Meeting the Needs for Satellite OVW

- **NEED –** Multiple scatterometers to extend the coverage of QuikSCAT and provide continuity
- **UNDERWAY**
  - EUMETSAT ASCAT on METOP series – 1st is in orbit
  - ISRO Oceansat-2 – Timely data access
  - SOA HY-2 – Timely data access
- **PROPOSED**
  - CNSA/SOA/CNES – CFOSAT – Timely data access
  - NOAA will propose an operational scatterometer to follow QuikSCAT – either a:
    - Functional equivalent or
    - Capability to improve the resolution of both the *rain ambiguity* and high wind speed regime

http://manati.orbit.nesdis.noaa.gov/SVW_nextgen/SVW_workshop_report_final.pdf

Table 1. Platform and sensor parameters of the four scatterometer missions

Satellite	Orbit Inclination (degree)	Swath Width (km)	ECT (local time)	Orbit Height (km)
QuikSCAT	98.722	1900	5:54 am/pm	803
ASCAT	98.7	2x550	9:30 am/pm	817
Oceansat-II	98	1840	12:00 am/pm	720
Haiyang-2	99	1700	6.00 am/pm	965

ECT - equatorial crossing time

Table -1: Technical characteristics of Oceansat-II Scatterometer

	Inner Beam	Outer Beam
Altitude	720 Km	
Look Angle	42.62°	49.38°
Incidence Angle	48.9°	57.6°
Swath	1400 Km	1840 Km
One way 3-dB Beam Width	1.47° x 1.67°	1.47° x 1.67°
One way 3-dB foot Print	26 Km X 46 Km	31 Km X 65 Km
Nominal Slice Width (Across Scan)	8Km	8Km
Inter center spacing along Track	19 Km	19 Km
Inter center spacing along scan	15 Km	19 Km
Wind Speed	4-20 m/s with accuracy of 2m/s (rms) 20-24 m/s with accuracy of 10% (rms)	
Wind Direction	0-360° (20° rms)	
Gridding	50Km x 50Km	

