



National Aeronautics and
Space Administration

Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California



Surface Water and Ocean Topography (SWOT) Mission

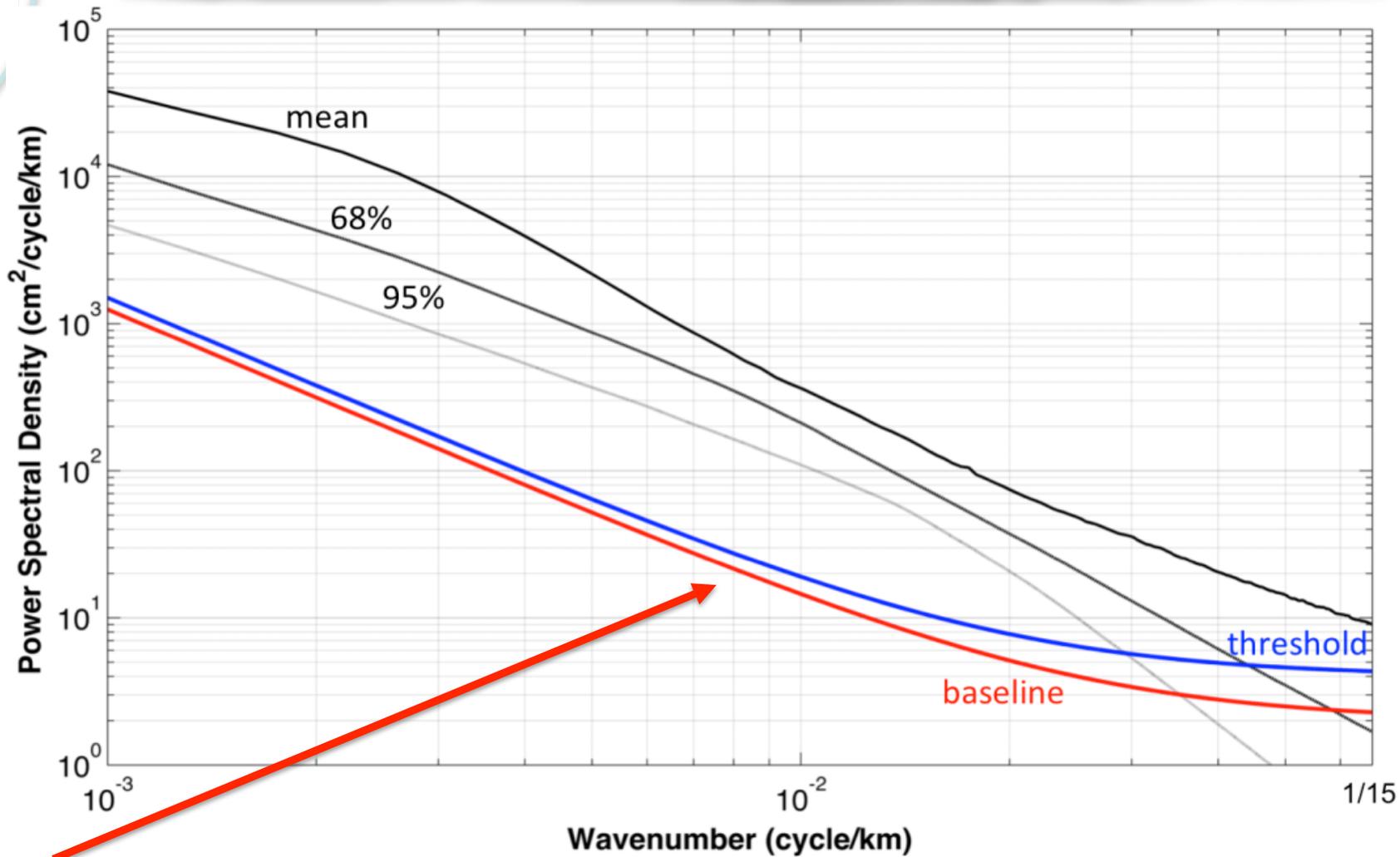
SWOT CalVal Meeting
June 16, 2016

Ocean Cal/Val Challenges

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SSH Error PSD Requirement (D-61923)



The spectrum of the **difference** between measured and truth SSH needs to be characterized synoptically at scales between 15 km and ~150 km wavelengths



