

Décomposition Modale Empirique et analyse de données climatiques en Antarctique



Université
de Toulouse



Guilhem Autret



Page 1/25



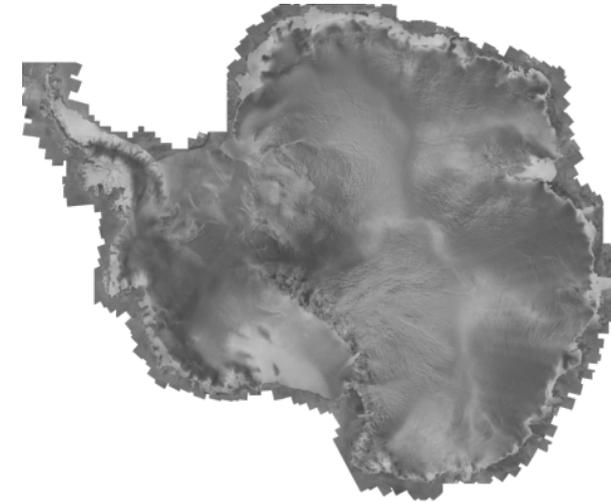


Sommaire

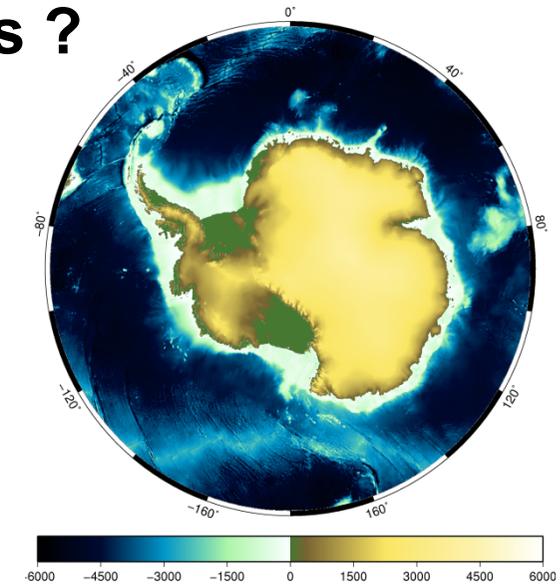
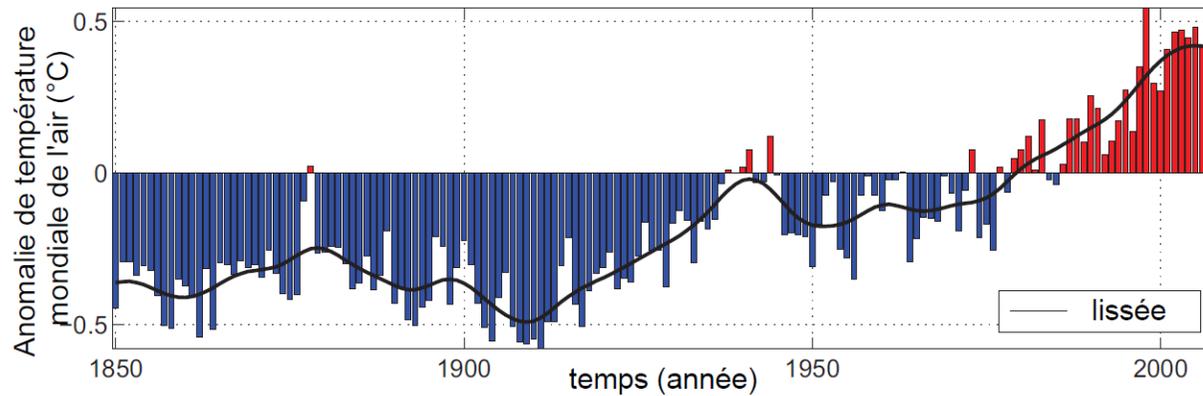
- Contexte
- Mesures

Types de signaux

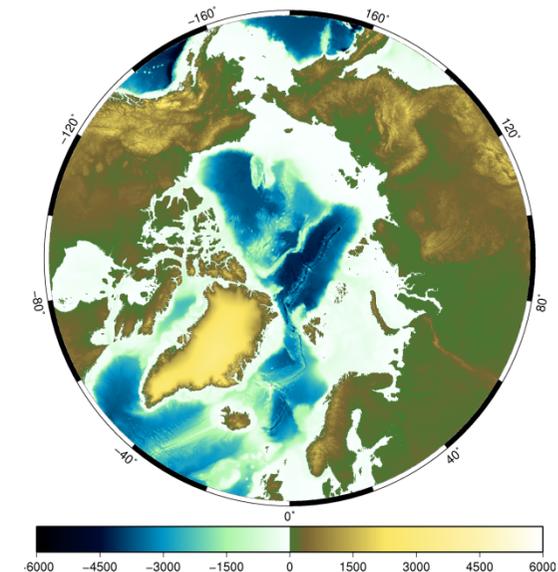
- Caractéristique des signaux
- Décomposition et Espaces de projections
- Corrélations
- Conclusions



Pourquoi étudier des pôles ?



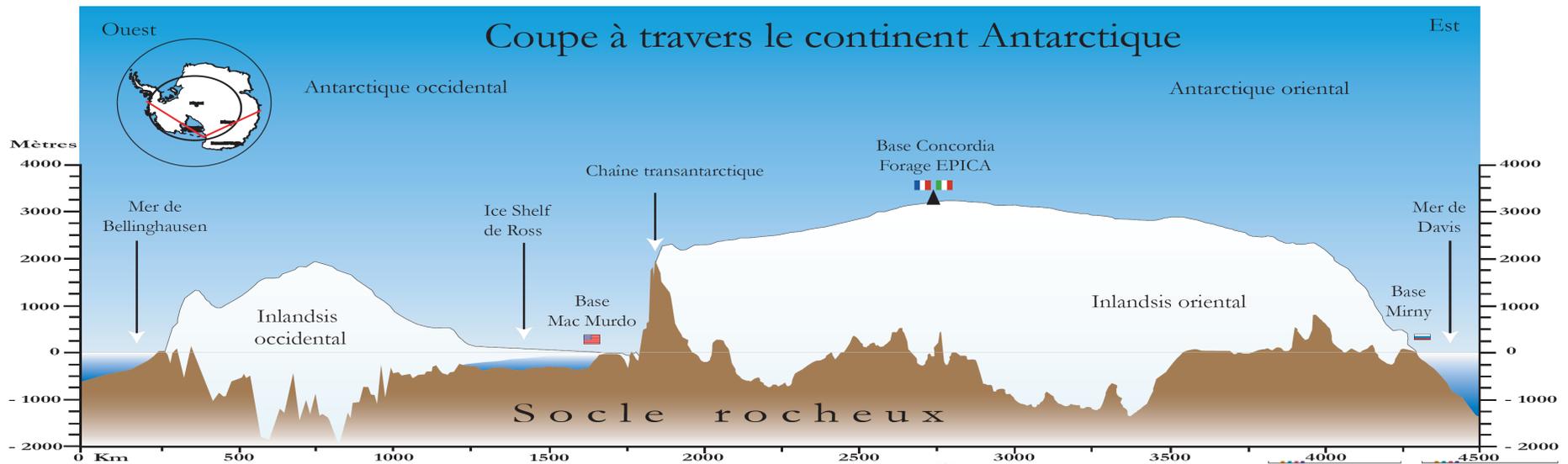
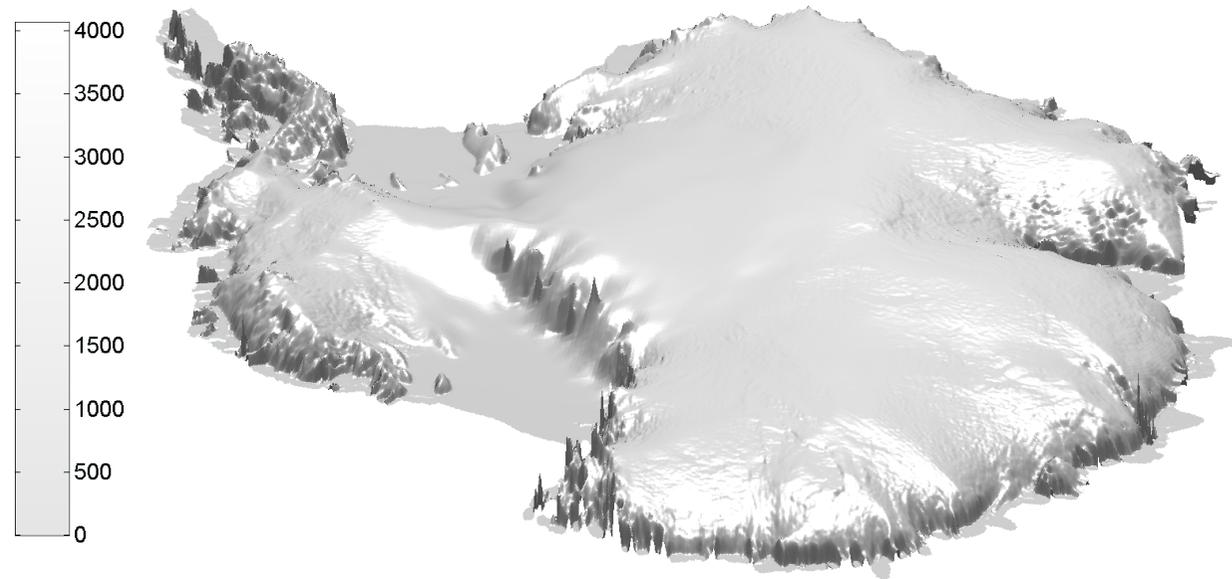
- « Témoins et acteurs »
- Tendances
- Océan glacial arctique et océan austral
- Topographie



