Cryosismicité induite par la marée dans la région du glacier Mertz, Terre Adélie, Est-Antarctique.

Journées REFMAR
Réseaux de référence des observations marégraphiques

17-21 Juin 2013

Guilhem Barruol*, Emmanuel Cordier*, Jérôme Bascou**, Fabrice R. Fontaine*, Benoit Legrésy***, Lydie Lescarmontier***

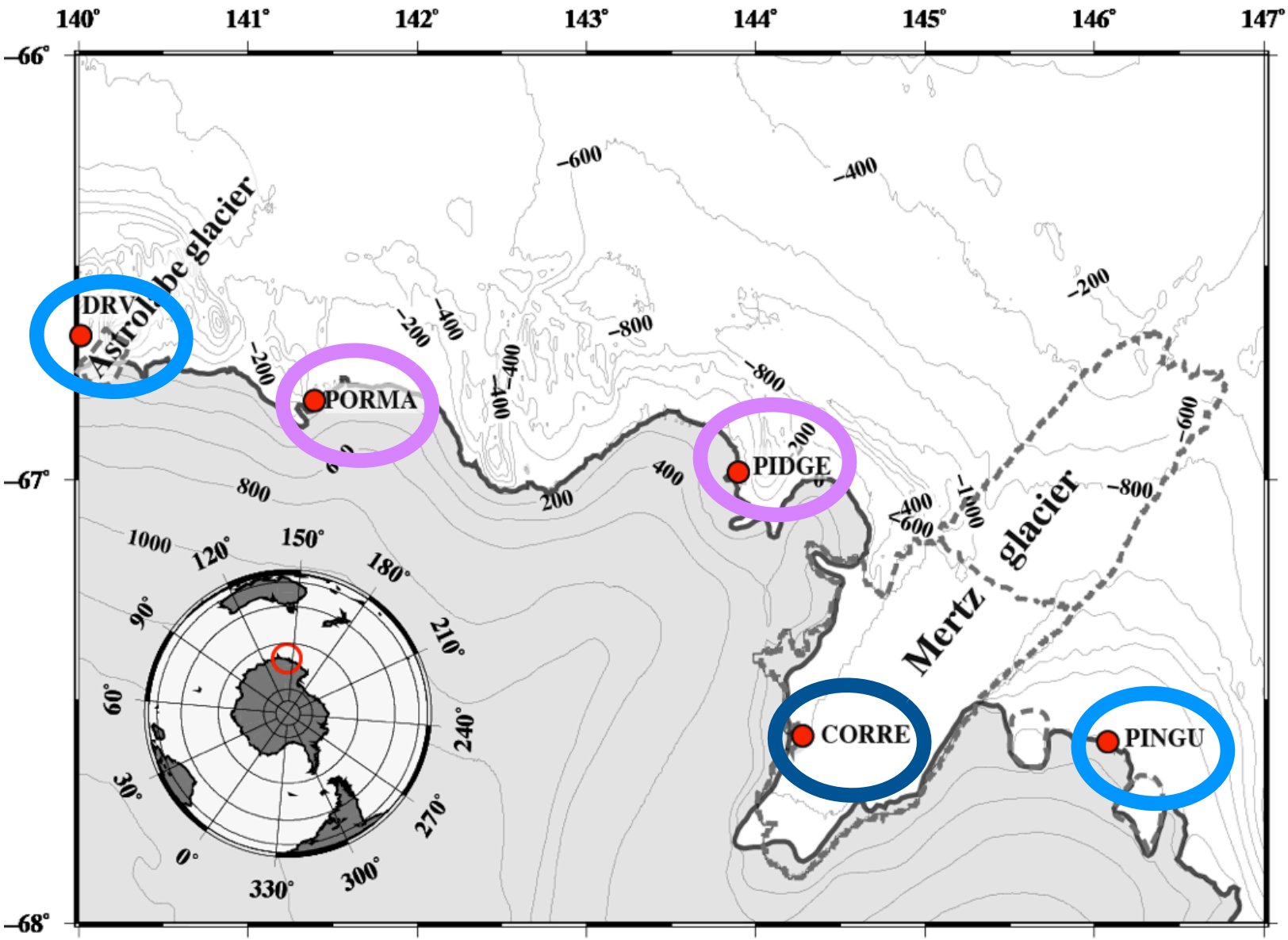
* Laboratoire Géosciences Réunion, LGSR Université de La Réunion, CNRS, IPGP, UMR 7154

** Laboratoire Magmas et Volcans, Université Jean Monnet, UMR-CNRS 6524,

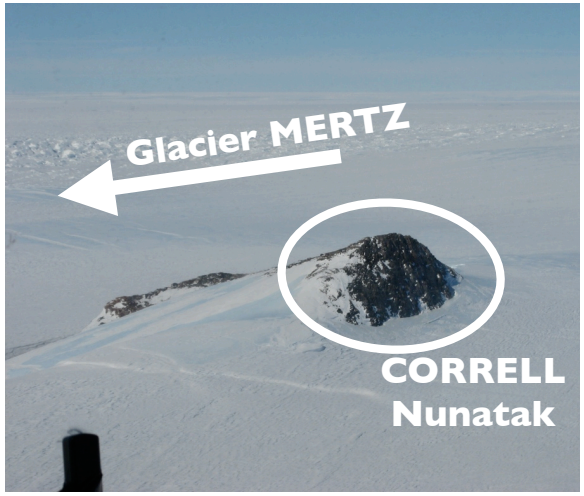
*** Laboratoire d'Etude en Géophysique et Océanographie Spatiale, Université Paul Sabatier

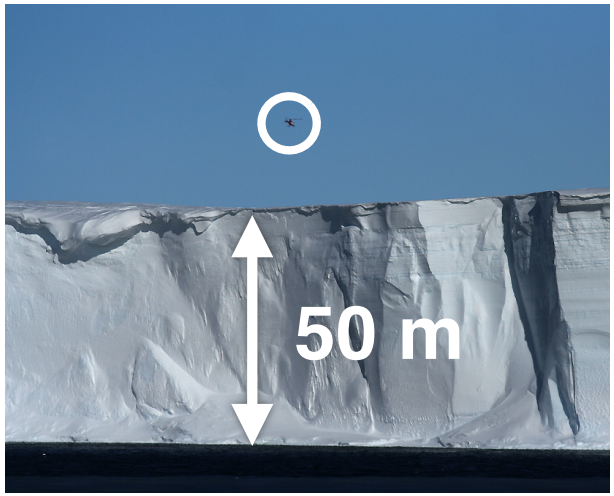
ArLiTA / Architecture de la Lithosphère de Terre Adélie

