Fédération de Recherche ECCOREV FR 3098
Colloque 1er et 2 octobre 2009

Mesures de l'hydrodynamique sédimentaire sur divers sites ateliers (étang de Berre, plage de la Capte Hyères)

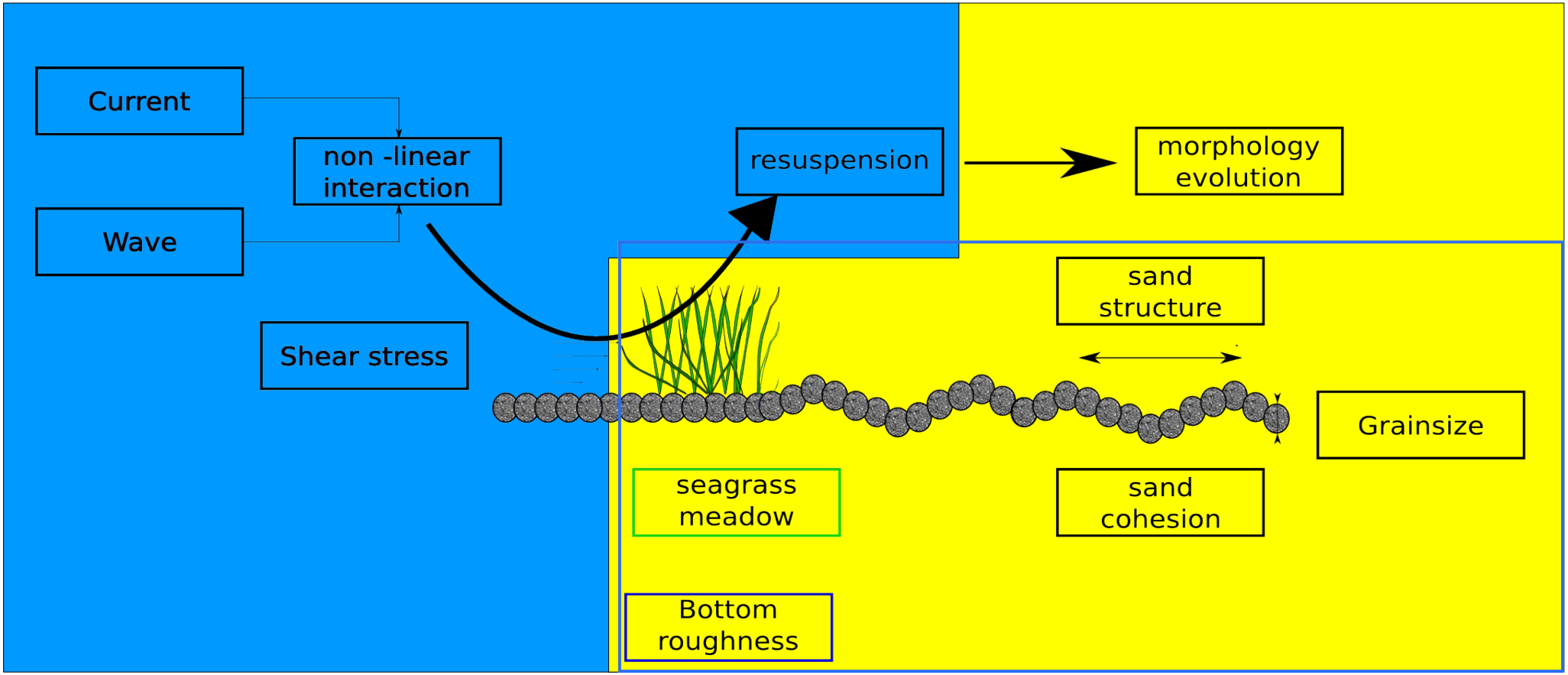
Samuel Meulé

In situ measurements in shallow water

