Monitoring of benthic habitats at the tidal energy site of Paimpol-Bréhat (Brittany, France)

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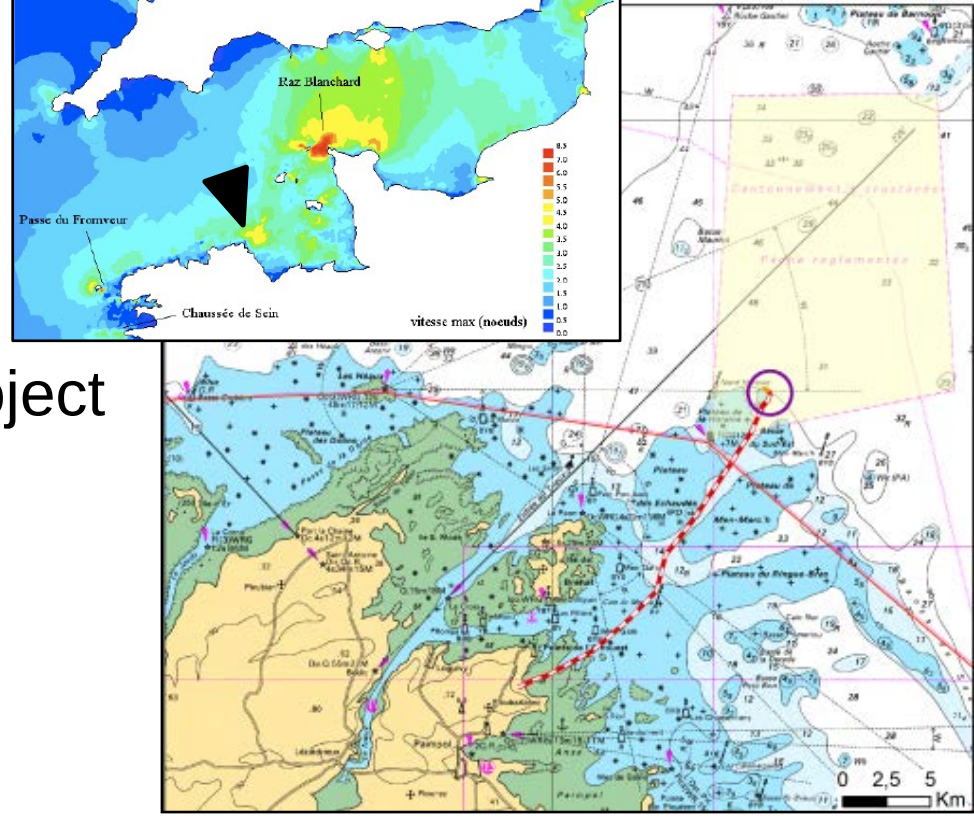
EIMR-2014, 28 April -02 May 2014, Stornoway, Isle of Lewis, Scotland

Context



- EDF-EN pre-commercial project
  - 4 *Open-Hydro* turbines
    - grid-connected in 2015 ?
  - Tidal currents: max. 3 m/s
  - Depth: 20 - 50 m
- Zone of ecological interest
  - ZCI, crustacean reserve,…
  - Knowledge gaps for benthos
- Experimental site of France Energies Marines
  - Collaborative research projects

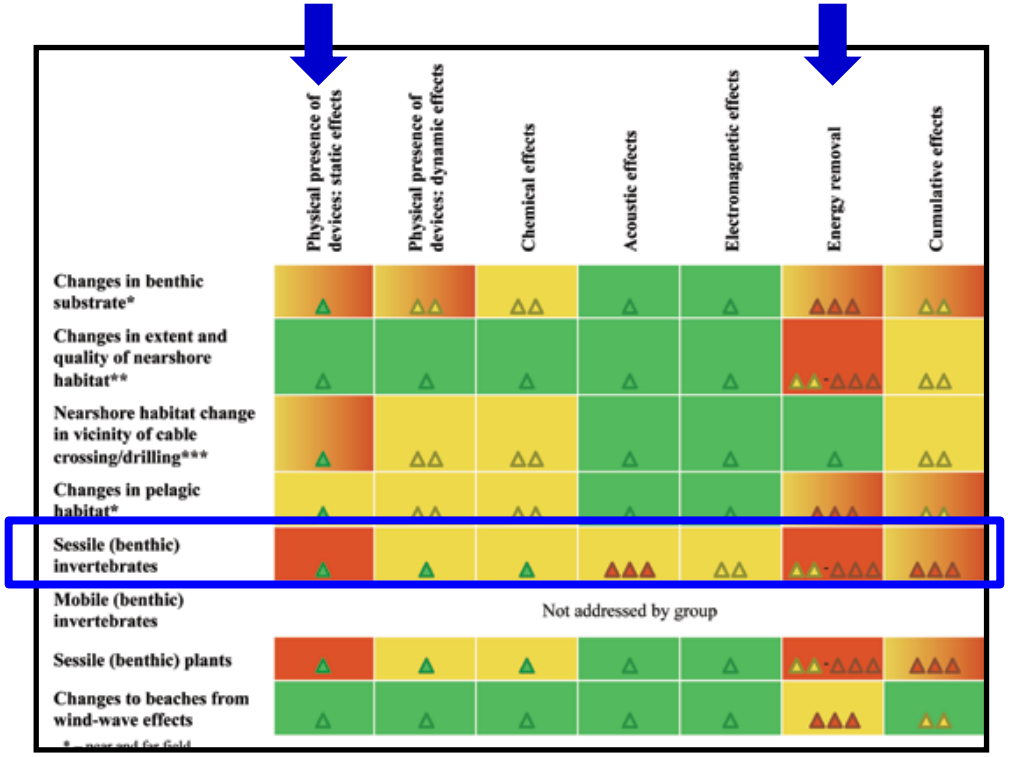
Objectives

Benthic baseline survey:

- Tidal deployment site
- Submarine power cable

1. Response of benthic epifauna to change of hydrodynamic regime?

2. Assess the ‘reef’ effect of unburied cable
   - Colonisation dynamic
   - Role of habitat

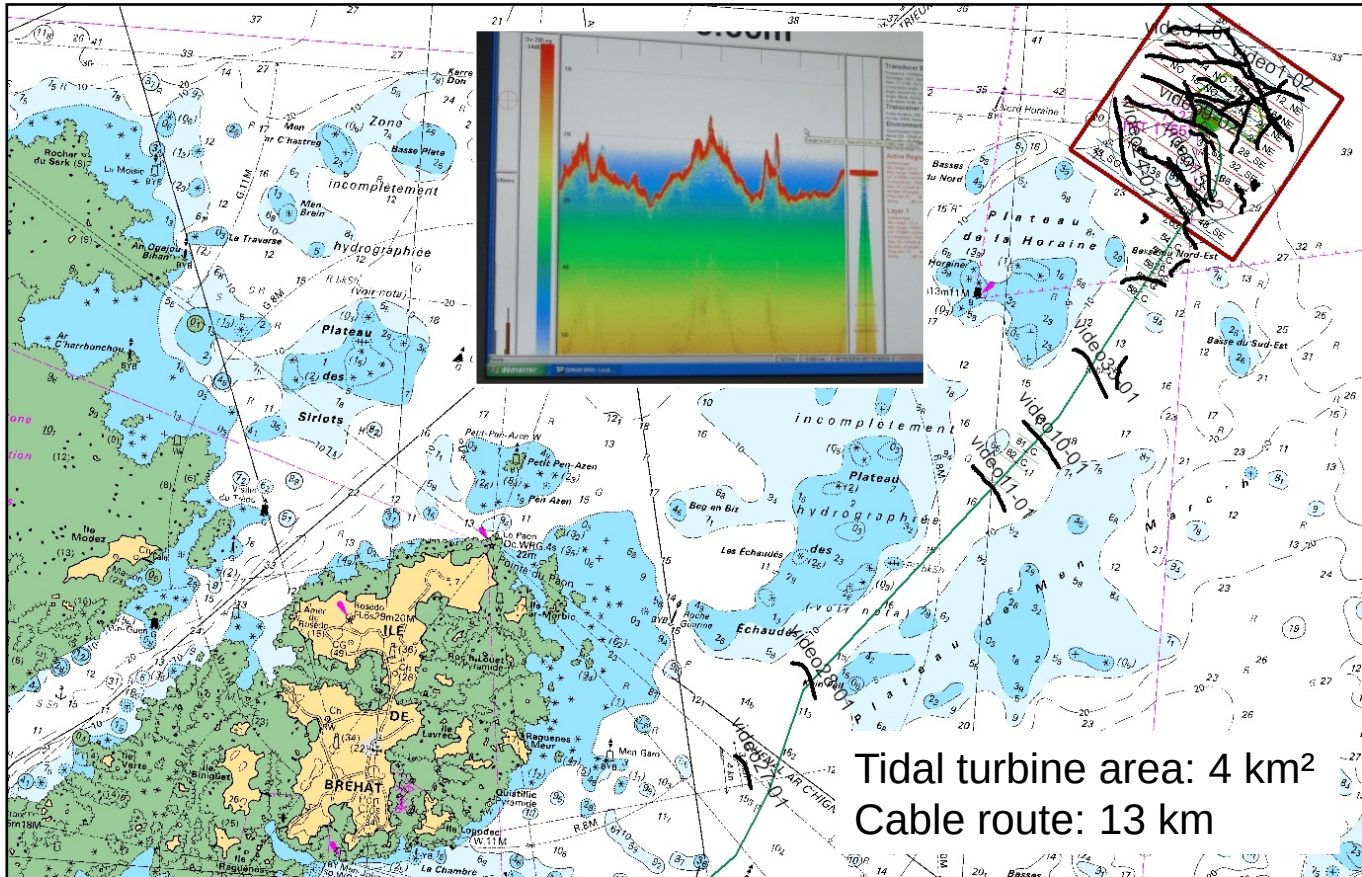


(Polagye et al., 2011)

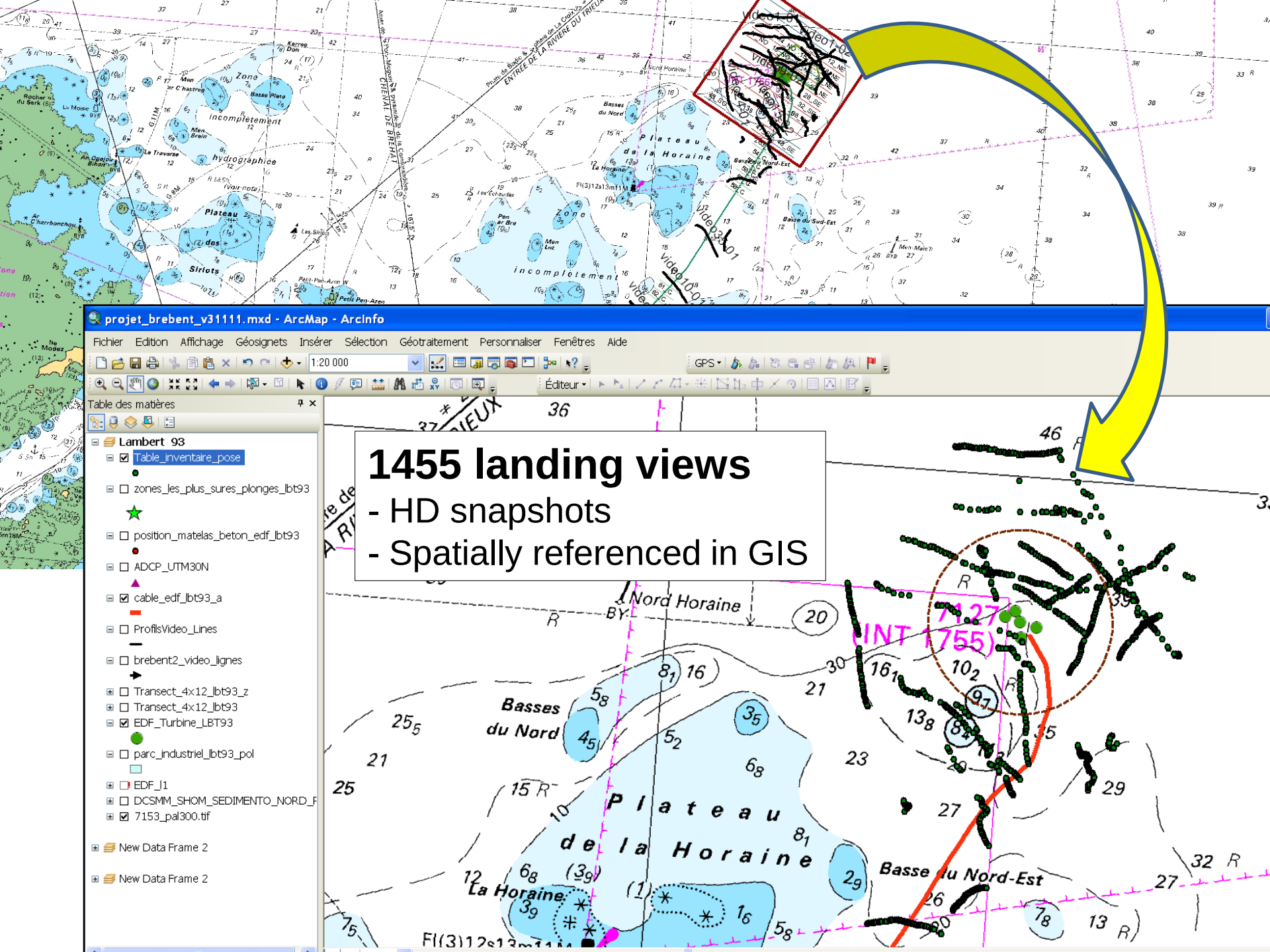
Method

- Exhaustive HD-video survey
  - Potentially impacted + reference areas
  - 35 video profiles in March 2012 (before cable installation)
  - 25 additional profiles in March 2013 (turbine deployment site)

