

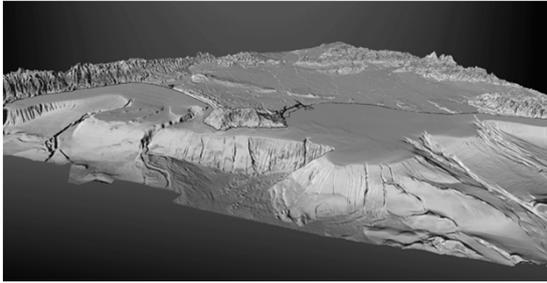
Hydrodynamique littorale et côtière

Ch. 1 : Introduction

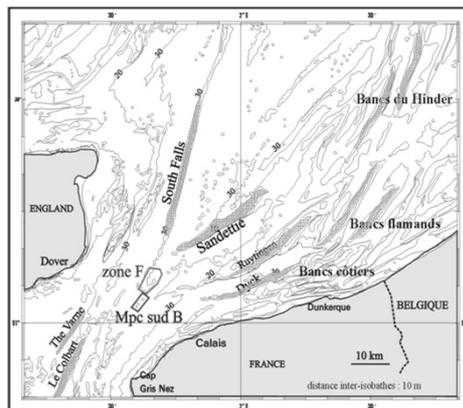
Bathymétrie océanique globale



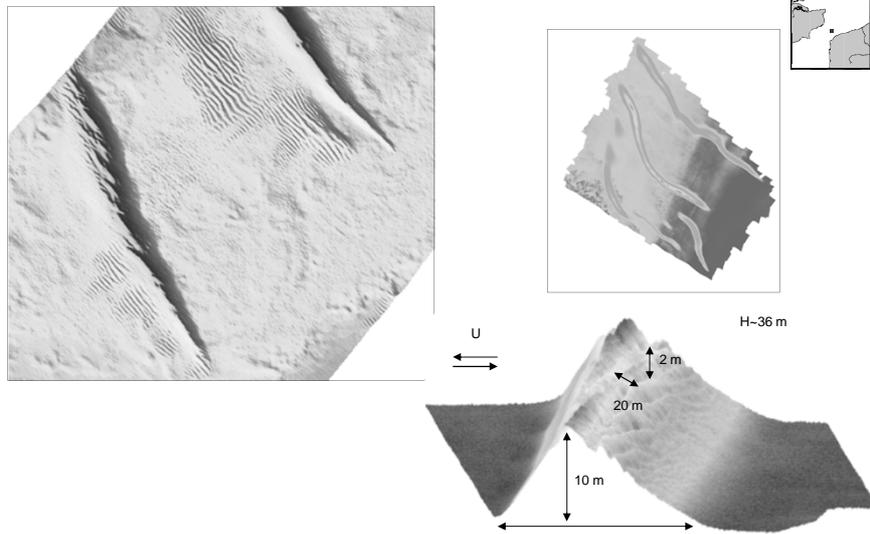
Plateau continental



Structures sous-marines



Structures sous-marines

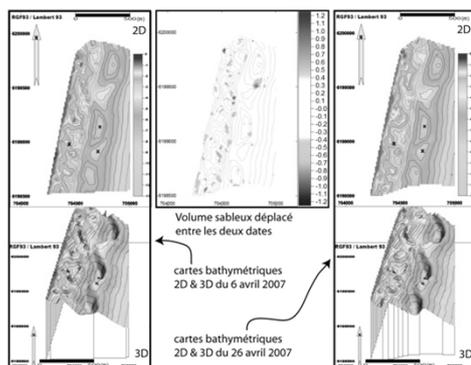


Dunes et mégarides de sable du détroit du pas de calais (Source : D. Idier)

littoraux – plages sableuses



Localisation du littoral de Leucate-Plage
(source : CNES, 2007).



A gauche, carte bathymétrique du 6 avril 2007.
A droite, carte bathymétrique du 26 avril 2007.
Au centre, carte du différentiel de volume entre ces deux dates.
(source : R. Certain)

Plage sableuse

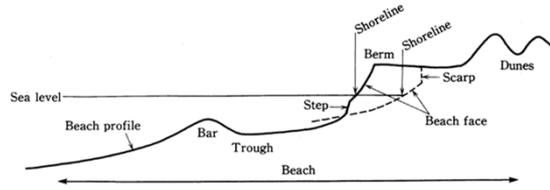


Figure 1.2 Typical beach profile.



