

Sea Search Operations

Flight AF447

A330-200 F-GZCP

Means Deployed

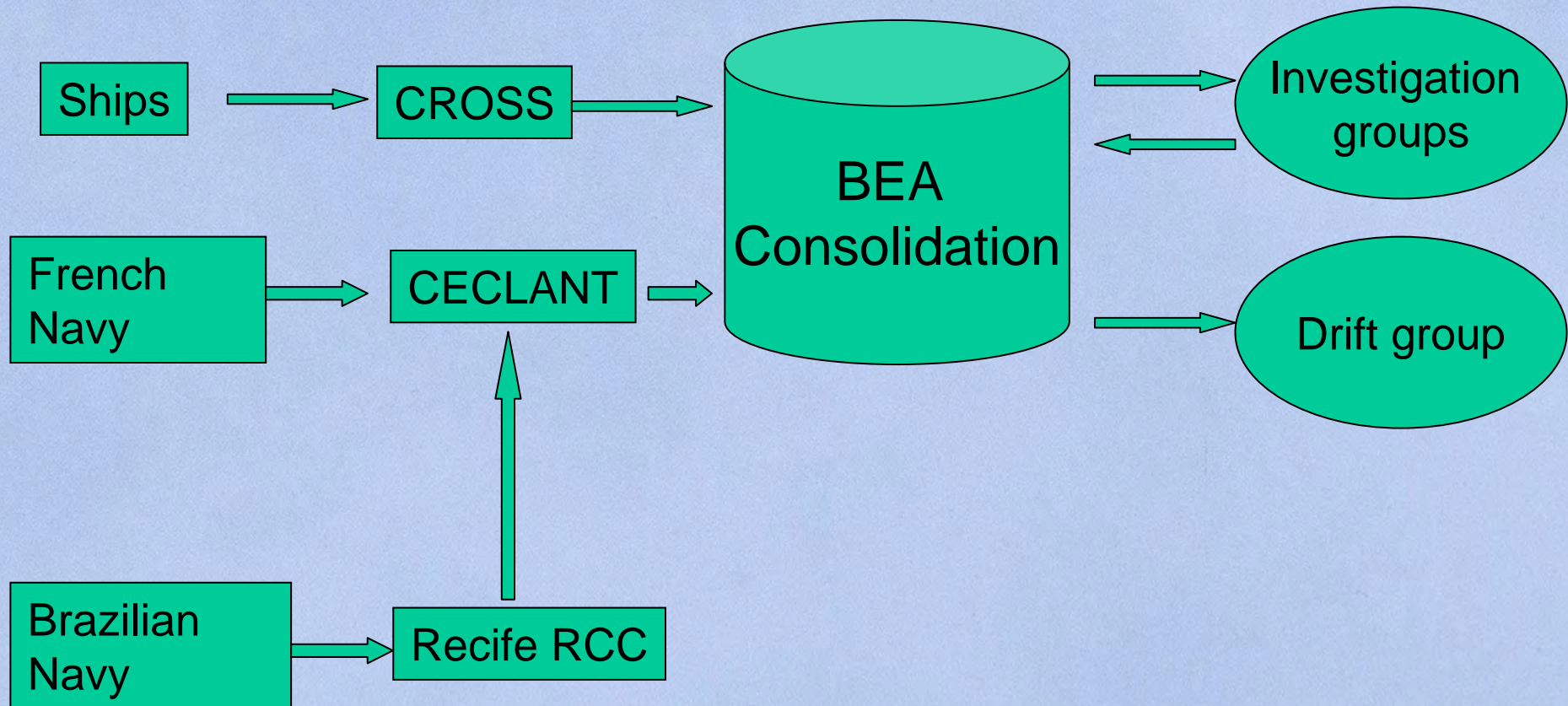
- French and Brazilian ships
- French, Brazilian and American aircraft
- Satellites from various countries (France, USA, Germany)

