

Comparison of a Deepwater Hindcast to Directional Wave Spectra Measured with an ADCP

William Dally & Carolina Burnette

University of North Florida

Andrew Cox

Oceanweather, Inc.



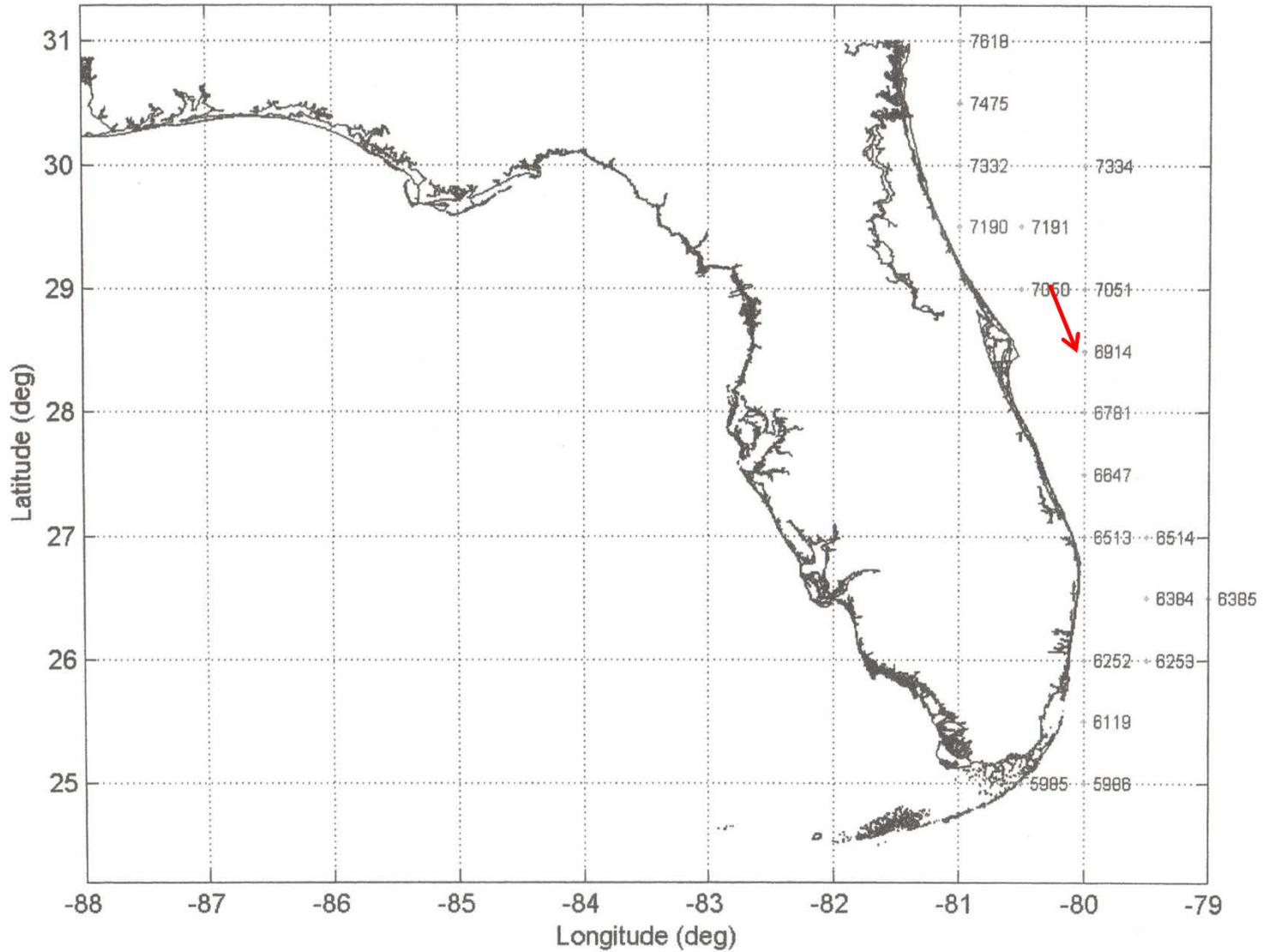
Surfbreak Engineering Sciences, Inc.

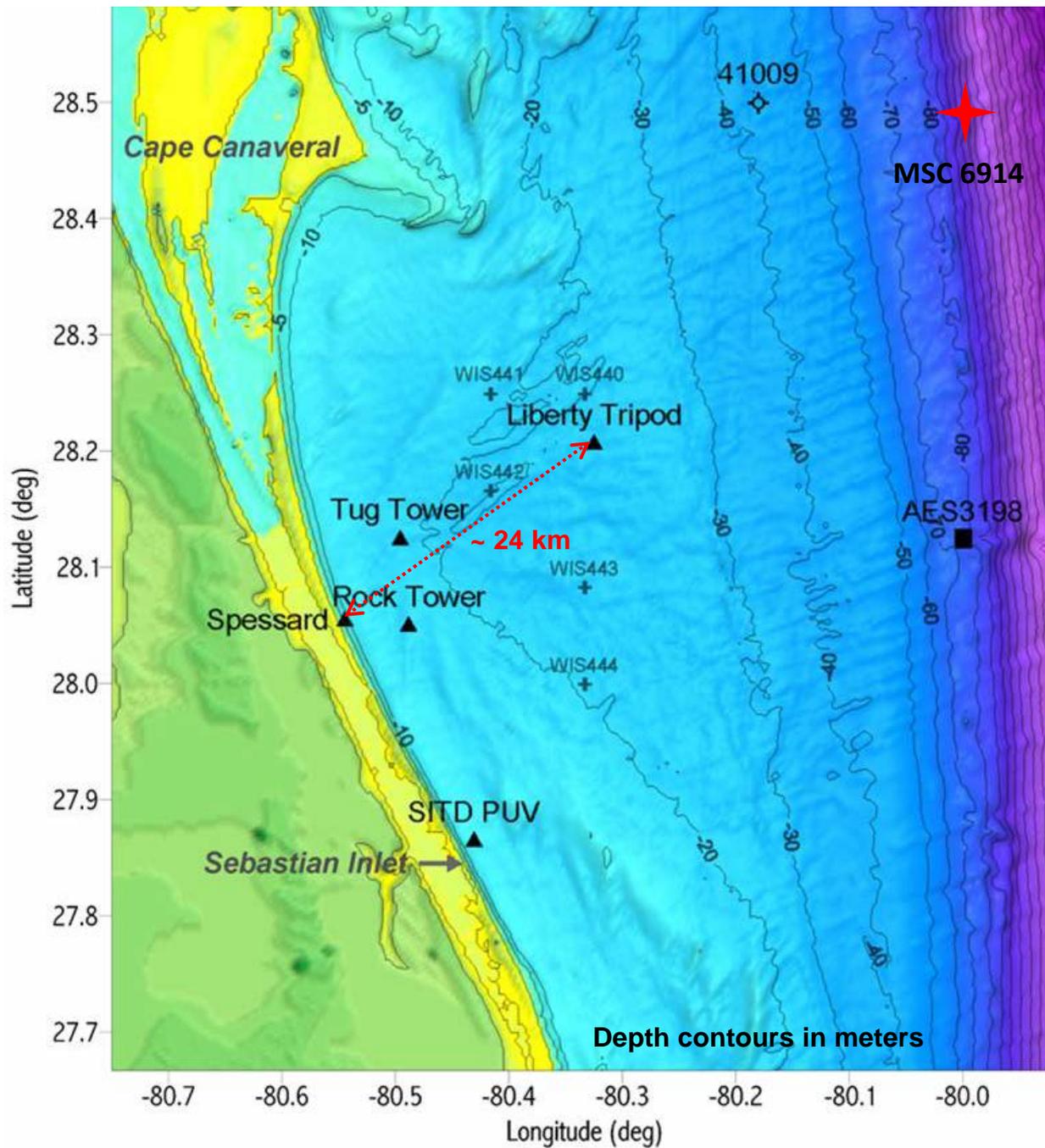
Outline

1. Motivation
2. The Experiment of Opportunity: MSC vs. ADCP
3. Basic Observations
4. Time Series of Frequency Spectra
5. Time Series of Directional Distributions
6. Spot Checks
7. Averaged Results
8. Conclusions & Future Work