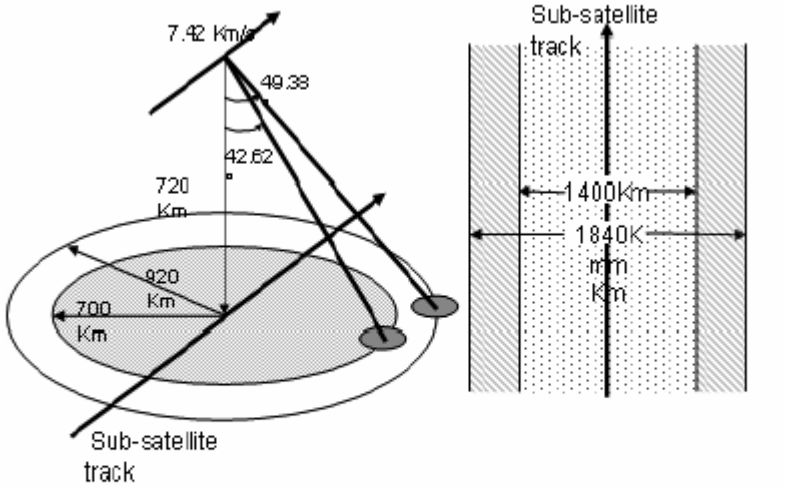
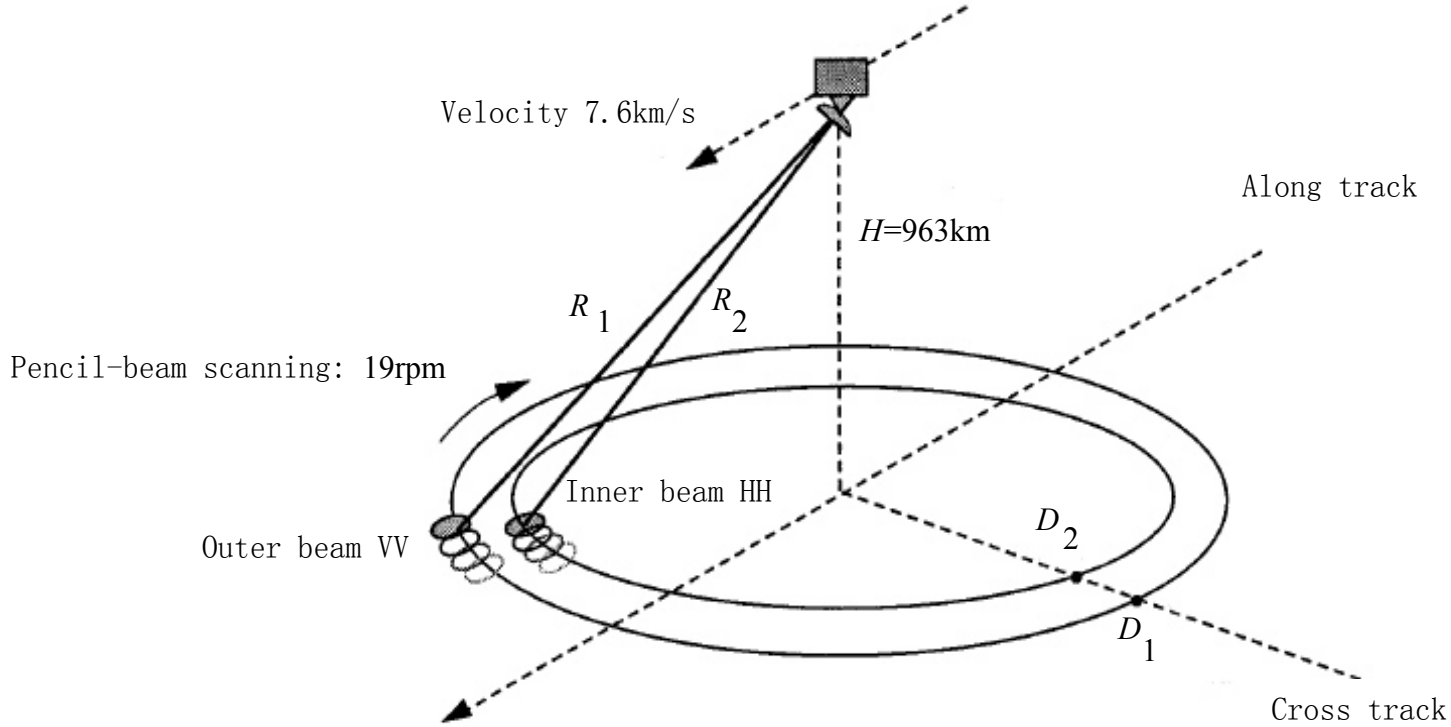