« beach cusps »



« Barres/baines »

Littoraux – « sand spit »

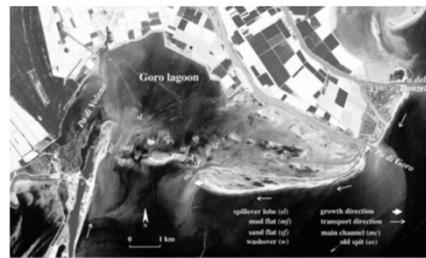
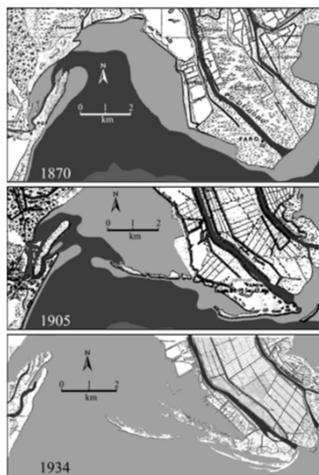


Fig. 9. ASTER satellite image of the Goro Lagoon from 2000.

Littoraux - Falaises

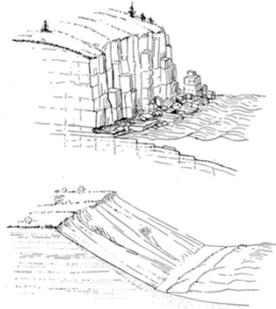


FIGURE 20.6 The nearly vertical cliff (above) is typical of the granite coast of Maine, while the gentler marine scarp of sand and gravel (below) is found on Cape Cod and other localities where glacial sediments are being eroded. (Drawn by A. N. Strahler.)



Punta degli Schiavi cliff (Sector 2). We can observe the bare upper slope, the deep gullies cut in the lower slope, the erosional triangular facets, as well as the narrow pebbly beach and the eroded edges of layers of the wave-cut bench in the foreshore.

Deltas

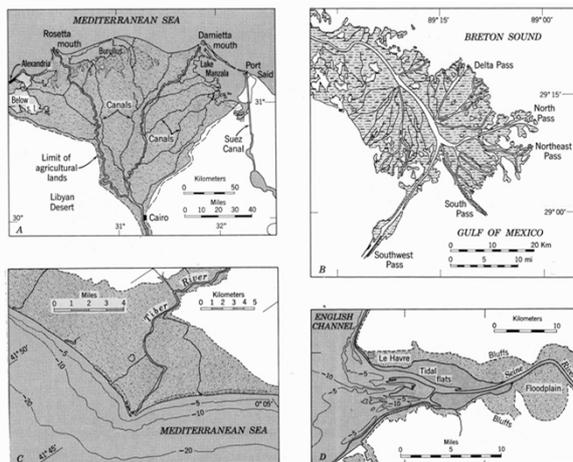


FIGURE 20.41 Deltas. (A) The Nile delta has an arcuate shoreline and is triangular in plan. (B) The Mississippi delta is of the branching, bird-foot type with long passes. (C) The Tiber delta on the Italian coast is pointed, or cusped, because of strong wave and current action. (D) The Seine delta is filling in a narrow estuary.

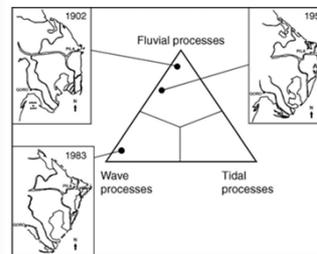
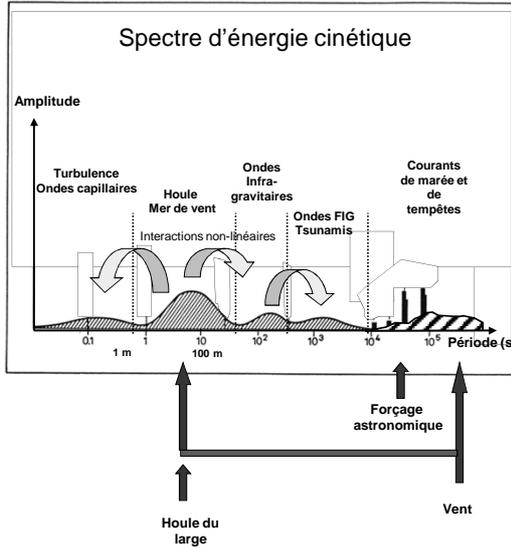


