Feasibility of Tidal and Ocean Current Energy in False Pass, Aleutian Islands, Alaska (DE-EE0005624.000)

Presented to

DOE Tribal Energy Program Review

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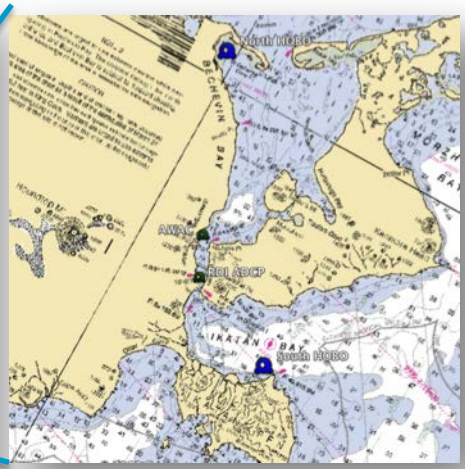
False Pass Alaska

False Pass is a remote community at the beginning of the Aleutian Chain

- Electricity is provided by diesel generators owned and maintained by the community
- Cost of Power in the community ranges from $0.36 - $0.42



- The City's load averages 40-50kW
- Community also sells power to the Bering Pacific Seafood (BPS) plant when their loads are modest, BPS has in-house diesel generation when loads exceed city's capacity
- BPS utilizes up to 300kW during peak months and has plans to expand load up to 1.5 MW with year-round operations

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False Pass Reconnaissance Study

Project Goal: to perform a feasibility study to determine if a tidal energy project would be a viable means to generate energy to meet long-term fossil fuel use reduction goals at False Pass

Project partners that helped make the study successful:

- The Aleutian Pribilof Island Association
- ORPC Alaska and ORPC Solutions (Ocean Renewable Power Company)
- The Aleutian Pribilof Island Community Development Association (APICDA)
- University of Alaska-Anchorage (UAA)
- National Renewable Energy Laboratory (NREL)
- Benthic GeoScience
- Marsh Creek

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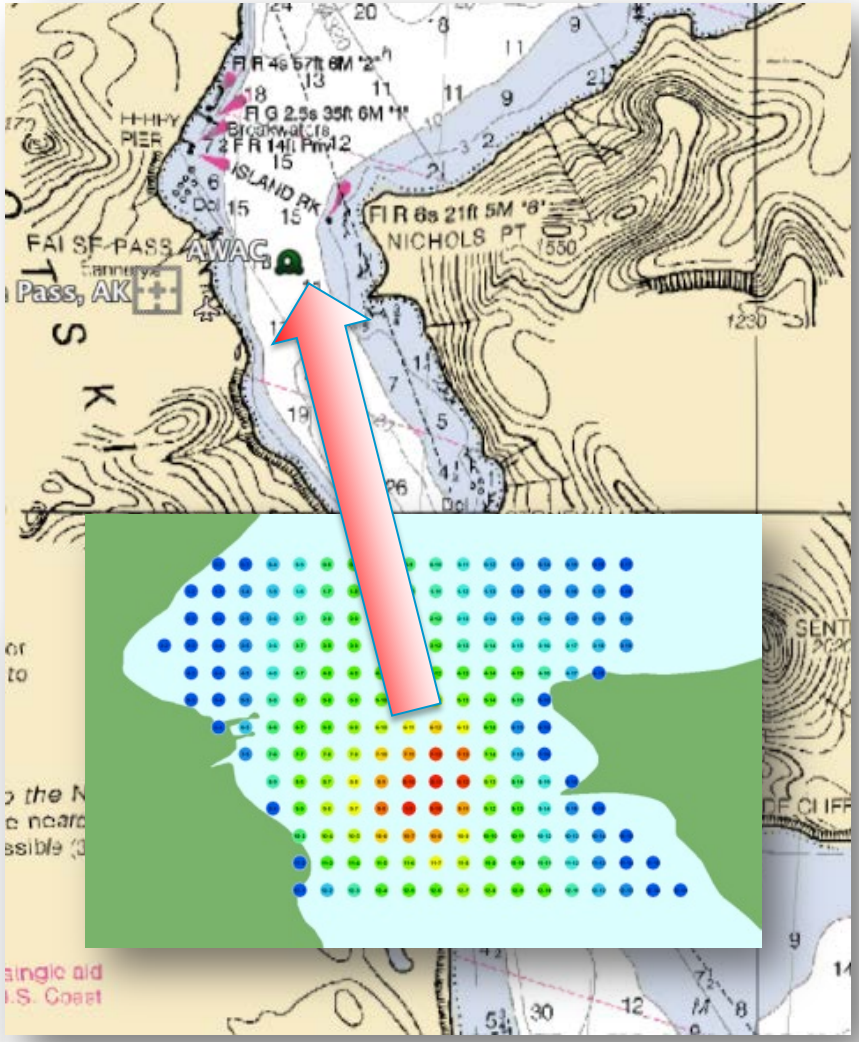
Candidate Site Selection

- Existing bathymetric and oceanographic data was collected and used by UAA to build a circulation model.
- Areas likely to have high current velocities and symmetric flow on flood and ebb tides were selected for current velocity measurements
- Local knowledge of area integrated into final site selection