French Military Means

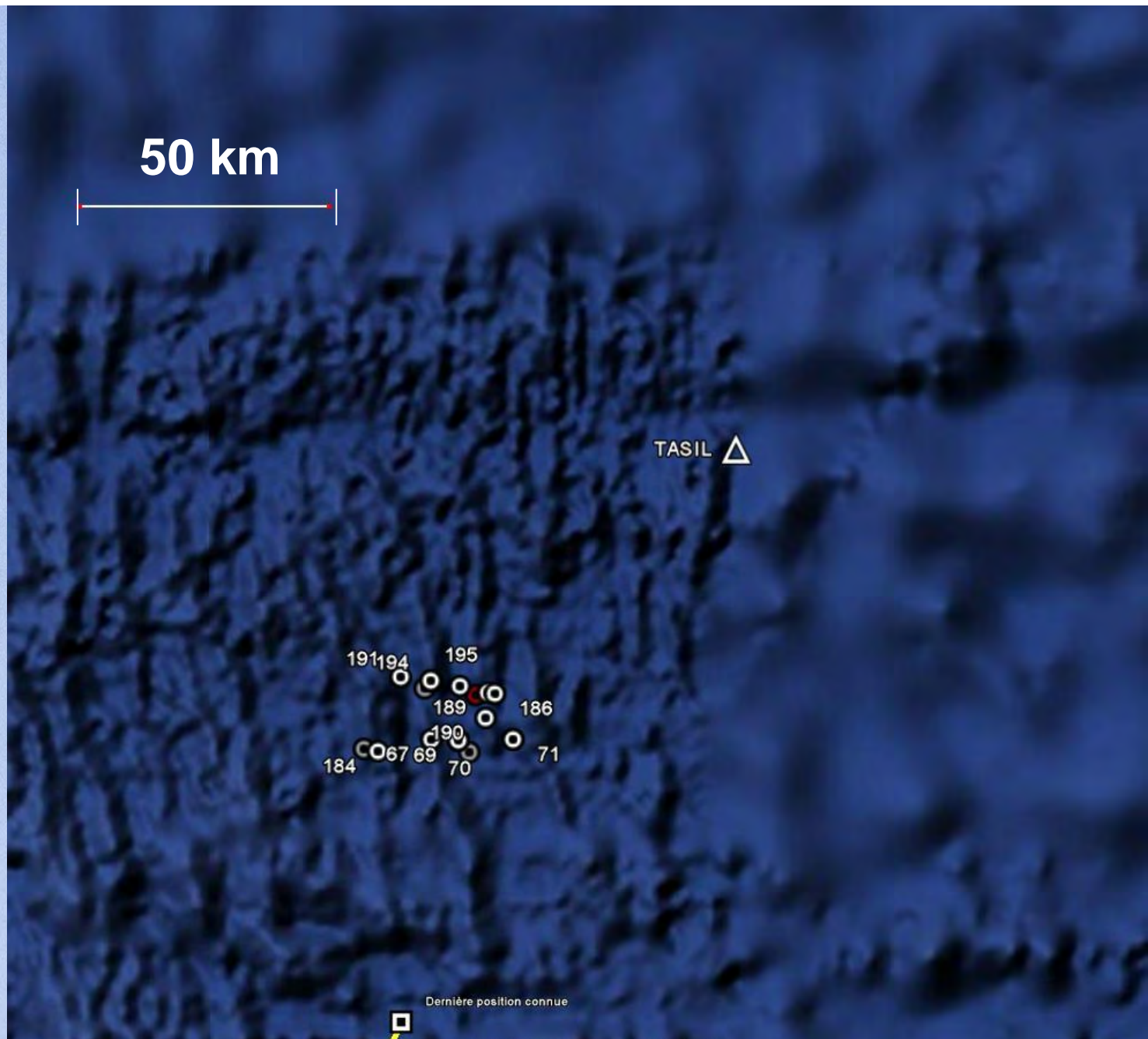
- Ventôse Frigate
- Emeraude nuclear submarine
- Mistral support ship
- Aircraft from the fleet air arm and the air force