Drop-down video approach



Tidal turbine area: 4 km²
Cable route: 13 km


projet_brebent_v31111.mxd - ArcMap - ArcInfo
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position_matelas_beton_edf_lbt93
ADCP_UTM30N
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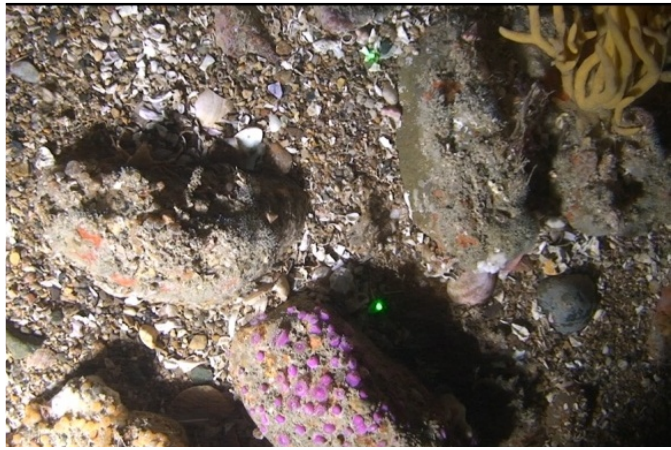
ProfilsVideo_Lines
brebent2_video_lignes
Transect_4x12_lbt93_z
Transect_4x12_lbt93
EDF_Turbine_LBT93
parc_industriel_lbt93_pol
EDF_J1
DCSMM_SHOM_SEDIMENTO_NORD_F
7153_pal300.tif
New Data Frame 2
New Data Frame 2
1455 landing views
- HD snapshots
- Spatially referenced in GIS
Nord Horaine
Basses du Nord
Plateau de la Horaine
La Horaine
Basse du Nord-Est
INT 755
7127

First outcomes on benthic biodiversity

- Hard substrate dominant
  - Rugged relief
    - Rocks-boulders + gravels/shells between blocs

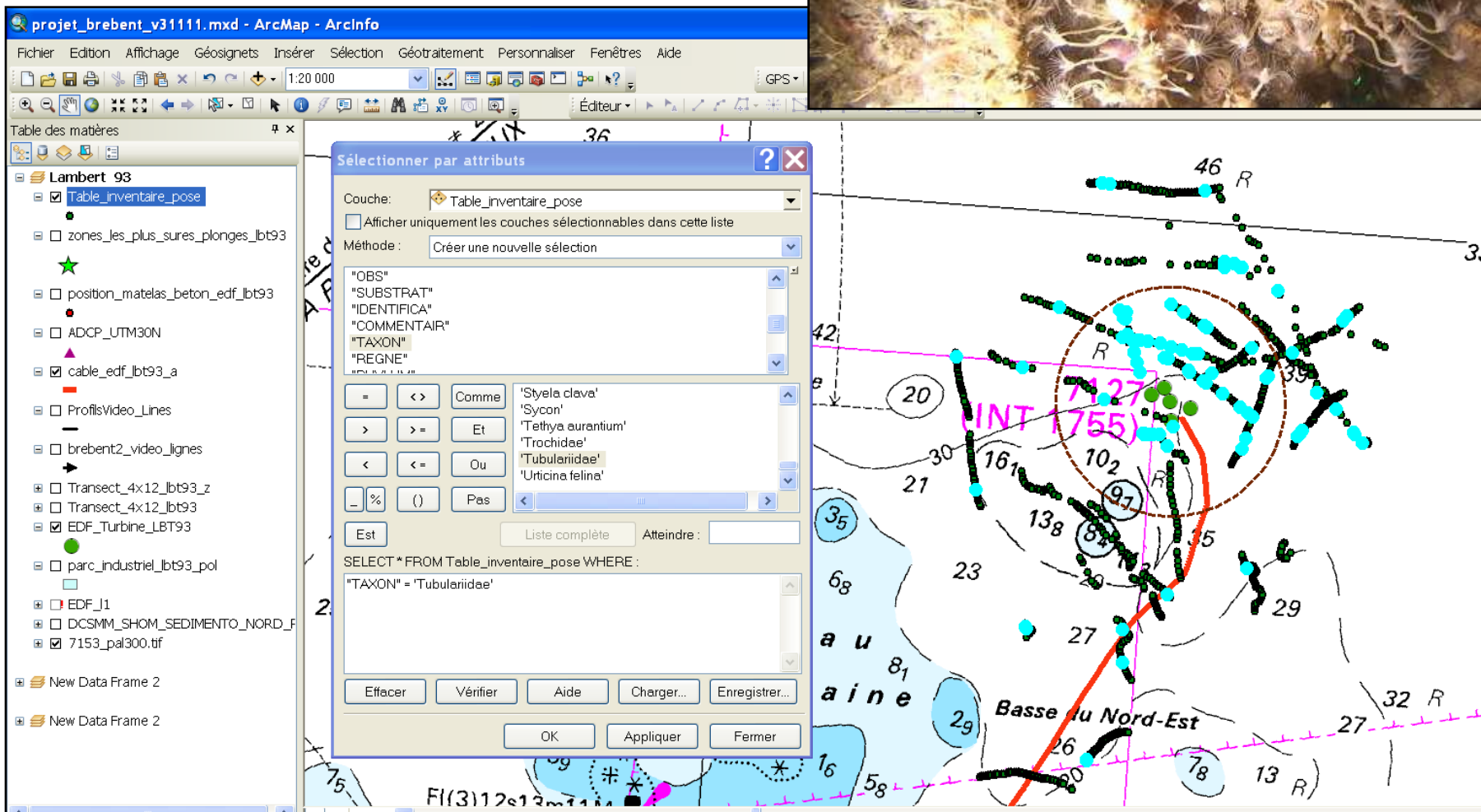


- Hard substrate epifouling benthos dominant
  - 105 benthic taxa (91 invertebrates taxa)
    - 52 to Species level (~ 50%)
  - 13 taxa of interest