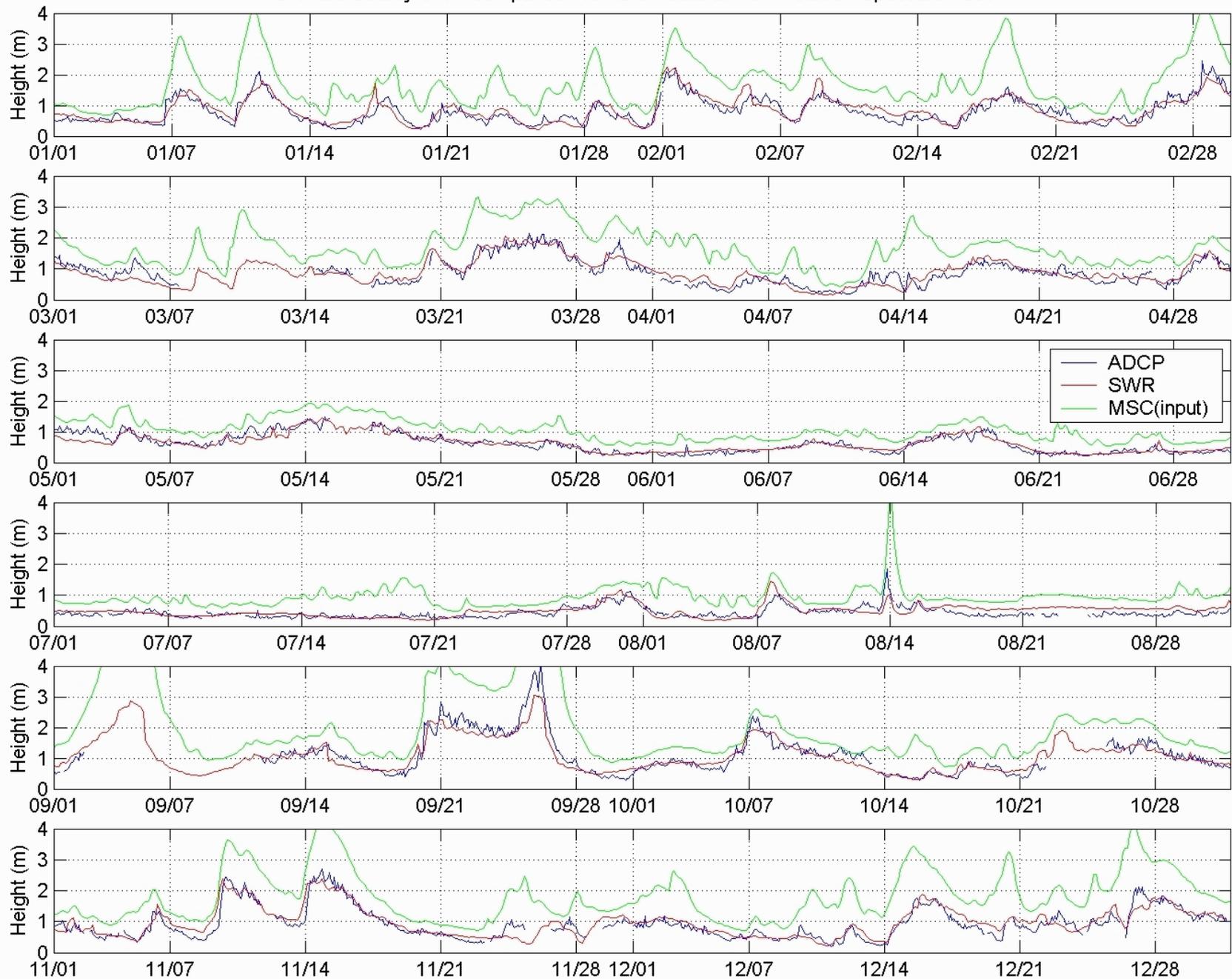
Motivation

Location of MSC Wave Model Output Points

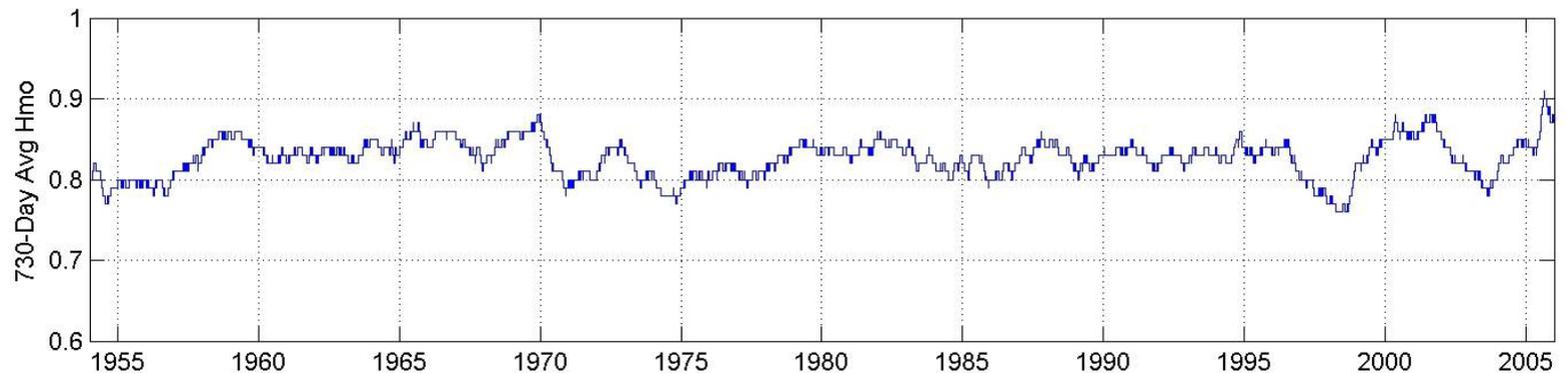
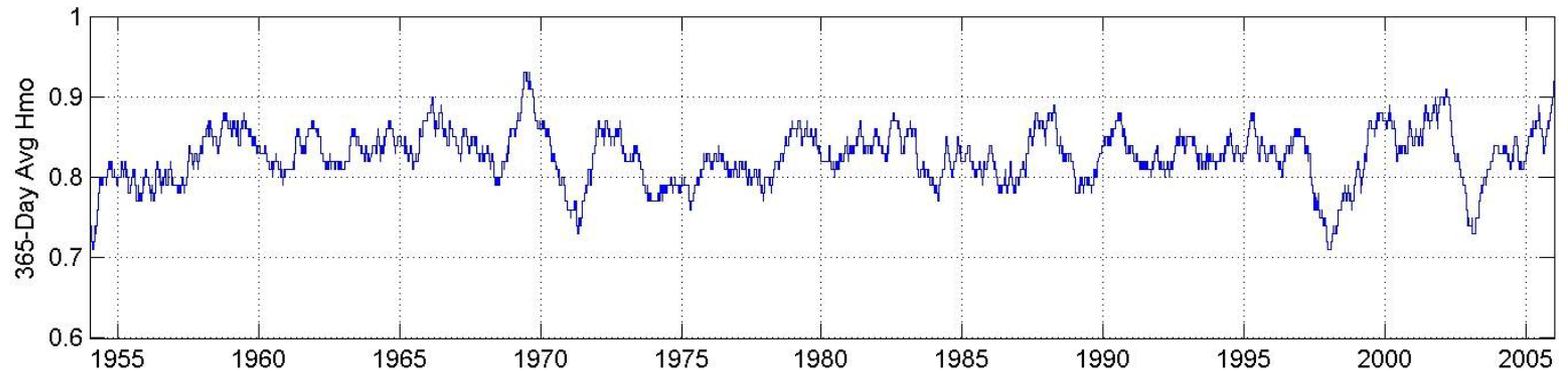
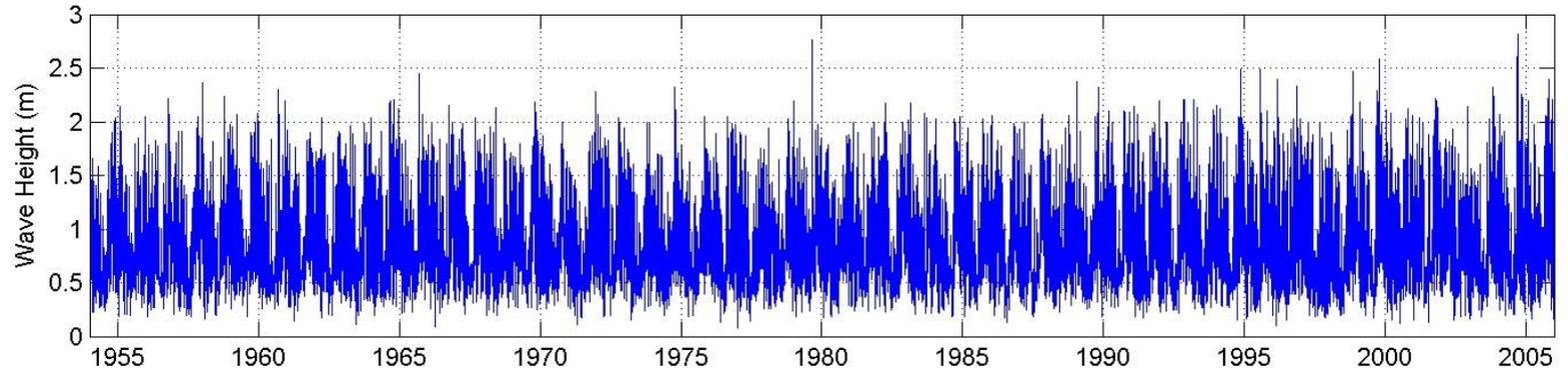




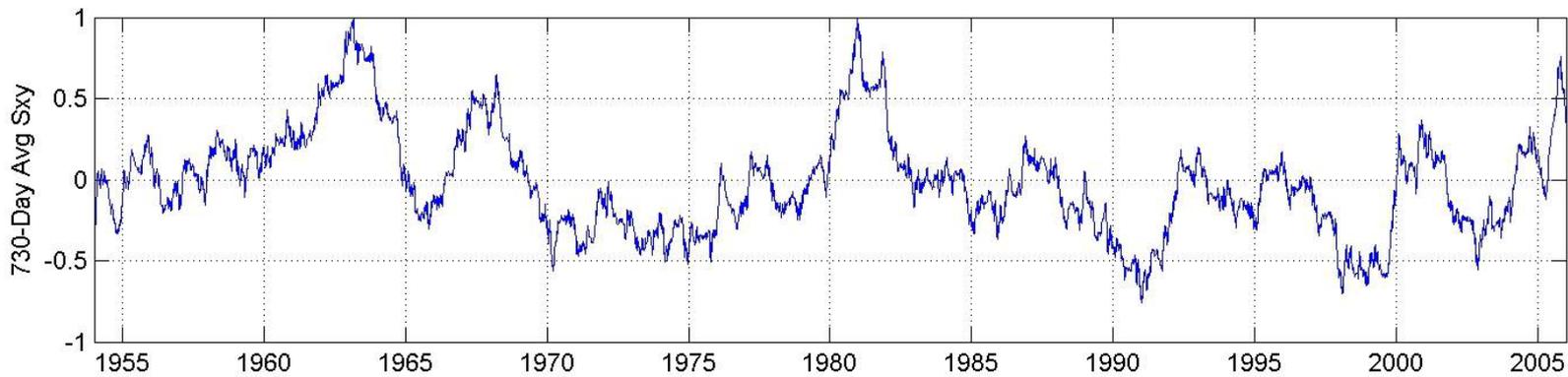
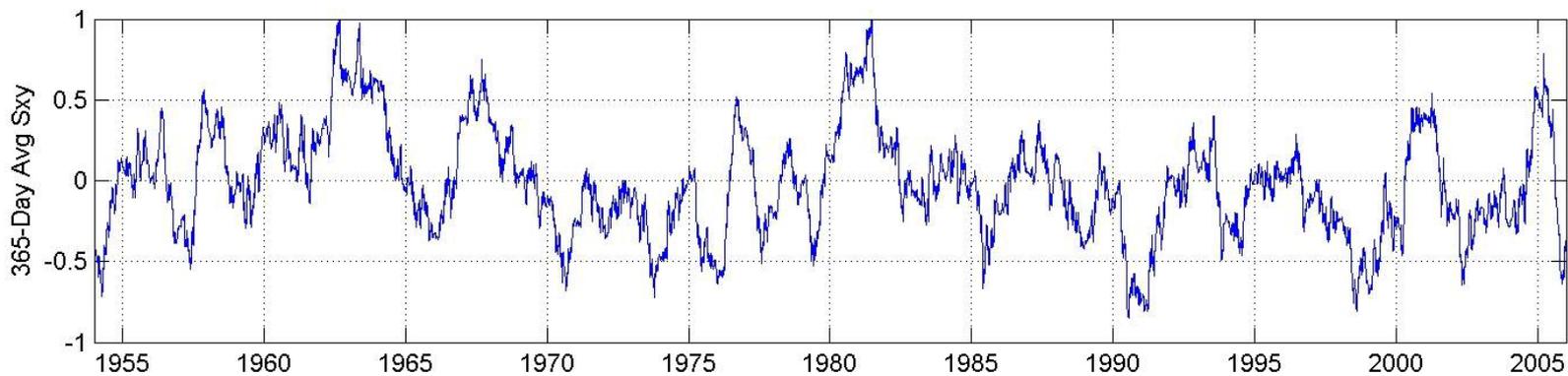
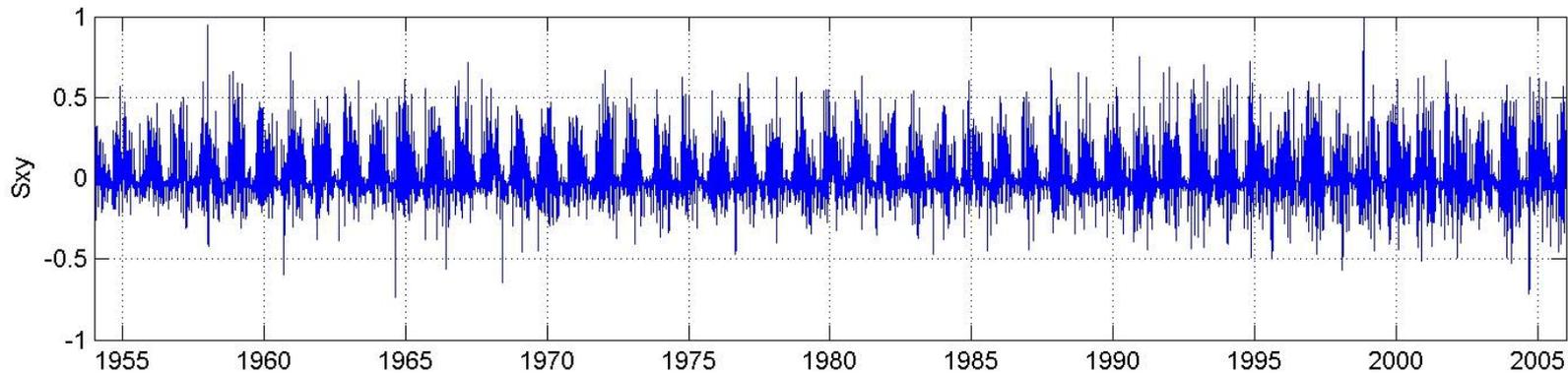
Brevard County SWR comparison to ADCP data at FCFP Station Spessard - 2004