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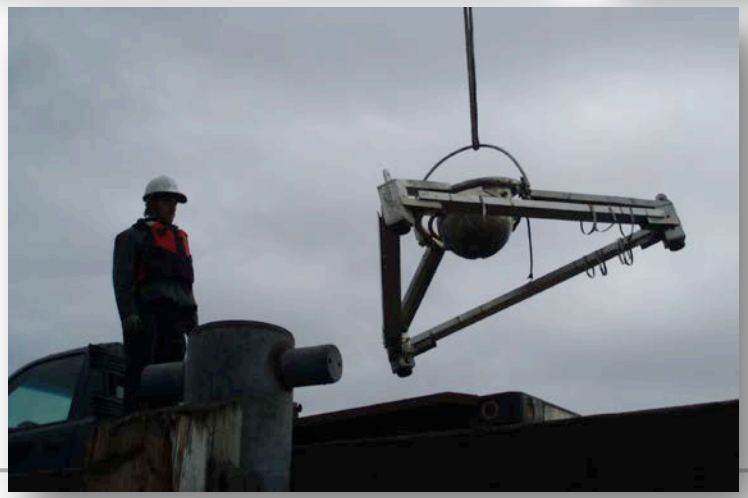
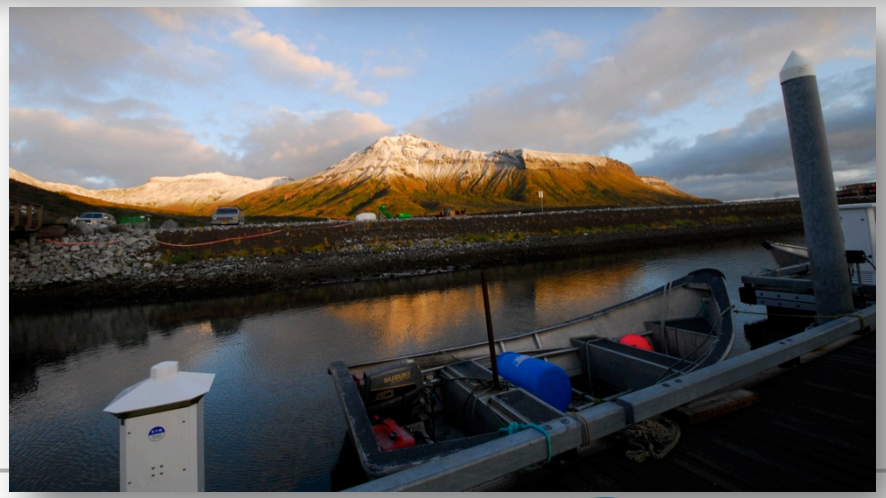
Team mobilized to field in late September to collect data on current velocities





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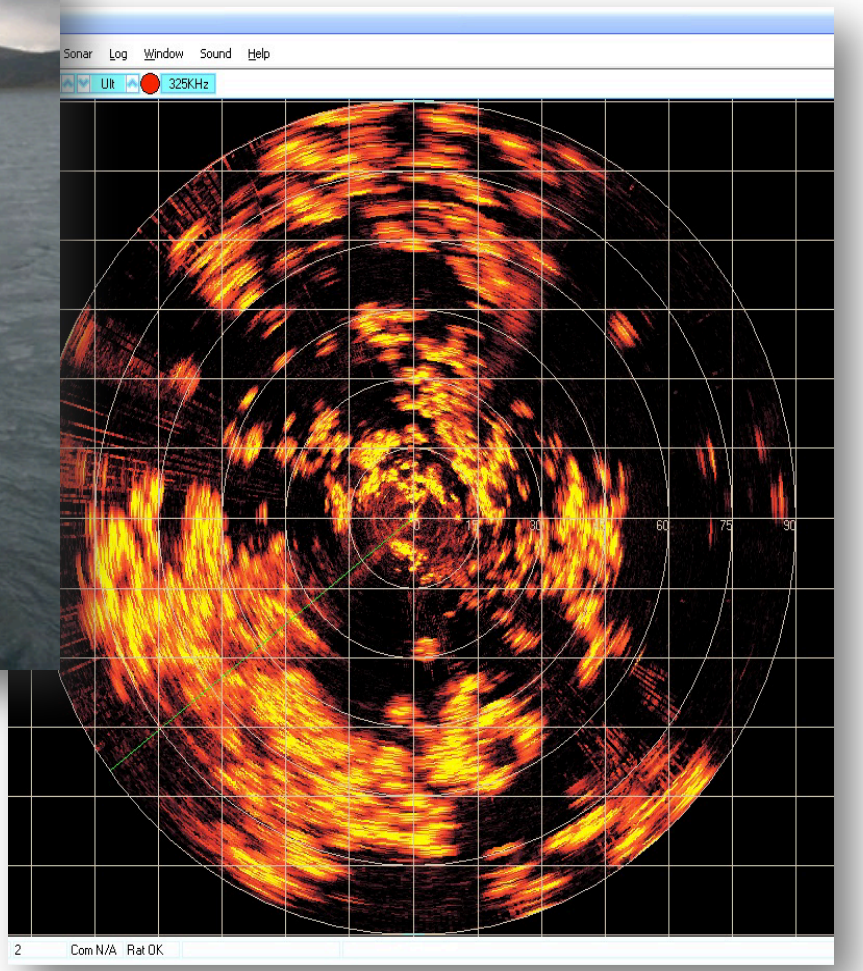
Hazard Assessment with Scanning Sonar



A bottom-mounted sonar was deployed to seven sites to assess hazards to successful ADCP deployment and retrieval.

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Two sites were selected and ADCPs were deployed.

