SYNOBSIG

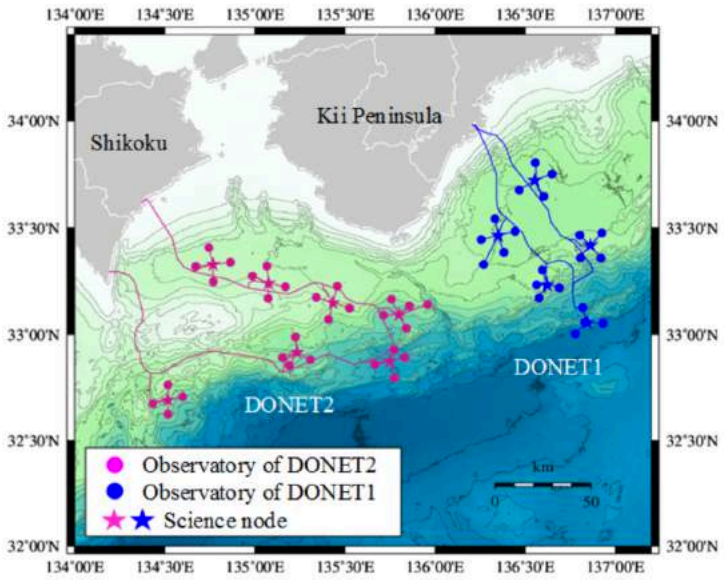
SYNergy for **OBS**ervatories for seafloor se**I**smology and **G**eodesy

1. General Outlines

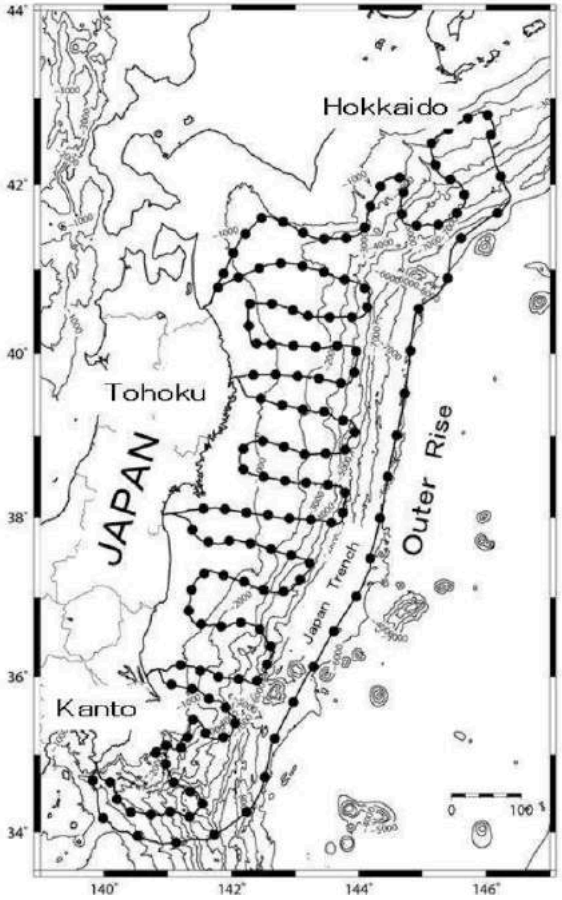
To propose an alternative to cabled observatories for the long-term, permanent monitoring of earthquake and tsunami hazards in seafloor environments

The present situation : gap between large-scale cabled observatory and autonomous OBSs