< 7m

Hydrodynamic measurements

Bathymetric studies



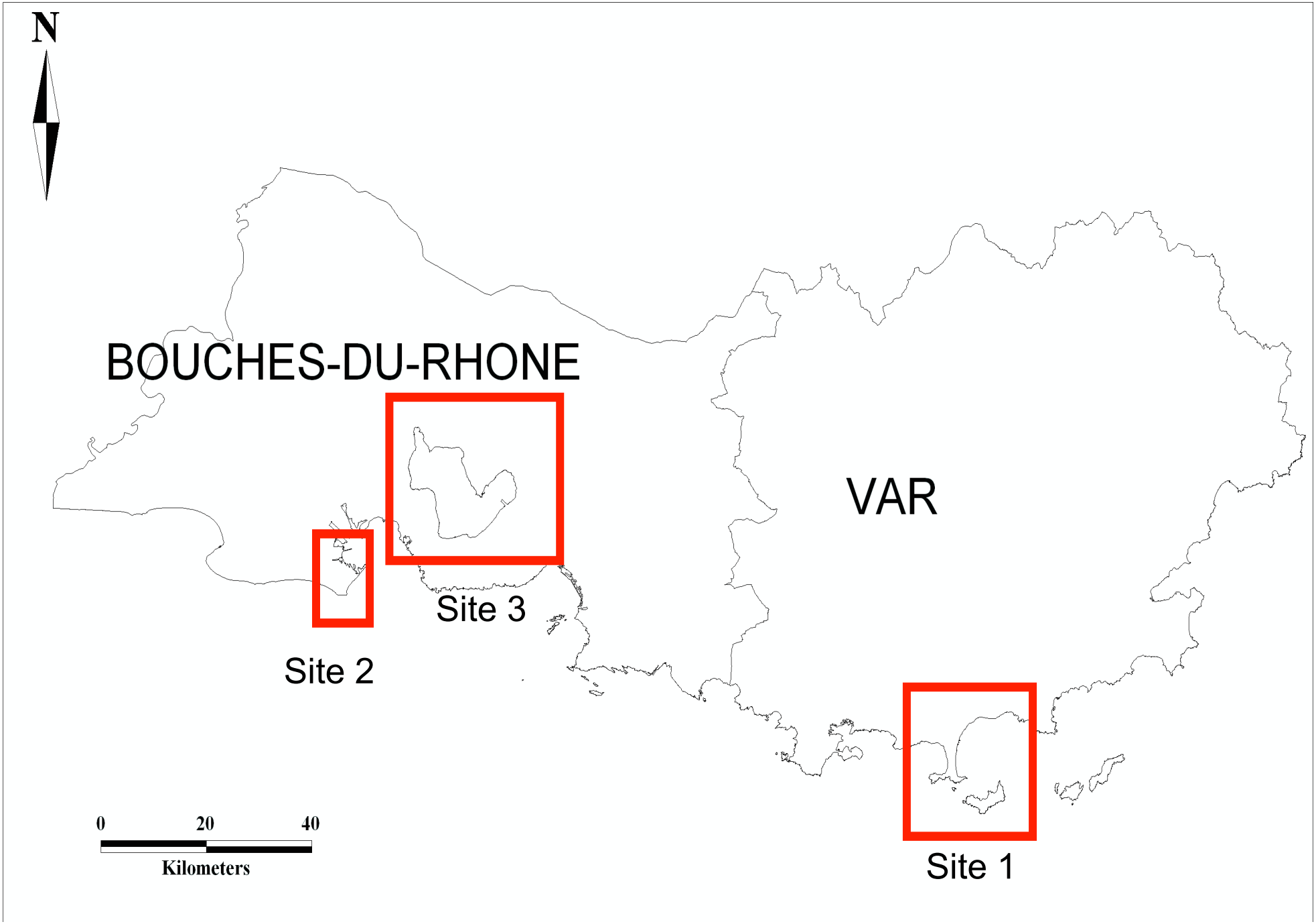
In situ measurements in shallow water

ECOSYSTEMES CONTINENTAUX
ECCOREV
FR 3098
ET RISQUES ENVIRONNEMENTAUX

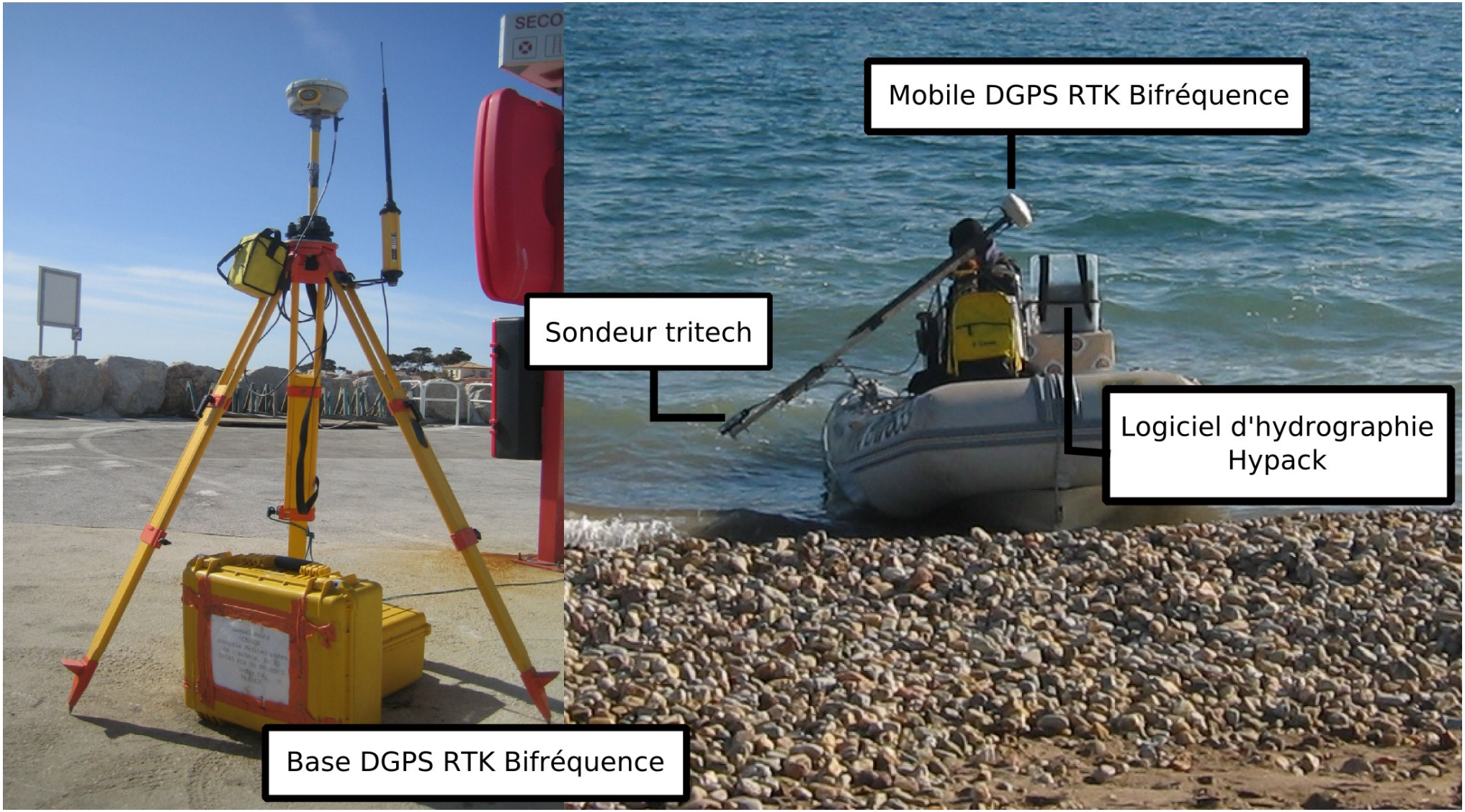
ADCP 1200 kHz RDI

OBS3A+