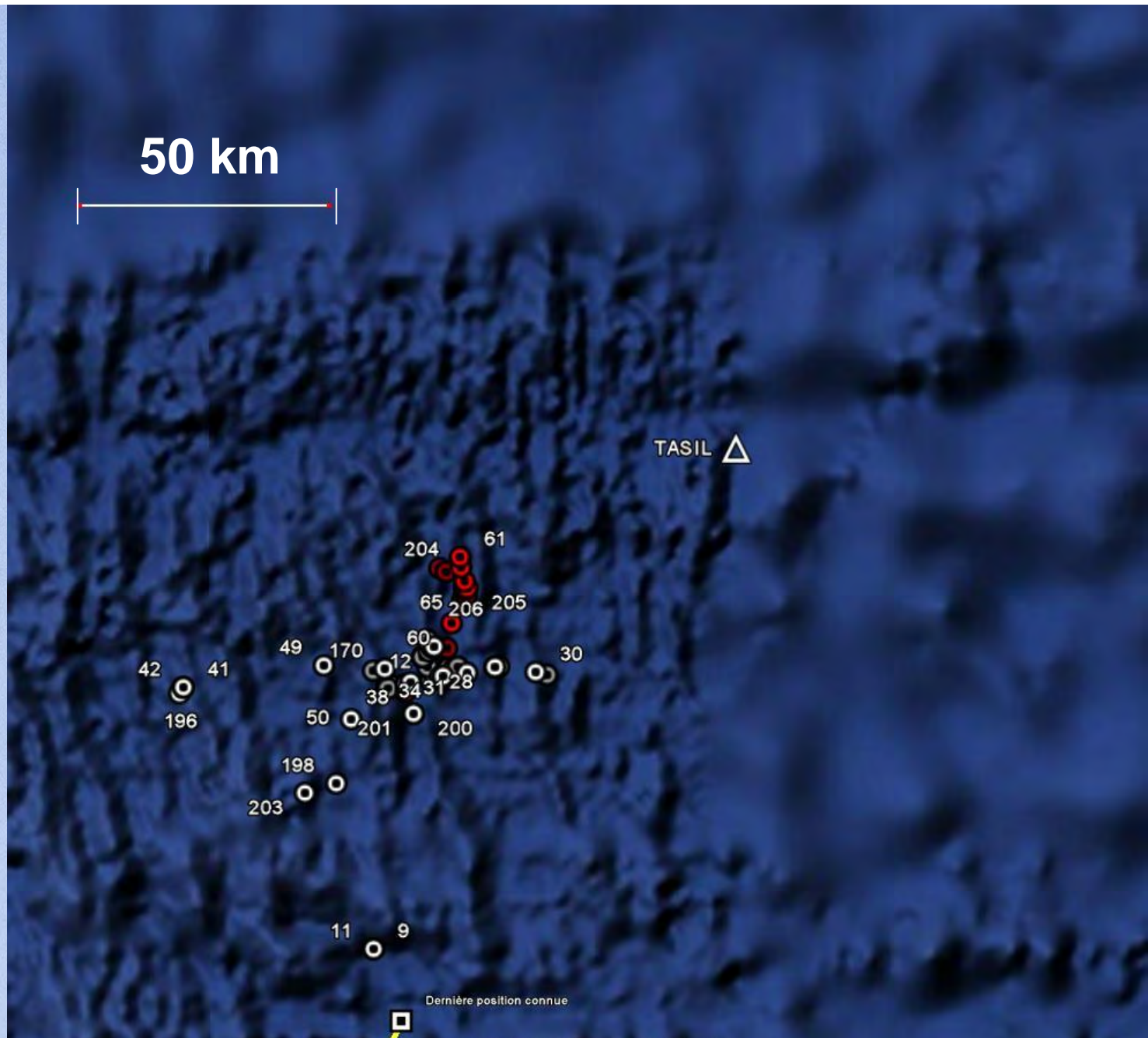
Data Exchange Coordination



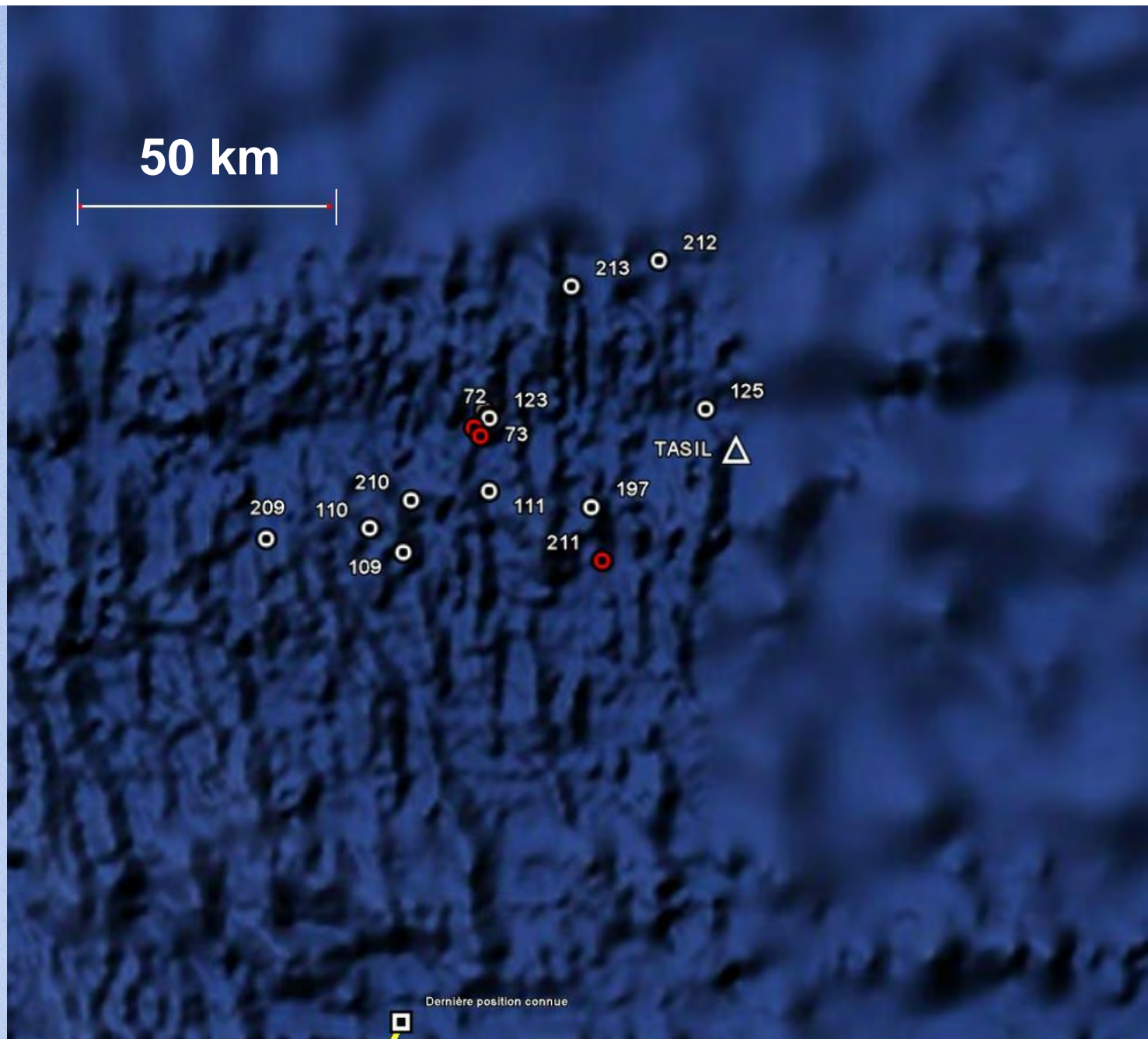
6
June