- DONET



S-NET



- NEPTUNE-Canada

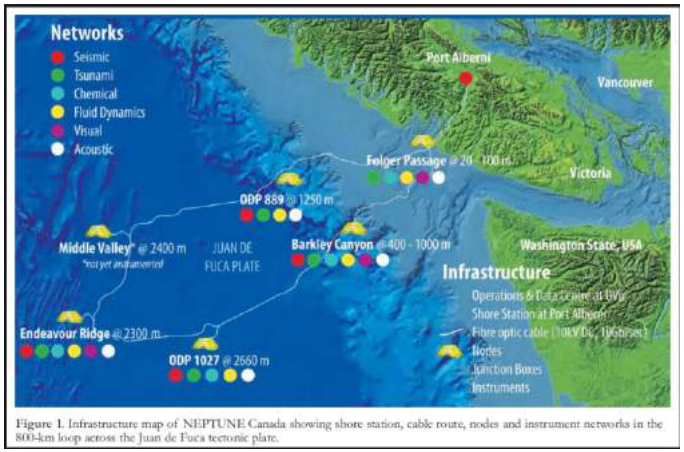
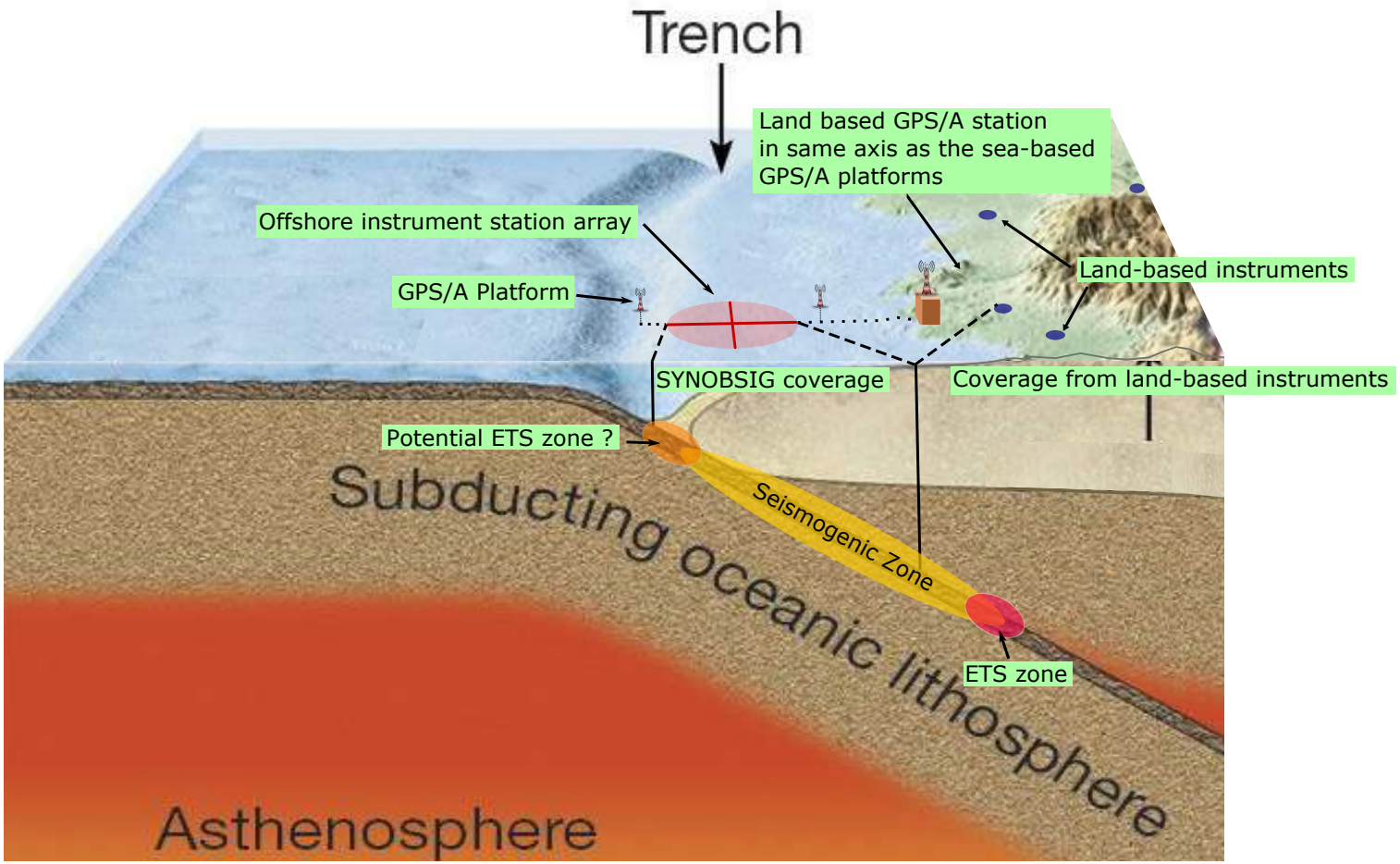


Figure 1. Infrastructure map of NEPTUNE Canada showing shore station, cable route, nodes and instrument networks in the 800-km loop across the Juan de Fuca tectonic plate.