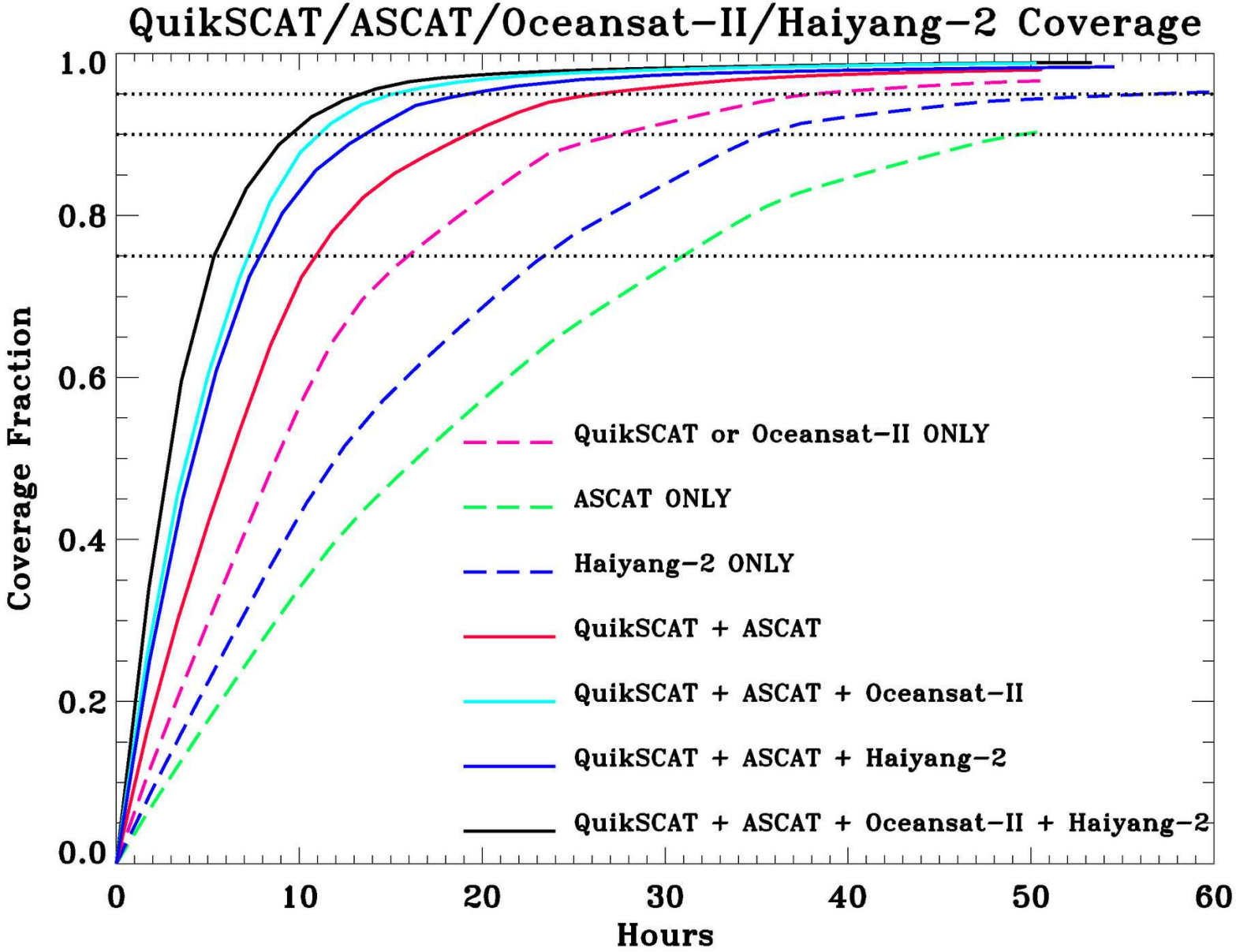
Fig : 1 Viewing Geometry and Swath of Oceansat-II scatterometer

