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January 2, 2008

VADM Conrad C. Lautenbacher, Jr., USN (Ret)
Under Secretary of Commerce for Oceans and
Atmosphere and NOAA Administrator
4th & Constitution Ave, NW Route A
Washington D.C. 20230-0001

Dear Colleague:

The National Weather Association (NWA) is a member-led, non-profit, professional organization supporting and promoting excellence in operational meteorology and related activities. Excellence in daily weather observing and forecasting for the public good can best be achieved by continual modernization of observing equipment and taking advantage of new technologies.

Therefore, on behalf of the over 3,000 NWA members from all sectors of the meteorological community, the NWA President, with the advice and consent of the NWA Council and NWA Remote Sensing Committee, requests your support for the extended ocean vector winds mission (XOVWM) as a future replacement for QuikSCAT.

Sincerely,

Stephen W. Harned, CCM
Executive Director

Attachments:
QuikSCAT Replacement Letter of Support: Executive Summary
QuikSCAT Replacement Letter of Support: Background Information

Distribution

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National Weather Association

Letter of Support for

QuikSCAT Replacement

Executive Summary

The operational use of satellite ocean surface vector wind (OSVW) observations has advanced considerably over the past 10 years. The OSVW data from active and passive sensors on research (QuikSCAT/Quick Scatterometer and WindSat) and operational satellites (ASCAT/Advanced Scatterometer) are now depended on and used daily by operational weather forecast and warning centers around the world. As an example, the active SeaWinds scatterometer on QuikSCAT provides satellite OSVW measurements with the highest available accuracy, spatial resolution and coverage.

With oceans comprising over 70% of the Earth's surface, the impacts of QuikSCAT OSVW data have been significant in meeting societal needs for weather and water information and in supporting the Nation's commerce with information for safe, efficient and environmentally sound transportation and coastal preparedness. Within the National Oceanic and Atmospheric Administration's (NOAA's) National Weather Service (NWS) the use of OSVW data encompasses the warning, analysis and forecasting missions associated with tropical cyclones, extratropical cyclones, fronts, localized coastal wind events (i.e., gap winds), and sea conditions driven by ocean surface winds. Much has been learned about the importance and utility of satellite OSVW data in operational weather forecasting and warning by exploiting OSVW research satellites in near real-time. These data have had major operational impacts in the areas of:

- Determination of wind warning areas for mid-latitude systems (Gale, Storm, and Hurricane Force [HF]). Specifically, the availability of reliable, spatially extensive QuikSCAT measurements allowed the introduction of mid-latitude HF wind warnings beginning in late 2000.
- Determination of tropical cyclone (TC) 34-knot and 50-knot wind radii.
- Tracking of TC center locations, including the initial identification of TC formation.
- Identification and warning of extreme gap and jet wind events at all latitudes.
- Improved analysis of the current location of frontal systems and high and low pressure centers.
- Improved monitoring of coastal winds (resulting in improved forecasts of sea conditions) leading to issuance of small craft advisories and even Gale warnings within 60 nautical miles of the.

- Sea ice analysis including ice edge detection and monitoring, automated sea ice type characterization (multiyear vs. first year), and the detection of melting and refreezing conditions.

Although QuikSCAT wind data are extremely useful as indicated above, QuikSCAT is incapable of measuring the maximum intensity and overall wind field distribution in TCs, has only 12-hourly temporal resolution, and lacks the ability to retrieve winds within 30 km of the coastline. Moreover, QuikSCAT's OSVW data suffer from significant rain contamination, have relatively coarse spatial sampling (nominally 25 km) and have wide gaps between satellite passes at mid- and low latitudes. These critical, but solvable, gaps in OSVW capabilities leave life and property at risk.

QuikSCAT is well beyond its design life and therefore its ability to continue providing critical data for use in operations is uncertain. Eight years after NOAA first began using OSVW data from the QuikSCAT satellite; the Nation still has no approved plans to replace QuikSCAT.

