Un modèle de climat sur architecture vectorielle en 2025

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Centre Régional Informatique et d'Applications Numériques de Normandie
Journées scientifiques des utilisateurs, 3 Juin 2025

Plan

- L’océan NEMO
- Portage sur *boreale*
- Simulations et premiers résultats scientifiques

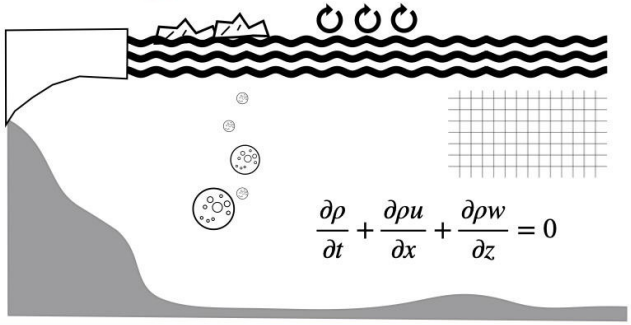
Expertise of NEMO System Team CNRS

Ocean- atmosphere interactions
Sebastien Masson
(co-project manager and CNRS consortium expert)

Ice Shelf - Ocean Interactions
Katherine Hutchinson (co-project manager)
Pierre Mathiot (co-chair developer's committee)

Sea Ice and SI3 model
Clément Rousset (NEMO officer)

SI3 OPA TOP



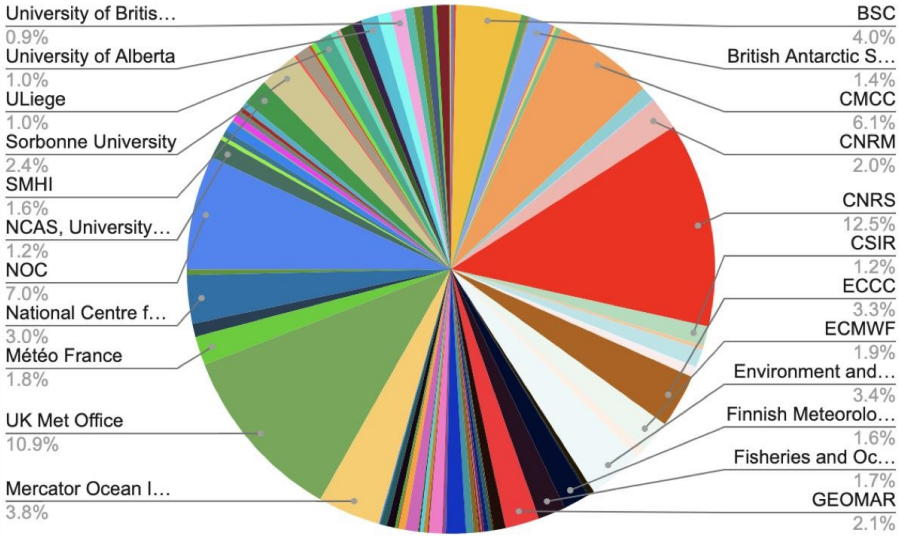
High performance computing
Eric Maisonnave

Ocean model kernel
Gurvan Madec (scientific leader)
Sibylle Techene

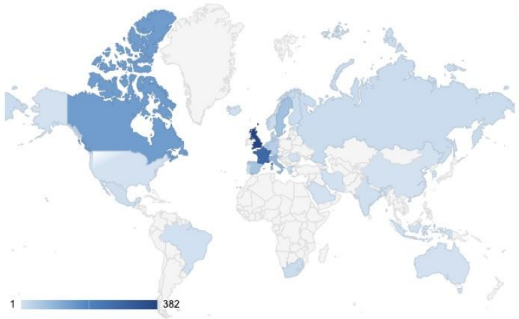
Coupling biogeochmistey-physics-climate
Christian Éthe

Biogeochemistry and PISCES
Renaud Person

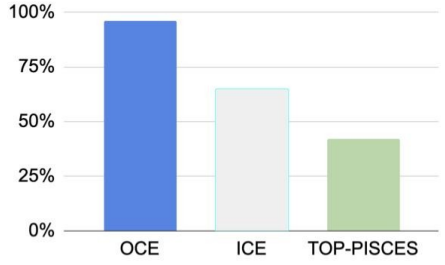
Qui utilise NEMO?