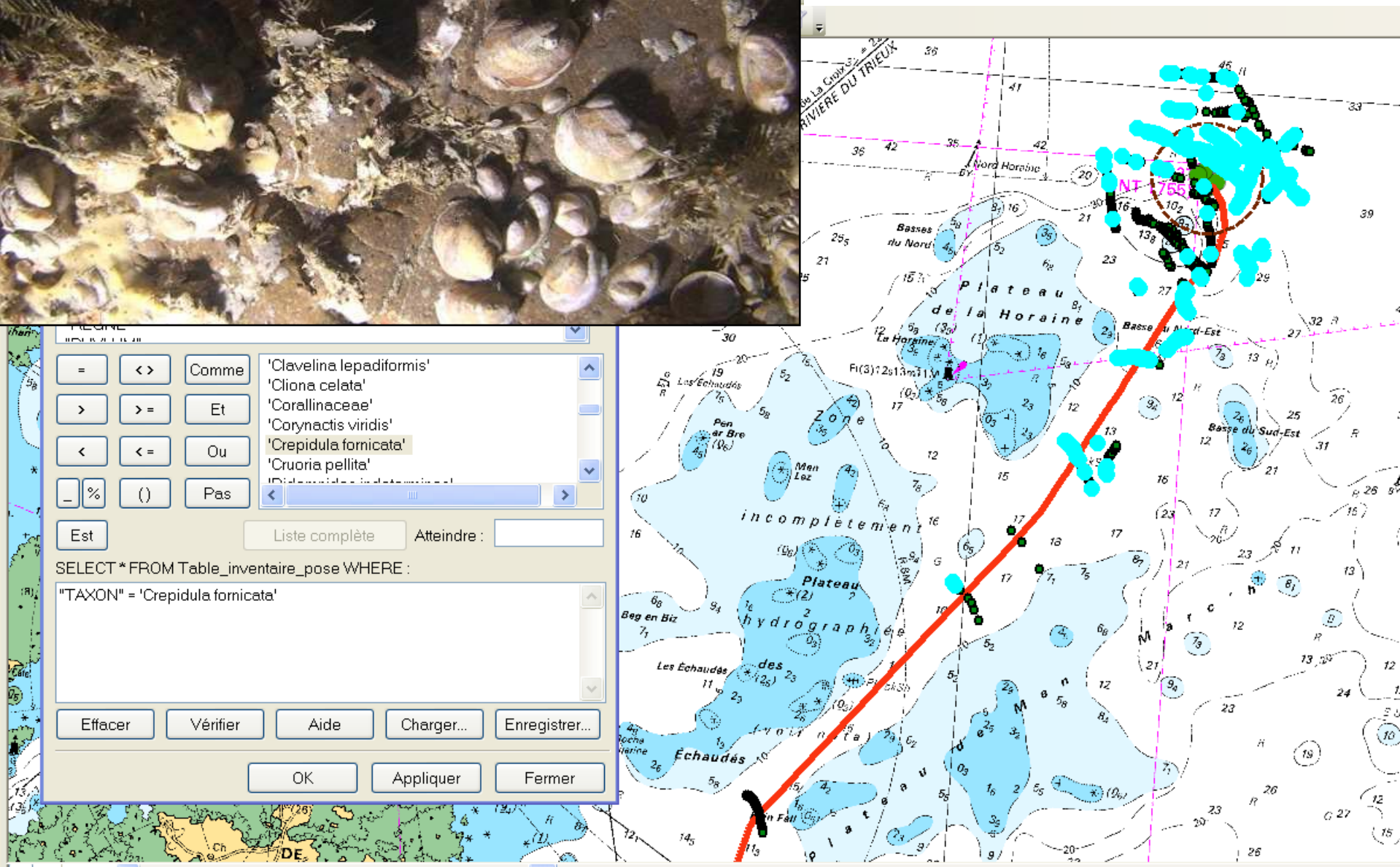
- 18 specific assemblages (« *faciès* »)

Phylum	TAXA	Minimum occurrence frequency (%)
Chordata	Ascidies sociales indeterm.	68.7
Chordata	*Stolonica socialis*	17.9
Porifera	Eponges encroûtantes indéterm.	59.8
Porifera	*Tethya aurantium*	5.9
Cnidaria	*Corynactis viridis*	34.5
Cnidaria	*Urticina felina*	24.9
Cnidaria	*Alcyonium digitatum*	20.0
Cnidaria	*Sagartia elegans*	16.5
Mollusca	*Crepidula fornicata*	25.4
Mollusca	*Calliostoma zizyphinum*	23.9
Arthropoda	Balanes indeterm.	12.4
Arthropoda	Inachidae sp.	7.3
Bryozoa	*Cellaria* sp.	7.2
Bryozoa	*Flustra foliacea*	5.8
Annelida	Chaetopteridae sp.	6.0
Annelida	*Spirobranchus sp.*	1.9
Heterokontophyta	Algues brunes encroûtantes indéterm.	17.2
Rhodophyta	Algues rouges encroûtantes indéterm.	25.2
Rhodophyta	Algues rouges en lame indéterm.	15.6

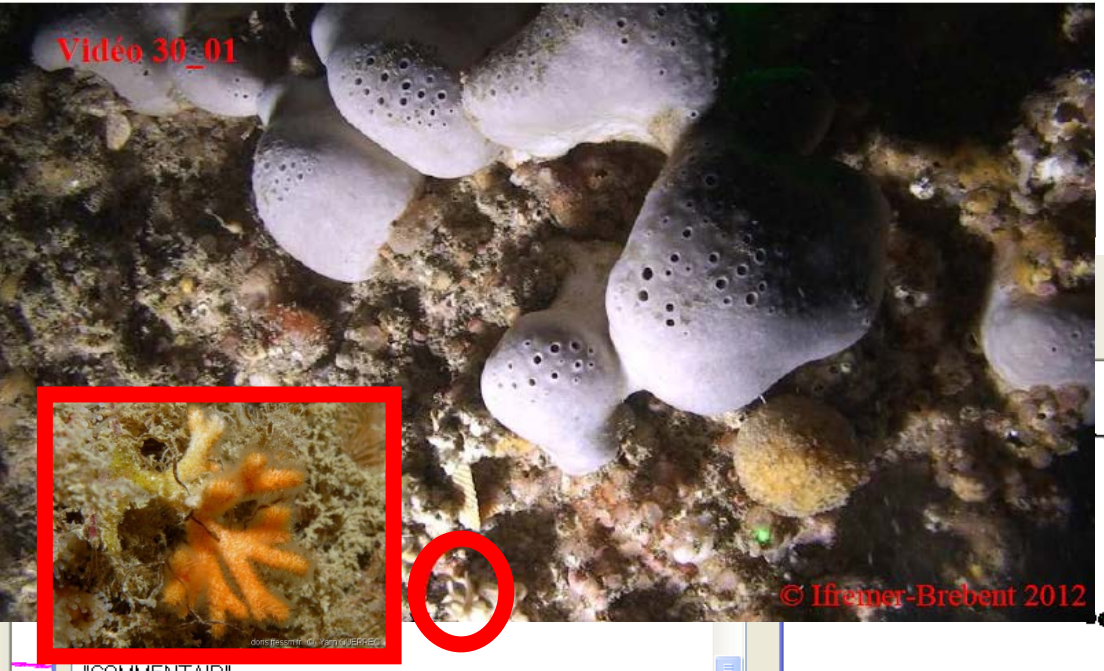
- High energetic environment species (Tubulariidae sp.)