To meet current and future needs, an improved operational space-based OSVW system is required by the meteorological and oceanographic community. Following NOAA's request, the National Aeronautics and Space Administration's (NASA) Jet Propulsion Laboratory (JPL) proposed a design for an extended ocean vector winds mission (XOVWM) that will be capable of providing wind retrievals under all weather conditions and within 2.5 km of the coast with a spatial resolution of 5 km . The results of the JPL study show that technology is currently available to increase the scientific and operational capabilities of OSVW data by an order of magnitude, with a moderate risk in terms of mission design, complexity, and cost.

To ensure continuity of quality OSVW measurements from space, the National Weather Association (NWA) recommends the following:

(1) **Elevate the priority of and accelerate and approve plans for continuous operational OSVW missions** to minimize the data gap and continue improvements in weather and oceanic forecasting and warning capabilities and climate studies that have already been realized today.

(2) **Fund the Extended Ocean Surface Vector Winds Mission (XOVWM)** as recommended by the National Research Council in the document found at the URL http://www.nap.edu/catalog/11820.html, and as designed and presented in a study by JPL to overcome limitations in current measurement capabilities and advance improvements in weather and ocean monitoring and forecasting, especially in coastal zones and for tropical cyclones.

QuikSCAT Replacement Letter of Support

Detailed Background Information

Why Measure Winds Over the Ocean?

Oceans cover more than 70% of the Earth's surface and are the largest heat reservoir in the climate system. Understanding ocean circulations and ocean-atmosphere interactions is key to understanding weather and climate variability, as well as ecosystem dynamics, as most of the world's living organisms reside in the oceans. Additionally, more than half of the U.S. population (and more than 20% of all of humanity) lives within 50 miles of the coast. Ocean activities support over 28 million U.S. jobs; U.S. consumers spend over $55 billion annually for fishery products; and nearly one-third of U.S. oil and one-quarter of natural gas production takes place on the outer continental shelf (National Research Council [NRC] *Earth Science and Applications from Space: National Imperatives for the Next Decade and Beyond, 2007*).

Winds over the ocean regulate the interaction between the atmosphere and the ocean, playing a critical role in determining global weather patterns and regional climate. Much of the weather across the U.S. is directly or indirectly impacted by the interaction of the atmosphere and ocean, primarily through the transport of heat and moisture over distances of thousands of miles that affect the tracks and intensity of tropical and extratropical cyclones (among the most destructive of all natural phenomena) and the distribution and intensity of precipitation.

Wind-observation data are particularly significant for ship routing. Prior knowledge of wind behavior enables ship captains to choose routes that avoid heavy seas or high headwinds that would slow the ships' progress, increase fuel consumption, or cause damage to vessels and loss of life. There are over 12 million recreational boaters in the U.S. (http://www.yoto98.noaa.gov/facts/naviga.htm) who make decisions based on current conditions and marine forecasts. Accurate assessment of current conditions and accurate forecasts are often lacking due to limited monitoring capabilities in the coastal and offshore waters. As a result, boaters frequently encounter unexpected conditions, resulting in complaints to NOAA's NWS offices that boaters' lives are put at risk by marine forecasts that underestimate wind and sea conditions. On the other hand, users also complain when forecasts overestimate winds, causing boating events, cruises, etc, to be canceled. This is all a direct result of limited monitoring capabilities (Hinojosa 2006; verbal communication with coastal NWS offices). The lack of adequate monitoring capabilities in near shore waters is also a public safety as well as an economic issue.

Finally, offshore oil and gas production is increasing at sites around the world, such as the Gulf of Mexico, the North Sea, and the Persian Gulf. Safe, efficient drilling operations depend on an accurate understanding of the current sea state and timely and accurate warnings of impending storms. Surface-wind information is also important when determining how oil will spread in the event of a spill (http://winds.jpl.nasa.gov/aboutScat/applications.cfm).