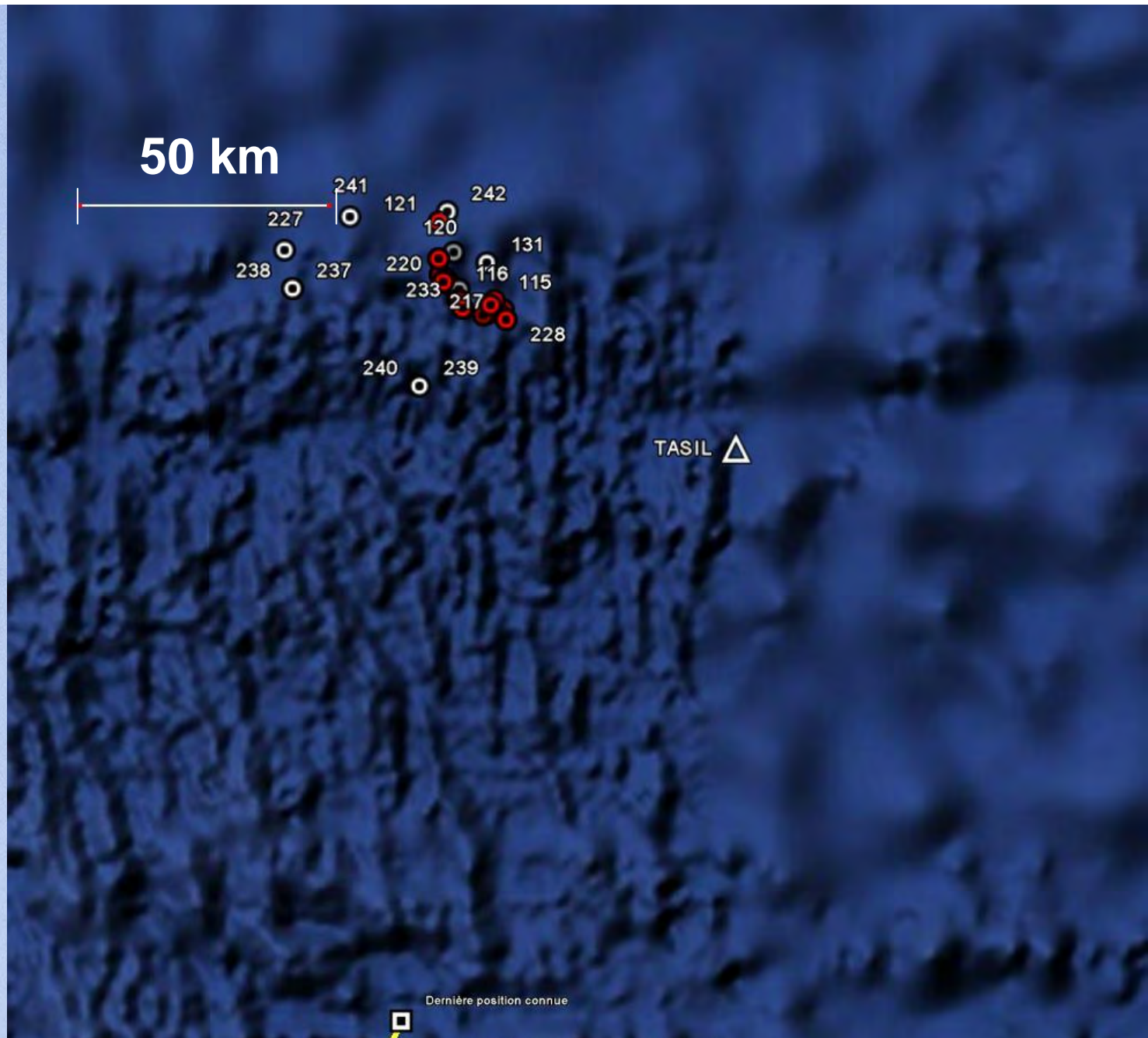
7
June



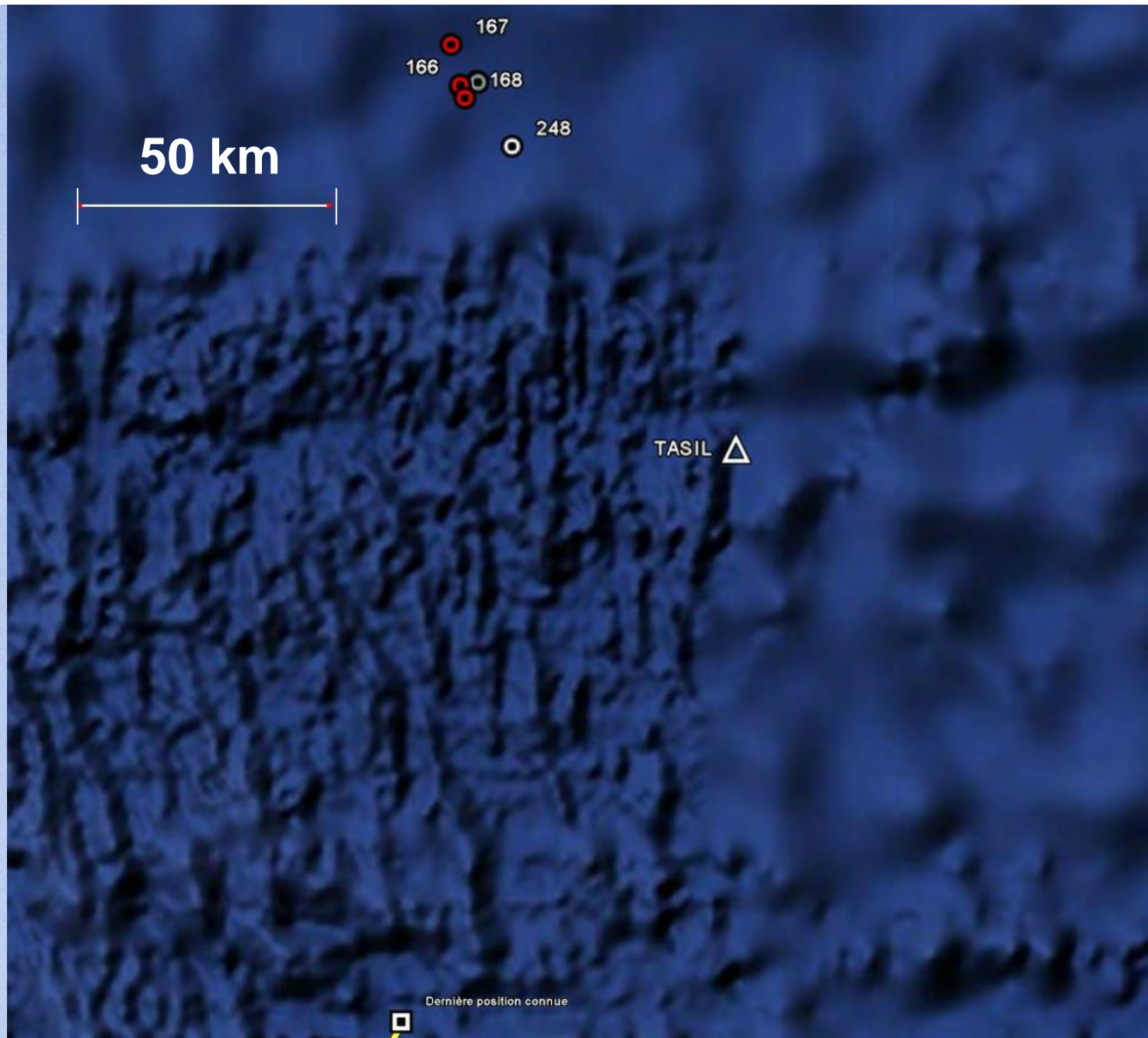
8
June



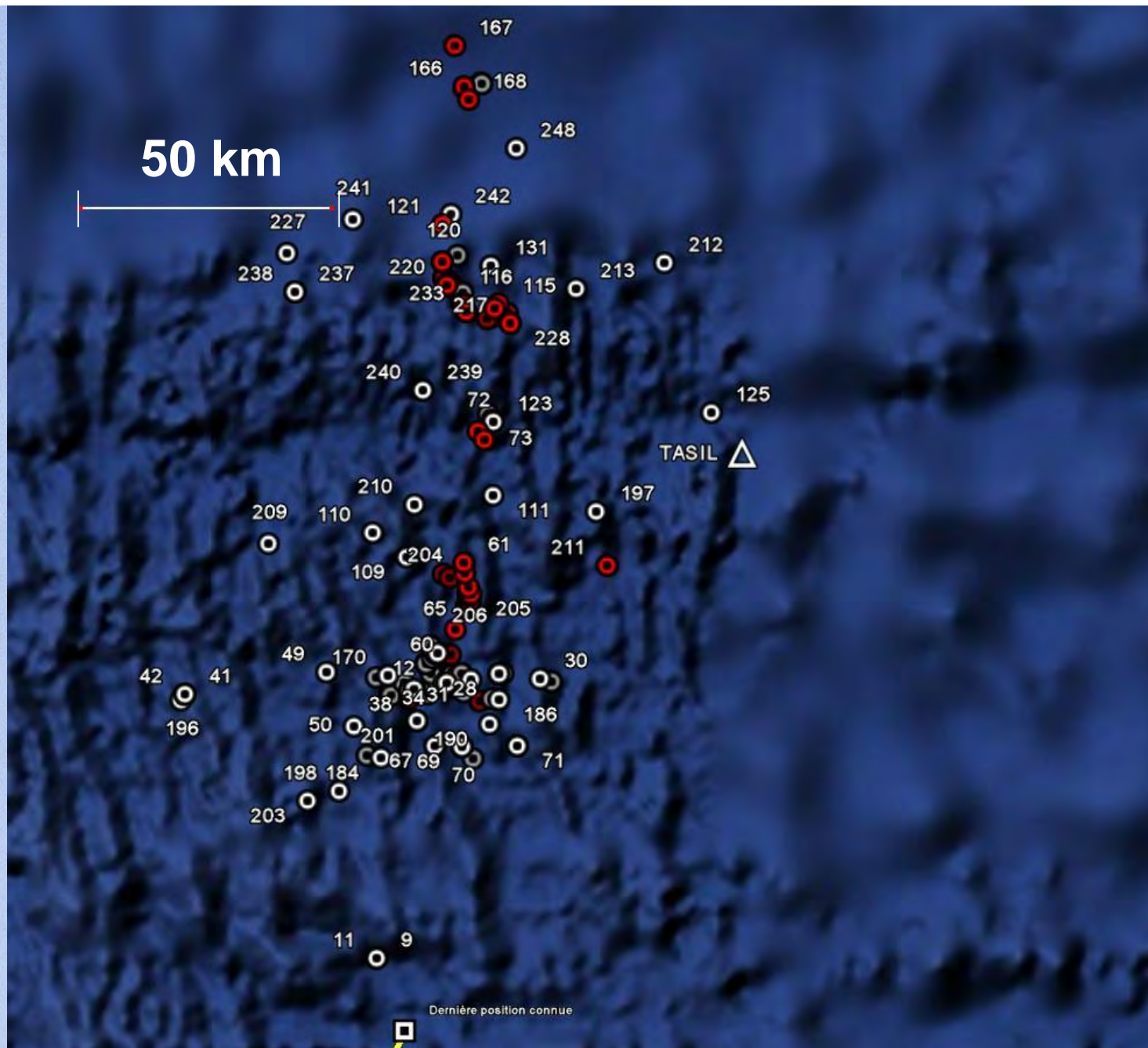