Seafloor instrumentation is required to characterize the seismogenic zone

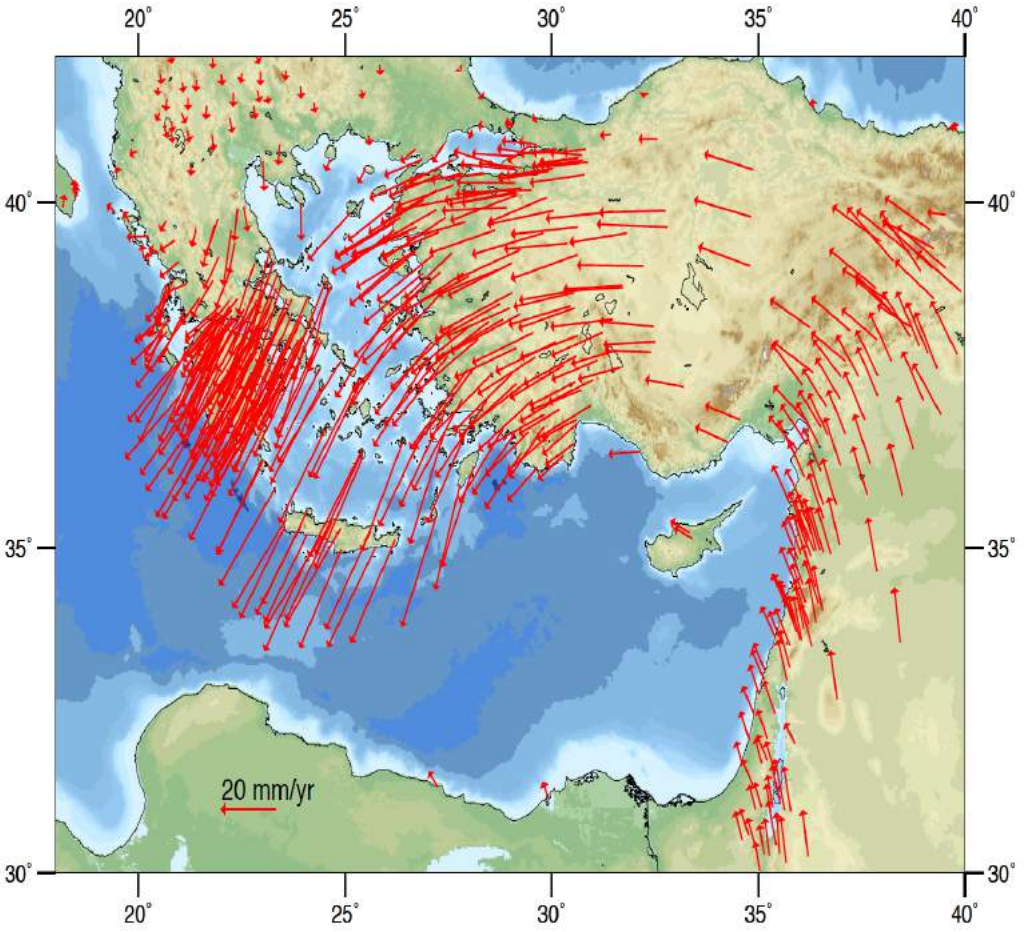


GPS ends at the shoreline

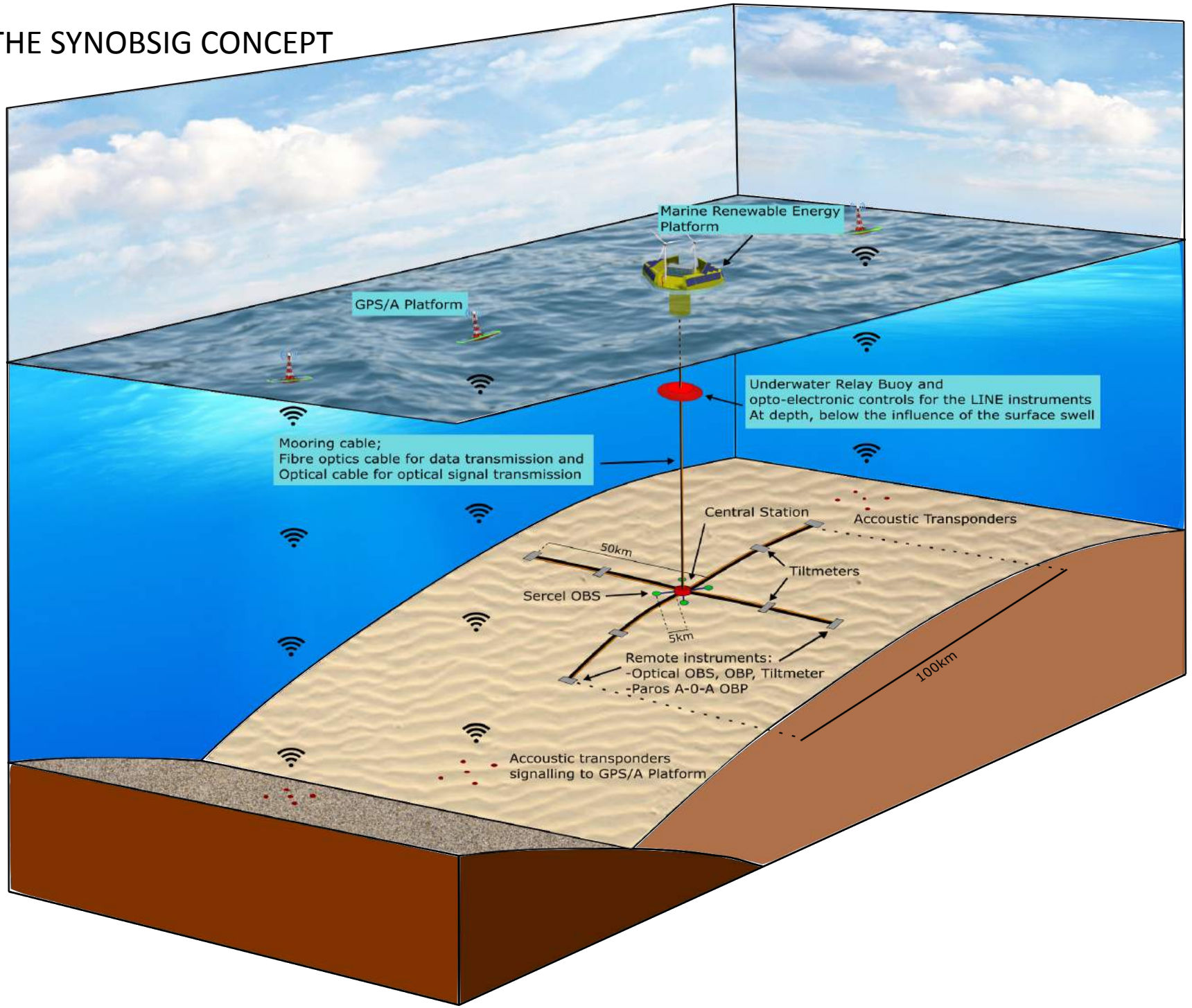
after Nocquet, 2012

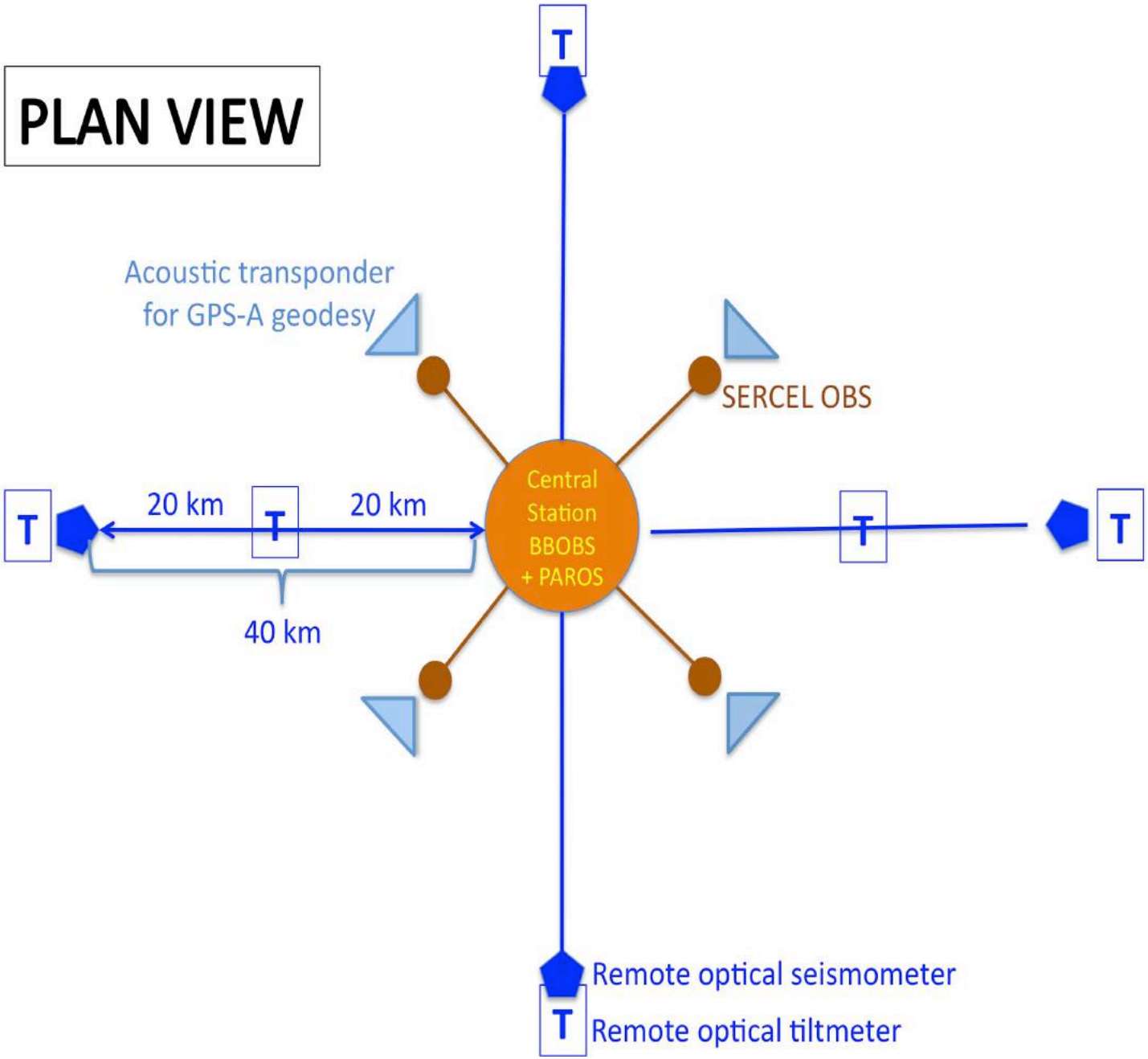
We are blind to current offshore plate motion because
GPS does not work under water.

→ Fundamental plate tectonic processes remain enigmatic.



THE SYNOBSIG CONCEPT




PLAN VIEW
Acoustic transponder
for GPS-A geodesy
SERCEL OBS
Central
Station
BBOBS
+ PAROS
T
