

# Northwest National Marine Renewable Energy Center

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## Global Marine Renewable Energy Conference

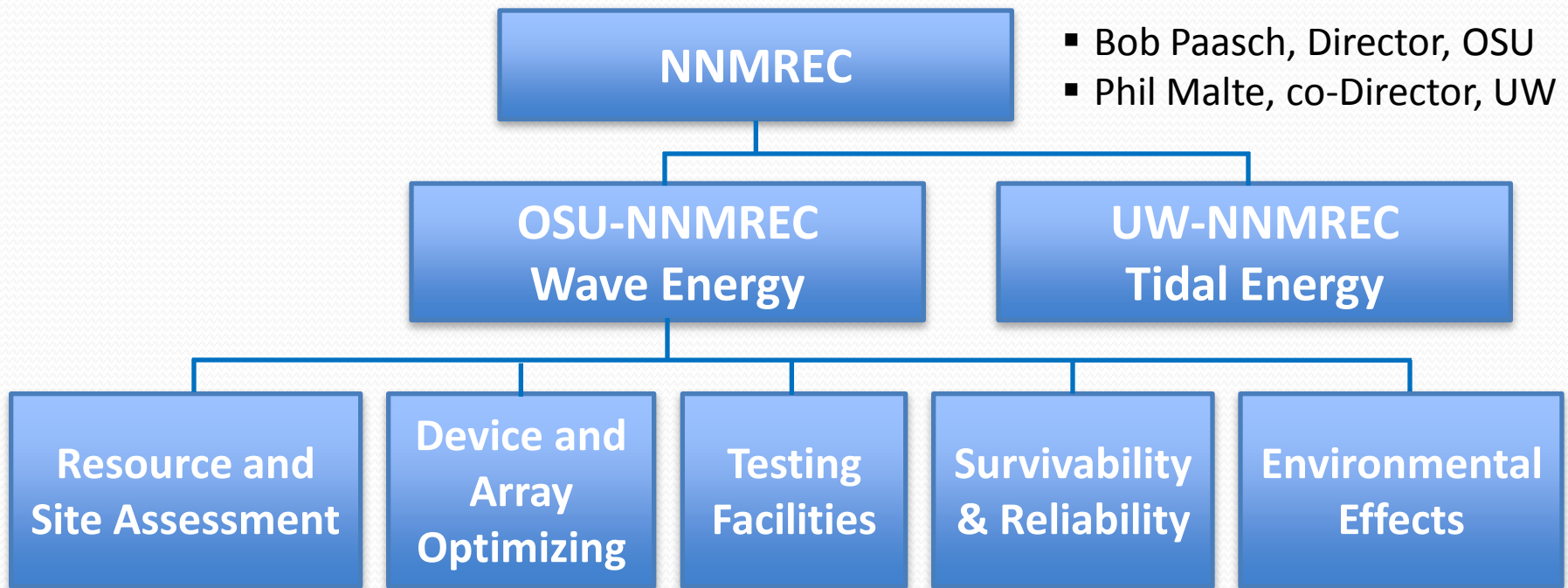
April 14, 2010

# The Northwest National Marine Renewable Energy Center (NNMREC)

- Partnership between Oregon State University (wave) & the University of Washington (tidal) sponsored by the U.S. Department of Energy
- Our charge is to develop a full range of capabilities to support wave and tidal energy development
- Virtual center focused on evaluation of marine renewable energy technologies centered around:
  - Technology
  - Environment (physical and ecological)
  - Human dimension



# OSU-NNMREC Research

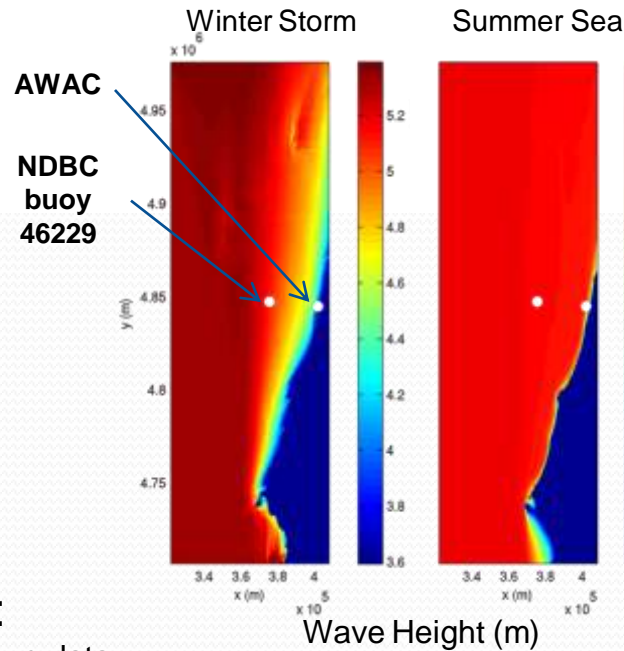


**10 Faculty members involved**

**8 Graduate student researchers supported**



# Collaborative Interdisciplinary Research



## Resource Assessment & Advanced Forecasting:

- Predictive models physically validated – quite accurate
- Refraction effects due to bottom features are seen
- Shadowing effects from shoreline features can be predicted