Validation Requirements

- Validation is validation of the SWOT **error**, not the ability of SWOT to reproduce the ocean spectrum
 - Necessary but not sufficient condition
 - Phases matter!
 - Validation is of the entire height signature, including tides, internal waves, etc., not the geostrophic pressure term
- Validation must be done for both swaths (independent errors) and must represent the swath averaged spectrum.
- Validation must be done across a range of wave and wind conditions
- Validation must be of the signature of **at the time of data collection**
 - Critical when considering that internal waves may be a dominant SSH contributor at high frequencies



AirSWOT Challenges

- See AirSWOT presentation



Lidar Challenges

- Demonstrate ability to resolve SSH up to 15km wavelengths
 - Good evidence for Jason-scale wavelengths
- Develop a comprehensive error budget
- Collect data faster and over longer transects
 - If viable for short wavelength mapping, should consider a change in platform
- Limited swath may have challenges with wave aliasing
- Weather conditions are a limitation
 - Fog is a killer, so California in certain times of year is problematic
 - Nominal CalVal period overlaps fog season
 - One of the reasons the Gulf Stream was selected as a validation site

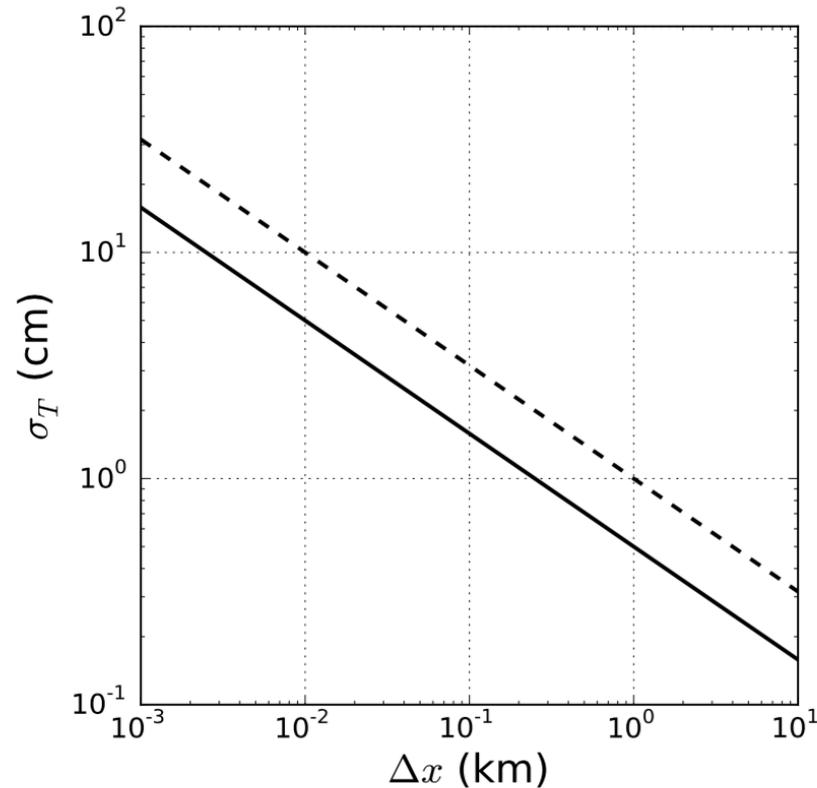


In Situ Challenges

- Synoptic measurements
- Measurements across the swath and for both swaths
- Demonstrating the ability to measure SSH spectra to the required precision



In Situ Accuracy Requirement



In situ instrumentation white noise standard deviation (σ_T in cm) requirement as a function of measurement separation (Δx in km). The solid line is the requirement derived in equation (4), while the dashed line is the noise level for which the SWOT noise and the truth noise would be equal.



Path Forward

- Expect a white paper for SWOT spectrum CalVal options to be the long-term (<6 months!) outcome of this meeting
- Report should contain, for each proposed method:
 - Theoretical and experimental basis
 - Error assessment and limitations
 - Evaluation between different CalVal sites
 - Estimated cost
 - Pre-launch experiment plan to validate the validator in the appropriate site
 - Post-launch plan
- Progress in the white paper will be evaluated at the next SWOT CalVal meeting in Paris, November 7, after the OSTST meeting