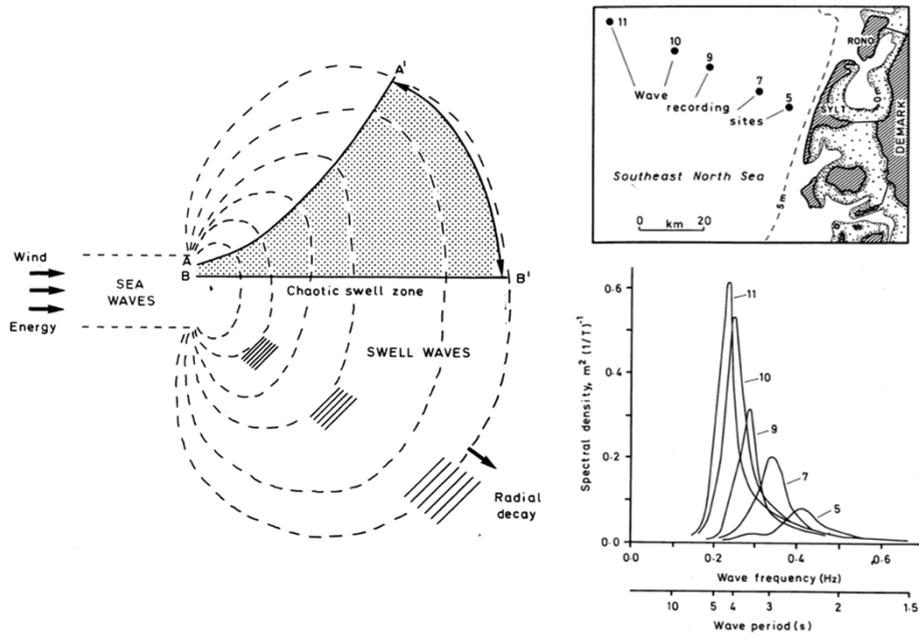
Fig. 3. Morphological evolution of the Po Delta (after Simeoni et al., 2000a, modified).

Processus hydrodynamiques en zones littorales et côtières



- Grande gamme d'échelles
- Apports d'énergie sur certaines gammes de fréquence
 - Houle
 - Tempêtes (vents + pression)
 - Marées

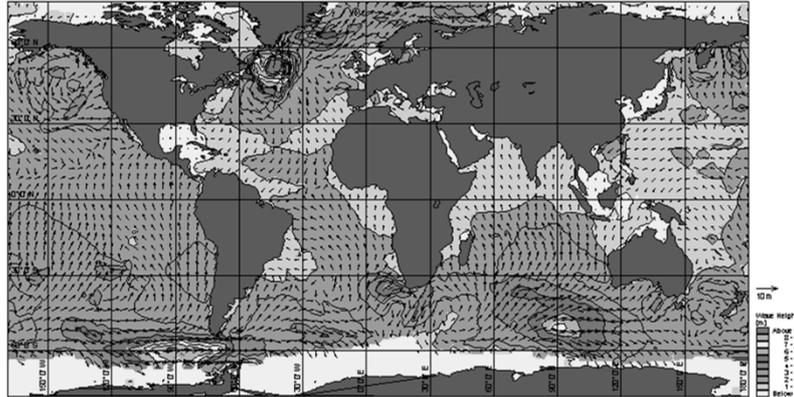
Génération et propagation de la houle



Modélisation du champ de houle planétaire

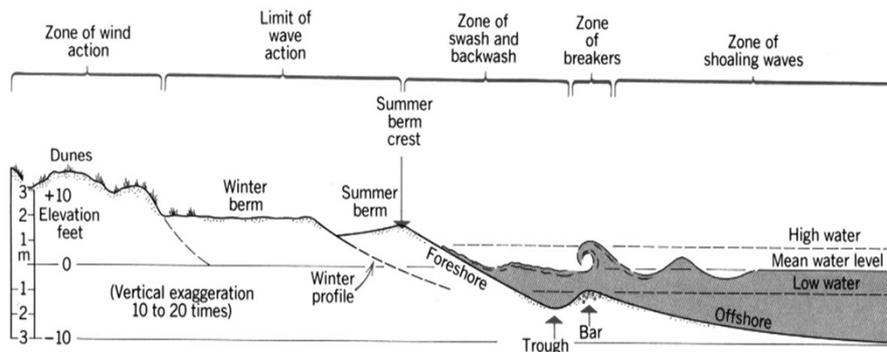
Objectid = 15059 **The World** Significant Wave Height and Direction
 Forecast Period: 2009-10-14 00:00:00 to 2009-10-16 00:00:00 UTC Checking: W:\Waterforecast\webrout\Production\animations\GP26x29a24c

Showing: 15/10/2009 10:00 UTC



10/16/2009 10:00:00

Transformation de la houle en milieu peu-profond

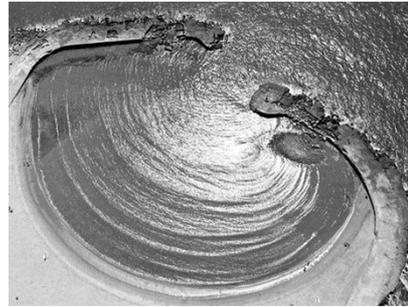


(d'après Strahler et Strahler 1992)

