far from the drifters launched during the Sea Term. The feedback from the academy's training staff, captain, and mates onboard has been positive and supportive of any changes that we have felt necessary to enhance this training.



The VOS program is committed to support Safety Of Life At Sea (SOLAS) through ongoing education and participation in the VOS program, communicating and training proper methods and use of tools for observations, and ongoing transfer of real-world weather experience to the maritime workforce of the future. VOS, like all government programs, is challenged with budget and resources constraints but will work to promote future involvement of VOS PMOs and NOAA personnel to facilitate ongoing maritime academy training. The results may seem intangible, but they are real. This training produces more weather-aware mariners, and promotes the value of VOS participation and observations, which leads to safer operating conditions for mariners navigating the world's oceans.



## 2018 Mariners Decision Maker's Workshop



**David Dellinger**  
**PMO South Florida**

This past March, key leaders from the Maritime Industry were invited to a multiday workshop at the National Hurricane Center (NHC)/Miami Weather Forecast Office (WFO) and hosted by the Tropical Analysis & Forecast Branch (TAFB) personnel. Also in attendance were representatives from the Ocean Prediction Center (OPC) and the Voluntary Observing Ship (VOS) Program.

The weather services and program leaders each provided the maritime industry leaders a look at how forecasts products are made and how the data their ship's provide enhanced, daily, and near- and off-shore forecasts, as well as long-

range model output. In return, leaders from the cruise, cargo, and tanker community took part in semirealistic weather-exercise scenarios.

The exercises were part of decision making for both sides to see how forecast products impact the commercial maritime industry. Additionally, it was a process for the NWS to peer into the complex and varied challenges the Maritime Community experiences during challenging weather. A quote from the organizing forecaster from TAFB: "We learned even more this year from you," said Andrew Latto, Lead forecaster from TAFB. "We appreciate your willingness to discuss various ideas and share your opinions with us."



Participants included representatives from Tropical Shipping, CMA CGM, Royal Caribbean Cruise Lines, Celebrity Cruises, FOSS, Princess Cruises, Norwegian Cruise Lines, Disney Cruise Lines, Crowley, The STAR Center, and Carnival Cruise Lines. (Photo: Dennis Felgen, National Hurricane Center PAO)



## Connecticut Maritime Association (CMA) 2018

**James Luciani**  
PMO New York

From March 12–14, 2018, I had the pleasure of attending, along with our Program Manager, Michael Potochney, and the Houston PMO, Chris Fakes, the 2018 Connecticut Maritime Association (CMA) “Shipping 2018” Conference and Expo in Stamford, Connecticut.



We networked with our business partners from AMVER about potential changes to the weather-observing code and how that might affect them going forward. We were able to exchange information about how VOS currently uses ship-board communications. The vendors shared their views on the direction shipboard communication is heading and how VOS can begin to formulate a plan to best position ourselves to be ready to operate using these evolving systems.



The conference bills itself on its Web page as, “A gathering of over 2000 industry leaders, owners and ship managers, controlling over 5000 vessels attended the 2018 Conference for 3 days of business discussions, networking, and information exchange.”

VOS business discussions included talking with AIS representatives about the need to prove or disprove the viability of transmitting weather observations with AIS units. We hope to partner with AIS manufacturers and other industry representatives to explore this in greater depth.

Mike Potochney, the VOS Program Manager, attended *The El Faro, A Case Study: Lessons Learned*, presented in the Grand Ballroom to an audience of over 1000 attendees, including ship owners, captains, and various company representatives. The key individuals involved in the investigation presented the factors that led to loss of lives in this unfortunate incident. During the Q/A session, Mike addressed the audience, providing a brief introduction of the VOS program, thanked those currently participating in the program, and urged others who may not be participating to consider the benefits of the VOS program.

These are just a few examples of the things undertaken during this short, but action-packed, 3-day conference. It is not often that we get an opportunity to personally meet with this diverse a group of professionals.





## VOS at the Lake Carriers Association

**Ron Williams**  
**PMO Great Lakes**

In early February, NOAA/NWS was represented at the annual Lake Carriers Association (LCA) Captains Committee Meeting in Cleveland, Ohio. The LCA represents U.S. Flag Vessels that operate on the Great Lakes. The Association's member companies operate 49 U.S. Flag self-propelled vessels and tug/barge units ranging from 494–1013.5 feet.

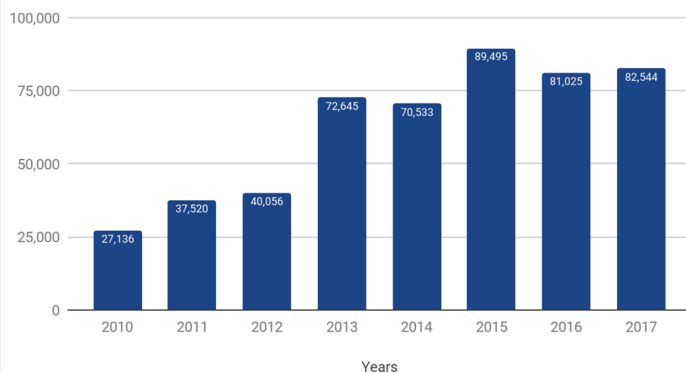
The Great Lakes Port Meteorological Officer (PMO), Ron Williams, along with the Central Region Marine Program Manager, Brian Hirsch, and Warning Coordination Meteorologist, Michael Bardou, from the Weather Forecast (WFO) Chicago, presented topics on Great Lakes forecasting products and the importance of ship weather observations.

This meeting serves as an important connection to mariners and the NWS in that we are able to poll users on how our forecasts reach them.

It was also an opportune time to show the importance on ship weather observations and how we use that data to publish a more accurate marine forecasts.

The attached chart below shows how we have steadily increased the amount of weather observations per year with successful recruitment of ships on the Great Lakes.

**Great Lakes Observations Submitted**



**(Left to right) Ron Williams, Michael Bardou, Michael Potochney, and Brian Hirsch**



## Tips for Barometer Placement

**James Luciani**  
PMO NY

These tips concern the placement of barometers. As a PMO, it has become evident that there is no standard regarding placement of the barometer on the bridge. Some barometers are located near the compartments overhead, others are at eye level, and some below eye level. Most are located on a bulkhead (wall), while others may be located on columns within the bridge or on the side of a room divider.

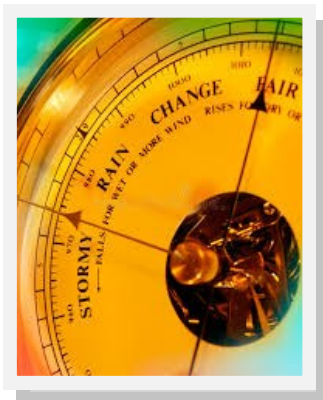
Based on my own experience, I have some simple guidelines concerning placement. First, look at the observer's barometers current location. If the observer had to remove it from the wall or column to which it is fixed, would the observer's feet have to leave the deck? If yes, the barometer is likely too high or is too far from the observer (e.g., behind a wide chart table) to get a consistent reading.

Does the observer have to look up to read the pressure? If yes, the observer will have a degree of variability, based solely on the height of the person taking the observation. A person over 2 meters tall (6 feet) will get a much different reading than one who is 1.6 m (5 feet, 3 inches). Is the barometer more than 2 meters from the observer? I have poor eyesight, and some barometers are too far away for me to read the barometer to the 1/10th (the requested degree of accuracy).

Here are my recommendations about locating the barometer.

- The height of the aneroid barometer should be at a convenient eye level for all observers, in such a position that it avoids errors due to parallax. Tall people can squat or bend, but short people cannot easily raise themselves to the desired height.
- If the observer can touch his or her nose to the unit, it is at the optimal height and distance for reading. If the observer must locate it behind some type of bench or shelf, please try to keep the distance less than 1 meter. (Remember: The observer should gently tap the unit before reading it.) If the observer can't reach it, it is too far from the observer.
- The observer should keep the barometer out of direct sunlight

If the observer follows the above guidelines, it will also make PMO adjustments to the observer's barometers easier and safer (for the equipment) to complete.



Scott Stripling and Michael Formosa  
Tropical Analysis and Forecast Branch,  
National Hurricane Center, Miami, Florida  
NOAA National Centers for Environmental Prediction

The period of September through December 2017 proved to be active in terms of gale- and storm-force conditions across the TAFB Area of Responsibility (AOR). The 22 nontropical marine warnings issued for the Tropical North Atlantic and the 19 nontropical marine warnings issued for the Tropical Northeast Pacific basins during this time were above average compared to the past several years.

below shows the nontropical marine warning events that occurred across the Tropical Atlantic, Gulf of Mexico, and Caribbean Sea during this period. In addition to the typical gales brought about by cold fronts and baroclinic low-pressure systems, three of these warned events were tropical in nature. Improved remote-sensing technologies in the past decades provide forecasters important data over the oceans, such as scatterometer surface winds. In these three tropical cases, gale-force winds were verified with scatterometer data prior to, and in the decay period of, Atlantic Tropical Cyclones.

Nontropical Warnings issued for the Atlantic Basin between 01 Sept 2017 and 31 Dec 2017.				
Time	Basin	Wind Speed	Duration	System Type
0000 UTC 20 Sep	Tropical N Atlc	40 kts	18 hr	Remnants of TC Lee
0000 UTC 01 Oct	Tropical N Atlc	35 kts	30 hr	Low pres/Cold front
1800 UTC 03 Oct	Tropical N Atlc	35 kts	18 hr	Stationary front
0600 UTC 04 Oct	Gulf of Mexico	35 kts	06 hr	Pres gradient
1800 UTC 04 Oct	Tropical N Atlc	35 kts	18 hr	Cold front
0600 UTC 09 Oct	Tropical N Atlc	35 kts	06 hr	Tropical wave
1200 UTC 16 Oct	Gulf of Mexico	40 kts	36 hr	Cold front
1800 UTC 23 Oct	Gulf of Mexico	35 kts	18 hr	Cold front
1800 UTC 27 Oct	Caribbean	35 kts	18 hr	Low pres/Pre TC Philippe
1200 UTC 28 Oct	Gulf of Mexico	40 kts	24 hr	Cold front
0000 UTC 16 Nov	Central Atlc	40 kts	36 hr	Low pres/Cold front
0000 UTC 19 Nov	Gulf of Mexico	35 kts	36 hr	Cold front
1200 UTC 22 Nov	Gulf of Mexico	35 kts	36 hr	Low pres/Cold front
0000 UTC 23 Nov	Central Atlc	40 kts	36 hr	Low pres/Cold front
0000 UTC 05 Dec	Central Atlc	35 kts	24 hr	Cold front

Nontropical Warnings issued for the Atlantic Basin between 01 Sept 2017 and 31 Dec 2017.

0000 UTC 06 Dec	Gulf of Mexico	40 kts	90 hr	Cold fronts
1200 UTC 09 Dec	NW Caribbean	40 kts	60 hr	Cold front
0000 UTC 13 Dec	Central Atlc	35 kts	15 hr	Cold front
1800 UTC 15 Dec	Gulf of Mexico	35 kts	12 hr	Cold front
0000 UTC 16 Dec	Caribbean	35 kts	84 hr	Pres gradient
1800 UTC 23 Dec	Gulf of Mexico	35 kts	12 hr	Cold front
0000 UTC 24 Dec	Caribbean	35 kts	36 hr	Pres gradient

The most dangerous threat to maritime navigation over this portion of the Eastern Pacific Ocean for the time period of 01 September to 31 December is tropical cyclone activity, which peaks in September. However, the fall and early winter months usher in the westerlies over the midlatitudes of the Eastern Pacific Ocean region south of 31N. Occasional gale- and storm-force winds occur in conjunction with the passage of strong frontal systems. These

gales and storms are baroclinic in nature and are typically stronger in the late-fall months. Another source for gales and storms occurs through mountain gaps into and extend across and downstream of areas such as the Gulf of California, the Gulf of Tehuantepec, the Gulf of Papagayo, and the Gulf of Fonseca. The most frequent of these gap-wind locations is typically over the Gulf of Tehuantepec. This 2017 fall season had 14 Gulf of Tehuantepec warnings, two Gulf of California gales, and one Gulf of Papagayo gale

Nontropical Cyclone Warnings Issued for the Pacific Basin between 01 Sep 2017 and 31 Dec 2017.

0600 UTC 06 Oct	Gulf of Tehuantepec	35 kts	30 hr
1800 UTC 16 Oct	Gulf of Tehuantepec	40 kts	54 hr
1800 UTC 23 Oct	Gulf of Tehuantepec	50 kts	66 hr / 12 hr
0600 UTC 29 Oct	Gulf of Tehuantepec	35 kts	12 hr
0000 UTC 10 Nov	Gulf of Tehuantepec	40 kts	144 hr
0000 UTC 20 Nov	Gulf of Tehuantepec	40 kts	24 hr
0600 UTC 23 Nov	Gulf of Tehuantepec	40 kts	39 hr
0000 UTC 27 Nov	Gulf of Tehuantepec	40 kts	39 hr
0600 UTC 30 Nov	Gulf of Tehuantepec	40 kts	63 hr
0000 UTC 04	27N140W	35 kts	12 hr

Nontropical Cyclone Warnings Issued for the Pacific Basin between 01 Sep 2017 and 31 Dec 2017.			
1800 UTC 05 Dec	Gulf of California	35 kts	12 hr
1800 UTC 07 Dec	Gulf of California	35 kts	30 hr
0600 UTC 09 Dec	Gulf of Tehuantepec	55 kts	78 hr/36 hr
1800 UTC 10 Dec	Gulf of Papagayo	35 kts	06 hr
1200 UTC 16 Dec	Gulf of Tehuantepec	35 kts	12 hr
1800 UTC 23 Dec	28N140W	35 kts	18 hr
0600 UTC 24 Dec	Gulf of Tehuantepec	35 kts	18 hr
1200 UTC 25 Dec	Gulf of Tehuantepec	35 kts	33 hr
0600 UTC 28 Dec	Gulf of Tehuantepec	35 kts	54 hr

Ship observations received in real time used to issue or verify warnings across the Tropical Eastern Pacific during the fall season are shown below in .

Ship Report Verification of Warned Events over the Gulf of Tehuantepec, Baja California, and Tropical Eastern Pacific between 01 Sep 2017 and 31 Dec 2017.			
0100 UTC 07 Oct		11.7N 90.1W	35 kts 10 ft (3 m)
1800 UTC 17 Oct		13.6N 95.0W	42 kts
0600 UTC 26 Oct		13.1N 96.1W	45 kts 16 ft (5 m)
0600 UTC 26 Oct		13.9N 95.7W	51 kts
2300 UTC 26 Oct		15.6N 95.5W	36 kts
1200 UTC 11 Nov		13.2N 96.3W	35 kts 10 ft (3 m)
0100 UTC 14 Nov		14.4N 93.7W	40 kts 19 ft (6m)
1000 UTC 16 Nov		15.2N 94.2W	35 kts 10 ft (3 m)
0400 UTC 24 Nov		15.0N 95.4W	40 kts 16 ft (5m)
1200 UTC 01 Dec		14.1N 95.3W	40 kts 19 ft (6m)
1800 UTC 02 Dec		14.9N 95.1W	39 kts 13 ft (4m)

Ship Report Verification of Warned Events over the Gulf of Tehuantepec, Baja California, and Tropical Eastern Pacific between 01 Sep 2017 and 31 Dec 2017.			
0600 UTC 04 Dec		30.2N 141.3W	35 kts 10 ft (3m)
1900 UTC 04 Dec		32.5N 137.5W	41 kts 10 ft (3m)
1000 UTC 08 Dec		26.4N 114.4W	50 kts 7 ft (2m)
1300 UTC 08 Dec		27.3N 115.1W	35 kts 10 ft (3m)
2300 UTC 13 Dec		15.4N 95.3W	47 kts 10 ft (3m)
1600 UTC 21 Dec		25.4N 140.2W	40 kts 10 ft (3m)
0500 UTC 26 Dec		15.3N 94.7W	55 kts 10 ft (3m)
0800 UTC 31 Dec		27.2N 133.7W	45 kts 7 ft (2m)

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# MARINE WEATHER REVIEW — NORTH ATLANTIC AREA

May to August 2017

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College Park, Maryland

## Introduction

Although this 4-month period is the least-active period for North Atlantic cyclonic activity, the more-active month of May did feature one cyclone that produced near-hurricane-force winds late in the month. Early June featured a storm with the lowest-central pressure of the 4-month period (962 hPa), an occurrence more commonly seen in winter. In a preview of the more-active fall season to come, one hurricane-force low did form on the western North Atlantic at the end of August. It originated from a nontropical low near the southeast coast of the U.S. that the National Hurricane Center briefly issued advisories for as a “potential tropical cyclone” (Reference 4). The active 2017 hurricane season did produce one tropical cyclone, Gert, which moved into OPC’s marine area of responsibility north of 31N in the middle of August. The North Atlantic hurricane season normally approaches its peak at the end of August.

## Tropical Activity

Hurricane Gert. Tropical Depression Eight formed south of OPC’s marine area near 26N 71W on the night of 13 August and intensified into a hurricane as it crossed 31N near 72W at 0600 UTC August 15, developing maximum sustained winds of 65 kt. Hurricane Gert then gradually turned toward the east-northeast over the following 2 days and developed a maximum intensity of 85 kt for sustained winds while passing near 40N 60W on the evening of the 16<sup>th</sup>.

This places the cyclone in Category 2 of the Saffir-Simpson hurricane wind scale (Reference 2). The cyclone weakened the following day and became a posttropical cyclone as of the 2100 UTC 17 August advisory on Gert, located near 45N 46W, with maximum sustained winds of 55 kt. An ASCAT scatterometer pass from 1304 UTC on the 17<sup>th</sup>, 8 hours before Gert was declared posttropical, revealed a compact circulation with the highest wind retrievals of 55 kt southeast of the cyclone’s center. Gert’s posttropical remnant then weakened to a gale-force low the following night and to a subgale-force low over the north-central North Atlantic on the 20<sup>th</sup>, before dissipation over Scotland on the 23<sup>rd</sup>. More information on Gert may be found in Reference 3.

## Other Significant Events of the Period

**North Atlantic Storms, May 1–2:** As May began, a complex multicentered cyclone formed over the central North Atlantic with some of the centers developing storm-force winds, such as the ones in the central waters and east of Greenland (Figure 1). The two cyclones shown east of Greenland are actually two separate systems, moving into that area from the south as implied by 24-hour forecast tracks used on OPC’s charts. The stronger low (974 hPa) moving south and then southeast on the western side of the complex system developed satellite-detected winds to 45 kt on its west side as shown in Figure 2. The complex as a whole weakened later on May 2, and winds diminished to subgale force the next day.

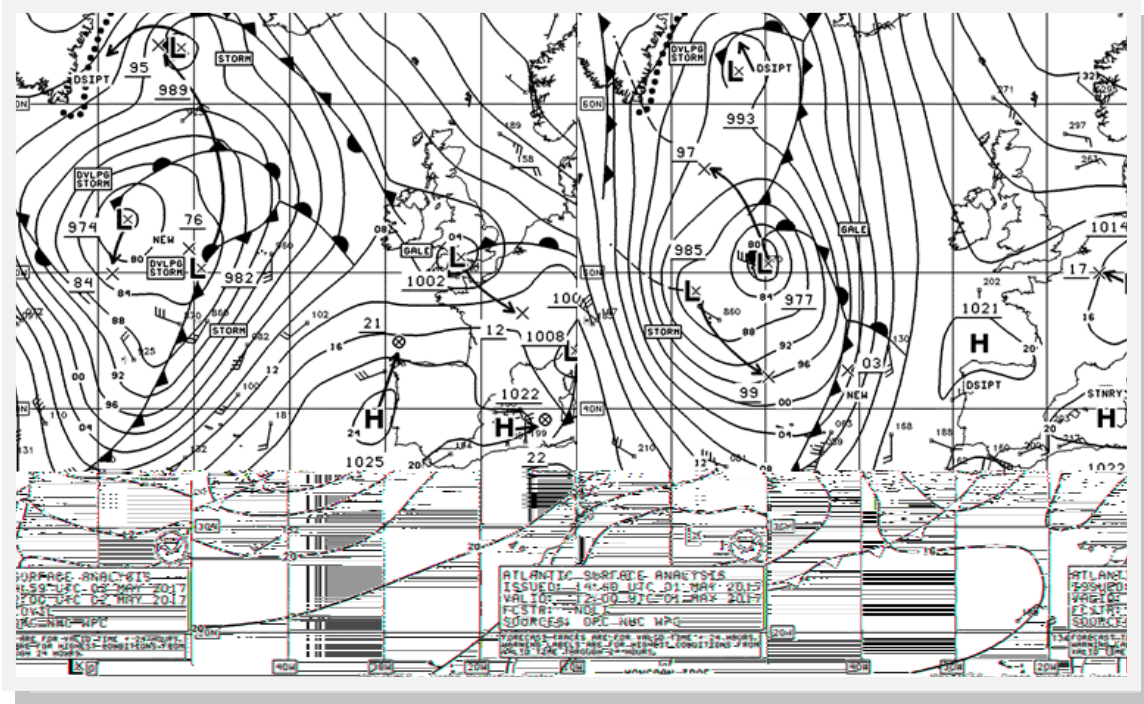


Figure 1. OPC North Atlantic Surface Analysis charts (Part 1 — east) valid 1200 UTC May 1 and 2, 2017. The 24-hour forecast tracks are shown with the forecast central pressures given as the last two whole digits in millibars (hPa).

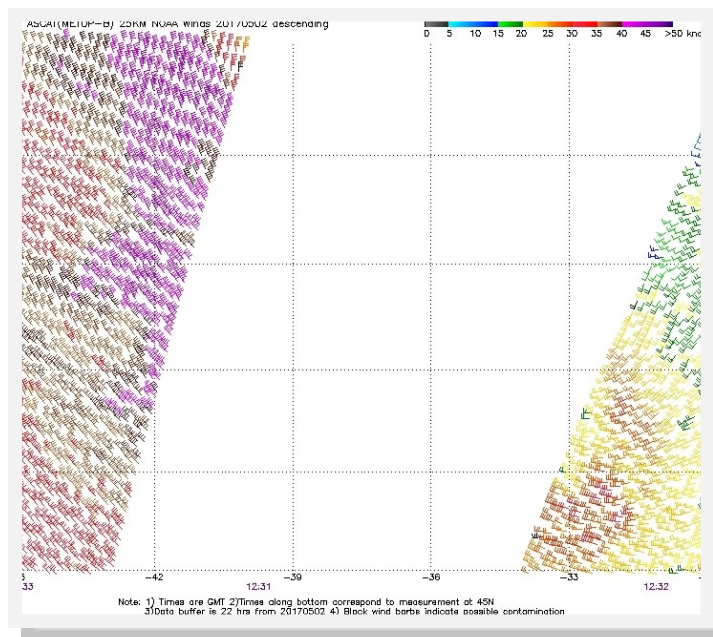
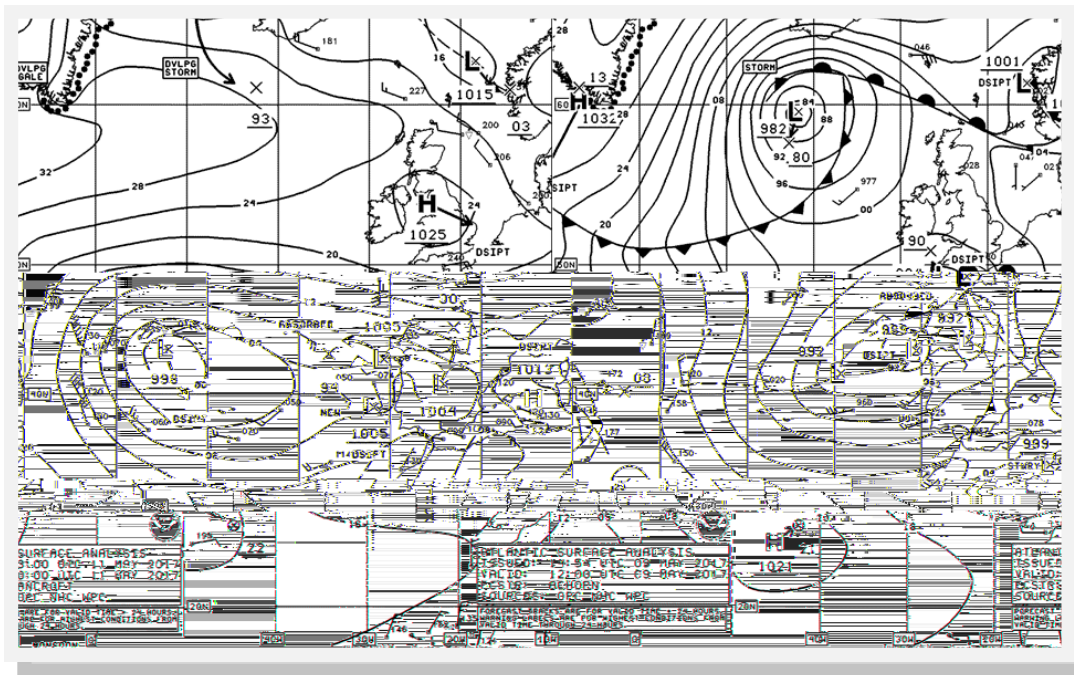


Figure 2. A 25-km ASCAT METOP-B (European Advanced Scatterometer) image of satellite-sensed winds around the cyclone shown in the second part of Figure 1. The valid time of the pass is 1231 UTC May 2, 2017, or about 0.5 hour later than the valid time of the second part of Figure 1. Image is courtesy of NOAA/NESDIS/Center for Satellite Application and Research.