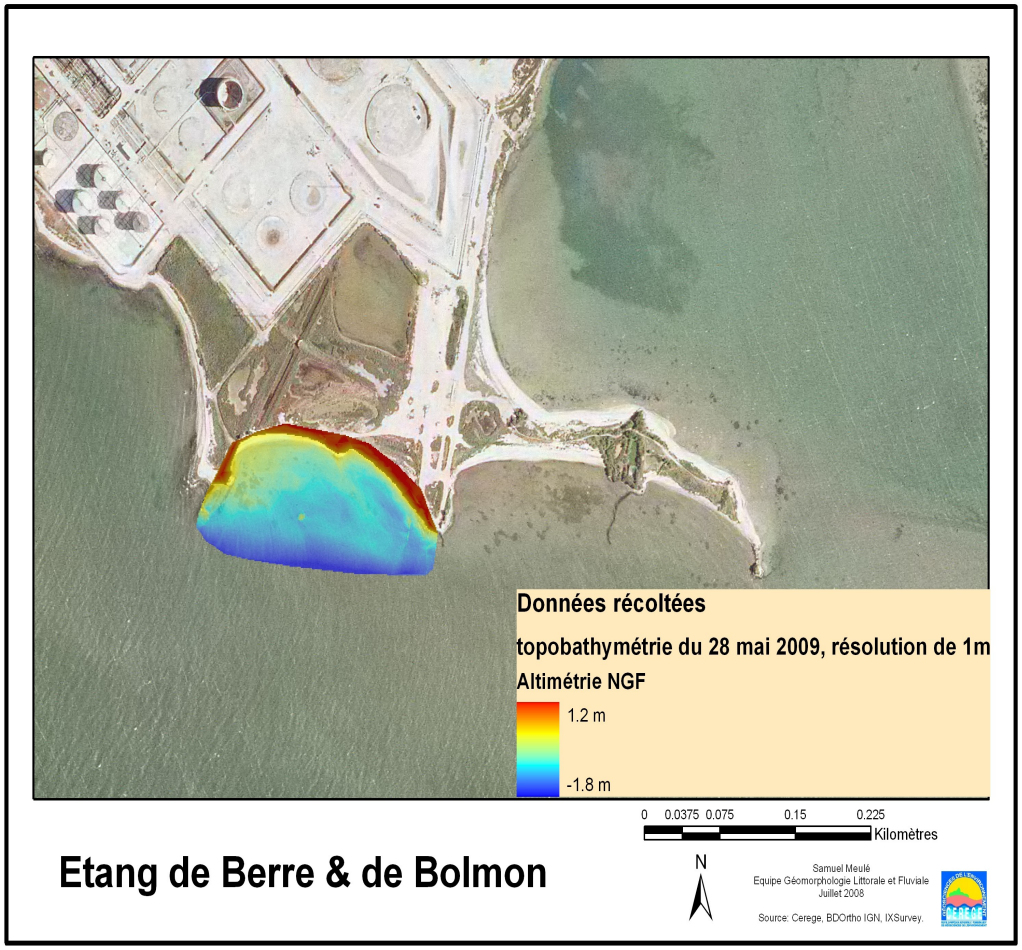
Localisation



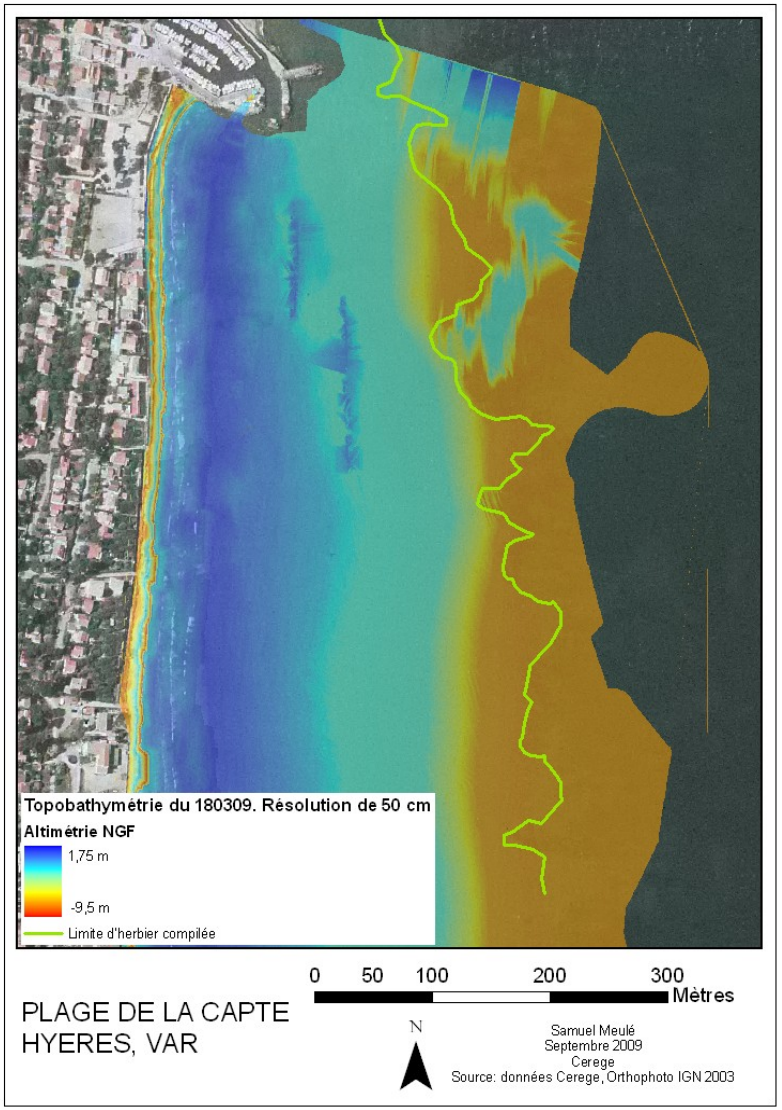
Bathymetric study



Bathymetric study

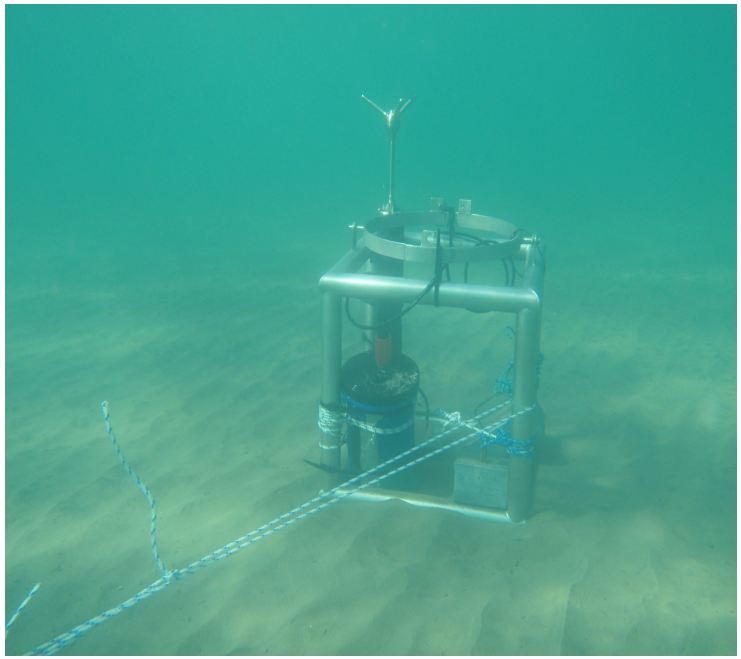


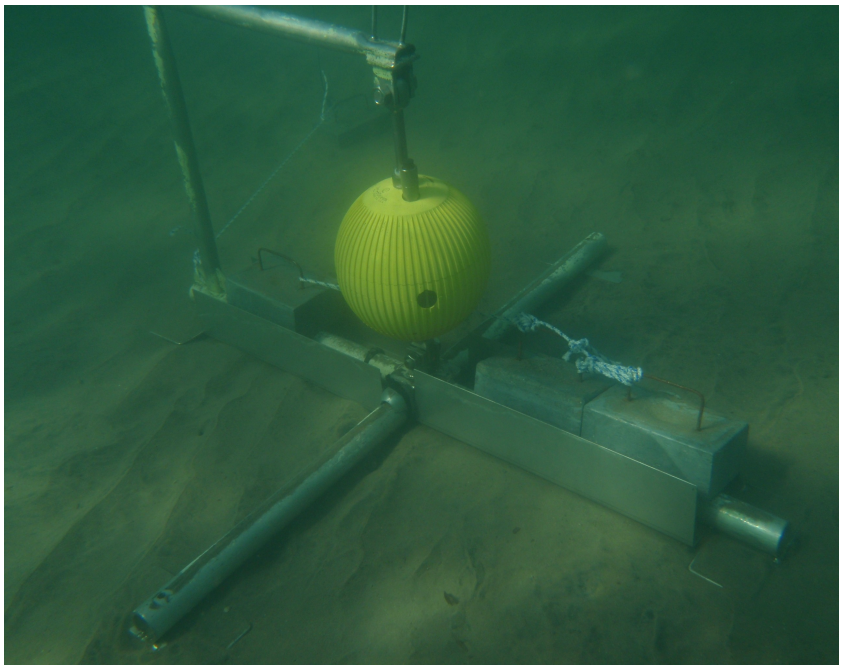
Site 3

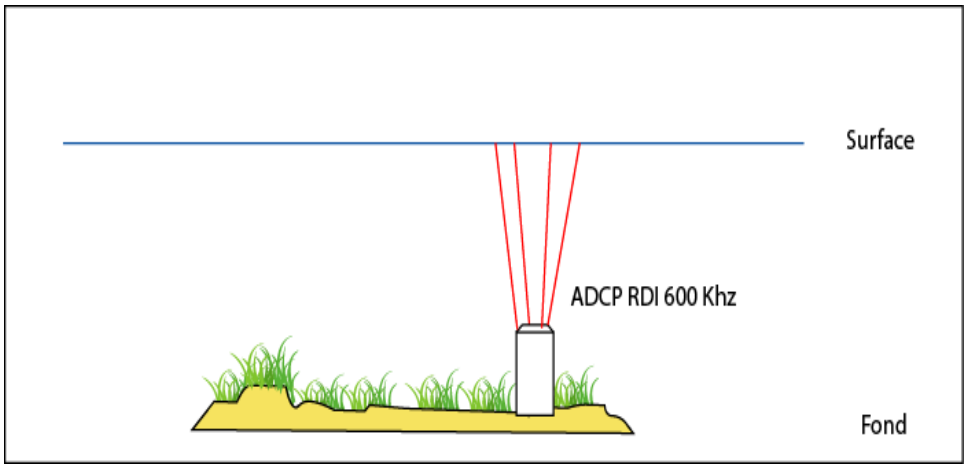