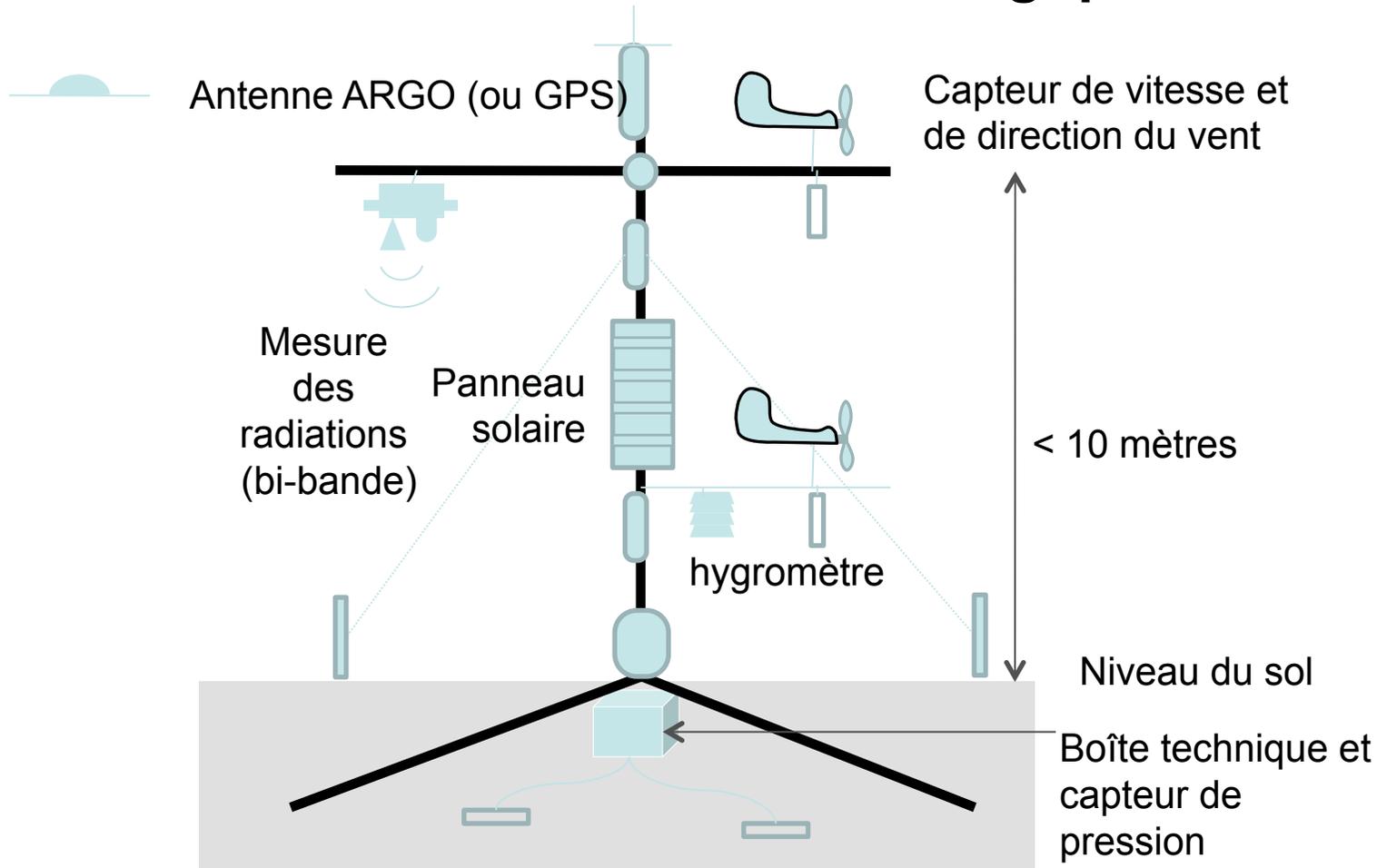
Observations spatiales

Mesures altimétriques
topographie

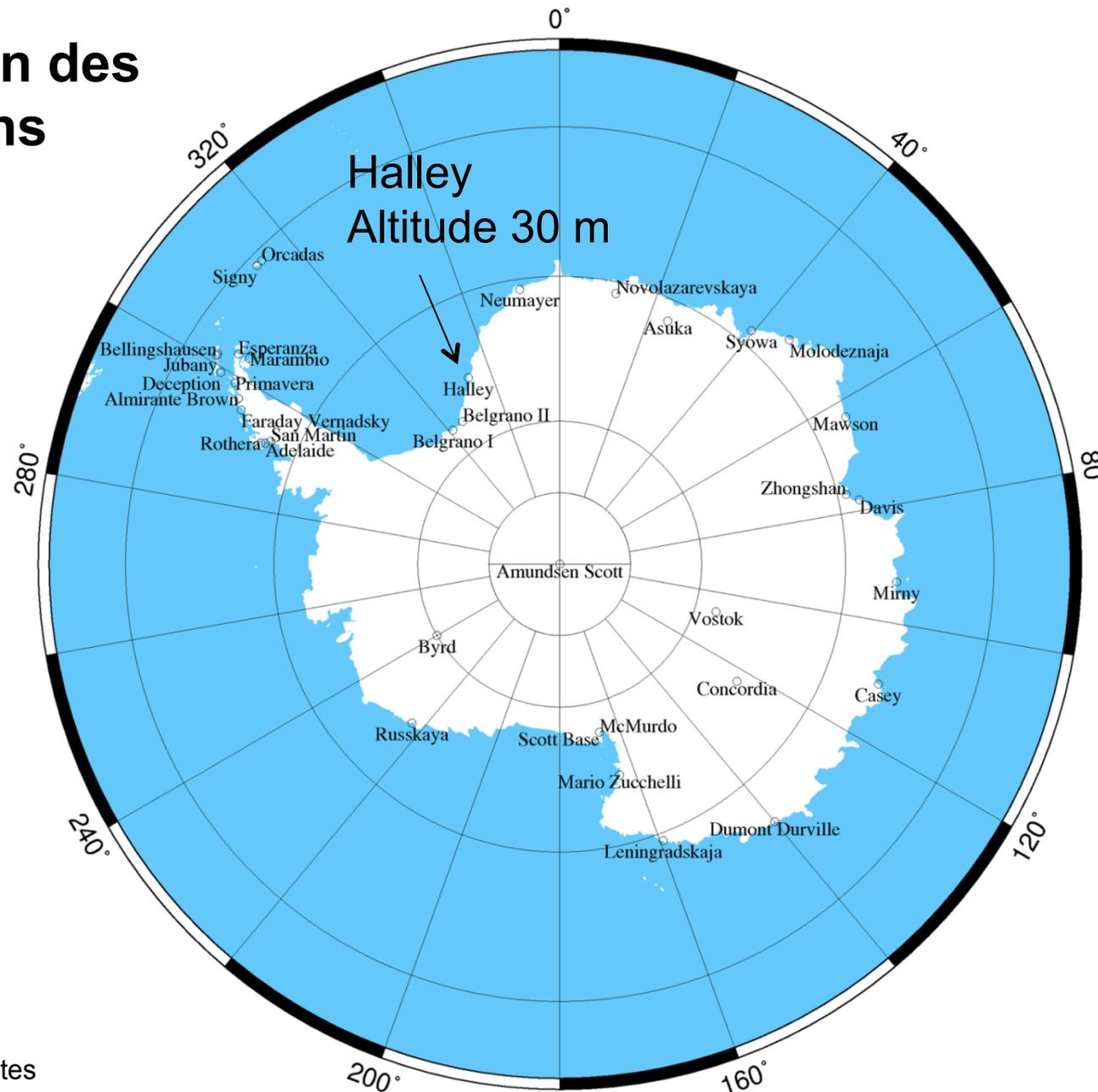
- conditions locales
- vents



Station Météorologique



Répartition des stations



Données 10 minutes



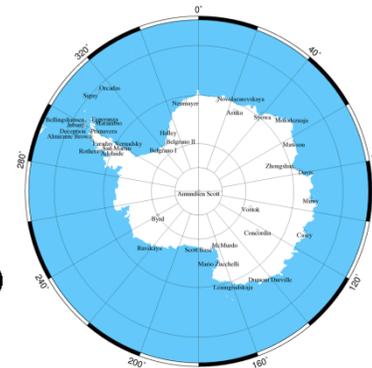
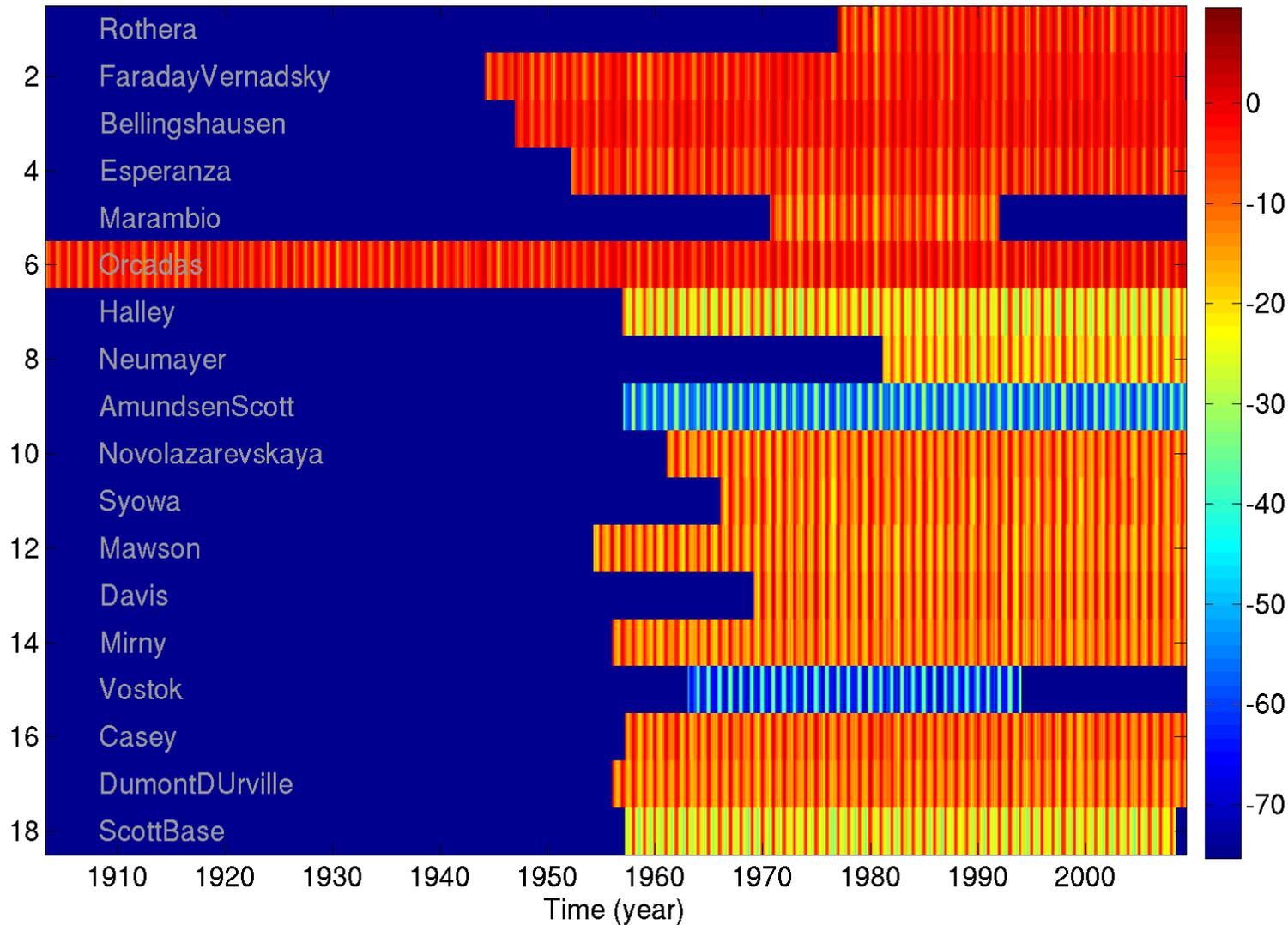
Guilhem AUTRET



