

# MICORE Workshop

WP3 – Site monitoring

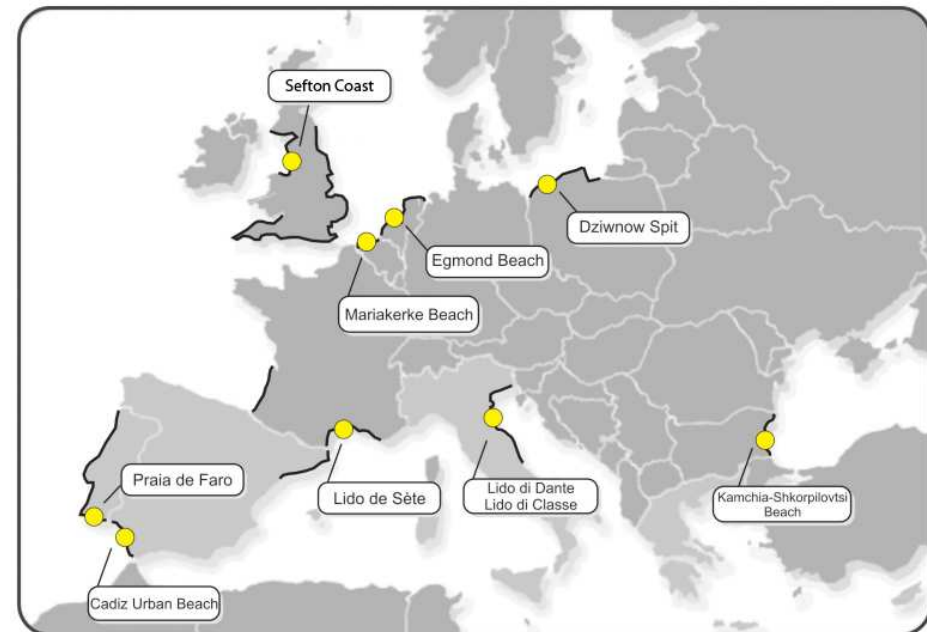


# Overview


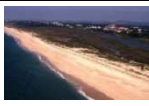







- Aim of MICORE WP3
- Aims for the Belgian test site
- Measurements & measurement locations
- Results and analysis
- Conclusions (WP4, future EWS)

# Aim of WP3

- MICORE objectives WP3:
  - Monitor field sites with pre- and post- storm beach profiles
  - Provide support measurements for model calibration (WP4)
  - Characterise storm processes and storm impacts (socio-economics)



# Aim of WP3

Country	Field site	
Italy	Lido di Dante- Classe	
Portugal	Ria Formosa, praia de Faro	
Spain	Cadiz Bay, Cortadura, camposoto	
France	Lido of Sète to Marseillan	
UK	Sefton coast	
NL	Egmond	
Poland	Dziwnow Spit	
Belgium	Mariakerke	
Bulgaria	Kamchia - Shkorpilovtsi beach	

## Variability of coastal environments

### Tidal conditions

No tide: Dziwnow, Shkorpilovtsi

Micro-tidal range: Lido di Dante, Lido de Sète

Meso-tidal range: Praia de Faro, Cadiz Bay, Egmond

Macro-tidal range: Sefton coast, Mariakerke

### Wave exposure

Low to high wave energy

### Geomorphology

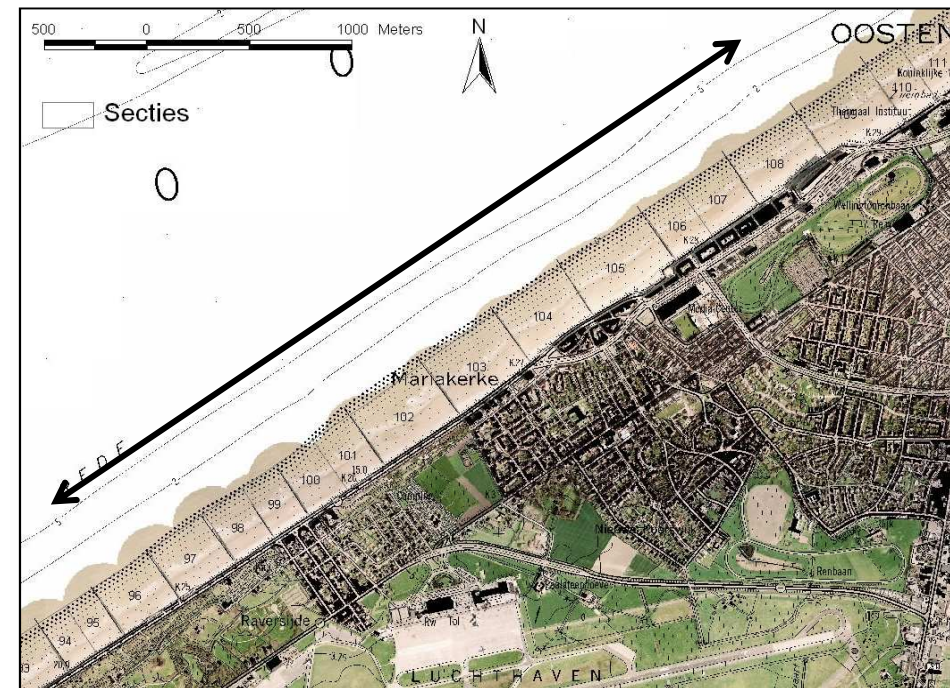
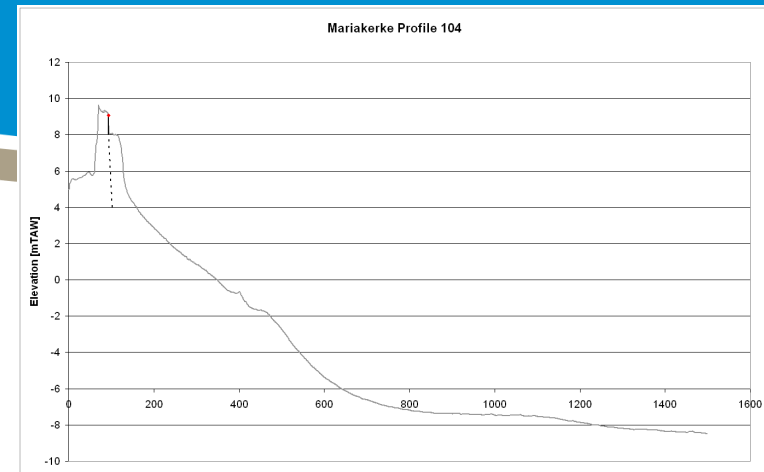
Barriers: Lido de Sète, Praia de Faro, Dziwnow, camposoto

