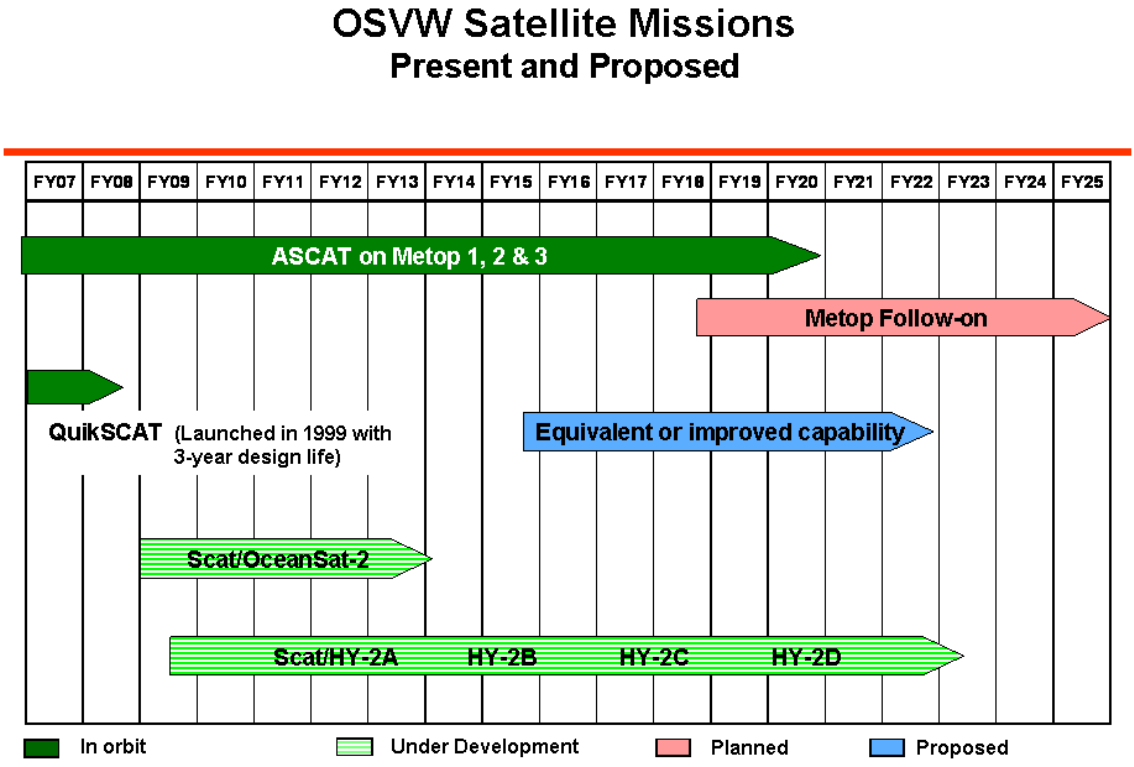
CEOS Ocean Surface Vector Wind (OSVW) Virtual Constellation
Proposed by NOAA, EUMETSAT & ISRO
Version 18 April 2008

Objectives

The OSVW Virtual Constellation will utilize satellite scatterometry to collect observations of ocean surface vector winds over the global ice-free oceans. Standard OSVW products will be generated from scatterometers on multiple satellites and made available to the international community within sufficient time for inclusion in operational analyses and forecasts, as well as retrospective research.

The key space segment capabilities will include the following polar-orbiting OSVW satellite missions in orbit and under development – QuikSCAT, ASCAT on the MetOp series, and the scatterometers on OceanSat-2 and the HY-2 series of satellites – as well as planned and proposed future missions. In addition to the space segment, collaboration as part of this Constellation will include on-orbit calibration, the validation of derived products, the utilization of the resulting products for operational use, and shared use in research.