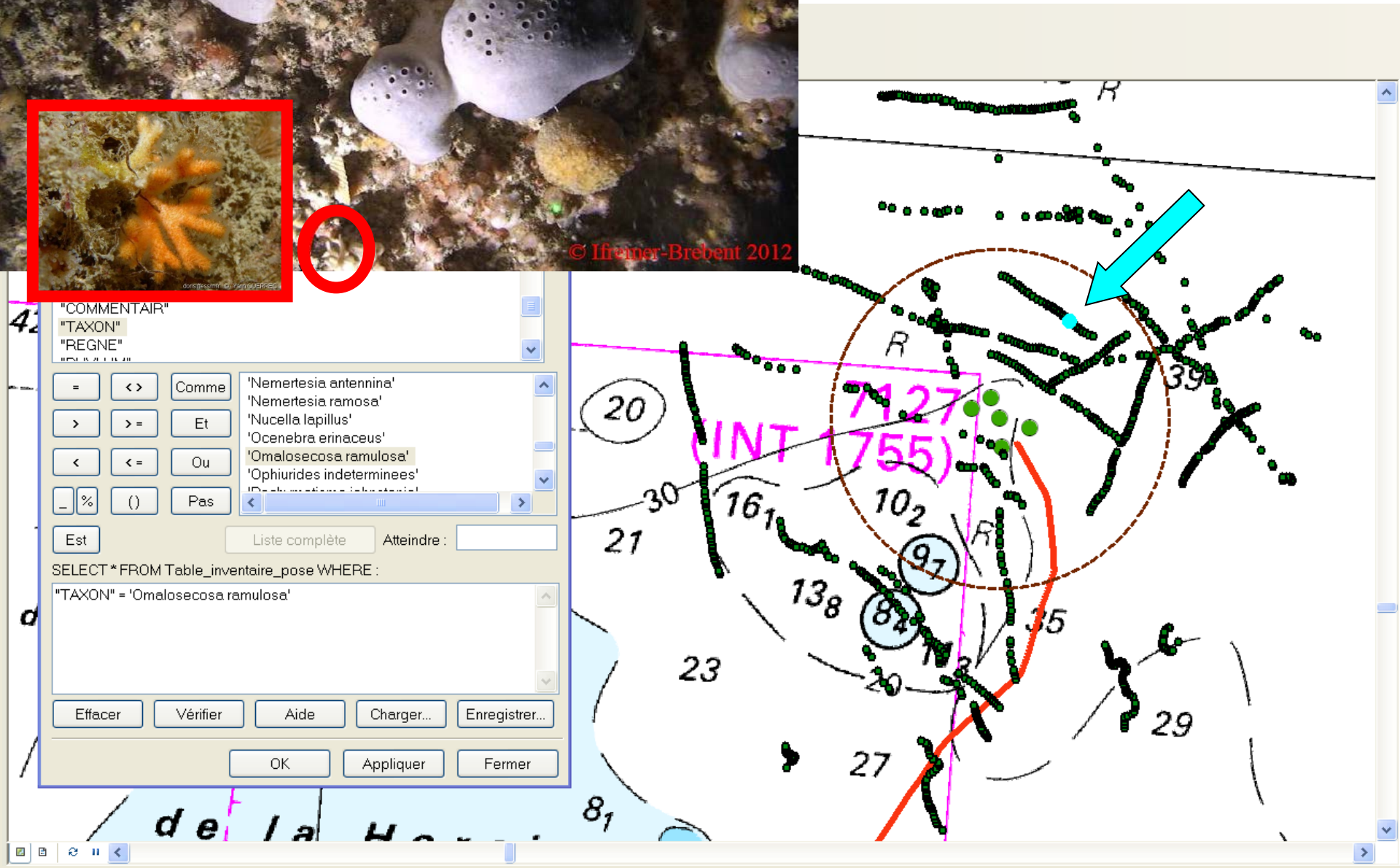


- Non-native species (*Crepidula fornicata*)



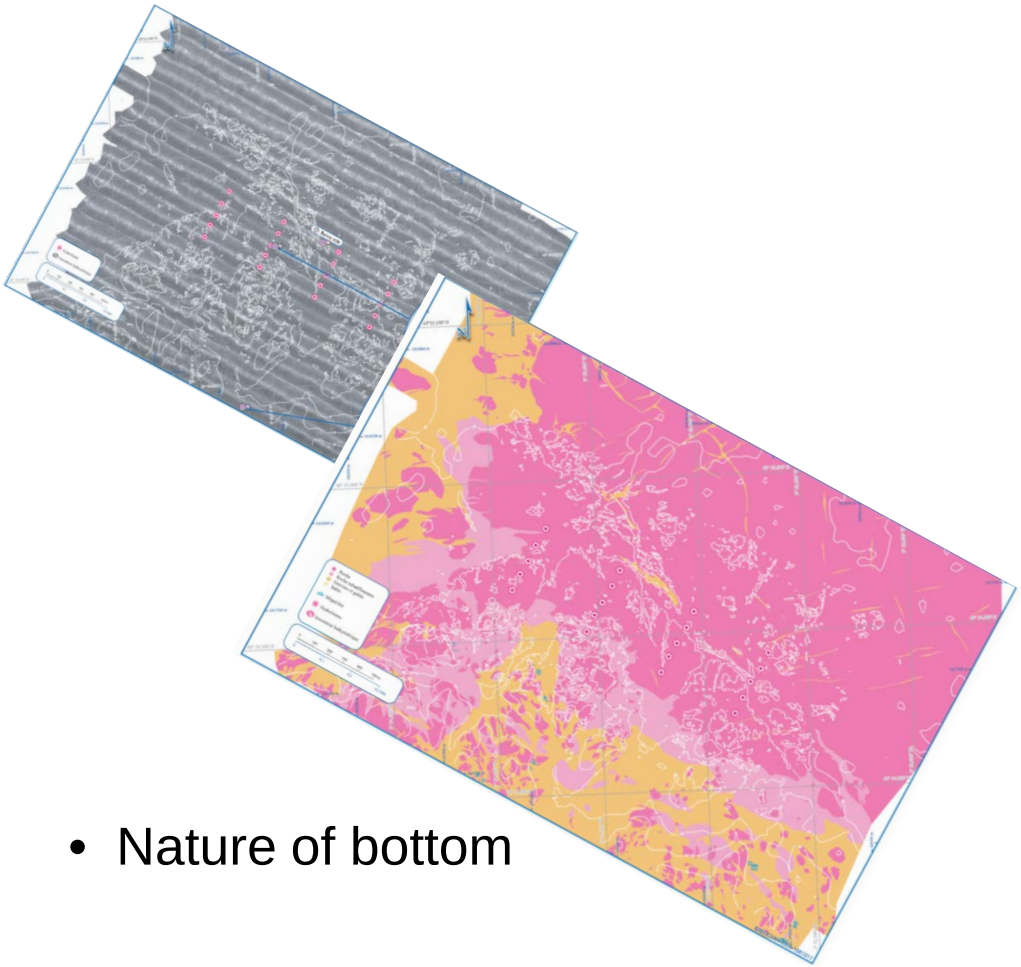
- Rare species (*Omalosecosa ramulosa*)