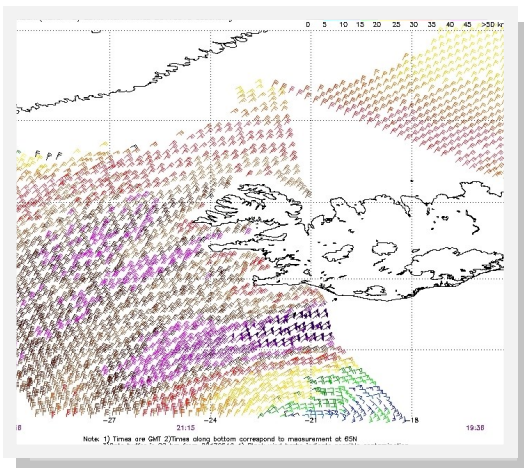


**North Atlantic Storm, May 9–13:** A strong cyclone with storm-force winds developed south of Iceland on May 9–11 as depicted in Figure 3. It followed an unusual track, originating in the Denmark Strait late on May 8. Earlier in its development, the central pressure fell 27 hPa in the 24-hour period ending at 0600 UTC May 10, so this cyclone could be considered a meteorological “bomb” (Sanders and Gyakum, 1980). It developed a maximum intensity of 979 hPa at 0600 UTC on the 11<sup>th</sup> near 59N 21W, where it

stalled over the next 2 days, before drifting northwest late on the 12<sup>th</sup> and on the 13<sup>th</sup> while maintaining storm-force winds. The ASCAT-B pass in Figure 4 reveals retrieved winds up to 55 kt on the north side of the cyclone. The **Celebrity Eclipse** (9HXC9) near 66N 14W reported east winds of 50 kt at 2200 UTC on the 12<sup>th</sup>. An Iceland coastal station (TFSTD, 65.7N 24.7W) reported 7.3-meter seas (24 feet) at 1300 UTC on the 10<sup>th</sup>. The cyclone subsequently became absorbed by another system passing to the east early on the 14<sup>th</sup>.



**Figure 3. OPC North Atlantic Surface Analysis charts (Part 1) valid 1200 UTC May 9 and 0000 UTC May 11, 2017.**

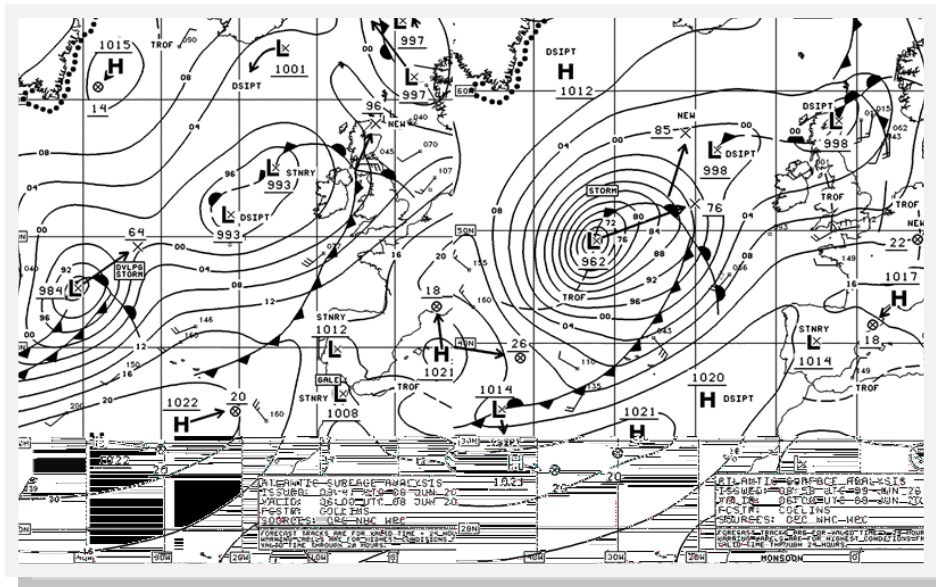


**Figure 4. A 25-km ASCAT (METOP-A) image of satellite-sensed winds around the north side of the cyclone shown in the second part of Figure 3. Portions of three overpasses are shown, with the valid time of the pass containing the strongest wind retrievals 2115 UTC May 10, 2017, or 2.75 hours prior to the valid time of the second part of Figure 3. Portions of Iceland and Greenland to the northwest are shown. Image is courtesy of NOAA/NESDIS/Center for Satellite Application and Research.**

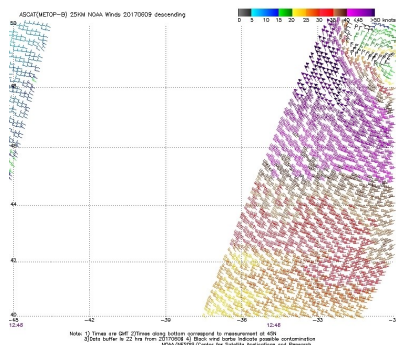


**North Atlantic Storms, June 6–10:** A series of three cyclones producing storm-force winds over the western and central waters formed during this period. The first one briefly developed storm-force winds near 42N 57W with a 994-hPa center around 0600 UTC June 7 after originating near the mid-Atlantic coast of the U.S. early on the 6<sup>th</sup>. An ASCAT-B scatterometer pass from 0113 UTC on the 7<sup>th</sup> revealed highest winds of 45 kt just southeast of the cyclone's center. The cyclone spawned a new center to the northeast near the Grand Banks on the 7<sup>th</sup> and became absorbed by the new center later that day. This was a prelude to the main event, the development of the deepest cyclone of the period with a central pressure as low as 962 hPa (Figure 7). It originated from a complex low off the mid-Atlantic coast of the U.S. late on the 5<sup>th</sup>. The central pressure fell 28 hPa in the 24-hour period ending at 0000 UTC on the 9<sup>th</sup>. The ASCAT-B image in

Figure 8 shows a swath of 50-kt wind retrievals to the west of the cyclone. The **Maria S. Merian** (DBBT) near 48N 21W reported south winds of 50 kt on the east side of the cyclone, at 1900 UTC on the 9<sup>th</sup>. The cyclone tracked northeast, weakened to a gale on the 10<sup>th</sup>, and then dissipated over the North Sea on the 12<sup>th</sup>. A third cyclone, originating near the southeast U.S. coast early on June 6, developed storm-force winds as it passed across Nova Scotia with a 981-hPa center on the night of the 9<sup>th</sup>. Buoy 44139 (44.2N 57.1W) reported southwest winds of 37 kt with gusts to 51 kt and seas of 5.0 meters (16 feet) at 0700 UTC on the 10<sup>th</sup>, and highest seas 6.5 meters (21 feet) 1 hour later. The **Modu Henry Goodrich** (46.7N 48.0W) reported southwest winds of 55 kt at 1500 UTC on the 10<sup>th</sup>, and highest seas of 5.0 meters (16 feet) 9 hours later. The cyclone subsequently weakened over the Labrador Sea later on the 10<sup>th</sup> and dissipated by the 12<sup>th</sup>.



**Figure 7. OPC North Atlantic Surface Analysis charts (Part 1) valid at 0600 UTC June 8 and 9, 2017.**



**Figure 8. A 25-km ASCAT (METOP-B) image of satellite-sensed winds around the west side of the cyclone shown in the second part of Figure 7. The valid time of the pass is 1248 UTC June 9, 2017, or about 6.75 hours later than the valid time of the second part of Figure 7. Image is courtesy of NOAA/NESDIS/Center for Satellite Application and Research.**

### Northwestern Atlantic Storm, August 21–22:

This cyclone developed gradually as it moved from inland over central Quebec late on August 19 to the northern Labrador Sea on the 21<sup>st</sup>, where it developed storm-force winds that day and into the following night. The storm center developed a lowest-central pressure of 990 hPa near 58N 52W at 0000 UTC on the 22<sup>nd</sup>. The **Mary Arctica** (BATEU00) reported east winds of 50 kt near 61N 49W at 0100 UTC on the 22<sup>nd</sup> and a southeast wind of 50 kt near that location 2 hours later. Near the time of these reports, an ASCAT-B pass from 0004 UTC August 22 detected southeast winds of 45 kt in that area. The cyclone subsequently drifted east and then northeast and weakened, dissipating over the east Greenland waters by the 26<sup>th</sup>.

### Western North Atlantic Storms, August 29–September 1:

Just prior to the main hurricane-force event, a cyclone moved from off the North Carolina coast early on August 27 and moved northeast, developing storm-force winds as it passed across the Grand Banks on the night of the 29<sup>th</sup> and on the 30<sup>th</sup> (Figure 11). It developed a lowest-central pressure of 990 hPa near 45N 48W at 0600 UTC on the 30<sup>th</sup>. The **Maersk Hartford** (WMHA) near 41N 52W reported northeast winds of 50 kt at 1200 UTC on the 29<sup>th</sup>. A full 9 hours later, the same ship reported west winds of 50 kt near 41N 49W. The **Terra Nova FPSO** (VCXF, 46.4N 48.4W) encountered northeast winds of 60 kt at 0300 UTC on the 30<sup>th</sup> at an anemometer height of 53 meters, with highest seas of 4.3 meters (14 feet) 9 hours later. The main event, the development of a hurricane-force low, is depicted

depicted in Figure 11. It originated as a low-pressure wave near the southeast coast of the U.S. that the National Hurricane Center issued advisories for as a “Potential Tropical Cyclone” from 0000 UTC August 28 to 1800 UTC on the 29<sup>th</sup> (See Tropical Cyclone Reports, 2017 in Reference 3). OPC handled this system as a developing hurricane-force low beginning 0000 UTC on the 30<sup>th</sup> (Figure 11). The central pressure fell 25 hPa in the 24-hour period ending at 1200 UTC on the 31<sup>st</sup>, when it developed its lowest-central pressure of 971 hPa. The GeoColor daytime true-color image in Figure 12 and reveals a well-defined circulation around the center, intense frontal bands around the north semicircle, and even some convective clouds within the band. (See Reference 6 for more information on this type of imagery.) The ASCAT-A image in Figure 13 returned a swath of westerly wind retrievals of 50 to 65 kt south of the well-defined circulation center. The **Norwegian Dawn** (C6FT7) near 33N 68W reported west winds of 45 kt and 4.3-meter seas (14 feet) at 1500 UTC on the 30<sup>th</sup>, followed by a report 5.8-meter seas (19 feet) near 35N 68W 9 hours later. The drilling jack-up rig **Deep Panuke** (CFL24, 43.8N 60.6W) reported northeast winds of 50 kt and 5.5-meter seas (18 feet) at 1000 UTC on the 31<sup>st</sup>. Buoy 44139 (44.2N 57.1W) reported east winds of 41 kt with gusts to 54 kt at 1100 UTC on the 31<sup>st</sup> and maximum seas 7.5 meters (25 feet) 5 hours later. The cyclone’s winds diminished to gale force as it passed over the Grand Banks the next day, September 1. It later passed just east of Iceland late on September 3.

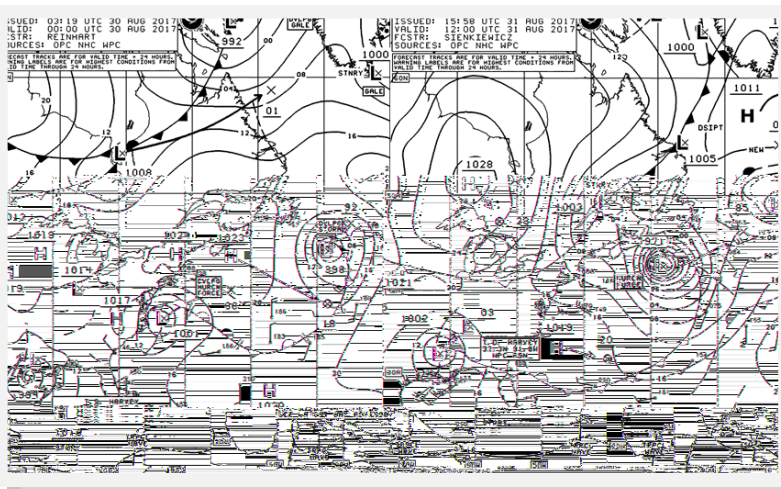
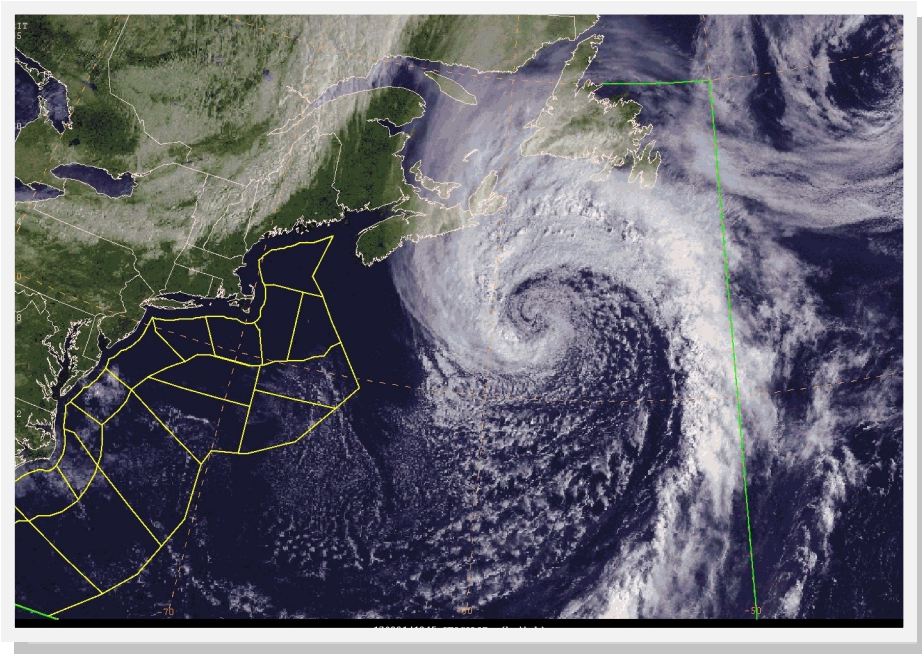
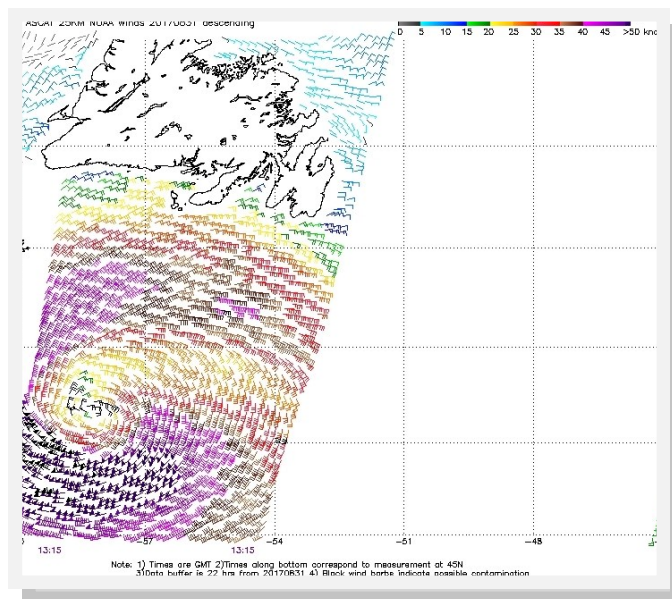


Figure 11. OPC North Atlantic Surface Analysis charts (Part 2) valid 0000 UTC August 30 and 1200 UTC August 31, 2017.



**Figure 12. Geocolor daytime true-color satellite image of the western North Atlantic valid at 1245 UTC July 31, 2017, or 0.75 of an hour later than the valid time of the second part of Figure 11. See Reference 6 for more information on this type of imagery.**



**Figure 13. A 25-km ASCAT (METOP-A) image of satellite-sensed winds around the cyclone shown in the second part of Figure 11. The valid time of the pass is 1315 UTC August 31, 2017, or about 1.25 hours later than the valid time of the second part of Figure 11. Image is courtesy of NOAA/NESDIS/Center for Satellite Application and Research.**

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## References for the North Atlantic

1. Sanders, Frederick and Gyakum, John R., Synoptic-Dynamic Climatology of the “Bomb”, *Monthly Weather Review*, October 1980.
2. Saffir-Simpson hurricane wind scale, at <http://www.nhc.ncep.noaa.gov/aboutsshws.php>
3. Ocean Surface Winds, <http://manati.star.nesdis.noaa.gov/datasets/ASCATData.php>
4. Tropical Cyclone Reports, 2017 available online at <http://www.hurricanes.gov/data/tcr/index.php?season=&basin=atl>
5. Tropical Cyclone Support FAQs at <http://www.metoc.navy.mil/jtwc/jtwc.html?faq>
6. GeoColor Product Quick Guide at [http://rammb.cira.colostate.edu/research/goes-r/proving\\_ground/cira\\_product\\_list/docs/QuickGuide\\_CIRA\\_Geocolor\\_20171019.pdf](http://rammb.cira.colostate.edu/research/goes-r/proving_ground/cira_product_list/docs/QuickGuide_CIRA_Geocolor_20171019.pdf)

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# MARINE WEATHER REVIEW — NORTH PACIFIC AREA

May to Early September 2017

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## Introduction

The weather pattern over the North Pacific was most active in early May when several cyclones moved out of the central or western North Pacific and produced storm-force winds in the area from the central Aleutian Islands to the Gulf of Alaska with the deepest storm developing a lowest central pressure of 965 hPa. Low-pressure systems continued to track northeast across the North Pacific, but with less intensity in the second half of May and through July. There were only two cyclones producing storm-force winds during this period, one briefly developing storm-force winds east of Japan early on June 1, and the second occurring June 18–19 in the same area. July and August saw increasing tropical activity, with three tropical storms and three typhoons developing. One of these, Noru, briefly attained super-typhoon intensity at the end of July. Super typhoons have maximum sustained winds of 130 kt or more (Reference 5). Of the tropical cyclones, only Sanvu, which formed in late August and lasted into early September, redeveloped into an intense extratropical (or posttropical) cyclone with hurricane-force winds in early September and became the first North Pacific hurricane-force event of the fall season. It also was only the second extratropical low to develop central pressures below 970 hPa during the May to early September period, with the first occurring at the beginning of May.

## Tropical Activity

**Tropical Storm Nanmadol:** A nontropical low well south of Japan near 11N 134E early on June 30 moved northwest and passed west of 130E (the western edge of OPC's Unified Analysis area) by early on July 1, becoming Tropical Storm Nanmadol early on July 3. At 1800 UTC July 3, Nanmadol was just southwest of Japan near 31N 128E with maximum sustained winds of 55 kt, after having reached maximum intensity with 60-kt sustained winds 6 hours prior. The cyclone then moved northeast and weakened, passing near 34N 139E at 1200 UTC July 4 with sustained winds of 40 kt. The **Costa Fortuna** (IBNY) near 30N 131E reported south winds of 35 kt and 5.8-meter seas (19 feet) at 1800 UTC on the 3<sup>rd</sup>. At 0900 UTC the next day, the **Majestic Princess** (MABI4) near 32N 136E encountered southwest winds of 50 kt and 4.3-meter seas (14 feet). Nanmadol then became posttropical east of Japan near 36N 147E as a 1000-hPa gale-force low by 0000 UTC July 5. The cyclone then re-intensified as a gale-force low as it approached the western Aleutian Islands late on the 6<sup>th</sup>, where it stalled and developed a lowest-central pressure of 984 hPa 0600 UTC on the 7<sup>th</sup> before resuming eastward motion near the Aleutian Islands late on the 7<sup>th</sup> and on the 8<sup>th</sup> with gradual weakening. The cyclone then dissipated near 138W off the coast of Washington on the 14<sup>th</sup>.

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**Supertyphoon Noru:** Noru was a long-lived cyclone, following an erratic looping path over the waters southeast and south of Japan during the period of July 20 to August 8 when it existed as a tropical cyclone. In fact, it outlasted two other cyclones occurring during this period, Tropical Storms Kulap and Nalgae (Figure 1). Tropical Depression 07W formed near 27N 158E at 1800 UTC July 20 and became Tropical Storm Noru 6 hours later, with maximum sustained winds of 35 kt. The cyclone then strengthened while following a clockwise loop between 26N and 29N from 158E to 151E, becoming a typhoon at 1200 UTC July 23 near 28N 151E with maximum sustained winds of 85 kt, or Category 2 on the Saffir-Simpson scale (Reference 2). The cyclone then completed its loop, crossing its previous path by 1800 UTC on the 25<sup>th</sup> while begging a north-westward turn. The cyclone reached its northernmost point early on the 27<sup>th</sup> before the final turn toward Japan early in August, passing near 31N 150E at 0600 UTC on the 27<sup>th</sup> with sustained winds of 75 kt. Noru then began a south-westward and then southward track later that day and through the 29<sup>th</sup>, briefly weakening to a strong tropical storm with sustained winds of 60 kt 0000 UTC on the 30<sup>th</sup> near 23N 142E. The cyclone then rapidly intensified as it reached its farthest south point in its track near 22N 141E, becoming a supertyphoon 18 hours later, with maximum sustained winds as high as 140 kt. This would be equivalent to Category 5 on the Saffir-Simpson wind scale (Reference 2). Noru then resumed a northwestward movement late on the 30<sup>th</sup> while retaining supertyphoon status through 0600 UTC on the 31<sup>st</sup>, while otherwise remaining a major typhoon much of the time until early on August 2, with sustained winds of at least 100 kt. The cyclone reached the farthest west point in its track as it passed near 30N 129E with sustained winds of 75 kt at 1200 UTC August 5 before beginning its final northeastward turn. Noru then made landfall on the south coast of Japan near 34N 135E as a minimal typhoon with sustained winds of 65 kt at 0600 UTC on the 7<sup>th</sup>. The **OOCL Guangzhou** (VRGO6) near 30N 132E reported southwest winds of 35 kt and 7.9-meter seas (26 feet) at 0600 UTC August 6, when the typhoon was centered near 31N 132E. At 0300 UTC on the 7<sup>th</sup>,

the **Kn Arcadia** (9V3913) near 34.5N 134.4E encountered northeast winds of 40 kt while Noru was a minimal typhoon near 33N 134E. The cyclone then weakened rapidly inland, becoming a tropical depression near 36N 138E at 1800 UTC on the 7<sup>th</sup> and then a posttropical low late on the 8<sup>th</sup> near 39N 140E, where it dissipated on the 9<sup>th</sup>.

**Tropical Storm Kulap:** A nontropical gale-force low near 26N 176E at 0600 UTC July 21 became Tropical Storm Kulap 6 hours later with 35-kt sustained winds near 27N 177E, at the same time that Tropical Storm Noru was to the west near 28N 155E. Kulap then followed a west-northwest track over the next 3 days, with Figure 1 showing the cyclone at maximum intensity. Kulap then moved west-southwest and slowly weakened, becoming a tropical depression with sustained winds of 30 kt near 32N 153E at 1200 UTC July 25, and then dissipating as a remnant low near 30N 149E the next day.

**Tropical Storm Nalgae:** A nontropical low near 27N 161E at 1800 UTC July 31 became Tropical Depression 13W 6 hours later near 26N 162E, drifted southeast over the next 36 hours before turning northwest as Tropical Storm Nalgae near 27N 167E at 1200 UTC August 2 with sustained winds of 35 kt, at the same time that Typhoon Noru was well to the west (Figure 1). Nalgae then continued a northwestward drift until the 4<sup>th</sup>, when it accelerated to the north. Figure 2 depicts Nalgae at 1800 UTC on the 5<sup>th</sup> prior to becoming a posttropical storm-force low 12 hours later. The ASCAT-B scatterometer image in Figure 3 reveals a compact circulation normally seen in a tropical cyclone, but with the wind distribution becoming asymmetric as the cyclone accelerates into the midlatitude westerlies. The cyclone briefly became an extratropical storm-force low with a lowest central pressure of 985 hPa (Figure 2) before weakening, with its winds diminishing to below gale force late on the 6<sup>th</sup>. An ASCAT METOP-A) pass from 0945 UTC on the 6<sup>th</sup> showed the strongest wind retrievals of up to 40 kt to the east and northeast of the cyclone's center. The remains of Nalgae then dissipated near the Kuril Islands by the 9<sup>th</sup>.