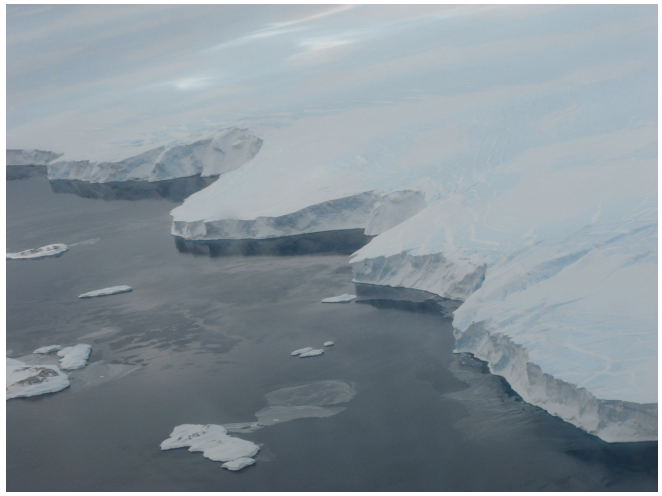
Réseau de mesures 2009-2012

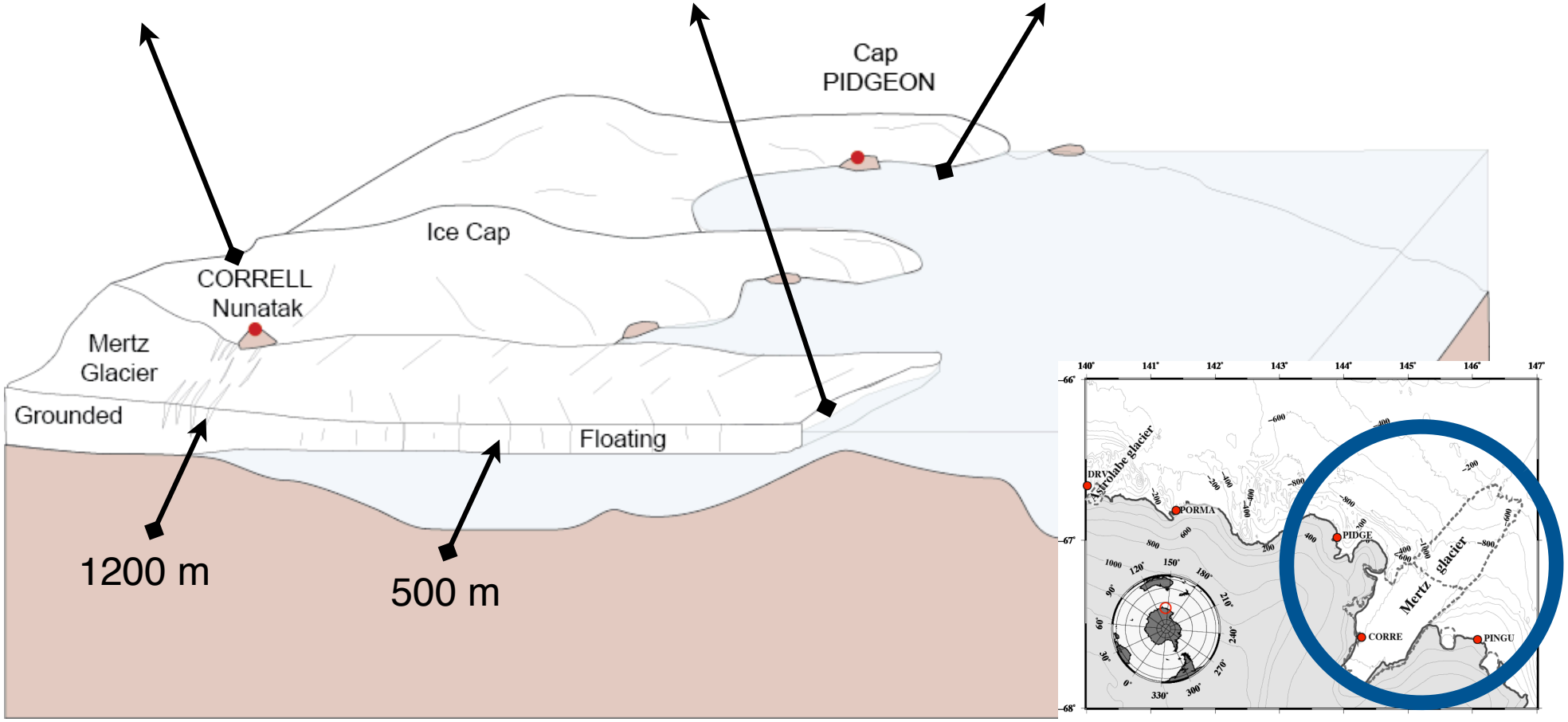


Le Glacier MERTZ / Station CORRE



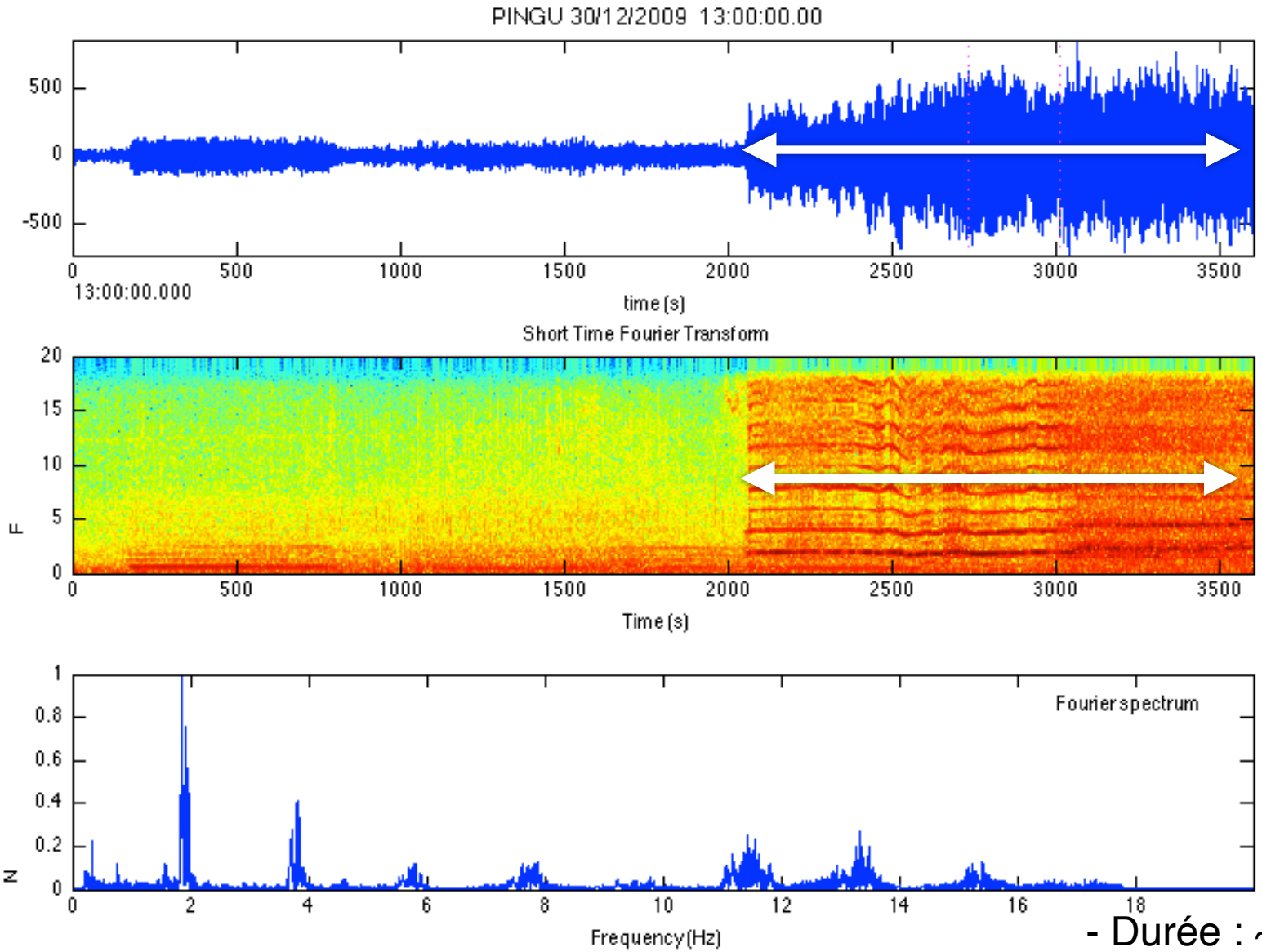






Origine de la Cryosismicité

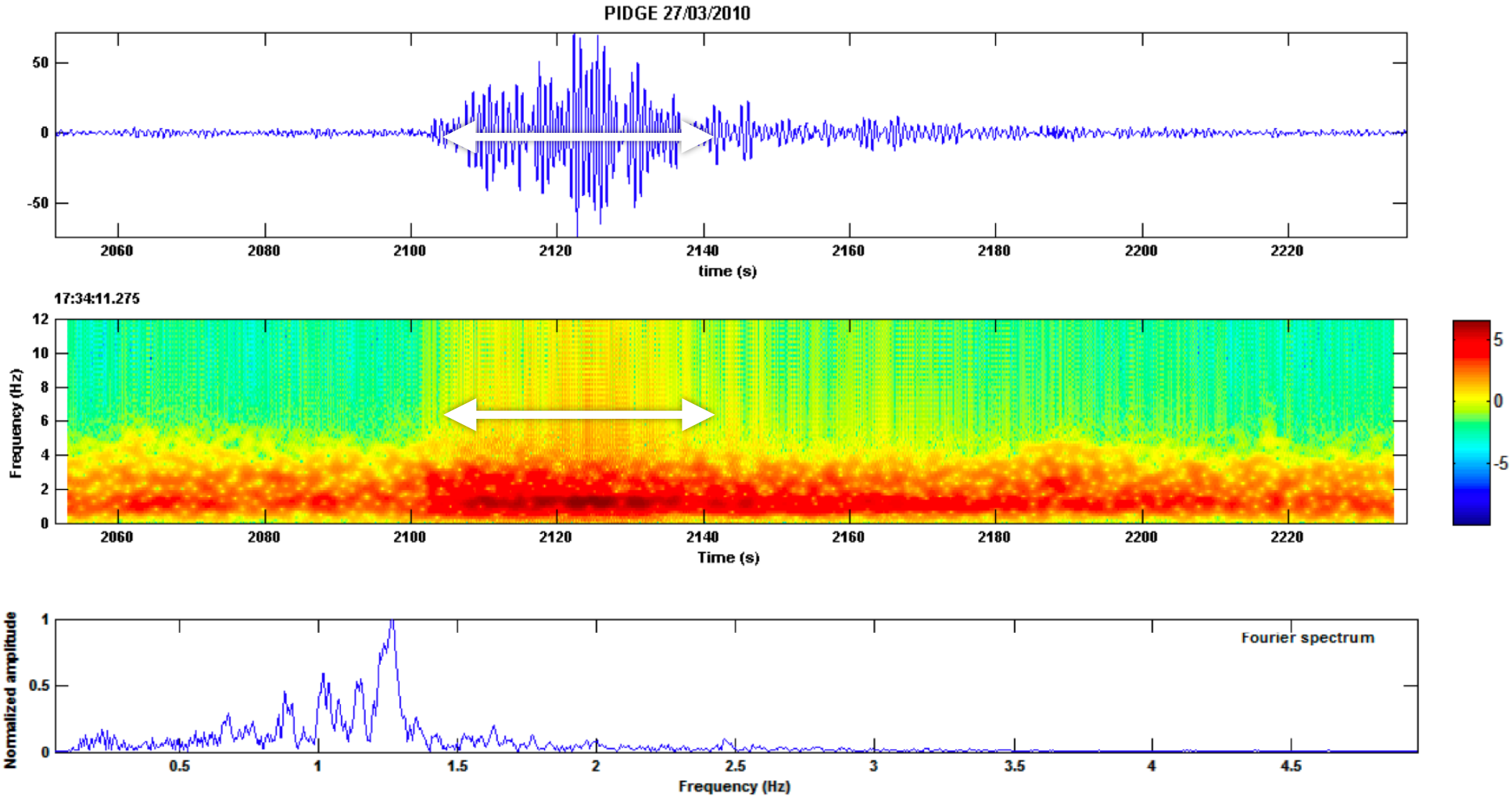
Collisions Icebergs / Interactions avec fond océanique