- Current Velocity measurements are made using Acoustic Doppler Current Profilers (ADCPs) deployed for a full lunar cycle (29.5 days)
- One ADCP deployed at south (S2) site in narrow constriction of Isanotski Strait
- Second profiler loaned from NREL deployed at north (N2) site close to community near False Pass Harbor
- Both deployed with redundant recovery systems to enhance recovery probability in harsh environment.
-

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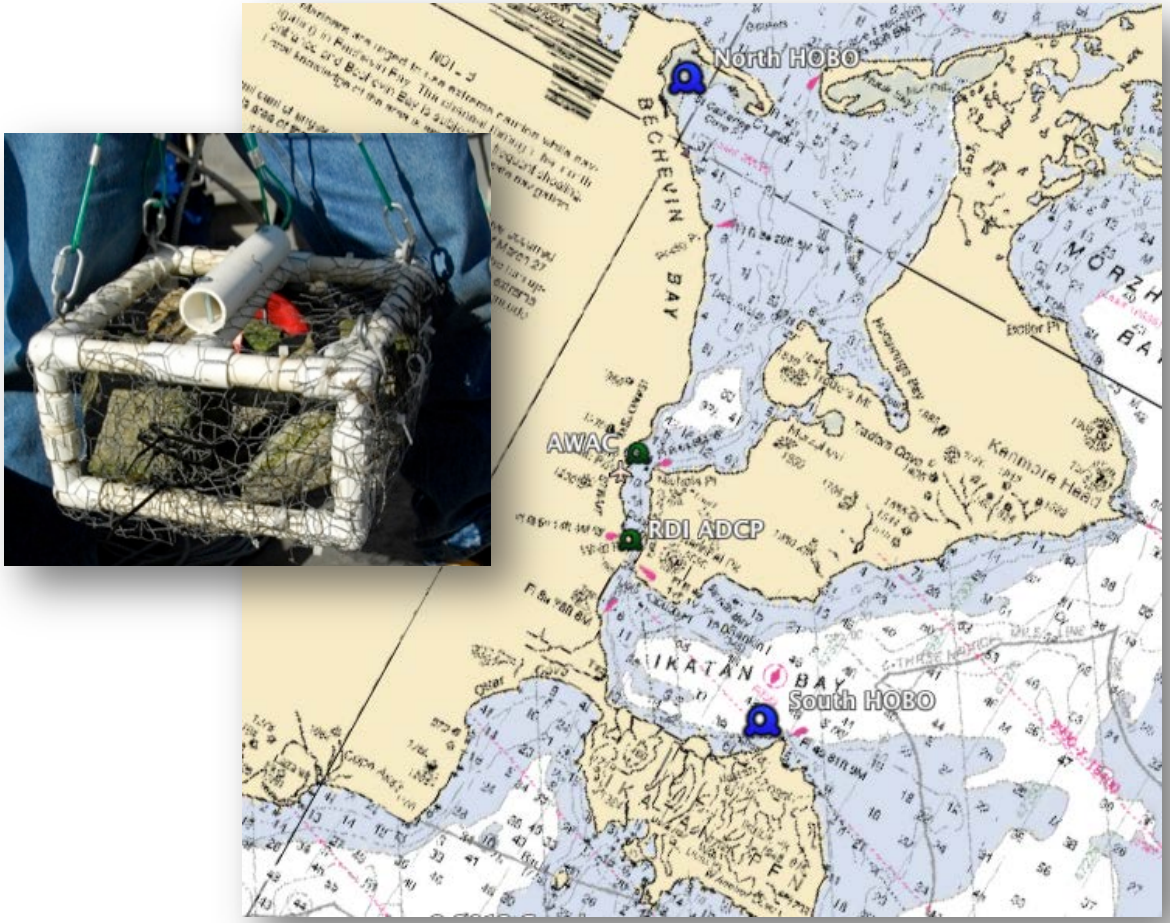
Two water-level sensors were deployed to enhance UAA circulation model.

- Water-level sensors deployed at southern and northern boundaries of modeling domain.
- Model then hindcast to cover ADCP deployment period to assess model validity and provide insight into finer scale location of future ADCP deployments.



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ADCPs recovered
(with some difficulty!)
on October 30 and
November 4.