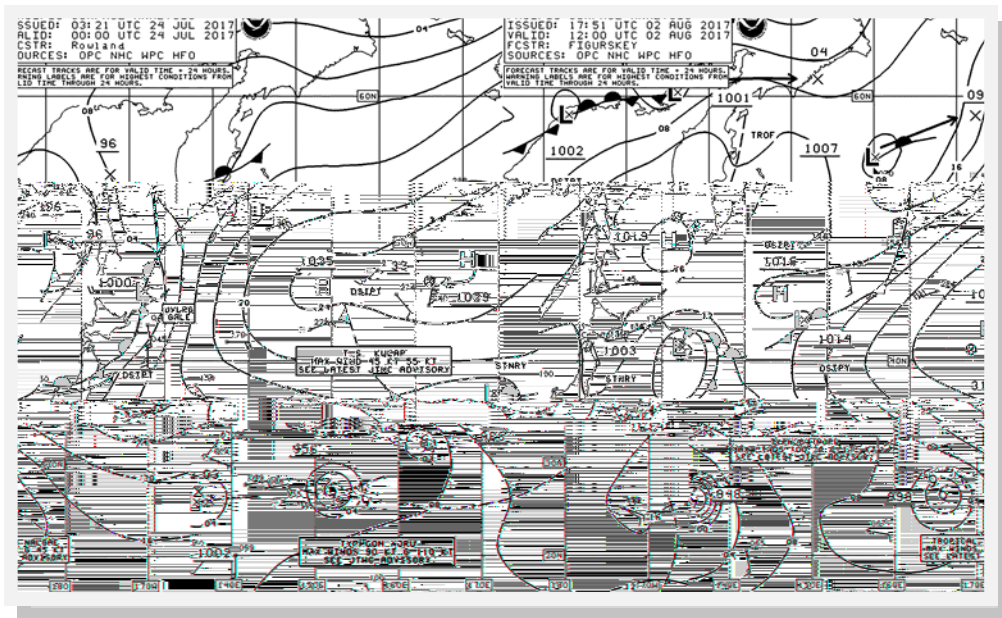


Figure 1. OPC North Pacific Surface Analysis charts (Part 2 — west) valid 0000 UTC July 24 and 1200 UTC August 2, 2017. The 24-hour forecast tracks are shown with the forecast central pressures given as the last two whole digits in millibars (hPa). No forecast central pressures are given for tropical cyclones. Text boxes contain tropical cyclone information.

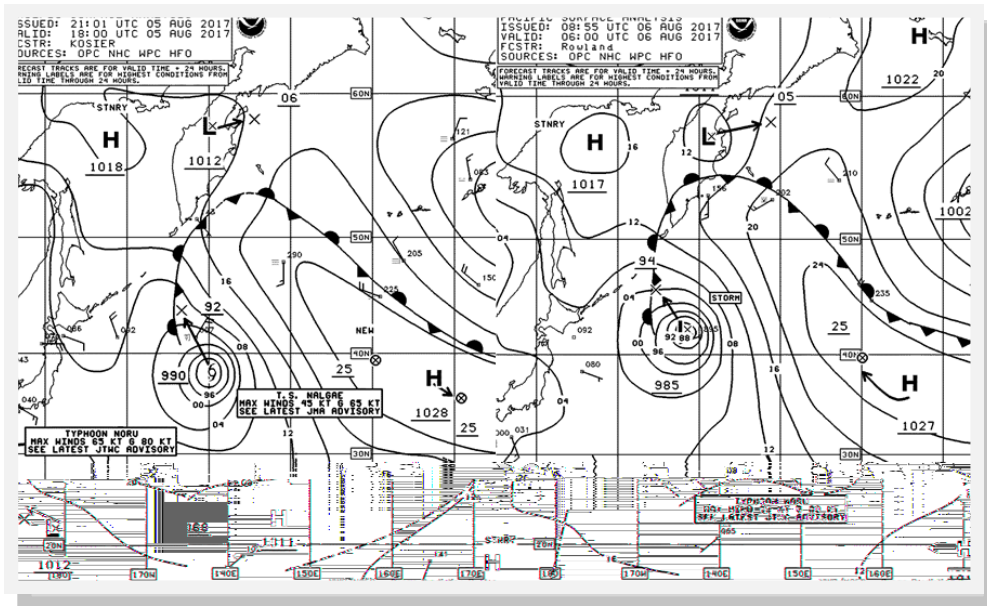
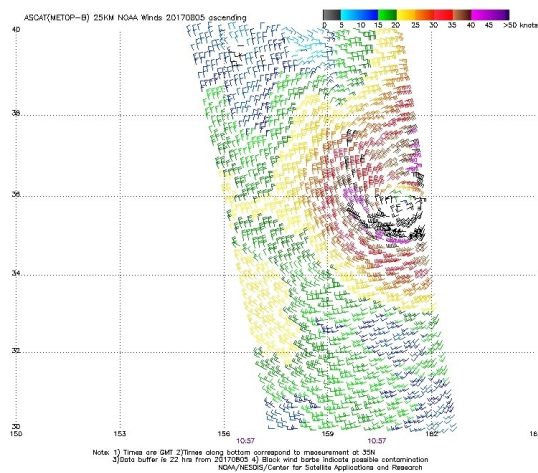


Figure 2. OPC North Pacific Surface Analysis charts (Part 2) valid 1800 UTC August 5 and 0600 UTC August 6, 2017.



**Figure 3. A 25-km ASCAT METOP-B (European Advanced Scatterometer) image of satellite-sensed winds around Tropical Storm Nalgae shown in Figure 2. The valid time of the pass is 1057 UTC August 5, 2017, or about 7 hours prior to the valid time of the first part of Figure 2. Image is courtesy of NOAA/NESDIS/Center for Satellite Application and Research.**

**Typhoon Banyan:** Tropical Depression 14W formed near 16N 170E at 0000 UTC on August 11 and drifted northwest, becoming Tropical Storm 14W 6 hours later with sustained winds of 35 kt and named Banyan after another 6 hours. The cyclone drifted northwest over the next 3 days and intensified into a typhoon at 1800 UTC on the 12<sup>th</sup> near 21N 164E with sustained winds of 80 kt. The maximum intensity of 90 kt was reached 12 hours later as the center passed near 22N 164E. The cyclone then increased its northward motion later on the 13<sup>th</sup> and on the 14<sup>th</sup> with some fluctuation in intensity, before beginning a weakening trend on the 15<sup>th</sup>. It weakened to a tropical storm near 38N 170E with sustained winds of 60 kt at 1800 UTC August 16 and became posttropical as a gale-force low near 43N 177E at 0600 UTC on the 17<sup>th</sup>. Its winds weakened to below gale force as it passed just south of the central Aleutian Islands on the 18<sup>th</sup>, before dissipation late on the 19<sup>th</sup>.

**Typhoon Sanvu:** A weak low-pressure area showing signs of tropical development near 20N 147E at 0600 UTC August 28 became Tropical Depression 17W 6 hours later while drifting west, and then Tropical Storm Sanvu after another 6 hours while turning toward the north, to near 21N 147E with sustained winds of 35 kt. The cyclone then intensified while moving northwest over the next 3 days and became a typhoon near 27N 142E at 0600 UTC August 31 with an intensity of 70 kt. The **APL Saipan** (WDJ2573) near 19N 142E reported southwest winds of 45 kt and 6.4-meter seas (21 feet) at 1200 UTC on the 29<sup>th</sup>. At 2100 UTC the next day, a vessel reporting with the

**SHIP** callsign encountered north winds of 50 kt and 4.3-meter seas (14 feet) near 30N 135E. The **Bremen Express** (DHBN) near 26N 138E reported northwest winds of 40 kt and 4.9-meter seas (16 feet) at 0000 UTC September 1, followed by a report of 6.4-meter seas 6 hours later near 27N 138E. Typhoon Sanvu developed a peak intensity of 90 kt for sustained winds near 27N 142E at 0000 UTC September 1. Gradual weakening followed, as the cyclone accelerated toward the northeast. Sanvu weakened to a tropical storm with an intensity of 60 kt near 31N 145E at 0600 UTC September 2. Figure 4 shows the subsequent extratropical transition and re-intensification into an intense hurricane-force low over a 36-hour period. Figure 5 shows ASCAT-A wind retrievals on the east side of Sanvu, where its winds were strongest, shortly after becoming posttropical. A later ASCAT-B image from 2312 UTC September 3 also showed detected winds up to 60 kt, but mainly near the southern tip of the Kamchatka Peninsula. The remotely sensed altimeter data in Figure 6 reveal significant wave heights as high as 35 feet (10.7 meters) along the satellite track of wave heights labeled with times of 1332 to 1336 UTC September 3 at a time when the cyclone was centered near 45N 155E, or just west of the farthest west satellite track. The lowest (960 hPa) central pressure of extratropical Sanvu made it the deepest of the May to early September period in the North Pacific. The

cyclone subsequently weakened while moving off to the east-northeast, with its top winds lowering to gale force by early on the

5<sup>th</sup>, and then moved along the Aleutian Island chain to enter the western Gulf of Alaska as a subgale-force low on the 7<sup>th</sup>.

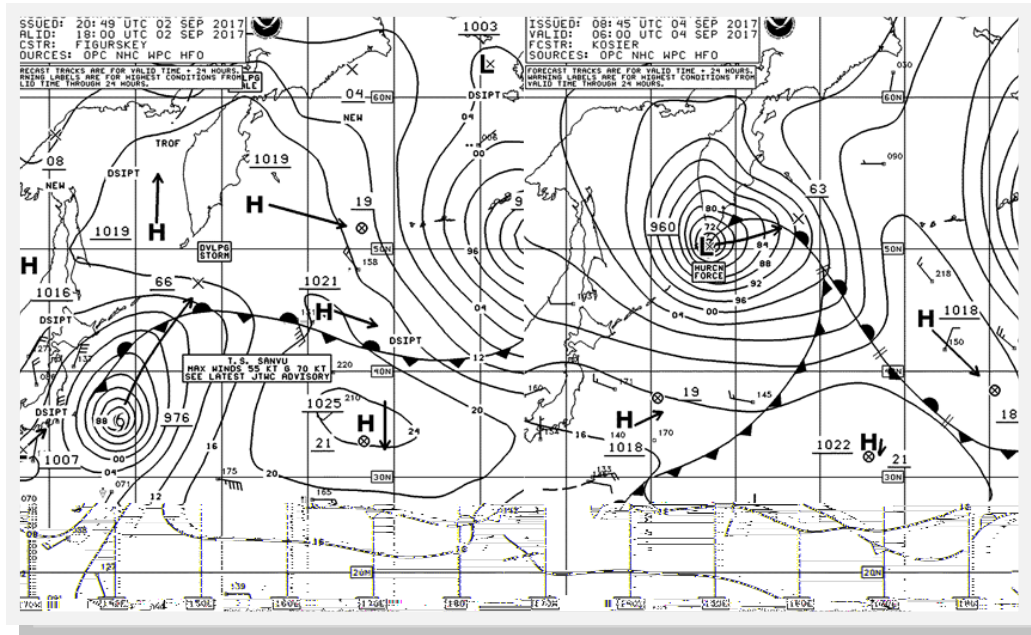


Figure 4. OPC North Pacific Surface Analysis charts (Part 2) valid 1800 UTC September 2 and 0600 UTC September 4, 2017.

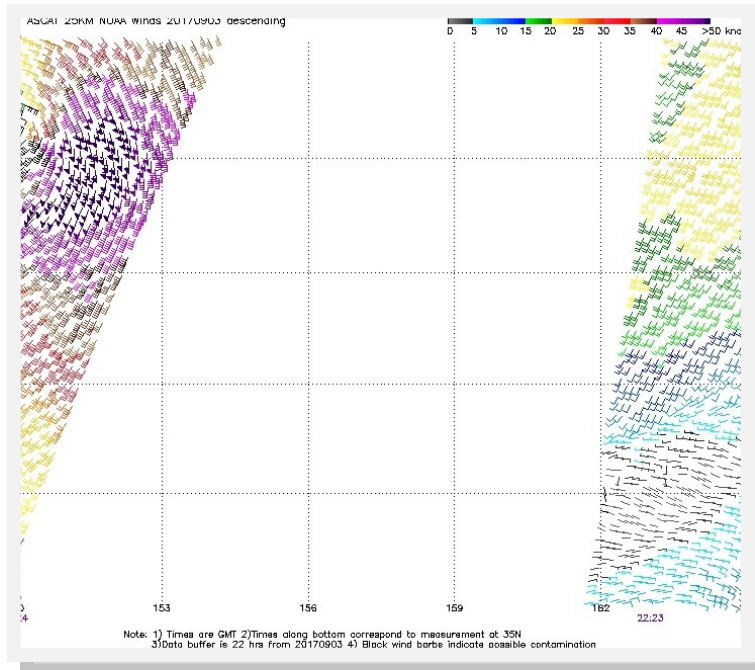
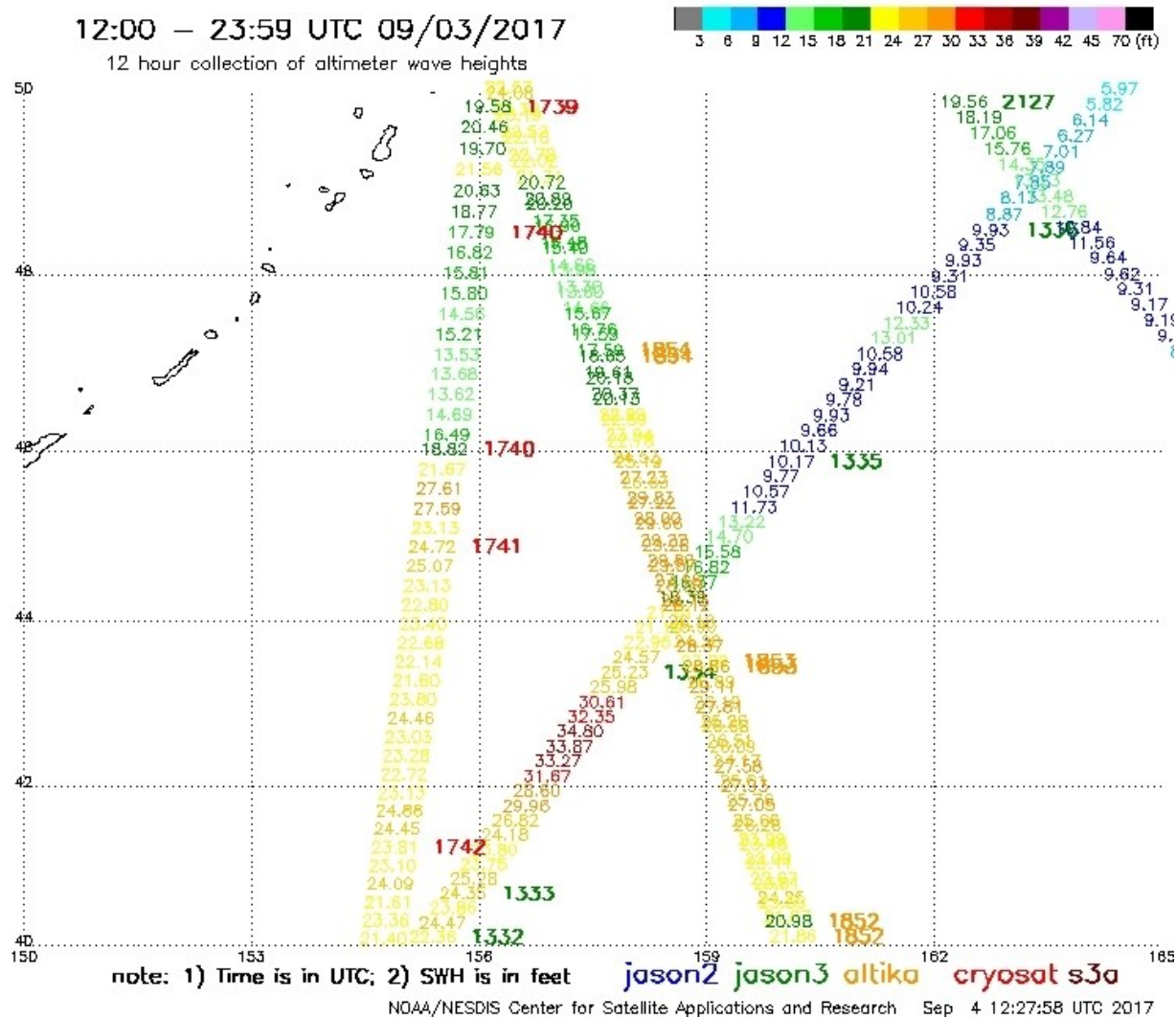


Figure 5. A 25-km ASCAT (METOP-A) image of satellite-sensed winds around the eastern semicircle of Post-Tropical Cyclone Sanvu shown in Figure 4. The valid time of the pass is 0024 UTC September 3, 2017, or about 6.5 hours later than the valid time of the first part of Figure 4 (the last synoptic time when Sanvu was a tropical storm). Image is courtesy of NOAA/NESDIS/Center for Satellite Application and Research.

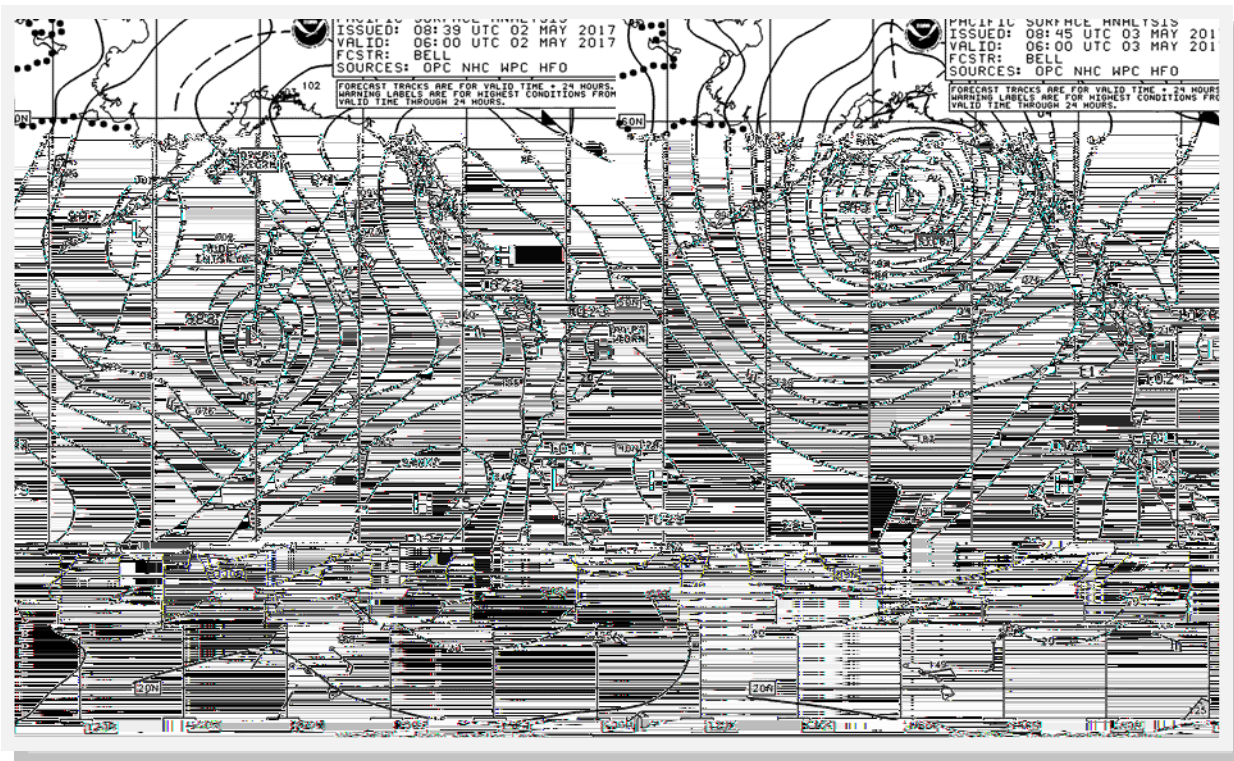


**Figure 6. AltiKa, Cryosat, and Sentinel-3a satellite altimeter passes through the south and east sides of the cyclone shown in the second part of Figure 4 (Posttropical Cyclone Sanvu). The satellite tracks include four-digit significant wave heights in feet to two decimal places and four-digit times to the right in UTC (in colors according to satellite; see legend at bottom of figure). A color scale for the wave heights appears at the top edge. The valid times of the passes at 48N near the center of the image are 1335, 1740, and 1854 UTC September 3, 2017. The valid time of the earlier pass containing the highest wave heights is about 16.5 hours prior to the valid time of the second part of Figure 4. A portion of the Kuril Islands appears near the upper-left side of the image. Image is courtesy of NOAA/NESDIS/Center for Satellite Application and Research.**

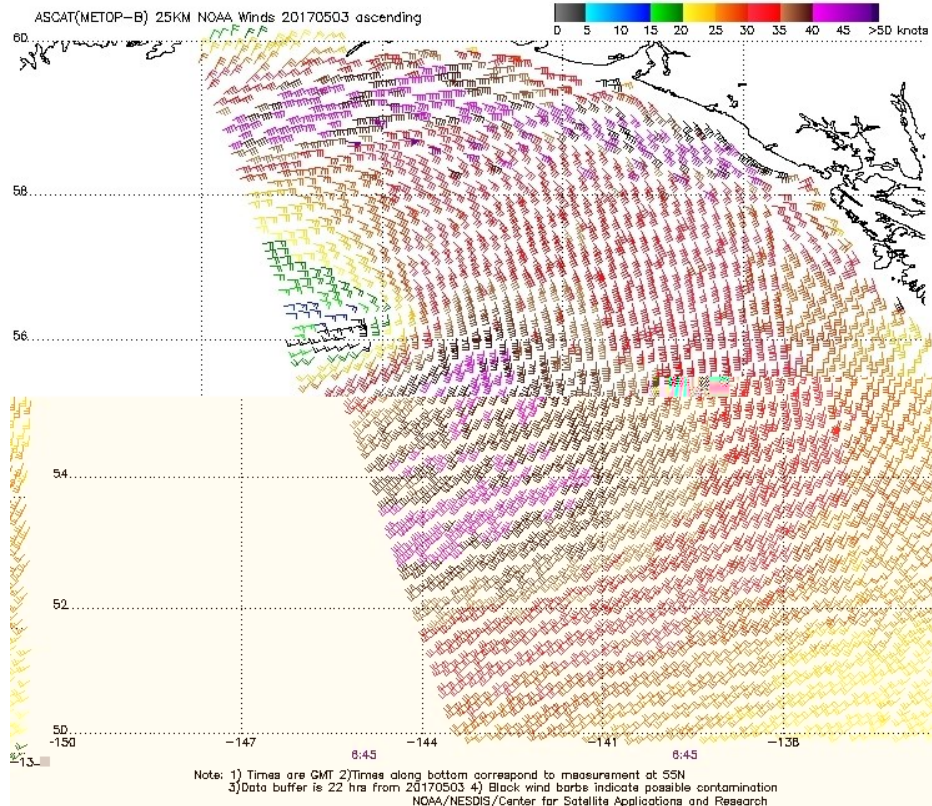
## Other Significant Events of the Period

**Northeastern Pacific Storm, May 2–3:** Figure 7 depicts the final 24-hour period of development of this storm, with the lowest central pressure of 965 hPa, making it the second deepest of the May to early September period in the North Pacific. It originated as a low-pressure wave in the central North Pacific late on April 30. This cyclone could be considered a meteorological bomb as its central pressure dropped 28 hPa in the 24-hour period ending at 0000 UTC May 3 (Sanders and Gyakum, 1980). The **Midnight Sun** (WAHG) near 54N 146W reported southwest winds of 45 kt and 4.3-meter seas (14 feet) at 2100 UTC on the 3<sup>rd</sup>. The **Polar Adventure** (WAZV) near 56N 142W encountered east winds of 40 kt and 5.5-meter seas (18 feet) at 1800 UTC May 2. Buoy 46080

(57.9N 150.0W) reported northeast winds of 39 kt with gusts to 51 kt and 7.5-meter seas (25 feet) at 1000 UTC May 3. Buoy 46085 (55.9N 142.5W) reported south winds of 35 kt with gusts to 47 kt and 6.5-meter seas at 0600 UTC on the 3<sup>rd</sup>, a peak gust of 49 kt 2 hours later, and maximum seas of 8.0 meters (26 feet) at 1500 UTC on the 3<sup>rd</sup>. The seas at buoy 46246 (50.0N 145.2W) peaked at 6.5 meters (21 feet) at 0200 UTC on the 3<sup>rd</sup>. The ASCAT-B image in Figure 8 reveals widespread wind retrievals of 30 to 45 kt around the east and north sides of the cyclone, with even some 50 kt to the north of the center, off the southern Alaska coast. The cyclone subsequently stalled and weakened in the northern Gulf of Alaska late on the 3<sup>rd</sup> and on the 4<sup>th</sup>, with its winds diminishing to below gale force on the 4<sup>th</sup>. It then dissipated off Southeast Alaska on the 5<sup>th</sup>.