HY-2 Scatterometer Characteristics

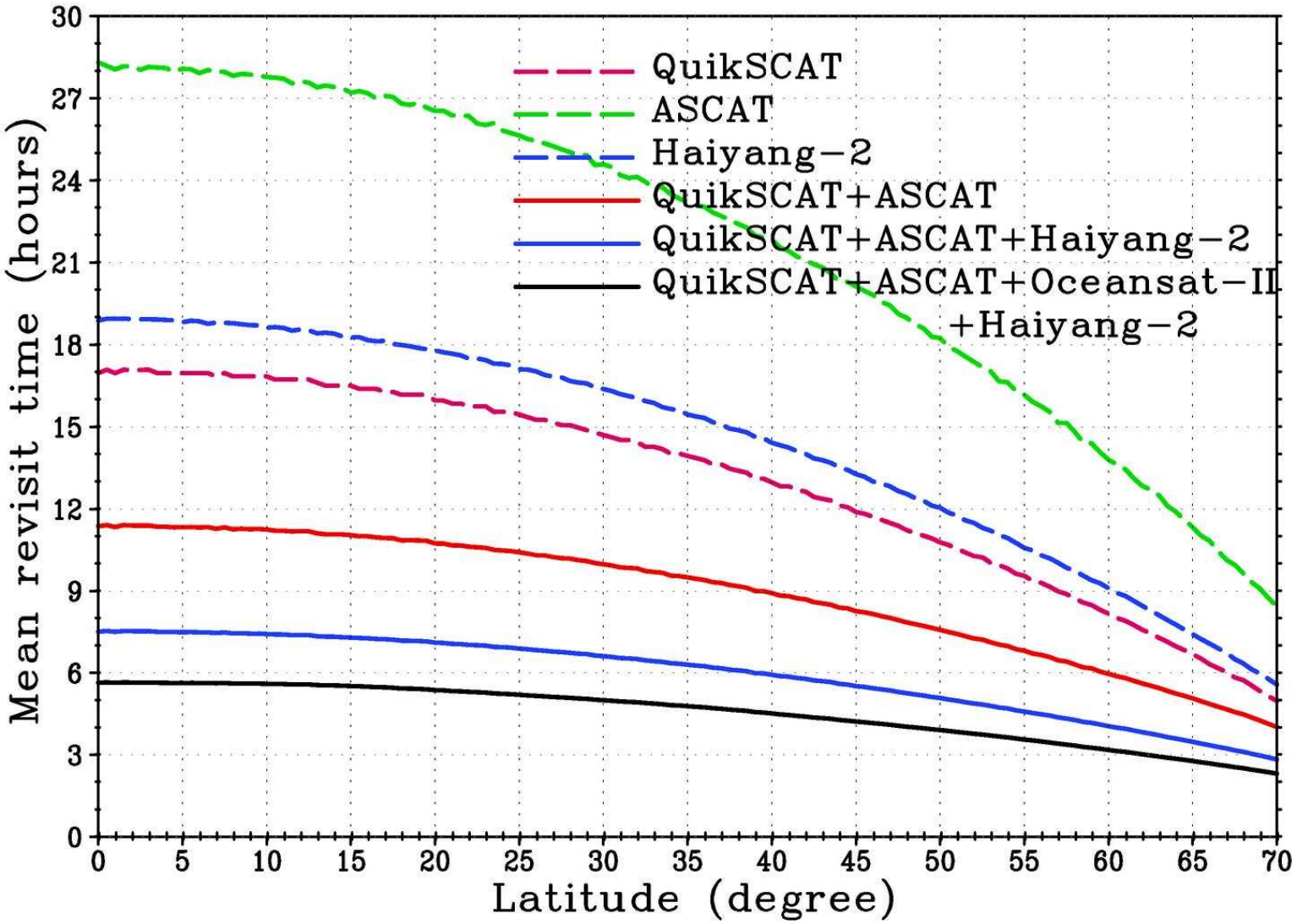
- σ^0 range: -40-+20dB
- σ^0 accuracy: 0.5dB
- Swath width: >1350km for H; >1700km for V
- Ground resolution: 25km
- Polarization: HH (inner beam) and VV (outer beam)
- Antenna incidence angle: 38^0 (for inner beam); 44^0 (for outer beam)
- Antenna gain: 42dBi
- Beam width (azimuth × tilt): $1.40^0 \times 1.30^0$ (for H); $1.35^0 \times 1.20^0$ (for V)
- Antenna dimension: 1.3m
- Transmitted peak power: 120W
- PRF: 100-200Hz
- Frequency: 13.255GHz
- LF bandwidth: 3MHz
- Orbit height: 963km
- Obit inclination angle: 99°
- Local crossing time for the descending nodes: 6:00 or 18:00