20 km
20 km
40 km
Remote optical seismometer
Remote optical tiltmeter

1. Technological Advances

- Surface platform with 100 % marine renewable energy => use of sub-surface buoy ?

- Batteries only for back up use

- Use Opto-mechanical sensors : seismometers, tiltmeters, absolute pressure

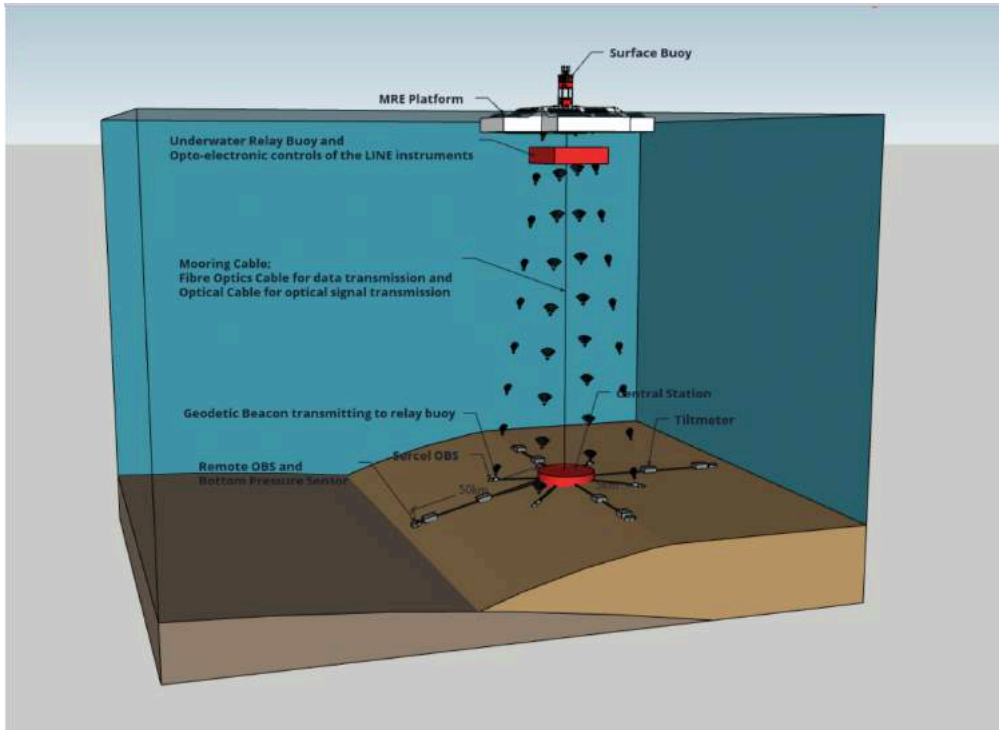
- Commercial sensors for seismology at the center

- Intense use of commericial absolute pressure sensors for vertical

- Use of satellite telecommunications (price is collapsing)