Open beaches: Lido di Dante, Egmond, Mariakerke, Shkorpilovtsi

Estuarine beach: Sefton coast

# Aims for the Belgian test site

- Aims of the monitoring at Mariakerke beach:
  - Monitor storm induced changes by regular monitoring
  - Basis for evaluation of interaction between hydro- & morphodynamics
  - Basis for XBeach
  - Measure:
    - Topography
    - Bathymetry
    - Sediment size distribution
    - Hydrodynamics



# Measurements and measurement locations

Afdeling Kust & IMDC				Afdeling Kust, IMDC & Geotechniek		Meetnet Vlaamse Banken				Nº
Monitoring	Topo Mariakerke	Bathy Mariakerke	Lidar Mariakerke	Sediment Mariakerke	Campaign Mariakerke	Offshore waves Akkaert buoy	Nearshore waves Ostend buoy	Tide Ostend	Wind Westhinder	
Month										
sep/08										
okt/08	17/10/2008	17/10/2008		23/10/2008		x	x	x	x	t0
nov/08	26/11/2008					x	x	x	x	t1
dec/08	17/12/2008	17/12/2008		15/12/2008	x	x	x	x	x	t2
jan/09					x	x	x	x	x	
feb/09	12/02/2009	13/02/2009		13/02/2009	x	x	x	x	x	t3
mrt/09					x	x	x	x	x	
apr/09	28/04/2009	14/04/2009			x	x	x	x	x	t4
mei/09						x	x	x	x	
jun/09						x	x	x	x	
jul/09						x	x	x	x	
aug/09						x	x	x	x	
sep/09	10/09/2009	23/09/2009	22/09/2009	21/09/2009		x	x	x	x	t5
okt/09						x	x	x	x	
nov/09						x	x	x	x	
dec/09						x	x	x	x	
jan/10						x	x	x	x	
feb/10		24/02/2010				x	x	x	x	t6
mrt/10	5/03/2010	10/03/2010				x	x	x	x	t7
apr/10	30/04/2010	29/04/2010		29/04/2010		x	x	x	x	t8
mei/10						x	x	x	x	
jun/10						x	x		x	
jul/10						x	x		x	
aug/10						x	x		x	
sep/10	13/09/2010	28/09/2010				x	x		x	t9
okt/10										

Out from the project area

Only Single Beam data

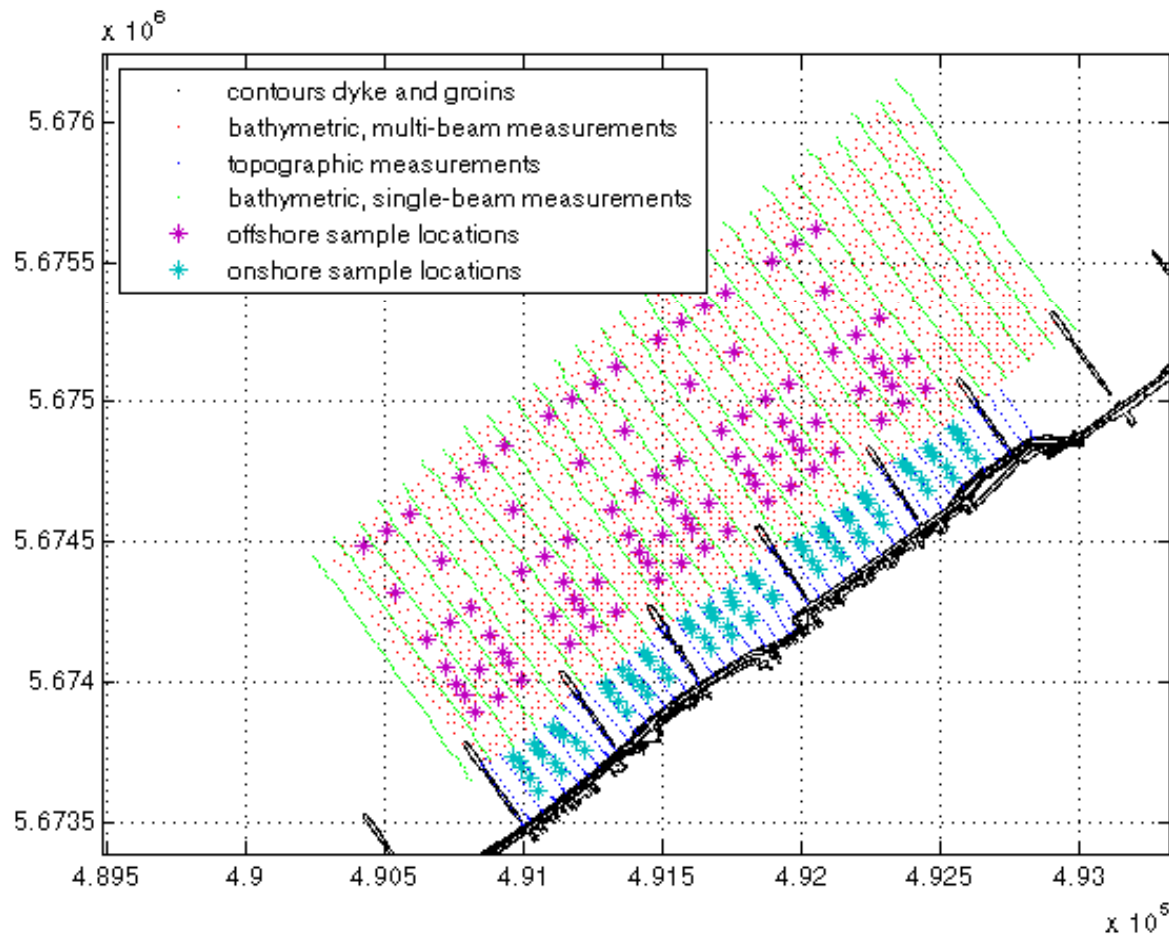
# Measurements and measurement locations