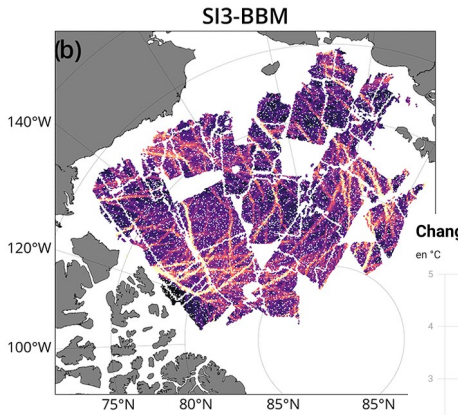
Dans quels pays?

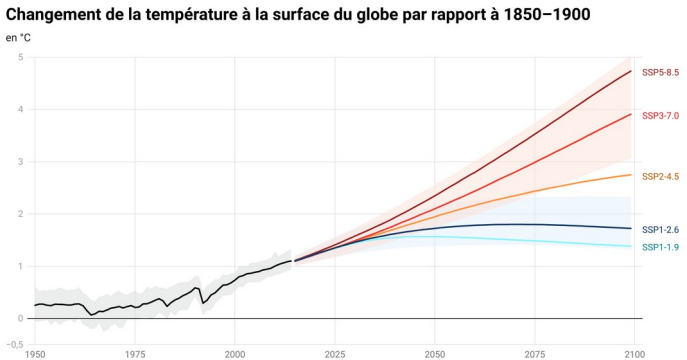


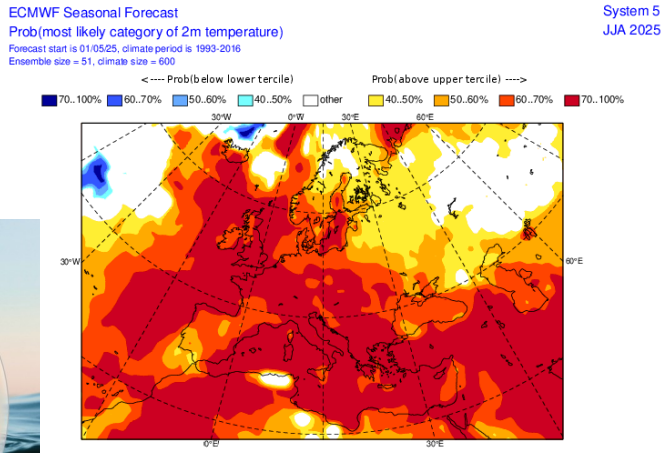
Quelle composante?