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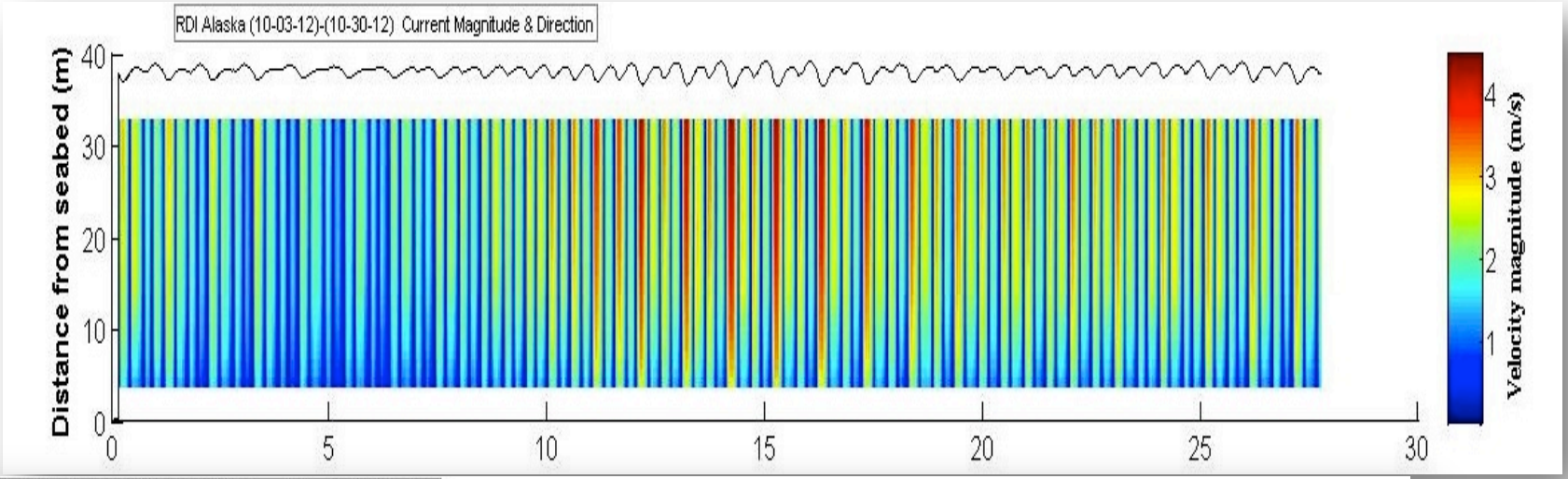
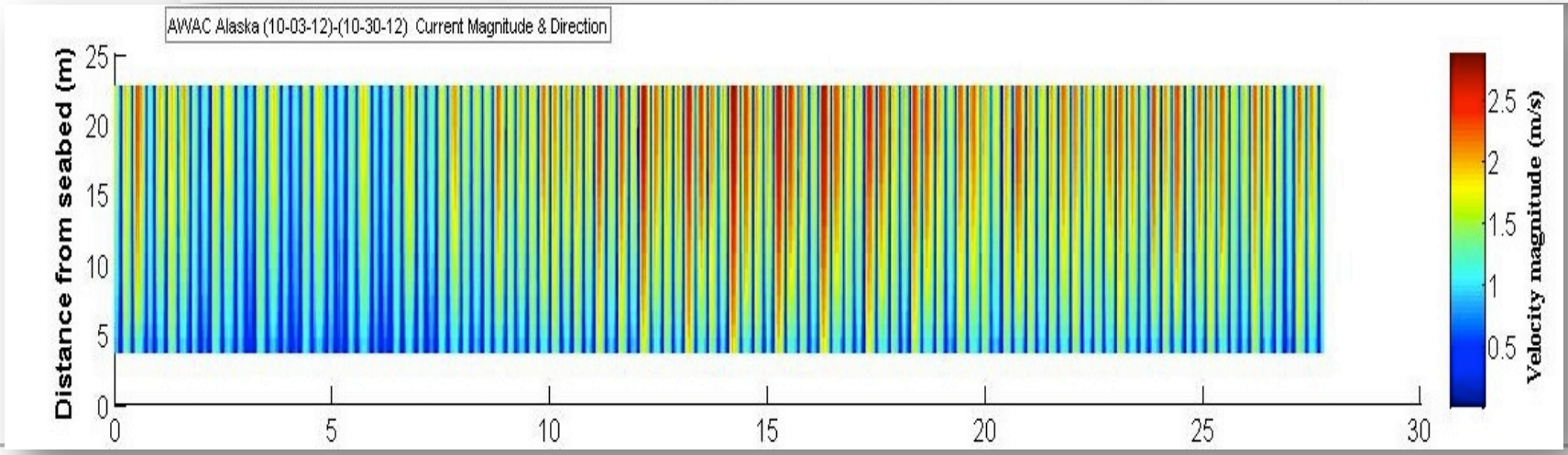
Data thru entire water column over deployment period