**Figure 7. OPC North Pacific Surface Analysis charts (Part 1 — east) valid 0600 UTC May 2 and 3, 2017.**



**Figure 8. A 25-km ASCAT (METOP-B) image of satellite-sensed winds around the north and east sides of the cyclone shown in the second part of Figure 7. The valid time of the pass is 0645 UTC on May 3, 2017, or 0.75 of an hour later than the valid time of the second part of Figure 7. Image is courtesy of NOAA/NESDIS/Center for Satellite Appli-**

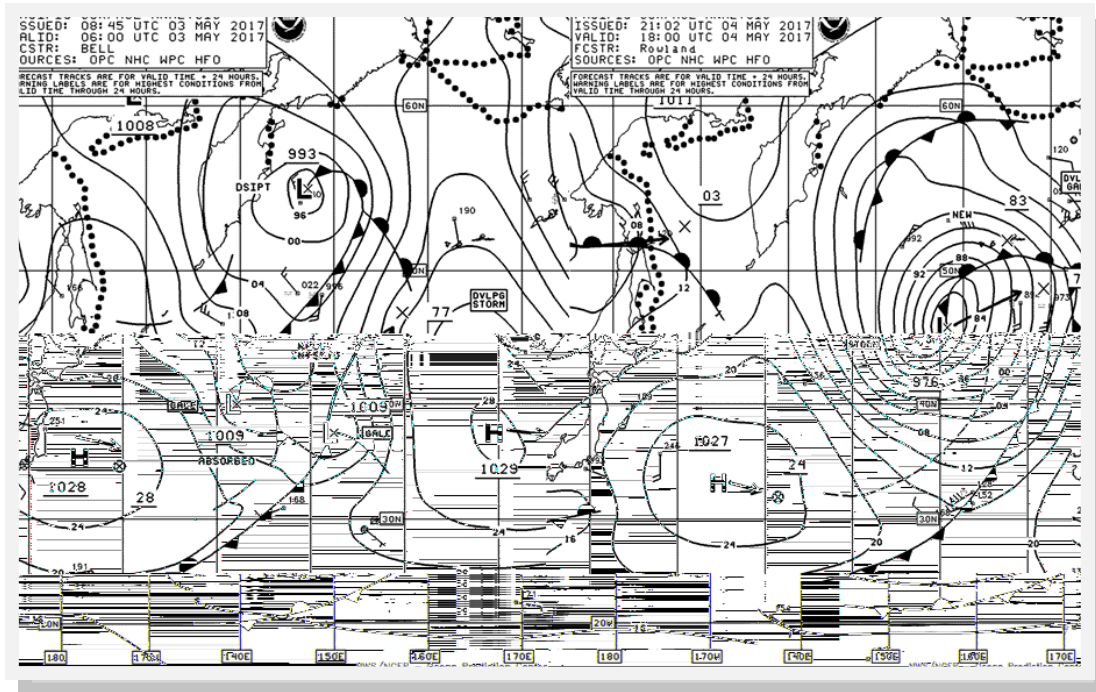
**Central North Pacific Storm, May 3–4:** A complex low-pressure system in the western North Pacific consolidated over a 36-hour period to produce a storm south of the central Aleutian Islands as shown in Figure 9. Its central pressure deepened rapidly by an impressive 30 hPa in the 24-hour period ending at 0600 UTC on May 4. The peak intensity of 975 hPa occurred at 0000 UTC on the 5<sup>th</sup>. The ASCAT-B image in Figure 10 reveals wind retrievals highest in the easterly flow on the north side of 40 kt or so, while discounting wind directions that appear 180 degrees off. The **APL Singapore** (WCX8812) near 48N 179W reported east winds of 45 kt and 4.3-meter seas (14 feet) at 0500 UTC on the 4<sup>th</sup>. The **Westwood Rainier** (C6SI3) near 53N 179W encountered east winds of 45 kt at 0000 UTC on the 5<sup>th</sup>. The cyclone then moved northeast and

weakened on the night of the 4<sup>th</sup>, with its winds diminishing to gale force, and became absorbed by another complex system passing to the north on the 7<sup>th</sup>.

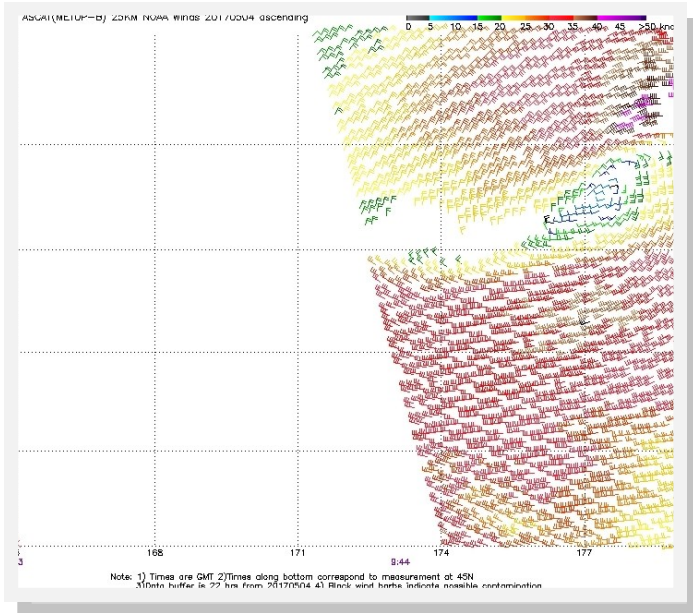
**Northeast Pacific Storm, May 6–7:** The aforementioned central North Pacific low-pressure system, as it weakened, spawned a new wave of low pressure along its front south of the Gulf of Alaska, near 49N 155W at 1200 UTC May 6. This wave developed into a storm-force low just south of Kodiak Island from late on the 6<sup>th</sup> into early on the 7<sup>th</sup> with a central pressure analyzed by OPC as low as 985 hPa at 0600 UTC on the 7<sup>th</sup>. It produced storm-force winds in the northern Gulf of Alaska near Kodiak Island on the night of May 6, similar to the cyclone in that area late in August, described below. The East Amatuli Island Light (AMAA2, 58.9N 151.9W) reported northeast winds of 44 kt with gusts to 52 kt at

0900 UTC May 7, followed by a gust of 55 kt 1 hour later. Buoy 46080 (57.9N 150.0W) reported east winds of 31 kt with gusts 37 kt and 3.5-meter seas (11 feet) at 0500 UTC on the 7<sup>th</sup>, a peak gust of 39 kt 3 hours later, and highest seas 4.5 meters (15 feet) at 1000 UTC on the

7<sup>th</sup>. The cyclone subsequently turned toward the west and made a cyclonic loop in the vicinity of the Alaska Peninsula on the 7<sup>th</sup> and 8<sup>th</sup> before drifting southeast and dissipating over the state of Washington on the 12<sup>th</sup>.



**Figure 9. OPC North Pacific Surface Analysis charts (Part 2) valid 0600 UTC May 3 and 1800 UTC May 4, 2017.**



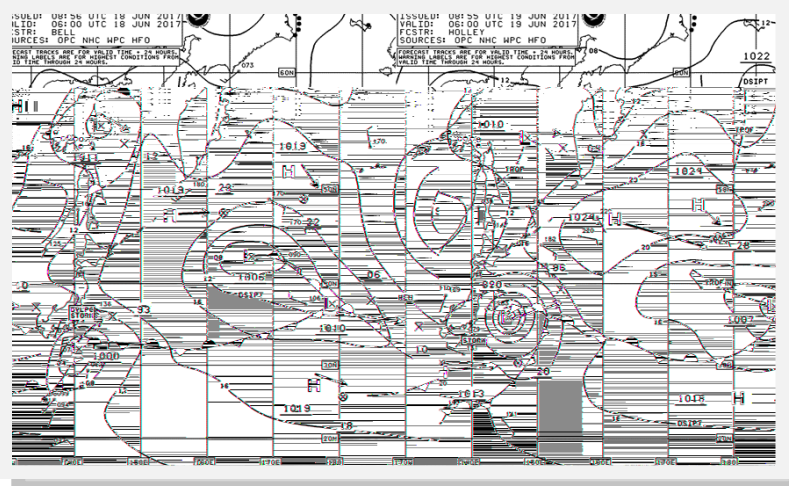
**Figure 10. A 25-km ASCAT (METOP-B) image of satellite-sensed winds around the cyclone shown in the second part of Figure 9. The valid time of the pass is 0944 UTC May 4, 2017, or about 8.25 hours prior to the valid time of the second part of Figure 9. Image is courtesy of NOAA/NESDIS/ Center for Satellite Application and Research.**

**North Pacific Storm, May 10–11:** A cyclone with an intensity similar to that of the earlier central North Pacific event originated from a low-pressure wave on a front south of the western Aleutian Islands near 45N 176E at 0600 UTC on May 10, which moved north while rapidly intensifying. It developed into a gale near 53N 178E with a 982 hPa central pressure at 0600 UTC on the 11<sup>th</sup>, with the pressure falling 24 hPa in the preceding 24-hour period. While stalling near the western Aleutians, it developed a lowest central pressure of 977 hPa and storm-force winds 12 hours later. An ASCAT (METOP-B) scatterometer pass from 2251 UTC on the 11<sup>th</sup> showed wind retrievals of 45 kt just south of the western Aleutians. After stalling, the cyclone then accelerated toward the northeast while weakening and dissipated over mainland Alaska on the 15<sup>th</sup>.

**Western North Pacific Storm, May 31–June 1:** The first of two cyclones developing storm-force winds in June originated as a low-pressure wave south of Japan near 32N 138E with a 1001-hPa central pressure at 1800 UTC May 31, which moved northeast and briefly developed storm-force winds with a 992 hPa center 18 hours later, near 37N 146E. An ASCAT-A scatterometer pass east of Japan from 1049 UTC June 1 returned winds of 45 kt to the east and southeast of the low center, comparing well with a ship reporting 50 kt near the

center at the nearest synoptic time, 1200 UTC. As the cyclone lifted to the north over cooler sea surface temperatures, winds weakened to gale force 6 hours later, although the central pressure continued to drop. The cyclone developed a lowest central pressure of 985 hPa while passing near 42N 148E at 0600 UTC June 2, before moving northeast toward the western Aleutian Islands while weakening. It stalled near the western Aleutians by June 6, before moving southeast on the 8<sup>th</sup> and dissipating south of the central Aleutians on the 10<sup>th</sup>.

**Western North Pacific Storm, June 17–19:** The second of two storm-force lows in June formed later in the month, with Figure 11 displaying its final period of development over a 24-hour period. It originated well south of western Japan as a low-pressure wave early on June 17. Unlike in the early June event in the same area, the strongest winds with this storm occurred on the west side as indicated in scatterometer imagery. A vessel reporting with the **SHIP** callsign encountered north winds of 55 kt and 9.0-meter seas (30 feet) near 37N 144E at 0600 UTC on the 19<sup>th</sup> (Figure 11). Another report with northwest winds of 50 kt and 7.9-meter seas (26 feet) near this location 3 hours later likely came from the same ship. The cyclone subsequently moved northeast as a gale-force low over the following 2 days, before stalling just southwest of the western Aleutian Islands on the 21<sup>st</sup>. It then resumed northeastward motion later on the 22<sup>nd</sup> with the approach of another cyclone and became absorbed on the 24<sup>th</sup>.

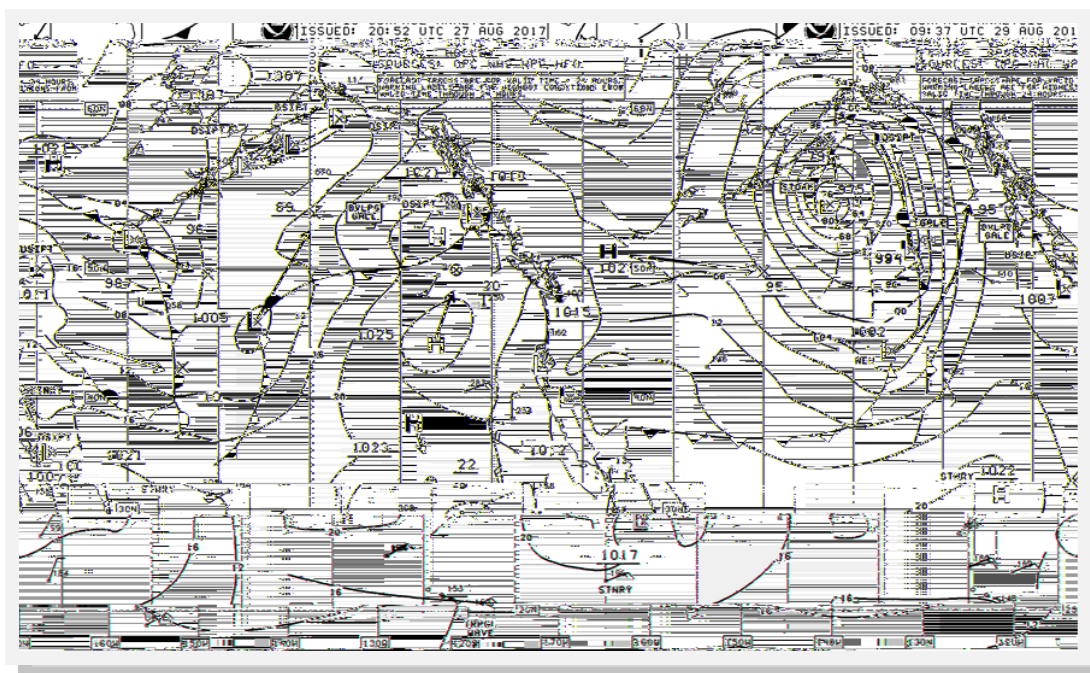


**Figure 11. OPC North Pacific Surface Analysis charts (Part 2) valid 0600 UTC June 18 and 19, 2017.**

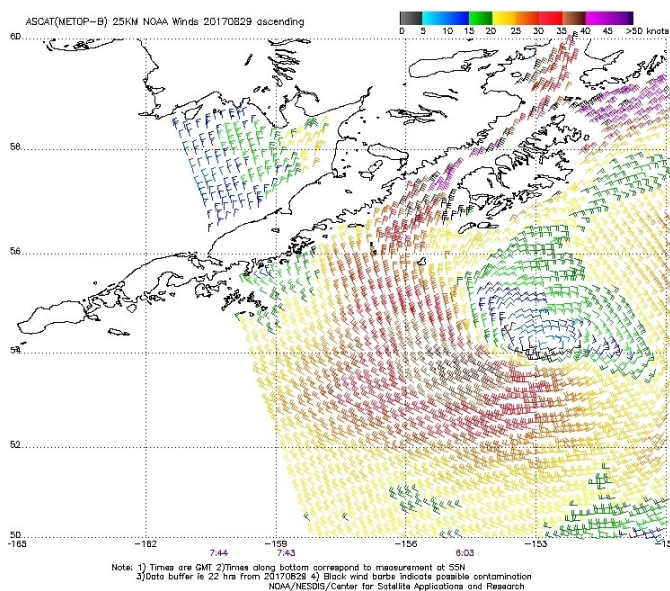


**Northeastern Pacific Storm, August 28–29:** Low pressure moving southeast from the Aleutian Islands combined with a developing low-pressure wave south of the Gulf of Alaska to form a 975-hPa storm-force low as depicted in Figure 12. Apart from tropical activity, this was the first late-summer strong cyclone of nontropical origin in the North Pacific. The second part of Figure 12 shows the cyclone at maximum intensity in terms of central pressure. Storm-

force winds accompanied the system from the afternoon of the 28<sup>th</sup> to the following night. The scatterometer data in Figure 13 reveal strongest wind retrievals of 40 to 45 kt in the northerly flow around the north and northwest sides of the low center, near the coast of Alaska. The cyclone subsequently weakened near the Alaskan coast later on the 29<sup>th</sup> and dissipated inland over south-central Alaska at the end of the month.



**Figure 12. OPC North Pacific Surface Analysis charts (Part 1) valid 1800 UTC August 27 and 0600 UTC August 29, 2017.**



**Figure 13. A 25-km ASCAT (METOP-B) image of satellite-sensed winds around the cyclone shown in the second part of Figure 12. Portions of two overpasses are shown, with the valid time of the pass containing the strongest wind retrievals 0944 UTC August 28, 2017, or about 3.75 hours later than the valid time of the second part of Figure 12. Image is courtesy of NOAA/NESDIS/Center for Satellite Application and Research.**

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# Buoy Measurements of Pressure-Wind-Wave Relations during Hurricane Jose in 2017

[Professor S. A. Hsu](#), Louisiana State University

According to [Berg](#) in September 2017, when Jose moved near the National Data Buoy Center (NDBC) Buoy Station 41043, located about 170 nm NNE of San Juan, Puerto Rico ([www.ndbc.noaa.gov](http://www.ndbc.noaa.gov)), it was a major hurricane. Figure 1 indicates that during its passage near that buoy, the minimum pressure was measured near 950 hPa (or mb). Figure 2 shows that the max wind speed,  $U_4$ , and wind gust,  $U_{gust}$ , at 4 m were recorded approximately at 36 m/s (70 knots) and 49 m/s (95 knots), respectively. In addition, the max significant wave height,  $H_s$ , reached to 13.4 m (44 feet). Relation between significant wave height,  $H_s$ , and barometric pressure,  $P_c$ , during the passage of Jose at Buoy 41043 is presented in Fig. 3, indicating that:

$$H_s = -0.217 P_c + 223, \quad (1)$$

With a very high correlation coefficient,  $R = 0.96$ .

Because the wind speed at 10 m,  $U_{10}$ , is the reference or standard height for use at sea, one needs to adjust the wind speed from measured  $U_4$  to  $U_{10}$ . This is performed as follows: According to Hsu (2003):

$$U_{10} = U_4 (10/4)^p, \quad (2)$$

$$p = 0.5 (G - 1).$$

$$U_{10} = 1.2 U_4.$$

The relation between  $H_s$  and  $U_{10}$  is presented in Figure 5, depicting that:

$$H_s = 0.30 U_{10} \quad (3)$$

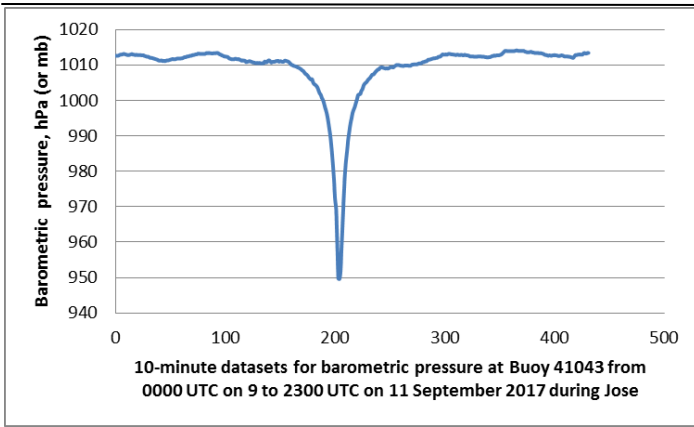
With  $R = 0.94$ .

Equation (3) states that the significant wave height (in meters) is approximately 30 percent of the wind speed (in m/s). This 30-percent rule of thumb between  $H_s$  and  $U_{10}$  further supports the suggestion made by the author (see Hsu, 2015) in the December 2015 issue of [this journal](#). Since both Equations (1) and (3) have very high correlation coefficients ( $R \geq 0.94$ ), they are useful as a first approximation for rapid estimations of the relations among pressure, wind, and waves during a tropical cyclone.

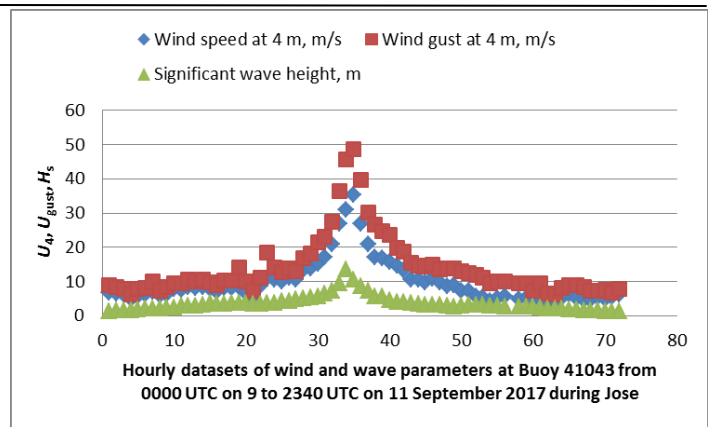
**Acknowledgments:** Appreciation goes to the NDBC for proving the datasets used in this analysis.

## References:

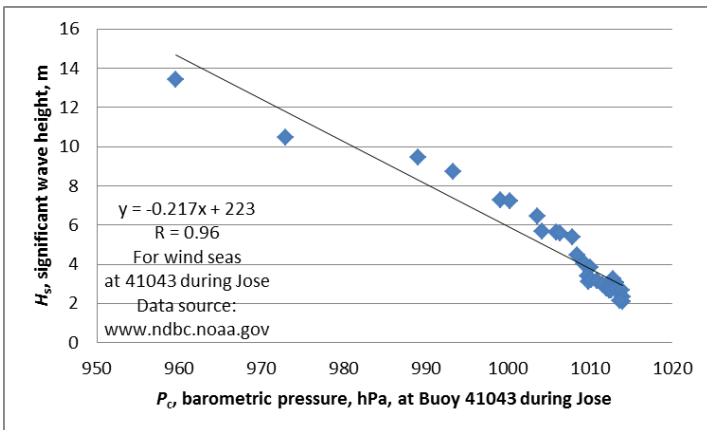
- Hsu, S. A., 2003, Estimating overwater friction velocity and exponent of power-law wind profile from gust factor during storms, *Journal of Waterway, Port, Coastal and Ocean Engineering*, 129(4), 174-177.
- Hsu, S. A., 2015, Estimating wave height using wind speed during a tropical cyclone, *Mariners Weather Log*, Vol.59, No.3, December 2015. Available [online](#).