- Adaptation and re-use of DeepSeaNEt

- Innovative platform for GPS-A geodesy

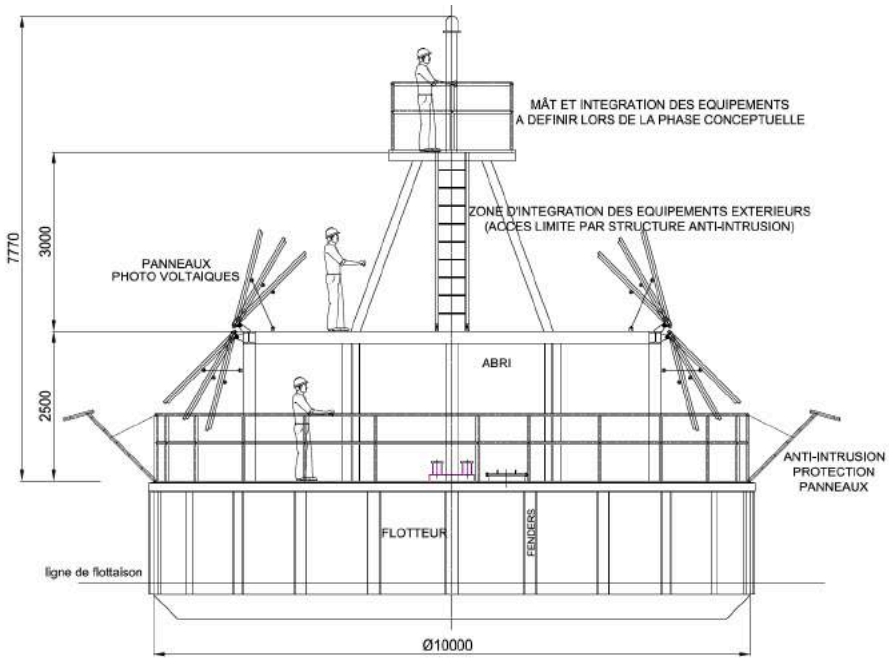


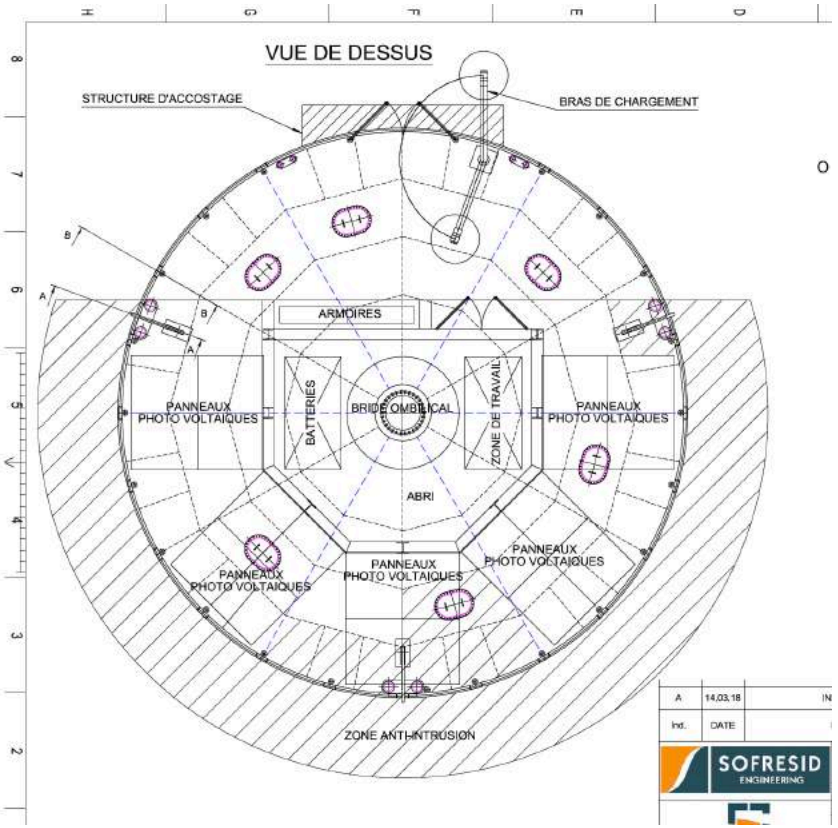
2. Main technological Challenges

- Long-term mooring for production of permanent 200 W power at the surface buoy

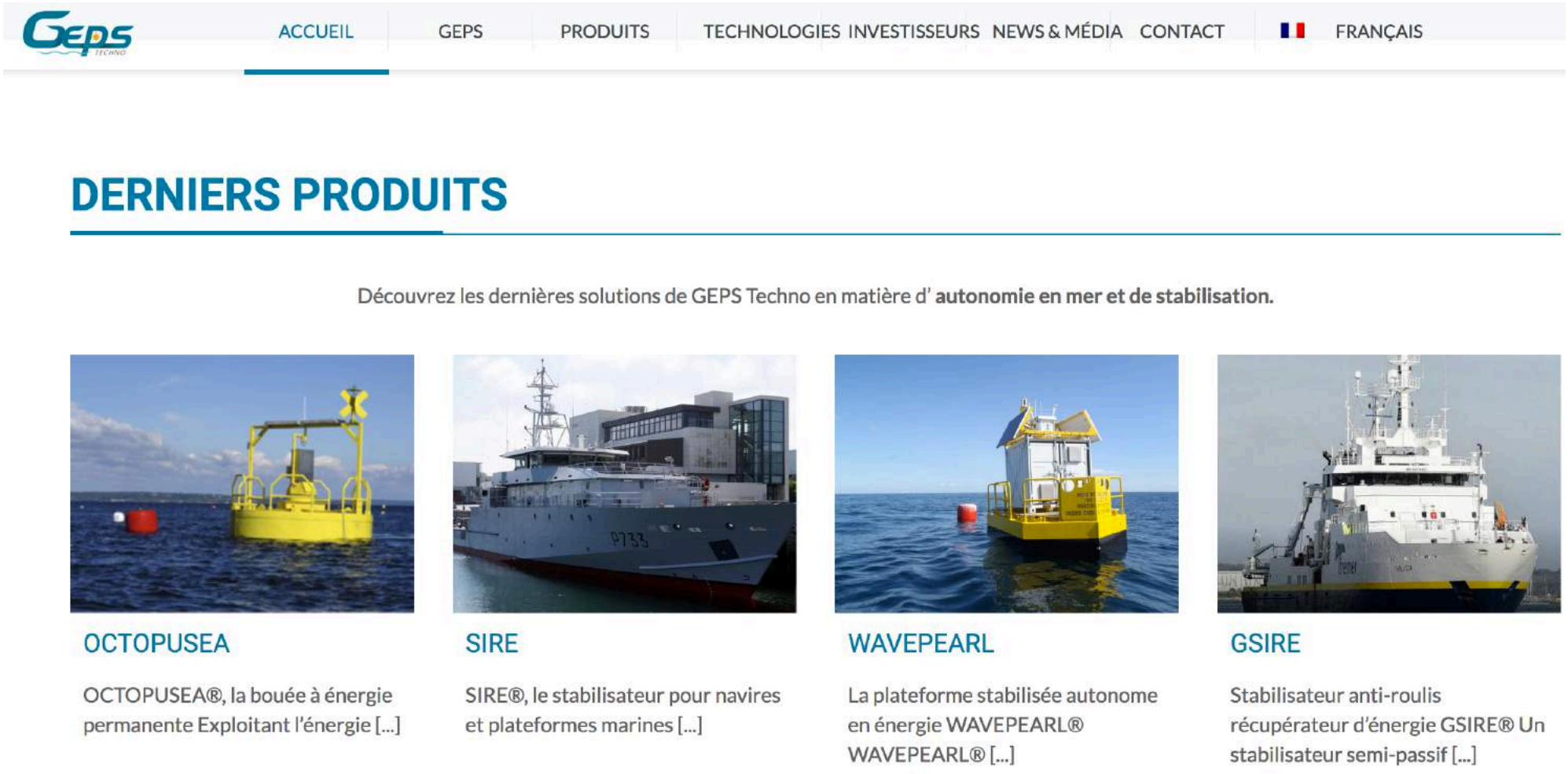
- Lowering of power consumption of opto-mechanical sensors

MAREGAMI PLATFORM
(100 W permanent for the Sea of Marmara)

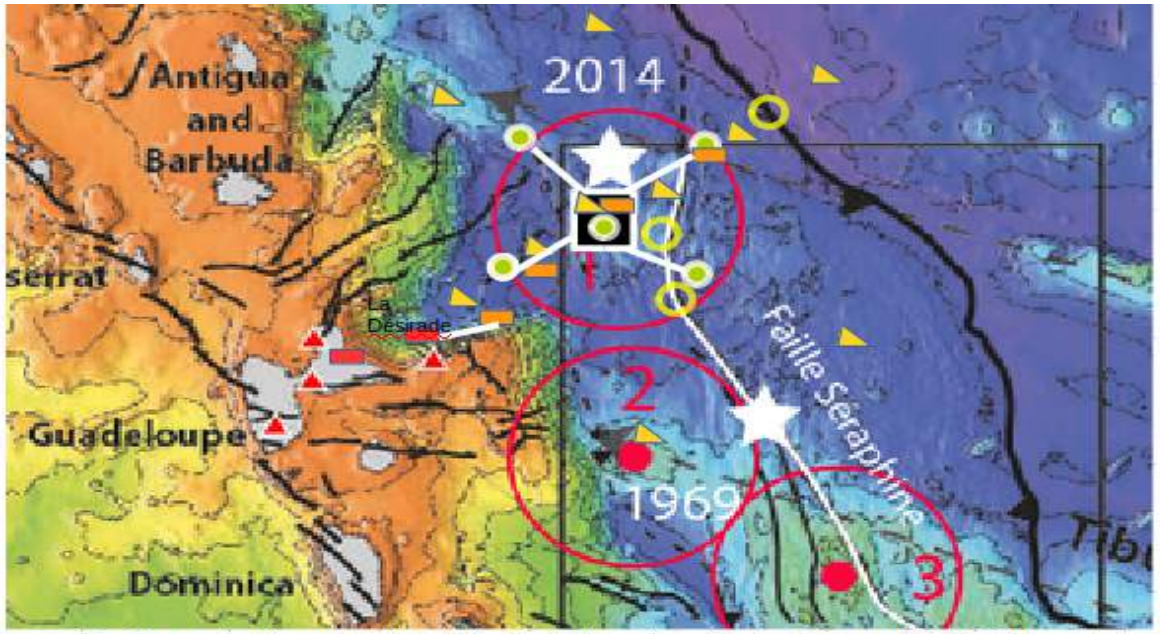