Background

Scatterometers are active microwave radar instruments specifically designed to measure the ocean surface vector wind field. Wind observations in nearly all-weather conditions from NASA's Quick Scatterometer (QuikSCAT) mission (launched in June 1999) are fully integrated and heavily used in the routine work flow of NOAA's National Centers for Environmental Prediction (NCEP) (Ocean Prediction Center [OPC]; Tropical Prediction Center/National Hurricane Center [TPC/NHC]), the U.S. Navy's Joint Typhoon Warning Center (JTWC) and coastal NWS Weather Forecast Offices (WFOs). QuikSCAT data have also been assimilated routinely for numerical weather prediction (NWP) modeling at NCEP and other NWP modeling centers such as the European Centre for Medium-Range Weather Forecasting (ECMWF) and the U.S. Navy's Fleet Numerical Meteorology and Oceanography Center (FNMOC). In addition to previously documented utility in global and regional NWP (Lord 2006; Atlas et al., 2001, 2006a,b), QuikSCAT data have had major operational impacts in the areas of

- Introduction of a Hurricane Force (HF) wind warning category for winter ocean storms at OPC in 2000. (Sienkiewicz et al. 2004, 2006; Chelton et al. 2006; Von Ahn et al. 2004, 2006;),
- Improved analysis of the locations of fronts, low and high pressure areas, and the Inter-tropical Convergence Zone (ITCZ),
- Improved definition of Gale and Storm force wind radii analysis in Tropical Cyclones (TC), which help further refine ship avoidance and warning areas for these systems (Brennan and Knabb 2007a; Knabb 2006),
- Earlier detection of surface circulations in developing TCs. (Brennan and Knabb 2007a; Knabb 2006),
- Improved forecasting and warning of localized wind events (gap, coastal, and topographic influenced winds) (Brennan et al. 2007a; Nelaimischkies and Smith 2007, Chang and Jelenak 2006; Lovegrove 2006; Cobb et al. 2003), and
- Improved monitoring of coastal winds and improved sea state and marine wind forecasts at WFOs (Stamus and Milliff 2006).

In June 2006, NOAA's OSVW requirements were redefined at a meeting held at TPC/NHC in Miami, FL. The primary goals of this meeting were to:

1) Document the use and impact of presently available satellite OSVW data in operational marine weather analysis, forecast and warning activities at NOAA,

2) Define the OSVW operational requirements within NOAA based on actual experience and phenomena observed, and
3) Explore sensor/mission concepts capable of meeting the requirements (Chang and Jelenak 2006).

The new NOAA OSVW requirements enumerated during this meeting included increased accuracy for selected 10-meter/1-minute sustained wind as defined by operational requirements:

- 0-165kts wind speed range.
  - 10–165 kts: speed +/- 2 kt and direction +/- 10 degrees (2 sigma).
  - 4–10 kts: speed +/- 2 kt and direction +/- 20 degrees (2 sigma).
  - 0–4 kts: speed +/- 2 kts.
- Revisit time interval (defined as the time interval between measurements at a particular point on the ocean surface): every 6 hours (1 to 3 hour goal).
- Reduced product latency: 45 to 60 minutes from measurement to product availability (15 minute goal).
- 2.5 km x 2.5 km grid spacing, which is defined as the spacing between unique wind vector retrievals (1 km x 1 km goal).
- Unique wind vector grid cells to within 2.5 km of the coast (1 km goal).

During the workshop, an instrument design was presented that combines the best of existing technologies and measurement heritage. Although QuikSCAT wind data are extremely useful as indicated above, QuikSCAT is incapable of measuring the maximum intensity and overall wind field distribution in TCs, has only 12-hourly temporal resolution, and lacks the ability to retrieve winds within 30 km of the coastline. Moreover, QuikSCAT's OSVW data suffer from significant rain contamination, have relatively coarse spatial sampling (nominally 25 km) and have wide gaps between satellite passes at mid- and low latitudes. These critical gaps in OSVW capabilities leave life and property at risk. However, these issues are solvable. The proposed mission to replace QuikSCAT represents an opportunity to increase the scientific and operational capabilities of OSVW data by an order of magnitude, with a moderate risk in terms of mission design, complexity and cost.