- Durée : ~30 min
- Fréquence dominante : 2 Hz
- Evts occasionnels

Origine de la Cryosismicité

Glaciers Earthquakes (déformation basale)

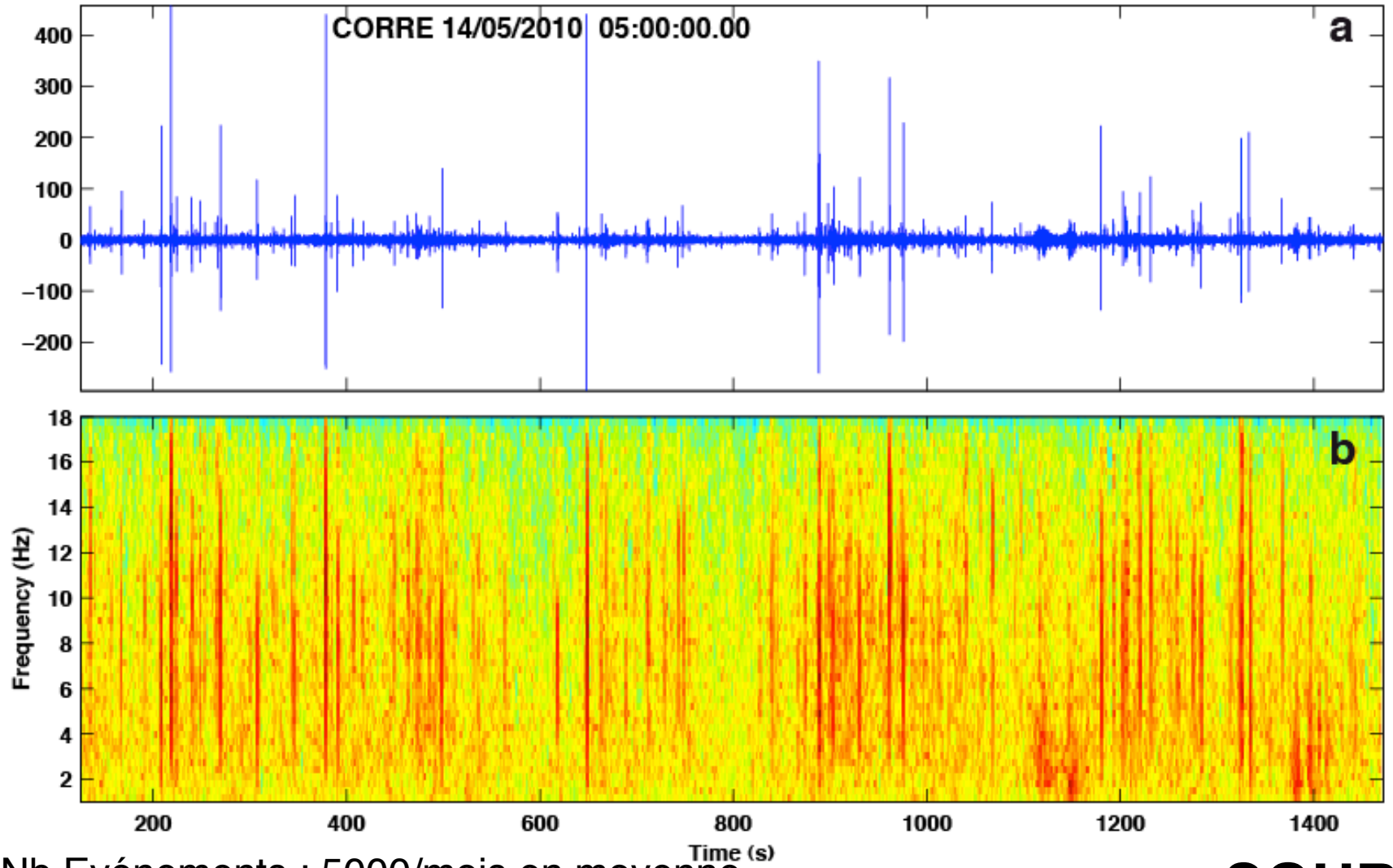


Durée : ~40-50 s
Fréquence : 1-1.5 Hz
Evts occasionnels

Origine de la Cryosismicité

IceQuakes (fracturation – ouverture de crevasses)