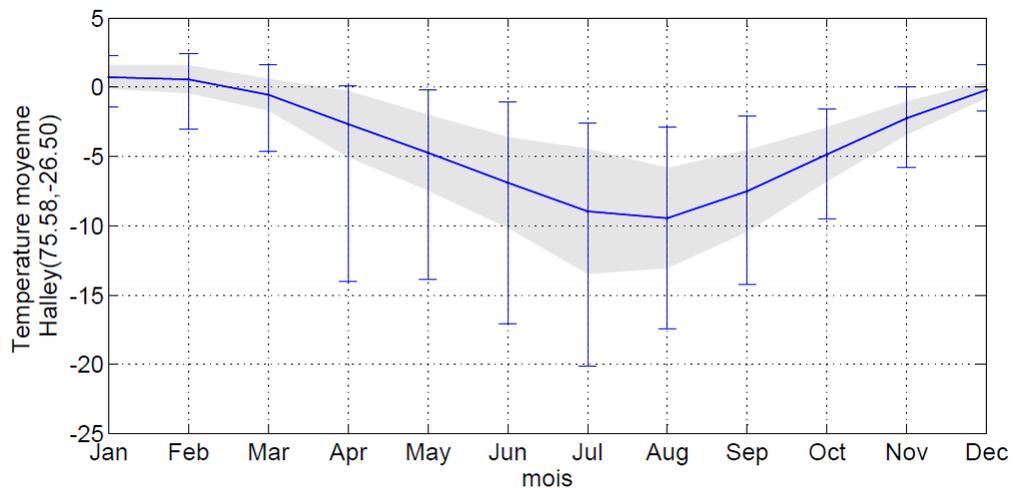
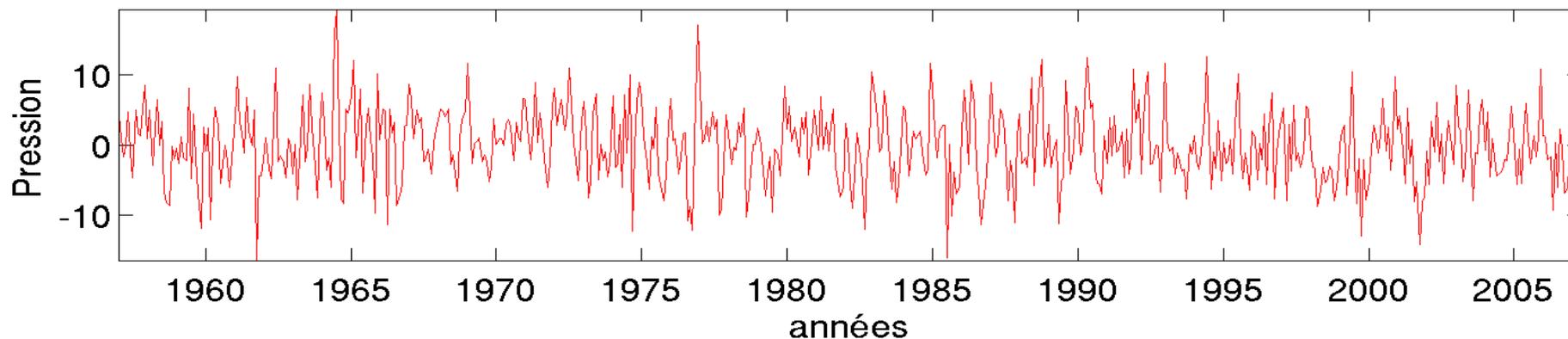
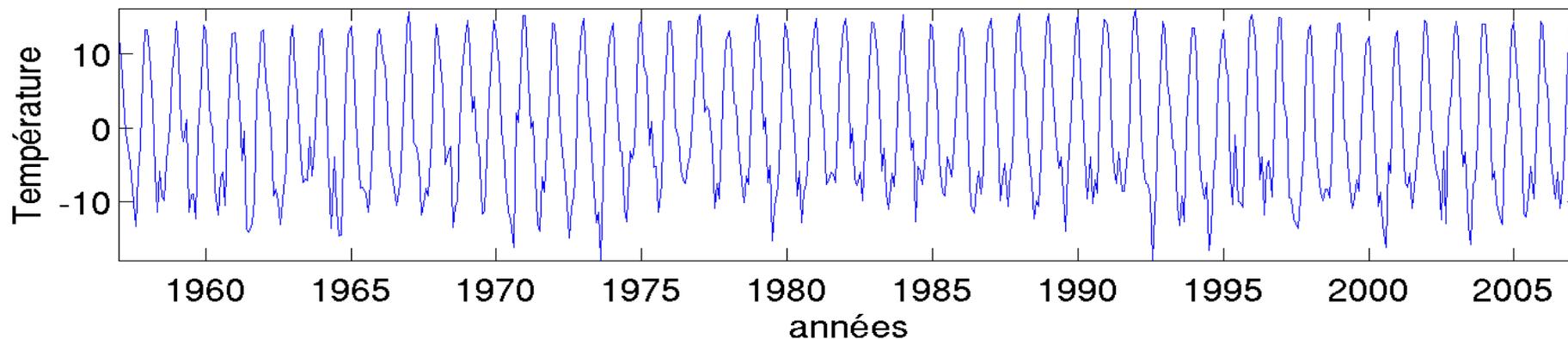
Réseau
Scientifique
et Technique
de l'Équipement



Prétraitement



Comparaison des variables centrées de Halley



Mesures centrées de Halley
actuellement :
-18 °C, 991 hPa, vent 9 km/h
(70°Ouest sans rafales)