Motivation: Long-term nearshore wave climate

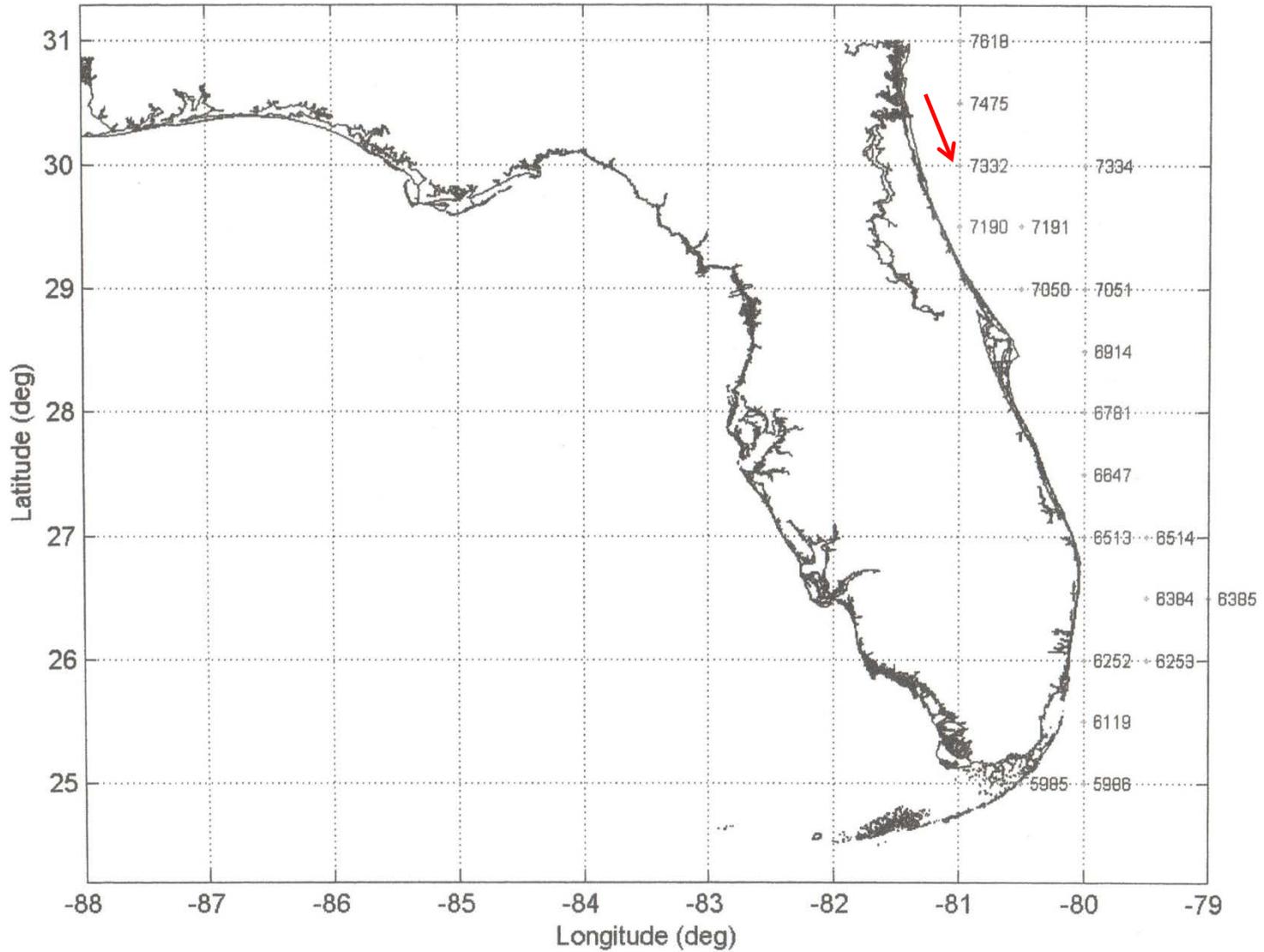


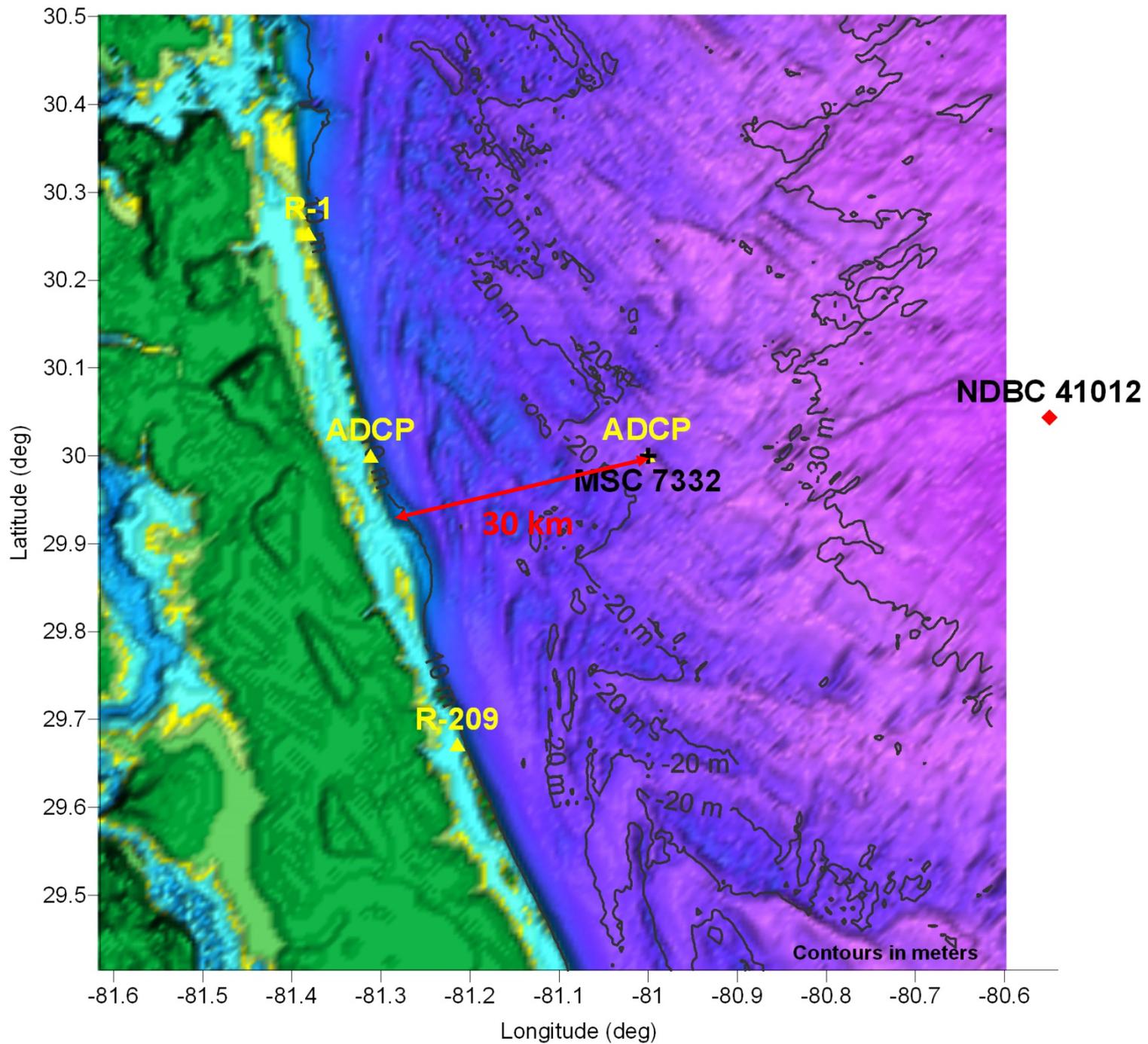
$$S_{xy}/S_{xy}(\max)$$



The Experiment of Opportunity

Location of MSC Wave Model Output Points

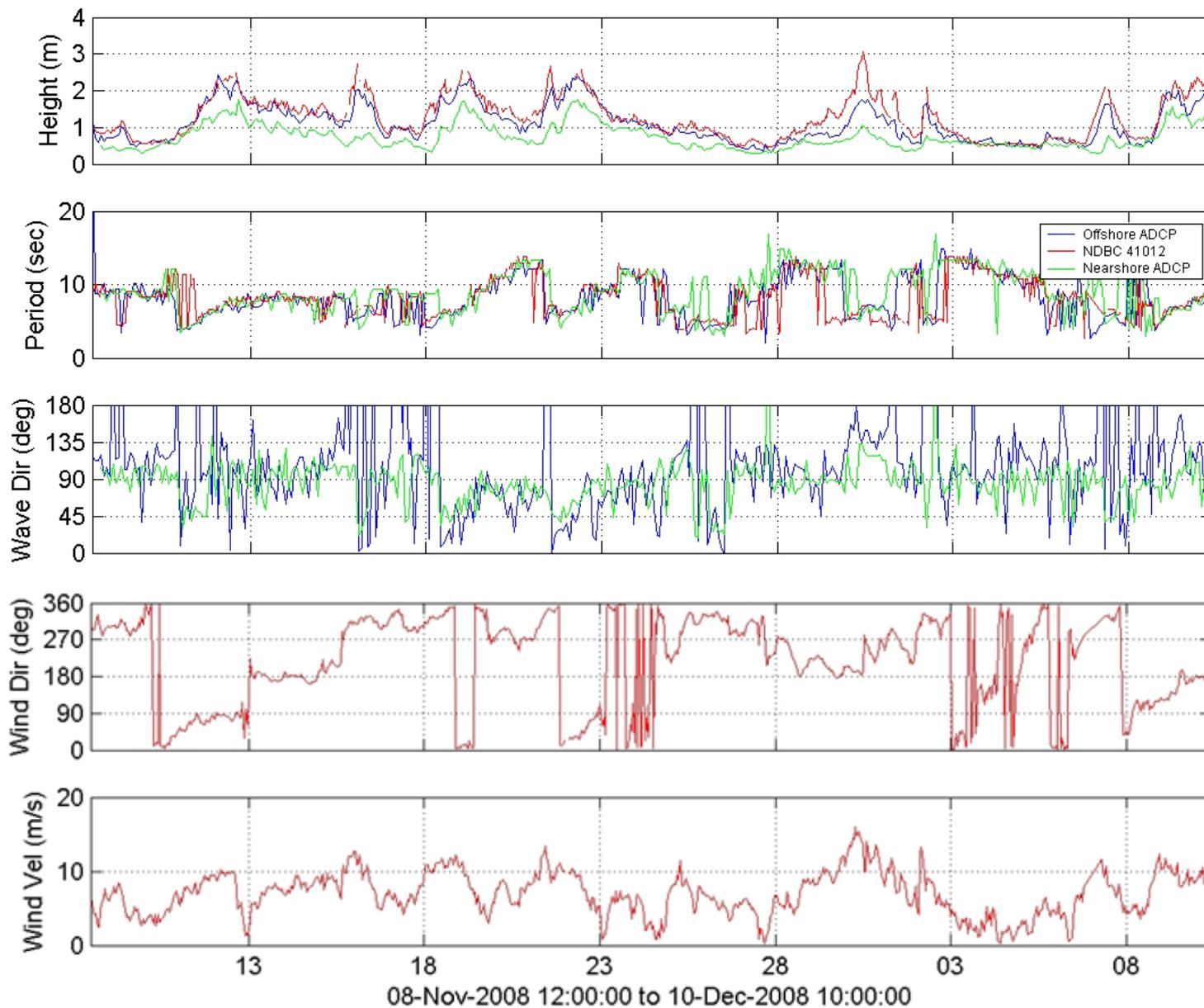