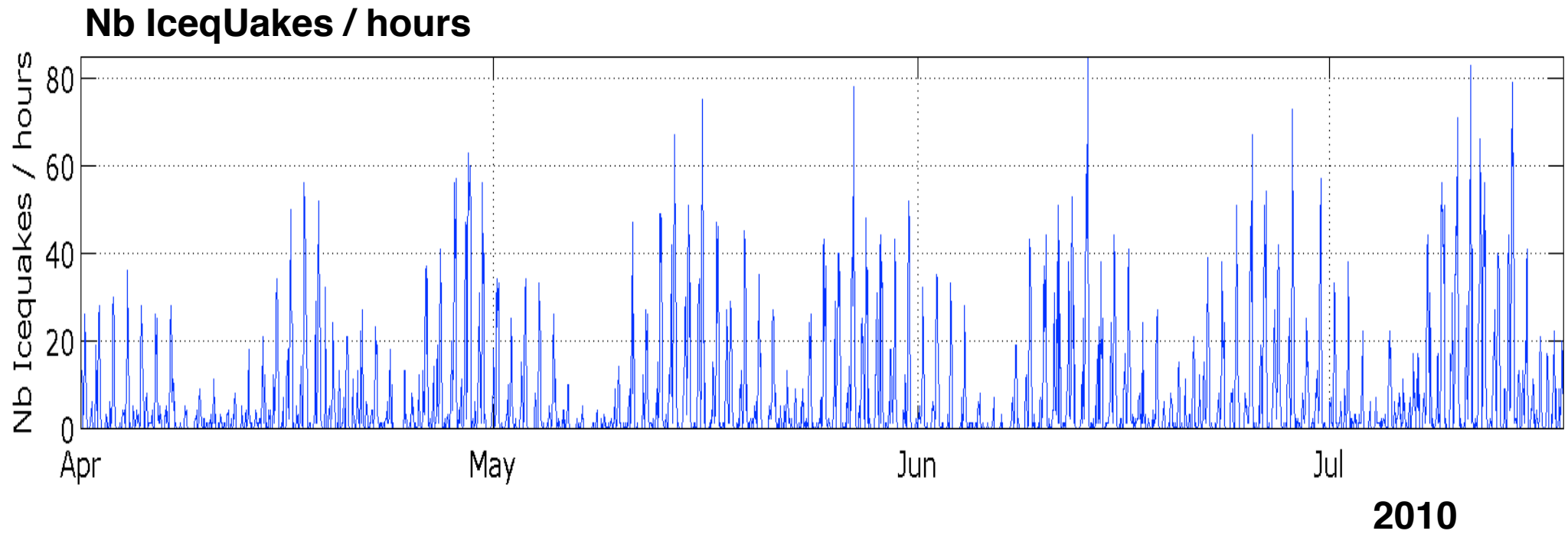
Sismicité Station CORRE

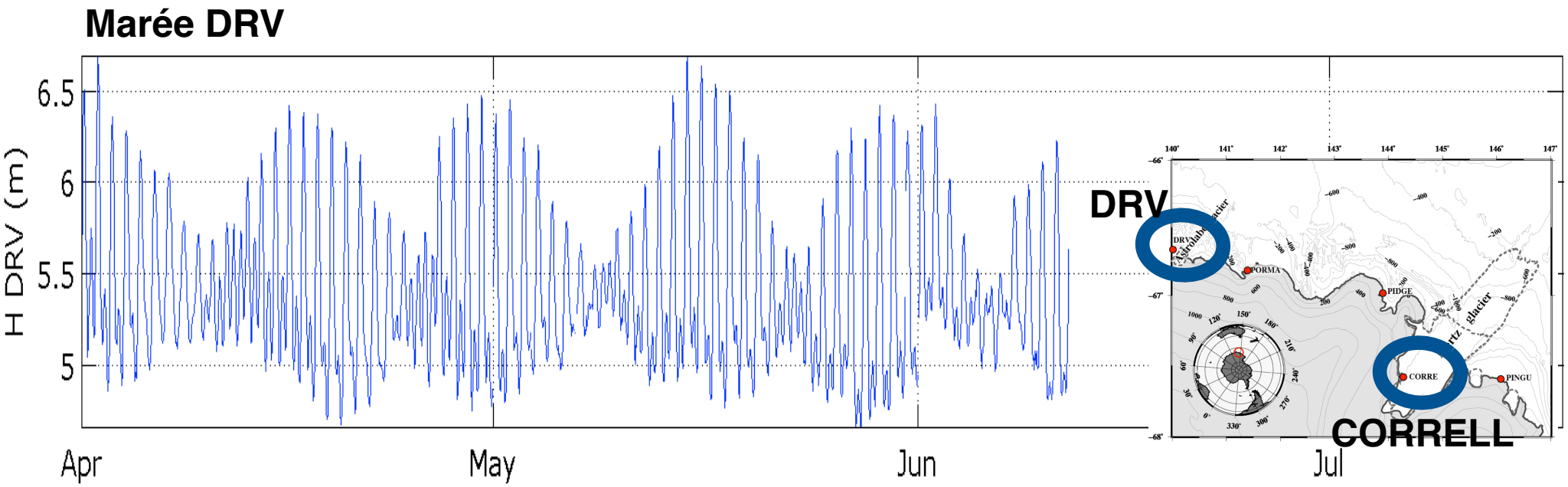


- Nb Evénements : 5000/mois en moyenne
- Durée < 2 s
- Magnitudes < 0 ==> Evénements proches de la station