Site 1

Hydrodynamic measurements



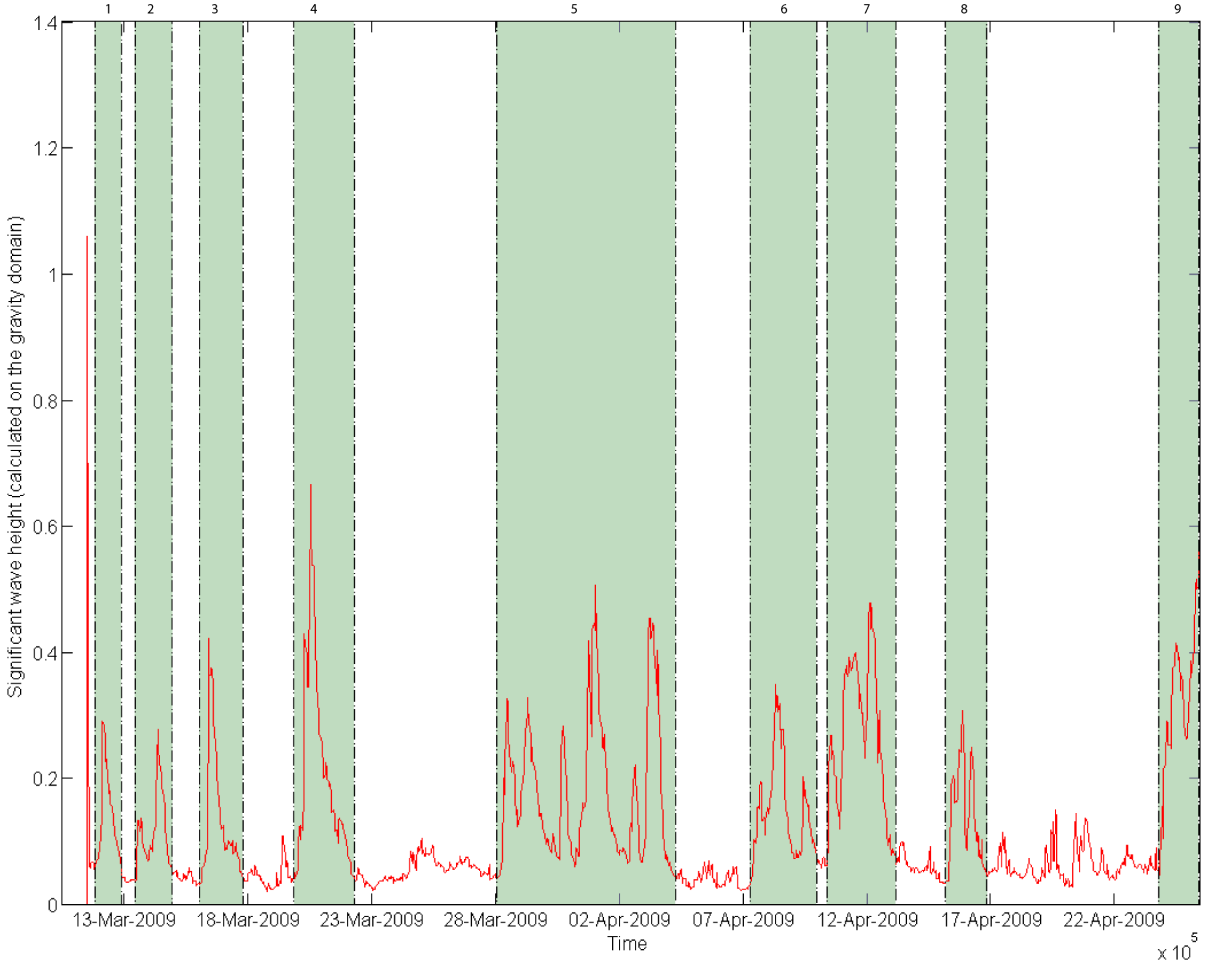




Site 1

Hydrodynamic measurements

Site 1



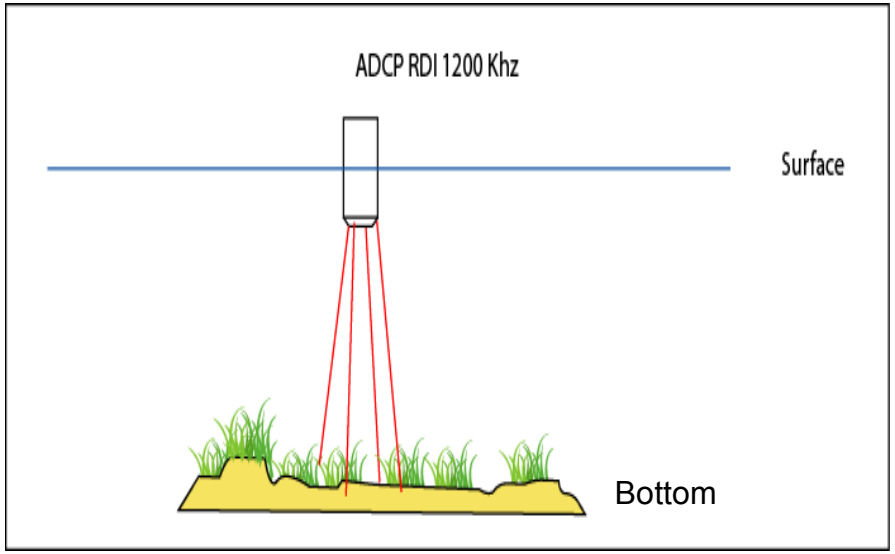
Stokes 1st order

$$u_{max} = \frac{\pi . H}{T} \cdot \frac{1}{sh\left[4\pi^2 . h / g . T^2\right]}$$