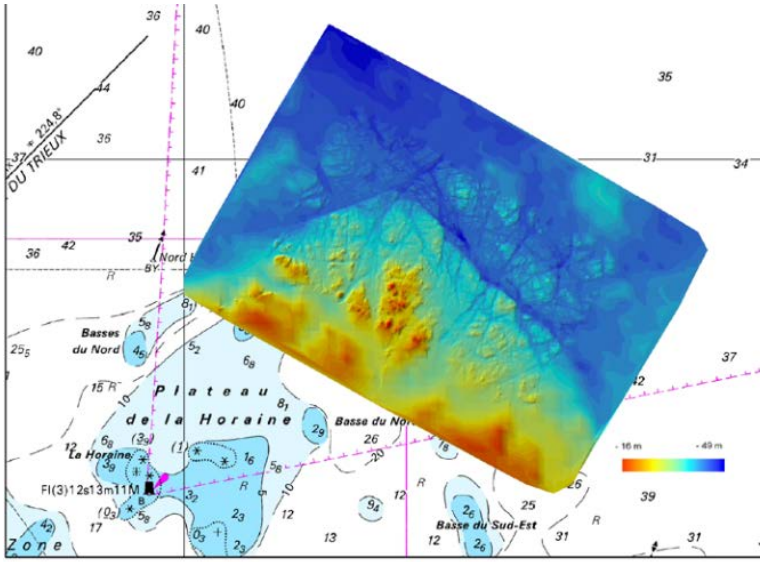


Physical parameters

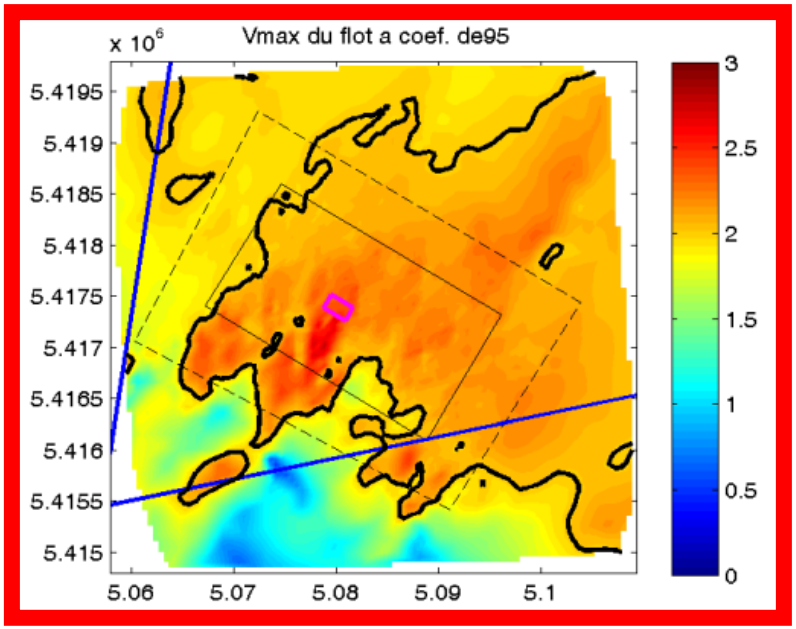
(Data: EDF-EN)