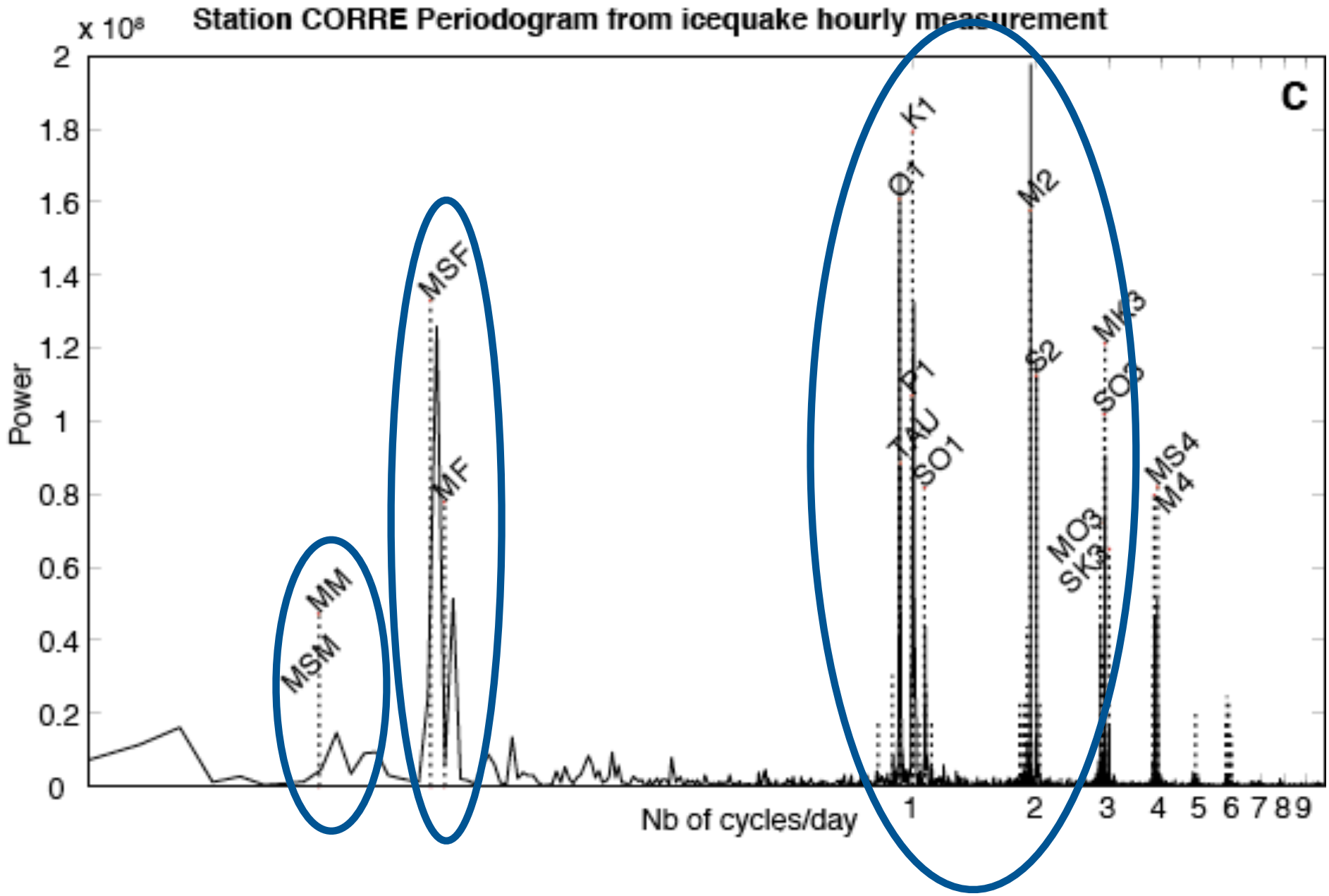
SOURCE
RAYON de 1 km

Nb Icequakes / Heures - Observations CORRE

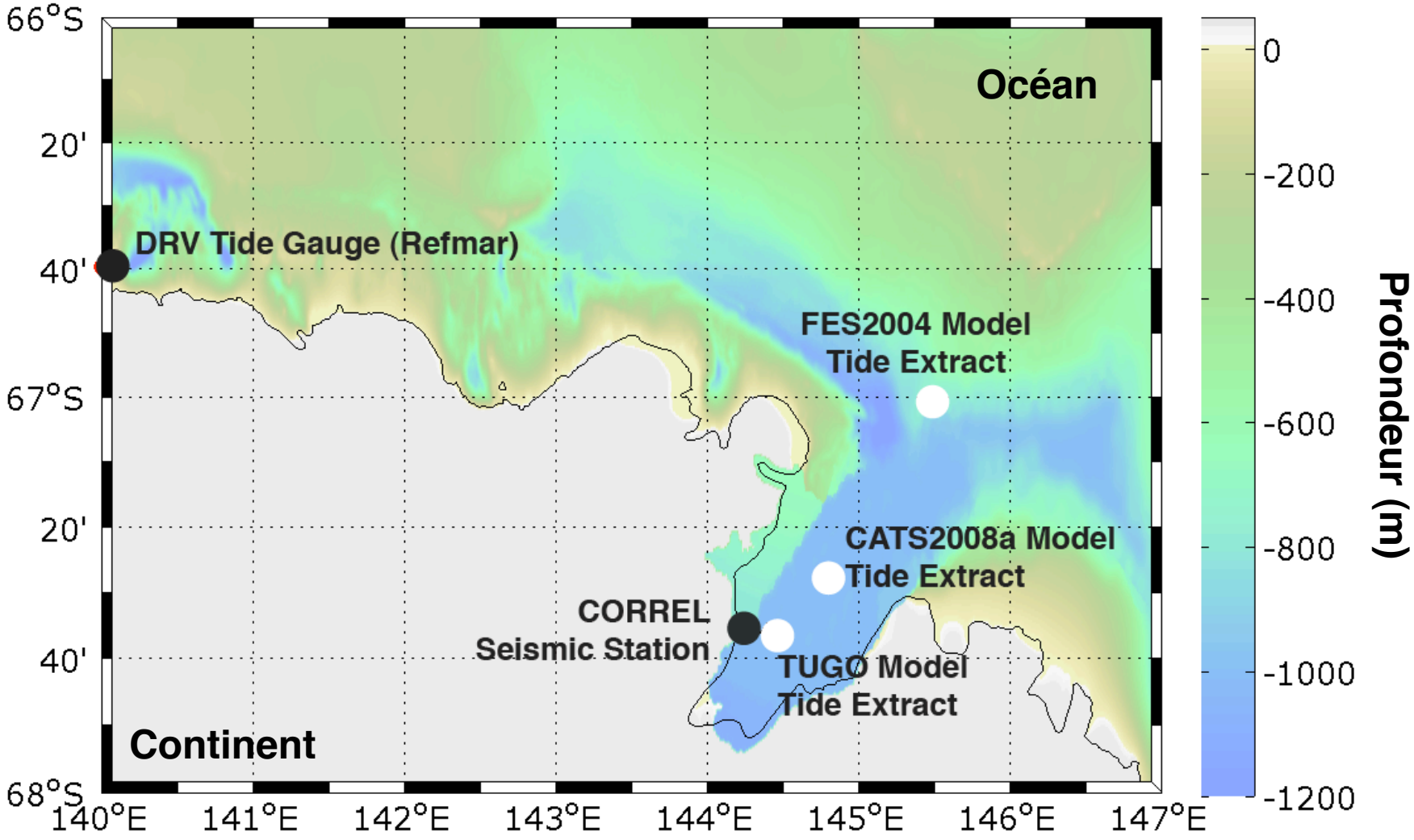




Nb Icequakes / Heures - Analyse spectrale



Marée en Terre Adélie



FES2004 (Lyard et al., 2006, *Ocean Dynamics*, **56**, 394-415)
CATS2008a OSU (Padman et al., 2008, *GRL*, **35**, L22504)

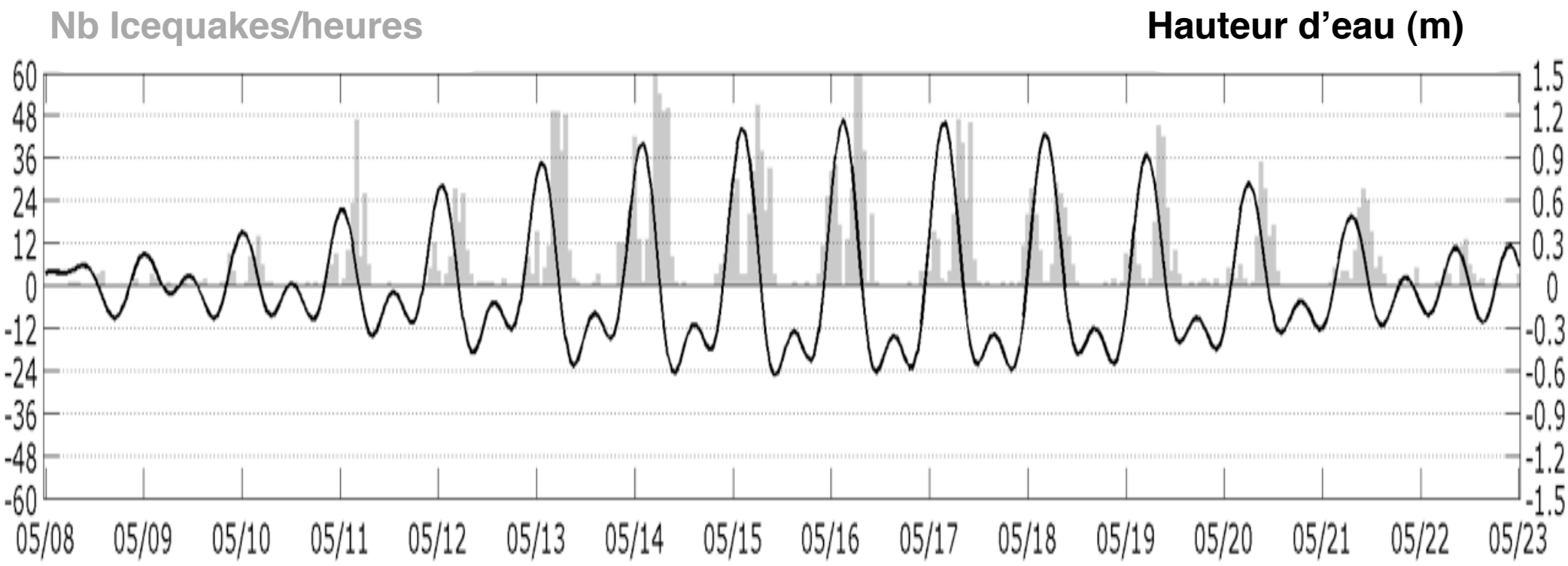
TUGO (Lescarmontier et al., 2012, *J. Glaciol.*, **58**, 665-676)

élévation h (m)

amplitude de la vitesse d'élévation dh (m/h)

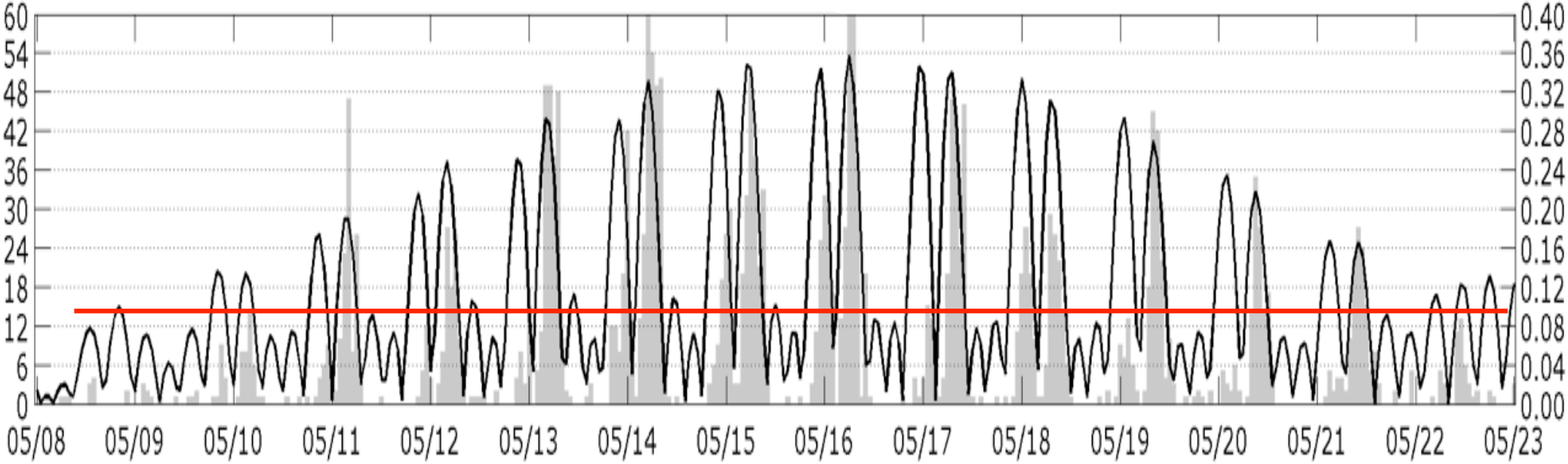
fonction de courant : succion ou vitesse absolue dans la largeur du Fjord

Marée et Icequakes - Station CORRE



Marée et Icequakes - Mouvements Verticaux

Vitesse de variation élévation (m/h)