Vision

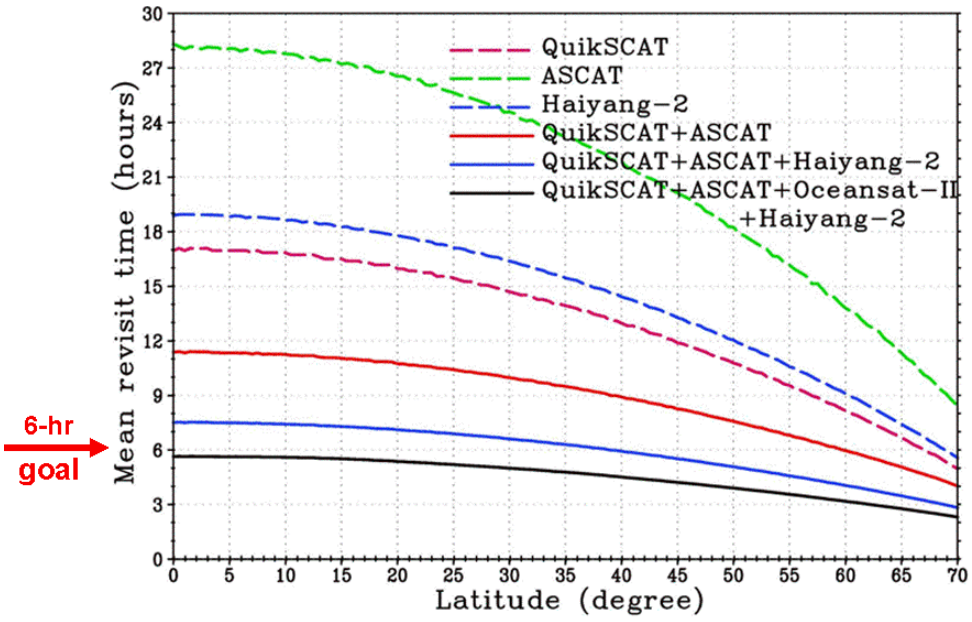
The OSVW Virtual Constellation will enable significant improvements in marine warnings and forecasts over the global oceans – and hence to the protection of lives and property both on the high seas and along coastal areas – through the operational use of observations of OSVW from satellite scatterometry, especially when used in conjunction with significant wave height from satellite altimetry already being provided by the companion Ocean Surface Topography Constellation. It will also enable characterization of the OSVW field for use in climate-quality data records, as well as research related to assessing the influence of the wind in forcing the circulation of the oceans.

Statement of Need

While multiple satellite scatterometers are desired, the basic need for two concurrent satellite scatterometers is documented in the following two references. This enables a mean revisit time of 12 hours at the equator, with successively shorter times at higher latitudes as noted in the following diagram.

- *Implementation Plan for the Global Observing System for Climate in Support of the UNFCCC*, October 2004, Action A11: *Ensure continuous operation of AM and PM satellite scatterometers…*
- *WMO Workshop on the Redesign and Optimization of the Space-based Global Observing System*, WMO Headquarters, Geneva, 21-22 June 2007, Recommendation: *Maintain at least two scatterometers to ensure a minimum coverage in all conditions…*

Sharing Data in a Timely Manner Enables Significant Reductions in Mean Revisit Times



Liu et al., 2007, *Int. J. of Remote Sensing*, in press.

OSVW products are required in support of the GEO 2007-2009 Work Plan, *Towards Convergence*, (30 March 2007) under the following two principal societal benefit areas.

- Weather: Improving weather information, forecasting and warning.
  - WE-06-02: Space-based Global Observing System for Weather – Achieve a stable and improved space-based Global Observing System (GOS) including polar components – Satellite scatterometer-derived OSVW are required for operational analyses and forecasts both on the high seas and for coastal areas; as examples, they are used in the early detection, tracking and characterization of hurricanes and typhoons; they are also used as input to surface wave forecasting models.

- Climate: Understanding, assessing, predicting, mitigating, and adapting to climate variability and change.
  - CL-06-01: Sustained Reprocessing and Reanalysis Efforts – Ensure the development of international mechanisms to coordinate and maintain sustained climate data reprocessing and reanalysis efforts; obtain consistent long-time series of satellite records – Any reanalysis effort for the oceans requires a realistic estimation of surface wind forcing, and satellite scatterometry is the only feasible way to resolve the spatial variability in the OSVW field.
  - CL-06-02: Key Climate Data from Satellite Systems – Establish actions securing the provision of key data for climate studies and forecasting from satellite systems – As noted above, satellite scatterometer-derived OSVW are required for operational analyses and forecasts of hurricanes and surface waves, both key elements of high-seas and coastal warnings and forecasts.
  - CL-06-06: Global Ocean Observation System – Enhance and improve coordination of coastal and marine climate observations in support of a global ocean observation system; observations of the OSVW are required for any operational ocean observing system.