- Storms:
  - Threshold for storm induced morphological change (coastline):
    - Preliminary:  $H_s > 4.1\text{m}$  –  $WL > +5.0\text{mTAW}$  – duration  $> 9$  hours
    - Direction to be included in the future
    - Expect to have effect along the coast (to be finalised)
  - Storms 2008 – 2010:
    - None
    - 5 energetic events:
      - November 2008 ( $H_s = 4.1\text{m}$ ,  $WL = +4.80\text{mTAW}$ ,  $< 9$  hours)
      - January 2009 ( $H_s = 3.8\text{m}$ ,  $WL = +4.80\text{mTAW}$ ,  $< 2$  hours)
      - February 2009 ( $H_s = 4.1$ ,  $WL = +5.5 \text{ mTAW}$ ,  $< 3$  hours)
      - February 2010 (Xynthia,  $H_s = 2.9\text{m}$ ,  $WL = +5.6 \text{ mTAW}$ )
      - March 2010 ( $H_s = 4.1\text{m}$ ,  $WL = +5.1\text{mTAW}$ ,  $< 1$  hour)



## Measurements and measurement locations

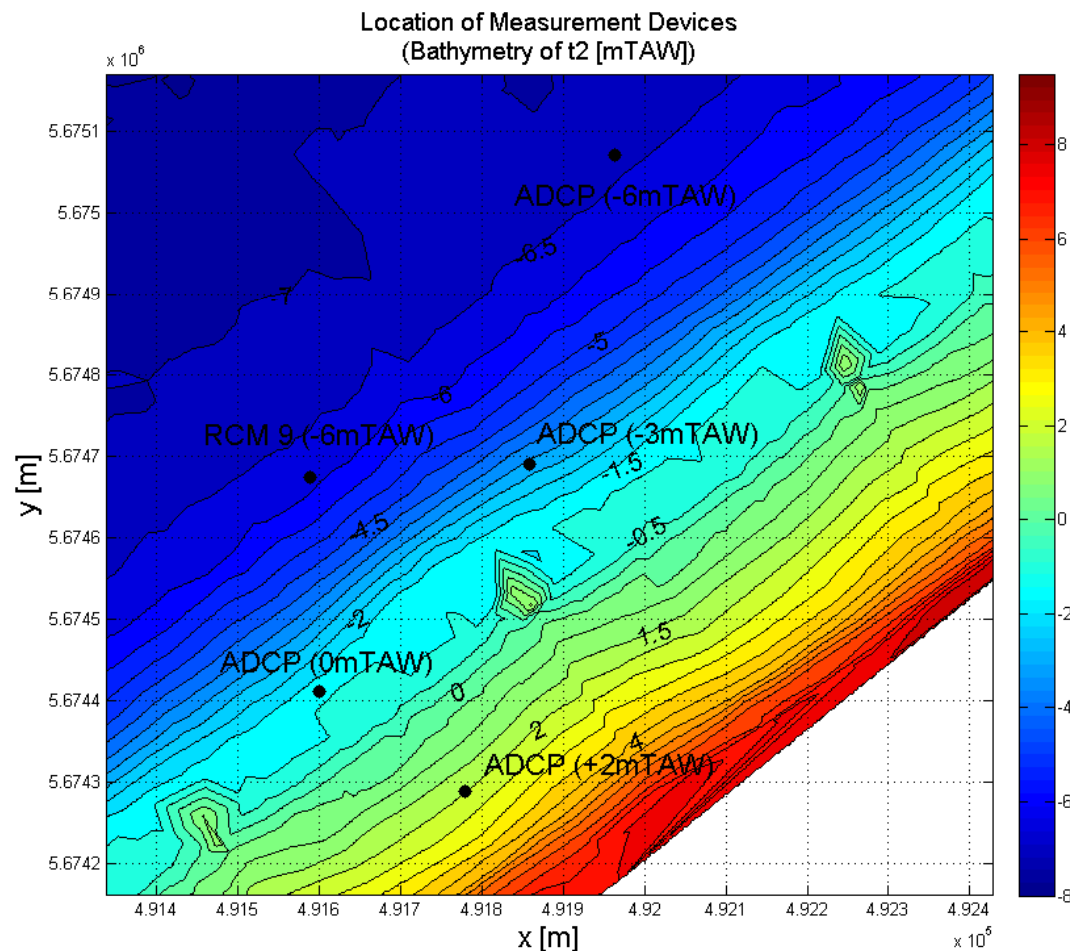
- Locations of the measurements:





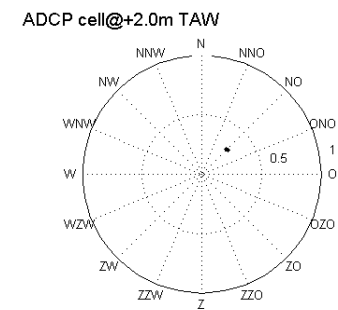
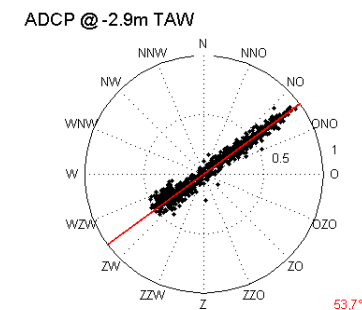
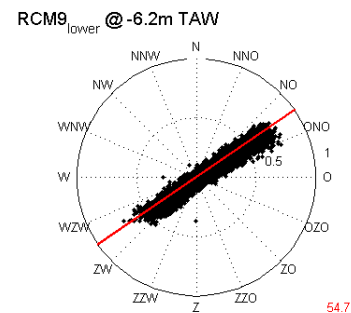
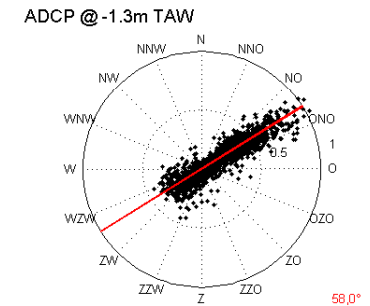
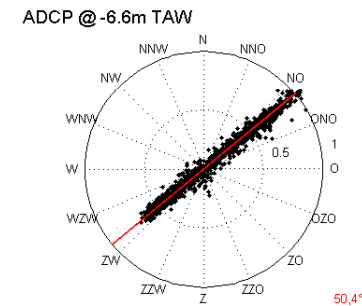
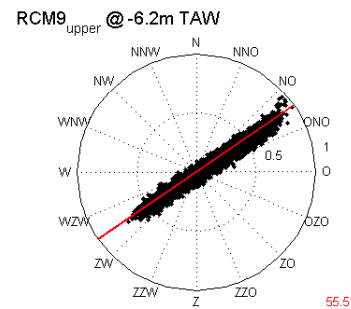
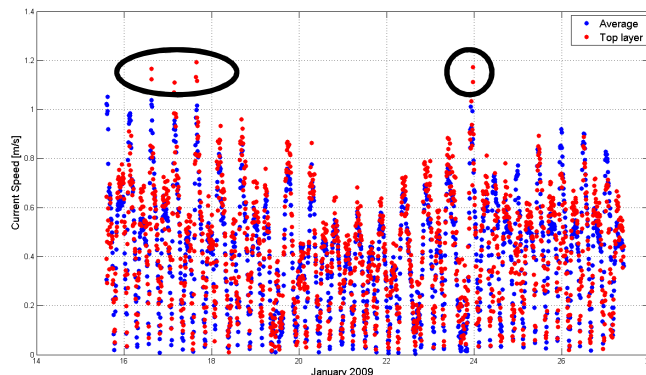
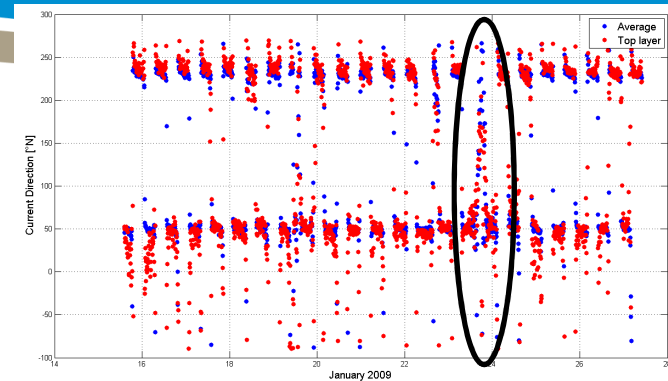
# Measurements and measurement locations

- Locations of the intensive hydrodynamic measurements:



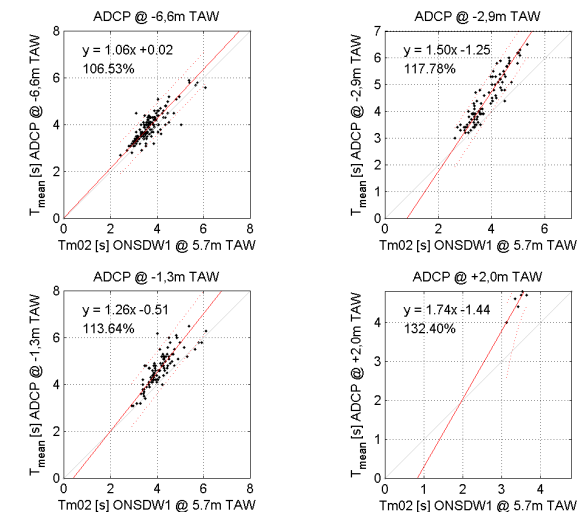
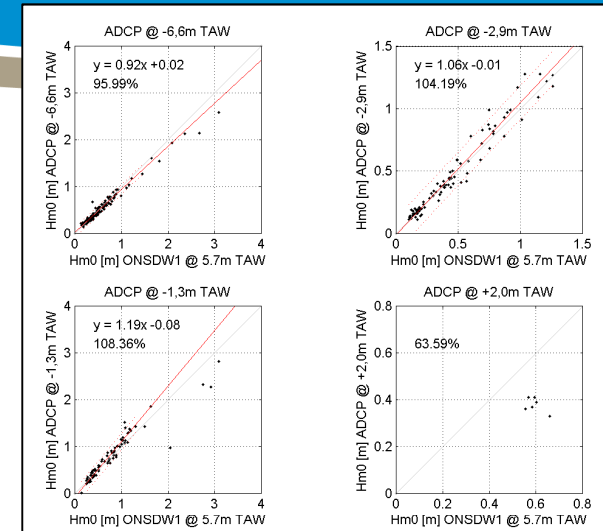
# Results and analysis - Hydrodynamics