In January 2007, the NRC Committee on Earth Science and Applications from Space delivered to agency sponsors a pre-publication version of its decadal survey final report, *Earth Science and Applications from Space: National Imperatives for the Next Decade and Beyond.* This report was generated in response to a request from NASA's Office of Earth Science, NOAA's National Environmental Satellite Data and Information Service (NESDIS), and the U.S. Geological Survey's (USGS) Geography Division to generate consensus recommendations from the Earth and environmental science and applications communities regarding:

1) High-priority flight missions and activities to support National needs for research and monitoring of the dynamic Earth system during the next decade, and;

2) Important directions that should influence planning for the decade beyond.

The committee took great care to point out the operational need for QuikSCAT wind data to issue forecasts and warnings for a variety of severe ocean storms such as tropical and extreme extratropical cyclones. One of the three missions recommended to NOAA by this report is the Extended Ocean Vector Winds Mission (XOVWM) for operational use. The recommended XOVWM concept follows the presentation made at the June 2006 NOAA OSWV workshop (Chang and Jelenak 2006).

In June 2007, following the recommendation of the NRC decadal survey, NOAA initiated and funded NASA's Jet Propulsion Laboratory (JPL) to provide a cost and design analysis for two possible mission options: a QuikSCAT-like mission, and a next-generation scatterometer mission based on the XOVWM design that would take the first step towards an operational mission to meet NOAA's new OSVW requirements. The XOVWM instrument concept design combines a Ku-band scatterometer (QuikSCAT's SeaWinds scatterometer heritage) to preserve wide-swath measurements, high temporal sampling capabilities, and higher horizontal resolution (up to 2.5km); a C-band scatterometer (Advanced Scatterometer [ASCAT] heritage) to provide accurate measurements in rain and achieve better performance in all wind speed ranges (up to category 5 hurricane intensity); a larger antenna and Synthetic Aperture RADAR (SAR) processing for improved spatial resolution across the entire measurement swath; and a X-band polarimetric radiometer (WindSat and SeaWinds heritage) for additional correction of rain and atmospheric effects and improved wind direction retrieval (Fernandez et al. 2006).

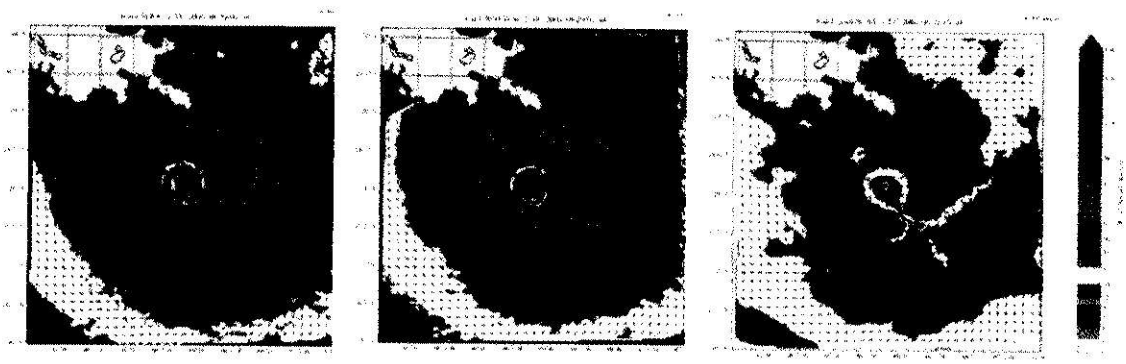
Mission concept design for XOVWM and results of simulation studies were presented to the user community during NOAA's Hurricane Conference held at TPC/NHC in November 2007 (Jelenak and Chang, 2007). Projected XOVWM performance shows significant advances over a QuikSCAT-like mission in the following areas (Figures 1-2):

- Higher horizontal resolution measurements (~ 3-5 km vs. 12.5 km),
- Measurements closer to the coast (~ 5 km vs. 30 km),
- Measurements in rain, and
- Measurements of high wind events (up to 80 m/s vs. 40 m/s).