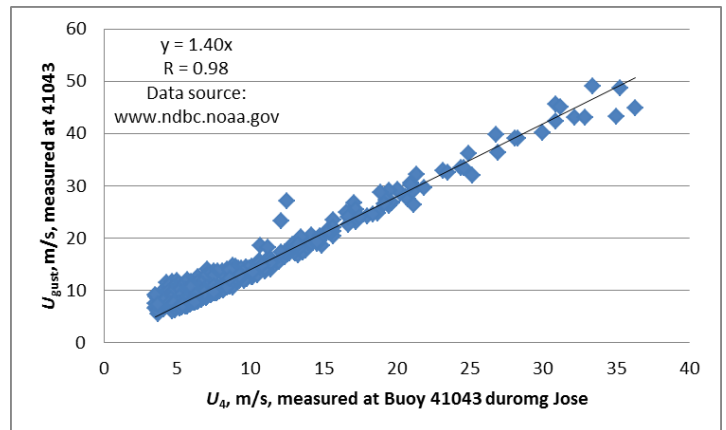
**Figure 1. Timeline of barometric pressure at NDBC Buoy 41043 during the passage of Hurricane Jose in 2017 (Data source: [www.ndbc.noaa.gov](http://www.ndbc.noaa.gov).)**



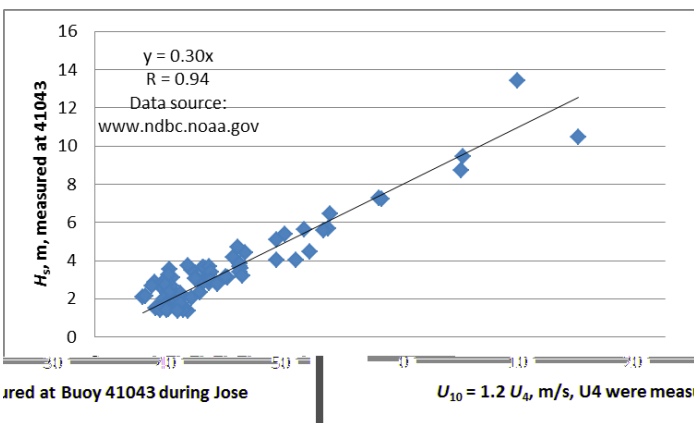
**Figure 2. Timeline of wind and wave parameters at Buoy 41043 during the passage of Jose (Data source: [www.ndbc.noaa.gov](http://www.ndbc.noaa.gov).)**



**Figure 3. Relation between significant wave height and barometric pressure at Buoy 41043 during Jose.**



**Figure 4. Relation between wind gust and wind speed at 4 m at Buoy 41043 during Jose.**



**Figure 5. Relation between significant wave height and estimated wind speed at 10 m during Jose.**

# VOS Program Cooperative Ship Report: January 1, 2018, through March 31, 2018

Ship Name	Call Sign	Status	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
ALASKA MARINER	WSM5364	A	Anchorage	2	0	0	0	0	0	0	0	0	0	0	0	2
ALASKA TITAN	WDE4789	A	Anchorage	13	17	12	0	0	0	0	0	0	0	0	0	42
ALASKAN EXPLORER	WDB9918	A	Anchorage	0	0	34	0	0	0	0	0	0	0	0	0	34
ALASKAN FRONTIER	WDB7815	A	Anchorage	0	25	30	0	0	0	0	0	0	0	0	0	55
ALASKAN LEGEND	WDD2074	A	Anchorage	205	123	50	0	0	0	0	0	0	0	0	0	378
ALASKAN NAVIGATOR	WDC6644	A	Anchorage	92	80	35	0	0	0	0	0	0	0	0	0	207
ALBANY SOUND	VRXM4	A	Anchorage	18	9	15	0	0	0	0	0	0	0	0	0	42
ALERT	WCZ7335	A	Anchorage	0	0	1	0	0	0	0	0	0	0	0	0	1
ALGOLAKE	VCPX	A	Duluth	0	0	0	0	0	0	0	0	0	0	0	0	0
ALGOMA DISCOVERY	CFK9796	A	Duluth	0	0	0	0	0	0	0	0	0	0	0	0	0
ALGOMA GUARDIAN	CFK9698	A	Duluth	0	0	0	0	0	0	0	0	0	0	0	0	0
ALGOMA MARINER	CFN5517	A	Duluth	14	8	1	0	0	0	0	0	0	0	0	0	23
ALGOMA SPIRIT	CFN4309	A	Duluth	0	0	0	0	0	0	0	0	0	0	0	0	0
ALGOWAY	VDFP	A	Duluth	0	0	0	0	0	0	0	0	0	0	0	0	0
ALLIANCE FAIRFAX	WLMQ	A	Jacksonville	2	0	49	0	0	0	0	0	0	0	0	0	51
ALLIANCE NORFOLK	WGAH	A	Jacksonville	53	0	0	0	0	0	0	0	0	0	0	0	53
ALLIANCE ST LOUIS	WGAE	A	Charleston	18	1	1	0	0	0	0	0	0	0	0	0	20
ALLURE OF THE SEAS	C6XS8	A	Miami	12	16	19	0	0	0	0	0	0	0	0	0	47
ALPENA	WAV4647	A	Duluth	0	0	2	0	0	0	0	0	0	0	0	0	2
AM GHENT	A8ZA8	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
AM HAMBURG	V7ZZ5	A	Anchorage	318	484	402	0	0	0	0	0	0	0	0	0	1204
AM QUEBEC	V7AE7	A	Anchorage	0	0	89	0	0	0	0	0	0	0	0	0	89
AM ZENICA	V7FJ8	A	Anchorage	0	0	6	0	0	0	0	0	0	0	0	0	6
AMERICAN CENTURY	WDD2876	A	Duluth	151	0	72	0	0	0	0	0	0	0	0	0	223
AMERICAN MARINER	WQZ7791	A	Duluth	4	0	0	0	0	0	0	0	0	0	0	0	4
AMERICAN NO. 1	WCD7842	A	Anchorage	0	6	0	0	0	0	0	0	0	0	0	0	6
AMERICAN SPIRIT	WCX2417	A	Duluth	2	0	0	0	0	0	0	0	0	0	0	0	2
AMERICAS SPIRIT	C6FW2	A	Anchorage	40	36	17	0	0	0	0	0	0	0	0	0	93
AMSTEL OSPREY	3FRX8	A	Anchorage	6	24	9	0	0	0	0	0	0	0	0	0	39
AMSTERDAM	PBAD	A	Anchorage	111	168	142	0	0	0	0	0	0	0	0	0	421
ANDROMEDA VOYAGER	C6FZ6	A	Anchorage	17	13	3	0	0	0	0	0	0	0	0	0	33
ANSAC MOON BEAR	3FKS5	A	Anchorage	8	23	5	0	0	0	0	0	0	0	0	0	36
ANTARES VOYAGER	C6ZJ5	A	Anchorage	10	2	51	0	0	0	0	0	0	0	0	0	63
APL BELGIUM	WDG8555	A	Los Angeles	57	24	4	0	0	0	0	0	0	0	0	0	85
APL CHINA	WDB3161	A	Los Angeles	39	109	81	0	0	0	0	0	0	0	0	0	229
APL CHONGQUING	9V9373	A	Anchorage	69	15	18	0	0	0	0	0	0	0	0	0	102
APL DETROIT	9V9925	A	Anchorage	0	0	18	0	0	0	0	0	0	0	0	0	18
APL ENGLAND	9VDD2	A	Anchorage	0	21	4	0	0	0	0	0	0	0	0	0	25
APL ESPLANADE	S6LT4	A	Los Angeles	27	18	24	0	0	0	0	0	0	0	0	0	69

Ship Name	Call Sign	Status	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
APL FULLERTON	S6NQ	A	Anchorage	20	14	13	0	0	0	0	0	0	0	0	0	47
APL GUAM	WAPU	A	Anchorage	14	13	17	0	0	0	0	0	0	0	0	0	44
APL HOLLAND	9VKQ2	A	Charleston	15	14	0	0	0	0	0	0	0	0	0	0	29
APL HOUSTON	9V9921	A	Los Angeles	10	0	0	0	0	0	0	0	0	0	0	0	10
APL KOREA	WCX8883	A	Los Angeles	41	45	34	0	0	0	0	0	0	0	0	0	120
APL LE HAVRE	9V9375	A	Anchorage	75	28	4	0	0	0	0	0	0	0	0	0	107
APL MEXICO CITY	9V9926	A	Norfolk	0	0	0	0	0	0	0	0	0	0	0	0	0
APL PHILIPPINES	WCX8884	A	Los Angeles	26	20	53	0	0	0	0	0	0	0	0	0	99
APL PHOENIX	9V9918	A	Los Angeles	49	8	28	0	0	0	0	0	0	0	0	0	85
APL SAIPAN	WDJ2573	A	Anchorage	105	50	61	0	0	0	0	0	0	0	0	0	216
APL SANTIAGO	9V9924	A	Charleston	0	0	0	0	0	0	0	0	0	0	0	0	0
APL SAVANNAH	9V9919	A	New Orleans	0	1	0	0	0	0	0	0	0	0	0	0	1
APL SENTOSA	S6LT5	A	Anchorage	12	23	23	0	0	0	0	0	0	0	0	0	58
APL SINGAPORE	WCX8812	A	Los Angeles	1	0	4	0	0	0	0	0	0	0	0	0	5
APL THAILAND	WCX8882	A	Los Angeles	34	31	44	0	0	0	0	0	0	0	0	0	109
AQUARIUS VOYAGER	C6UC3	A	Jacksonville	74	77	47	0	0	0	0	0	0	0	0	0	198
ARCTIC BEAR	WBP3396	I	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
ARCTIC TITAN	WDG2803	A	Anchorage	5	12	13	0	0	0	0	0	0	0	0	0	30
ARCTURUS VOYAGER	C6YA7	A	Anchorage	69	58	41	0	0	0	0	0	0	0	0	0	168
ARI CRUZ	WDG9588	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
ARIES VOYAGER	C6UK7	A	Anchorage	9	2	18	0	0	0	0	0	0	0	0	0	29
ARNOLD MAERSK	OXES2	A	New Orleans	68	48	18	0	0	0	0	0	0	0	0	0	134
ASIA ENDEAVOUR	C6AX6	A	Anchorage	144	58	20	0	0	0	0	0	0	0	0	0	222
ASIA ENERGY	C6AX4	A	Anchorage	20	42	50	0	0	0	0	0	0	0	0	0	112
ASIA EXCELLENCE	C6AX5	A	Anchorage	79	76	80	0	0	0	0	0	0	0	0	0	235
ASIA INTEGRITY	C6BC8	A	Anchorage	93	72	32	0	0	0	0	0	0	0	0	0	197
ASIA VENTURE	C6BC9	A	Anchorage	112	96	84	0	0	0	0	0	0	0	0	0	292
ASIA VISION	C6AX3	A	Anchorage	34	28	34	0	0	0	0	0	0	0	0	0	96
ATLANTIC BRAVE	D5LQ8	A	New Orleans	56	21	0	0	0	0	0	0	0	0	0	0	77
ATLANTIC EXPLORER (AWS)	WDC9417	A	Anchorage	0	0	78	0	0	0	0	0	0	0	0	0	78
ATLANTIC GEMINI	VRDO9	A	Anchorage	34	41	50	0	0	0	0	0	0	0	0	0	125
ATLANTIC GRACE	VRDT7	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
ATLANTIC HURON	VCQN	A	Duluth	1	0	1	0	0	0	0	0	0	0	0	0	2
ATLANTIC OLIVE	VREF8	A	Anchorage	10	9	9	0	0	0	0	0	0	0	0	0	28
ATLANTIS (AWS)	KAQP	A	Anchorage	715	669	740	0	0	0	0	0	0	0	0	0	2124
ATTENTIVE	WCZ7337	A	Anchorage	1	0	4	0	0	0	0	0	0	0	0	0	5
AURORA	WYM9567	A	Anchorage	9	2	0	0	0	0	0	0	0	0	0	0	11
AVIK	WDB7888	I	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
AWARE	WCZ7336	A	Anchorage	1	0	1	0	0	0	0	0	0	0	0	0	2
AYESHA	V7LC9	A	Baltimore	0	0	0	0	0	0	0	0	0	0	0	0	0
AZAMARA JOURNEY	9HOB8	A	Anchorage	35	5	2	0	0	0	0	0	0	0	0	0	42
AZAMARA QUEST	9HOM8	A	Anchorage	0	0	23	0	0	0	0	0	0	0	0	0	23

Ship Name	Call Sign	Status	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
AZUL LIBERO	9VMU5	A	Anchorage	29	22	21	0	0	0	0	0	0	0	0	0	72
BADGER	WBD4889	I	Duluth	0	0	0	0	0	0	0	0	0	0	0	0	0
BAI CHAY BRIDGE	3FAD8	A	Anchorage	56	150	116	0	0	0	0	0	0	0	0	0	322
BAIE ST. PAUL	CFN6120	A	Duluth	0	0	0	0	0	0	0	0	0	0	0	0	0
BAKER RIVER	VRMV3	A	Anchorage	16	17	16	0	0	0	0	0	0	0	0	0	49
BAKER SPIRIT	C6BQ4	A	Anchorage	33	57	23	0	0	0	0	0	0	0	0	0	113
BALTIC WASP	V7HZ4	A	Anchorage	7	4	9	0	0	0	0	0	0	0	0	0	20
BARRINGTON ISLAND	C6QK	A	Miami	6	0	12	0	0	0	0	0	0	0	0	0	18
BARROW ISLAND	VRMK7	A	Anchorage	7	4	0	0	0	0	0	0	0	0	0	0	11
BERGE NANTONG	VRBU6	A	Anchorage	362	38	12	0	0	0	0	0	0	0	0	0	412
BERGE NINGBO	VRBQ2	A	Anchorage	0	0	20	0	0	0	0	0	0	0	0	0	20
BERING TITAN	WDI6469	A	Anchorage	18	17	37	0	0	0	0	0	0	0	0	0	72
BERLIAN EKUATOR	HPYK	A	Anchorage	1	0	0	0	0	0	0	0	0	0	0	0	1
BERLIN BRIDGE	VRIM5	A	Norfolk	27	18	5	0	0	0	0	0	0	0	0	0	50
BILLIE H.	WCY4992	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
BLUEFIN	WDC7379	A	Seattle	21	83	63	0	0	0	0	0	0	0	0	0	167
BOB FRANCO	WDG8180	A	Anchorage	35	31	18	0	0	0	0	0	0	0	0	0	84
BRAZOS	V7UU4	A	Anchorage	115	316	97	0	0	0	0	0	0	0	0	0	528
BRENTON REEF	KREQ	A	New Orleans	23	5	14	0	0	0	0	0	0	0	0	0	42
BRILLIANCE OF THE SEAS	C6SJ5	A	Miami	40	41	54	0	0	0	0	0	0	0	0	0	135
BROTONNE BRIDGE	VRHO2	A	New York City	42	27	18	0	0	0	0	0	0	0	0	0	87
BTS SABINA	9V5722	A	Anchorage	22	23	9	0	0	0	0	0	0	0	0	0	54
BUDAPEST BRIDGE	VRIZ5	A	New York City	0	0	32	0	0	0	0	0	0	0	0	0	32
BURNS HARBOR	WDC6027	A	Duluth	14	0	0	0	0	0	0	0	0	0	0	0	14
CAFER DEDE	V7PR8	A	New York City	0	13	1	0	0	0	0	0	0	0	0	0	14
CALIFORNIA	KEBO	A	Anchorage	7	19	20	0	0	0	0	0	0	0	0	0	46
CALUMET	WDE3568	A	Duluth	2	0	16	0	0	0	0	0	0	0	0	0	18
CAPE AZALEA	9V9450	A	Anchorage	2	26	0	0	0	0	0	0	0	0	0	0	28
CAPE LILY	9V8843	A	Anchorage	30	32	19	0	0	0	0	0	0	0	0	0	81
CAPE MORETON	VRGG6	A	Anchorage	8	29	13	0	0	0	0	0	0	0	0	0	50
CAPE NELSON	VRWZ5	A	Anchorage	13	15	35	0	0	0	0	0	0	0	0	0	63
CAPRICORN VOYAGER	C6UZ5	A	Anchorage	53	31	22	0	0	0	0	0	0	0	0	0	106
CAPT. HENRY JACKMAN	VCTV	A	Duluth	0	0	0	0	0	0	0	0	0	0	0	0	0
CARNIVAL BREEZE	3FZO8	A	Houston	3	0	1	0	0	0	0	0	0	0	0	0	4
CARNIVAL CONQUEST	3FPQ9	A	Miami	49	60	46	0	0	0	0	0	0	0	0	0	155
CARNIVAL DREAM	3ETA7	A	New Orleans	51	22	92	0	0	0	0	0	0	0	0	0	165
CARNIVAL ECSTASY	H3GR	A	Miami	87	74	62	0	0	0	0	0	0	0	0	0	223
CARNIVAL ELATION	3FOC5	A	Jacksonville	70	100	133	0	0	0	0	0	0	0	0	0	303
CARNIVAL FANTASY	H3GS	A	New Orleans	3	70	69	0	0	0	0	0	0	0	0	0	142
CARNIVAL FASCINATION	C6FM9	A	Jacksonville	0	0	112	0	0	0	0	0	0	0	0	0	112
CARNIVAL FREEDOM	3EBL5	A	Houston	3	3	28	0	0	0	0	0	0	0	0	0	34
CARNIVAL GLORY	3FPS9	A	Miami	2	74	77	0	0	0	0	0	0	0	0	0	153
CARNIVAL IMAGINATION	C6FN2	A	Los Angeles	79	65	87	0	0	0	0	0	0	0	0	0	231
CARNIVAL INSPIRATION	C6FM5	A	Los Angeles	7	9	9	0	0	0	0	0	0	0	0	0	25

Ship Name	Call Sign	Status	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
CARNIVAL LEGEND	9HA3667	A	Miami	162	201	257	0	0	0	0	0	0	0	0	0	620
CARNIVAL LIBERTY	HPYE	A	Jacksonville	34	15	58	0	0	0	0	0	0	0	0	0	107
CARNIVAL MAGIC	3ETA8	A	Jacksonville	101	45	14	0	0	0	0	0	0	0	0	0	160
CARNIVAL MIRACLE	H3VS	A	Seattle	5	18	27	0	0	0	0	0	0	0	0	0	50
CARNIVAL PARADISE	3FOB5	A	Miami	80	40	1	0	0	0	0	0	0	0	0	0	121
CARNIVAL PRIDE	H3VU	A	Jacksonville	10	3	10	0	0	0	0	0	0	0	0	0	23
CARNIVAL SENSATION	C6FM8	A	Miami	54	18	19	0	0	0	0	0	0	0	0	0	91
CARNIVAL SPLENDOR	3EUS	A	Anchorage	0	0	2	0	0	0	0	0	0	0	0	0	2
CARNIVAL SUNSHINE	C6FN4	A	Jacksonville	30	14	11	0	0	0	0	0	0	0	0	0	55
CARNIVAL TRIUMPH	C6FN5	A	New Orleans	66	39	41	0	0	0	0	0	0	0	0	0	146
CARNIVAL VALOR	H3VR	A	Houston	15	9	2	0	0	0	0	0	0	0	0	0	26
CARNIVAL VICTORY	3FFL8	A	Miami	34	63	40	0	0	0	0	0	0	0	0	0	137
CARNIVAL VISTA	3EMB9	A	Miami	76	66	59	0	0	0	0	0	0	0	0	0	201
CAROLINE MAERSK	OZWA2	A	Seattle	93	56	68	0	0	0	0	0	0	0	0	0	217
CASON J. CALLAWAY	WDH7556	A	Duluth	30	0	25	0	0	0	0	0	0	0	0	0	55
CASTOR VOYAGER	C6UZ6	A	Anchorage	0	0	16	0	0	0	0	0	0	0	0	0	16
CELEBRITY CONSTELLATION	9HJB9	A	Miami	34	10	0	0	0	0	0	0	0	0	0	0	44
CELEBRITY ECLIPSE	9HXC9	A	Miami	270	296	434	0	0	0	0	0	0	0	0	0	1000
CELEBRITY EQUINOX	9HXD9	A	Miami	346	247	267	0	0	0	0	0	0	0	0	0	860
CELEBRITY INFINITY	9HJD9	A	Miami	257	56	21	0	0	0	0	0	0	0	0	0	334
CELEBRITY MILLENNIUM	9HJF9	A	Anchorage	142	118	110	0	0	0	0	0	0	0	0	0	370
CELEBRITY REFLECTION	9HA3047	A	Miami	135	166	183	0	0	0	0	0	0	0	0	0	484
CELEBRITY SILHOUETTE	9HA2583	A	Miami	145	123	154	0	0	0	0	0	0	0	0	0	422
CELEBRITY SOLSTICE	9HRJ9	A	Seattle	297	142	143	0	0	0	0	0	0	0	0	0	582
CELEBRITY SUMMIT	9HJC9	A	Miami	105	29	88	0	0	0	0	0	0	0	0	0	222
CHALLENGE PROCYON	3EXV7	A	Anchorage	11	16	4	0	0	0	0	0	0	0	0	0	31
CHAMPION BAY	VRYP3	A	Anchorage	99	1	0	0	0	0	0	0	0	0	0	0	100
CHARLES ISLAND	C6JT	A	Miami	0	0	21	0	0	0	0	0	0	0	0	0	21
CHARLESTON EXPRESS	WDD6126	A	Houston	18	4	24	0	0	0	0	0	0	0	0	0	46
CHILOE ISLAND	VRMO4	A	Anchorage	0	0	7	0	0	0	0	0	0	0	0	0	7
CHUKCHI SEA	WDE2281	A	Anchorage	1	1	2	0	0	0	0	0	0	0	0	0	4
CISNES	D5HF4	A	Anchorage	0	39	50	0	0	0	0	0	0	0	0	0	89
CLYDE S. VANENKEVORT	WDJ4194	A	Duluth	0	0	1	0	0	0	0	0	0	0	0	0	1
CMA CGM J. ADAMS	MAZS6	A	New York City	133	65	162	0	0	0	0	0	0	0	0	0	360
CMB GIULIA	VRJQ4	A	New Orleans	0	1	0	0	0	0	0	0	0	0	0	0	1
CMB PAULE	VRJF3	A	New Orleans	5	1	3	0	0	0	0	0	0	0	0	0	9
CMB WEIHAI	VRGZ8	A	Anchorage	105	69	82	0	0	0	0	0	0	0	0	0	256
CMB YASMINE	VRIC4	A	Anchorage	12	0	4	0	0	0	0	0	0	0	0	0	16
COASTAL MERCHANT	WCV8696	I	Seattle	0	0	1	0	0	0	0	0	0	0	0	0	1
COASTAL NAVIGATOR	WCY9686	A	Seattle	0	8	8	0	0	0	0	0	0	0	0	0	16
COASTAL NOMAD	WDC6439	A	Anchorage	7	0	6	0	0	0	0	0	0	0	0	0	13

Ship Name	Call Sign	Status	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
COASTAL PROGRESS	WDC6363	A	Anchorage	7	5	16	0	0	0	0	0	0	0	0	0	28
COASTAL STANDARD	WDI5038	A	Anchorage	9	11	19	0	0	0	0	0	0	0	0	0	39
COASTAL TRADER	WSL8560	A	Anchorage	9	5	1	0	0	0	0	0	0	0	0	0	15
COASTAL VENTURE	WDF3647	A	Charleston	0	0	0	0	0	0	0	0	0	0	0	0	0
COLORADO	V7UU7	A	Anchorage	0	0	13	0	0	0	0	0	0	0	0	0	13
COLUMBIA	WYR2092	I	Seattle	0	0	0	0	0	0	0	0	0	0	0	0	0
COLUMBIA RIVER	VRNB4	A	New Orleans	0	12	5	0	0	0	0	0	0	0	0	0	17
COLUMBINE MAERSK	OUHC2	A	Norfolk	2	9	0	0	0	0	0	0	0	0	0	0	11
COOPER ISLAND	VRRD6	A	Anchorage	0	13	2	0	0	0	0	0	0	0	0	0	15
CORCOVADO	D5HF3	A	Anchorage	22	27	0	0	0	0	0	0	0	0	0	0	49
CORNELIA MAERSK	OWWS2	A	New York City	3	1	3	0	0	0	0	0	0	0	0	0	7
CORWITH CRAMER	WTF3319	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
COSCO DEVELOPMENT	VRIZ9	A	New York City	65	78	77	0	0	0	0	0	0	0	0	0	220
COSCO EXCELLENCE	VRJT8	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
COSCO FAITH	VRJL6	A	Anchorage	2	11	32	0	0	0	0	0	0	0	0	0	45
COSCO FORTUNE	VRKE9	A	Anchorage	1	0	53	0	0	0	0	0	0	0	0	0	54
COSCO GLORY	VRIR7	A	Anchorage	19	33	25	0	0	0	0	0	0	0	0	0	77
COSCO HARMONY	VRJA4	A	Anchorage	0	3	0	0	0	0	0	0	0	0	0	0	3
COSCO HOPE	VRKF2	A	Anchorage	0	14	5	0	0	0	0	0	0	0	0	0	19
COSCO INDONESIA	VRHE3	A	New York City	1	11	14	0	0	0	0	0	0	0	0	0	26
COSCO JAPAN	VRFX5	A	New York City	19	8	0	0	0	0	0	0	0	0	0	0	27
COSCO KOREA	VRGH3	A	New York City	9	19	34	0	0	0	0	0	0	0	0	0	62
COSCO MALAYSIA	VRGV9	A	New York City	25	25	50	0	0	0	0	0	0	0	0	0	100
COSCO PHILIPPINES	VRGM7	A	New York City	57	27	18	0	0	0	0	0	0	0	0	0	102
COSCO PRINCE RUPERT	VRID6	A	New York City	0	30	61	0	0	0	0	0	0	0	0	0	91
COSCO THAILAND	VRHM2	A	Anchorage	4	13	56	0	0	0	0	0	0	0	0	0	73
COSCO VIETNAM	VRID5	A	New York City	43	32	37	0	0	0	0	0	0	0	0	0	112
COSTA DIADEMA	IBCX	A	Anchorage	31	23	10	0	0	0	0	0	0	0	0	0	64
COSTA FORTUNA	IBNY	A	Miami	106	48	73	0	0	0	0	0	0	0	0	0	227
COSTA NEOCLASSICA	ICIC	A	Anchorage	17	58	72	0	0	0	0	0	0	0	0	0	147
COSTA PACIFICA	ICJA	A	Anchorage	0	0	129	0	0	0	0	0	0	0	0	0	129
COSTA SERENA	ICAZ	A	Anchorage	2	33	13	0	0	0	0	0	0	0	0	0	48
COYHAIQUE	D5HF5	A	Anchorage	0	11	1	0	0	0	0	0	0	0	0	0	12
CROSS POINT	WDA3423	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
CRYSTAL MARINE	9VIC4	A	Anchorage	0	9	47	0	0	0	0	0	0	0	0	0	56
CRYSTAL SERENITY	C6SY3	A	Anchorage	105	127	105	0	0	0	0	0	0	0	0	0	337
CRYSTAL SUNRISE	9V2024	A	Anchorage	18	10	8	0	0	0	0	0	0	0	0	0	36
CS GLOBAL SENTINEL	KGSU	A	Seattle	63	49	42	0	0	0	0	0	0	0	0	0	154
CSCL AFRICA	VRBI3	A	New York City	69	39	6	0	0	0	0	0	0	0	0	0	114
CSCL ASIA	VRAB8	A	Anchorage	7	18	13	0	0	0	0	0	0	0	0	0	38
CSCL BRISBANE	VRBJ9	A	Anchorage	29	3	0	0	0	0	0	0	0	0	0	0	32
CSCL CALLAO	VRFB4	A	Anchorage	4	7	0	0	0	0	0	0	0	0	0	0	11
CSCL OCEANIA	VRBI2	A	New York City	25	1	9	0	0	0	0	0	0	0	0	0	35
CSCL ZEEBRUGGE	VRCS2	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0



