Large and small scale changes in macrobenthic communities in Belgian Offshore wind farms

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Introduction & methodology

- Up till now only small-scale, operational effects detected in the Thorntonbank OWF → related to changing hydrodynamics and organic enrichment
- Belwind NV completed phase I in 2009 on the Bligh Bank with 55 monopile foundations
  - First macrofaunal samples taken inside Belgian OWF at a large-scale (> 200 m distance from foundations)
  - Fishery exclusion inside concession area (blue area on map) → will this effect the native macrofauna living in the soft sediments?
  - Will there be a higher food availability inside OWF? → detrital flux down to the seabed from the colonised foundations

- BACI-design on Bligh Bank
  - 2008 (Baseline)
  - 2009 (During construction)
  - 2010 - 2012 (after construction → operational effect monitoring)
  - 2011 & 2012 → 4 stations sampled inside impact area
- Sampled with Van Veen grab
- Monitoring areas
  - Impact area & Border (Concession area, Fishery exclusion)
  - Outer border & Future impact area
  - Reference Goote Bank

Important results

- No changes in species abundance, diversity or biomass (univariate)
- Differences in macrofaunal assemblage or species composition (multivariate analysis) between areas
  - Based on abundance: Impact & Border ≠ Outer border & Future impact area
  - Based on Biomass: Impact area ≠ Outer border & Future impact area
- Goote Bank and impact area significantly lower median grain size
- No changes in Total organic matter content (TOM %)

Conclusions

- Macrofauna community and grain size on Goote Bank significantly different to all areas, during all years → not an ideal reference bank
- First signs of changes in macrofaunal species composition in the operational phase of Belwind OWF with 55 monopile foundations 2 - 3 years after construction at a large-scale
- Only after longer-term monitoring the exact large-scale effects will be determined
- Changes due to fishery exclusion within OWF? Higher food availability? Changing hydrodynamics? → Focus on food web interactions

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* Belwind offshore Energy

PCO plot averaged multivariate abundance data

5 most abundant species (Based on Simper, Primer)
- Impact
  - Nephtys cirrosa
  - Ophelia borealis
  - Bathyporeia elegans
  - Bathyporeia guilliamsoniana
  - Spio sp.
- Border
  - Nephtys cirrosa
  - Bathyporeia guilliamsoniana
  - Spio sp.
  - Bathyporeia elegans
  - Aonides paucibranchiata
- Outer border
  - Nephtys cirrosa
  - Glycera sp.
  - Spio sp.
  - Nephtys juvenilis
  - Spio sp.
- Future impact area
  - Nephtys cirrosa
  - Glycera sp.
  - Aonides paucibranchiata
  - Spiophanes bombyx
  - Urothoe brevicornis
- Goote Bank
  - Nephtys cirrosa
  - Spio sp.
  - Spiophanes bombyx
  - Ophelia borealis
  - Urothoe brevicornis

- Impact & Border (Concession zone)
- Outer Border
- Future impact area
- Impact 
- Border
- Outer border
- Future impact area
- Goote Bank