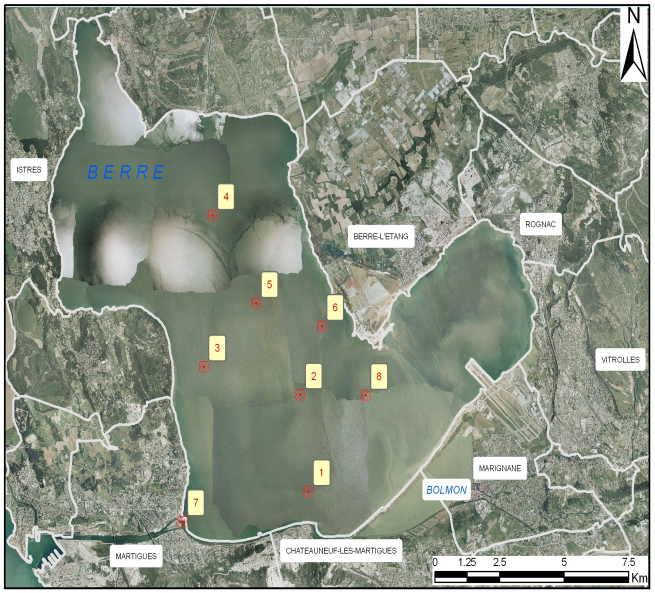
Stokes 2nd order

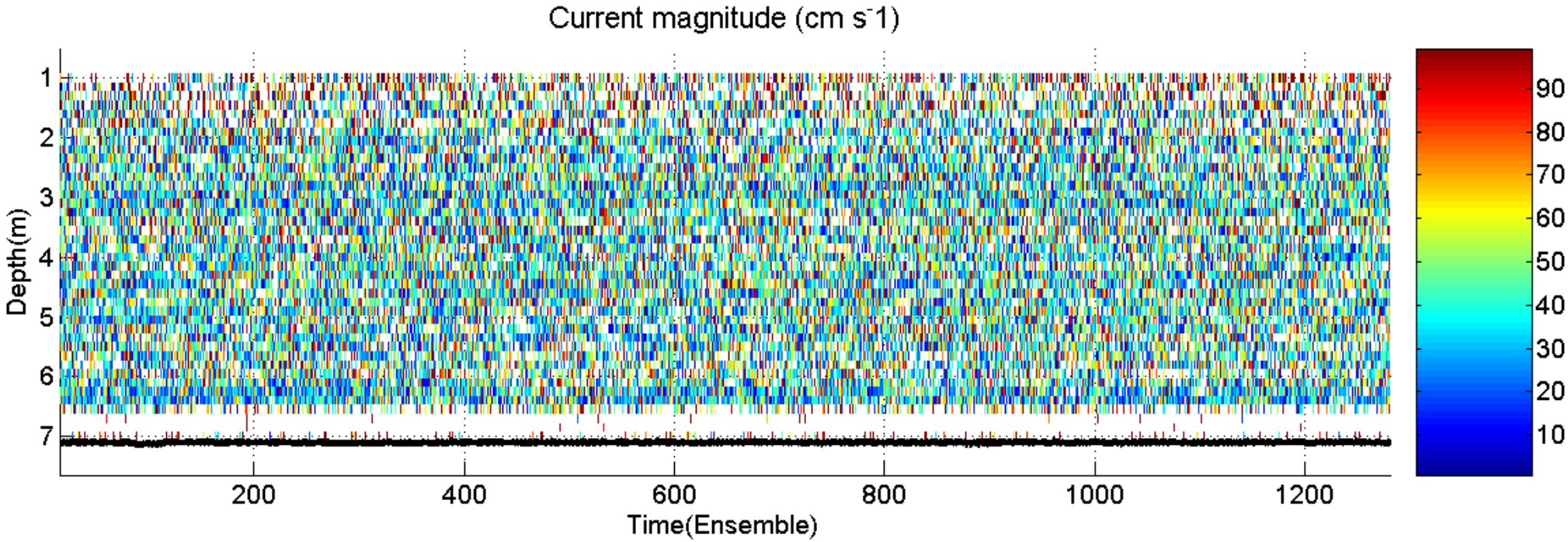
$$u_{pics} = \zeta_0 \cdot \frac{2\pi}{T} \cdot \frac{1}{sh(kh)} + 3\frac{\pi^2}{\lambda . T} \cdot \zeta_0^{2.} \frac{1}{sh^4(kh)}$$

Hydrodynamic measurements

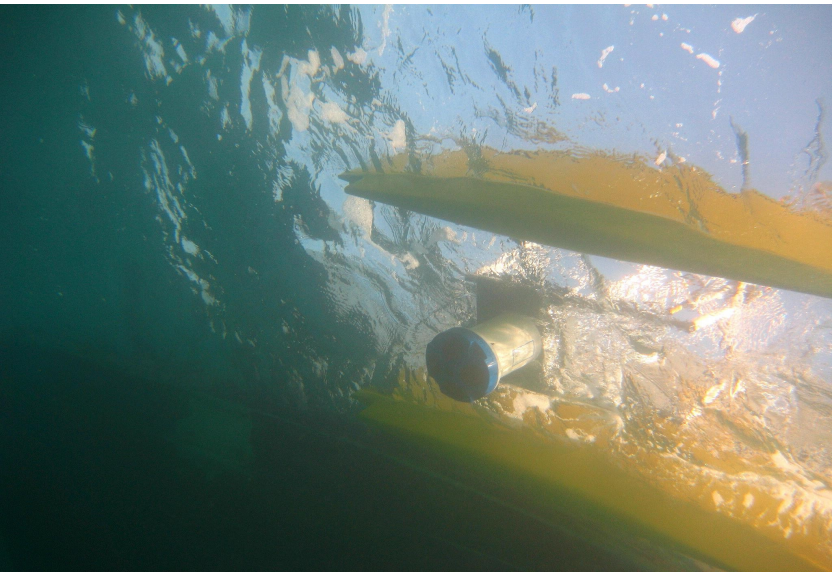


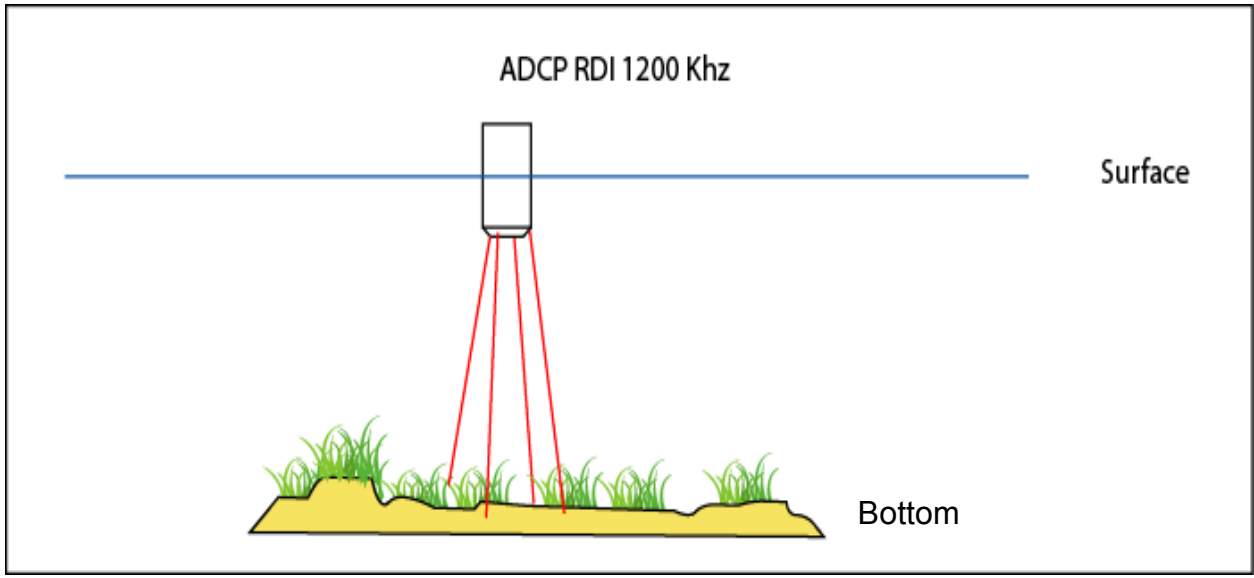
Site 3





Interaction between Seagrass meadow and sediment transport





Backscatter signal from bottom tracking ADCP

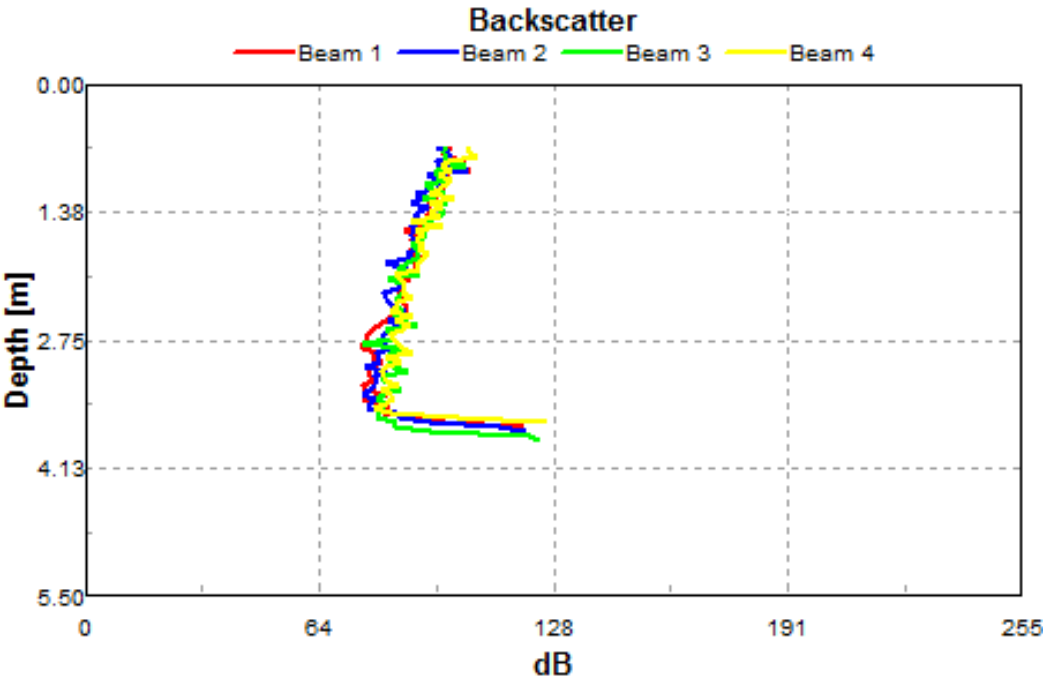
↓

Signal analysis →
- Bottom identification
- Meadows map
- Seagrass characteristics