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CSL ASSINIBOINE	VCKQ	A	Duluth	0	0	0	0	0	0	0	0	0	0	0	0	0
CSL LAURENTIEN	VCJW	A	Duluth	2	0	0	0	0	0	0	0	0	0	0	0	2
CSL NIAGARA	VCGJ	A	Duluth	16	0	3	0	0	0	0	0	0	0	0	0	19
CSL ST-LAURENT	CFK5152	A	Duluth	0	0	0	0	0	0	0	0	0	0	0	0	0
DANIEL FOSS	WTS3171	A	Anchorage	1	0	0	0	0	0	0	0	0	0	0	0	1
DARYA LOK	VRKQ7	A	Anchorage	28	52	69	0	0	0	0	0	0	0	0	0	149
DEPENDABLE	V7DI6	A	Baltimore	34	31	2	0	0	0	0	0	0	0	0	0	67
DETROIT EXPRESS	VR LX4	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
DISCOVERER CLEAR LEADER	V7MO2	A	Houston	0	0	0	0	0	0	0	0	0	0	0	0	0
DISCOVERER INSPIRATION	V7MO3	A	Houston	123	109	120	0	0	0	0	0	0	0	0	0	352
DISNEY DREAM	C6YR6	A	Jacksonville	43	35	71	0	0	0	0	0	0	0	0	0	149
DISNEY FANTASY	C6ZL6	A	Jacksonville	0	0	26	0	0	0	0	0	0	0	0	0	26
DISNEY MAGIC	C6PT7	A	Miami	0	26	4	0	0	0	0	0	0	0	0	0	30
DISNEY WONDER	C6QM8	A	Jacksonville	20	41	75	0	0	0	0	0	0	0	0	0	136
DOMINATOR	WBZ4106	A	Anchorage	0	0	27	0	0	0	0	0	0	0	0	0	27
DREW FOSS	WYL5718	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
DUNCAN ISLAND	C6JS	A	Miami	0	0	20	0	0	0	0	0	0	0	0	0	20
EAGLE ATLANTA	S6TE	A	Houston	0	0	0	0	0	0	0	0	0	0	0	0	0
EAGLE AUGUSTA	S6TC	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
EAGLE KUCHING	9V8132	A	Houston	11	0	0	0	0	0	0	0	0	0	0	0	11
EAGLE STAVANGER	3FNZ5	A	Houston	21	22	0	0	0	0	0	0	0	0	0	0	43
EAGLE SYDNEY	3FUU	A	New Orleans	10	17	9	0	0	0	0	0	0	0	0	0	36
EAGLE TAMPA	S6NK6	A	Houston	17	1	0	0	0	0	0	0	0	0	0	0	18
EASTER N	3FMO7	A	New Orleans	28	21	8	0	0	0	0	0	0	0	0	0	57
EASTERN CAPE	VR LD8	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
EDGAR B. SPEER	WDH7562	A	Duluth	46	0	27	0	0	0	0	0	0	0	0	0	73
EDWIN H. GOTT	WDH7558	A	Duluth	115	0	27	0	0	0	0	0	0	0	0	0	142
ELCIE	WDF2656	A	Baltimore	5	16	7	0	0	0	0	0	0	0	0	0	28
ELIZABETH RIVER	VRBJ5	A	Anchorage	10	14	14	0	0	0	0	0	0	0	0	0	38
EMERALD SPIRIT	C6BC3	A	Anchorage	0	0	111	0	0	0	0	0	0	0	0	0	111
EMILIUS	9V2909	A	Anchorage	97	120	133	0	0	0	0	0	0	0	0	0	350
EMPERY	9V2907	A	Anchorage	24	0	0	0	0	0	0	0	0	0	0	0	24
EMPIRE STATE	KKFW	A	New York City	0	0	0	0	0	0	0	0	0	0	0	0	0
EMPRESS OF THE SEAS	C6CM8	A	Miami	0	0	74	0	0	0	0	0	0	0	0	0	74
ENCHANTMENT OF THE SEAS	C6FZ7	A	Miami	16	23	10	0	0	0	0	0	0	0	0	0	49
ENDEAVOR (AWS)	WCE5063	A	New York City	716	594	735	0	0	0	0	0	0	0	0	0	2045
ENDURANCE	WDE9586	A	Baltimore	74	61	58	0	0	0	0	0	0	0	0	0	193
ENDURANCE	WDF7523	A	Anchorage	7	0	7	0	0	0	0	0	0	0	0	0	14
ESPERANCE BAY	VRHM6	A	Anchorage	0	0	7	0	0	0	0	0	0	0	0	0	7
EURODAM	PHOS	A	Miami	108	63	99	0	0	0	0	0	0	0	0	0	270
EUROPA 2	9HA3283	A	Charleston	0	0	0	0	0	0	0	0	0	0	0	0	0
EVER DAINTY	9V7951	A	Baltimore	0	0	5	0	0	0	0	0	0	0	0	0	5

Ship Name	Call Sign	Status	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
EVER EAGLE	ZNZH6	A	Seattle	14	11	0	0	0	0	0	0	0	0	0	0	25
EVER ELITE	VSJG7	A	Los Angeles	46	19	15	0	0	0	0	0	0	0	0	0	80
EVER ETHIC	VQFS4	A	Seattle	4	2	24	0	0	0	0	0	0	0	0	0	30
EVER EXCEL	VSXV3	A	Los Angeles	65	0	0	0	0	0	0	0	0	0	0	0	65
EVER LAMBENT	2FRE8	A	New York City	2	1	0	0	0	0	0	0	0	0	0	0	3
EVER LAUREL	9V9287	A	New York City	43	39	87	0	0	0	0	0	0	0	0	0	169
EVER LAWFUL	9V9288	A	New York City	19	20	170	0	0	0	0	0	0	0	0	0	209
EVER LEADER	9V9289	A	New York City	12	15	35	0	0	0	0	0	0	0	0	0	62
EVER LEADING	2FRK8	A	Norfolk	78	0	0	0	0	0	0	0	0	0	0	0	78
EVER LEGACY	9V9290	A	New York City	0	9	7	0	0	0	0	0	0	0	0	0	16
EVER LEGEND	9V9724	A	New York City	15	2	0	0	0	0	0	0	0	0	0	0	17
EVER LEGION	9V9725	A	New York City	35	21	61	0	0	0	0	0	0	0	0	0	117
EVER LIBERAL	2HDG2	A	New York City	6	13	26	0	0	0	0	0	0	0	0	0	45
EVER LIBRA	BKIC	A	New York City	37	38	57	0	0	0	0	0	0	0	0	0	132
EVER LIFTING	2ILJ7	A	New York City	7	24	24	0	0	0	0	0	0	0	0	0	55
EVER LINKING	2GLI9	A	New York City	0	0	29	0	0	0	0	0	0	0	0	0	29
EVER LISSOME	2HDG3	A	New York City	16	35	47	0	0	0	0	0	0	0	0	0	98
EVER LIVELY	9V9726	A	Anchorage	9	9	17	0	0	0	0	0	0	0	0	0	35
EVER LIVEN	BKIE	A	New York City	41	29	56	0	0	0	0	0	0	0	0	0	126
EVER LOGIC	BKIF	A	New York City	4	9	35	0	0	0	0	0	0	0	0	0	48
EVER LOVELY	9V9793	A	Charleston	6	12	10	0	0	0	0	0	0	0	0	0	28
EVER LOYAL	BKIZ	A	New York City	34	15	41	0	0	0	0	0	0	0	0	0	90
EVER LUCKY	3FAE4	A	New York City	9	4	1	0	0	0	0	0	0	0	0	0	14
EVER LUNAR	BKKF	A	New York City	18	0	3	0	0	0	0	0	0	0	0	0	21
EVER SALUTE	3ENU5	A	Anchorage	3	5	2	0	0	0	0	0	0	0	0	0	10
EVER SHINE	MJKZ4	A	Anchorage	0	3	6	0	0	0	0	0	0	0	0	0	9
EVER SIGMA	MKKZ7	A	Seattle	0	0	9	0	0	0	0	0	0	0	0	0	9
EVER SMART	MLBD9	A	Anchorage	0	9	13	0	0	0	0	0	0	0	0	0	22
EVER SMILE	MLTH5	A	Anchorage	33	48	53	0	0	0	0	0	0	0	0	0	134
EVER STEADY	3EHT6	A	Anchorage	13	18	24	0	0	0	0	0	0	0	0	0	55
EVER SUMMIT	3EKU3	A	Anchorage	30	24	28	0	0	0	0	0	0	0	0	0	82
EVER SUPERB	3EGL5	A	Anchorage	13	13	22	0	0	0	0	0	0	0	0	0	48
EVER UBERTY	9V7960	I	Seattle	0	0	0	0	0	0	0	0	0	0	0	0	0
EVER ULYSSES	9V7962	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
EVER UNICORN	9V7963	I	Seattle	6	0	0	0	0	0	0	0	0	0	0	0	6
EVER UNIFIC	9V7961	A	Anchorage	0	0	6	0	0	0	0	0	0	0	0	0	6
EVER UNITED	9V7957	A	Seattle	7	9	13	0	0	0	0	0	0	0	0	0	29
EVERGREEN STATE	WDE4430	A	Seattle	15	28	14	0	0	0	0	0	0	0	0	0	57
EXCALIBUR	ONCE	A	Houston	0	8	21	0	0	0	0	0	0	0	0	0	29
EXCEL	9HA4691	A	Houston	0	0	0	0	0	0	0	0	0	0	0	0	0
EXCELSIOR	ONCD	A	Houston	39	11	0	0	0	0	0	0	0	0	0	0	50
EXPLORER OF THE SEAS	C6SE4	A	Jacksonville	51	67	56	0	0	0	0	0	0	0	0	0	174
EXPRESS	ONFL	A	Houston	54	30	28	0	0	0	0	0	0	0	0	0	112

Ship Name	Call Sign	Status	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
FAIRWEATHER	WDB5604	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
FEDERAL BALTIC	V7DS8	A	Anchorage	0	0	3	0	0	0	0	0	0	0	0	0	3
FEDERAL BEAUFORT	V7MF7	A	Anchorage	1	0	0	0	0	0	0	0	0	0	0	0	1
FEDERAL BERING	V7NB6	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
FEDERAL CHURCHILL	V7NK3	A	Anchorage	8	0	1	0	0	0	0	0	0	0	0	0	9
FEDERAL KIVALINA	V7RF2	A	Anchorage	0	0	36	0	0	0	0	0	0	0	0	0	36
FEDERAL KUMANO	V7RF4	A	Anchorage	25	6	1	0	0	0	0	0	0	0	0	0	32
FEDERAL MARGAREE	V7RI7	A	Anchorage	11	15	1	0	0	0	0	0	0	0	0	0	27
FEDERAL MAYUMI	V7YF2	A	Anchorage	0	0	25	0	0	0	0	0	0	0	0	0	25
FEDERAL SABLE	V7WS4	A	Anchorage	0	1	25	0	0	0	0	0	0	0	0	0	26
FEDERAL SCHELDE	8POF	A	Anchorage	30	10	14	0	0	0	0	0	0	0	0	0	54
FEDERAL TAKASE	V7NJ9	A	Anchorage	29	25	25	0	0	0	0	0	0	0	0	0	79
FEDERAL TAMBO	V7YW3	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
FEDERAL TIBER	V7YW2	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
FEDERAL TWEED	V7YW4	A	Anchorage	1	0	0	0	0	0	0	0	0	0	0	0	1
FEDERAL TYNE	V7YW5	A	Anchorage	110	88	138	0	0	0	0	0	0	0	0	0	336
FEDERAL YUKINA	VRHN7	A	Anchorage	7	9	6	0	0	0	0	0	0	0	0	0	22
FISH HAWK	WDF2995	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
FLORIDA	WFAF	A	Houston	14	24	0	0	0	0	0	0	0	0	0	0	38
FLORIDA VOYAGER	WDF4764	A	New Orleans	40	12	25	0	0	0	0	0	0	0	0	0	77
FMG MATILDA	VRRD2	A	Anchorage	0	23	20	0	0	0	0	0	0	0	0	0	43
FOMENTO TWO	9V5542	A	Anchorage	10	7	3	0	0	0	0	0	0	0	0	0	20
FREEDOM	WDB5483	A	Jacksonville	13	21	11	0	0	0	0	0	0	0	0	0	45
FREEDOM OF THE SEAS	C6UZ7	A	Miami	2	17	1	0	0	0	0	0	0	0	0	0	20
FRITZI N	A8PQ4	A	Anchorage	8	28	39	0	0	0	0	0	0	0	0	0	75
FRONTIER ISLAND	VRID4	A	Anchorage	0	15	12	0	0	0	0	0	0	0	0	0	27
G. L. OSTRANDER	WCV7620	A	Duluth	1	0	0	0	0	0	0	0	0	0	0	0	1
G. SYMPHONY	3FCJ9	A	Anchorage	13	15	16	0	0	0	0	0	0	0	0	0	44
G3 MARQUIS	XJBO	A	Duluth	6	0	2	0	0	0	0	0	0	0	0	0	8
GENCO CLAUDIUS	V7SY6	A	Anchorage	34	44	30	0	0	0	0	0	0	0	0	0	108
GENCO HADRIAN	V7QN8	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
GENCO THUNDER	V7LZ4	I	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
GENCO TITUS	VRDI7	A	Anchorage	16	0	0	0	0	0	0	0	0	0	0	0	16
GENER8 COMPANION	ZCDI4	A	Anchorage	550	582	619	0	0	0	0	0	0	0	0	0	1751
GENMAR COMPATRIOT	ZCDK2	A	Anchorage	0	0	18	0	0	0	0	0	0	0	0	0	18
GENOA EXPRESS	VRXL5	A	Anchorage	23	28	2	0	0	0	0	0	0	0	0	0	53
GEORGE N	A8PQ5	A	Anchorage	14	23	16	0	0	0	0	0	0	0	0	0	53
GLEN CANYON BRIDGE	3EFD9	A	Norfolk	6	21	30	0	0	0	0	0	0	0	0	0	57
GORDON JENSEN	WDG3440	A	Anchorage	0	0	15	0	0	0	0	0	0	0	0	0	15
GRANDEUR OF THE SEAS	C6SE3	A	Jacksonville	36	88	87	0	0	0	0	0	0	0	0	0	211
GREAT REPUBLIC	WDH7561	A	Duluth	16	0	0	0	0	0	0	0	0	0	0	0	16
GREEN BAY	WDI3177	A	Jacksonville	5	7	15	0	0	0	0	0	0	0	0	0	27

Ship Name	Call Sign	Status	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
GREEN COVE	WDG5660	A	Baltimore	7	3	9	0	0	0	0	0	0	0	0	0	19
GREEN LAKE	WDDI	A	Jacksonville	1	27	12	0	0	0	0	0	0	0	0	0	40
GREEN RIDGE	WZZF	A	Jacksonville	0	0	0	0	0	0	0	0	0	0	0	0	0
GUANG DONG BRIDGE	3EFI	A	New York City	28	13	25	0	0	0	0	0	0	0	0	0	66
GUARDSMAN	WBN5978	A	Anchorage	5	0	3	0	0	0	0	0	0	0	0	0	8
GULF CAJUN	WDE2831	A	Anchorage	1	8	20	0	0	0	0	0	0	0	0	0	29
GULF TITAN	WDA5598	A	Anchorage	0	1	0	0	0	0	0	0	0	0	0	0	1
H A SKLENAR	C6CL6	A	Houston	3	13	147	0	0	0	0	0	0	0	0	0	163
H. LEE WHITE	WZD2465	A	Duluth	3	0	0	0	0	0	0	0	0	0	0	0	3
HAINAN ISLAND	VRMY3	A	Anchorage	16	4	0	0	0	0	0	0	0	0	0	0	20
HALIFAX EXPRESS	VRMW7	A	New Orleans	2	16	0	0	0	0	0	0	0	0	0	0	18
HARMONY OF THE SEAS	C6BX8	A	Miami	25	8	45	0	0	0	0	0	0	0	0	0	78
HENRY GOODRICH	YJQN7	A	Houston	200	122	211	0	0	0	0	0	0	0	0	0	533
HERBERT C. JACKSON (AWS)	WL3972	A	Duluth	291	2	309	0	0	0	0	0	0	0	0	0	602
HERCULES VOYAGER	C6AB9	A	Anchorage	10	6	15	0	0	0	0	0	0	0	0	0	31
HOEGH CHIBA	LAVD7	A	Jacksonville	20	21	15	0	0	0	0	0	0	0	0	0	56
HON. JAMES L. OBERSTAR (AWS)	WL3108	A	Duluth	211	123	741	0	0	0	0	0	0	0	0	0	1075
HONOR	WDC6923	A	Baltimore	2	31	13	0	0	0	0	0	0	0	0	0	46
HOOD ISLAND	C6LU4	A	Miami	0	0	0	0	0	0	0	0	0	0	0	0	0
HORIZON ENTERPRISE	KRGB	A	Seattle	90	69	67	0	0	0	0	0	0	0	0	0	226
HORIZON PACIFIC	WSRL	A	Seattle	66	29	33	0	0	0	0	0	0	0	0	0	128
HORIZON RELIANCE	WFLH	A	Los Angeles	32	0	18	0	0	0	0	0	0	0	0	0	50
HORIZON SPIRIT	WFLG	A	Los Angeles	18	21	60	0	0	0	0	0	0	0	0	0	99
HOUSTON	KCDK	A	New Orleans	17	13	19	0	0	0	0	0	0	0	0	0	49
HOVDEN SPIRIT	V7UT7	A	Anchorage	6	0	1	0	0	0	0	0	0	0	0	0	7
HUNTER	WBN3744	A	Anchorage	2	2	9	0	0	0	0	0	0	0	0	0	13
HYDRA VOYAGER	C6AB8	A	Anchorage	0	0	1	0	0	0	0	0	0	0	0	0	1
ILLUSION (AWS)	WBA4557	I	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
IMABARI LOGGER	VRNE6	A	Anchorage	22	16	10	0	0	0	0	0	0	0	0	0	48
IMPRESSION BAY	VROV6	A	Anchorage	8	0	13	0	0	0	0	0	0	0	0	0	21
INDEPENDENCE II	WGAX	A	Baltimore	51	38	37	0	0	0	0	0	0	0	0	0	126
INDEPENDENCE OF THE SEAS	C6WW4	A	Miami	0	0	3	0	0	0	0	0	0	0	0	0	3
INDIANA HARBOR	WXN3191	A	Duluth	5	0	0	0	0	0	0	0	0	0	0	0	5
INDIGO LAKE	VROY7	A	Anchorage	28	2	16	0	0	0	0	0	0	0	0	0	46
INLAND SEAS	WCJ6214	I	Duluth	0	0	0	0	0	0	0	0	0	0	0	0	0
INTEGRITY	WDC6925	A	Baltimore	20	11	4	0	0	0	0	0	0	0	0	0	35
INTEGRITY	WDD7905	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0

Ship Name	Call Sign	Status	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
ISLA BELLA	WTOI	A	Jacksonville	25	51	70	0	0	0	0	0	0	0	0	0	146
JACAMAR ARROW	C6YT3	A	Charleston	0	0	0	0	0	0	0	0	0	0	0	0	0
JAMES BAY	VRU4	A	Anchorage	16	14	21	0	0	0	0	0	0	0	0	0	51
JAMES L. KUBER	WDF7020	A	Duluth	6	0	0	0	0	0	0	0	0	0	0	0	6
JAMES R. BARKER (AWS)	WYP8657	A	Duluth	0	0	386	0	0	0	0	0	0	0	0	0	386
JEAN ANNE	WDC3786	A	Los Angeles	36	2	1	0	0	0	0	0	0	0	0	0	39
JENNY N	A8PQ7	A	Houston	664	659	728	0	0	0	0	0	0	0	0	0	2051
JERVIS BAY	VRMM1	A	Anchorage	7	0	11	0	0	0	0	0	0	0	0	0	18
JEWEL OF THE SEAS	C6FW9	A	Miami	49	28	56	0	0	0	0	0	0	0	0	0	133
JOHN G. MUNSON	WDH7557	A	Duluth	0	0	1	0	0	0	0	0	0	0	0	0	1
JOHN J. BOLAND	WZE4539	A	Duluth	0	0	0	0	0	0	0	0	0	0	0	0	0
JONATHAN SWIFT	A8SN5	A	New York City	17	38	43	0	0	0	0	0	0	0	0	0	98
JOSEPH L. BLOCK	WXY6216	A	Duluth	0	0	0	0	0	0	0	0	0	0	0	0	0
JOYCE L. VANENKE-VORT	WDB9821	A	Duluth	1	0	0	0	0	0	0	0	0	0	0	0	1
JUPITER EXPRESS	V7XY7	I	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
JUSTINE FOSS	WYL4978	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
K. GARNET	3EVU4	A	New Orleans	0	0	0	0	0	0	0	0	0	0	0	0	0
KAI XUAN	V7YL7	A	Anchorage	11	6	28	0	0	0	0	0	0	0	0	0	45
KANDA LOGGER	VRPN7	A	Anchorage	16	5	16	0	0	0	0	0	0	0	0	0	37
KAPRIJKE	ONIK	A	Houston	126	83	69	0	0	0	0	0	0	0	0	0	278
KAREN ANDRIE	WBS5272	A	Duluth	1	1	0	0	0	0	0	0	0	0	0	0	2
KAROLINE N	A8PQ8	A	Anchorage	7	0	10	0	0	0	0	0	0	0	0	0	17
KAUAI	WSRH	A	Seattle	2	1	2	0	0	0	0	0	0	0	0	0	5
KAYE E. BARKER (AWS)	WCF3012	A	Duluth	207	0	318	0	0	0	0	0	0	0	0	0	525
KENDAL	C6XE9	A	Anchorage	238	40	72	0	0	0	0	0	0	0	0	0	350
KESWICK	C6XE5	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
KILO MOANA	WDA7827	A	Honolulu	2	4	74	0	0	0	0	0	0	0	0	0	80
KINGCRAFT	9V2737	A	Anchorage	15	85	69	0	0	0	0	0	0	0	0	0	169
KISBER	9V2736	A	Anchorage	10	0	0	0	0	0	0	0	0	0	0	0	10
KIWI TRADER	VRWN7	A	Anchorage	0	0	8	0	0	0	0	0	0	0	0	0	8
KN ARCADIA	9V3913	A	Anchorage	59	43	36	0	0	0	0	0	0	0	0	0	138
KONINGS DAM	PBGJ	A	Miami	35	8	10	0	0	0	0	0	0	0	0	0	53
KRIS KIN	9V2739	A	Anchorage	40	23	12	0	0	0	0	0	0	0	0	0	75
KULTUS COVE	VRQD7	A	Anchorage	13	4	12	0	0	0	0	0	0	0	0	0	29
LA STELLA	ONIS	A	Anchorage	44	34	12	0	0	0	0	0	0	0	0	0	90

Ship Name	Call Sign	Status	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
LAKE DOLPHIN	ONHA	A	Anchorage	19	33	30	0	0	0	0	0	0	0	0	0	82
LAURENCE M. GOULD (AWS)	WCX7445	A	Seattle	744	672	621	0	0	0	0	0	0	0	0	0	2037
LECONTE	WZE4270	A	Anchorage	20	24	14	0	0	0	0	0	0	0	0	0	58
LEE A. TREGURTHA (AWS)	WUR8857	A	Duluth	233	0	77	0	0	0	0	0	0	0	0	0	310
LEO VOYAGER	C6AB7	A	Seattle	13	32	29	0	0	0	0	0	0	0	0	0	74
LIBERTY	KLIG	A	Baltimore	0	9	13	0	0	0	0	0	0	0	0	0	22
LIBERTY EAGLE	WHIA	A	Houston	0	37	48	0	0	0	0	0	0	0	0	0	85
LIBERTY GLORY	WADP	A	Houston	61	81	65	0	0	0	0	0	0	0	0	0	207
LIBERTY GRACE	WADN	A	Houston	68	56	49	0	0	0	0	0	0	0	0	0	173
LIBERTY OF THE SEAS	C6VQ8	A	Houston	33	22	36	0	0	0	0	0	0	0	0	0	91
LIBERTY PASSION	WLPI	A	Charleston	0	0	0	0	0	0	0	0	0	0	0	0	0
LIBERTY PEACE	WLIU	A	Houston	45	55	56	0	0	0	0	0	0	0	0	0	156
LIBERTY PRIDE	KRAU	A	Charleston	21	35	49	0	0	0	0	0	0	0	0	0	105
LIBRA VOYAGER	C6AB6	A	Anchorage	13	23	80	0	0	0	0	0	0	0	0	0	116
LISA ANN 2 (AWS)	WDB3573	A	Anchorage	80	60	61	0	0	0	0	0	0	0	0	0	201
LIVORNO EXPRESS	VRU9	A	Anchorage	39	10	7	0	0	0	0	0	0	0	0	0	56
LOIRE	V7QJ5	A	Anchorage	18	8	14	0	0	0	0	0	0	0	0	0	40
LOIS H	WTD4576	A	Anchorage	0	0	1	0	0	0	0	0	0	0	0	0	1
LONGVIEW LOGGER	VRDK7	A	Anchorage	36	53	47	0	0	0	0	0	0	0	0	0	136
LOWLANDS PHOENIX	9V5327	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
LUZON STRAIT	VRCJ2	A	Anchorage	0	18	5	0	0	0	0	0	0	0	0	0	23
MAASDAM	PFR0	A	Miami	97	49	55	0	0	0	0	0	0	0	0	0	201
MAERSK ATLANTA	WNTL	A	Charleston	7	5	15	0	0	0	0	0	0	0	0	0	27
MAERSK CHICAGO	WMCS	A	Norfolk	58	36	20	0	0	0	0	0	0	0	0	0	114
MAERSK COLUMBUS	WMCU	A	Norfolk	9	9	23	0	0	0	0	0	0	0	0	0	41
MAERSK DENVER	WMDQ	A	New York City	10	16	5	0	0	0	0	0	0	0	0	0	31
MAERSK DETROIT	WMDK	A	Norfolk	98	8	84	0	0	0	0	0	0	0	0	0	190
MAERSK HARTFORD	WMHA	A	New York City	36	30	31	0	0	0	0	0	0	0	0	0	97
MAERSK IDAHO	WKPM	A	Baltimore	22	12	22	0	0	0	0	0	0	0	0	0	56
MAERSK IOWA	KABL	A	Norfolk	70	39	48	0	0	0	0	0	0	0	0	0	157
MAERSK KENSINGTON	WMKN	A	Charleston	84	83	42	0	0	0	0	0	0	0	0	0	209
MAERSK KENTUCKY	WKPY	A	Norfolk	25	41	46	0	0	0	0	0	0	0	0	0	112
MAERSK KOTKA	D5OV9	A	Charleston	0	27	35	0	0	0	0	0	0	0	0	0	62
MAERSK MEMPHIS	WMMK	A	Charleston	62	6	11	0	0	0	0	0	0	0	0	0	79
MAERSK MONTANA	WCDP	A	Norfolk	60	30	49	0	0	0	0	0	0	0	0	0	139
MAERSK NIAGARA	VREO9	A	Anchorage	26	27	31	0	0	0	0	0	0	0	0	0	84
MAERSK OHIO	KABP	A	Houston	64	44	31	0	0	0	0	0	0	0	0	0	139
MAERSK PEARY	WHKM	A	Houston	36	33	34	0	0	0	0	0	0	0	0	0	103
MAERSK PITTSBURGH	WMPP	A	New York City	84	58	58	0	0	0	0	0	0	0	0	0	200