To reduce buoy size, we will use a combination of different sources of marine renewable energy : solar, wind, swell
=> examples below from Geps-Techno
https://www.geps-techno.com/



STUDY AREA 1 : Antilles



Benâtre et al., Sismotectonics of the Barbados prism, Master 2 report, IPGP, 2018

Offshore stations

Central station

Optical seismometer

Optical longbase tiltmeter/pressiometers

GPS-A for profiles

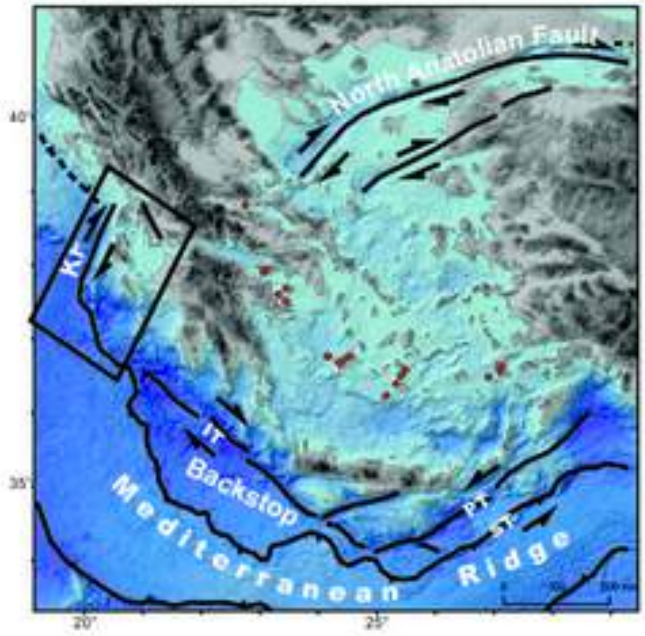
Possible sites for ocean bottom acoustics (for local gradients) (Seraphine fault, trench,...)