Interaction between Seagrass meadow and sediment transport

Sand

$+ ax^5 - bx^4 + cx^3 - dx^2 + ex + résidus$



$yfaisceau1 = 0.00004x^5 - 0.0036x^4 + 0.1054x^3 - 1.3427x^2 - 6.2708x + 97.232$

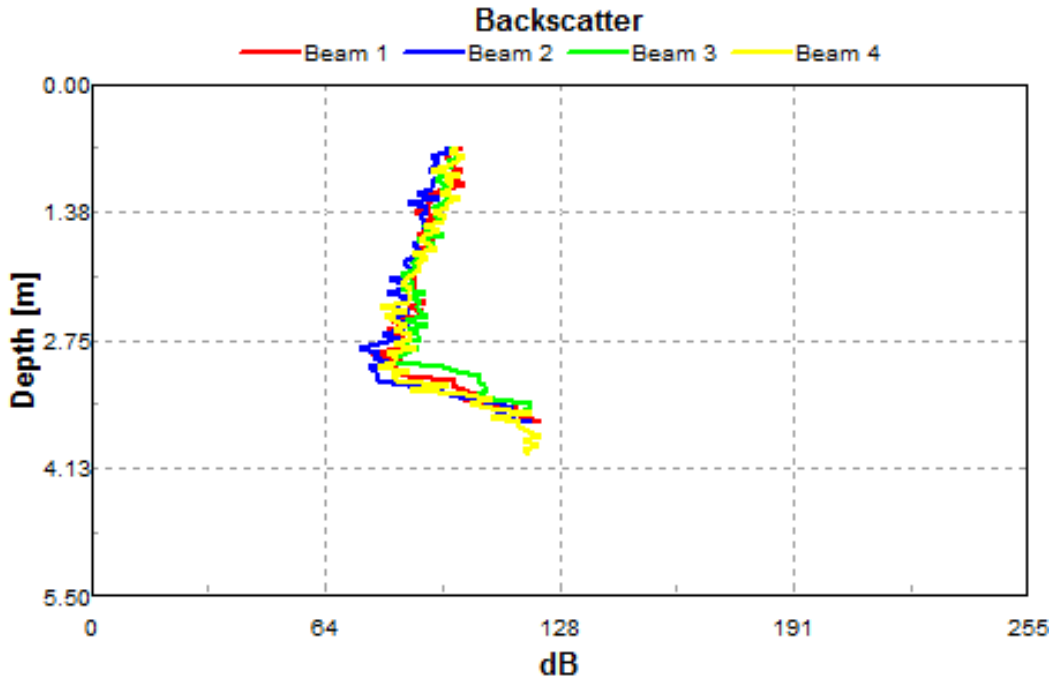
$yfaisceau2 = 0.00003x^5 - 0.0019x^4 + 0.0471x^3 - 0.5174x^2 - 2.2684x + 99.322$

$yfaisceau3 = 0.00005x^5 - 0.0037x^4 + 0.0977x^3 - 1.1018x^2 - 4.6317x + 98.927$

$yfaisceau4 = 0.00005x^5 - 0.0035x^4 + 0.0933x^3 - 1.0341x^2 - 4.3017x + 100.14$

Seagrass

$- ax^5 + bx^4 - cx^3 + dx^2 - ex + résidus$



$yfaisceau1 = -0.00002x^5 + 0.0014x^4 - 0.0388x^3 + 0.3053x^2 0.6386x + 105.72$

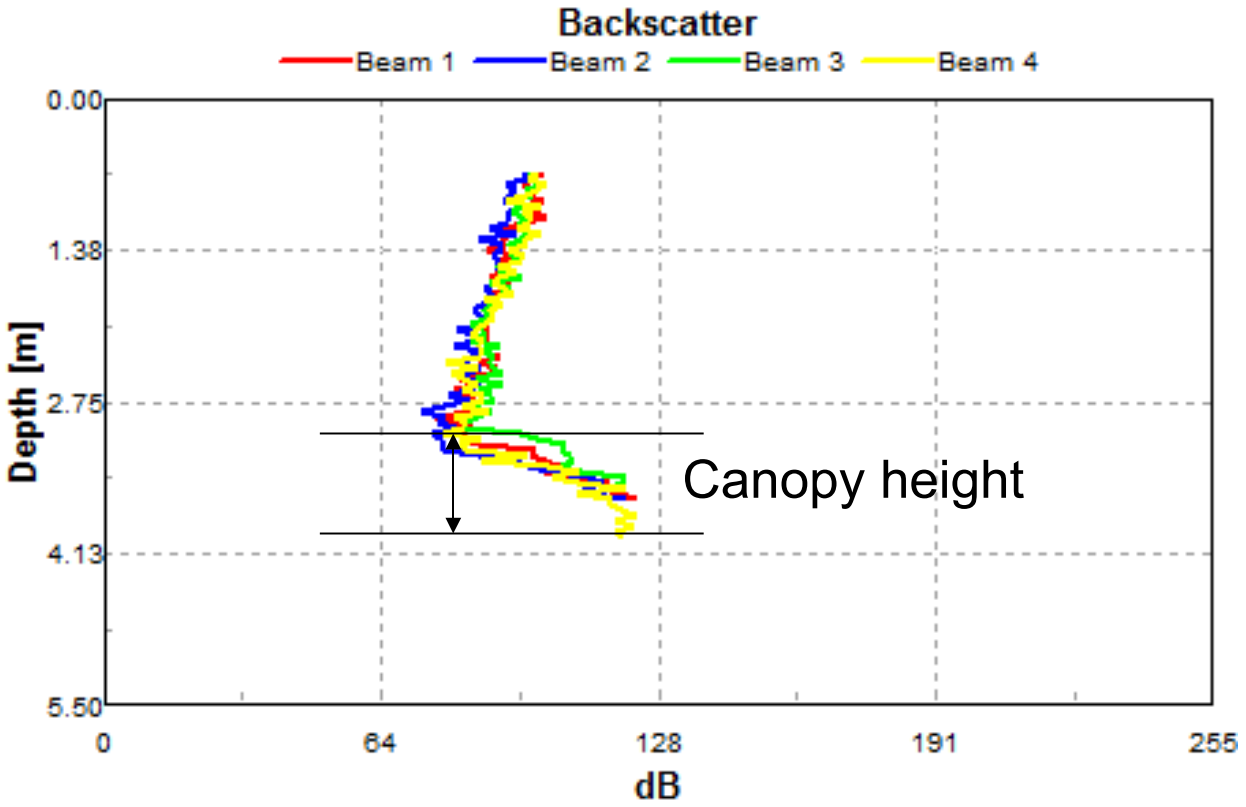
$yfaisceau2 = -0.00005x^5 + 0.0046x^4 - 0.1326x^3 + 1.5835x^2 - 7.4927x + 112.63$

$yfaisceau3 = -0.00003x^5 + 0.0028x^4 - 0.0799x^3 + 0.9438x^2 - 4.2378x + 110.08$

$yfaisceau4 = 0.000008x^5 - 0.0012x^4 + 0.0512x^3 - 0.7971x^2 - 4.4695x + 95.291$