Représentation fréquence, temps-fréquence et temps-échelle

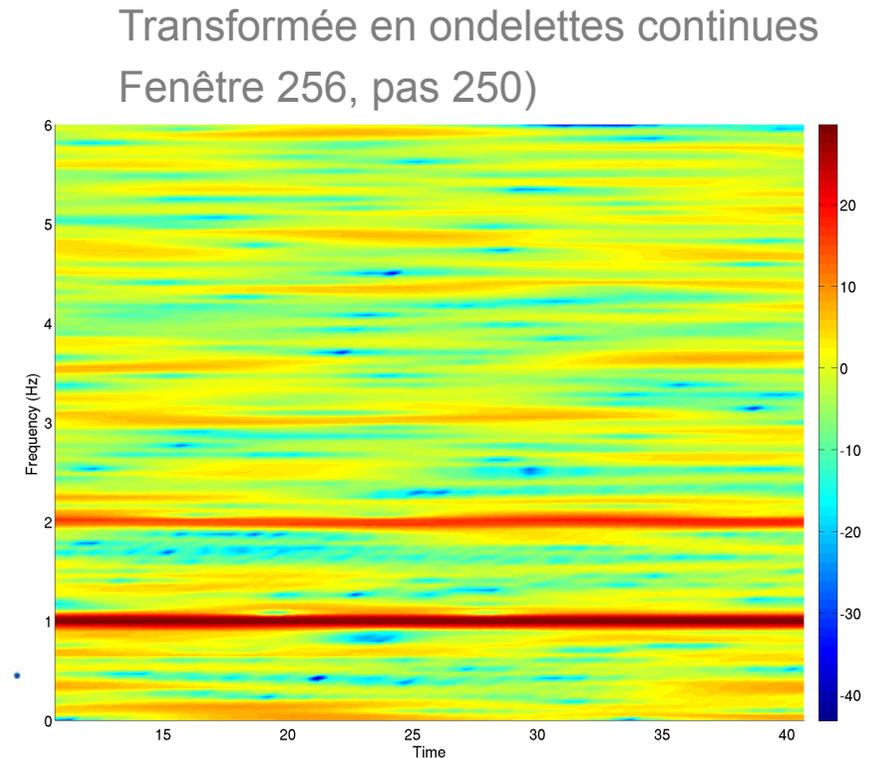
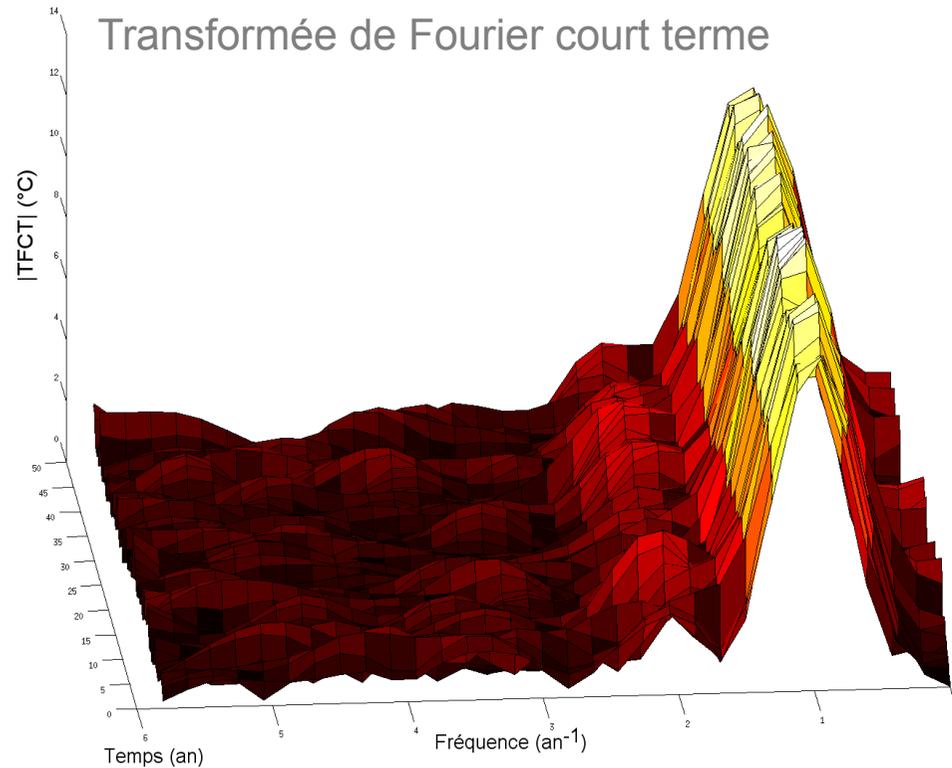
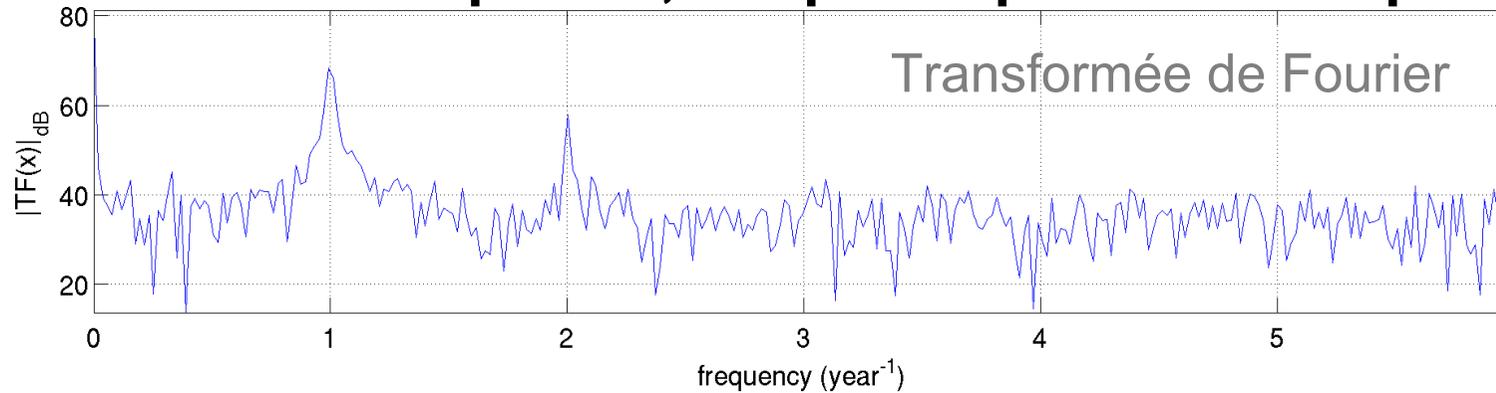
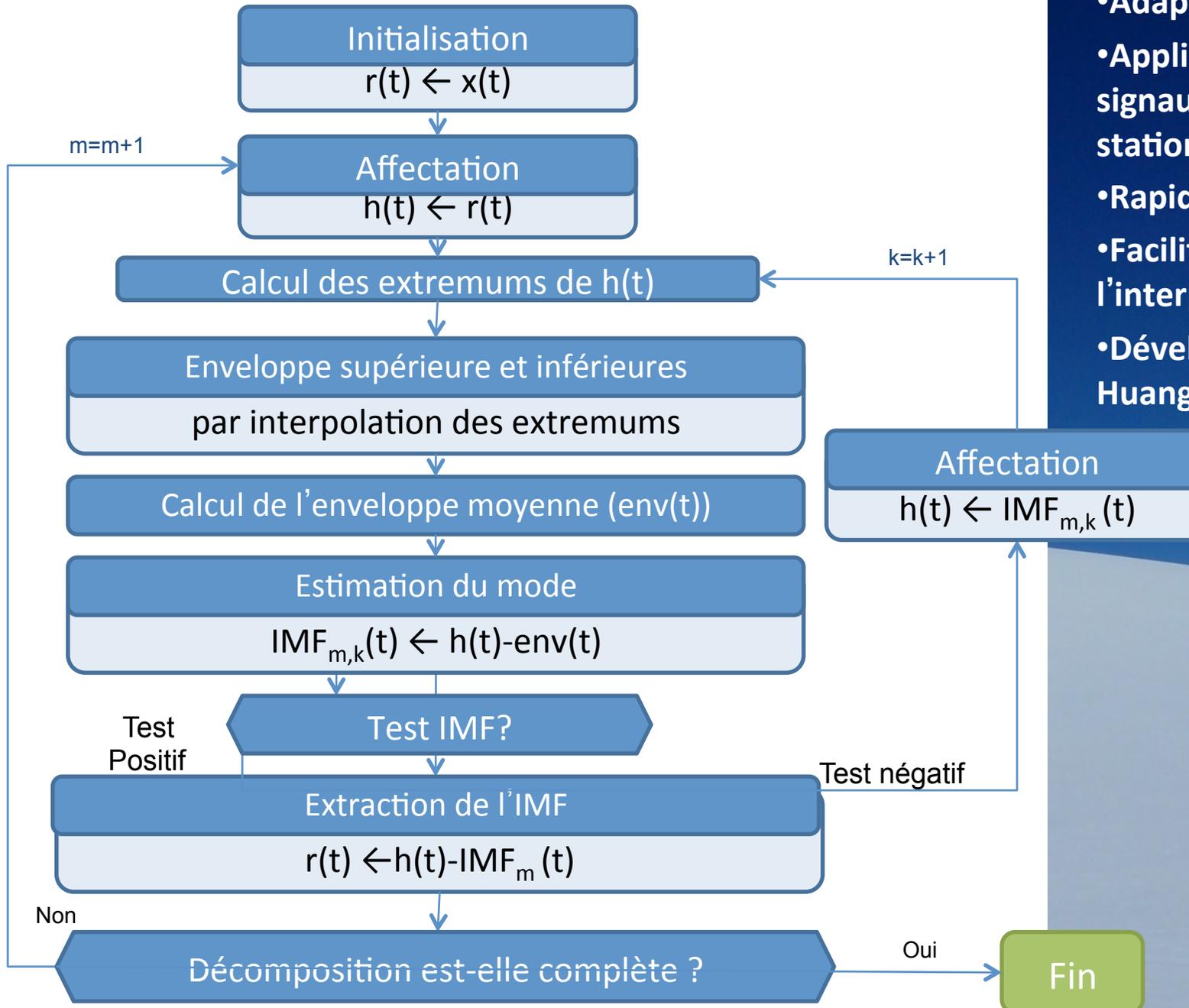