- Intensive campaign - currents:
  - Further away from the coast NE-SW tidal current
  - Closer to the beach ENE-WSW
  - NE (HT) strongest
  - Significant influence of storms to be confirmed
  - Tidal driven



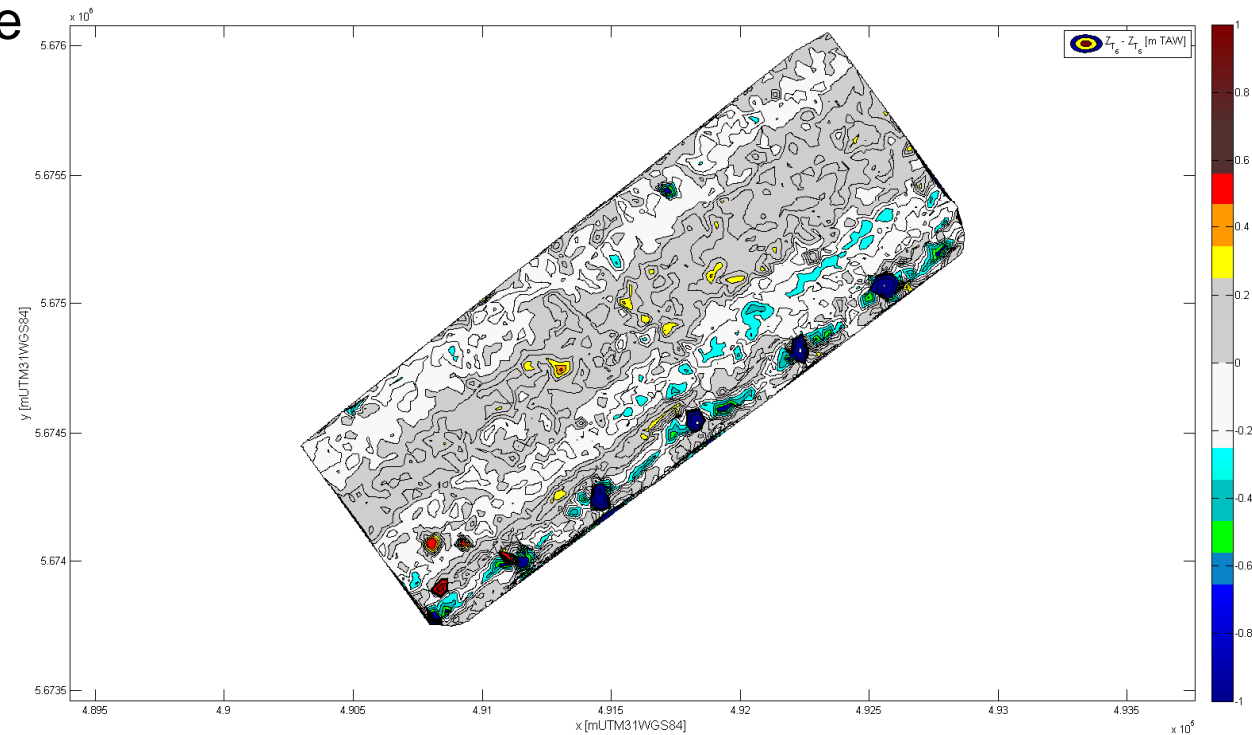
# Results and analysis - Hydrodynamics

- Intensive campaign - waves:
  - Normal wave climate:
    - For -6mTAW => waves 4% < ONSDW1
    - Shallower water:
      - Mariakerke = 4% > at -2.9mTAW
      - Mariakerke = 8% > at -1.3mTAW
    - Relations can be used for e.g. XBeach
  - Extreme wave climate:
    - Larger waves broken at more shallower locations