The first set of studies performed using Weather Research and Forecast (WRF) model simulations of Hurricanes Katrina and Rita showed that the increased resolution and decreased sensitivity to rain of XOVWM would result in:

- More reliable estimates of TC intensity through all stages of development,
- Improved analysis of TC wind field structure (34, 50, and 64 knot radii) that will result in more refined watch/warning areas for the coast,
- More accurate tracking of TC centers and earlier identification of developing systems, ensuring more accurate initial motion estimates as input into model guidance and data assimilation activities,

- More accurate maximum wind estimates of extratropical cyclones across all warning categories, and
- More accurate tracking of near shore conditions resulting in more accurate short-range marine forecasts, advisories, and warnings.

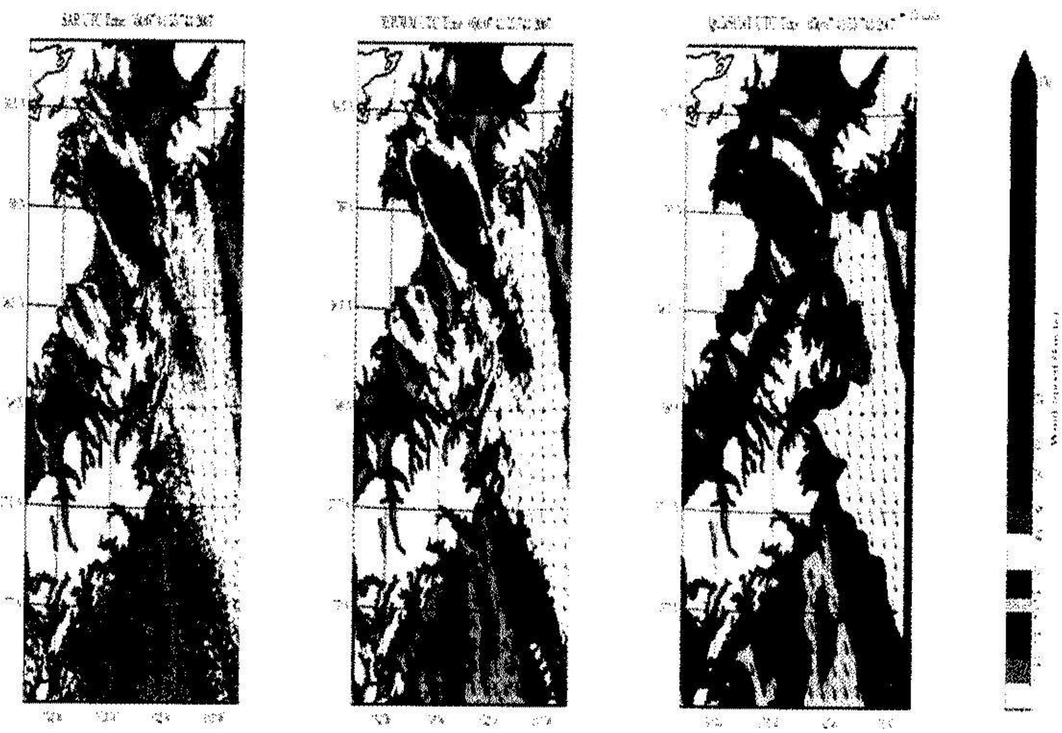


(a) (b) (c)