Réfraction-diffraction



Réfraction de la houle



Diffraction et réfraction de la houle

Courants de houle – longitudinaux

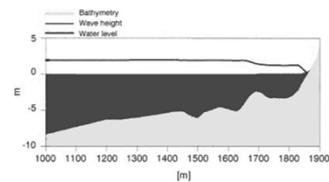
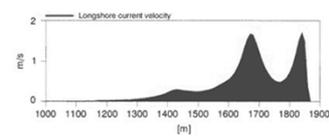
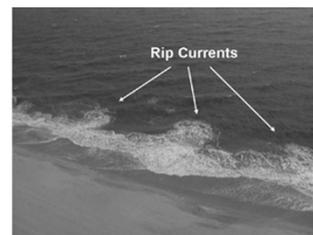
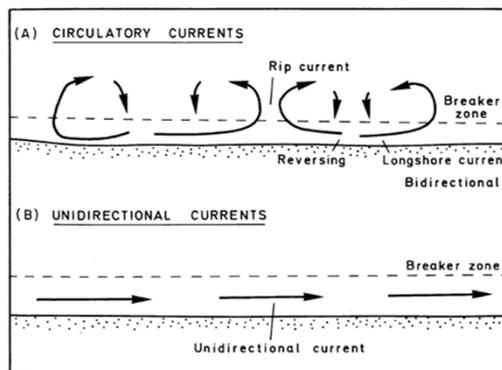


Figure 35. Two types of longshore current pattern.

Génération de la marée

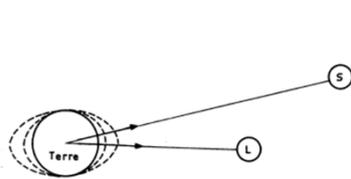
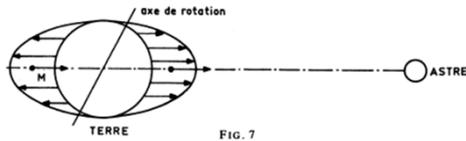


FIG. 9. - Position des astres en vive-eau.

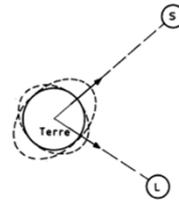
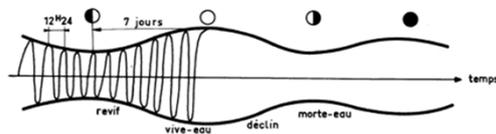
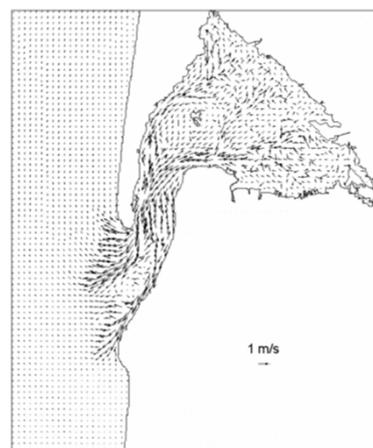
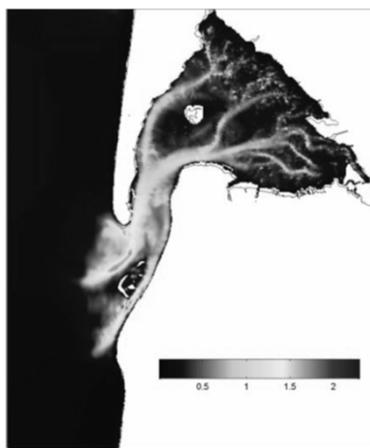


FIG. 11. - Position des astres en morte-eau.