SAMPLING IMPROVEMENT

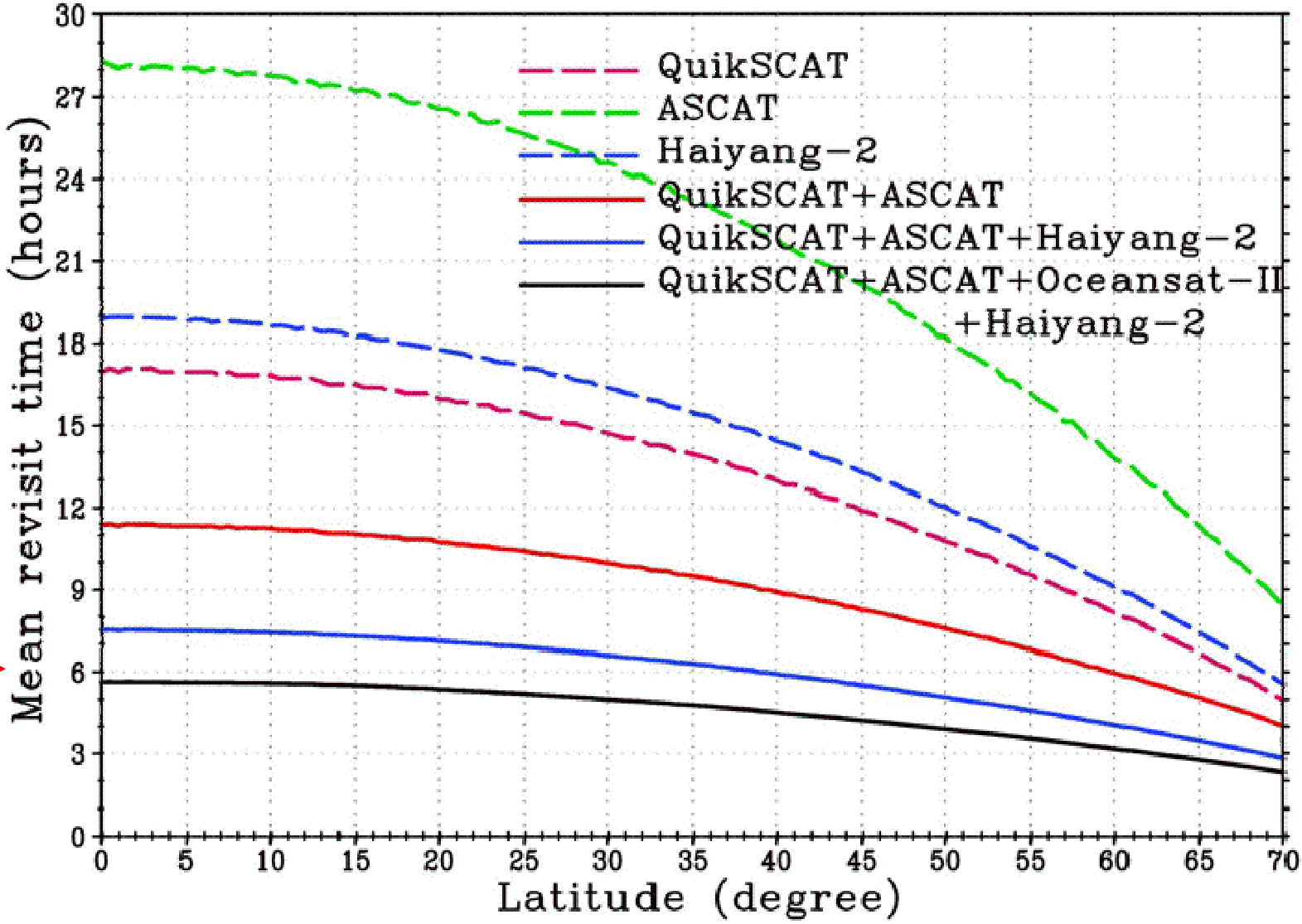


Tandem mission resolves initial period and daily cycle



Scatterometer constellation will provide less than 6-hour revisit interval for all latitudes, meeting operational weather forecast requirement