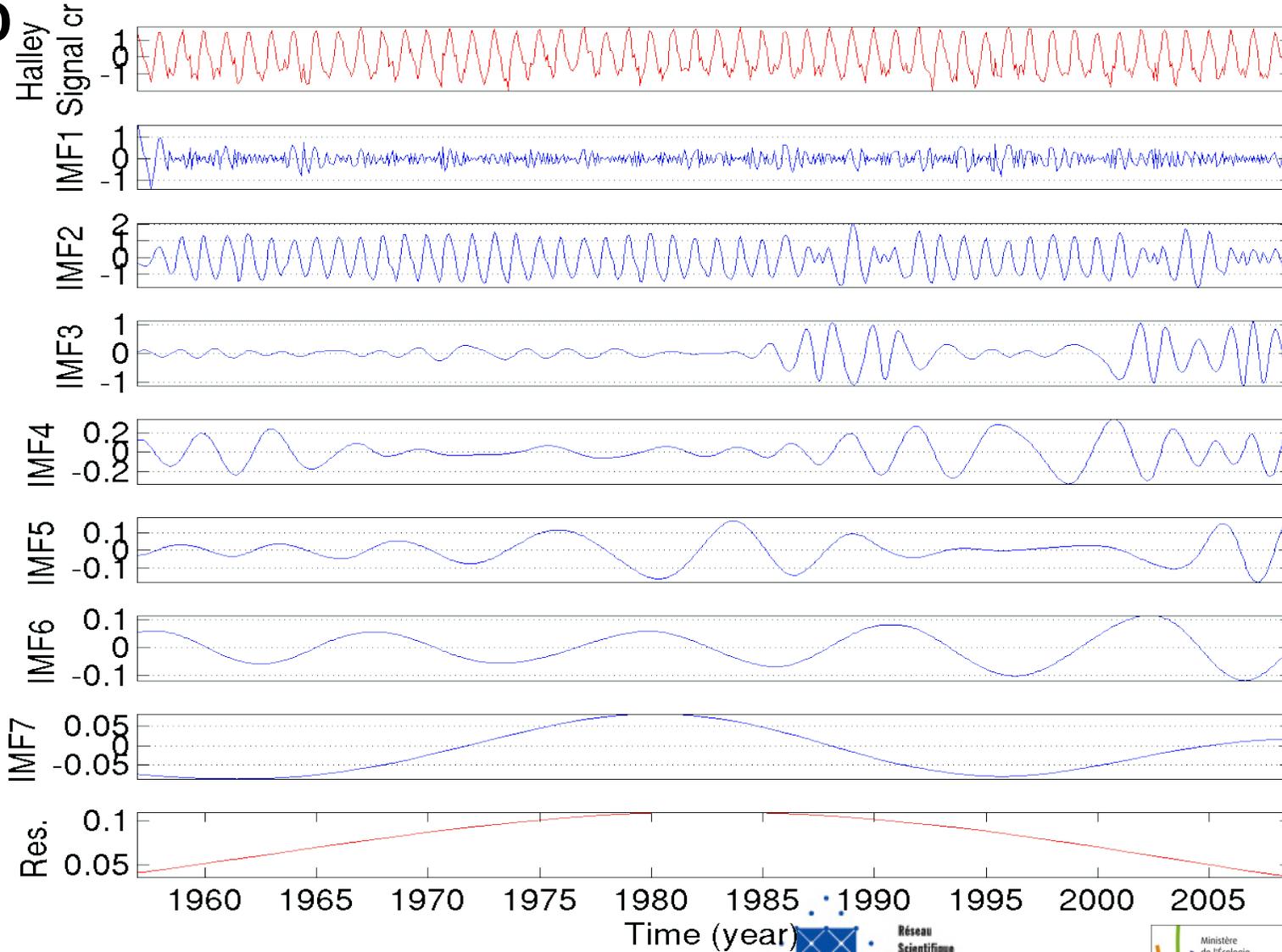
Schéma Bloc de l' EMD



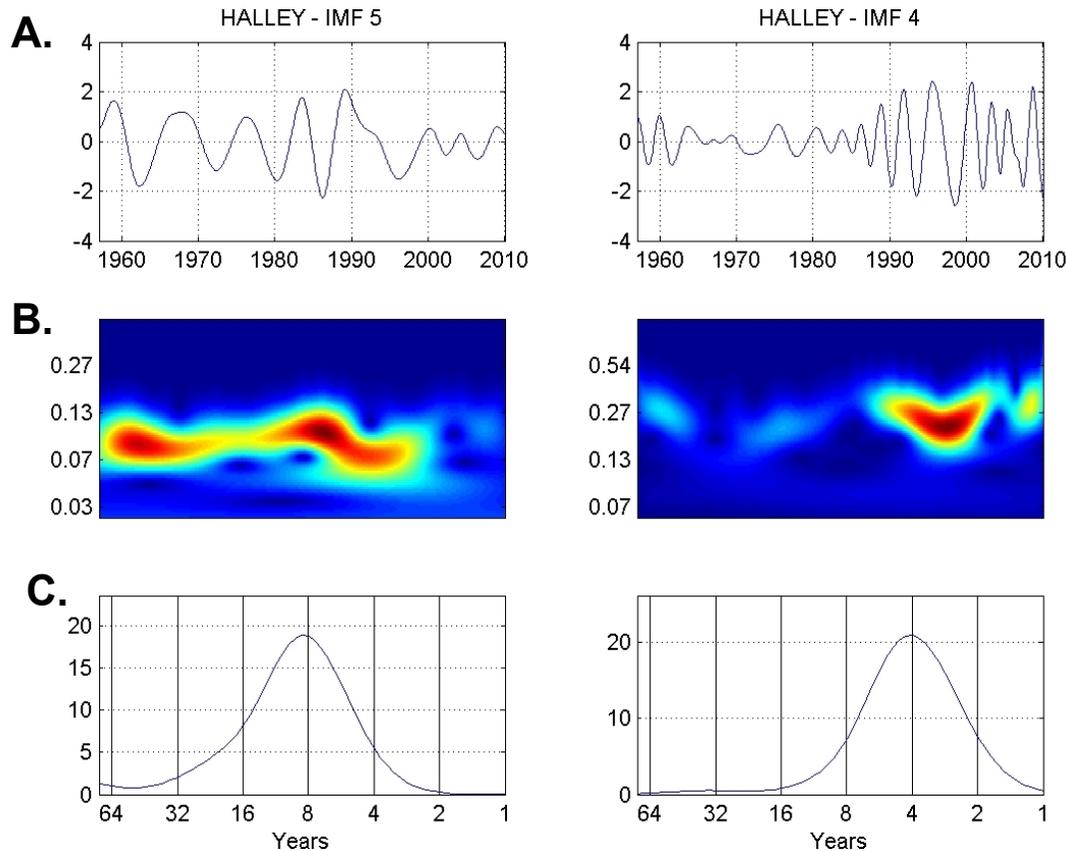
Méthode :

- Adaptative
- Applicable à des signaux non stationnaires
- Rapide
- Facilité de l'interprétation
- Développée par Huang 1998

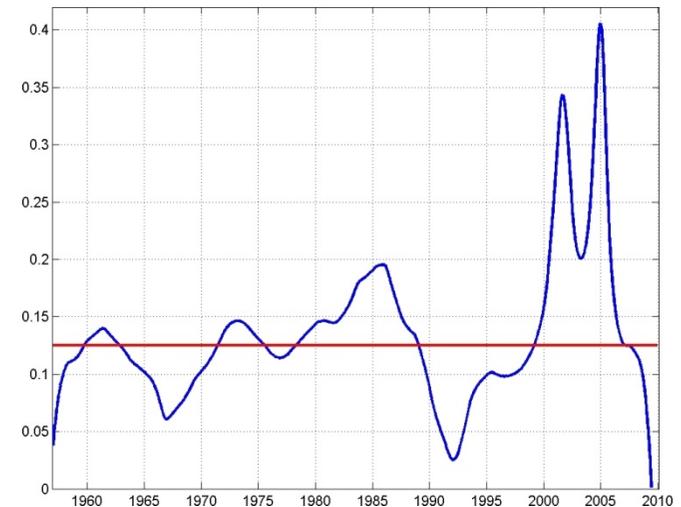
EMD



Présentation des résultats en cours de publications



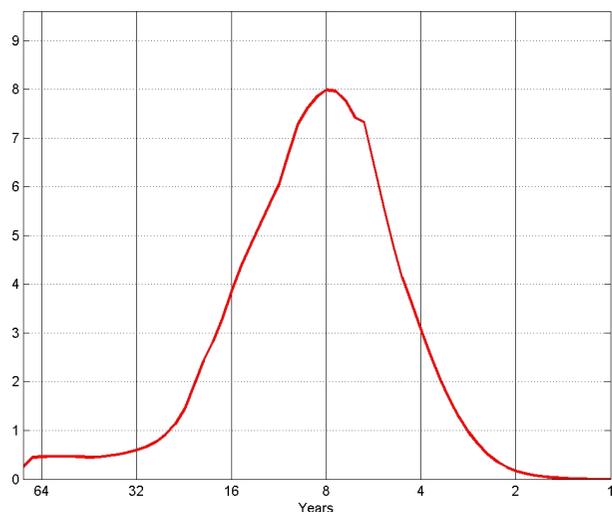
Fréquence instantanée de l'imf₅(t)