9
June



10
June



6 to 10
June



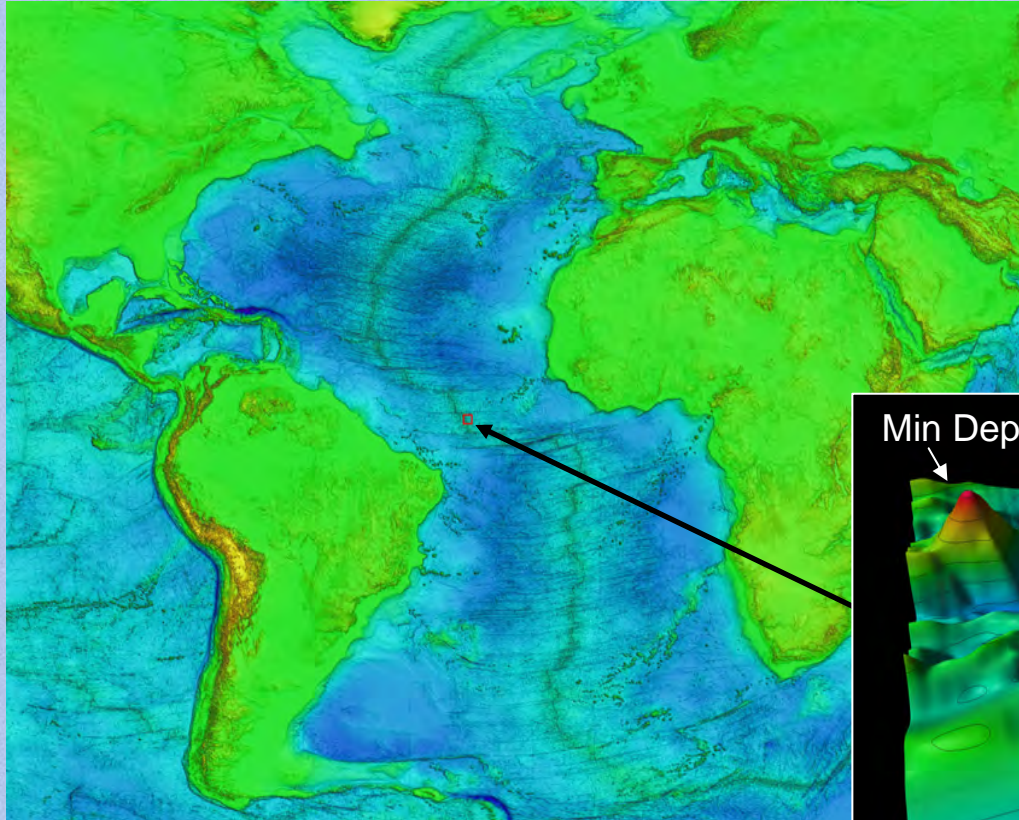
Undersea Searches

- Context of searches
 - Unfavourable environment
 - Necessity for an acoustic search
 - Time pressure
- Means
 - Ships
 - Men
 - Acoustic and undersea equipment