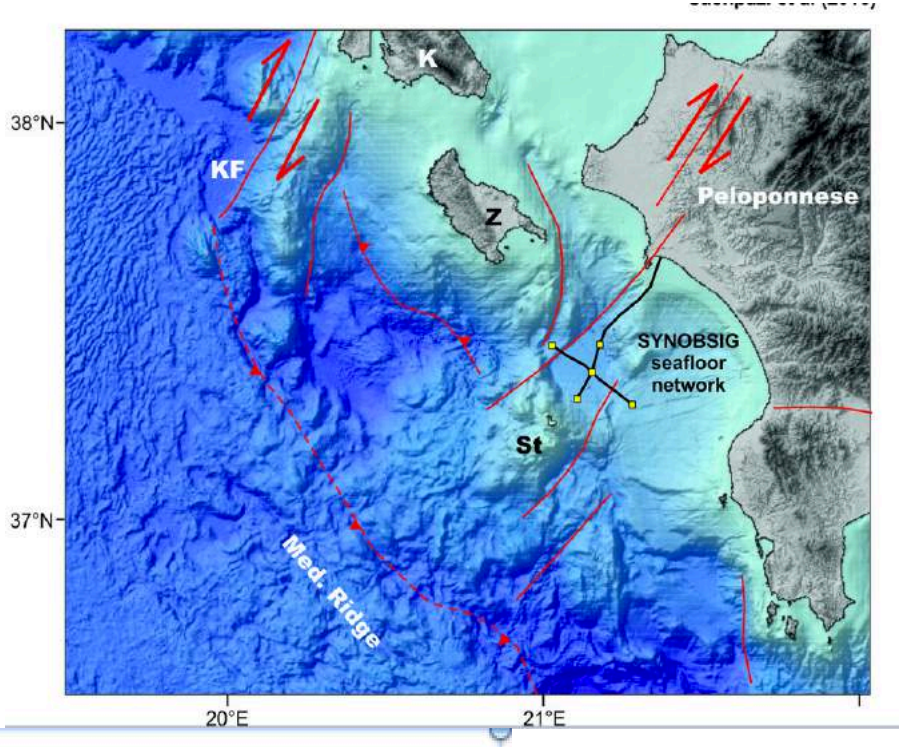
Land stations :

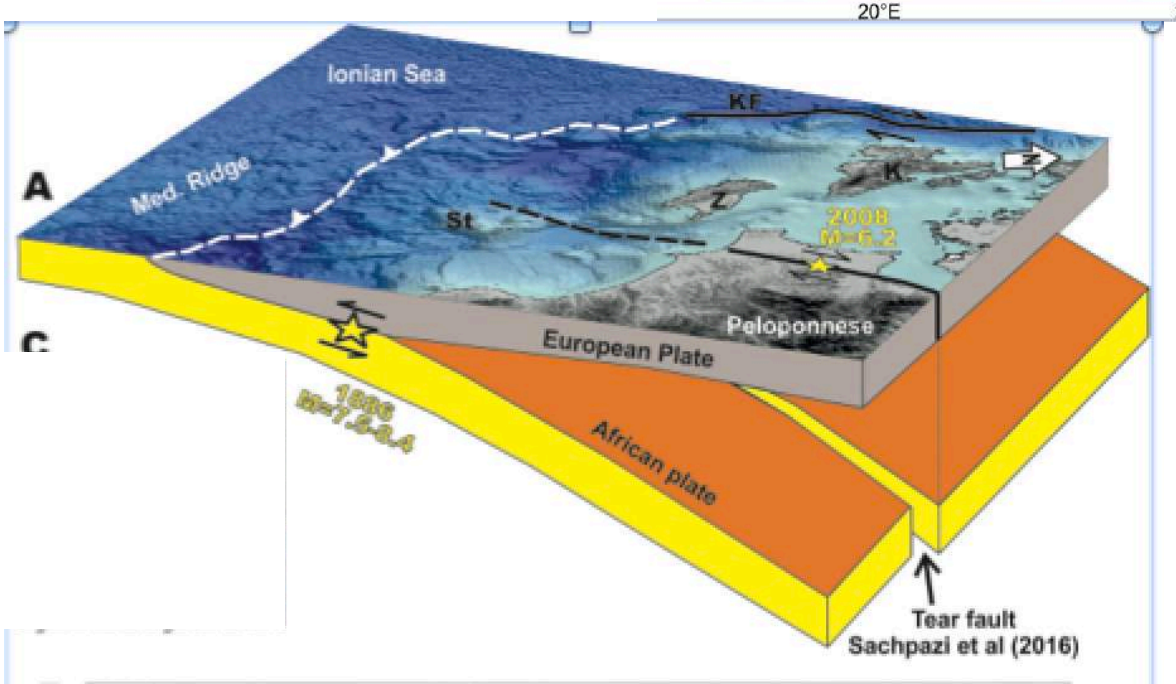
GPS : existing

Tiltmeter : to install in horizontal boreholes

STUDY AREA 2 : Hellenic Trench







Partners and funding scheme

Funding scheme : ERC-Synergy Grant 2019

Budget Enveloppe ~ 10-14 M€ (sur 6 ans)