# Results and analysis - Morphodynamics

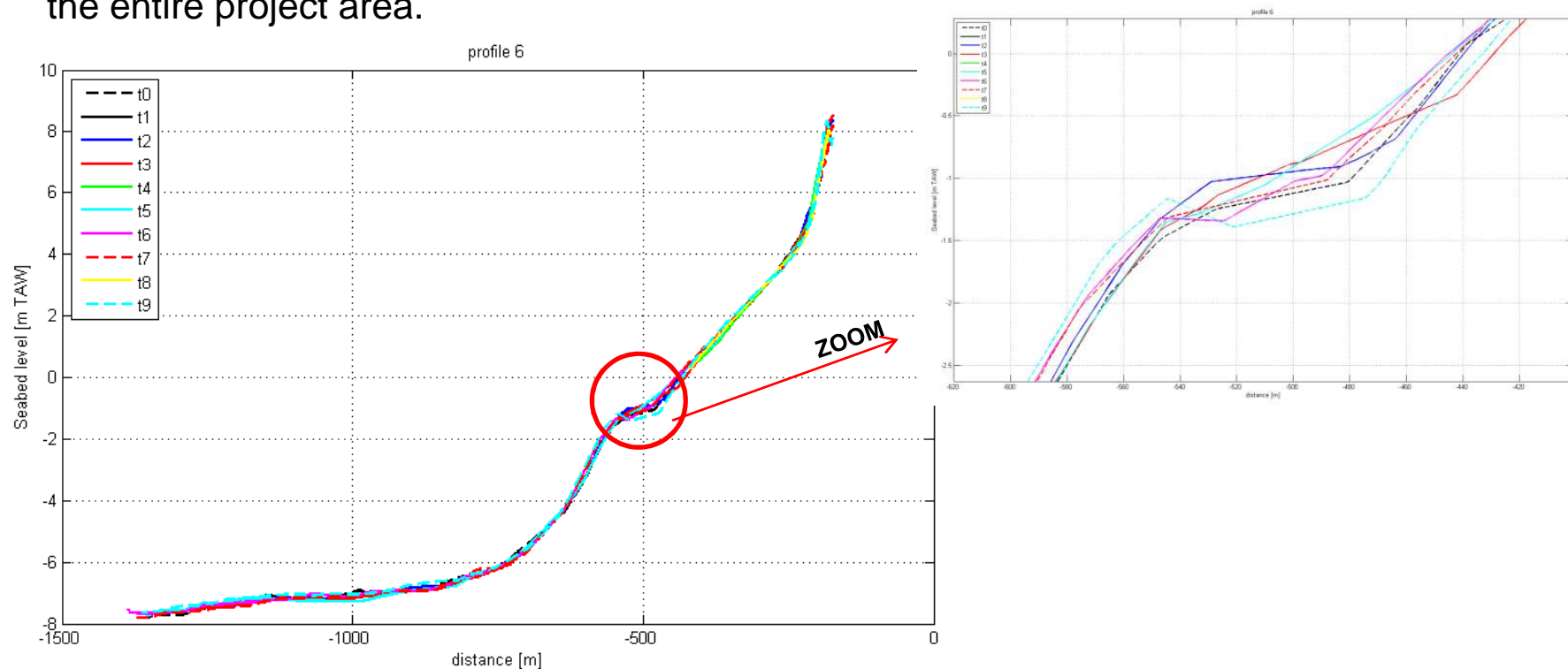
- Beach evolution:
  - No storms => No significant morphological changes
  - Locally some variations = no trend



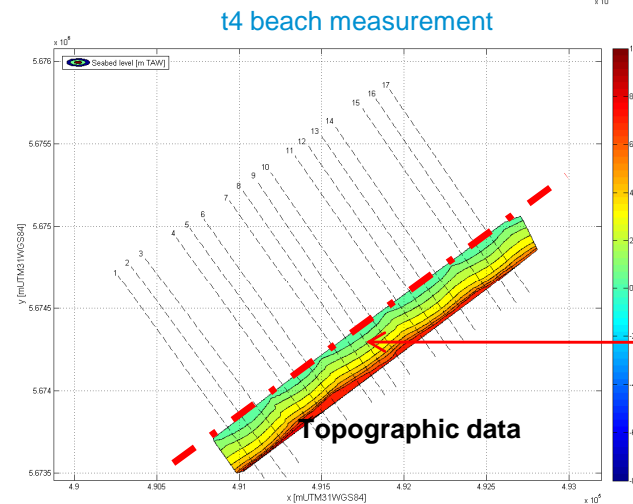
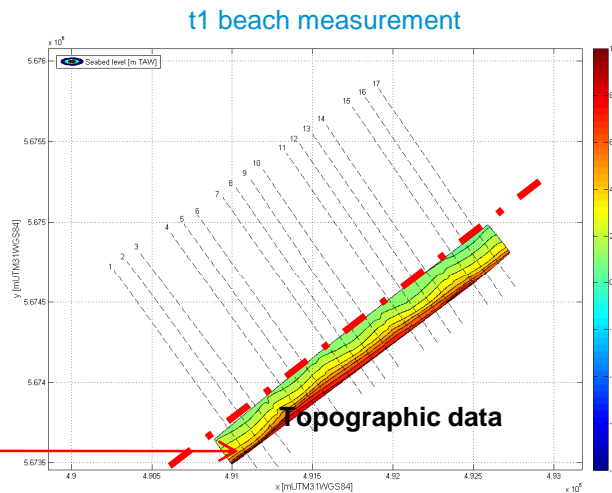
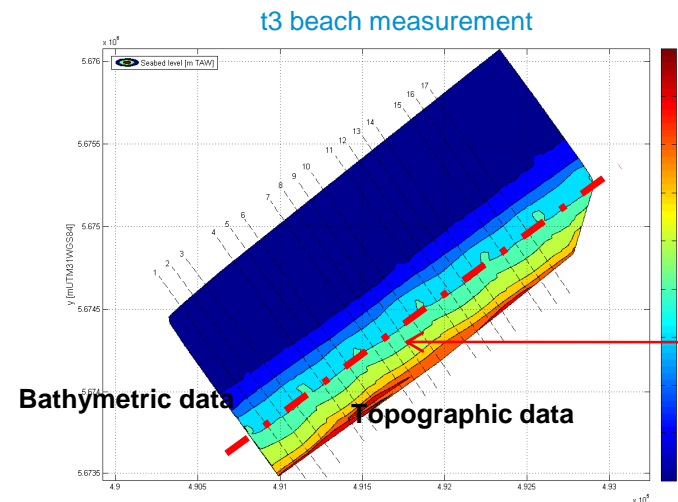
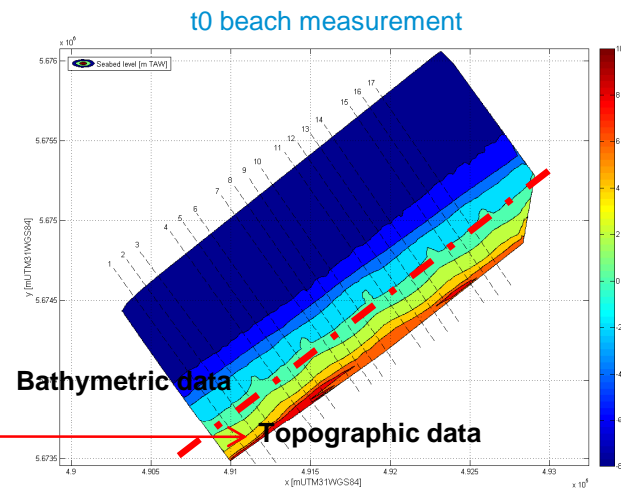
# Results and analysis - Morphodynamics