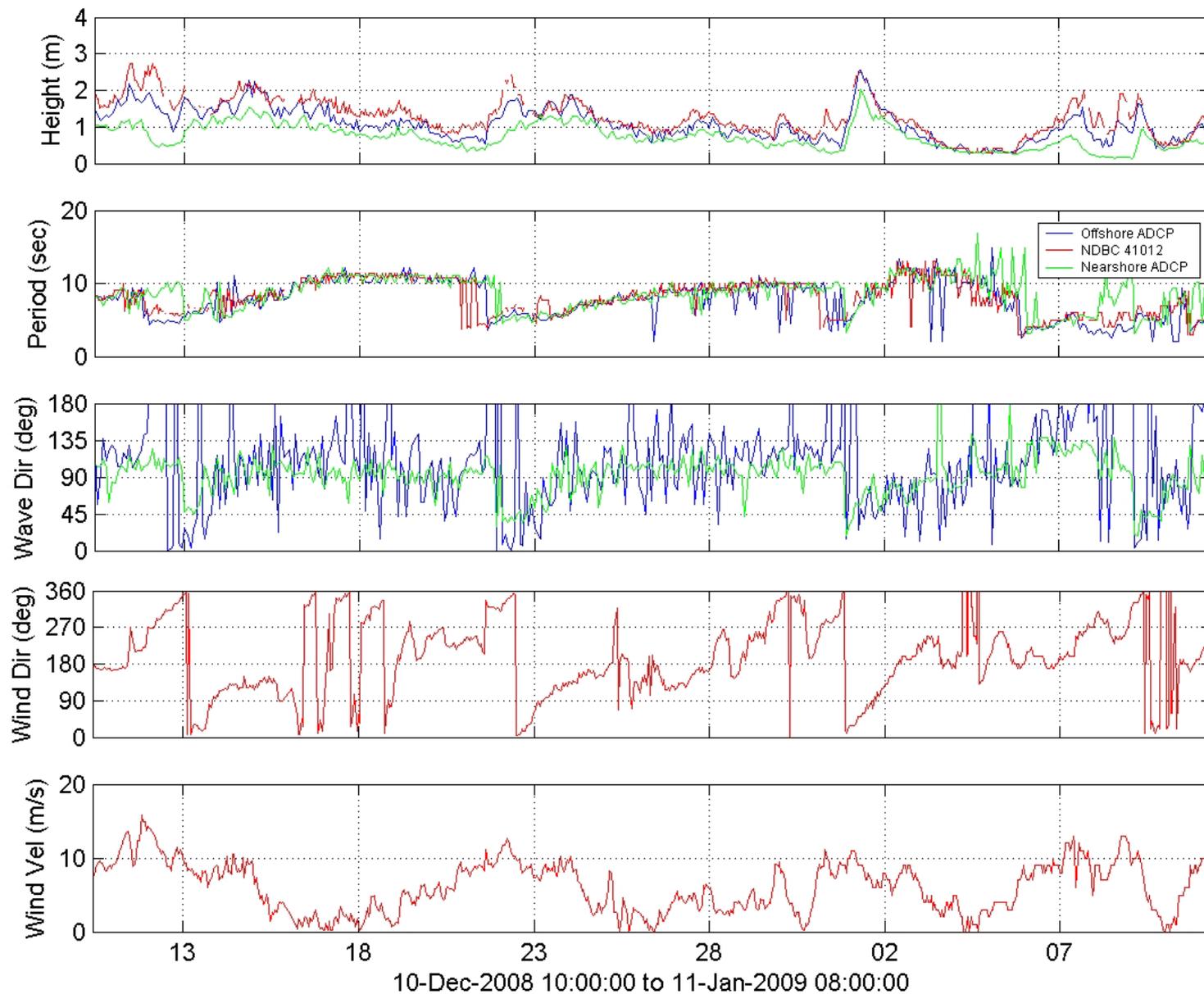
24.5 m depth
1200 kHz



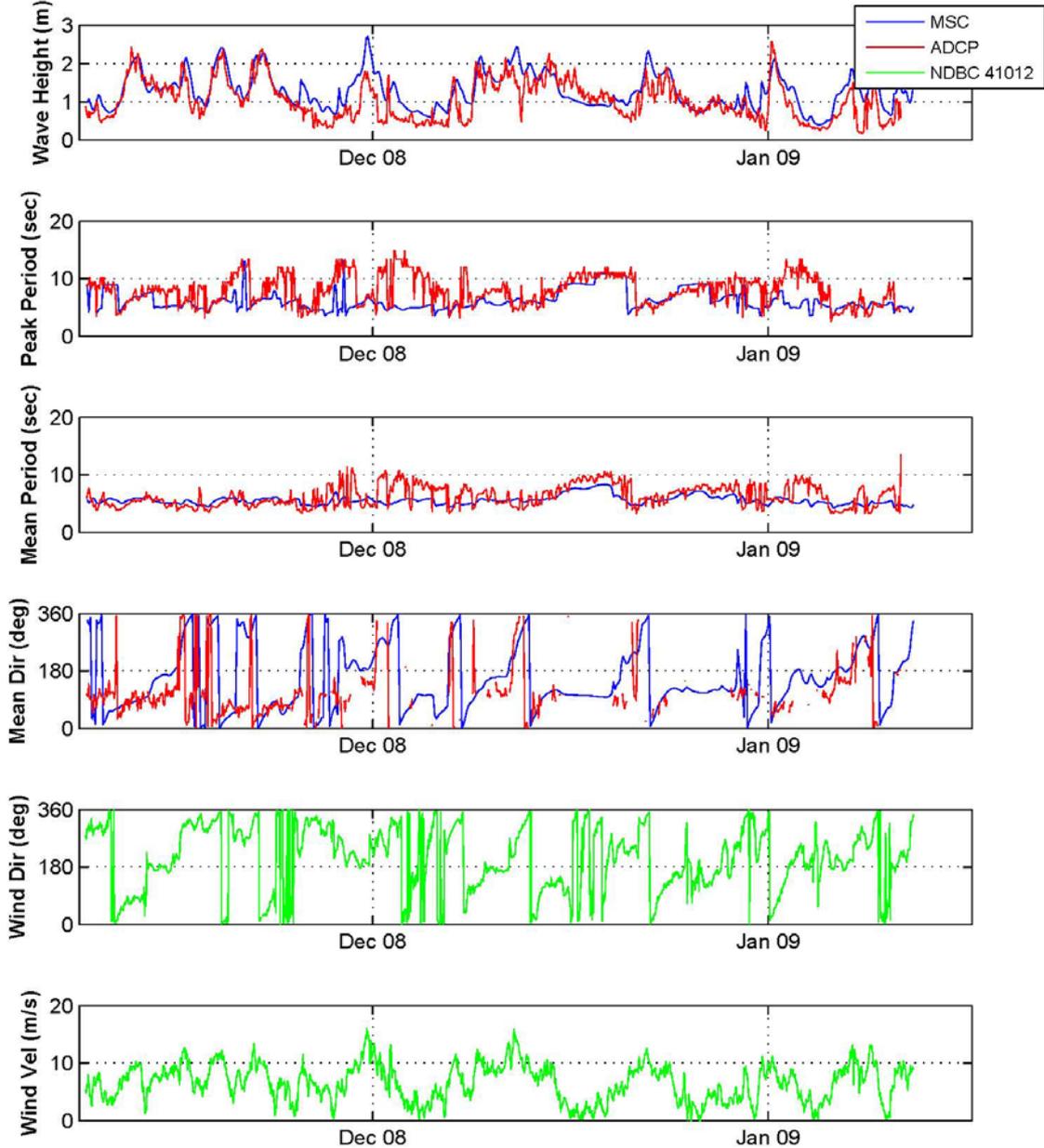
Basic Parameter Observations – Deployment #1



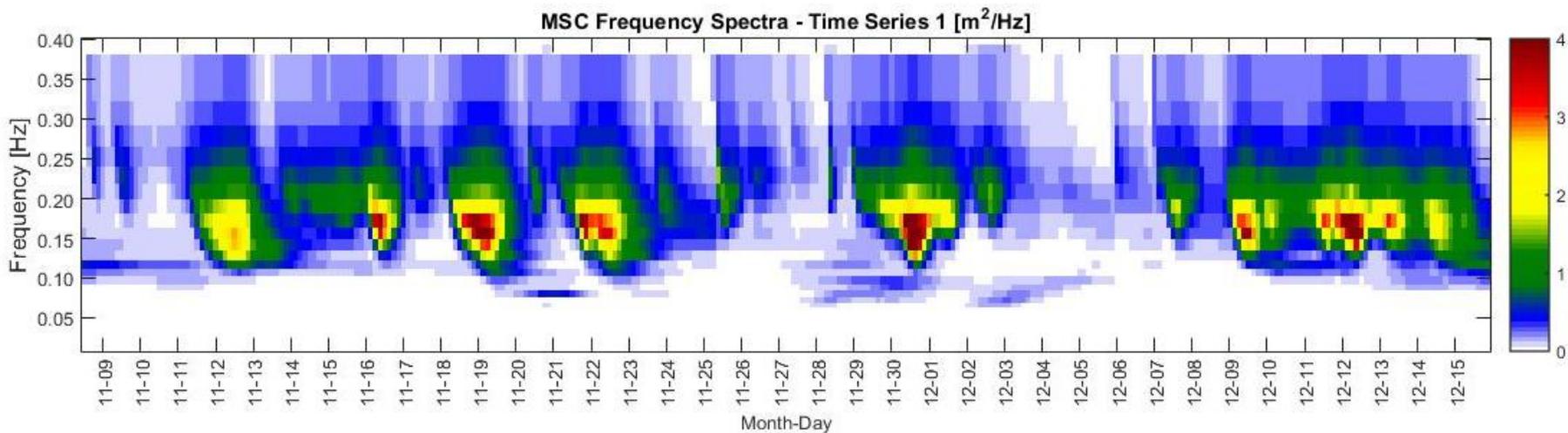
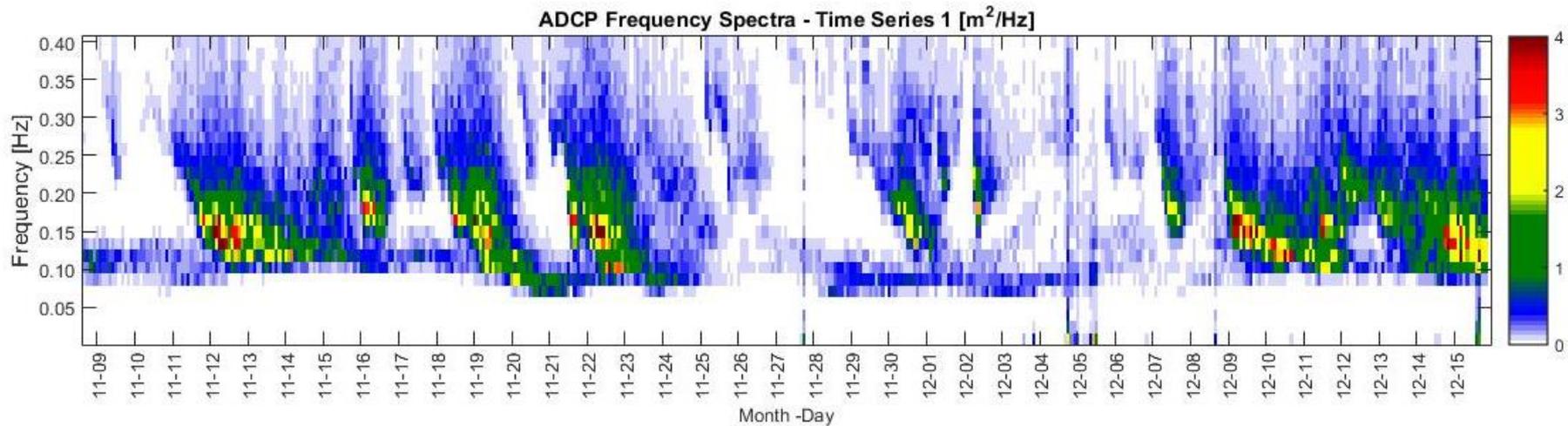
Basic Parameter Observations – Deployment #2



