



Evaluation of Marine Renewable Energy (MRE) Resources: The Benefits of Earth Observation Systems

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1



What are we talking about?



□ Marine Renewable Energy (MRE) Technologies

- Ocean Thermal Energy Conversion (OTEC)
- Tidal currents
- Waves

□ Earth Observation Systems (EOS)

- Remote sensing (satellites and radars)
- In-situ
- Numerical models

Measurements



Main Variables Thermal energy (OTEC)





$\Delta T > 20^{\circ} C$



Main Variables Hydrokinetic energy (waves - tidal currents)



Island energy transitions: Pathways for accelerated uptake of renewables



Earth Observation Systems (EOS) CONTRACTOR INTERNAL





Principle of resource assessment







Global OTEC resource





7



Global OTEC resource



$\Delta \text{T},$ 0-1000m, June 2012



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Global tidal current resource



Tidal current average velocity – IRENA Global Atlas





Global wave power resource



Annual mean wave power density



Source: Gunn and Stock-Williams, 2012



Relevance of EOS







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IREMARE: end-user oriented characterization of the resource





Technical Data Point-specific





Wave peak direction for point 45879





Roadmap for MRE resource assessment, ~3 to 5 years



Development of an MRE project

Assessment from global seastate hindcasts – a few months – low cost

Assessment from dedicated sea-state hindcast (high resolution, ~20 year simulation) + Onsite measurements for calibration/validation – a few years – moderate costs

Extensive onsite measurement

Site-specific forecasting system

calibration/validation/benchmarking -



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network for







ACCURATE (MRE) RESSOURCE EVALUATION CAN NOT BE DISREGARDED IN THE FRAMEWORK OF AN ACTION PLAN FOR ACCELERATING UPTAKES OF RENEWABLES



Color Maps Regional/Site scale



Techno.-specific electricity production (kWh/kW installed)