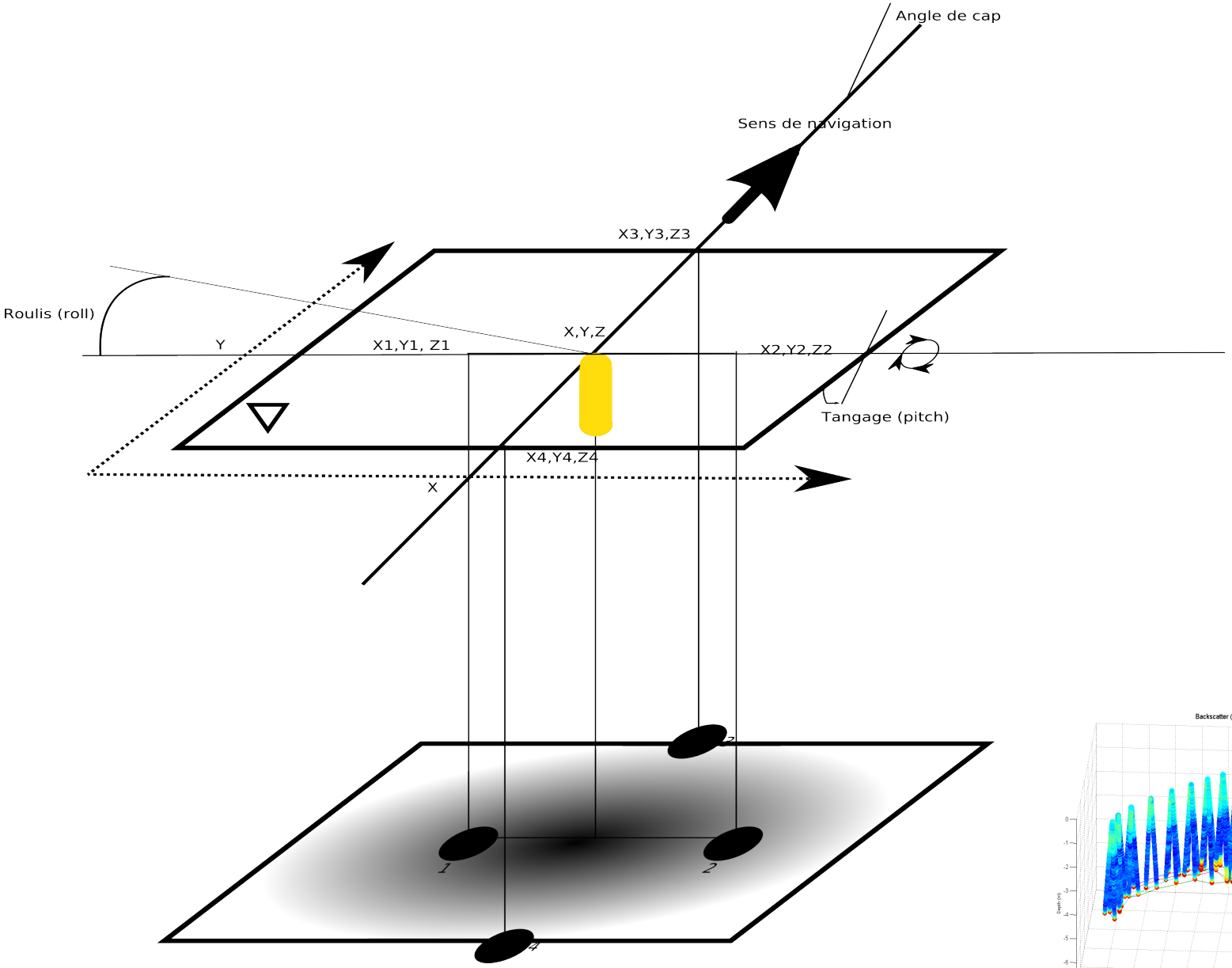
Site 1

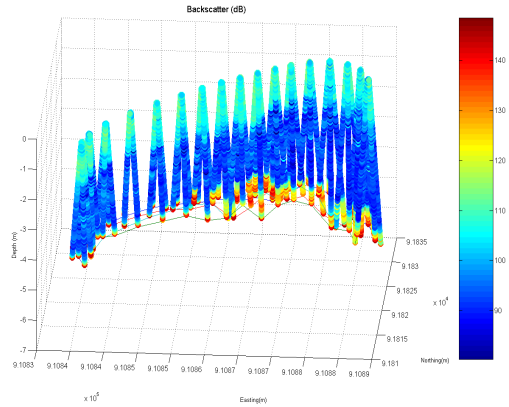
Interaction between Seagrass meadow and sediment transport