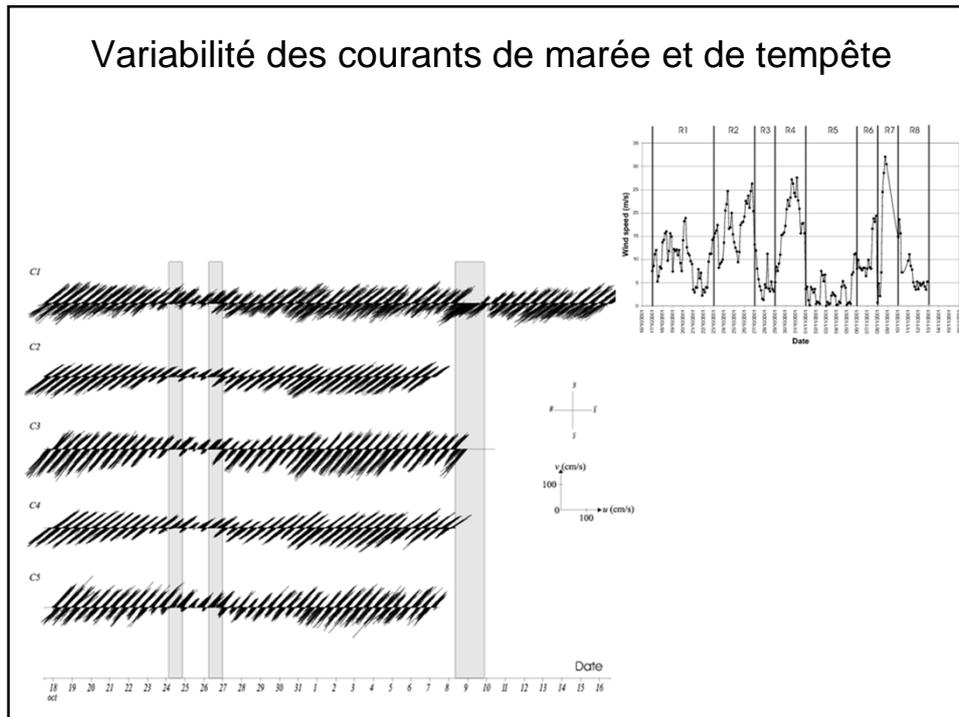


Courants de marée

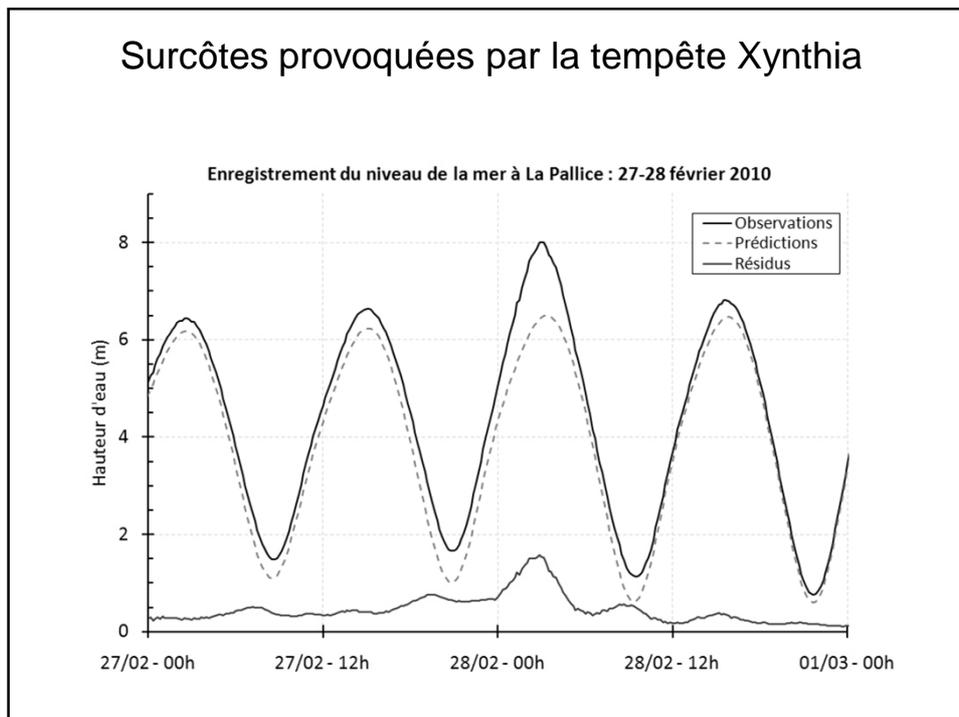


Courants de marée maximums dans le bassin d'Arcachon (Ifremer)

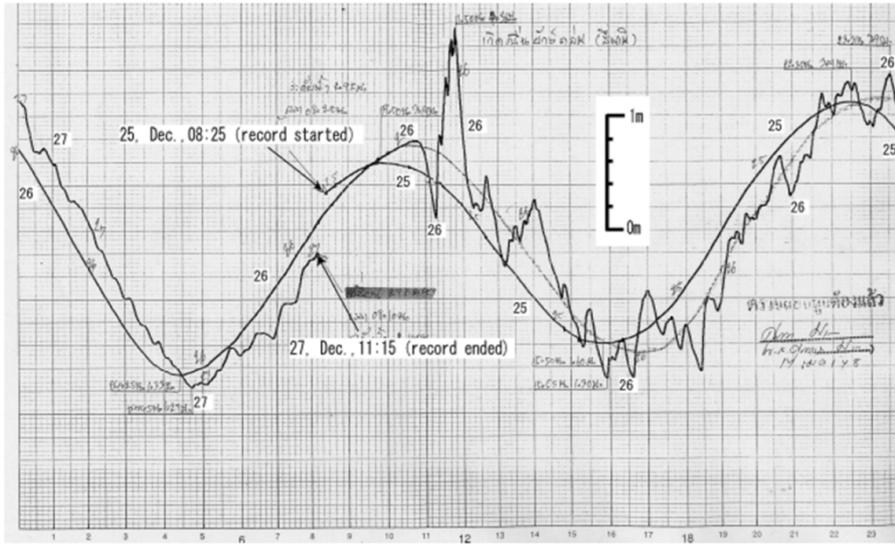
Variabilité des courants de marée et de tempête