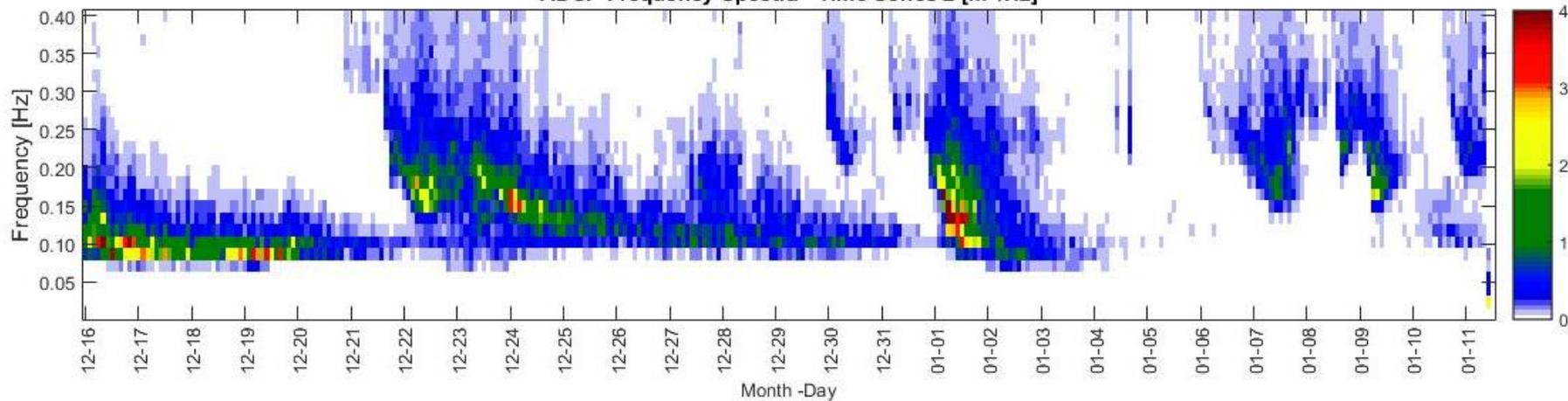
MSC vs. ADCP Spectral Parameters



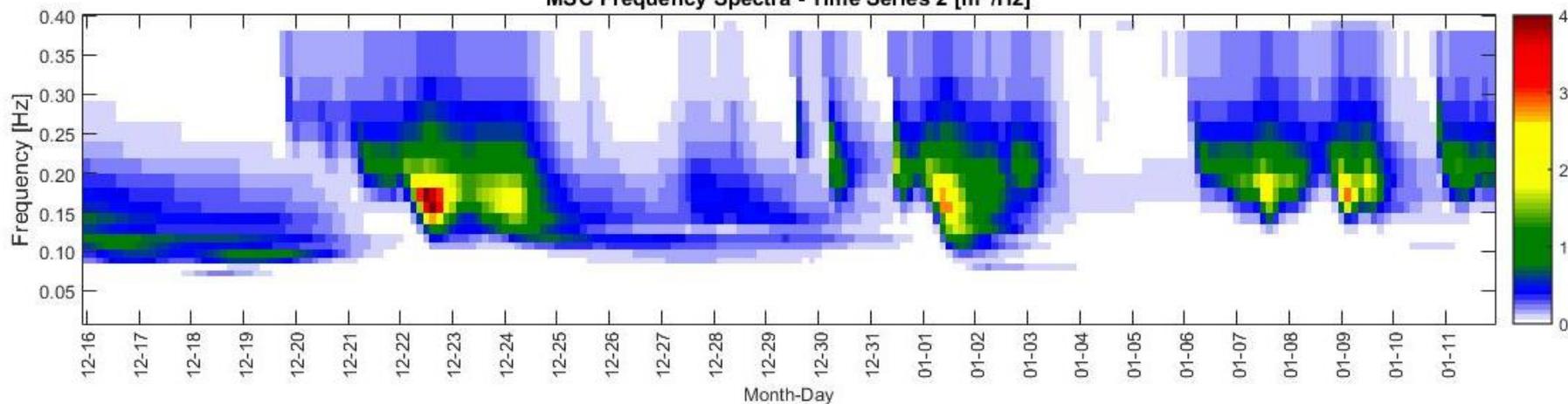
Time Series of Frequency Spectra



ADCP Frequency Spectra - Time Series 2 [m^2/Hz]

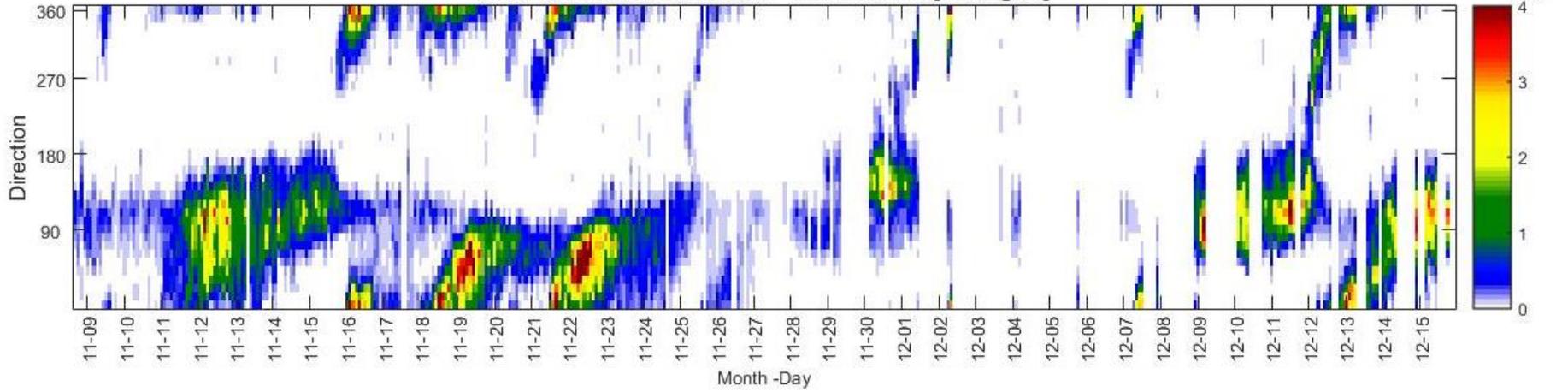


MSC Frequency Spectra - Time Series 2 [m^2/Hz]

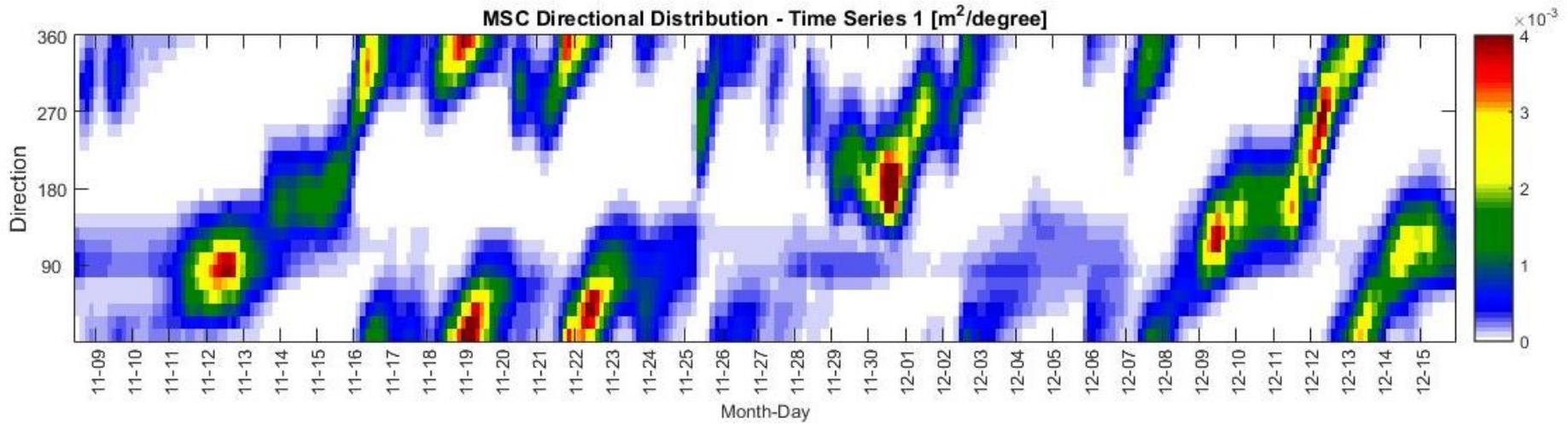


Time Series of Directional Distributions

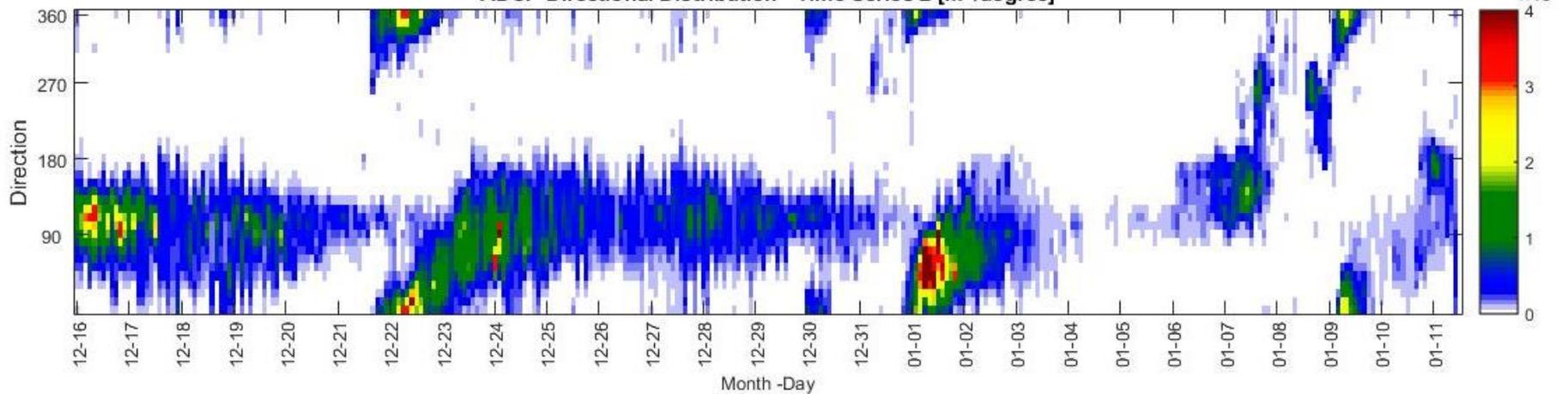
ADCP Directional Distribution - Time Series 1 [m²/degree]