- Nature of bottom



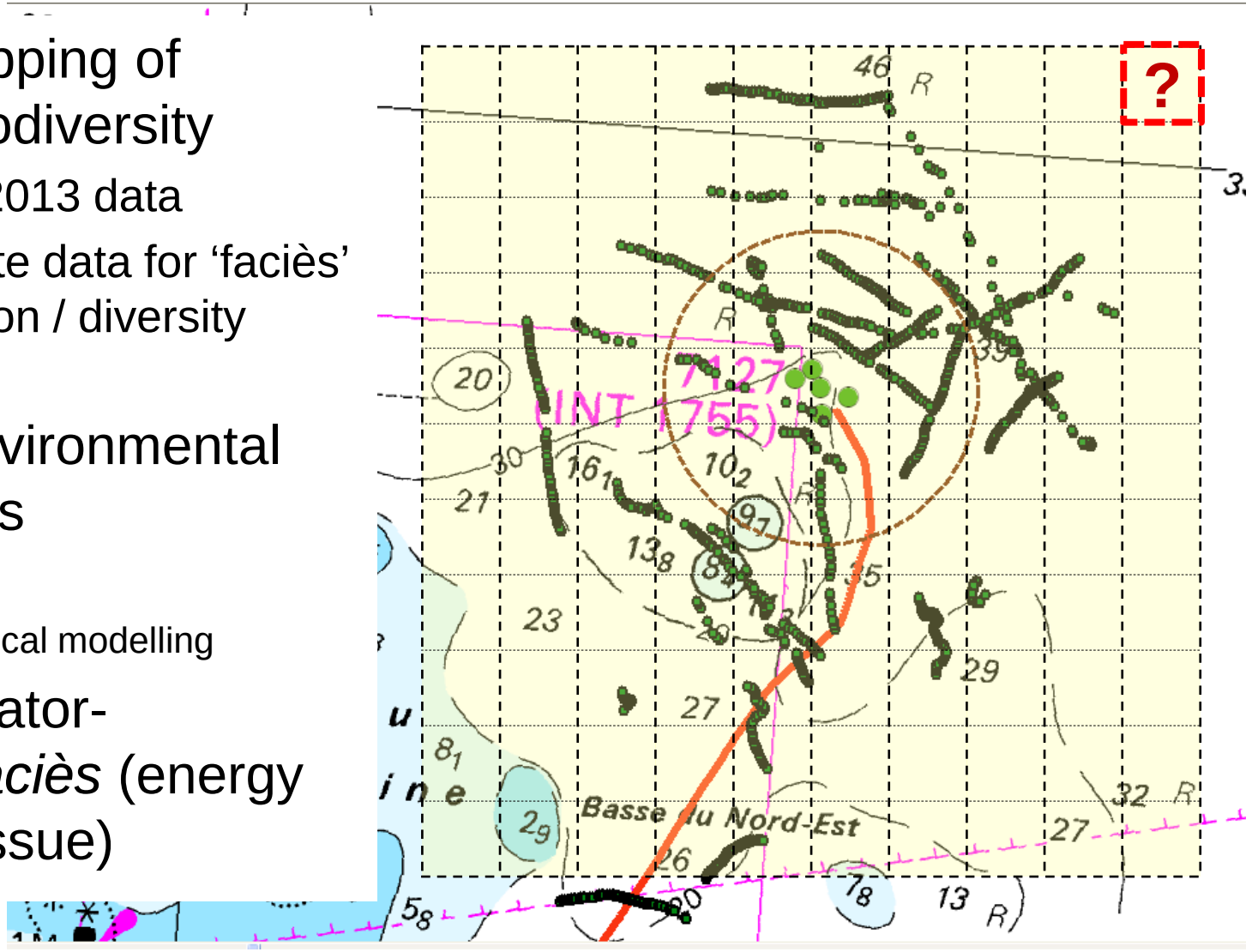
- Fine scale (10 m) bathymetry



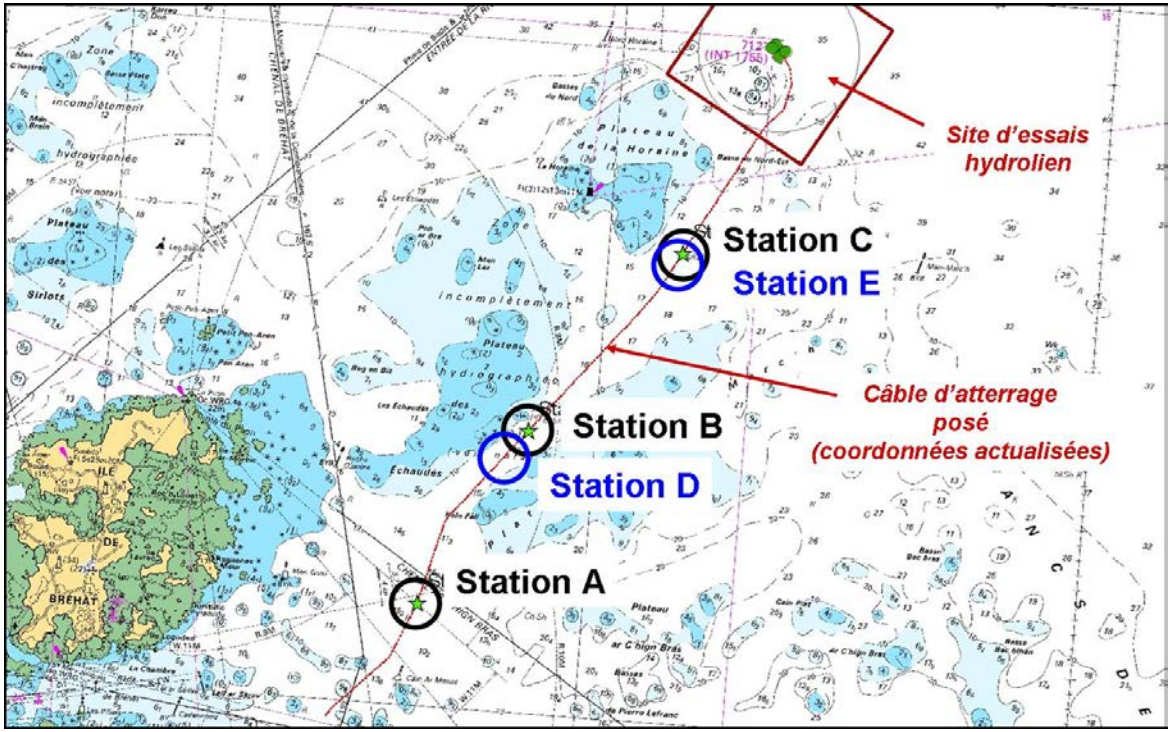
- **Current (speed; direction)**

Next steps…

1. Better mapping of benthic biodiversity
   - Include 2013 data
   - Aggregate data for ‘faciès’ distribution / diversity index
2. Role of environmental parameters
   - Currents
     - Statistical modelling
3. Best indicator-species/*faciès* (energy removal issue)



‘Reef’ effect of unburied power cable ?



- Colonisation monitoring on protection (**iron cast**) and stabilisation structures (**concrete mattress**)
  - Started in 2013
  - HD-Photos / scuba-diving (depth < 30 m)
  - Every 6 months (first 3 years)

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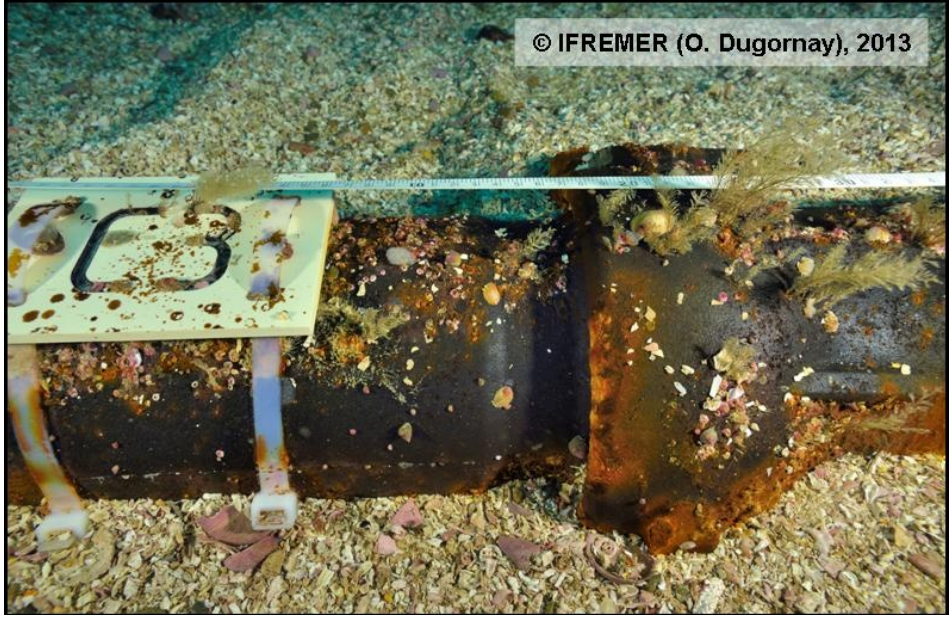
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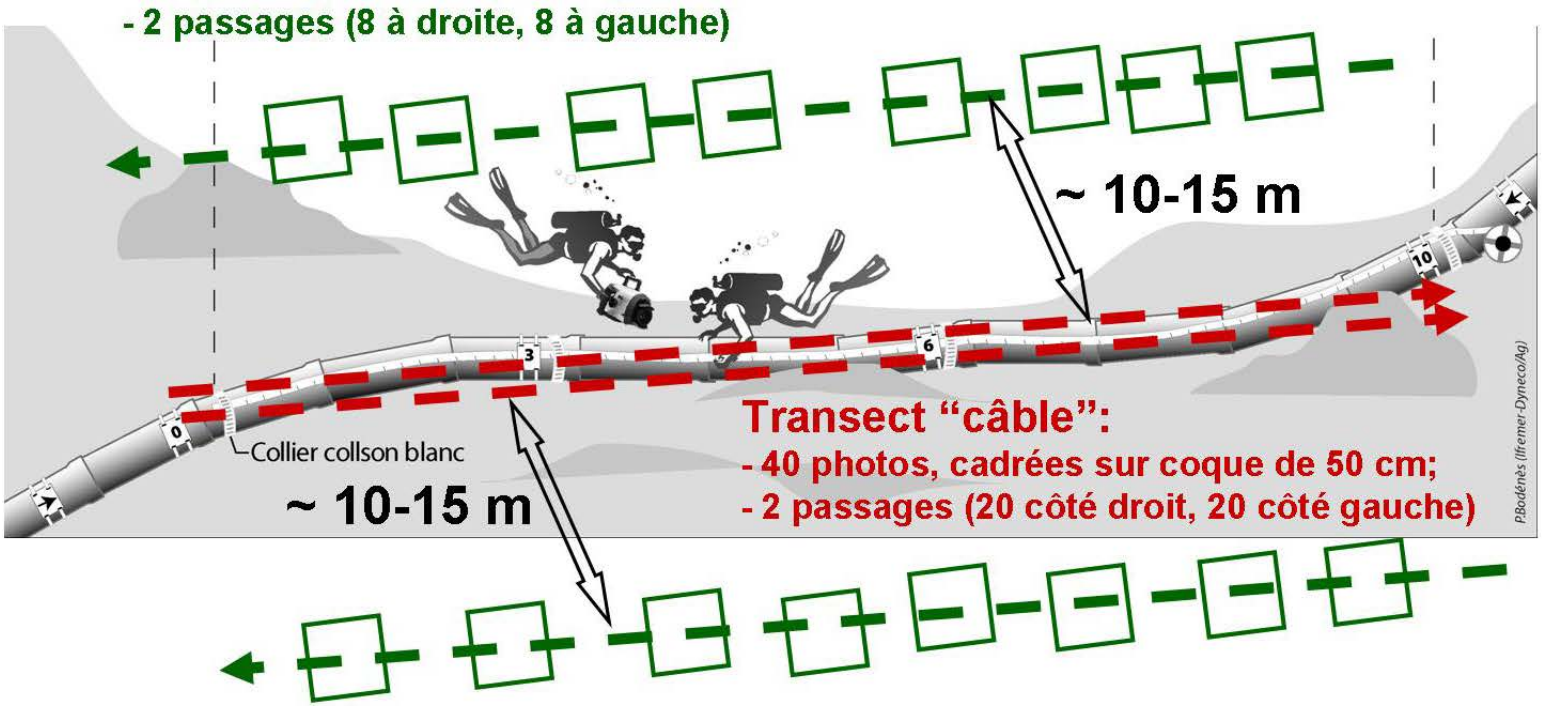
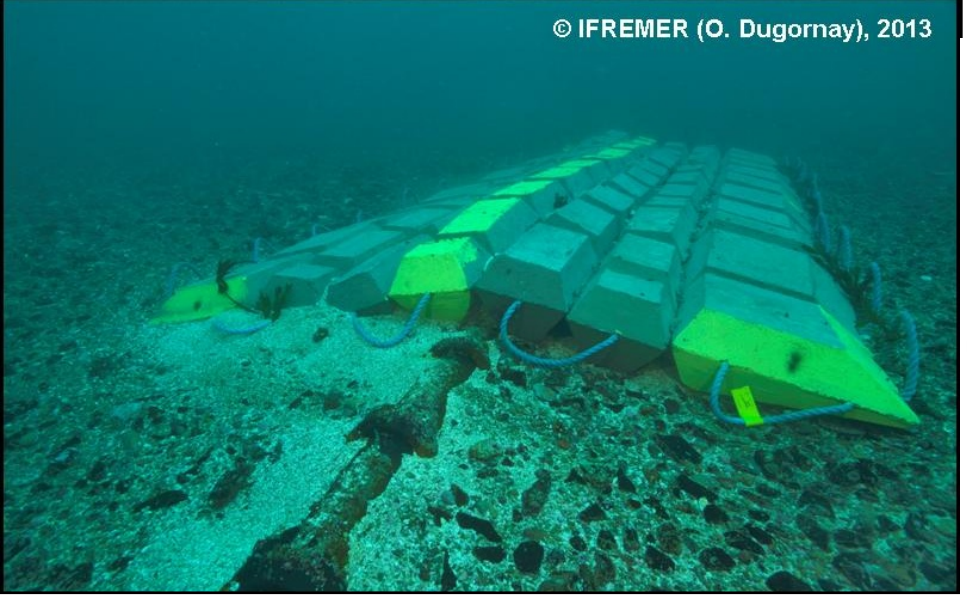