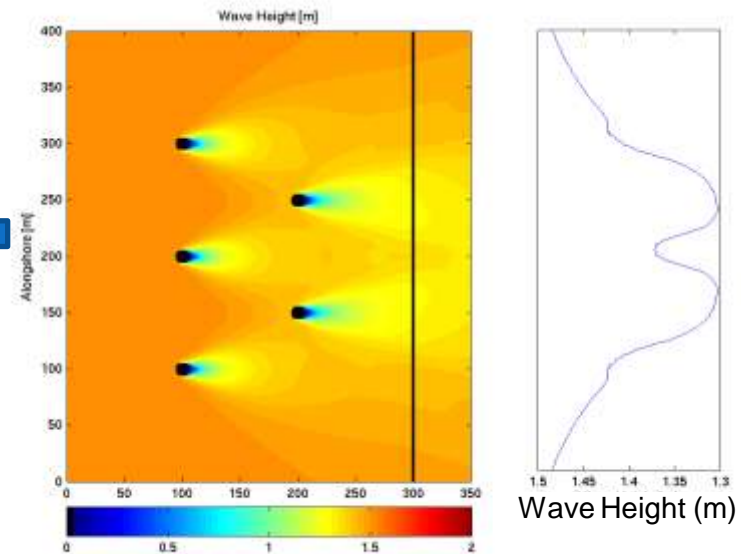
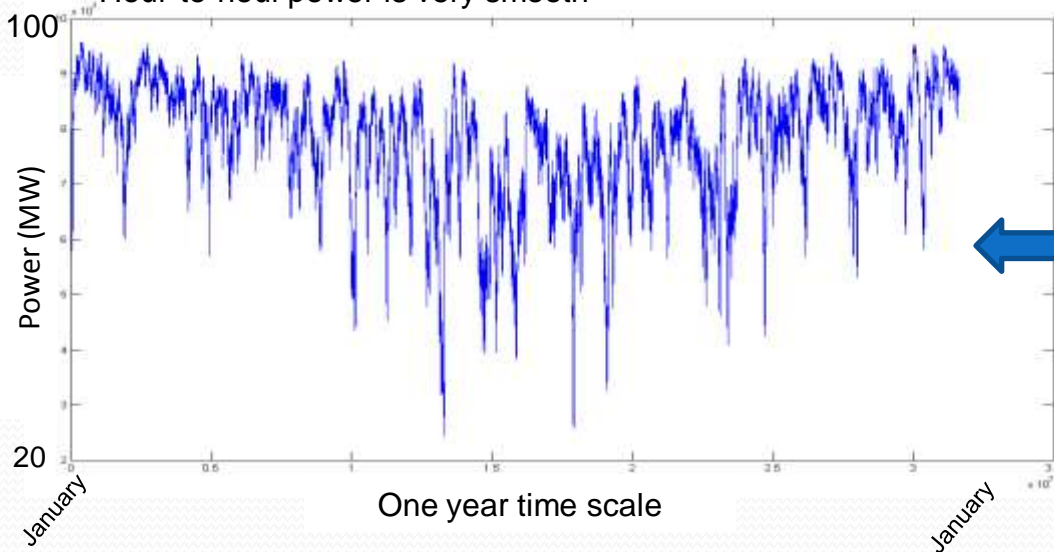
## Annual Array Power Output:

- Preliminary and empirical based on wave data
- Seasonal variability evident
- Power is rarely zero (unlike wind and solar)
- Hour-to-hour power is very smooth



## Possible effects of an array:

- Wave forecasting and hydrodynamic modeling to quantify height reduction in lee of device array and near the shore
- Validation with real devices needed



# NNMREC Scaling, Development & Evaluation Resources

## Model Validation at OSU Facilities

- 20kW Wave Energy Linear Test Bed (WESRF), 2m stroke
- Tank Testing in Regular and Irregular Waves (HWRL)  
Scale ( $\lambda$ ); 1:35-100  
TRL: 4 - 6

## Advanced Model Validation at OSU Facilities

- Tank Testing in Regular and Irregular Waves (HWRL)  
Scale ( $\lambda$ ); 1:15-50  
TRL: 4 - 6

## Field Testing (Intermediate Scale)

- Yaquina Bay, OR: Wind Waves: 0-0.2m in 7.6m water depth
- Puget Sound, WA: Wind Waves: 0-1m in 16m water depth  
TRL: 6 - 8

## Full Scale Device Testing & Demonstration Mobile Ocean Test Berth (MOTB)

- Newport, Oregon: Water depth 40-50m  
TRL: 7 - 9