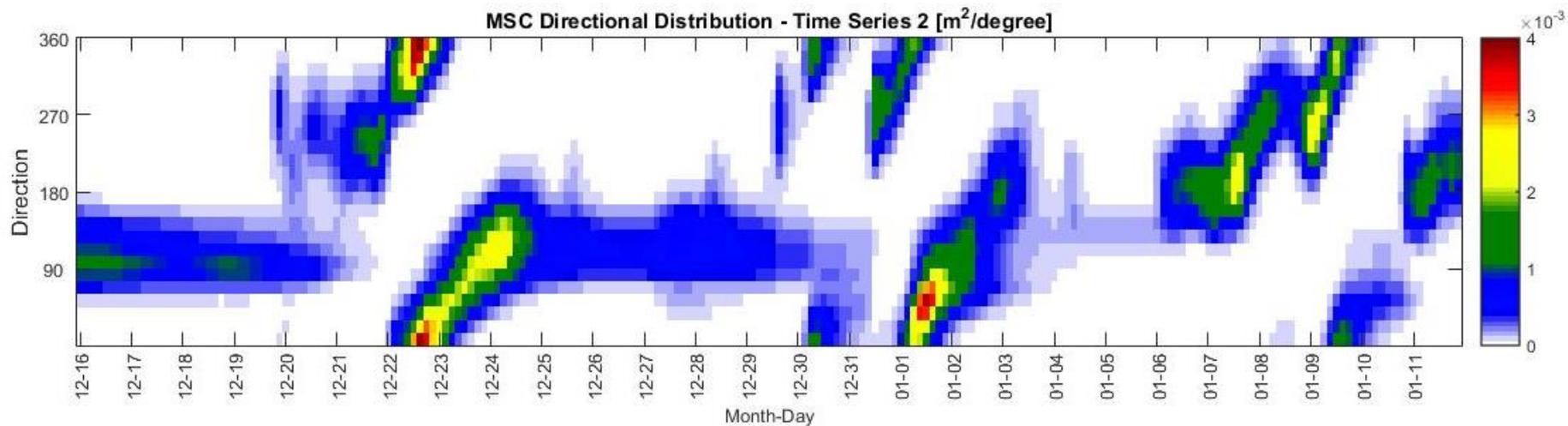
MSC Directional Distribution - Time Series 1 [m²/degree]



ADCP Directional Distribution - Time Series 2 [m²/degree]

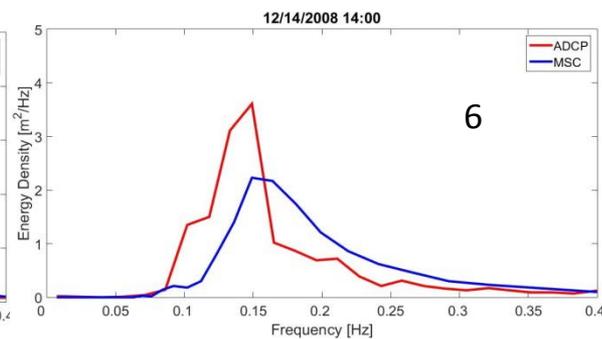
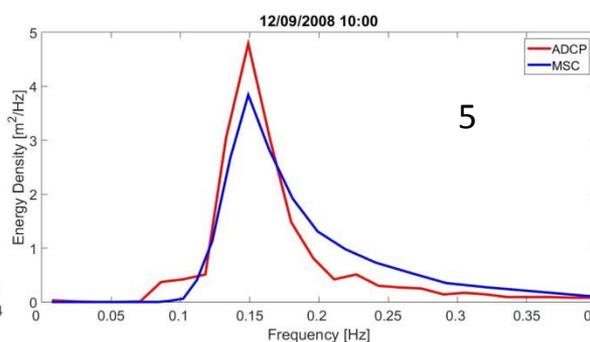
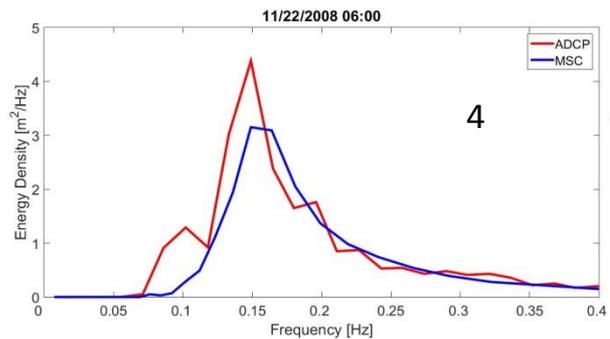
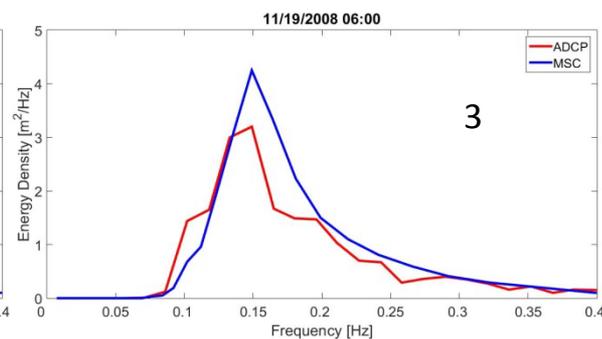
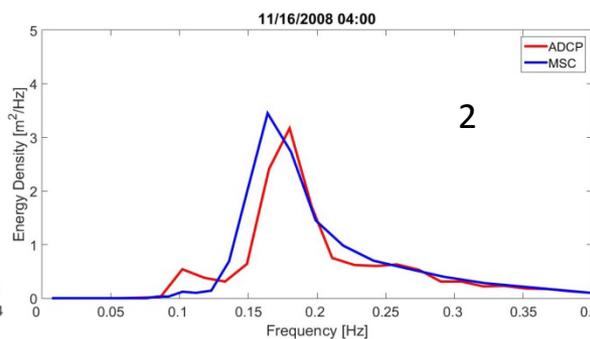
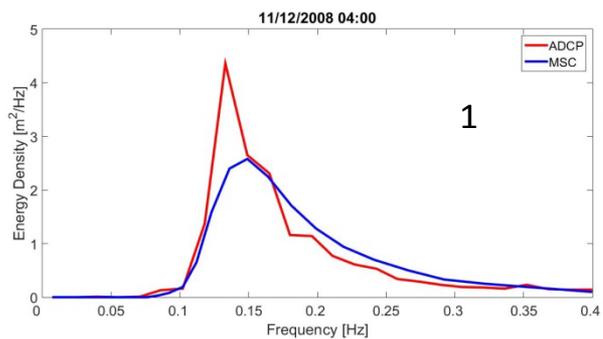
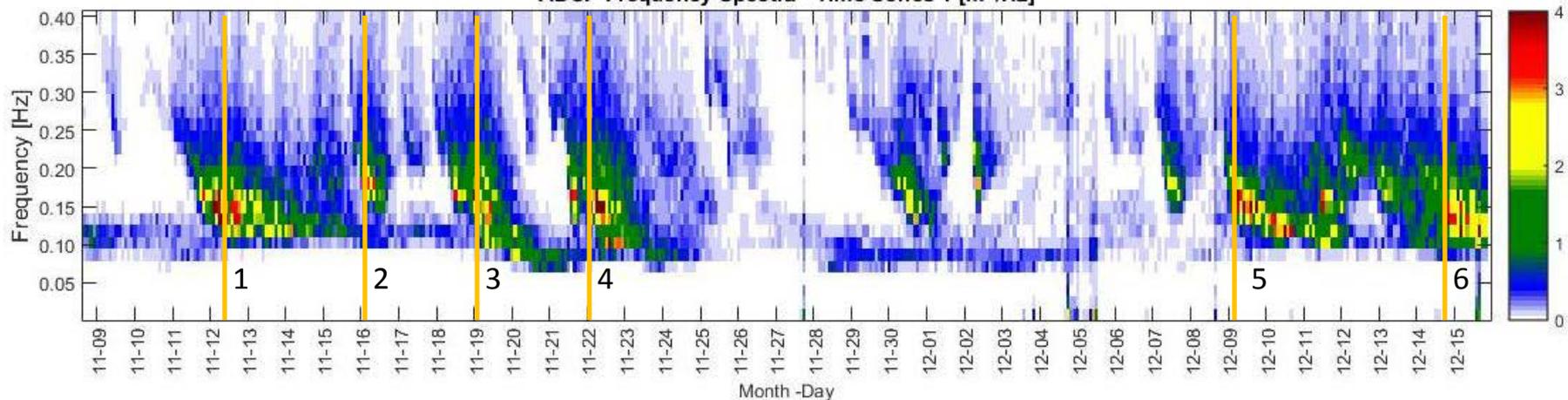


MSC Directional Distribution - Time Series 2 [m²/degree]