- 2 passages (8 à droite, 8 à gauche)
~ 10-15 m
Collier collson blanc
~ 10-15 m
Transect "câble":
- 40 photos, cadrées sur coque de 50 cm;
- 2 passages (20 côté droit, 20 côté gauche)
P.Bodénès (Ifremer-Dyneco/Ag)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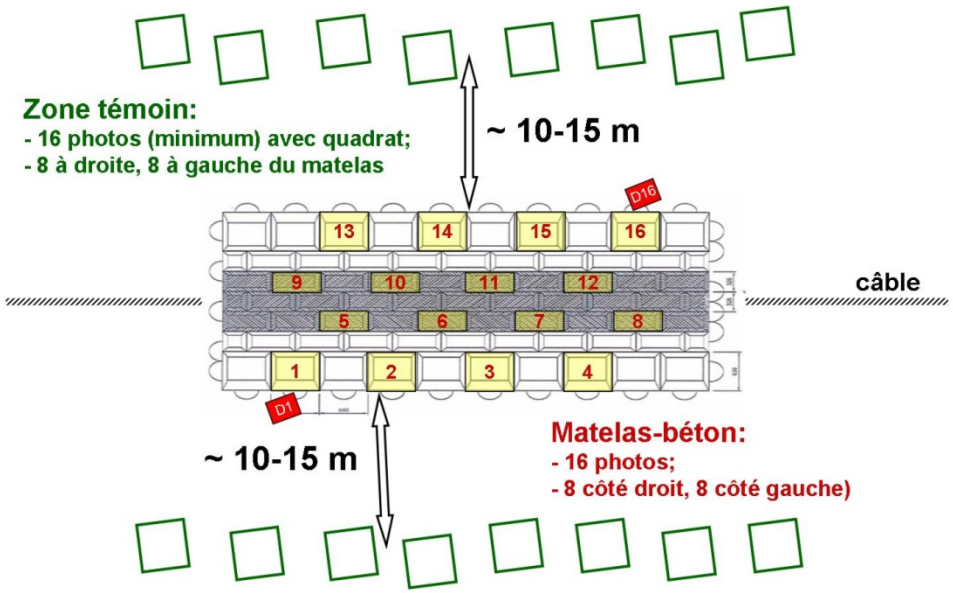
Zone témoin:
- 16 photos (minimum) avec quadrat;
- 8 à droite, 8 à gauche du matelas
~ 10-15 m
D16
13
14
15
16
9
10
11
12
câble
5
6
7
8
1
2
3
4
D1
~ 10-15 m
Matelas-béton:
- 16 photos;
- 8 côté droit, 8 côté gauche)

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Thanks for your attention!

Thanks are also due to:
Thalia, *Côtes de la Manche* and *Pépère* crews,
and all scientific divers.

FACIES'S TYPES	CARACTERISTIQUES ENVIRONNEMENTALES	STATUT	Typologie ZNIEFF-MER	PRESENCE	Occurrence (Nbre de vidéo / 57)
à Ulosa stuposa et spongiaires proliférants	milieux turbides; fort courant	Validé	IV.6.1.4	certaine	55
à Alcyonium digitatum	hydrodynamisme intense (=fort courant)	Proposé		certaine	53
à hydraires gazonnants	milieux turbides avec courant (type chenaux)	Proposé		certaine	53
à Corynactis viridis - Alcyonium digitatum	hydrodynamisme intense (=fort courant)	Validé	III.9.3.8	certaine	51
à Cliona celata	avec courant	Proposé		certaine	47
à ascidies - micropolychètes ensablés		Proposé		certaine	43
à Hydraires et Balanes	roches horizontales du circalittoral; fort courant	Validé	IV.6.1.8	certaine	38
à Tubulaire (Faciès à Tubularia indivisa)	hydrodynamisme extrême	Validé	III.9.3.9	certaine	32
à ascidies simples (Ascidiella aspersa) - Chlamys varia	Courant + matière en suspension	Validé	III.9.5.1	certaine	25
à Cellaria sinuosa - Bugula flabellata		Validé	IV.6.1.2	supposée	25
à Flustra foliacea - Polycarpa sp.	cailloutis profonds à Sabellaria spinulosa	Validé	IV.6.1.3	supposée	24
à didemnidés proliférants en draperies		Validé	IV.6.1.5	certaine	14
à Laminaria hyperborea - Laminaria ochroleuca		Validé	III.9.3.3b	certaine	10
à Aslia lefevrei	topographie en fissures	Proposé		certaine	9
à Gorgones et à Roses de mer		Validé	IV.6.1.	certaine	9
à Leuconia johnstonii - Scrupocellaria sp.		Validé	III.9.3.9	très probable	8
Banc de maërl	Habitat à fort intérêt patrimonial			certaine	1
à ascidies - micropolychètes ensablés		Proposé		supposée	1