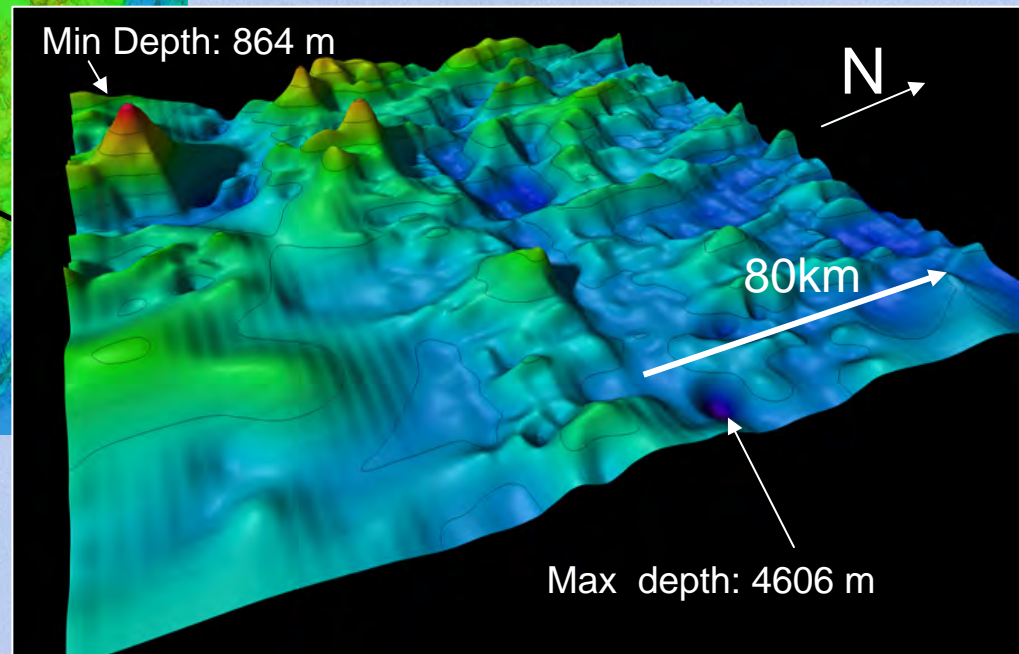
Requirements

- Definition and deployment of means
- Determination of the search zones

Context of Searches



- No traces of the accident in the first days
- No radar data
- Unfavourable environment



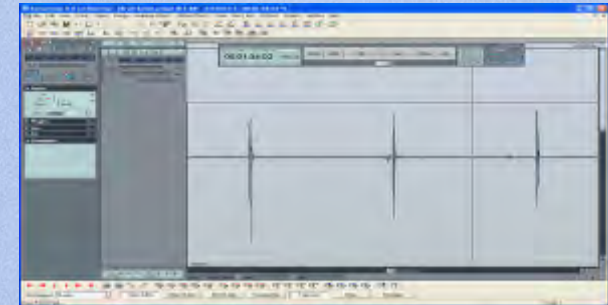
Source: SHOM

BEA

Specifications of Beacons

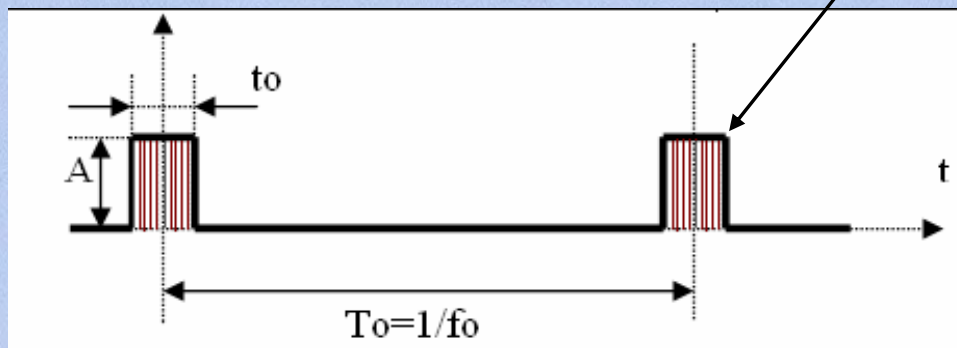
✓ Characteristics of the Underwater Locator Beacon (ULB)