Surcôtes provoquées par la tempête Xynthia

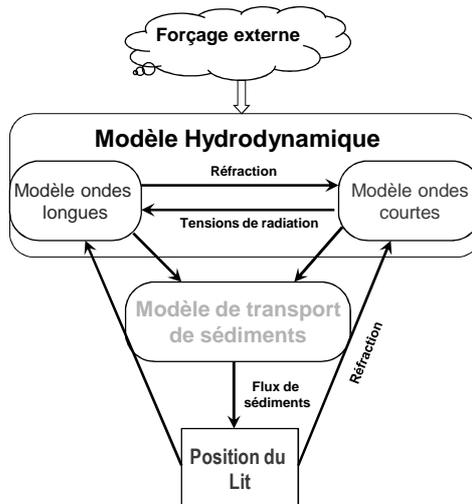
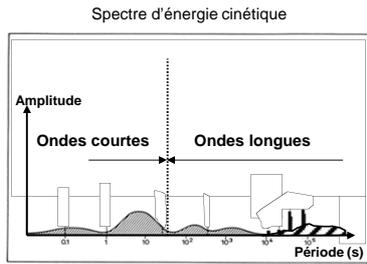


Surcôte provoquée par un Tsunami

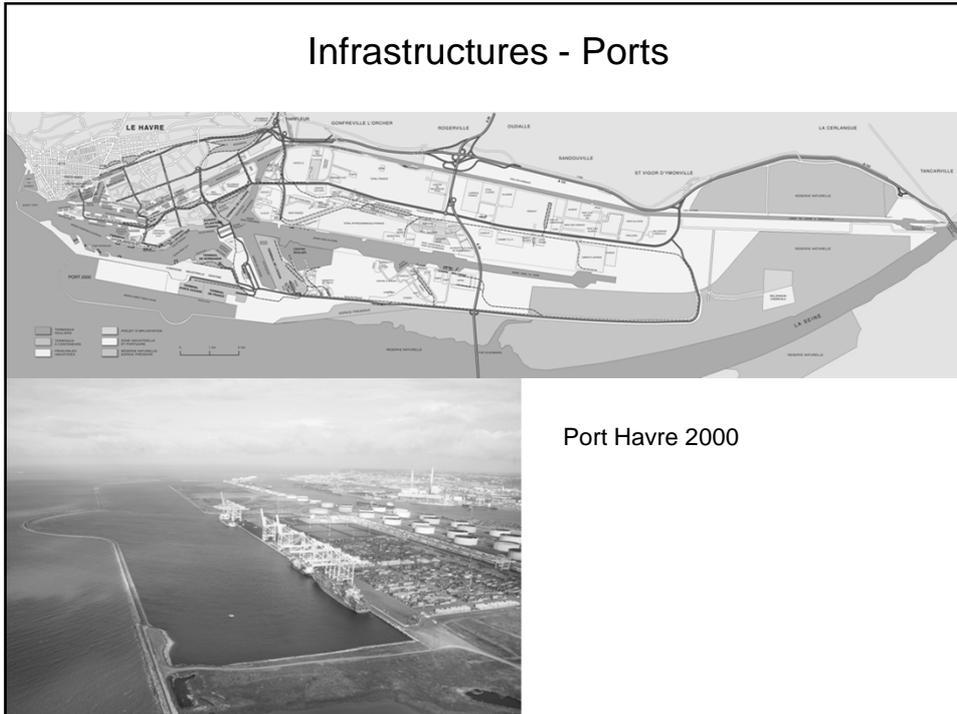


Thaïlande, décembre 2004

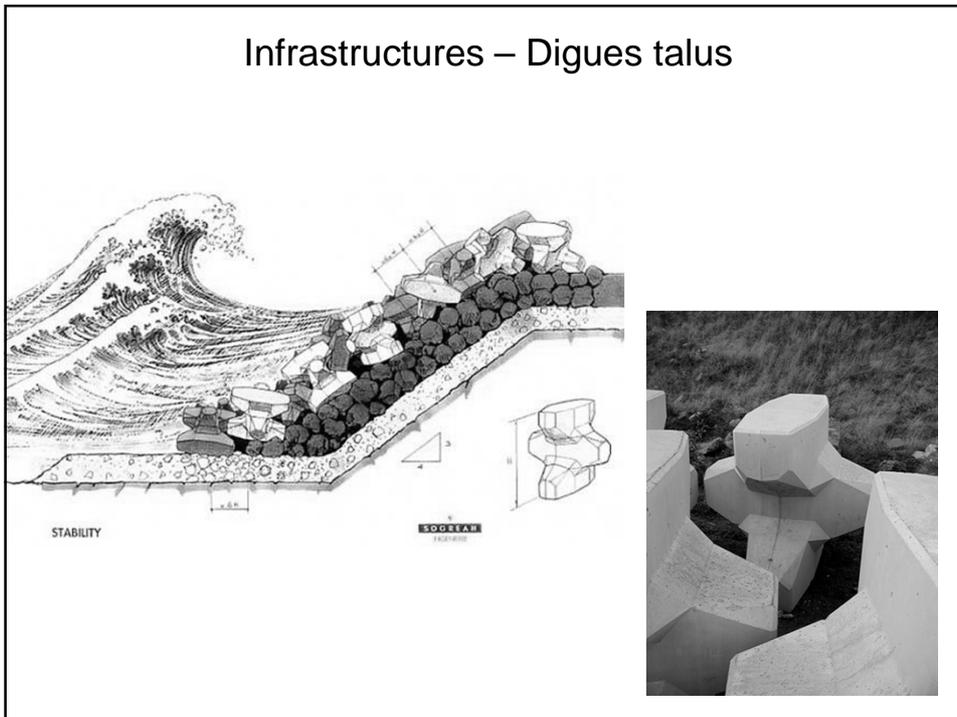
Modèle hydro-sédimentaire



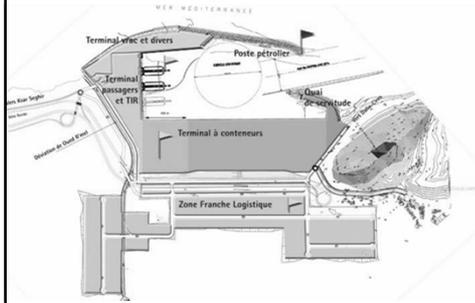