Figure 1. *(a) Weather Research and Forecasting (WRF) model simulations of Hurricane Katrina on 29 August 2005 at 0550 UTC showing surface wind (arrows) and speed (color contours, knots), (b) simulated XOVWM and (c) QuikSCAT-like wind retrievals.*

XOVWM will be capable of retrieving winds within 2.5–5 km of the coast. This increases the utility of XOVWM over QuikSCAT in this high impact region. Accurate OSVW data in the coastal zone is important for meteorological and oceanographic applications for several reasons: nearly 50% of the U.S. population lives within 50 miles of the coast; coastal fisheries depend on wind-driven nutrient upwelling; shipping and fishing industries need to know wind conditions near the coast; winds near the coast are influenced by land topography and can exhibit strong jets and fronts that are unresolved by other observational platforms.

The Gulf of Alaska is one region where severe wind gap and barrier jet events occur close to the coast. These wind events are often associated with gale-force, storm-force, and even occasionally minimal hurricane-force winds. Many ships have sunk or experienced severe distress in these topographically-forced flows. To simulate the possible performance differences between XOVWM and a QuikSCAT-like instrument, high-resolution (500 m) SAR wind speed data were used to simulate scatterometer measurements along Alaska's coast. Because SAR is not capable of providing directional information, it was obtained from numerical models. The SAR winds were then used to simulate scatterometer measurements and retrieve wind field information from them. The results of one such experiment for a jet wind event observed by SAR on 25 February 2007 are shown in Figure 2.



(a) (b) (c)

Figure 2. *SAR wind speeds (color shading, kt) (a) observed in Gulf of Alaska on 25 February 2007 and corresponding simulated (b) XOVWM and (c) QuikSCAT-like wind speed retrievals.*

This enhanced measurement performance will yield significant improvements in the ability to forecast and warn for extreme wind events in both open ocean and coastal regions. Although these extreme weather events occur only 5% of the time over the global ocean, they represent a significant threat to safety at sea. Dangerous winds and waves associated with these extreme events can cover vast ocean areas and result in the loss of lives and property. The economic impact of these events is far reaching and affects commerce and transportation, search and rescue, and oil and food production.

The Measurement Gap

Accuracy, resolution, and coverage requirements for research and operational uses of OSVW measurements have been documented in numerous reports published over the past decade, including the National Polar-orbiting Operational Environmental Satellite System (NPOESS) Integrated Operational Requirements Document (IORD II 2001, http://www.osd.noaa.gov/rpsi/IORDII_011402.pdf), the Global Climate Observing System (GCOS) Report, the requirements database summarized by the World Meteorological Organization (WMO) Committee on Earth-Observing Satellites (http://alto-stratus.wmo.ch/sat/stations/SatSystem.html) and NOAA's Operational OSWV

Requirements (Chang and Jelenak 2006). QuikSCAT currently provides OSVW measurements with the highest accuracy, spatial resolution and coverage of any available satellite-based OSVW platform. However, QuikSCAT is well beyond its design life and cannot be expected to continue operating for more than a few more years. While it may be possible to extend the life of QuikSCAT, it does not provide data of a sufficient quality to meet the new operational OSVW requirements defined by NOAA at the Miami workshop in 2006.

The U.S. Navy's WindSat, the first passive polarimetric microwave radiometer capable of measuring OSWV was launched in January 2003 and is now beyond its baseline mission lifetime (Gaiser et al. 2004; Bettenhausen et al. 2006; Adams et al. 2006). The accuracy of WindSat OSVW retrievals over a wide range of conditions is still under investigation, but analyses of preliminary data indicate that WindSat measurement errors are 30% larger than those from QuikSCAT for winds of storm force (48 kt) or higher (Freilich and Vanhoff, 2006; Brennan and Knabb 2007b). Moreover, WindSat cannot provide wind estimates closer than 50 km to land or ice, its measurement accuracy is degraded at wind speeds below ~ 7 m/s, and it has only 60% of the spatial coverage of QuikSCAT. The only operational active scatterometer is the Advanced Scatterometer (ASCAT) instrument (Gelsthorpe et al. 2000) that was launched on the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT) Meteorological Operational (MetOp) satellite in October 2006. The ASCAT has only half the spatial resolution of QuikSCAT and provides only ~ 60% of the QuikSCAT coverage, with a 720-km gap between parallel swaths centered on the satellite ground track.