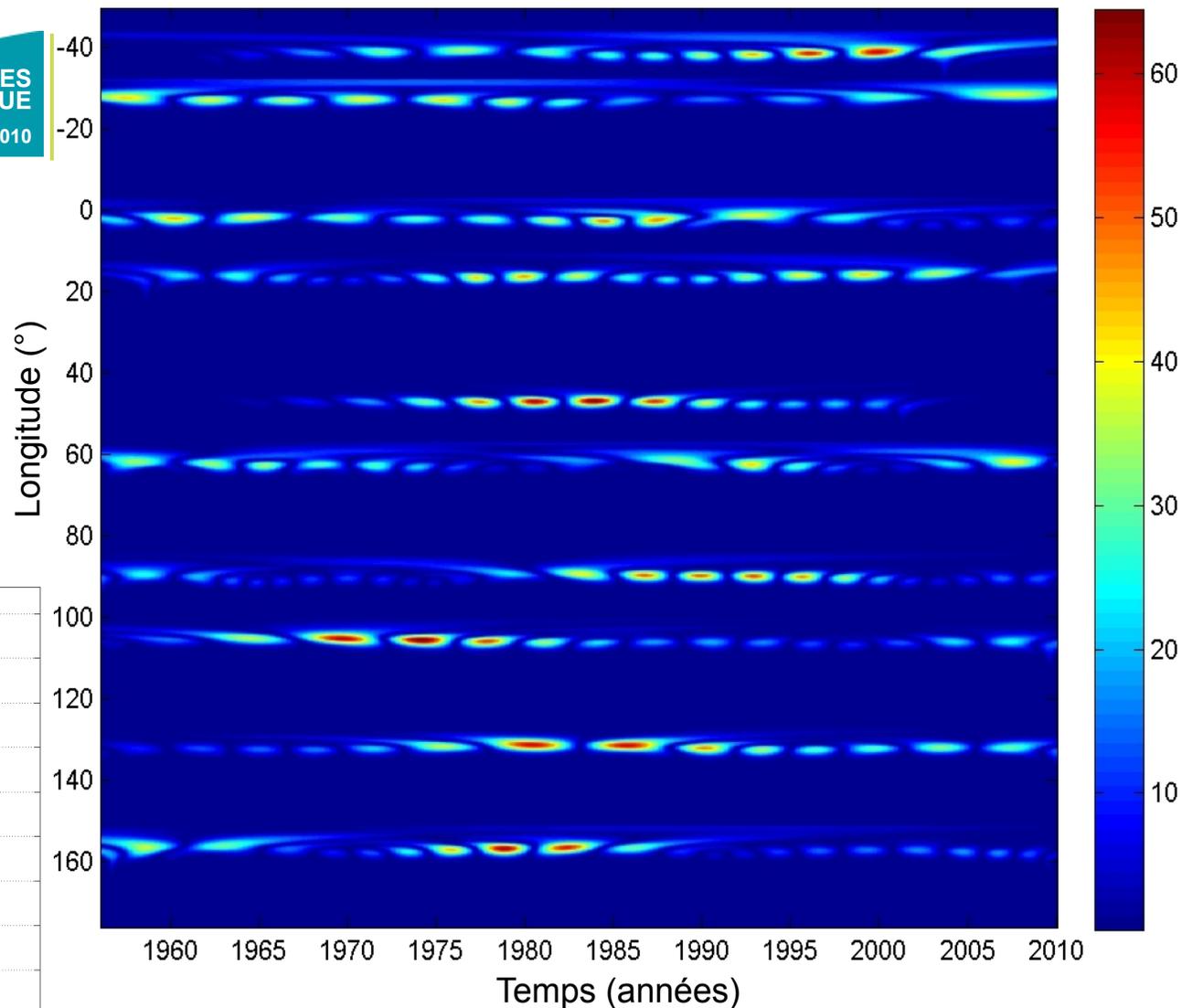
Décomposition en Ondelettes

A. $imf(t)$, B. $|TO(imf(t))|$, C. $SGO(imf(t))$

Présentation des résultats en cours de publications

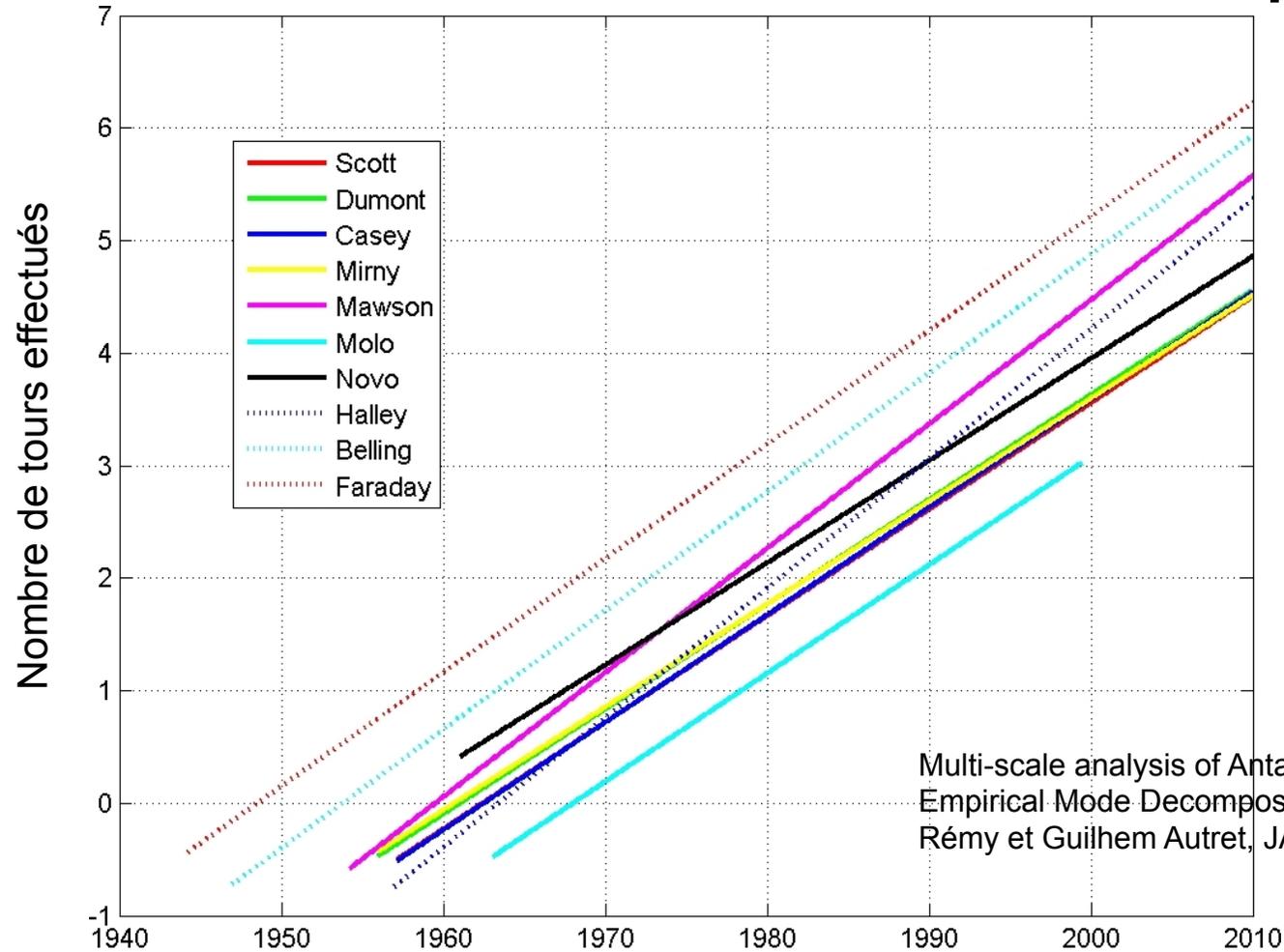


Abscisse du maximum du spectre global moyen : 7.8 ans

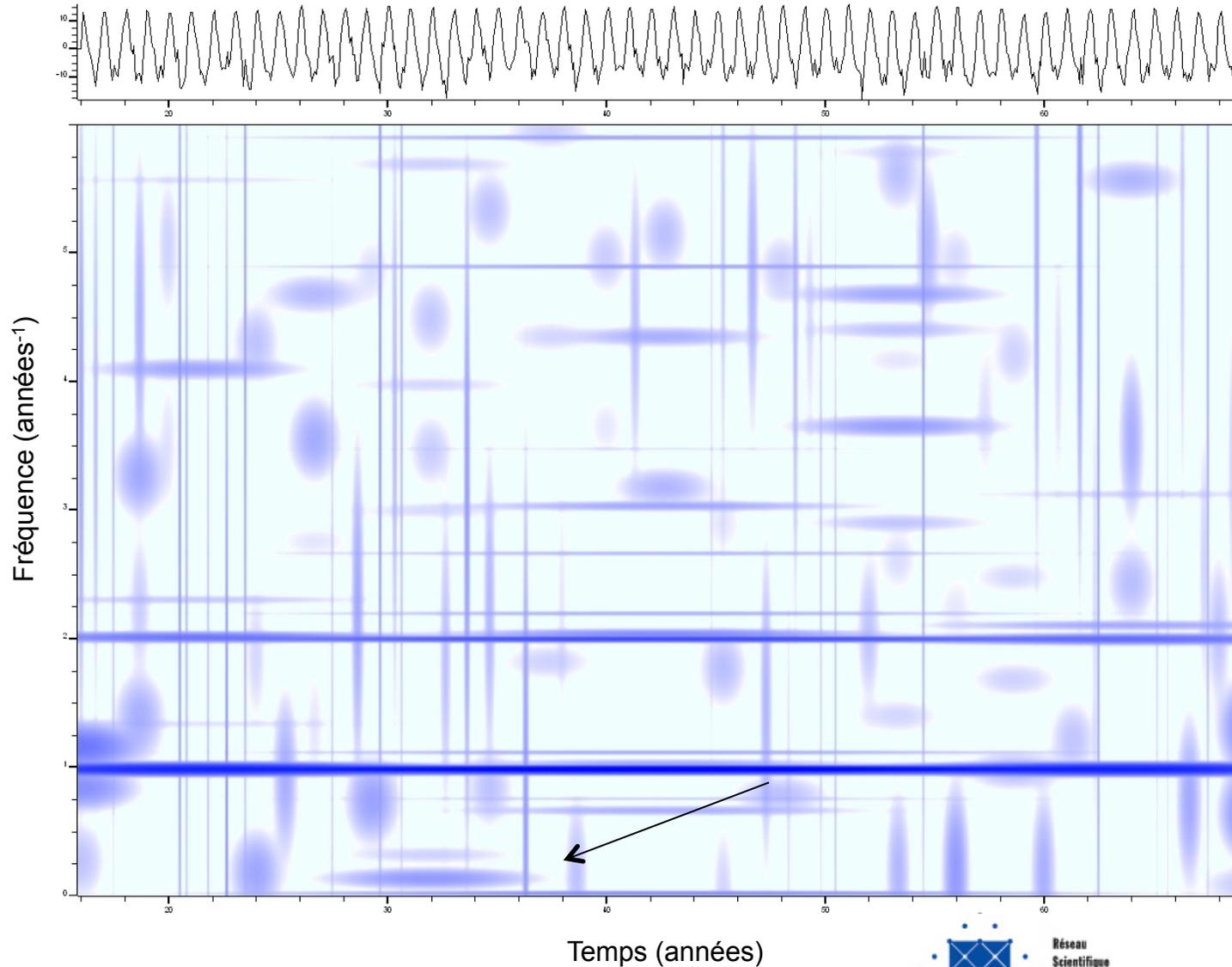


Décompositions en ondelettes des modes à "8" ans (décalés en longitude)

Présentation des résultats en cours de publications

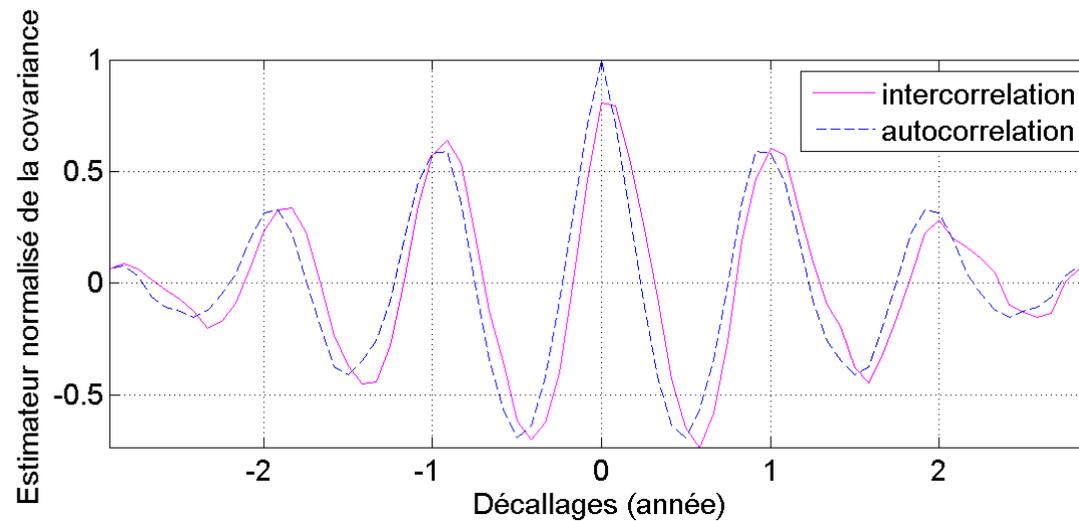
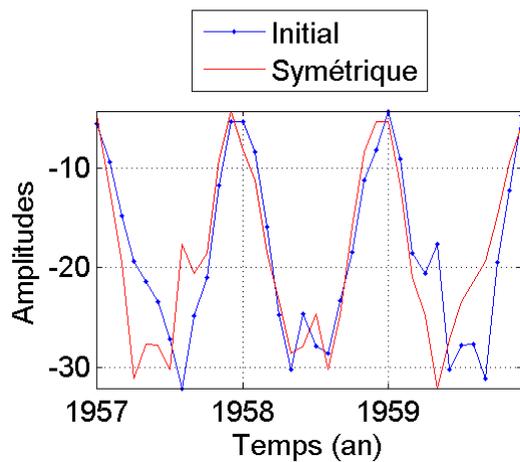
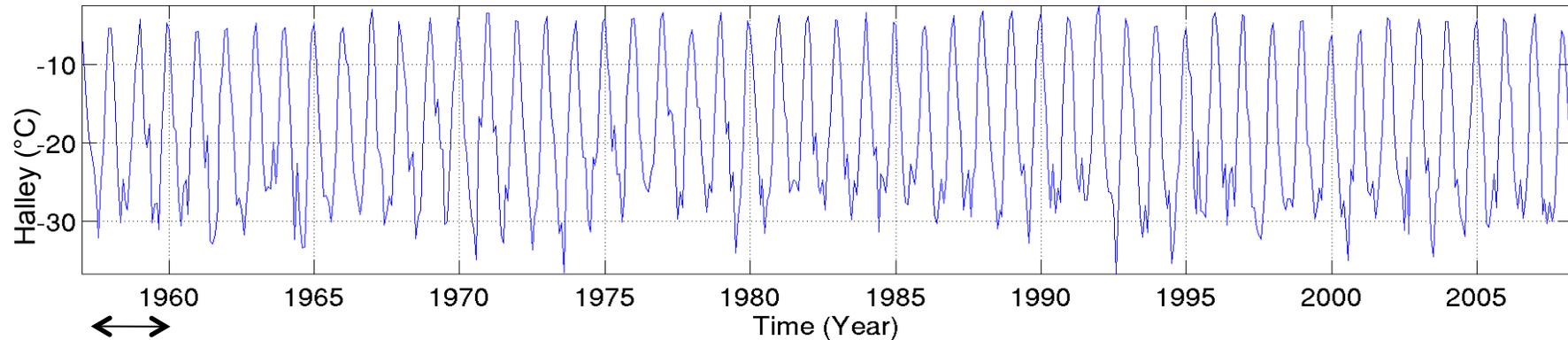


Multi-scale analysis of Antarctic surface temperature series by
Empirical Mode Decomposition, Sylvie Roques, Frédérique
Rémy et Guilhem Autret, JAOT



Matching Pursuit
Décompositions en
150 atomes
gaussiens du
signal de
température
Les effets de bords
sont atténués