Timely Data Access will Enable Significant Reductions in Mean Revisit Times



6-hr goal

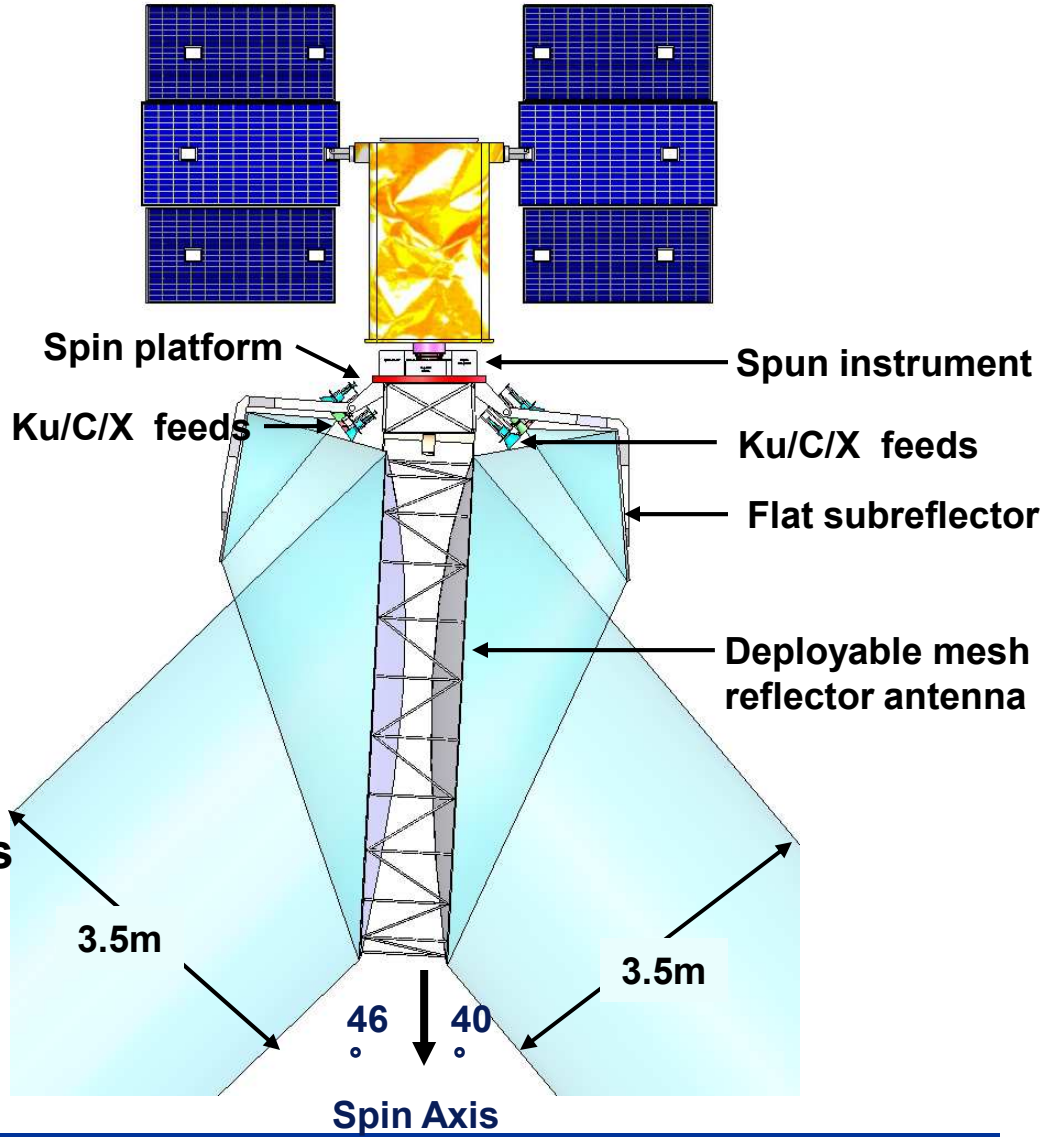
Liu et al., 2007, *Int. J. of Remote Sensing*, in press.

Recent Events

- **NOAA Operational Satellite Surface Vector Winds Requirements Workshop, Tropical Prediction Center – Miami, June 5-7, 2006**
  http://manati.orbit.nesdis.noaa.gov/SVW_nextgen/SVW_workshop_report_final.pdf
- **$4M for research to operations transitioning of ocean capabilities has now been provided for the third year in a row (FY05-07)**
- **New leader – Mary Kicza – at NOAA/NESDIS was quick to recognize and act on the difference in capabilities between WindSat and QuikSCAT**
- **New leader – Mike Freilich at NASA/ESD – shares with Kicza an appreciation of the challenge of *transitioning***
- **The controversy over NOAA's lack of a QuikSCAT follow-on caused by the (then) Director of the NHC got this issue fully into the open**
  - **Both Kicza and Administrator Lautenbacher have testified to Congress**
  - **She and the (then) head of the NWS have visited JPL**
- **NPOESS Nunn-McCurdy impact on climate data records has generated some interest in the Administration**
  - **OSTP made $15M available to address this in FY07**
  - **Of this amount, the NOAA scatterometer study received $500K (to which we secured an additional $500K as a match)**