From site S2 (top) and N2 (bottom), 10.5 meters above sea floor





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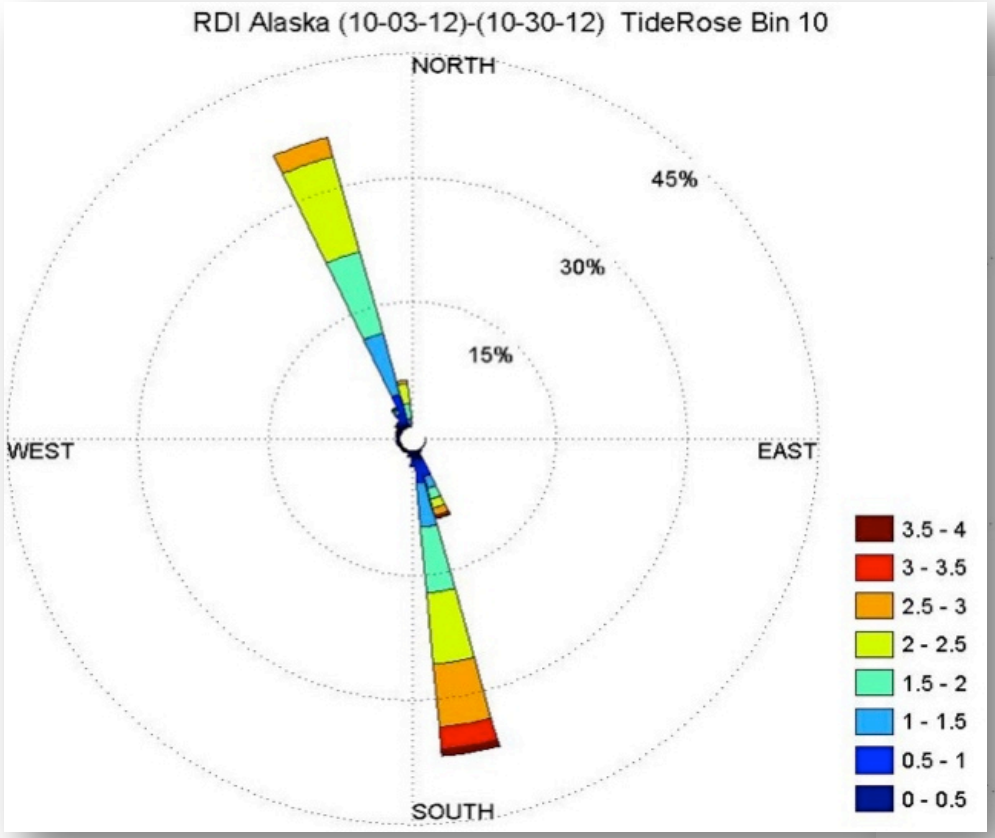
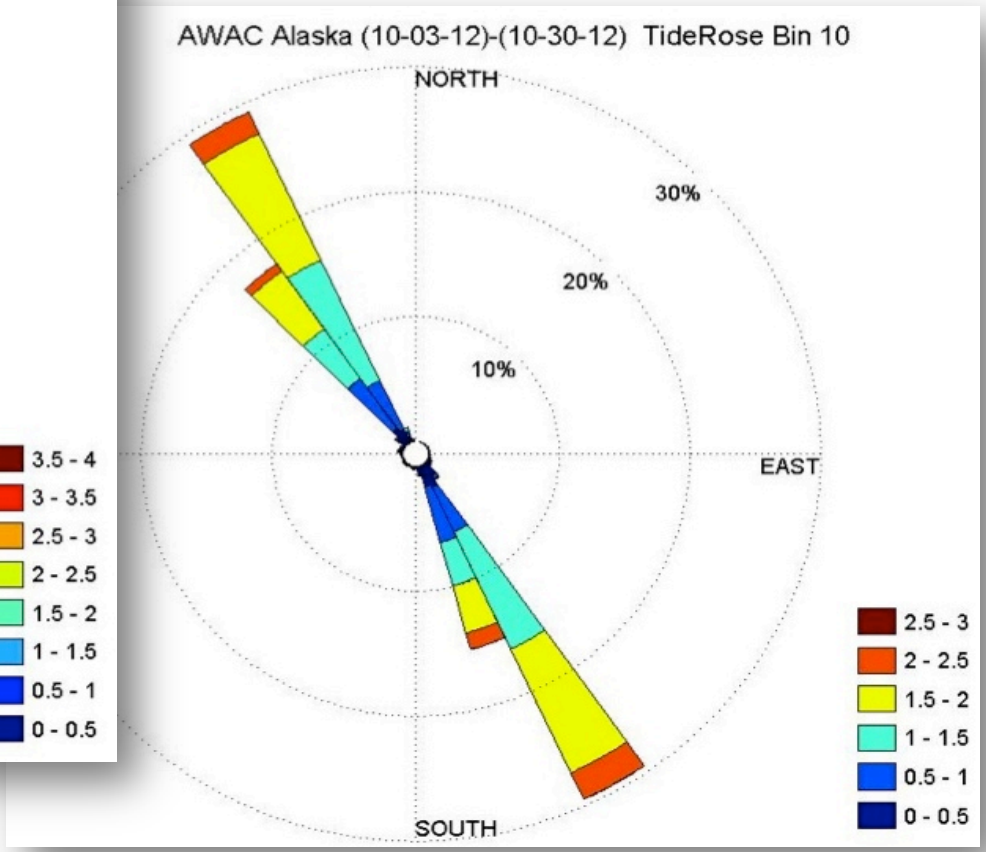
Tide Rose data to assess magnitude and flow symmetry