A MAREE DESCENDANTE

Accommodation flexure

▼

Micro-fracturation de surface

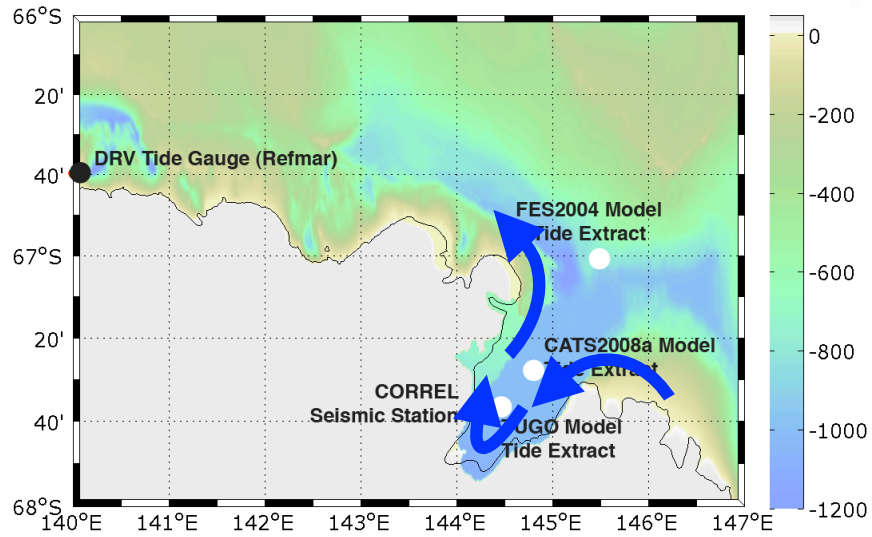
A MAREE MONTANTE

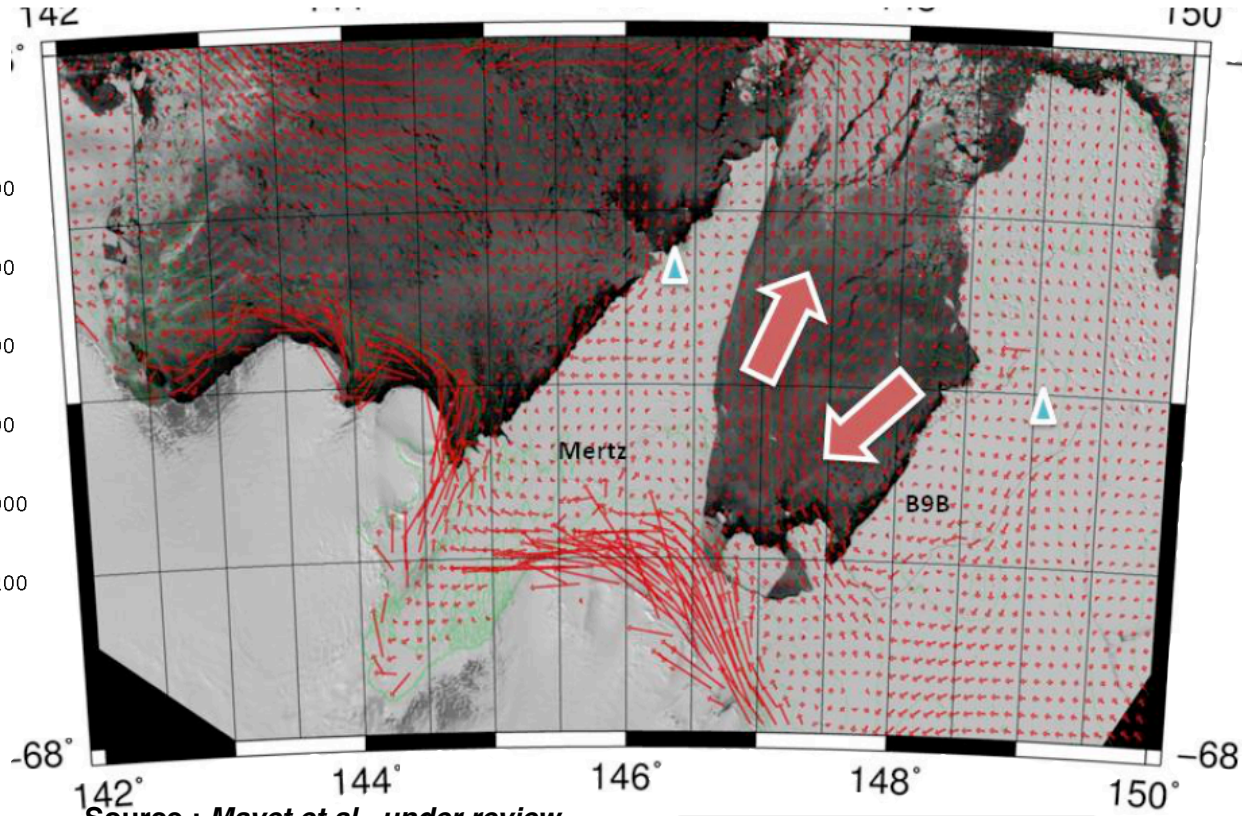
Fermeture des fractures extrados

▼

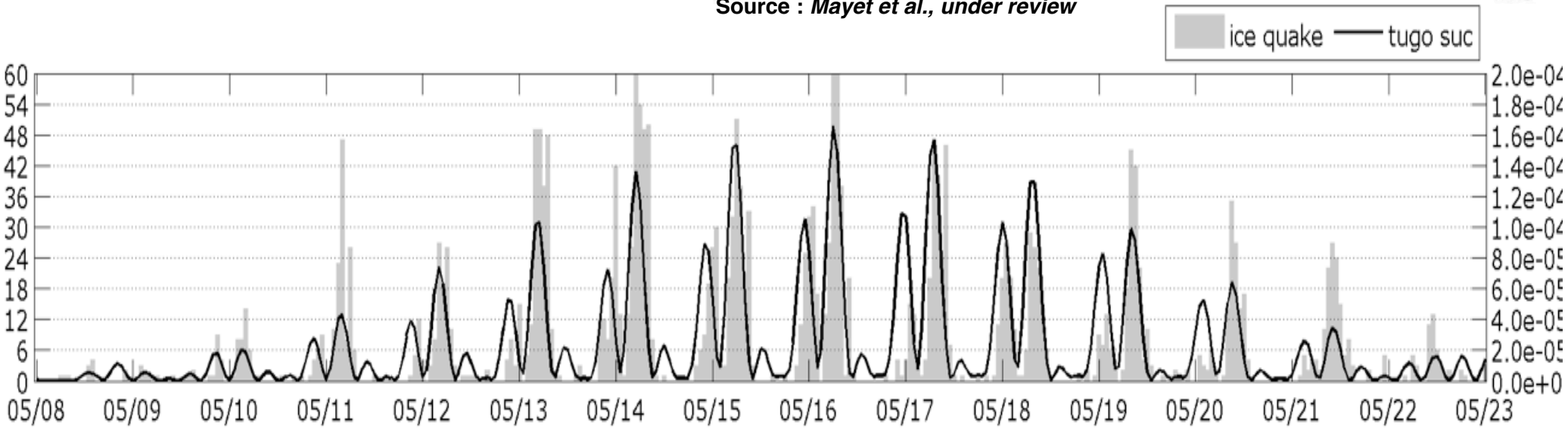
Fracturation interne ?
Déformation basale ductile ?

