

Deltares – Japan
Exploring Collaboration & Opportunities in Offshore Wind



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Japan – The Netherlands

- High population density: 336 499 / km²
- Metropolitan Areas: Kanto, Kansai Randstad
- Long coast lines: 29,000 km 1,900km
- Land reclamations: Odalba, Kansai IA Flevopolders
- Important inland waters: Biwako, Seto Nai Kai IJsselake
- Nuclear energy: MHI Sinop Borssele
- High agricultural stakes rice, grass, potatoes, grain
- International fishery sectors
- Wind energy: Kamisu, Sakata Egm. a. Z., Prinses Amalia
- Johannis de Rijke
- Anton Geesink
- Kelsuke Honda...

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Presentation

- > What is Deltares
- > Introduction: Japan – The Netherlands
- > Overview of projects and research
- > Cooperation and Opportunities
- > Focus on Offshore Wind!




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Important topics


Japan and The Netherlands share important topics:

- > Climate change and flood prevention
- > Dike stability
- > Salt intrusion
- > Water quality
- > Coastal erosion
- > Effects of cooling water & industrial use: fish impingement, thermal impacts
- > Smart sewage and water transport infrastructure
- > Sustainable energy: wind & tides

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About Deltares

Deltares is an independent institute for applied research in the fields of water, subsurface and infrastructure



- > applied research & specialist consultancy
- > focus on water safety, availability of resources (energy and water), and ecology
- > advise on infrastructure and policy making
- > independent: serving industries and governments
- > strong specialist teams on engineering subjects
- > extensive hydraulic/geotechnical laboratories and computer modeling facilities
- > more than 800 MSc/PhD staff (> 28 nationalities)
- > main offices in Delft and Utrecht, The Netherlands
- > branch offices in Singapore, USA, Jakarta, Abu Dhabi/Dubai, Rio de Janeiro

Deltares is a merger since 2008 of WL | Delft Hydraulics, Quedt and parts of THD and Rijkswaterstaat (RWS, RZA en DMW)

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Recent cooperation

- Urban Water Management (with TU Delft)
- Assistance in Tohoku recovery (academic studies)
- Tai Sei – Guest Research at Deltares
- Turkey NPP development – Mitsubishi Heavy Industries
- India Desalination Plant Development – Kajima & Hitachi


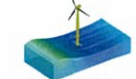



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Deltares and activities in offshore wind

Deltares' topics in offshore wind:

- Hydrodynamics**
 - ✓ Metocean / environmental conditions
 - ✓ Hydrodynamic design conditions (waves, currents, water levels)
 - ✓ Operational forecasting systems (for installation and O&M)
 - ✓ Wave loads / impacts on foundations
 - ✓ Vortex-induced-Vibrations of cables
- Geotechnics**
 - ✓ Geotechnical design of foundations (e.g. cyclic liquefaction)
 - ✓ Pile installation techniques (impact-driving, vibrating)
 - ✓ Cable burial techniques (jetting, ploughing, trenching, self-burial)
 - ✓ External threats to electricity cables (anchors, fishnets, objects)
- Morphology & morphodynamics**
 - ✓ Scour and scour protection of all kinds of foundations
 - ✓ Offshore geology, seabed characteristics
 - ✓ Bed level changes due to morphodynamics (e.g. sand waves)
 - ✓ Cable routing and site selection in morphodynamic areas
- Offshore surveying**
 - ✓ One-sweep-survey


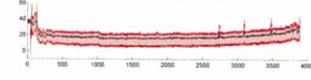
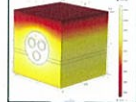
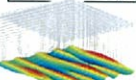




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FLOW-CABLES: Cable monitoring and morphodynamics

Research Goals:



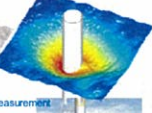
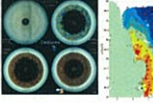
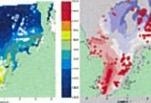
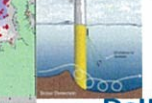

- Online determining of burial depth of electricity cables with DTS-technique (Distributed Temperature Sensing), resulting in a continuous measurement of cable safety against anchors and thermal bottlenecks
- Development of morphological models for dynamic seabed features (e.g. sand waves) to improve cable routing (new projects) or predict possible risk areas (existing projects). These models will be calibrated with the above measurement system.

Eneco, Van Oord, IHC, TU Delft, Deltares

FLOW-SCOUR: Scour Prediction, Monitoring & Mitigation

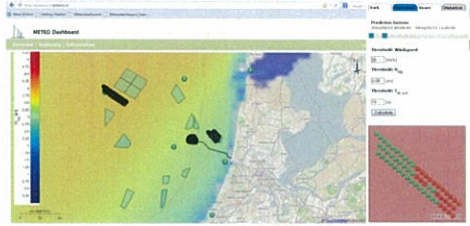
Goal: Reduce conservatism in scour prediction and design of scour protection to enable well-founded decisions between omitting or applying scour protection.

Van Oord, Eneco, Deltares

FLOW-METEO DASHBOARD

Snapshot of METEO Dashboard: zoomed in at Dutch wind parks for real-time prediction of environmental conditions



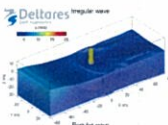
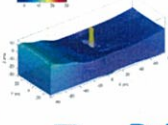
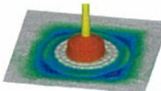

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FLOW-GBS: Gravity Base Structures

Goal: Design of alternative foundation for water depth range between 30 and 50m, based on principle of Gravity Base Structures

Research topics for Deltares:

- > Cyclic response of soil (cyclic liquefaction potential)
- > Scour protection design and installation method
- > Wave loads (incl. breaking waves)

RWE, bam, Van Oord, Deltares

JIP WIFI: Wave Impact on Fixed structures

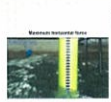
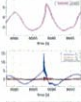

Scope: Wave impact against wind turbine foundations

JIP-partners:

- > industry (o.a. Ramboll, Storkraft & turbine manufacturers, contractors)
- > certification (GL, DNV)
- > research institutes (ECN, Marin en Deltares)

Deltares' focus:

- > Breaking wave kinematics in shallow water
- > Effect of sand waves and wave-current-interaction
- > Statistics of breaking wave occurrences

VATTENFALL, DONG, e.on, SRNL, STX, SIEMENS, RAMBOLL, KEMAR, GL, Ballast Nedam, ECN, MARIN, Deltares

JIP WindJack

- aimed at application of wind turbine installation vessels (jack-up-type)
- goal = increase workability criteria (with higher sea states)
- research questions:
 - vessel movement just before 'touch down' and just after 'lift off' + impact on spud cans / legs
 - geotechnical response during spudcan penetration
 - interaction between the above

Logos: HYUNDAI, Koppel, FELS, Van Oord, SEAWAY, SWIRE BLUE OCEAN, WITSILA, RWE, MARIN, Deltares

Future perspectives

Ways of collaboration:

- specialist consultancy
- (joint) contract research
- (joint) experiments (laboratory / field)
- collaboration/on-the-job training
- exchange of experts
- review and second opinion
- tool development
- expert input to projects
- knowledge transfer
- open source software
- capacity building workshops

Logos: Deltares, tares

Thank you for your attention!

¿Questions?

Dolwin-2 transformer platform in German Bight (North Sea)

More Information?
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