From S2 (left) and N2 (right) ~ 10.5 meters above seafloor





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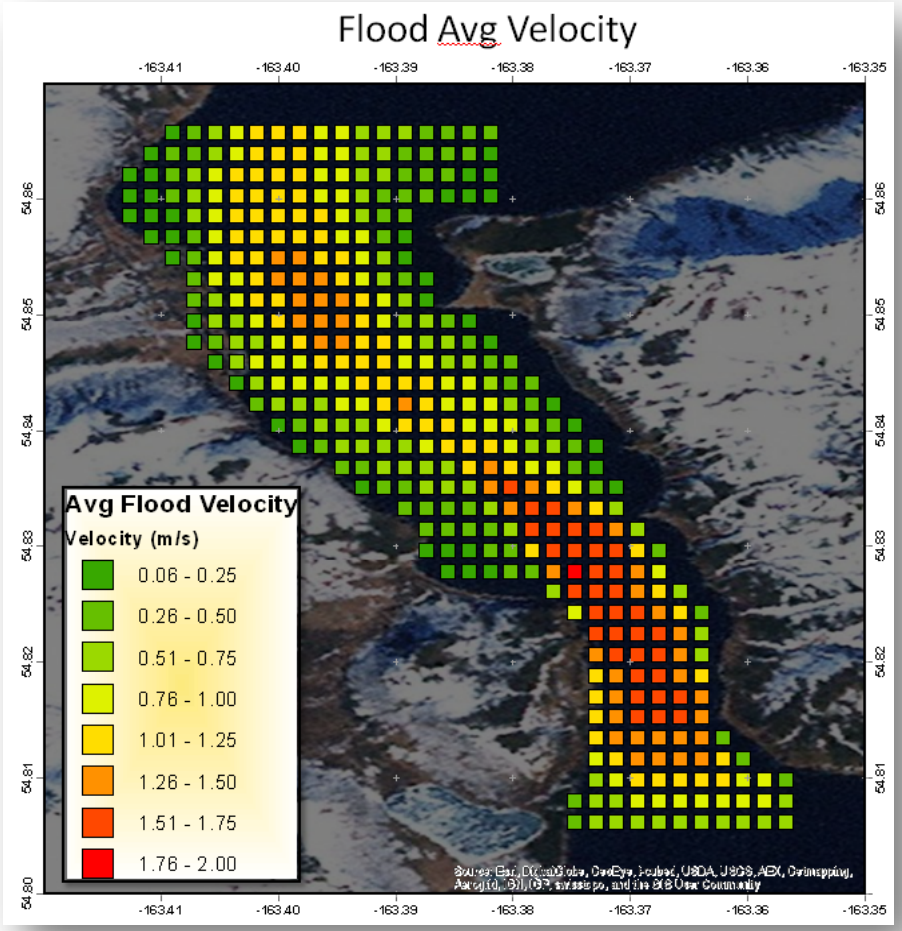
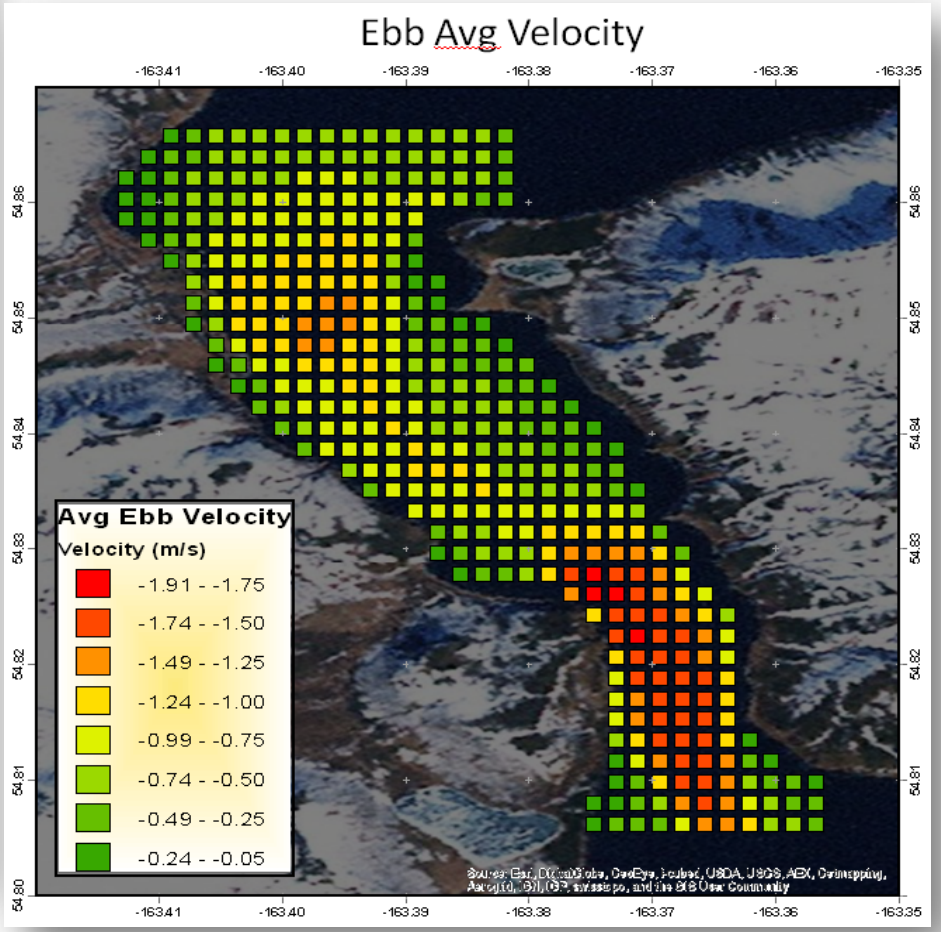
UAA modeling updated with water level and ADCP data





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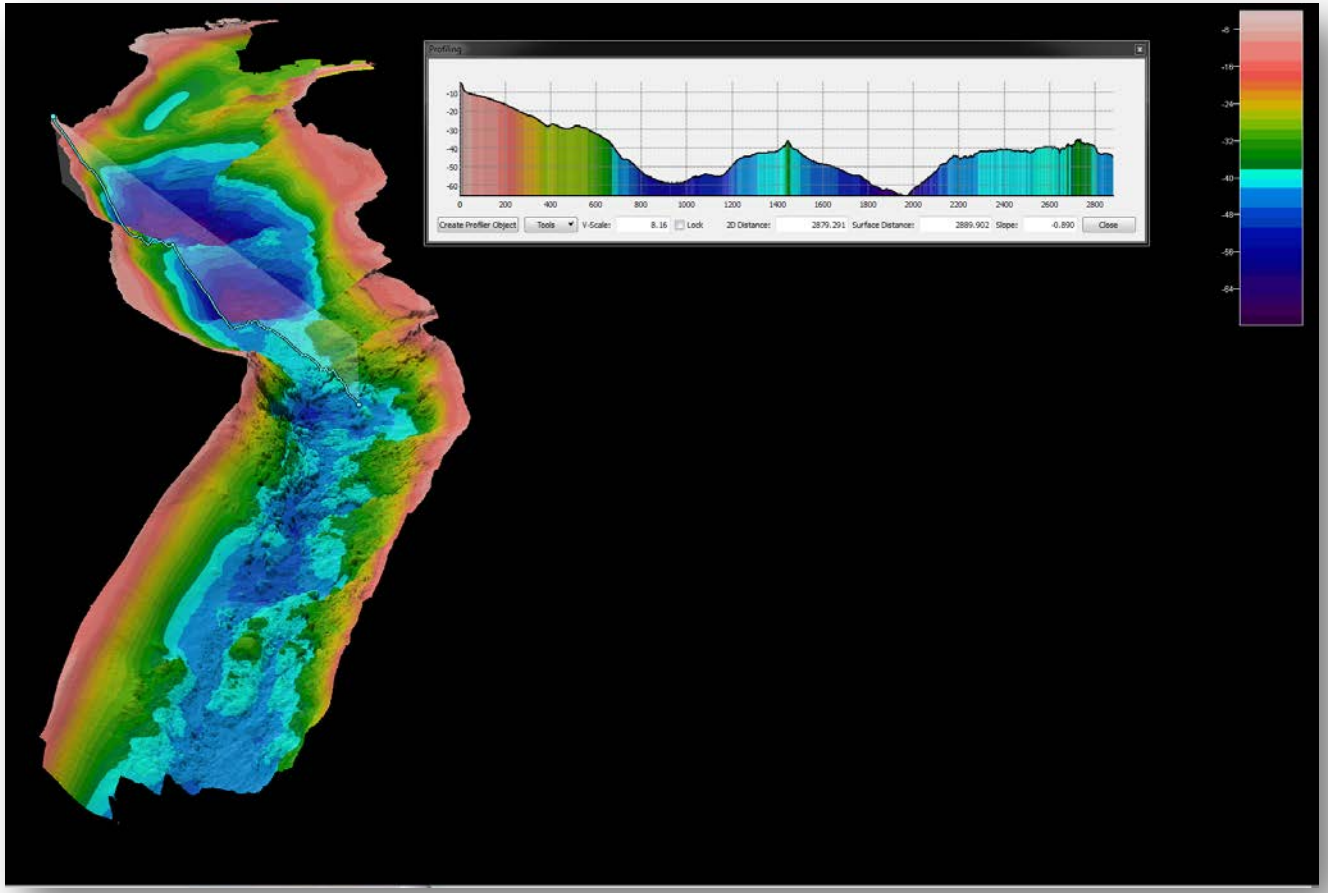
Bathymetric survey of entire project area completed