2 (min) to 4 (max) partners

Consortia :
Ifremer (incl: CNRS)
IPGP (incl ENS, ESEO, CNRS
GEOMAR
HCMR (incl NOA)

Deadline : November, 8, 2018

WORK PACKAGES

WP1. Global SYNOBSIG Platform architecture

- WP1.1 Surface platform for production of marine renewable energy in open-seas
- WP1.2 Telecommunication
- WP1.3 Seafloor segment (central station and commercial sensors)
- WP1.4 Mooring

WP2. Deep-sea applications of innovative opto-mechanical, seismological and geodetic, sensors

WP3. Vertical deformation based on commercial absolute pressure measurements

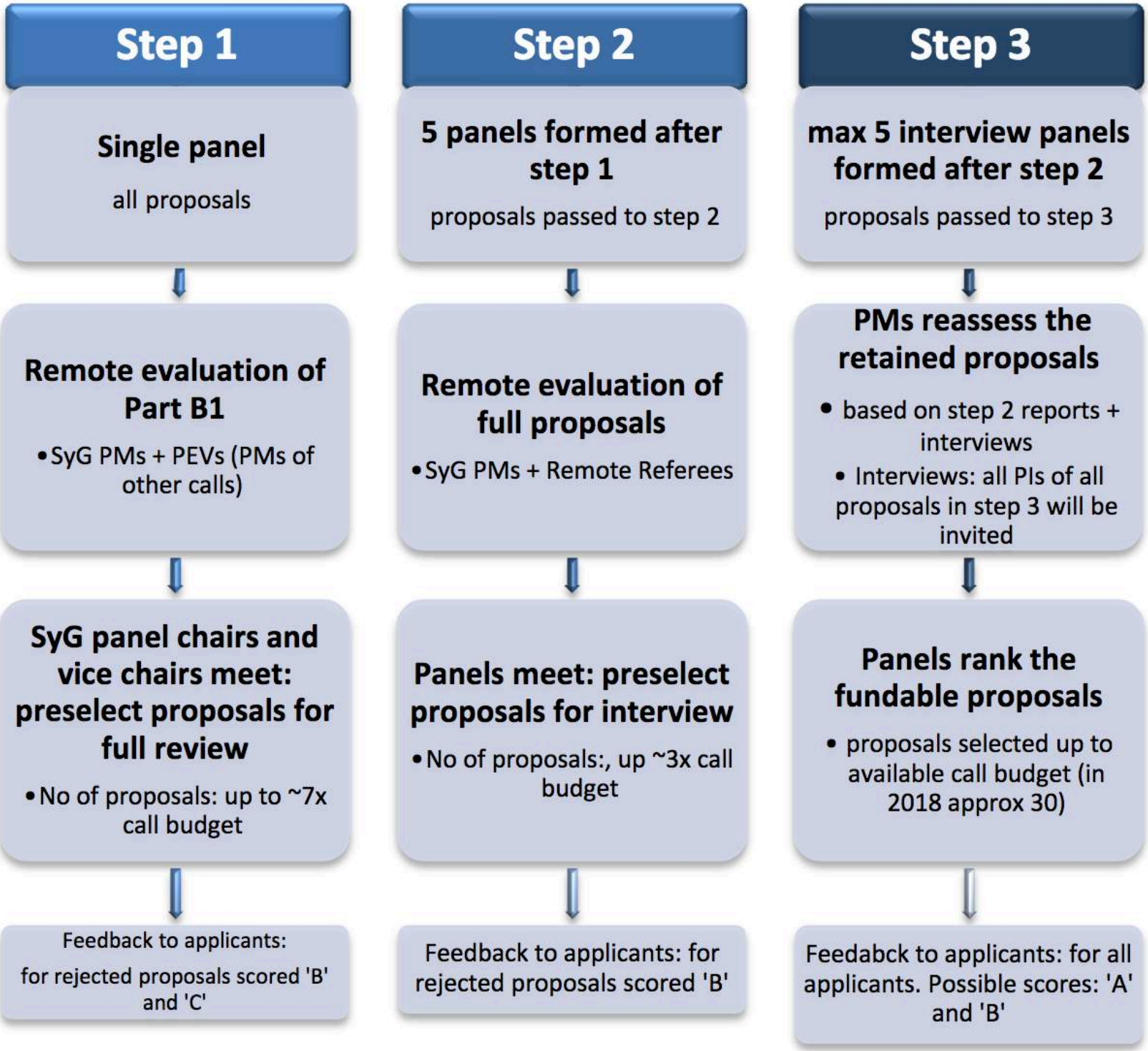
WP4. Developing GPS/A Platform

WP5. Marine operations

- WP5.1 Antilles site
- WP5.2 Hellenic site

WP6. Data processing, interpretation and scientific analysis

END


Step 1
Single panel
all proposals
Remote evaluation of Part B1
• SyG PMs + PEVs (PMs of other calls)
SyG panel chairs and vice chairs meet: preselect proposals for full review
• No of proposals: up to ~7x call budget
Feedback to applicants:
for rejected proposals scored 'B' and 'C'
Step 2
5 panels formed after step 1
proposals passed to step 2
Remote evaluation of full proposals
• SyG PMs + Remote Referees
Panels meet: preselect proposals for interview
• No of proposals:, up ~3x call budget
Feedback to applicants: for rejected proposals scored 'B'
Step 3
max 5 interview panels formed after step 2
proposals passed to step 3
PMs reassess the retained proposals
• based on step 2 reports + interviews
• Interviews: all PIs of all proposals in step 3 will be invited
Panels rank the fundable proposals
• proposals selected up to available call budget (in 2018 approx 30)
Feedabck to applicants: for all applicants. Possible scores: 'A' and 'B'