Two foreign scatterometer missions are planned to be launched in the next two years (OceanSat-2 from India at the end of 2008, and HY-2 from China at the end of 2009). However, neither of these two missions will ensure timely data access. Additionally, because neither India nor China has had any experience in building or using scatterometers it is possible that transitioning these data to near-real time operations will represent a challenge.

Currently, the only approved National plans for future OSVW measurements from U.S. satellites are for the Microwave Imager/Sounder (MIS) passive polarimetric microwave radiometer that is planned to fly on the second NPOESS satellite (NPOESS-C2) projected to launch in 2016. Although the Request for Proposal has not yet been issued for MIS, the instrument is expected to be similar, but not identical, to WindSat. The OSVW data available today from QuikSCAT already exceed the planned capabilities of MIS and do not meet NOAA's new operational requirements for OSVW. As a result, the continuity of the OSVW data record established by QuikSCAT is in serious jeopardy. An eventual gap in the data record of high-resolution, broad-swath measurements of ocean surface vector winds after the end of QuikSCAT is now inevitable. As noted above, this gap will only be partially addressed by the lower-resolution, dual narrow-swath ASCAT on the EUMETSAT MetOp satellite.

This degradation in the ability to estimate OSVW will result in less accurate wind warnings in both aerial extent and intensity, forecasts for ocean cyclones (tropical and extratropical), and day-to-day coastal and offshore marine forecasts from the NWS. The loss of QuikSCAT's measurement capability will negatively impact both the safety and efficiency of ocean transportation. Therefore, it is crucial that plans for a follow-on, operational satellite OSWV mission are approved and implemented. The future operational satellite OSVW mission should provide measurements of ocean vector winds with at least the accuracy, resolution, and coverage of QuikSCAT, and preferably have the capability to measure OSVW with a higher resolution (~5 km), provide accurate measurements in precipitating conditions and provide measurements within coastal zones. Currently existing technology, such as that possible with XOVWM, will allow these advances to be made (Rodriguez et al. 2006, Jelenak 2007).

Benefits of Closing the Gap and Advancing Measurement Capability

Forecasting TC intensity is one of the most significant challenges facing the meteorological community. It is impossible to improve intensity predictions without knowing the initial state of the TC's surface wind field and without verification data to assess forecast performance. Ocean surface vector winds at high temporal and spatial resolution with minimal impact from rain and other environmental factors in the TC environment are required to accurately determine a TC's intensity and wind field distribution. A benefit of these types of OSVW measurements would be more accurate analysis of the TC wind field, which would lead to improvements in warnings and intensity forecasts.

QuikSCAT data have revealed that extratropical cyclones reach hurricane force intensity more often than previously thought, that hurricane force conditions last on average 24 hours, and that these dangerous conditions are very difficult to predict. For these extratropical storms, the first step in improving intensity forecasts is to better understand the evolution of the wind field through accurate high resolution observations. An immediate benefit of such observations would be more accurate short-term warnings for these types of storms, while a longer term benefit would be improved forecasts and warnings for these systems.

Much of the Nation's waterborne commerce takes place in the immediate coastal zone, an area not observed by today's satellite OSVW sensors. Frequent and accurate measurements of OSVW within the coastal zone would greatly enhance economic efficiency and safety of maritime transportation. Ocean-borne commerce and transportation are impacted by wind, wave and current conditions. A key driver of ocean surface current is the wind velocity. A benefit of improved OSVW observing capabilities is superior definition of forcing for ocean wave and circulation forecasting models.