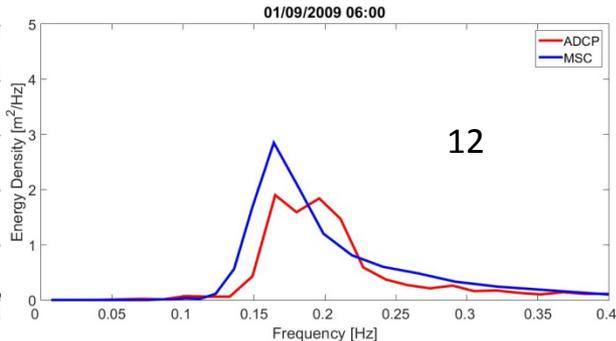
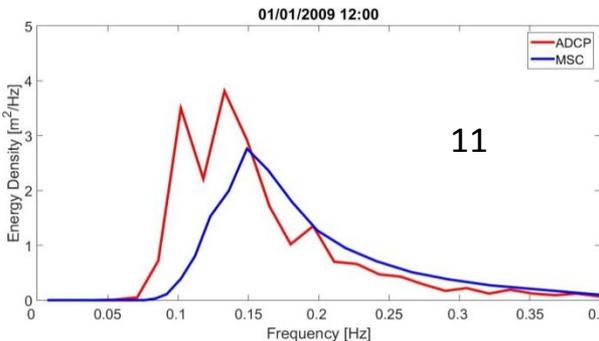
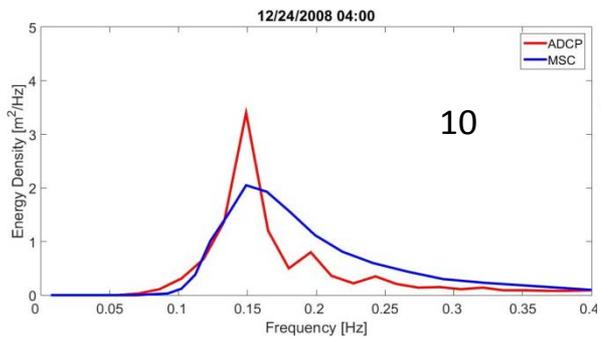
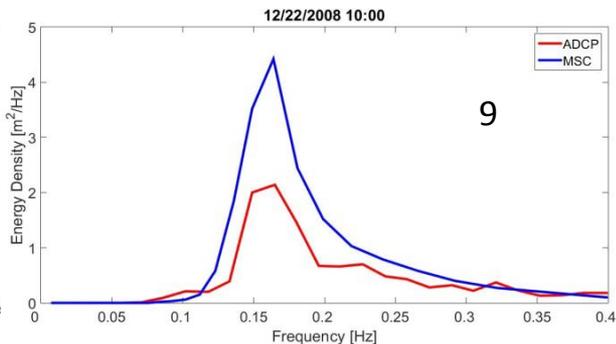
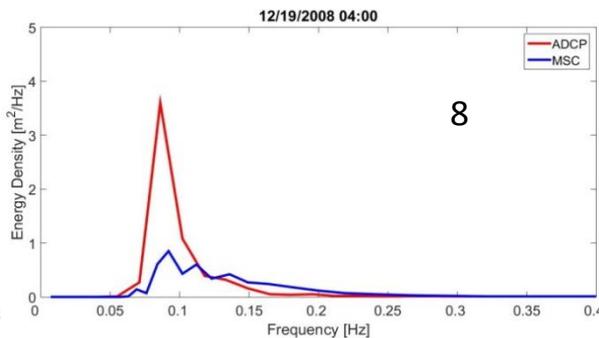
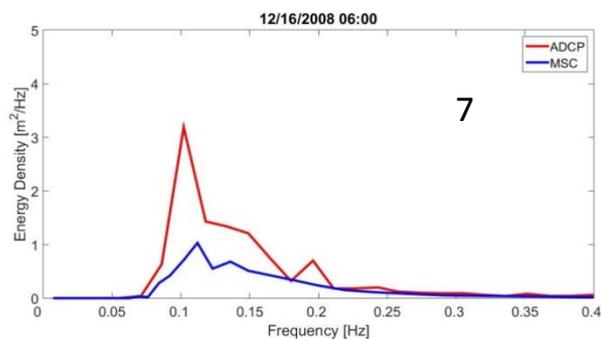
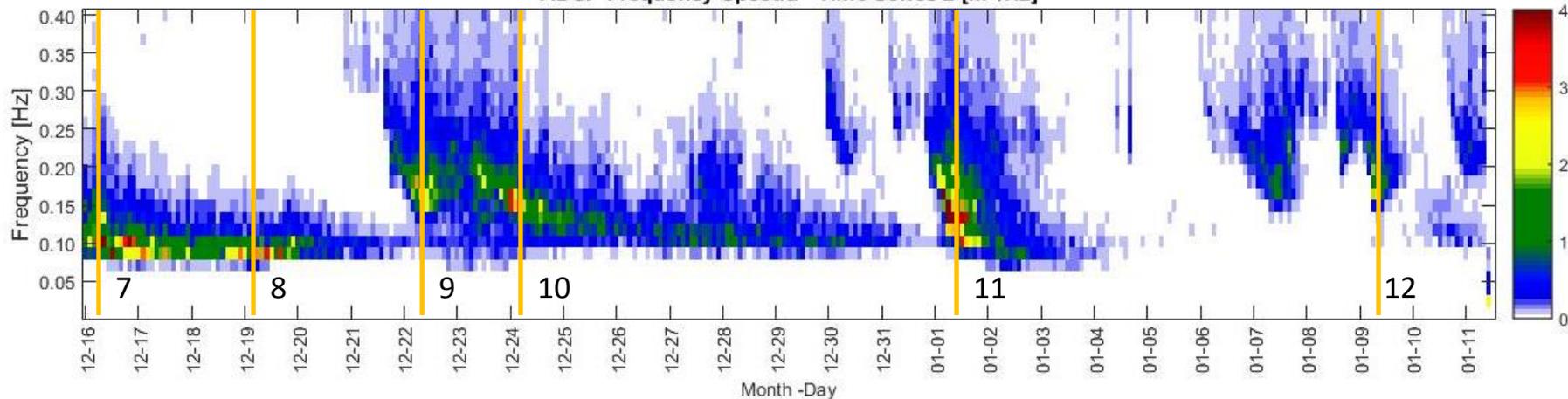


Spot Checks – Frequency Spectra

ADCP Frequency Spectra - Time Series 1 [m^2/Hz]

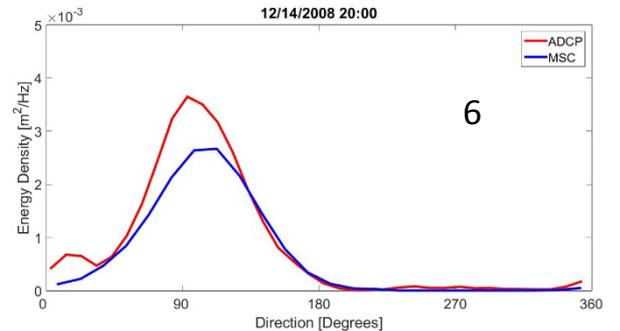
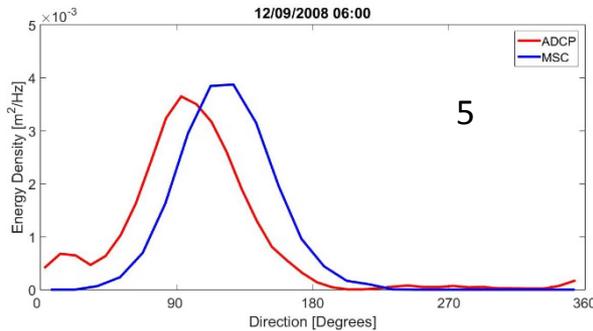
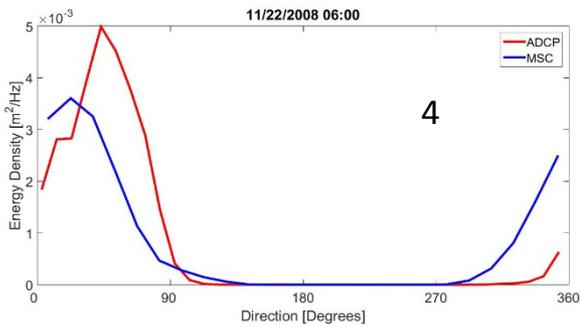
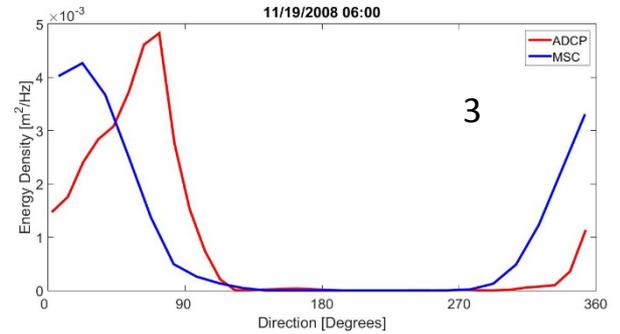
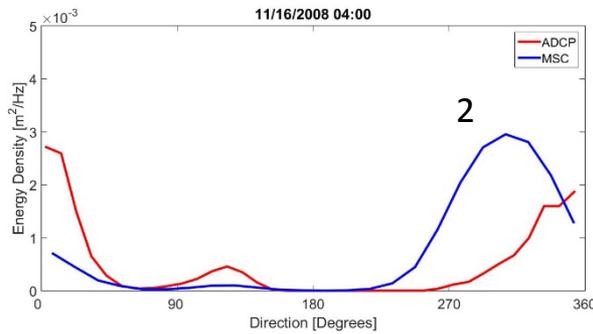
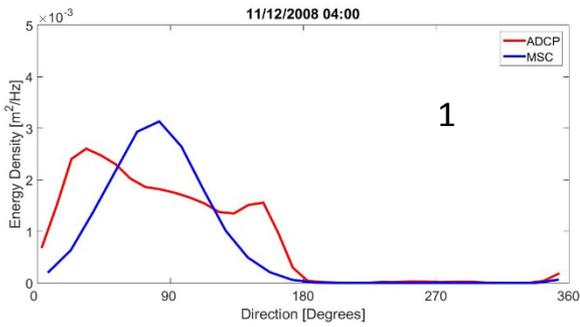
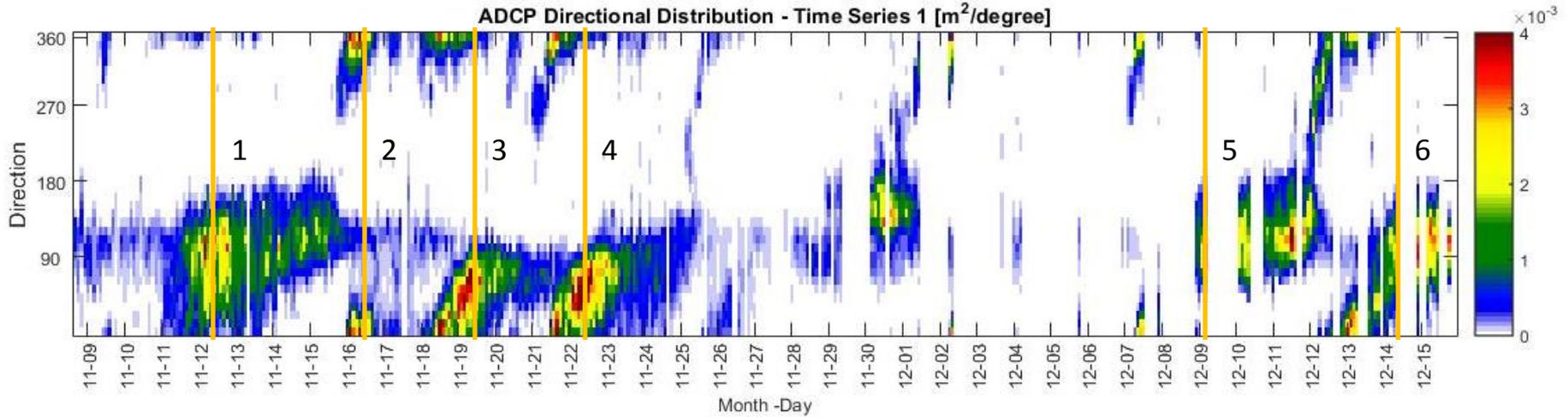


ADCP Frequency Spectra - Time Series 2 [m^2/Hz]