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MAERSK SELETAR	WTAA	A	New York City	26	35	38	0	0	0	0	0	0	0	0	0	99
MAERSK SEMARANG	D5MK9	I	Charleston	0	0	0	0	0	0	0	0	0	0	0	0	0
MAERSK SENTOSA	WSEP	A	New York City	0	6	15	0	0	0	0	0	0	0	0	0	21
MAGNOLIA STATE	KGNQ	A	Charleston	0	0	0	0	0	0	0	0	0	0	0	0	0
MAHIMAH	WHRN	A	Los Angeles	35	15	27	0	0	0	0	0	0	0	0	0	77
MAIA H	WYX2079	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
MAIPO RIVER	VREZ3	A	Anchorage	0	0	10	0	0	0	0	0	0	0	0	0	10
MAJESTY OF THE SEAS	C6FZ8	A	Jacksonville	31	0	9	0	0	0	0	0	0	0	0	0	40
MALOLO	WYH6327	A	Anchorage	29	32	28	0	0	0	0	0	0	0	0	0	89
MANIFESTO	9V9574	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
MANITOWOC	WDE3569	A	Duluth	0	0	0	0	0	0	0	0	0	0	0	0	0
MANOA	KDBG	A	Los Angeles	5	5	16	0	0	0	0	0	0	0	0	0	26
MANUKAI	WRGD	A	Los Angeles	10	23	16	0	0	0	0	0	0	0	0	0	49
MANULANI	WECH	A	Los Angeles	21	29	6	0	0	0	0	0	0	0	0	0	56
MARCELLUS LADY	9V3144	A	Anchorage	0	0	15	0	0	0	0	0	0	0	0	0	15
MARCH	V7HZ5	A	New Orleans	21	27	21	0	0	0	0	0	0	0	0	0	69
MARCUS G. LANGSETH (AWS)	WDC6698	A	Anchorage	542	672	695	0	0	0	0	0	0	0	0	0	1909
MARJORIE C	WDH6745	A	Los Angeles	5	11	29	0	0	0	0	0	0	0	0	0	45
MARSDEN POINT	VRNF3	A	Anchorage	21	18	33	0	0	0	0	0	0	0	0	0	72
MATAKANA ISLAND	VRGM4	A	Anchorage	9	19	51	0	0	0	0	0	0	0	0	0	79
MATANUSKA	WN4201	I	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
MATSON ANCHORAGE	KGTX	A	Anchorage	28	18	23	0	0	0	0	0	0	0	0	0	69
MATSON CONSUMER	WCHF	I	Seattle	0	0	0	0	0	0	0	0	0	0	0	0	0
MATSON KODIAK	KGTZ	A	Anchorage	29	19	74	0	0	0	0	0	0	0	0	0	122
MATSON TACOMA	KGTY	A	Anchorage	69	79	107	0	0	0	0	0	0	0	0	0	255
MATSONIA	KHRC	A	Los Angeles	0	0	0	0	0	0	0	0	0	0	0	0	0
MAUNALEI	KFMV	A	Los Angeles	22	36	38	0	0	0	0	0	0	0	0	0	96
MAUNAWILI	WGEB	A	Los Angeles	37	35	33	0	0	0	0	0	0	0	0	0	105
MEDEIA	WDE6486	A	Anchorage	0	0	3	0	0	0	0	0	0	0	0	0	3
MERCURY HOPE	3FRE6	A	Anchorage	0	9	24	0	0	0	0	0	0	0	0	0	33
MERMAID HOPE	3FOJ2	A	Anchorage	5	0	1	0	0	0	0	0	0	0	0	0	6
MESABI MINER (AWS)	WYQ4356	A	Duluth	339	0	204	0	0	0	0	0	0	0	0	0	543
MIDNIGHT SUN	WAHG	A	Seattle	16	15	24	0	0	0	0	0	0	0	0	0	55
MIKE O'LEARY	WDC3665	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
MINERAL BEIJING	ONAR	A	Anchorage	10	0	0	0	0	0	0	0	0	0	0	0	10
MINERAL CHARLIE	VRJZ9	A	Anchorage	11	19	24	0	0	0	0	0	0	0	0	0	54

Ship Name	Call Sign	Status	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
MINERAL CHINA	ONAC	A	Anchorage	33	47	44	0	0	0	0	0	0	0	0	0	124
MINERAL CLOUDBREAK	VRLA6	A	Anchorage	11	5	68	0	0	0	0	0	0	0	0	0	84
MINERAL DALIAN	ONFW	A	Anchorage	48	39	61	0	0	0	0	0	0	0	0	0	148
MINERAL DRAGON	ONFN	A	Anchorage	0	7	31	0	0	0	0	0	0	0	0	0	38
MINERAL FAITH	VRKS4	A	Anchorage	30	25	31	0	0	0	0	0	0	0	0	0	86
MINERAL HONSHU	VRKM2	A	Anchorage	0	3	37	0	0	0	0	0	0	0	0	0	40
MINERAL HOPE	VRKS3	A	Anchorage	23	11	7	0	0	0	0	0	0	0	0	0	41
MINERAL KYOTO	ONFI	A	Anchorage	32	37	53	0	0	0	0	0	0	0	0	0	122
MINERAL MAUREEN	VRKK2	A	Anchorage	13	9	35	0	0	0	0	0	0	0	0	0	57
MINERAL NEW YORK	ONGI	A	Anchorage	19	12	16	0	0	0	0	0	0	0	0	0	47
MINERAL NINGBO	ONGA	A	Anchorage	0	7	6	0	0	0	0	0	0	0	0	0	13
MINERAL NOBLE	ONAN	A	Anchorage	71	26	5	0	0	0	0	0	0	0	0	0	102
MINERAL STONEHENGE	ONGR	A	Anchorage	19	15	14	0	0	0	0	0	0	0	0	0	48
MINERAL SUBIC	VRIF9	A	Anchorage	12	21	32	0	0	0	0	0	0	0	0	0	65
MINERAL TIANJIN	ONBF	A	Anchorage	5	11	15	0	0	0	0	0	0	0	0	0	31
MINERAL YARDEN	D5LJ2	A	Anchorage	15	25	18	0	0	0	0	0	0	0	0	0	58
MOKIHANA	WNRD	A	Los Angeles	18	25	29	0	0	0	0	0	0	0	0	0	72
MOL BEACON	VROB9	A	Anchorage	27	14	22	0	0	0	0	0	0	0	0	0	63
MOL BEAUTY	VROG7	A	Anchorage	19	4	36	0	0	0	0	0	0	0	0	0	59
MOL BENEFACTOR	VRPJ6	A	Anchorage	18	8	43	0	0	0	0	0	0	0	0	0	69
MOL BREEZE	VRNL8	A	Anchorage	11	20	16	0	0	0	0	0	0	0	0	0	47
MOL BRILLIANCE	VRNL2	A	Anchorage	22	1	0	0	0	0	0	0	0	0	0	0	23
MOL EMISSARY	VRFX6	A	New Orleans	56	18	8	0	0	0	0	0	0	0	0	0	82
MOL GLIDE	VRJF2	A	Charleston	103	54	58	0	0	0	0	0	0	0	0	0	215
MOL MANEUVER	V7VC5	A	Charleston	0	10	7	0	0	0	0	0	0	0	0	0	17
MORNING HARUKA	A8GK7	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
MORSTON	9V9144	A	Anchorage	0	3	47	0	0	0	0	0	0	0	0	0	50
MOTIVATOR	9V9143	A	Anchorage	25	43	17	0	0	0	0	0	0	0	0	0	85
MOUNT HIKURANGI	VRMC8	A	Anchorage	114	111	10	0	0	0	0	0	0	0	0	0	235
MOUNT OWEN	VRDU6	A	Anchorage	61	262	0	0	0	0	0	0	0	0	0	0	323
MSC ANTIGUA	VRLC3	A	Charleston	0	0	0	0	0	0	0	0	0	0	0	0	0
MSC DIVINA	3FFA5	A	Anchorage	17	16	24	0	0	0	0	0	0	0	0	0	57
MSC POESIA	3EPL4	A	Miami	0	0	0	0	0	0	0	0	0	0	0	0	0
MSC SEASIDE	9HA4638	A	Anchorage	65	105	117	0	0	0	0	0	0	0	0	0	287



Ship Name	Call Sign	Status	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
MUSTAFA DAYI	TCZF2	A	New York City	0	1	23	0	0	0	0	0	0	0	0	0	24
NANNING	9V5409	A	Anchorage	7	11	3	0	0	0	0	0	0	0	0	0	21
NATHANIEL B. PALMER (AWS)	WBP3210	A	Seattle	219	617	743	0	0	0	0	0	0	0	0	0	1579
NATIONAL GLORY	WDD4207	A	Houston	27	15	18	0	0	0	0	0	0	0	0	0	60
NAVIGATOR OF THE SEAS	C6FU4	A	Miami	18	17	34	0	0	0	0	0	0	0	0	0	69
NEIL ARMSTRONG (AWS)	WARL	A	Anchorage	532	0	194	0	0	0	0	0	0	0	0	0	726
NEPTUNE VOYAGER	C6FU7	A	New Orleans	0	0	0	0	0	0	0	0	0	0	0	0	0
NEVZAT KALKAVAN	TCMO2	A	New York City	14	30	31	0	0	0	0	0	0	0	0	0	75
NIEUW AMSTERDAM	PBWQ	A	Miami	185	296	102	0	0	0	0	0	0	0	0	0	583
NIJINSKY	9VAX2	A	Anchorage	30	5	0	0	0	0	0	0	0	0	0	0	35
NOAA FAIRWEATHER (AWS)	WTEB	A	Seattle	0	0	0	0	0	0	0	0	0	0	0	0	0
NOAA GORDON GUNTER (AWS)	WTEO	I	Seattle	48	0	0	0	0	0	0	0	0	0	0	0	48
NOAA OKEANOS EXPLORER (AWS)	WTDH	A	Seattle	0	0	216	0	0	0	0	0	0	0	0	0	216
NOAA OSCAR DYSON (AWS)	WTEP	A	Seattle	0	190	388	0	0	0	0	0	0	0	0	0	578
NOAA RONALD H. BROWN (AWS)	WTEC	A	Seattle	0	0	62	0	0	0	0	0	0	0	0	0	62
NOORDAM	PHET	A	Anchorage	281	324	459	0	0	0	0	0	0	0	0	0	1064
NORDSEINE	9HA3825	A	New Orleans	0	0	20	0	0	0	0	0	0	0	0	0	20
NORFOLK	WDI3067	A	Charleston	0	0	0	0	0	0	0	0	0	0	0	0	0
NORTH STAR	KIYI	A	Seattle	0	16	74	0	0	0	0	0	0	0	0	0	90
NORTHWEST SWAN	ZCDJ9	A	Anchorage	123	83	55	0	0	0	0	0	0	0	0	0	261
NORWEGIAN BREAKAWAY	C6ZJ3	A	New York City	79	69	35	0	0	0	0	0	0	0	0	0	183
NORWEGIAN DAWN	C6FT7	A	New Orleans	122	19	60	0	0	0	0	0	0	0	0	0	201
NORWEGIAN ESCAPE	C6BR3	A	Miami	67	121	87	0	0	0	0	0	0	0	0	0	275
NORWEGIAN GEM	C6VG8	A	Jacksonville	25	41	38	0	0	0	0	0	0	0	0	0	104
NORWEGIAN JADE	C6WK7	A	Miami	93	94	37	0	0	0	0	0	0	0	0	0	224
NORWEGIAN JEWEL	C6TX6	A	Jacksonville	35	3	0	0	0	0	0	0	0	0	0	0	38
NORWEGIAN JOY	C6CX3	A	Anchorage	16	17	15	0	0	0	0	0	0	0	0	0	48
NORWEGIAN PEARL	C6VG7	A	Anchorage	535	485	573	0	0	0	0	0	0	0	0	0	1593
NORWEGIAN SPIRIT	C6TQ6	A	Jacksonville	229	136	93	0	0	0	0	0	0	0	0	0	458
NORWEGIAN STAR	C6FR3	A	Miami	123	127	71	0	0	0	0	0	0	0	0	0	321
NORWEGIAN SUN	C6RN3	A	Miami	69	3	53	0	0	0	0	0	0	0	0	0	125
NUNAVIK	V7CK9	A	Anchorage	11	19	19	0	0	0	0	0	0	0	0	0	49
NYK ATHENA	HPDY	A	Anchorage	95	62	39	0	0	0	0	0	0	0	0	0	196
NYK NEBULA	3ENG6	A	Charleston	12	8	7	0	0	0	0	0	0	0	0	0	27
NYK TRITON	3FUL2	A	Los Angeles	7	25	5	0	0	0	0	0	0	0	0	0	37
OAK BAY	VRMA2	A	Anchorage	65	11	20	0	0	0	0	0	0	0	0	0	96
OASIS OF THE SEAS	C6XS7	A	Jacksonville	54	59	34	0	0	0	0	0	0	0	0	0	147

Ship Name	Call Sign	Status	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
OCEAN AMBITION	VRNM9	A	Anchorage	24	14	9	0	0	0	0	0	0	0	0	0	47
OCEAN CRESCENT	WDF4929	A	Houston	18	6	2	0	0	0	0	0	0	0	0	0	26
OCEAN EAGLE	WDG8082	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
OCEAN FORTE	VRNZ9	A	Anchorage	24	19	21	0	0	0	0	0	0	0	0	0	64
OCEAN FREEDOM	WDF9323	A	Houston	0	0	0	0	0	0	0	0	0	0	0	0	0
OCEAN GIANT	WDG4379	A	Jacksonville	14	6	0	0	0	0	0	0	0	0	0	0	20
OCEAN GLOBE	KOGE	A	Houston	11	27	0	0	0	0	0	0	0	0	0	0	38
OCEAN HOPE 3	WDF2354	A	Anchorage	6	2	0	0	0	0	0	0	0	0	0	0	8
OCEAN JAZZ	WDJ4909	A	Anchorage	7	51	3	0	0	0	0	0	0	0	0	0	61
OCEAN MARINER	WCF3990	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
OCEAN RANGER	WAM7635	A	Anchorage	0	10	14	0	0	0	0	0	0	0	0	0	24
OCEAN RELIANCE	WADY	A	Anchorage	31	4	17	0	0	0	0	0	0	0	0	0	52
OCEANUS	WXAQ	I	Seattle	1	0	0	0	0	0	0	0	0	0	0	0	1
OLEANDER	V7SX3	A	New York City	37	36	28	0	0	0	0	0	0	0	0	0	101
OLIVE L. MOORE	WDF7019	A	Duluth	0	0	0	0	0	0	0	0	0	0	0	0	0
OOSTERDAM	PBKH	A	Anchorage	153	121	102	0	0	0	0	0	0	0	0	0	376
ORANGE BLOSSOM 2	D5DS3	A	New York City	55	84	78	0	0	0	0	0	0	0	0	0	217
ORANGE OCEAN	D5DS2	A	New York City	1	15	23	0	0	0	0	0	0	0	0	0	39
ORANGE SKY	ELZU2	A	New York City	59	43	13	0	0	0	0	0	0	0	0	0	115
ORANGE STAR	A8WP6	A	New York City	53	49	7	0	0	0	0	0	0	0	0	0	109
ORANGE SUN	A8HY8	A	New York City	27	20	40	0	0	0	0	0	0	0	0	0	87
ORANGE WAVE	ELPX7	A	New York City	8	34	13	0	0	0	0	0	0	0	0	0	55
ORE BRASIL	VRPY5	A	Anchorage	66	28	97	0	0	0	0	0	0	0	0	0	191
ORE GUAIBA	9V9040	A	Anchorage	703	585	522	0	0	0	0	0	0	0	0	0	1810
ORE ITALIA	VRPY6	A	Anchorage	3	21	57	0	0	0	0	0	0	0	0	0	81
ORE KOREA	VRPY7	A	Anchorage	427	608	392	0	0	0	0	0	0	0	0	0	1427
OREGON VOYAGER	WDF2960	A	New Orleans	11	0	0	0	0	0	0	0	0	0	0	0	11
ORIENTAL KING	VRQZ7	A	Anchorage	42	57	55	0	0	0	0	0	0	0	0	0	154
ORIENTAL QUEEN	VRAC9	A	Anchorage	2	25	50	0	0	0	0	0	0	0	0	0	77
OSAKA BAY	VRQS2	A	Anchorage	0	12	15	0	0	0	0	0	0	0	0	0	27
OTAGO BAY	VRQK3	A	Anchorage	17	1	12	0	0	0	0	0	0	0	0	0	30
OTAGO HARBOUR	VRNI7	A	Anchorage	17	8	28	0	0	0	0	0	0	0	0	0	53
OURO DO BRASIL	ELPP9	A	Baltimore	59	52	54	0	0	0	0	0	0	0	0	0	165
OVATION OF THE SEAS	C6BX9	A	Anchorage	56	65	14	0	0	0	0	0	0	0	0	0	135
OVERSEAS ANACORTES	KCHV	A	Miami	9	15	7	0	0	0	0	0	0	0	0	0	31
OVERSEAS BOSTON	WJBU	A	Anchorage	31	25	25	0	0	0	0	0	0	0	0	0	81
OVERSEAS CASCADE	WOAG	A	Houston	2	1	133	0	0	0	0	0	0	0	0	0	136

Ship Name	Call Sign	Status	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
OVERSEAS CHINOOK	WNFQ	A	Houston	1	2	11	0	0	0	0	0	0	0	0	0	14
OVERSEAS HOUSTON	WWAA	A	Miami	2	5	1	0	0	0	0	0	0	0	0	0	8
OVERSEAS LONG BEACH	WAAT	A	Jacksonville	11	30	8	0	0	0	0	0	0	0	0	0	49
OVERSEAS LOS ANGELES	WABS	A	Seattle	40	3	21	0	0	0	0	0	0	0	0	0	64
OVERSEAS MARTINEZ	WPAJ	A	Anchorage	44	33	84	0	0	0	0	0	0	0	0	0	161
OVERSEAS NIKISKI	WDBH	A	Houston	23	6	0	0	0	0	0	0	0	0	0	0	29
OVERSEAS SANTORINI	WOSI	A	Houston	25	23	47	0	0	0	0	0	0	0	0	0	95
OVERSEAS TAMPA	WOTA	A	Houston	0	3	4	0	0	0	0	0	0	0	0	0	7
OVERSEAS TEXAS CITY	WHED	A	Houston	40	3	19	0	0	0	0	0	0	0	0	0	62
OYSTER BAY	VRQE9	A	Anchorage	0	0	1	0	0	0	0	0	0	0	0	0	1
PACIFIC FREEDOM	WDD9283	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC LOGGER	VRWL4	A	Anchorage	10	25	116	0	0	0	0	0	0	0	0	0	151
PACIFIC RAVEN	WDD9278	I	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC SANTA ANA	A8WI3	A	Houston	11	27	27	0	0	0	0	0	0	0	0	0	65
PACIFIC SHARAV	D5DY4	A	Houston	22	9	22	0	0	0	0	0	0	0	0	0	53
PACIFIC TITAN	WCZ6844	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC WOLF	WDD9286	A	Anchorage	1	8	8	0	0	0	0	0	0	0	0	0	17
PARAMOUNT HAMILTON	2CW2	A	Houston	4	0	0	0	0	0	0	0	0	0	0	0	4
PATRIOT	WAIU	A	Charleston	16	27	32	0	0	0	0	0	0	0	0	0	75
PAUL GAUGUIN	C6TH9	A	Anchorage	257	237	222	0	0	0	0	0	0	0	0	0	716
PAUL R. TREGURTHA (AWS)	WYR4481	A	Duluth	65	0	0	0	0	0	0	0	0	0	0	0	65
PECOS	V7UU5	A	Anchorage	8	8	5	0	0	0	0	0	0	0	0	0	21
PERLA DEL CARIBE	KPDL	A	Jacksonville	31	3	12	0	0	0	0	0	0	0	0	0	46
PERSEVERANCE	WDE5328	A	Anchorage	1	2	0	0	0	0	0	0	0	0	0	0	3
PHILADELPHIA EXPRESS	WDC6736	A	Houston	91	44	20	0	0	0	0	0	0	0	0	0	155
PHILIP R. CLARKE	WDH7554	A	Duluth	15	0	24	0	0	0	0	0	0	0	0	0	39
PHYLLIS DUNLAP	WDA6552	A	Anchorage	0	3	7	0	0	0	0	0	0	0	0	0	10
POLAR ADVENTURE	WAZV	A	Seattle	26	18	22	0	0	0	0	0	0	0	0	0	66
POLAR DISCOVERY	WACW	A	Seattle	7	22	68	0	0	0	0	0	0	0	0	0	97
POLAR ENDEAVOUR	WCAJ	A	Seattle	25	18	32	0	0	0	0	0	0	0	0	0	75
POLAR ENTERPRISE	WRTE	A	Seattle	28	27	39	0	0	0	0	0	0	0	0	0	94
POLAR RESOLUTION	WDJK	A	Seattle	23	63	61	0	0	0	0	0	0	0	0	0	147
POLAR STORM	WDE8347	A	Anchorage	0	20	25	0	0	0	0	0	0	0	0	0	45
POLAR VIKING	WDD6494	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0