Extended Ocean Vector Winds Mission (XOVWM) Observatory

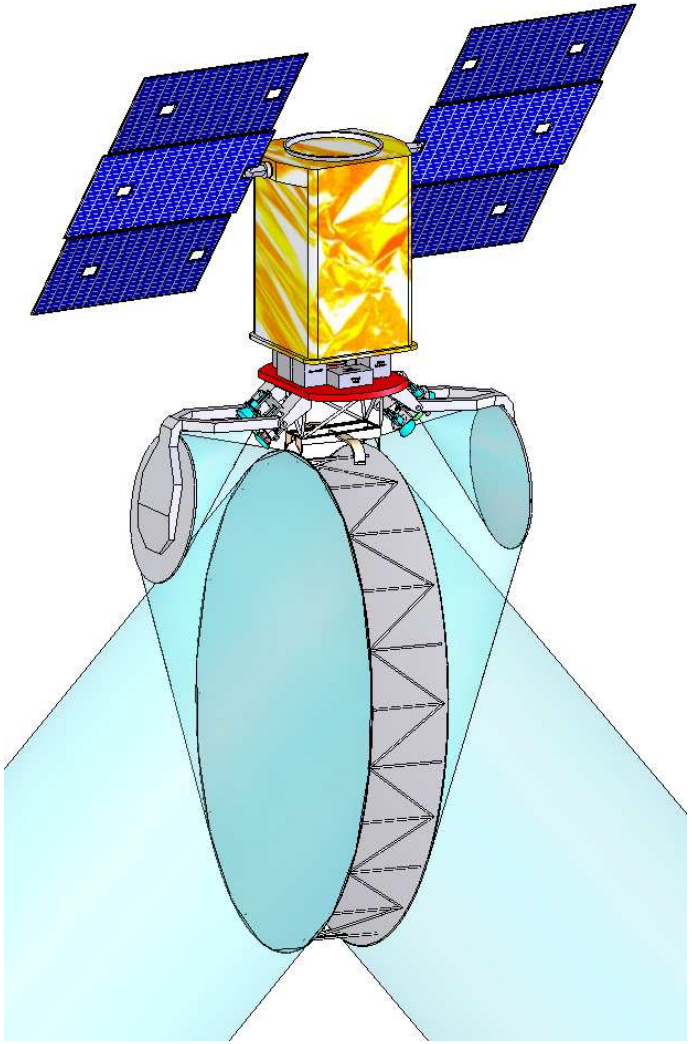
- **XOVWM to provide the next-generation wind measurement capabilities:**
  - **Spatial resolution ~ 5km**
  - **Wind speed range up to Category 5 hurricanes (155 mph winds)**
  - **All-weather capabilities, even in rain**
- **XOVWM builds on proven technologies:**
  - **Ku-band pencil beam (Quik-SCAT) and SAR for high res.**
  - **C-band (ASCAT) for high winds and better performance in rain**
  - **X-band radiometer (AMSR/WindSat) for improved rain correction**



Courtesy of Ernesto Rodriguez, JPL

XOVWM Mission Characteristics

- Orbit: 800 km altitude, sun-synchronous
- Swath: 1800 km
  - 90% global coverage/day
- Scatterometer spatial resolution:
  - Ku-band: 5 km
  - C-band: 10 km
- Performance requirements*
  - 2m/s rms speed up to 20 m/s
  - 10% rms speed above 20 m/s
  - 20^{o} rms direction
- Instrument characteristics*
  - Antenna size: 3.5m x 5m
  - Instrument weight: ~305kg
  - Instrument DC power: ~780W



* current best estimates

Courtesy of Ernesto Rodriguez, JPL

Next Steps

- QuikSCAT Follow-on
  - Significant interest on the part of operational forecasters in the enhanced capabilities of an XOVWM
  - Anticipate decision early in CY08 on which option to pursue
  - We will be pursuing an FY10 budget initiative for this
- Timely access to data from Chinese and Indian scatterometers is being pursued via:
  - Bilateral arrangements
  - Proposed CEOS Constellation
  - Coordinating Group of Meteorological Satellites
  - WMO Satellite Program and World Weather Watch