Auto et inter-corrélations

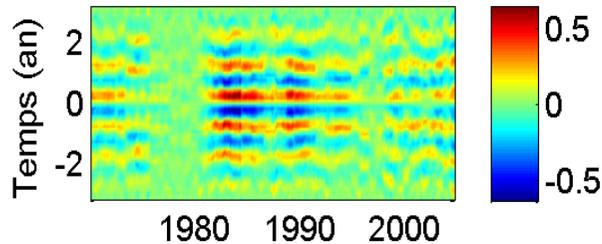


- Comparaisons locales

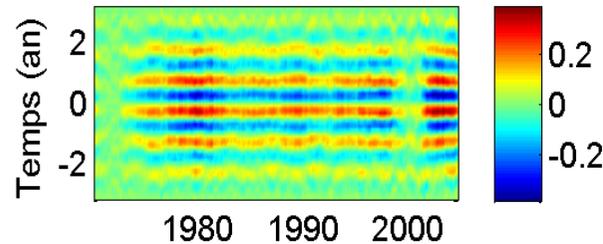
Décomposition Modale Empirique et analyse de données climatiques en Antarctique



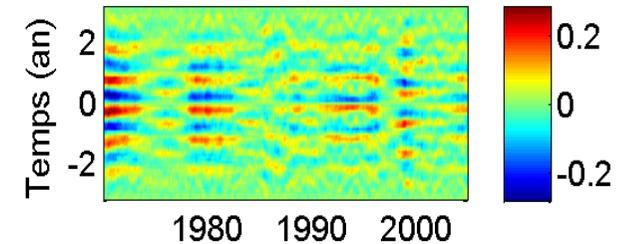
1-2 : FaradayVernadsky-Bellingshausen



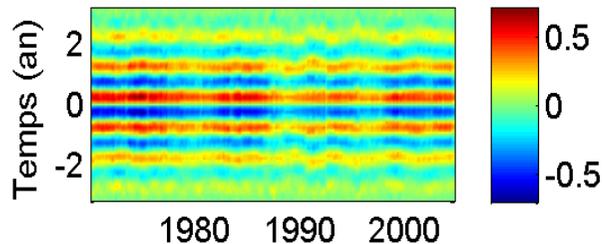
5-6 : Novolazarevskaya-Syowa



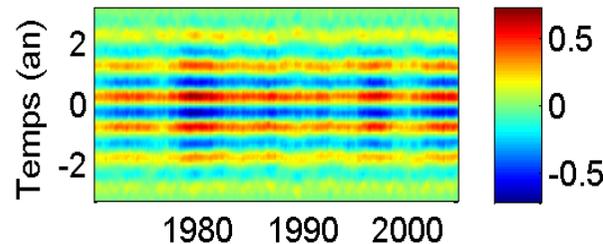
9-10 : Mirny-Casey



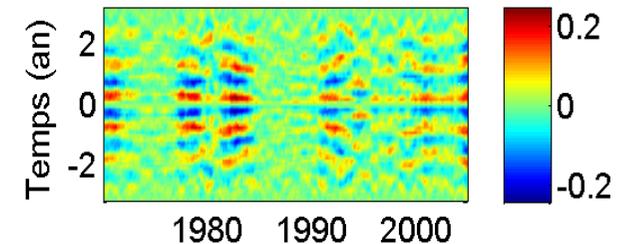
2-3 : Bellingshausen-Esperanza



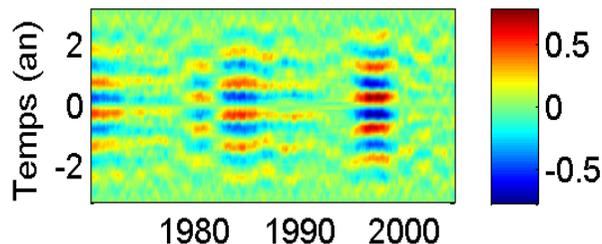
6-7 : Syowa-Mawson



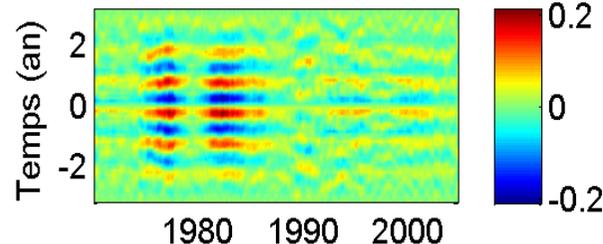
10-11 : Casey-DumontDUrville



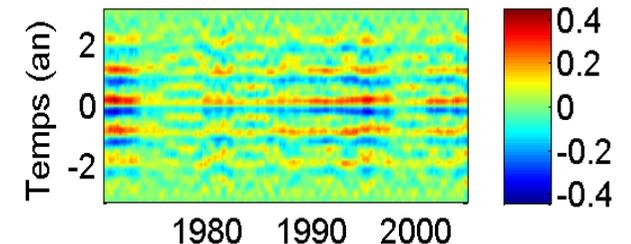
3-4 : Esperanza-Halley



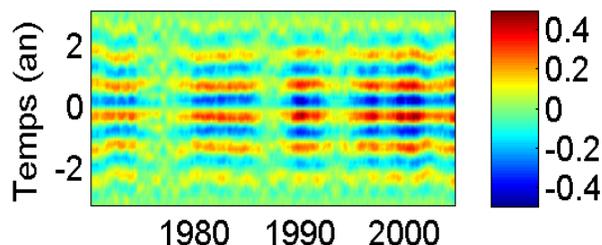
7-8 : Mawson-Davis



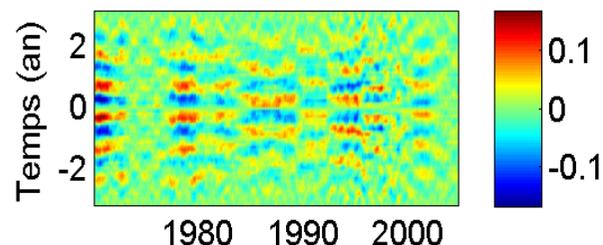
11-12 : DumontDUrville-ScottBase



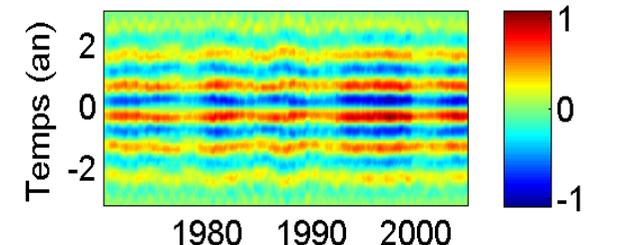
4-5 : Halley-Novolazarevskaya



8-9 : Davis-Mirny



12-1 : ScottBase-FaradayVernadsky



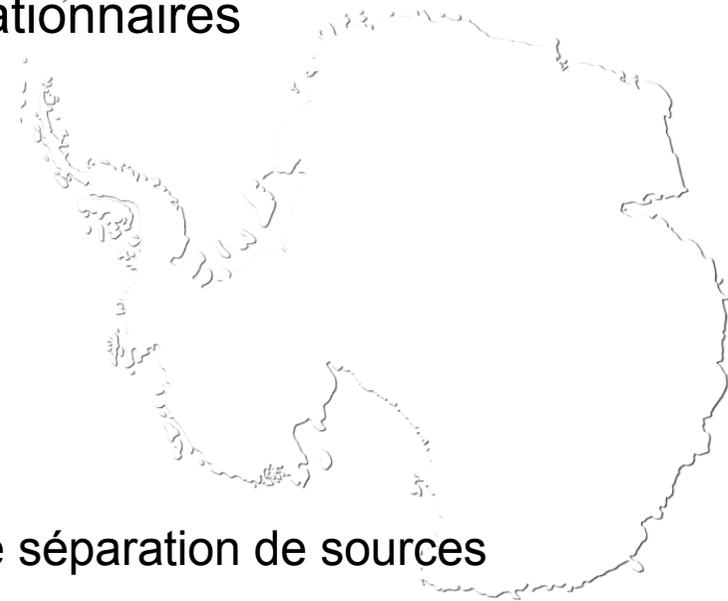
Temps (année)

Temps (année)

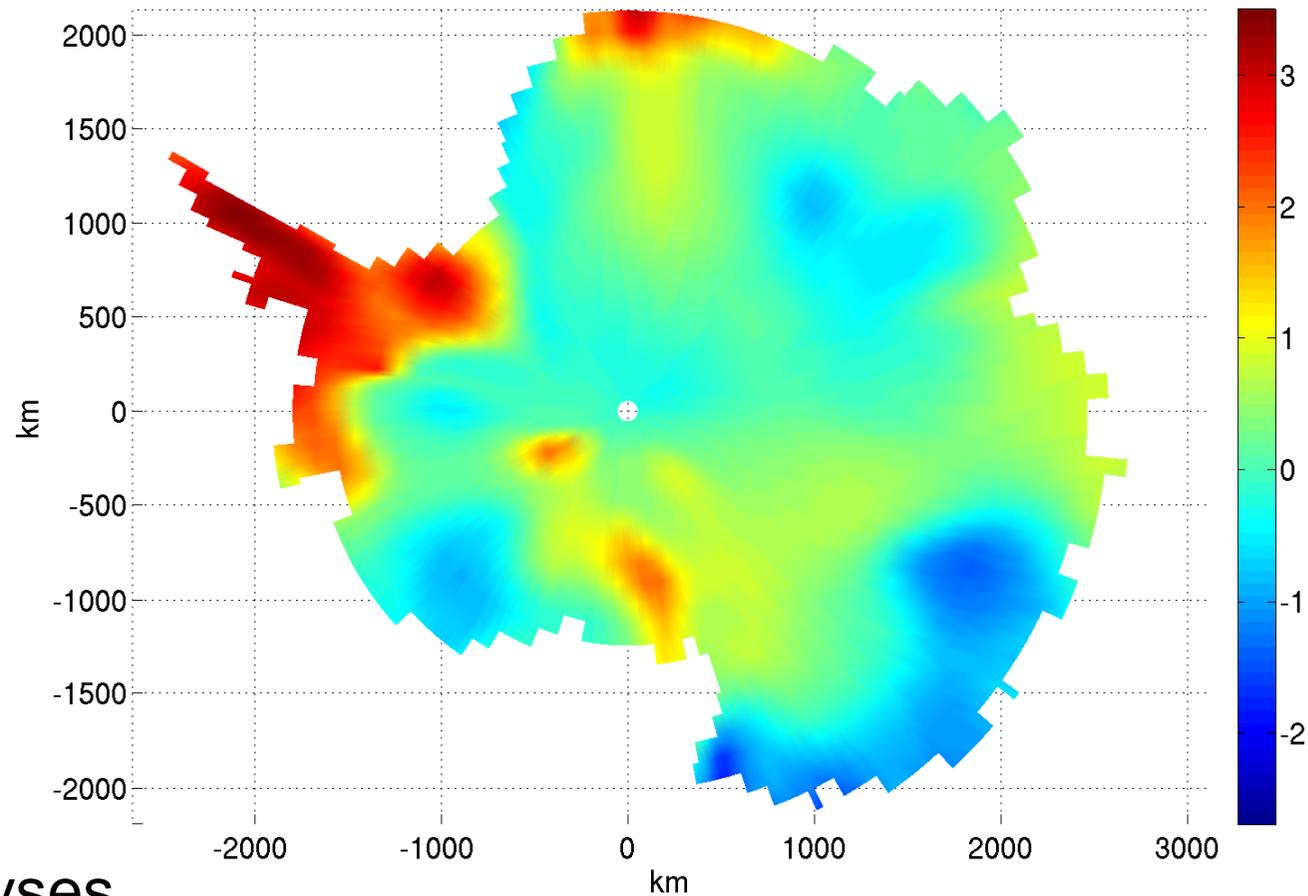
Temps (année)