- SouthWest Alaska Municipal Conference (SWAMC) given $150,000 in AEA programmatic funding
- Benthic GeoSicence contracted to complete survey in August 2013
- APICDA provided vessel support as cost share
- AEA has provided additional $25,000 in funding to UAA to enhance modeling effort (yet to be completed)



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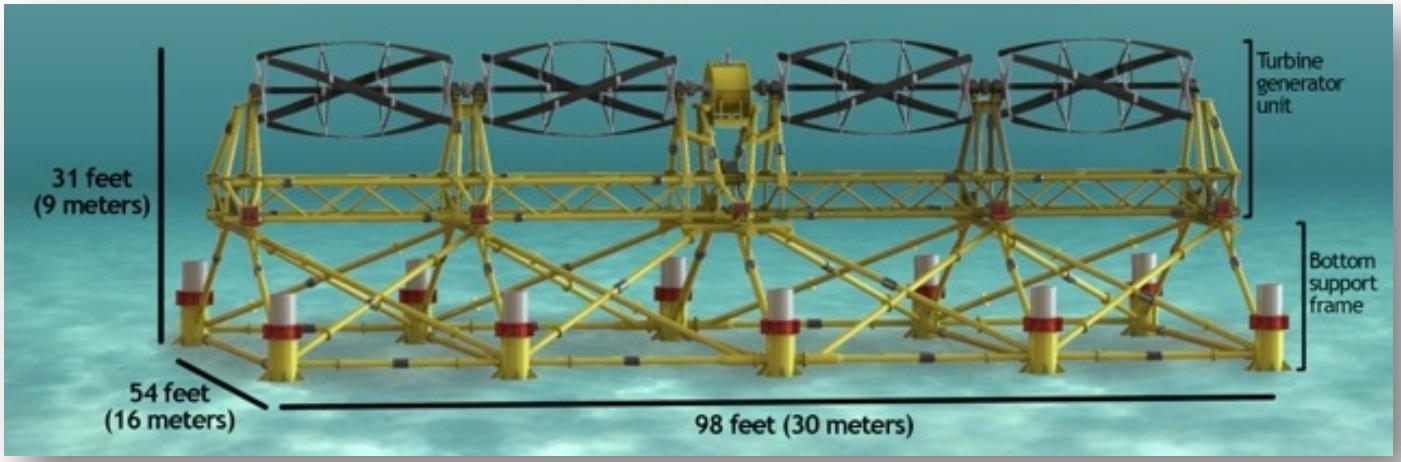
Potential Recoverable Energy

Using ORPC's TidGen® Power System parameters rated at 150kW in a 5.4 knot current

Site	N2 10.5 m above seafloor	S2 10.7 m above seafloor
Annual recoverable energy	284,490 kWh Capacity Factor 21.6%, 50% of annual community load	577,655 kWh Capacity Factor 43.9 %, 100% of community load



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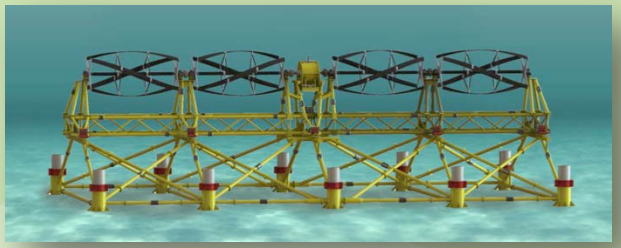
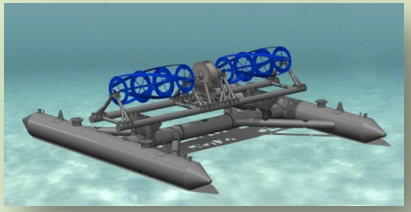
ORPC Power Systems