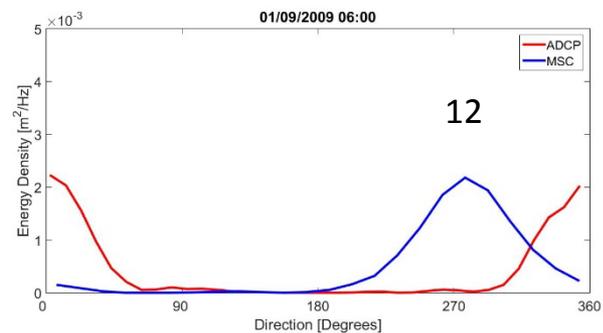
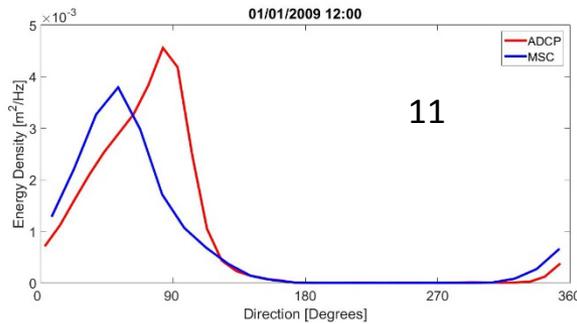
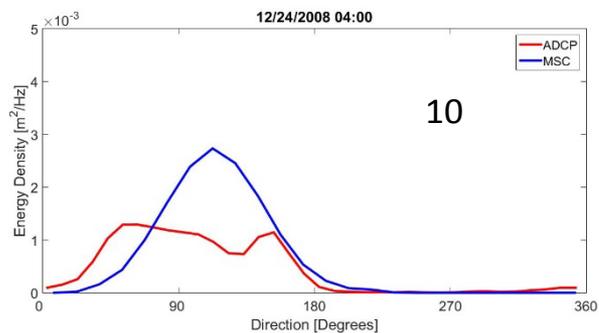
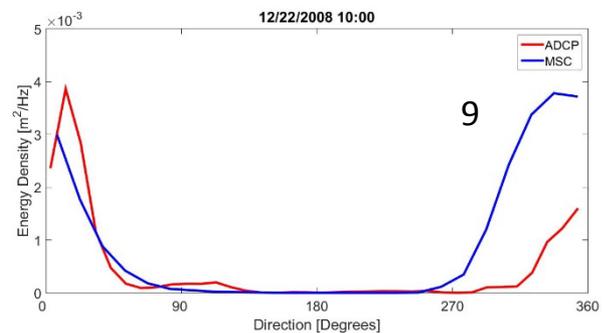
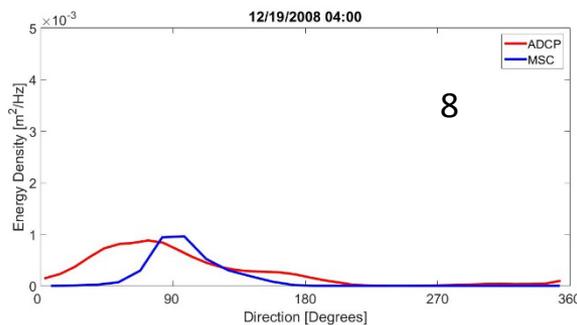
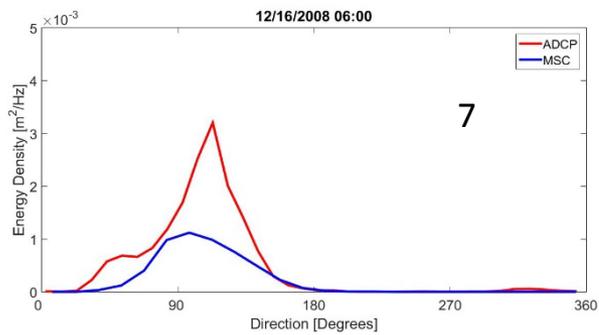
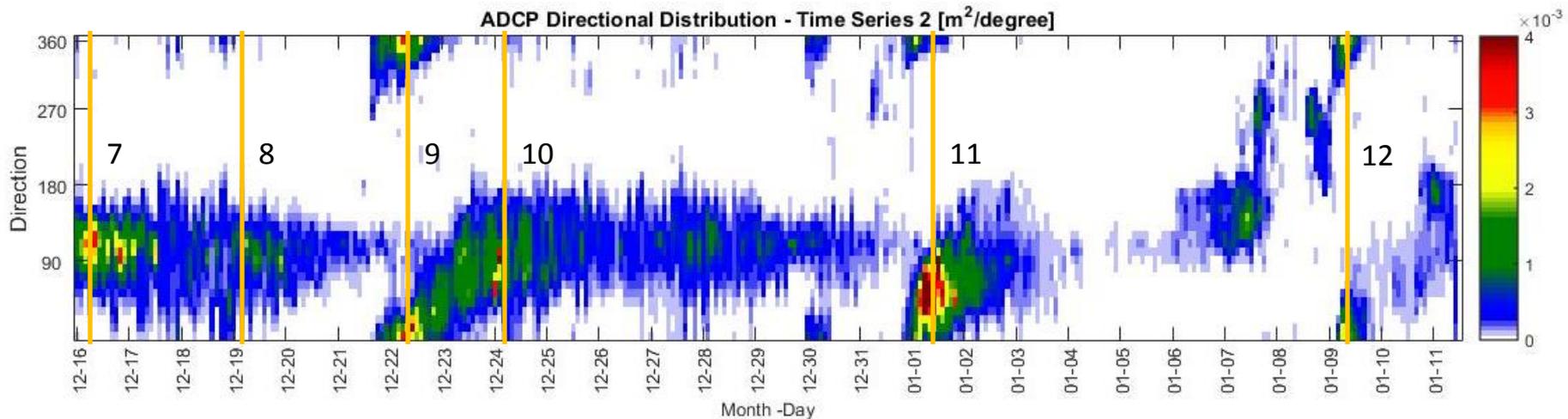


Spot Checks – Directional Distributions

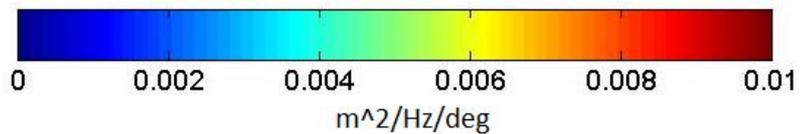
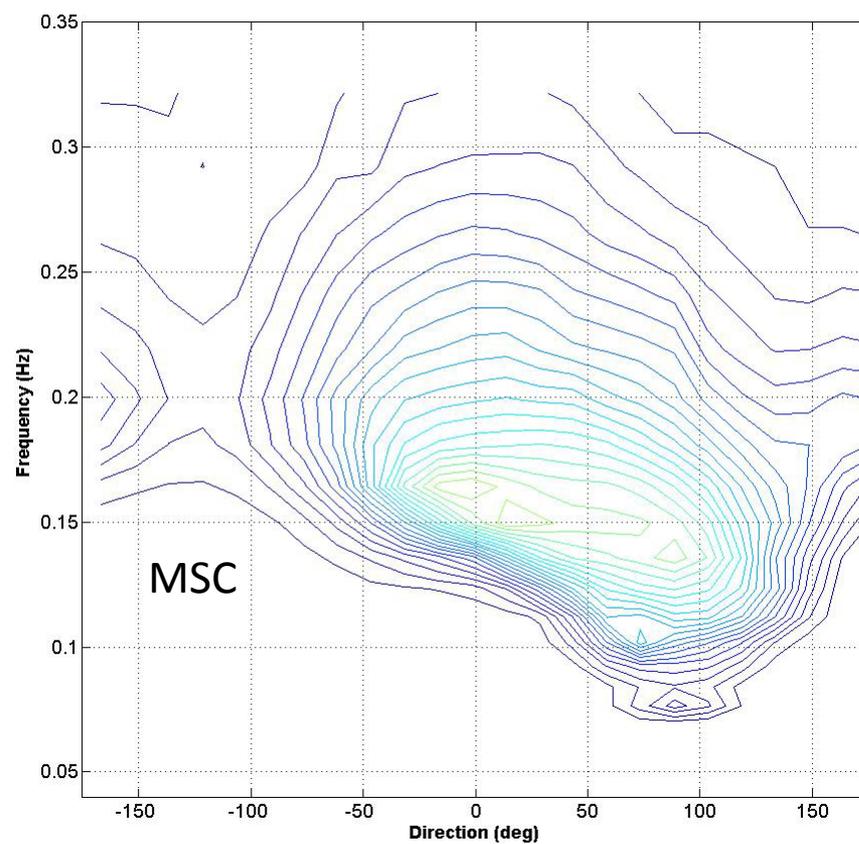
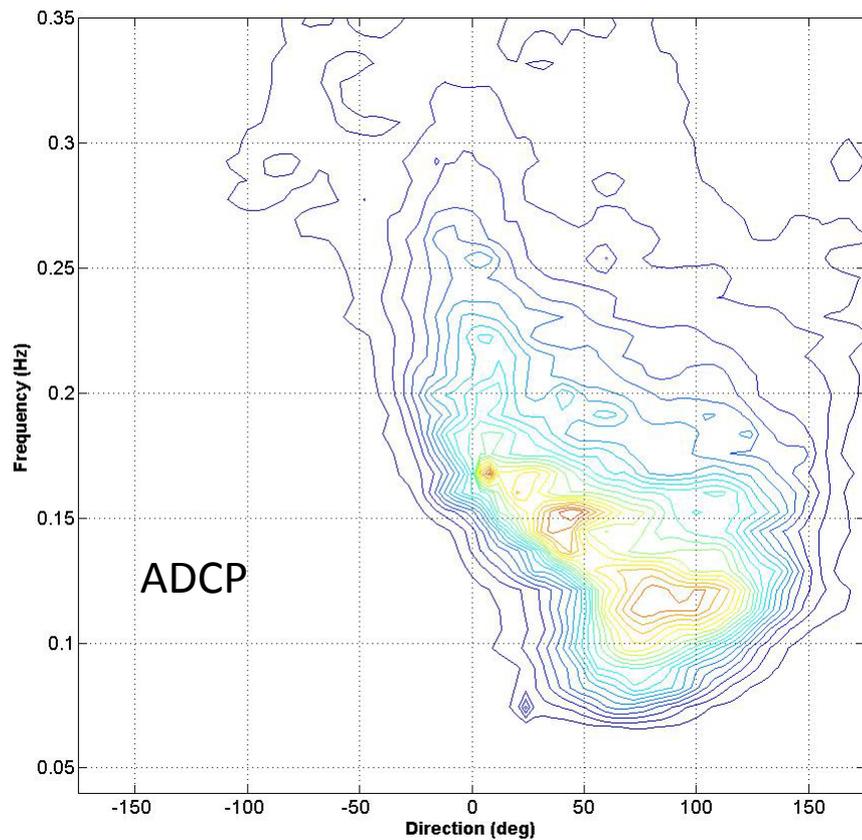
ADCP Directional Distribution - Time Series 1 [m^2/degree]



ADCP Directional Distribution - Time Series 2 [m^2/degree]



Average of all Spectra



Conclusions & Future Work

1. The comparison of deepwater hindcasts to high-fidelity ADCP measurements is encouraging.
2. Wave measurement technology/methodology has potentially outpaced modeling capabilities (good!).
3. The ADCP enables much greater directional resolution than can be obtained with buoys. Spectral spreading due to wave-wave interactions can be studied with greater confidence.