Measures of Success

CEOS, through the OSVW Virtual Constellation, can make a unique contribution by encouraging member agencies to collaborate in this virtual constellation and to create and sustain the space and ground segments required.

One major impediment to success that faces this Constellation includes facilitating access to the OSVW data stream within sufficient time – typically within three hours of collection – that they can be used for operational purposes. While joint discussions concerning timely data access for operational use are underway with the Indian Space Research Organization (ISRO) for its OceanSat-2 satellite, similar discussions have yet to be initiated with the sponsor of the HY-2 series of satellites, the Chinese State Oceanic Administration (SOA). CEOS could serve as a forum to reinforce the need for, and help bring political visibility to bear on, the issue of timely data access. In so doing, CEOS could help ensure that appropriate representatives from the respective agencies are present at that forum.

Additionally, the National Oceanic and Atmospheric Administration (NOAA), with the assistance of the National Aeronautics and Space Administration (NASA), has definition studies underway for an all-weather capability to observe OSVW in the post-QuikSCAT era. The objective is to develop and implement a capability that would enable resolution of the OSVW field under rainy conditions, an issue that forecasters typically face in tropical cyclones and hurricanes, as well as in hurricane-force, extra-tropical winter storms. CEOS again could provide a forum to identify collaborative opportunities associated with such an improved capability; and in so doing, help secure the resources required for its implementation.

With the OSVW Virtual Constellation, CEOS could assist in meeting the stated GCOS need, but it could help facilitate the development of significant improvements to operational analyses and forecasts for both the high-seas and coastal areas, improvements that would benefit people of many nations. As part of this activity, standard products could be provided on the Global Telecommunications System for operational use, collaboration in the operational use of these products could be realized, and – perhaps – the orbits of scatterometer-carrying satellites might be harmonized for optimal coverage in space and time.

Collaborating Organizations – Points of Contact

- Proposed Co-Chairs
  - EUMETSAT – Hans Bonekamp & Paul Counet
  - ISRO – B.S. Gohill
  - NOAA – Stan Wilson
- Proposed Initial Members
  - NASA – Eric Lindstrom
  - ESA – Mark Drinkwater
- Proposed Additional Members
  - CNES
  - State Oceanic Administration (SOA)
  - Chinese Meteorological Administration (CMA)
  - European Center for Medium-range Weather Forecasts
  - Indian Meteorological Department

Meetings and Milestones

September 28-29, 2007, Amsterdam – Joint Ocean Surface Vector Wind (OSVW) Science Team and ASCAT Science Advisory Group (SAG) Meeting – Initial discussion with ESA, EUMETSAT, NASA and NOAA concerning the potential for collaboration within the framework of a CEOS Ocean Surface Vector Wind (OSVW) Constellation

November 15, 2007, CEOS Plenary, Kona, Hawaii – Agreement in side meeting between ISRO, EUMETSAT and NOAA to pursue a CEOS OSVW Constellation

January 22-23, 2008, Bangalore – Joint ISRO/NASA/NOAA meeting to discuss collaboration regarding OSVW and timely access to Oceansat-2 scatterometer data

March 7, 2008, Bangalore – Joint ISRO/EUMETSAT meeting to discuss collaboration that included OSVW and timely access to Oceansat-2 scatterometer data

June 19-20, 2008, Darmstadt – First meeting of the renewed ASCAT SAG specifically focused on completion of the MetOp-A/ASCAT Commissioning Phase

July 8, 2008, Boston – Special Session on OSVW at the International Geoscience and Remote Sensing Symposium (IGARSS)

Late October 2008, Florida – NASA OSVW Science Team meeting

3rd Quarter 2008, ISRO/India – Launch of Oceansat-2 and initiation of its Commissioning Phase

December 2-5, 2008, Guangzhou – Special Session on OSVW at the Pan-Ocean Remote Sensing Conference

Late 2008/early 2009, Darmstadt – Post-EPS (EUMETSAT Polar System) User Conference – To include discussion of how to meet OSVW requirements on the successor system to MetOp-A, B & C

4th Quarter 2009, State Oceanic Administration/China – Launch of HY-2A and initiation of its Commissioning Phase