Marée et Icequakes - Mouvements Horizontaux

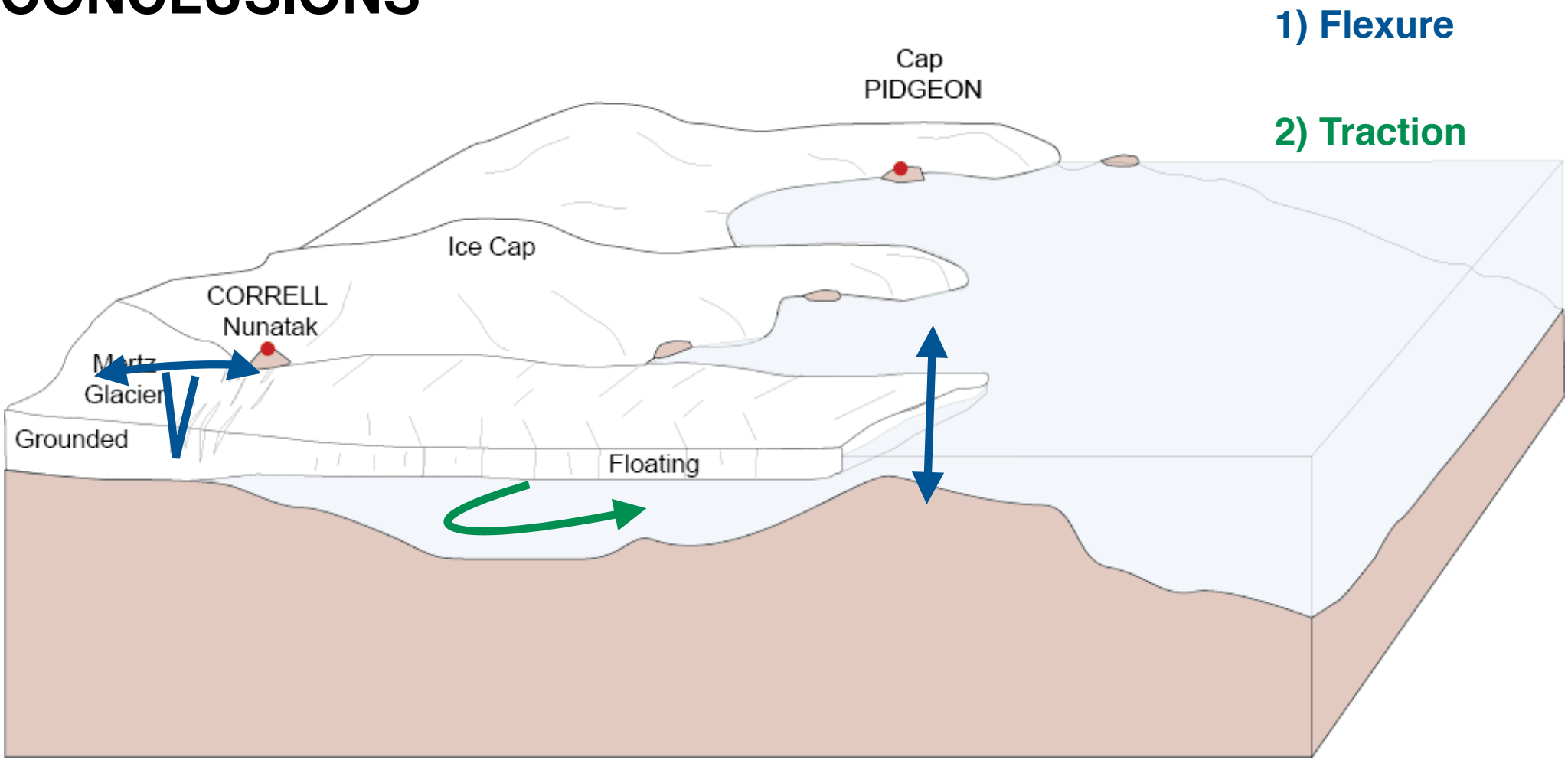




Source : ***Mayet et al., under review***



CONCLUSIONS



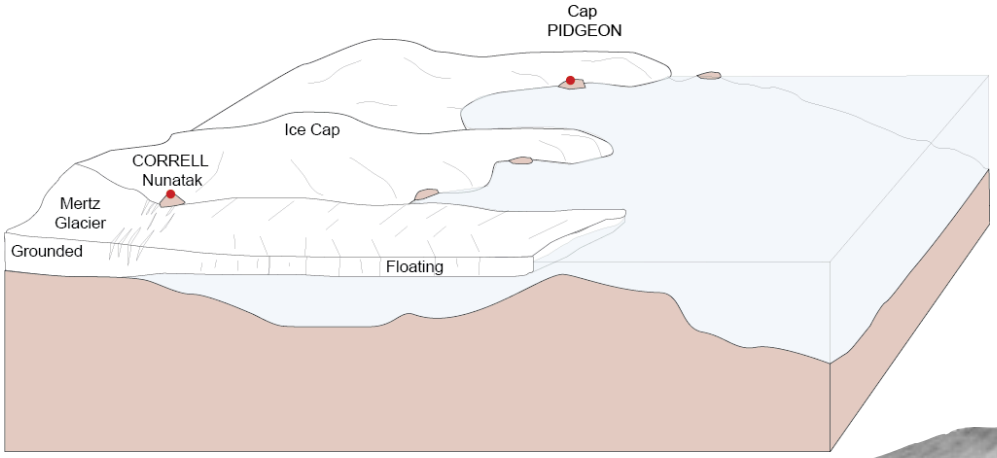
PERSPECTIVES

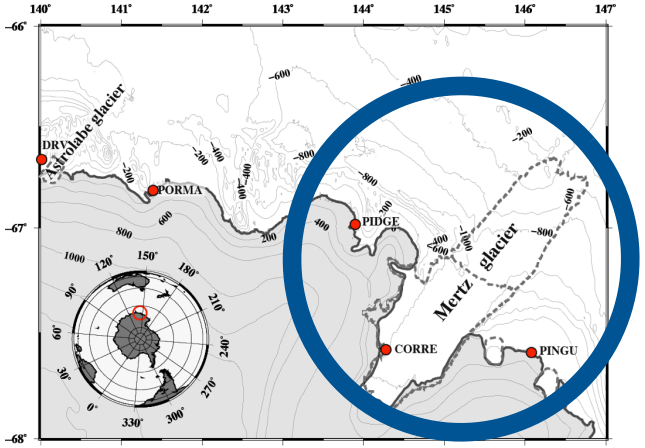
?? Localisation plus fine des événements en XYZ ??
=> Localisation de la transition fragile/ductile

Affiner l'interprétation de la circulation barotrope dans le Fjord

Merci ...