Infrastructures - Ports



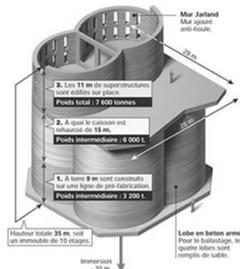
Infrastructures – Dignes talus



Infrastructures - Ports

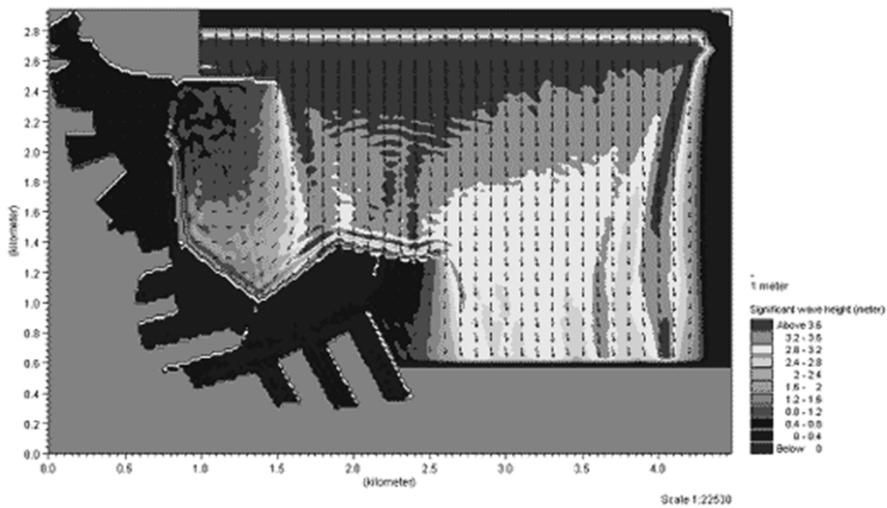


Port de tanger (2005)



Digue à caissons

Infrastructures - ports

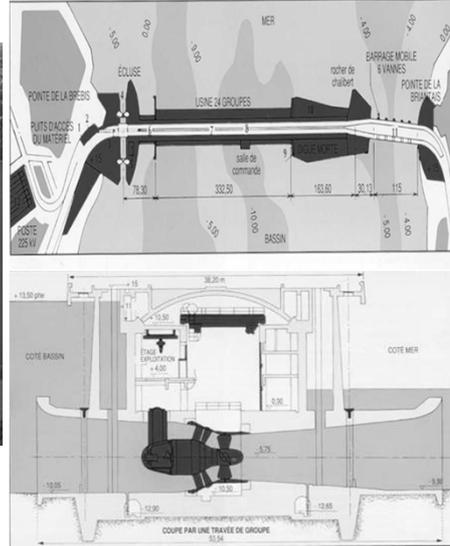


Modélisation de l'agitation portuaire (Mike 21 – DHI)