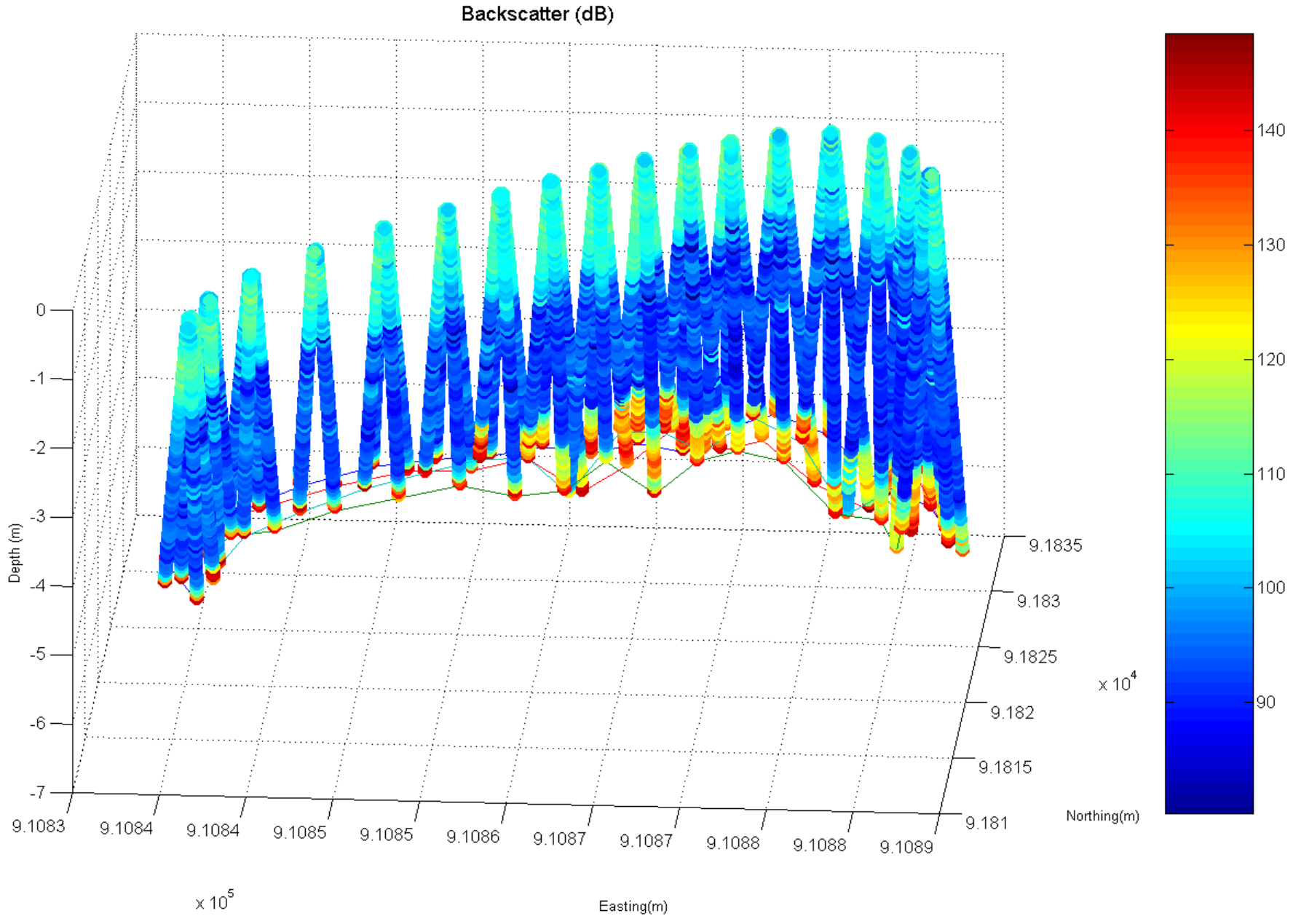
Site 1

Interaction between Seagrass meadow and sediment transport





Interaction between Seagrass meadow and sediment transport



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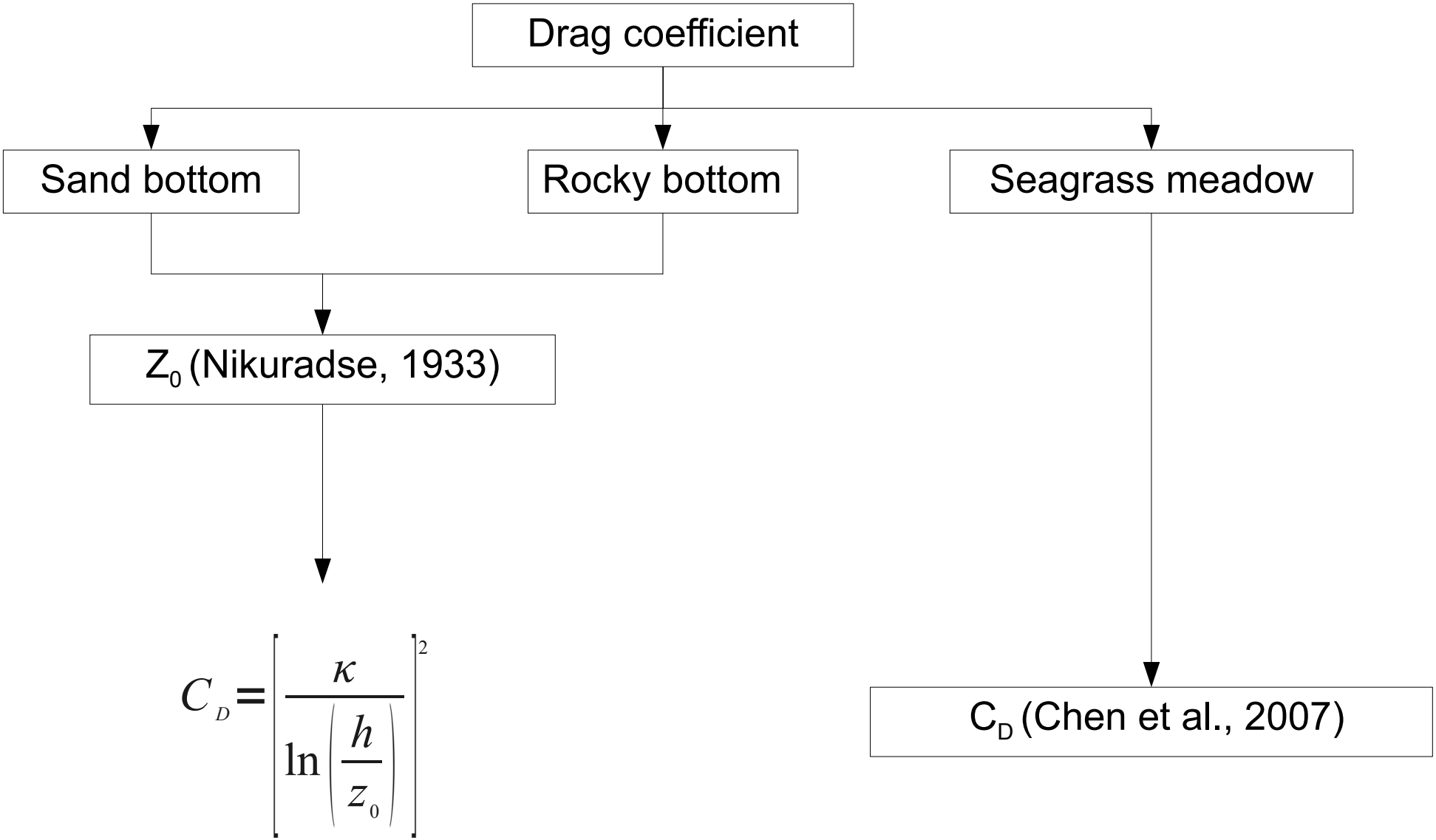


Interaction between Seagrass meadow and sediment transport

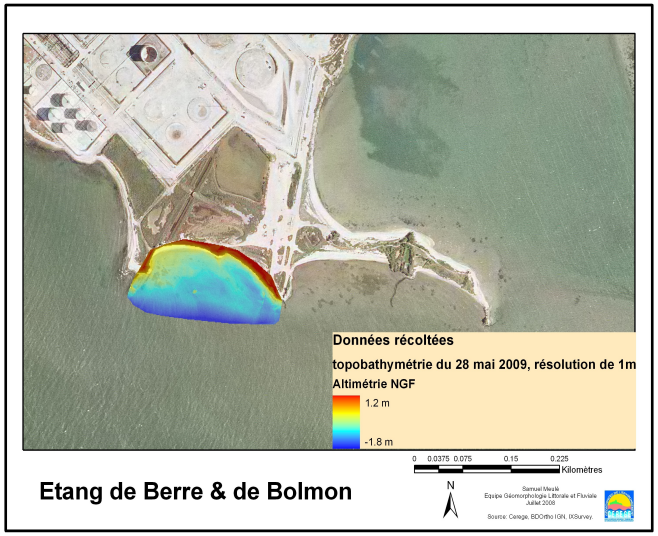
C_D (Chen et al., 2007)

$$C_D = \left(1 - \frac{nld^2}{h}\right) C_B + 0.5 \overline{C_D} ndl$$

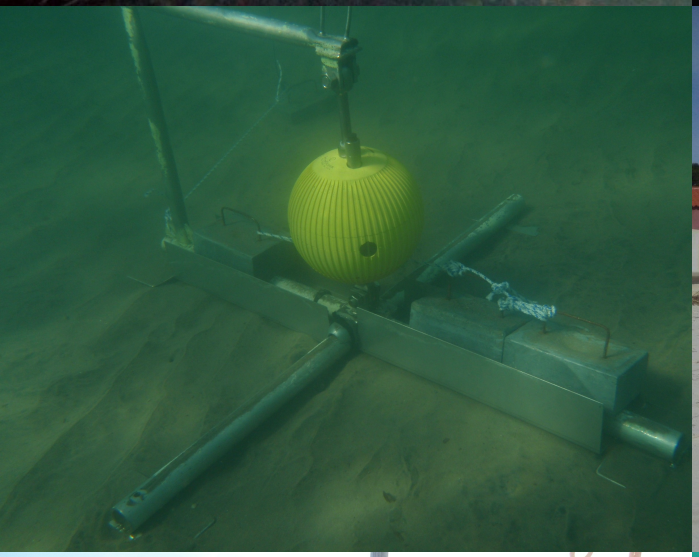
n, number of seagrass shoots per unit area (m²) ;
l, canopy height (m) ;
d, shoot diameter (en m) ;
h, depth (en m) ;
C_B , skin friction coefficient 0,001 (Nepf, 2000);

$\overline{C_{D,}}$ us a function of fractional volume approximate from Nepf (1999)

Interaction between Seagrass meadow and sediment transport





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