Benefits of Extended Ocean Vector Wind Mission

Increased horizontal resolution and decreased sensitivity to rain that could be achieved with the XOVWM mission will allow for:

- More reliable estimates of tropical cyclone intensity through all stages of development (tropical depressions, tropical storms, hurricanes and potentially major hurricanes),
- Improved analysis of tropical cyclone wind field structure (34, 50, and 64 kt radii) (more refined watch/warning areas for the coast),
- More accurate tracking of TC centers and earlier identification of developing TCs (more accurate initial motion estimates as input into model guidance),
- More accurate maximum wind estimates of extratropical cyclones and distribution of all warning categories,
- Wind fields associated with both organized convection, such as squall lines and less organized convection,
- Wind fields in the vicinity of ocean surface thermal features such as warm and cold rings, fronts, and currents,
- Significantly better definition of coastal wind features including orographically induced or enhanced low level jets,
- Significantly better definition of ocean forcing for areas such as upwelling along coastlines, and
- Wind fields associated with smaller scale features such as polar lows.

Application to Sea Ice Monitoring

In addition to open ocean surface wind vectors, satellite scatterometers acquire backscatter data applicable for sea ice mapping. Innovative techniques using QuikSCAT data have led to advanced measurements of sea ice characteristics and processes and the observation of melt-refreeze processes (Nghiem et al. 2006). Techniques developed by NASA/JPL exploit the availability of both horizontal and vertical polarizations, large swath widths, and high temporal coverage (twice a day for high latitudes) to detect and map Arctic sea ice. QuikSCAT sea ice mapping has in fact been successfully applied to measuring and tracking the drastic loss of perennial Arctic sea ice since 2000 and particularly the minimum conditions of both winter multiyear and summer sea ice extents in 2005 and 2007, the latter record conditions to date (Nghiem et al. 2007). QuikSCAT results have been verified with observations from a field validation campaign using the U.S. Coast Guard icebreaker, the USCGC Healy, over the Barents Sea and with sea ice charts from the National Ice Center (NIC).

These QuikSCAT data have become an essential tool for monitoring the changing distribution of Arctic sea ice multiyear and first year classes, which is crucial to understanding Arctic sea ice mass balance and the Arctic's overall climate stability. QuikSCAT results have revealed mechanisms contributing to the perennial ice extent loss including ice compression and ice export. In fact, QuikSCAT observations have documented the record loss out of the Arctic basin of the perennial (multiyear) sea ice, i.e., the thicker and oldest ice, through advection via the Fram Strait. Monitoring of the perennial ice depletion using QuikSCAT continues as of today

In addition to QuikSCAT sea ice products, the combination of these with QuikSCAT wind vectors over open waters adjacent to the ice are also proving to be a powerful tool for the analysis and forecasting of sea ice conditions in the marginal ice zone. The expected improvements, particularly in spatial resolution afforded by the proposed XOSVW mission will provide the ability to further refine the discrimination of sea ice types and provide better monitoring of rapidly changing conditions in an ice-diminishing Arctic as well as sea ice conditions over the Antarctic region. The potential loss of QuickSCAT could mean the loss of accurate monitoring of the Artic sea ice.

Recommendations

To ensure continuity of quality OSVW measurements from space we recommend the following:

(1) **Elevate the priority of and accelerate and approve plans for continuous operational OSVW missions** to minimize the data gap and continue improvements in weather and oceanic forecasting and warning capabilities and climate studies that have already been realized today.

(2) **Fund the Extended Ocean Surface Vector Winds Mission (XOVWM)** as recommended by the National Research Council in the document found at the URL http://www.nap.edu/catalog/11820.html and designed and presented in a study by JPL (Rodriguez et al. 2007, Jelenak and Chang 2007) to overcome limitations in current measurement capabilities and advance improvements in weather and ocean monitoring and forecasting, especially in coastal zones and TCs.

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