Infrastructures – Production d'énergie Marée



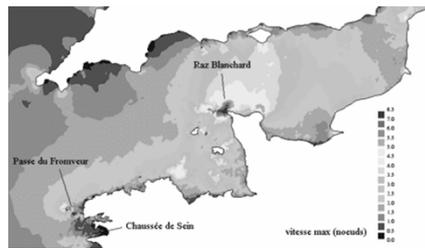
Usine marémotrice de la Rance



Infrastructures – Production d'énergie Marée



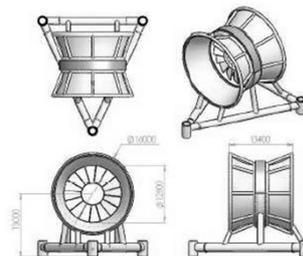
Hydrolienne « SeaGen »
(Marine Turbines Ltd)



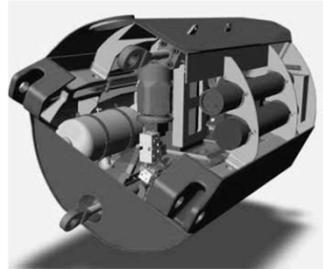
Courants de marée dans la manche



Parc hydrolien Paimpol-Bréat (EDF)
Hydrolienne OpenHydro (DCNS)



Infrastructures – Production d'énergie Houle



Système Pelamis P750
Wave energy converter (750 kW)

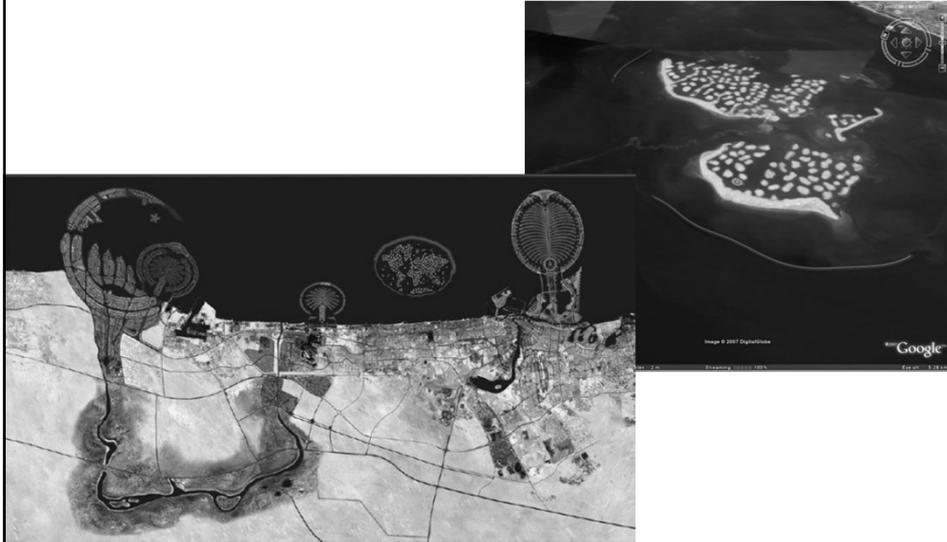


Infrastructures – Production d'énergie Autres energies



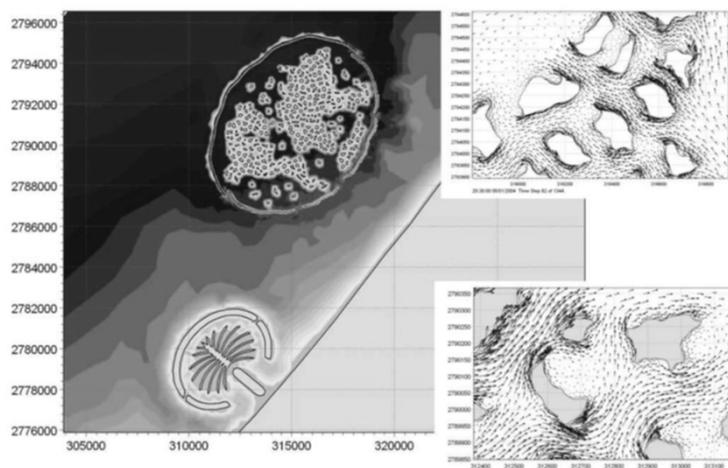
Centrale Nucléaire de Flamanville (EPR en construction)

Evolution du trait de côte – gains sur la mer



Iles artificielles « The World » (Dubai)

Evolution du trait de côte – gains sur la mer



Modélisation des courants autour des îles de « the World » (DHI)

Evolution de trait de côte - Erosion



Tempête (Quelques heures)
Canet en Roussillon



Long terme (dizaines d'années)
Cap Ferret

Evolution de trait de côte - Erosion



Soulac sur mer (Aquitaine)



Submersion marine



La faute sur mer (Tempête Xynthia)