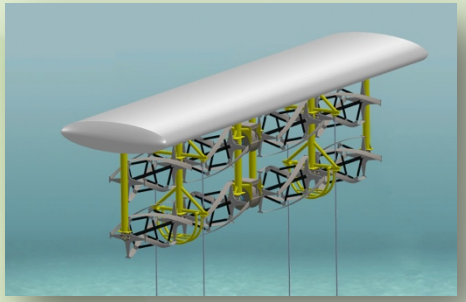


TidGen® Power System
150 kW* 2012



RivGen® Power System
25kW* 2014

OCGen® Power System
600kW* 2016



TidGen® TGU

Cobscook Bay, Maine Tidal Energy Project

- Single device TidGen® Power System connected to Bangor Hydro electric grid in September 2012.
- First grid connected hydrokoinetic tidal energy project in the Americas

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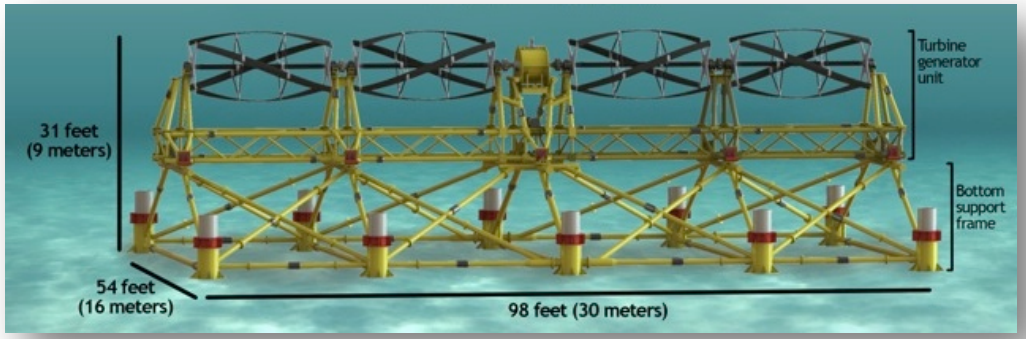
Cobscook Bay, Maine Tidal Energy Project



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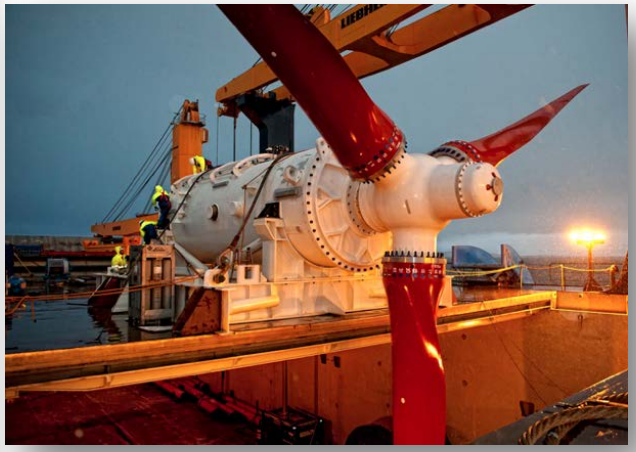
Tidal energy technologies around the globe



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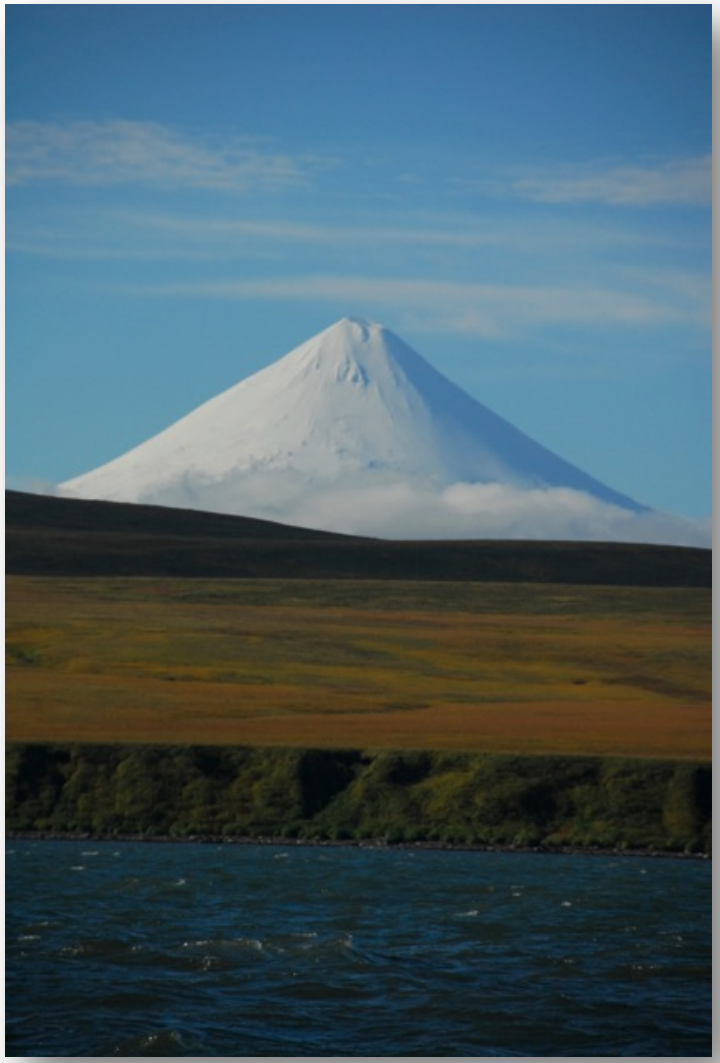
Next steps in development of False Pass tidal current resources

- Refine UAA modeling
- Expand upon resource assessment work
- Scope environmental issues and begin Study Plans
- Perform conceptual design and refine economic analysis



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Thank You!
Questions?

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