No any substantial morphological change from the beginning of the measurements campaign to its end along the cross-shore profiles analysed.

Profile 6 gives an approximated idea about the general seabed morphology inside the entire project area.

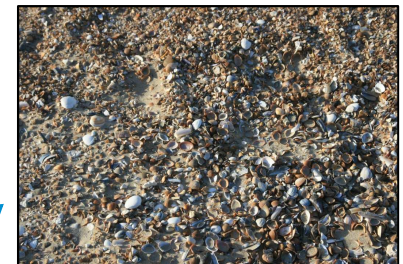


# Results and analysis - Morphodynamics



Smaller changes in the area covered by topographic measurements

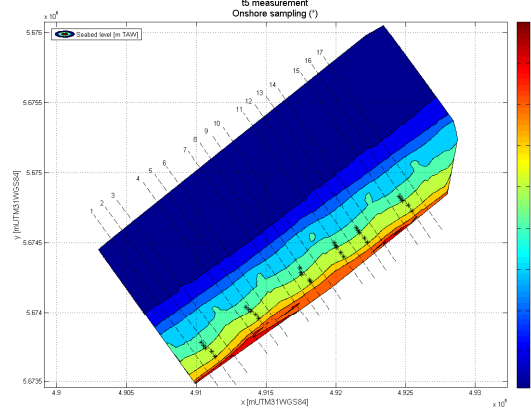
# Results and analysis – Sediment samples





# Results and analysis – Sediment samples

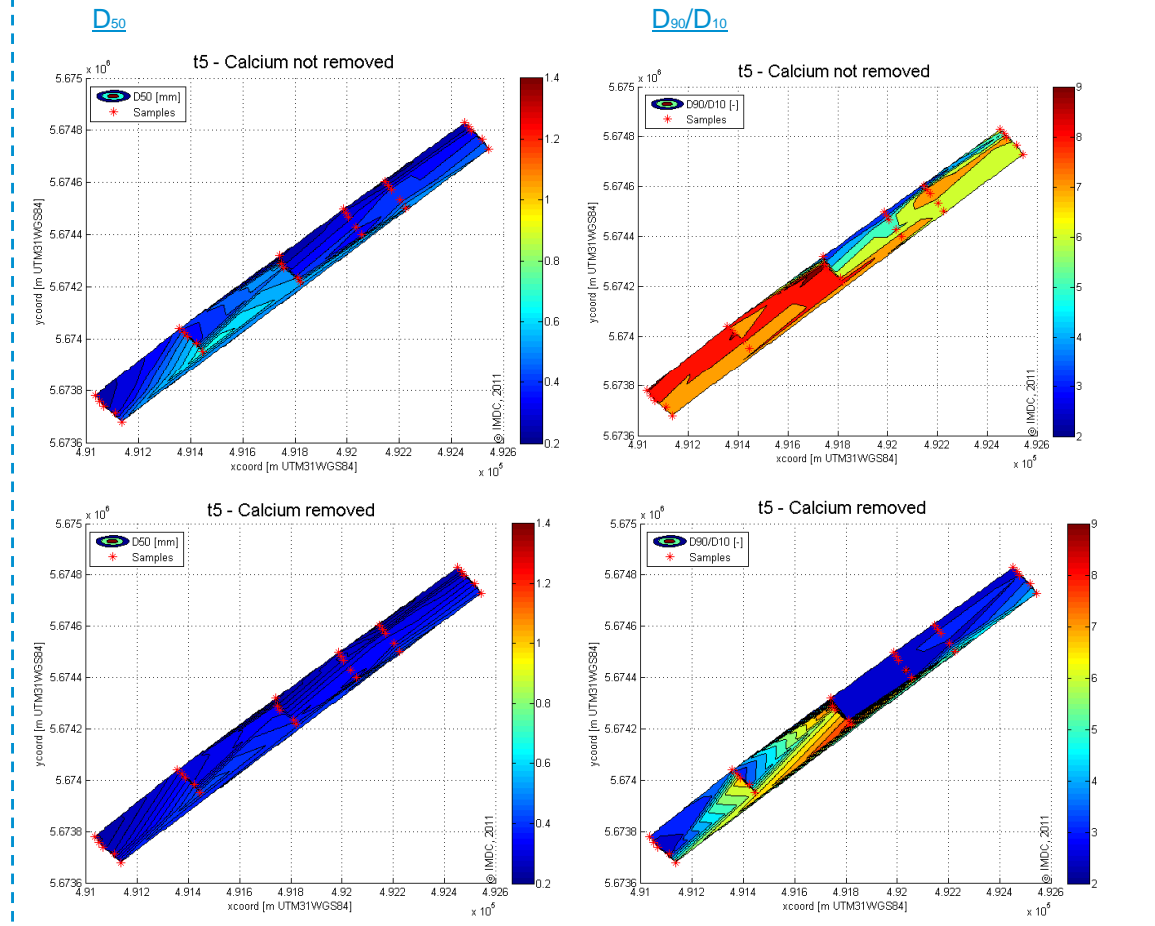
t5 beach measurement



The sediment size within the project area is variable:

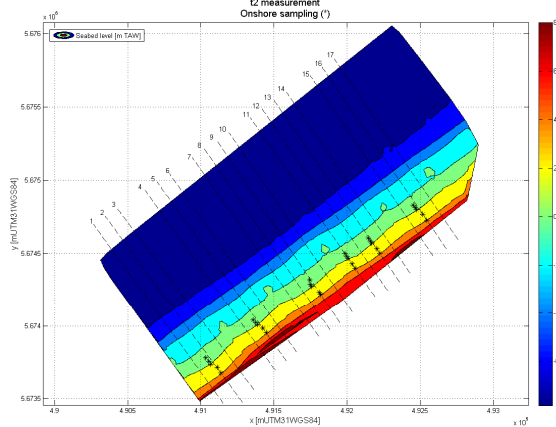
**D<sub>50</sub> - max = 0.44 mm**  
**D<sub>50</sub> - min = 0.23 mm**  
**D<sub>50</sub>- avg = 0.32 mm**

Onshore samples



# Results and analysis – Sediment samples

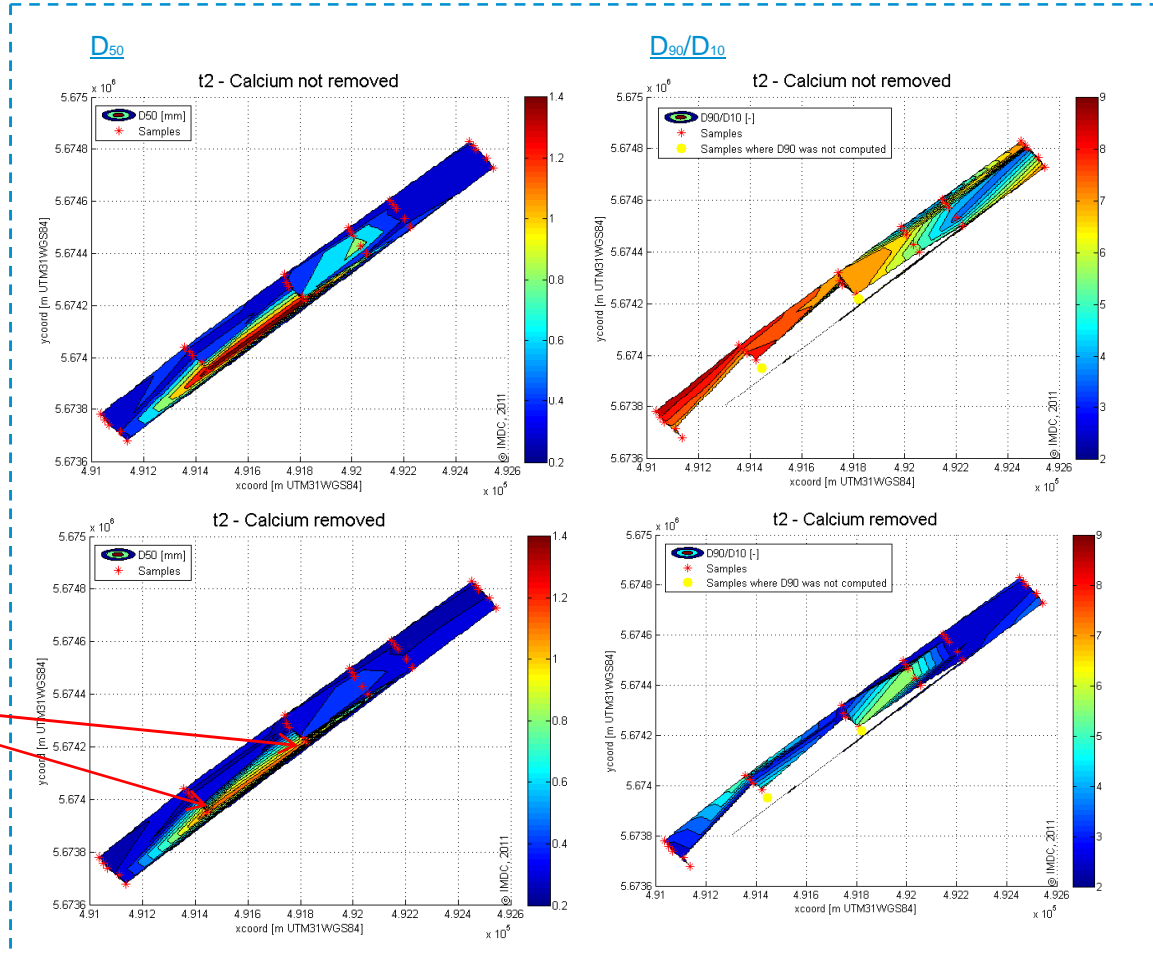
t2 beach measurement



Some not-uniformities at some sampling points:

- Wind effect?
- Sand nourishment?

Onshore samples



# Conclusions

- No storms during the monitoring period
- 5 energetic events
- Only limited cross-shore variation of the hydrodynamic boundary conditions
- Need for nearshore wave predictions
- Only limited morphological change
- Sediment variability to be further investigated
- Not sufficient input for XBeach to compute extreme events => storm of November 2007 and Oostende Noodstrand is used for WP4