Le Glacier MERTZ / Station CORRE





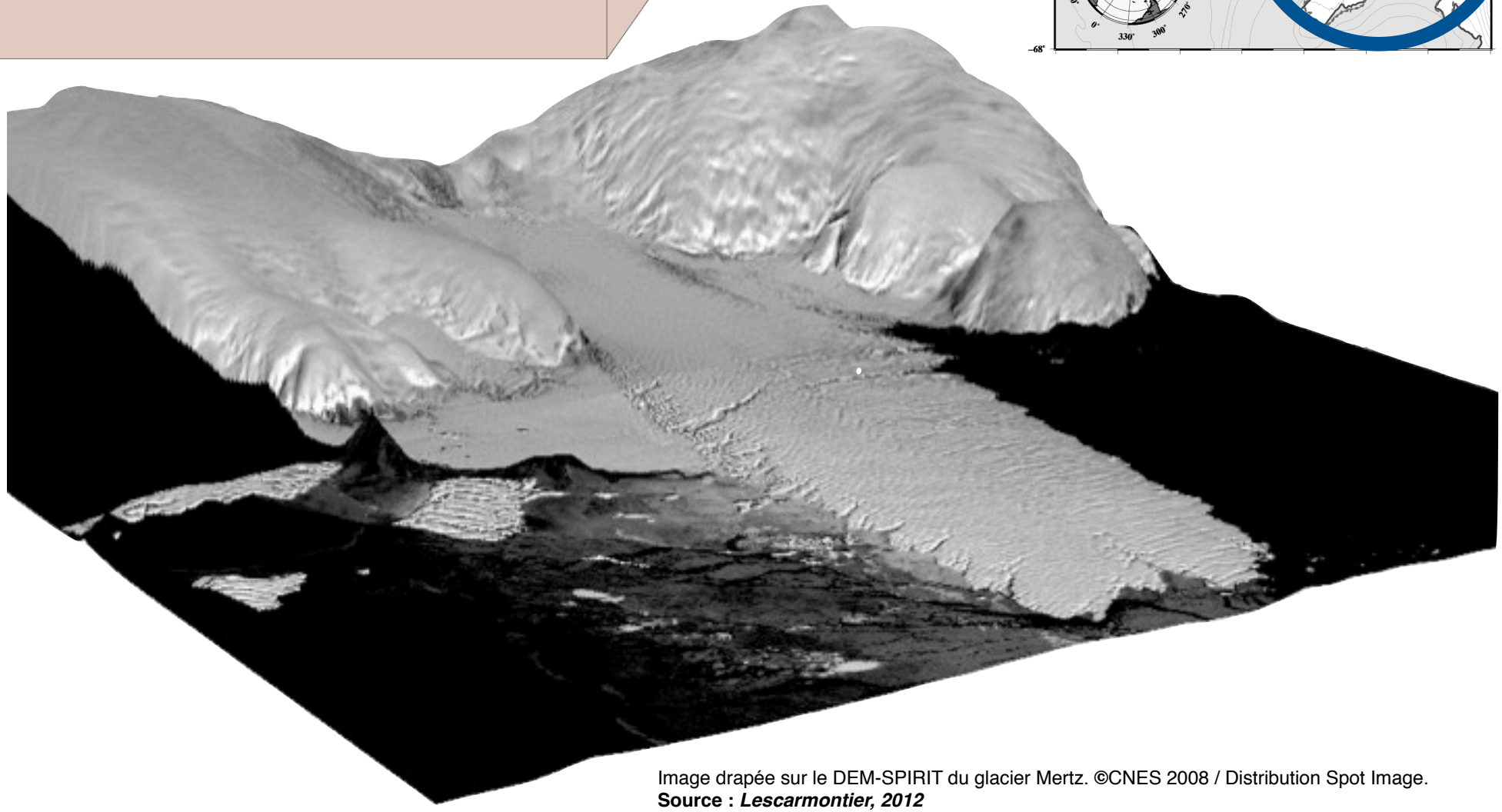
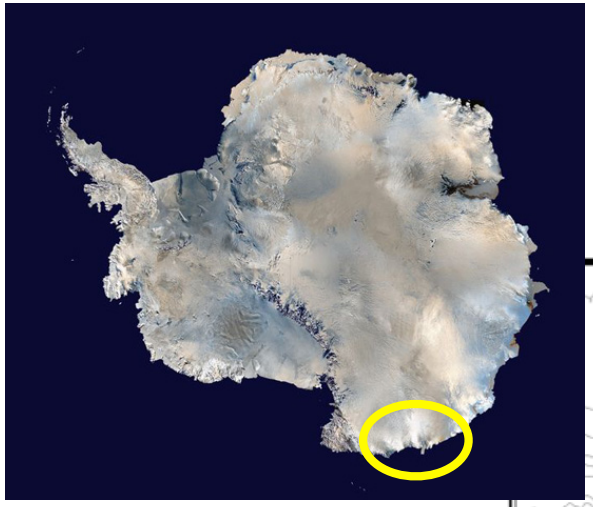
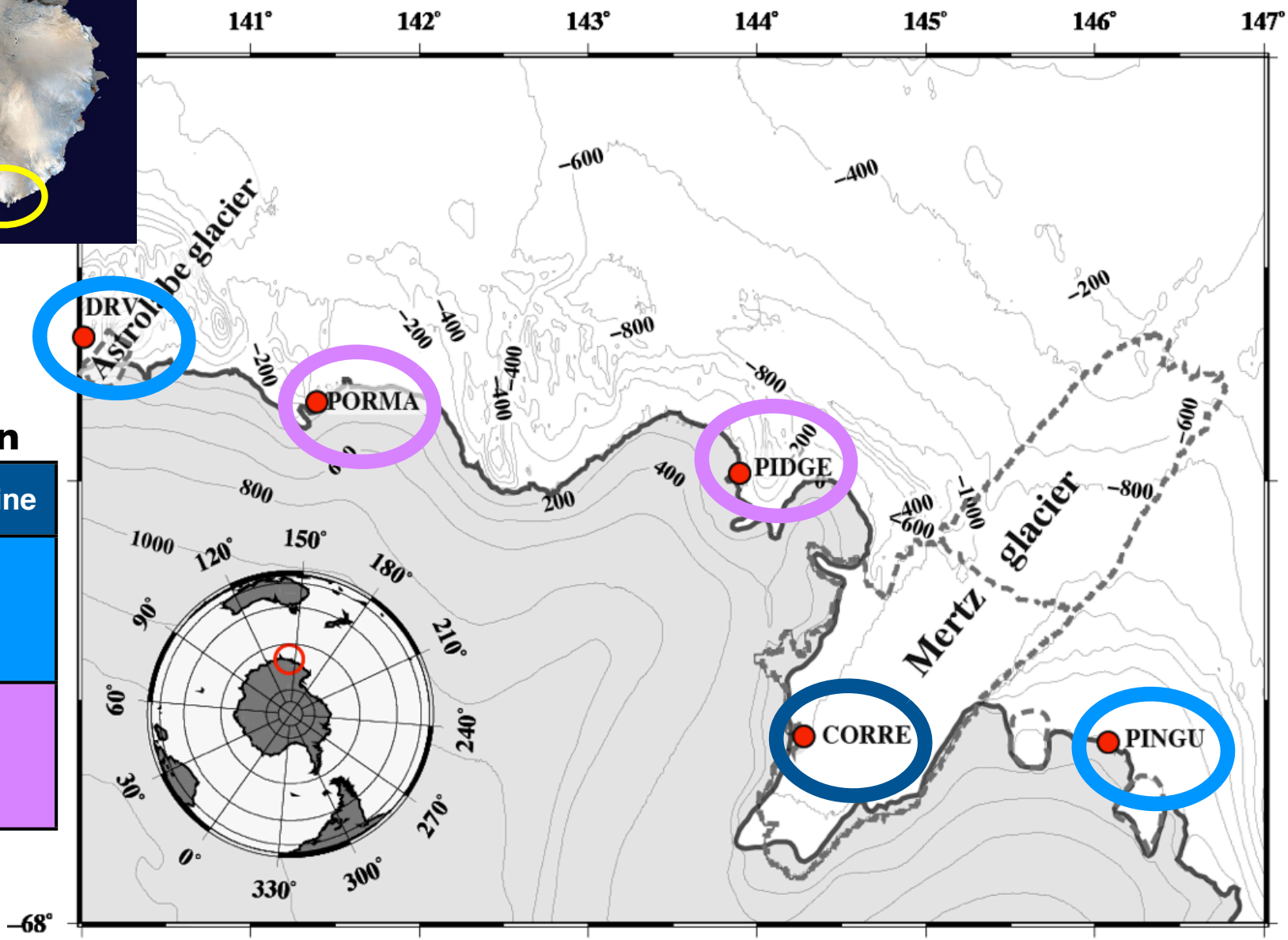


Image drapée sur le DEM-SPIRIT du glacier Mertz. ©CNES 2008 / Distribution Spot Image.
Source : ***Lescarmontier, 2012***

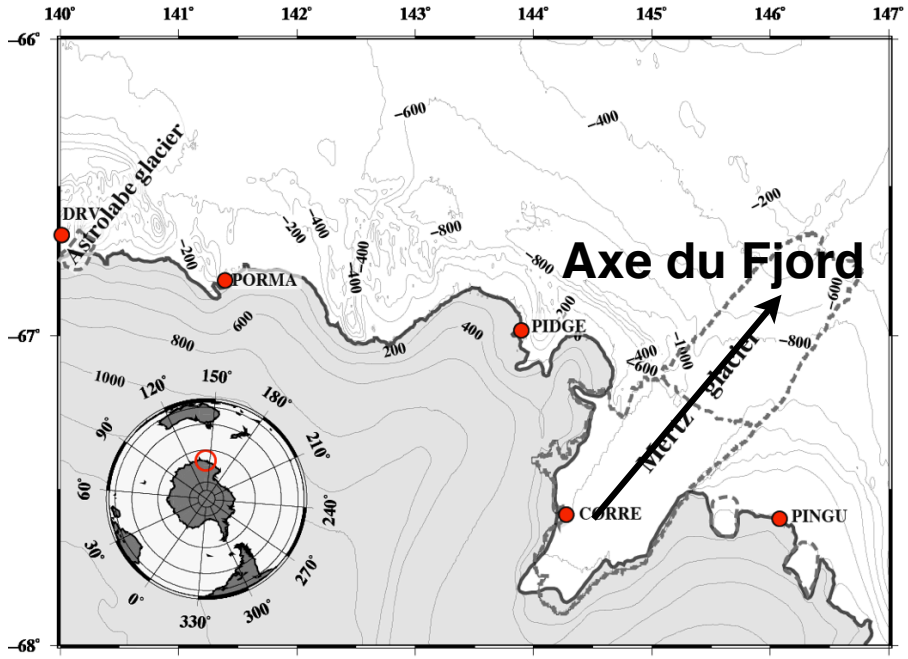
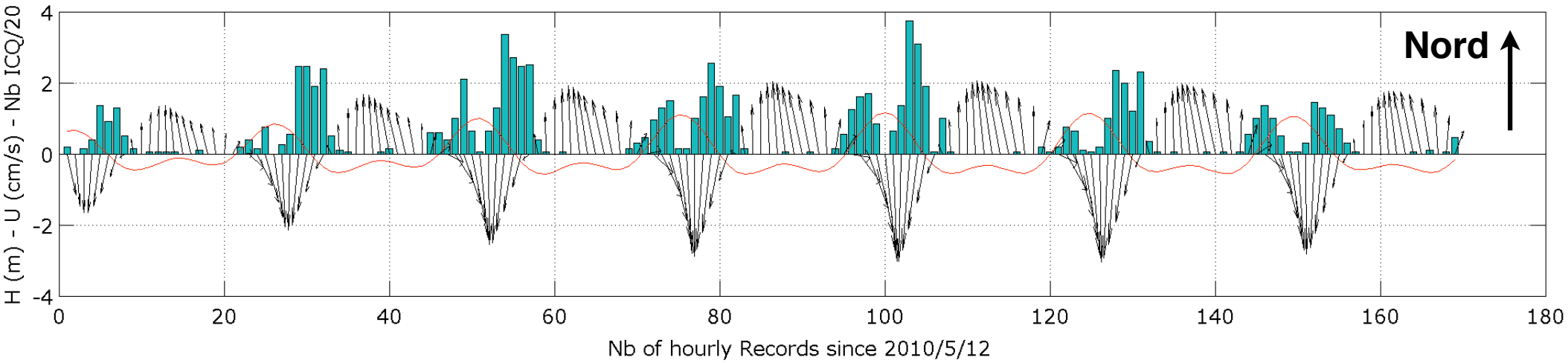
ArLiTA / Architecture de la Lithosphère de Terre Adélie



Réseau de mesures 2009-2012



Distance Glacier-Station

CORRE	Grounding line
DRV	< 10 km
PINGU	
PIDGE	> 10 km
PORMA	

Courant de jusant