- Broadcasts when the two contacts are wet
- Broadcasts for at least 30 days

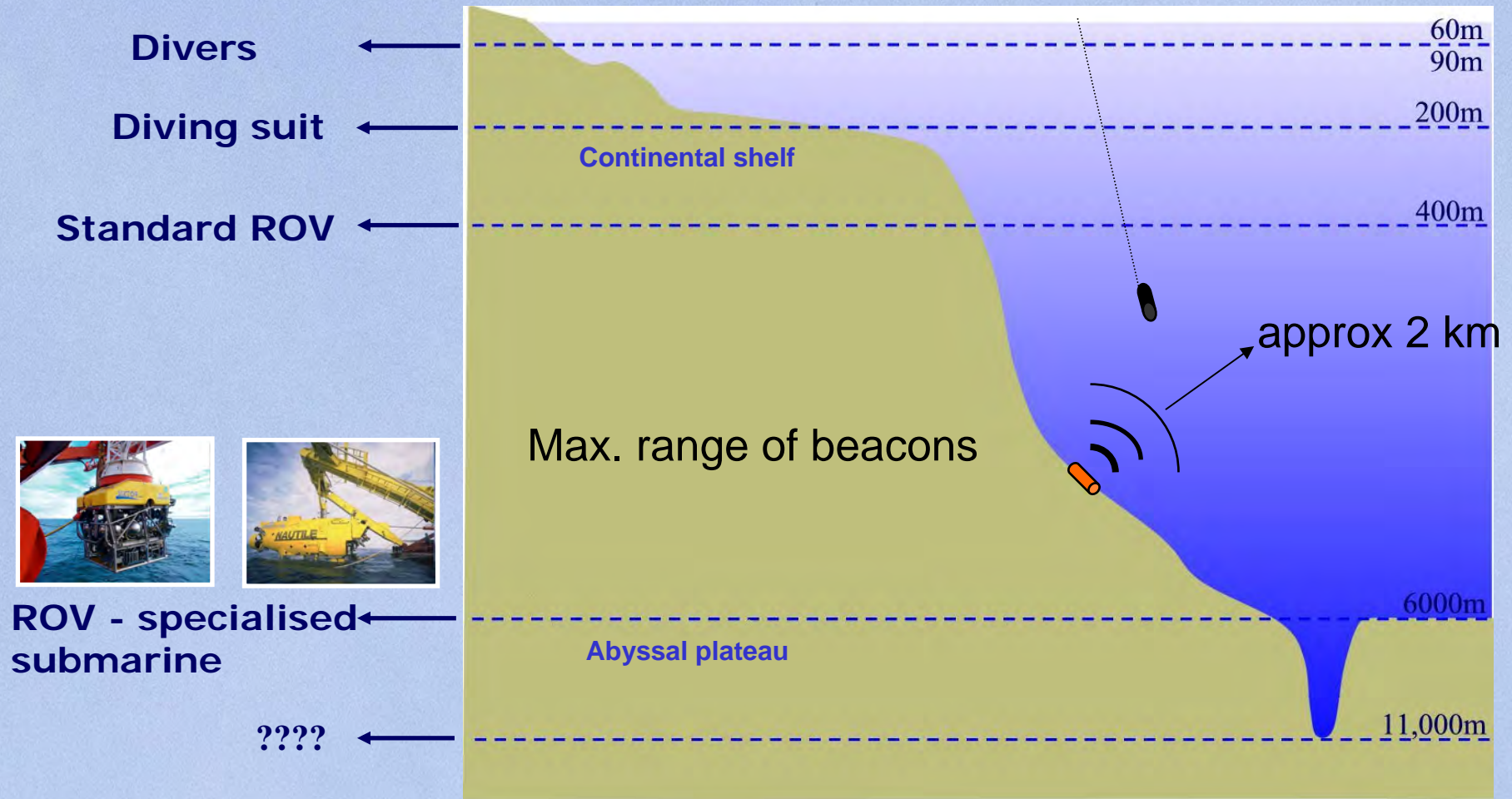


$t_0=10\text{ms}$
 $T_0<1,1\text{s}$

Signal at 37.5 kHz
+ or - 1kHz



Means Used According to Depth



⇒ Difficulties of listening from the surface

⇒ Need to descend hydrophones as close as possible to the seabed

Ships Chartered by the BEA

- IFREMER: The « Pourquoi Pas? »



- Two tugs from Louis-Dreyfus Armateurs (LDA) :

- Fairmount Expedition



- Fairmount Glacier



Teams

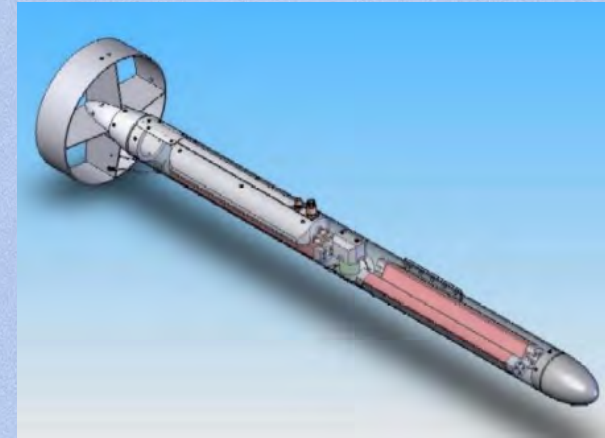
Specialists on board the chartered ships

- BEA investigators
- AAIB investigator (UK)
- Advisors from Air France, Airbus
- Advisers from CEPHISMER, SHOM, US Navy, IFREMER, GENAVIR

in coordination with senior police officers

Acoustic Means

- Two Towed Pinger Locators (TPL) supplied by the US Navy
 - > One on each tug
- Acoustic equipment from IFREMER (Multi-beam echo sounder, repeater)
- Emeraude nuclear submarine
- Directional systems - Sonardyne, BEA (ROV homer) used on IFREMER equipment



TPL System

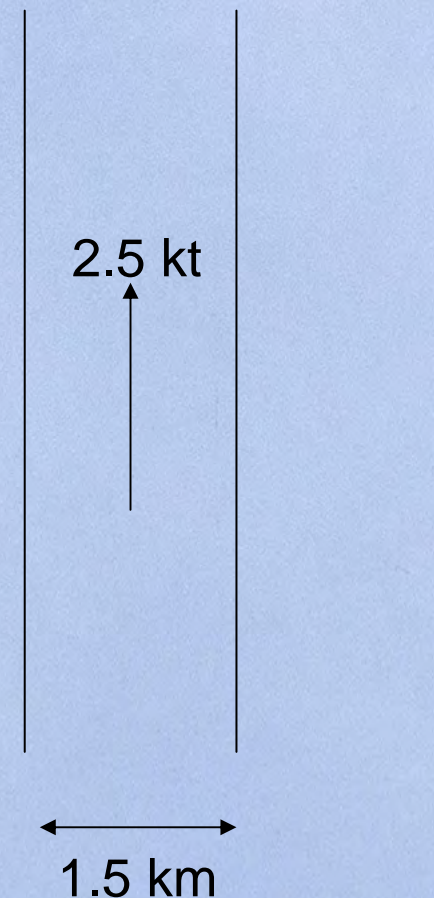


Acoustic repeater



Organisation of Searches

- Gridding of zone
- Division of zones between surface means and the submarine
- Use of TPL's
 - Towed by 6.000 m of cable;
 - Operate on bandwidths from 5 to 60 KHz;
 - Range approx 1 NM (1.852 km).



Undersea Search Equipment

- ROV Victor
(Remotely Operated Vehicle)



- Nautil submarine

on board the « Pourquoi Pas? »



Conclusions

- Specialised teams
- Complementary means
- An international effort (France, Brazil, United Kingdom, United States, Holland, etc.)