CONCLUSION

- **Détection de l'onde sur le continent Antarctique**
- **Apport des méthodes locales (et si possible adaptative)**
Evolution temporelle de signaux non stationnaires
Modèle de propagation
Simulations
Tests statistiques
- **Mesure de la vitesse de rotation de l'onde circumpolaire Antarctique**
- **Perspectives**
Comparaison aux algorithmes classiques de séparation de sources
Généralisation aux indicateurs et leurs fréquences propres



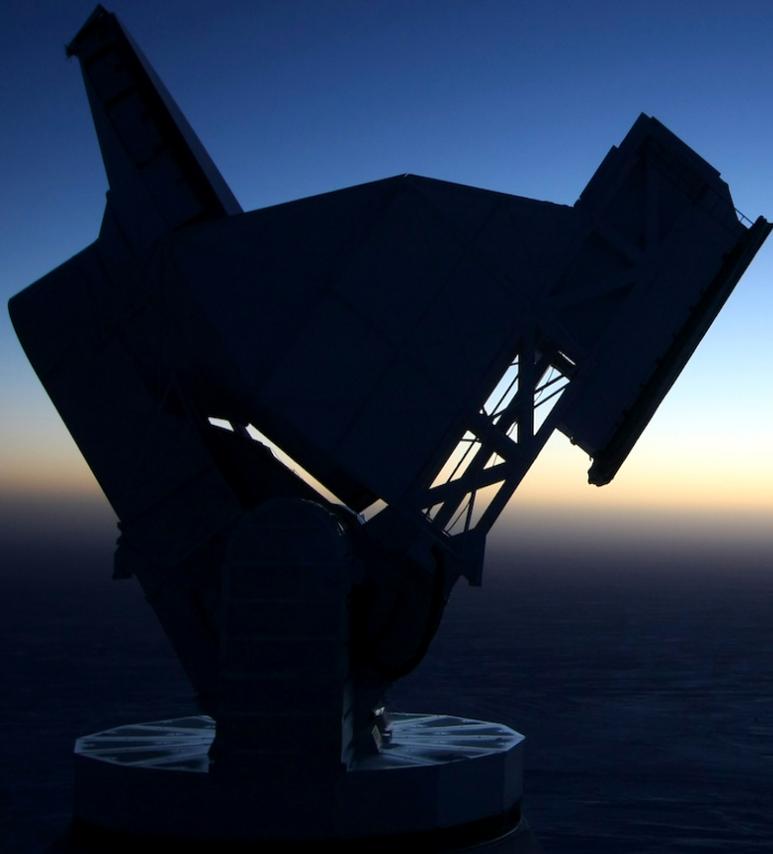
Tendances à long terme (°C/siècle)



Réanalyses



Université
de Toulouse



Fin

Guilhem AUTRET

ANNEXES



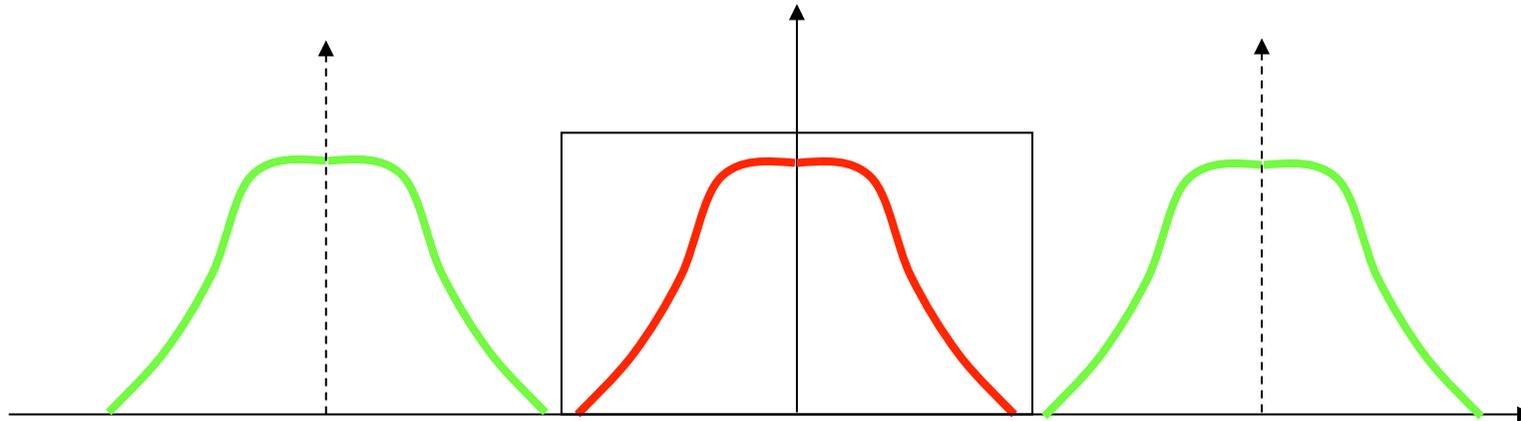
LES PLÉNIÈRES 2010 DU LCPC

Sciences et techniques
du Génie Civil

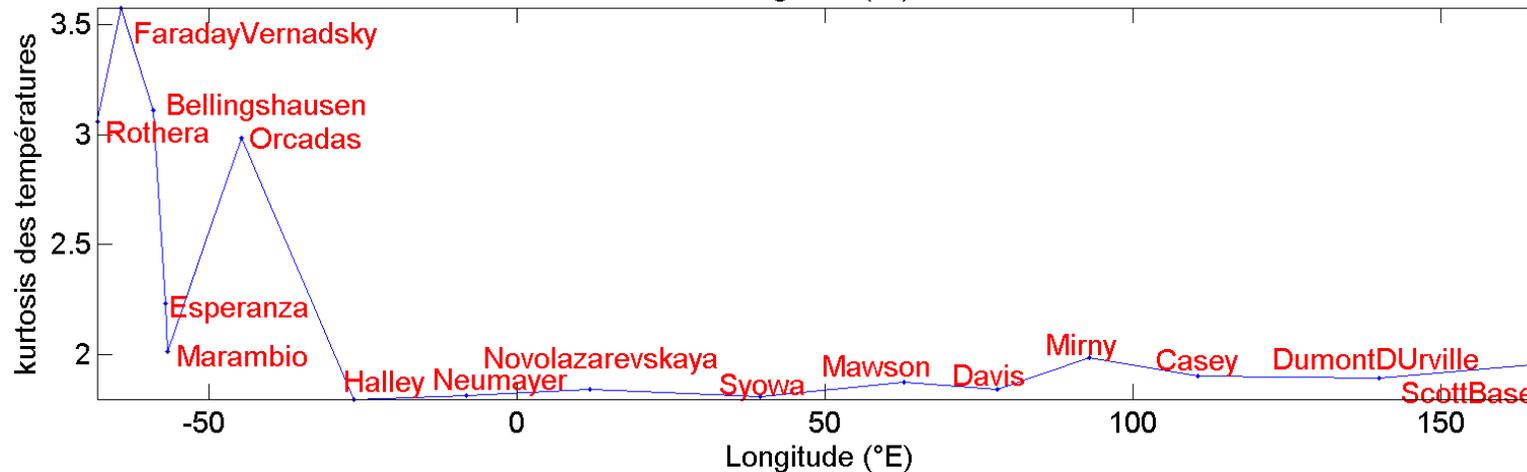
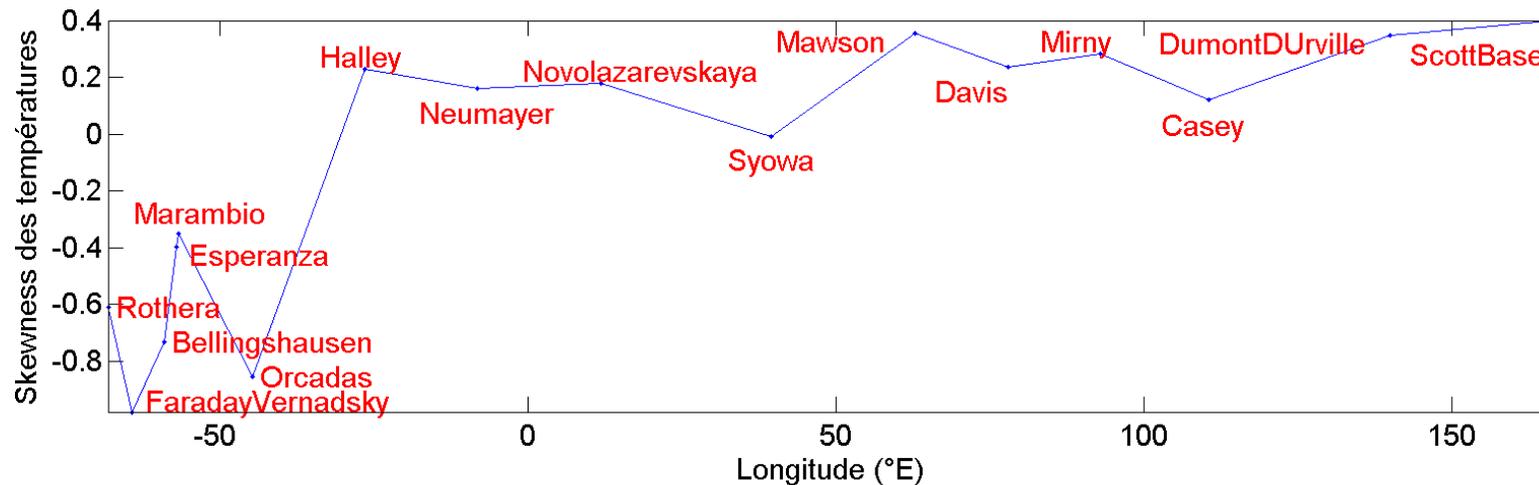
JOURNÉES ACOUSTIQUE

Wissembourg – 2 et 3 JUIN 2010

Signaux irréguliers



Statistiques



Données simulées