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POLAR WIND	WAZ9548	A	Anchorage	0	0	7	0	0	0	0	0	0	0	0	0	7
PORT ALBERNI	VRDT3	A	Anchorage	20	20	17	0	0	0	0	0	0	0	0	0	57
PORT ALFRED	VR LZ7	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
PORT ALICE	VRIC6	A	Anchorage	19	17	14	0	0	0	0	0	0	0	0	0	50
PORT ANGELES	VR CW8	A	Anchorage	0	0	2	0	0	0	0	0	0	0	0	0	2
PORT KENNY	VRGP2	A	Anchorage	7	15	24	0	0	0	0	0	0	0	0	0	46
PORT PEGASUS	VR AA8	A	Anchorage	26	13	16	0	0	0	0	0	0	0	0	0	55
PREMIUM DO BRASIL	A8BL4	A	Baltimore	15	0	15	0	0	0	0	0	0	0	0	0	30
PRESQUE ISLE	WDH7560	A	Duluth	48	0	32	0	0	0	0	0	0	0	0	0	80
PRIME EXPRESS	3FUZ4	A	Anchorage	0	0	13	0	0	0	0	0	0	0	0	0	13
PRINSENDAM	PBGH	A	Miami	93	86	109	0	0	0	0	0	0	0	0	0	288
PSU SEVENTH	9V3964	A	Anchorage	566	649	69	0	0	0	0	0	0	0	0	0	1284
PYXIS ALFA	9V3776	A	Anchorage	84	0	52	0	0	0	0	0	0	0	0	0	136
QUANTUM OF THE SEAS	C6BH8	A	New York City	19	41	50	0	0	0	0	0	0	0	0	0	110
R J PFEIFFER	WRJP	A	Los Angeles	42	47	50	0	0	0	0	0	0	0	0	0	139
R/V KIYI	KAO107	A	Duluth	0	0	0	0	0	0	0	0	0	0	0	0	0
RADIANCE OF THE SEAS	C6SE7	A	Anchorage	25	10	52	0	0	0	0	0	0	0	0	0	87
RED	V7UU2	A	Anchorage	0	0	2	0	0	0	0	0	0	0	0	0	2
RESOLVE	WCZ5535	A	Baltimore	52	25	34	0	0	0	0	0	0	0	0	0	111
RESPONDER	V7CY9	A	Baltimore	39	34	52	0	0	0	0	0	0	0	0	0	125
RHAPSODY OF THE SEAS	C6UA2	A	Miami	38	23	4	0	0	0	0	0	0	0	0	0	65
RICHARD BRUSCO	WDC3031	A	Anchorage	2	0	1	0	0	0	0	0	0	0	0	0	3
RIO GRANDE	V7UT9	A	Anchorage	2	17	12	0	0	0	0	0	0	0	0	0	31
RIO GRANDE EXPRESS	VRCE5	A	Anchorage	14	15	13	0	0	0	0	0	0	0	0	0	42
ROBERT C. SEAMANS	WDA4486	A	Anchorage	0	24	26	0	0	0	0	0	0	0	0	0	50
ROBERT GORDON SPROUL (AWS)	WSQ2674	A	Los Angeles	713	672	543	0	0	0	0	0	0	0	0	0	1928
ROGER BLOUGH	WDH7559	A	Duluth	0	0	99	0	0	0	0	0	0	0	0	0	99
ROGER REVELLE (AWS)	KAOU	A	Los Angeles	294	8	646	0	0	0	0	0	0	0	0	0	948
RONALD N	A8PQ3	A	Anchorage	68	41	49	0	0	0	0	0	0	0	0	0	158
RTM COLUMBUS	9V2781	A	Anchorage	18	87	11	0	0	0	0	0	0	0	0	0	116
RTM DAMPIER	9V2775	A	Anchorage	10	0	0	0	0	0	0	0	0	0	0	0	10
RTM DHAMBUL	9V2783	A	Anchorage	4	0	26	0	0	0	0	0	0	0	0	0	30
RTM DRAKE	9V2779	A	Anchorage	225	0	0	0	0	0	0	0	0	0	0	0	225
RTM TASMAN	9V2782	A	Anchorage	0	102	324	0	0	0	0	0	0	0	0	0	426
SAGA ADVENTURE	VRBL4	A	Anchorage	26	64	42	0	0	0	0	0	0	0	0	0	132
SAGA ANDORINHA	VRMV6	A	Anchorage	0	0	40	0	0	0	0	0	0	0	0	0	40
SAGA BEIJA-FLOR	VRVN8	A	Anchorage	1	28	25	0	0	0	0	0	0	0	0	0	54
SAGA CREST	VRWR7	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
SAGA DISCOVERY	VRBR8	A	Seattle	1	0	16	0	0	0	0	0	0	0	0	0	17

Ship Name	Call Sign	Status	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
SAGA FALCON	VRKX7	A	Anchorage	23	36	19	0	0	0	0	0	0	0	0	0	78
SAGA FANTASY	VRLL9	A	Anchorage	15	2	34	0	0	0	0	0	0	0	0	0	51
SAGA FJORD	VRLL2	A	Anchorage	27	0	0	0	0	0	0	0	0	0	0	0	27
SAGA FRAM	VRLL3	A	Anchorage	4	0	0	0	0	0	0	0	0	0	0	0	4
SAGA FRIGG	VRK7	A	Anchorage	16	35	22	0	0	0	0	0	0	0	0	0	73
SAGA FUJI	VRMS3	A	Anchorage	14	7	21	0	0	0	0	0	0	0	0	0	42
SAGA FUTURE	VRKX8	A	Anchorage	71	112	130	0	0	0	0	0	0	0	0	0	313
SAGA JANDAIA	VRYO9	A	Anchorage	26	3	0	0	0	0	0	0	0	0	0	0	29
SAGA MONAL	VRZQ9	A	Anchorage	202	94	9	0	0	0	0	0	0	0	0	0	305
SAGA MORUS	VRZQ8	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
SAGA NAVIGATOR	VRDA4	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
SAGA ODYSSEY	VRDU9	A	Anchorage	133	196	329	0	0	0	0	0	0	0	0	0	658
SAGA PIONEER	VRED4	A	Anchorage	52	55	85	0	0	0	0	0	0	0	0	0	192
SAGA SPRAY	VRWW5	A	Anchorage	17	0	9	0	0	0	0	0	0	0	0	0	26
SAGA TIDE	VRYO8	A	Anchorage	28	18	43	0	0	0	0	0	0	0	0	0	89
SAGA TUCANO	VRVP2	A	Anchorage	114	348	366	0	0	0	0	0	0	0	0	0	828
SAGA VIKING	VRXO6	A	Anchorage	0	0	9	0	0	0	0	0	0	0	0	0	9
SAGA VOYAGER	VRXL8	A	Anchorage	12	120	209	0	0	0	0	0	0	0	0	0	341
SAGA WAVE	VRYO7	A	Anchorage	0	0	66	0	0	0	0	0	0	0	0	0	66
SAKURA OCEAN	3FRC8	A	New Orleans	29	0	33	0	0	0	0	0	0	0	0	0	62
SALLY RIDE (AWS)	WSAF	A	Seattle	503	610	743	0	0	0	0	0	0	0	0	0	1856
SALTRAM	9V2312	A	Anchorage	7	14	24	0	0	0	0	0	0	0	0	0	45
SAM LAUD	WZC7602	I	Duluth	0	0	0	0	0	0	0	0	0	0	0	0	0
SAMSON MARINER	WCN3586	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
SAMUEL DE CHAMPLAIN	WDC8307	A	Duluth	0	0	9	0	0	0	0	0	0	0	0	0	9
SAN JACINTO	V7QJ4	A	Anchorage	7	2	1	0	0	0	0	0	0	0	0	0	10
SAN SABA	V7UT8	A	Anchorage	11	0	0	0	0	0	0	0	0	0	0	0	11
SANDRA FOSS	WYL4908	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
SANSOVINO	9V2729	A	Anchorage	116	111	88	0	0	0	0	0	0	0	0	0	315
SEA BIRD	9V2730	A	Anchorage	0	0	19	0	0	0	0	0	0	0	0	0	19
SEA HAWK	WDD9287	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
SEA PRINCE	WYT8569	A	Anchorage	0	0	28	0	0	0	0	0	0	0	0	0	28
SEA VOYAGER	WCX9106	A	Anchorage	13	0	17	0	0	0	0	0	0	0	0	0	30
SEABOARD AMERICA	5BAW3	A	New Orleans	18	13	42	0	0	0	0	0	0	0	0	0	73
SEABOARD PERU	5BZE2	A	New Orleans	46	33	44	0	0	0	0	0	0	0	0	0	123
SEABOURN QUEST	C6YZ5	A	Miami	3	29	64	0	0	0	0	0	0	0	0	0	96

Ship Name	Call Sign	Status	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
SEABOURN SOJOURN	C6YA5	A	Anchorage	352	558	500	0	0	0	0	0	0	0	0	0	1410
SAGA NAVIGATOR	VRDA4	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
SAGA ODYSSEY	VRDU9	A	Anchorage	133	196	329	0	0	0	0	0	0	0	0	0	658
SAGA PIONEER	VRD4	A	Anchorage	52	55	85	0	0	0	0	0	0	0	0	0	192
SAGA SPRAY	VRWW5	A	Anchorage	17	0	9	0	0	0	0	0	0	0	0	0	26
SAGA TIDE	VRYO8	A	Anchorage	28	18	43	0	0	0	0	0	0	0	0	0	89
SAGA TUCANO	VRVP2	A	Anchorage	114	348	366	0	0	0	0	0	0	0	0	0	828
SAGA VIKING	VRX06	A	Anchorage	0	0	9	0	0	0	0	0	0	0	0	0	9
SAGA VOYAGER	VRXL8	A	Anchorage	12	120	209	0	0	0	0	0	0	0	0	0	341
SAGA WAVE	VRYO7	A	Anchorage	0	0	66	0	0	0	0	0	0	0	0	0	66
SAKURA OCEAN	3FRC8	A	New Orleans	29	0	33	0	0	0	0	0	0	0	0	0	62
SALLY RIDE (AWS)	WSAF	A	Seattle	503	610	743	0	0	0	0	0	0	0	0	0	1856
SALTRAM	9V2312	A	Anchorage	7	14	24	0	0	0	0	0	0	0	0	0	45
SAM LAUD	WZC7602	I	Duluth	0	0	0	0	0	0	0	0	0	0	0	0	0
SAMSON MARINER	WCN3586	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
SAMUEL DE CHAMPLAIN	WDC8307	A	Duluth	0	0	9	0	0	0	0	0	0	0	0	0	9
SAN JACINTO	V7QJ4	A	Anchorage	7	2	1	0	0	0	0	0	0	0	0	0	10
SAN SABA	V7UT8	A	Anchorage	11	0	0	0	0	0	0	0	0	0	0	0	11
SANDRA FOSS	WYL4908	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
SANSOVINO	9V2729	A	Anchorage	116	111	88	0	0	0	0	0	0	0	0	0	315
SEA BIRD	9V2730	A	Anchorage	0	0	19	0	0	0	0	0	0	0	0	0	19
SEA HAWK	WDD9287	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
SEA PRINCE	WYT8569	A	Anchorage	0	0	28	0	0	0	0	0	0	0	0	0	28
SEA VOYAGER	WCX9106	A	Anchorage	13	0	17	0	0	0	0	0	0	0	0	0	30
SEABOARD AMERICA	5BAW3	A	New Orleans	18	13	42	0	0	0	0	0	0	0	0	0	73
SEABOARD PERU	5BZE2	A	New Orleans	46	33	44	0	0	0	0	0	0	0	0	0	123
SEABOURN QUEST	C6YZ5	A	Miami	3	29	64	0	0	0	0	0	0	0	0	0	96
SEABOURN SOJOURN	C6YA5	A	Anchorage	352	558	500	0	0	0	0	0	0	0	0	0	1410
SONANGOL BENGUELA	C6YM7	A	Anchorage	44	17	5	0	0	0	0	0	0	0	0	0	66
SONANGOL ETOSHA	C6YM5	A	Anchorage	74	77	65	0	0	0	0	0	0	0	0	0	216
SONANGOL SAMBI-ZANGA	C6YM6	A	Anchorage	43	54	103	0	0	0	0	0	0	0	0	0	200
SPICA	A8QJ5	A	New Orleans	19	16	16	0	0	0	0	0	0	0	0	0	51
SPREAD EAGLE	9V2314	A	Anchorage	34	14	0	0	0	0	0	0	0	0	0	0	48
ST LOUIS EXPRESS	WDD3825	A	Houston	15	17	25	0	0	0	0	0	0	0	0	0	57

Ship Name	Call Sign	Status	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
ST. CLAIR	WZA4027	A	Duluth	19	0	0	0	0	0	0	0	0	0	0	0	19
STAR FUJI	LAVX4	A	Seattle	3	0	0	0	0	0	0	0	0	0	0	0	3
STAR GRIP	LADQ4	A	Charleston	8	13	6	0	0	0	0	0	0	0	0	0	27
STAR HERDLA	LAVD4	A	New Orleans	43	6	34	0	0	0	0	0	0	0	0	0	83
STAR HIDRA	LAVN4	A	Baltimore	0	4	13	0	0	0	0	0	0	0	0	0	17
STAR ISFJORD	LAOX5	A	New Orleans	0	25	47	0	0	0	0	0	0	0	0	0	72
STAR ISMENE	LANT5	A	New Orleans	7	1	18	0	0	0	0	0	0	0	0	0	26
STAR ISTIND	LAMP5	A	Seattle	25	0	27	0	0	0	0	0	0	0	0	0	52
STAR JAPAN	LAZV5	A	Seattle	46	64	59	0	0	0	0	0	0	0	0	0	169
STAR JAVA	LAJS6	A	Baltimore	8	45	18	0	0	0	0	0	0	0	0	0	71
STAR JUVENTAS	LAZU5	A	Baltimore	0	0	0	0	0	0	0	0	0	0	0	0	0
STAR KILIMANJARO	LAIG7	A	Anchorage	0	0	2	0	0	0	0	0	0	0	0	0	2
STAR KINN	LAJF7	A	Anchorage	36	30	25	0	0	0	0	0	0	0	0	0	91
STAR KIRKENES	LAHR7	A	New Orleans	14	26	0	0	0	0	0	0	0	0	0	0	40
STAR KVARVEN	LAJK7	A	Seattle	4	0	19	0	0	0	0	0	0	0	0	0	23
STAR LIMA	LAPE7	A	Jacksonville	17	37	0	0	0	0	0	0	0	0	0	0	54
STAR LINDESNES	LAQJ7	A	Jacksonville	0	51	0	0	0	0	0	0	0	0	0	0	51
STAR LIVORNO	LAQM7	A	Houston	57	0	0	0	0	0	0	0	0	0	0	0	57
STAR LOEN	LAQN7	A	Anchorage	0	0	30	0	0	0	0	0	0	0	0	0	30
STAR LOFOTEN	LAQL7	A	Charleston	5	58	59	0	0	0	0	0	0	0	0	0	122
STAR LOUISIANA	V7SD8	A	New Orleans	18	68	2	0	0	0	0	0	0	0	0	0	88
STAR LUSTER	LAQO7	A	Anchorage	28	32	1	0	0	0	0	0	0	0	0	0	61
STAR LYGRA	V7FA7	A	Anchorage	1	9	0	0	0	0	0	0	0	0	0	0	10
STAR LYSEFJORD	LAQQ7	A	New Orleans	8	22	15	0	0	0	0	0	0	0	0	0	45
STAR MINERVA	V7GR8	A	Jacksonville	43	8	0	0	0	0	0	0	0	0	0	0	51
STELLAR VOYAGER	C6FV4	I	New Orleans	0	0	0	0	0	0	0	0	0	0	0	0	0
STEWART J. CORT (AWS)	WDC6055	A	Duluth	384	0	77	0	0	0	0	0	0	0	0	0	461
STIMSON	WDG2051	A	Anchorage	3	0	0	0	0	0	0	0	0	0	0	0	3
SUN RUBY	VRZU4	A	Anchorage	1	24	12	0	0	0	0	0	0	0	0	0	37
SUNLIGHT EXPRESS	3FMK7	A	Anchorage	8	18	29	0	0	0	0	0	0	0	0	0	55
SUNSHINE STATE	WDE4432	A	Miami	19	9	17	0	0	0	0	0	0	0	0	0	45
SUPERSTAR GEMINI	C6LG5	A	Anchorage	29	25	26	0	0	0	0	0	0	0	0	0	80
SUPERSTAR LIBRA	C6DM2	A	Anchorage	104	78	97	0	0	0	0	0	0	0	0	0	279
SYLVIE	VRCQ2	A	Anchorage	16	20	2	0	0	0	0	0	0	0	0	0	38
SYMI I	D5FL9	A	Anchorage	12	27	56	0	0	0	0	0	0	0	0	0	95
SYROS I	D5IV5	A	Anchorage	16	10	12	0	0	0	0	0	0	0	0	0	38
TAKU WIND	WDI9036	A	Anchorage	2	4	4	0	0	0	0	0	0	0	0	0	10
TALISMAN	9HA4613	A	Anchorage	0	3	17	0	0	0	0	0	0	0	0	0	20
TALISMAN	LAOW5	A	Jacksonville	7	5	42	0	0	0	0	0	0	0	0	0	54

Ship Name	Call Sign	Status	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
TAMPA BAY	VRLQ9	A	Anchorage	22	10	16	0	0	0	0	0	0	0	0	0	48
TAN'ERLIQ	WDF2025	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
TANGGUH HIRI	C6XC2	A	Anchorage	118	51	74	0	0	0	0	0	0	0	0	0	243
TARGET	9HA4710	A	Anchorage	0	0	19	0	0	0	0	0	0	0	0	0	19
TEST_SHIP_AGAIN	SSNEW	A		0	0	0	0	0	0	0	0	0	0	0	0	0
THOMAS G. THOMPSON	KTDQ	A	Seattle	1	72	17	0	0	0	0	0	0	0	0	0	90
THUNDER BAY	CFN6288	A	Duluth	6	0	0	0	0	0	0	0	0	0	0	0	6
TIGLAX	WZ3423	A	Anchorage	0	3	0	0	0	0	0	0	0	0	0	0	3
TIM S. DOOL	VGPY	A	Duluth	0	0	0	0	0	0	0	0	0	0	0	0	0
TIWAI POINT	VRFS8	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
TRF KIRKENES	V7MT7	A	Anchorage	4	4	1	0	0	0	0	0	0	0	0	0	9
TROPIC CARIB	J8PE3	A	Miami	108	97	17	0	0	0	0	0	0	0	0	0	222
TROPIC EXPRESS	J8QB8	A	Miami	7	6	15	0	0	0	0	0	0	0	0	0	28
TROPIC JADE	J8NY	A	Miami	106	53	62	0	0	0	0	0	0	0	0	0	221
TROPIC LURE	J8PD	A	Miami	28	85	94	0	0	0	0	0	0	0	0	0	207
TROPIC MIST	J8NZ	A	Miami	23	22	99	0	0	0	0	0	0	0	0	0	144
TROPIC NIGHT	J8NX	A	Miami	158	102	51	0	0	0	0	0	0	0	0	0	311
TROPIC OPAL	J8NW	A	Miami	119	120	174	0	0	0	0	0	0	0	0	0	413
TROPIC PALM	J8PB	A	Miami	58	48	49	0	0	0	0	0	0	0	0	0	155
TROPIC SUN	J8AZ2	A	Miami	91	87	99	0	0	0	0	0	0	0	0	0	277
TROPIC TIDE	J8AZ3	A	Miami	79	48	125	0	0	0	0	0	0	0	0	0	252
TROPIC UNITY	J8PE4	A	Miami	96	83	69	0	0	0	0	0	0	0	0	0	248
TS KENNEDY	KVMU	A	New York City	105	100	0	0	0	0	0	0	0	0	0	0	205
TUG DEFIANCE	WDG2047	A	Duluth	60	0	2	0	0	0	0	0	0	0	0	0	62
TUG DOROTHY ANN (AWS)	WDE8761	A	Duluth	32	321	737	0	0	0	0	0	0	0	0	0	1090
TUG MICHIGAN	WDF5344	A	Duluth	21	2	28	0	0	0	0	0	0	0	0	0	51
TUG SPARTAN	WDF5483	A	Duluth	0	0	0	0	0	0	0	0	0	0	0	0	0
TUSTUMENA	WNGW	A	Anchorage	34	38	14	0	0	0	0	0	0	0	0	0	86
TYCO DECISIVE	V7DI7	A	Baltimore	21	20	0	0	0	0	0	0	0	0	0	0	41
U. S. INTREPID	WDE2670	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
UNIQUE GUARDIAN	VRJM6	A	New Orleans	21	14	1	0	0	0	0	0	0	0	0	0	36
UNITY SPIRIT	C6BW3	A	Anchorage	11	0	16	0	0	0	0	0	0	0	0	0	27
USCGC HEALY	NEPP	A	Seattle	0	0	0	0	0	0	0	0	0	0	0	0	0
USCGC MACKINAW	NBGB	A	Duluth	0	0	0	0	0	0	0	0	0	0	0	0	0
USCGC POLAR STAR	NBTM	I	Seattle	59	22	26	0	0	0	0	0	0	0	0	0	107
VAIL SPIRIT	C6BQ8	A	Anchorage	4	4	0	0	0	0	0	0	0	0	0	0	8



Ship Name	Call Sign	Status	PMO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
VALDEZ RESEARCH (AWS)	WXJ63	A	Anchorage	190	0	0	0	0	0	0	0	0	0	0	0	190
VEENDAM	PHEO	A	Miami	193	147	193	0	0	0	0	0	0	0	0	0	533
VERMONT TRADER	9HYN7	A	Charleston	36	43	27	0	0	0	0	0	0	0	0	0	106
VISION OF THE SEAS	C6SE8	A	Miami	1	107	46	0	0	0	0	0	0	0	0	0	154
VOLENDAM	PCHM	A	Anchorage	361	303	436	0	0	0	0	0	0	0	0	0	1100
VOYAGER OF THE SEAS	C6SE5	A	Miami	39	37	23	0	0	0	0	0	0	0	0	0	99
W. H. BLOUNT	C6JT8	A	New Orleans	40	54	49	0	0	0	0	0	0	0	0	0	143
WALTER J. MCCARTHY JR.	WXU3434	A	Duluth	5	0	12	0	0	0	0	0	0	0	0	0	17
WASHINGTON	KLBO	A	Anchorage	1	4	1	0	0	0	0	0	0	0	0	0	6
WASHINGTON	WDI5795	A	Anchorage	0	1	4	0	0	0	0	0	0	0	0	0	5
WASHINGTON EXPRESS	WDD3826	A	Houston	22	12	3	0	0	0	0	0	0	0	0	0	37
WEST BAY	VRZP8	A	Anchorage	7	29	23	0	0	0	0	0	0	0	0	0	59
WESTERDAM	PINX	A	Miami	54	143	136	0	0	0	0	0	0	0	0	0	333
WESTERN RANGER	WBN3008	A	Anchorage	0	0	1	0	0	0	0	0	0	0	0	0	1
WESTWOOD COLUMBIA	C6SI4	A	Seattle	20	8	7	0	0	0	0	0	0	0	0	0	35
WESTWOOD OLYMPIA	C6UB2	A	Seattle	18	23	20	0	0	0	0	0	0	0	0	0	61
WESTWOOD RAINIER	C6SI3	A	Seattle	30	28	18	0	0	0	0	0	0	0	0	0	76
WHITEFISH BAY	CFN6287	A	Duluth	0	0	0	0	0	0	0	0	0	0	0	0	0
WHITTIER RESEARCH (AWS)	KXI29	A	Anchorage	190	0	0	0	0	0	0	0	0	0	0	0	190
WILFRED SYKES (AWS)	WC5932	A	Duluth	0	0	0	0	0	0	0	0	0	0	0	0	0
XPEDITION	HC2083	A	Anchorage	6	2	9	0	0	0	0	0	0	0	0	0	17
YM ANTWERP	VRET5	A	Anchorage	15	14	10	0	0	0	0	0	0	0	0	0	39
YM ULTIMATE	V7IK7	A	Charleston	23	37	27	0	0	0	0	0	0	0	0	0	87
YM UNISON	V7HU7	A	Anchorage	46	48	52	0	0	0	0	0	0	0	0	0	146
YM UNITY	A8HZ4	A	Anchorage	1	0	48	0	0	0	0	0	0	0	0	0	49
YM WELLHEAD	VROH8	A	Anchorage	29	20	22	0	0	0	0	0	0	0	0	0	71
YORKTOWN EXPRESS	WDD6127	A	Houston	1	0	8	0	0	0	0	0	0	0	0	0	9
YUHSAN	H9TE	I	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
YUYO SPIRITS	3FNF4	A	Anchorage	0	0	0	0	0	0	0	0	0	0	0	0	0
ZAANDAM	PDAN	A	Anchorage	94	168	360	0	0	0	0	0	0	0	0	0	622
ZIM DJIBOUTI	A8SI4	A	Seattle	0	0	18	0	0	0	0	0	0	0	0	0	18
ZIM SAN DIEGO	A8SI7	A	New York City	139	160	73	0	0	0	0	0	0	0	0	0	372
ZIM SHANGHAI	VRGA6	A	New York City	25	40	0	0	0	0	0	0	0	0	0	0	65
ZIM YOKOHAMA	A8MY4	A	Charleston	22	33	0	0	0	0	0	0	0	0	0	0	55
ZUIDERDAM	PBIG	A	Anchorage	142	176	130	0	0	0	0	0	0	0	0	0	448

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[www.jcomm.info/pmos](http://www.jcomm.info/pmos)

Intergovernmental Oceanographic Commission:

<http://www.ioc-unesco.org/>

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## NOAA Weather Radio Network

- (1) 162.550 mHz
- (2) 162.400 mHz
- (3) 162.475 mHz
- (4) 162.425 mHz
- (5) 162.450 mHz
- (6) 162.500 mHz
- (7) 162.525 mHz

Channel numbers (e.g., WX1, WX2) have no special significance, but are often designated this way in consumer equipment. Other channel numbering schemes are also prevalent.

The NOAA Weather Radio network provides voice broadcasts of local and coastal marine forecasts on a continuous cycle. The forecasts are produced by local National Weather Service Forecast Offices.

Coastal stations also broadcast predicted tides and real-time observations from buoys and coastal meteorological stations operated by NOAA's National Data Buoy Center. Based on user demand, and where feasible, Offshore and Open Lake forecasts are broadcast as well.

The NOAA Weather Radio network provides near-continuous coverage of the coastal U.S., Great Lakes., Hawaii, and populated Alaska coastline. Typical coverage is 25 nautical miles offshore, but may extend much further in certain areas.

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