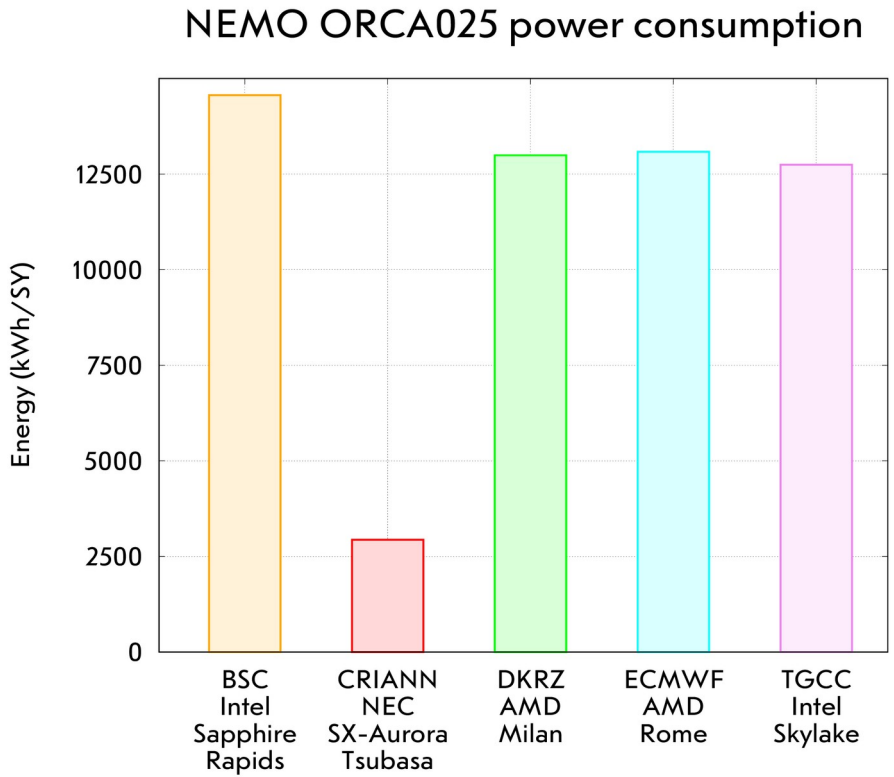
- recherche fondamentale en océanographie côtière et hauturière
- études des climats passés, présents et futurs
- océanographie opérationnelle
- prévision saisonnière et projections climatiques



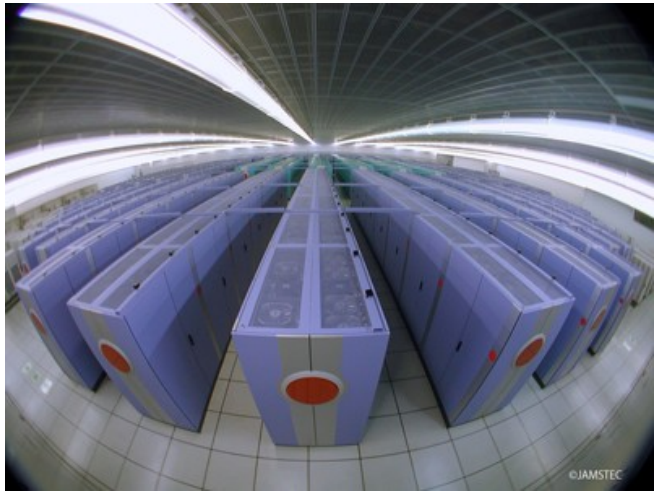




Pourquoi le CRIANN ?

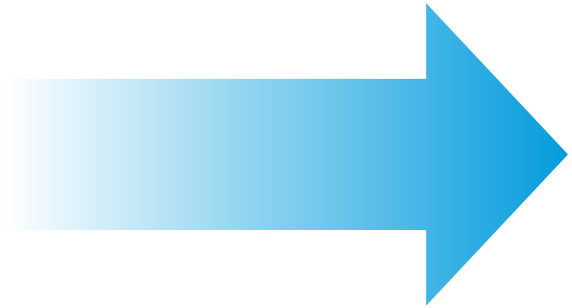


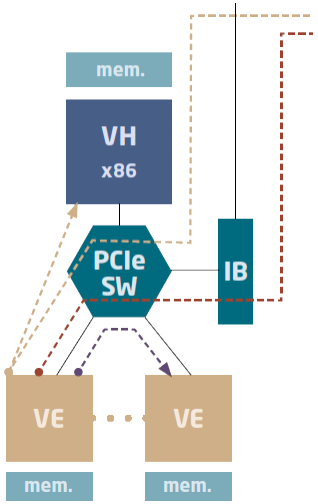
Portage



NEC SX 6

2003

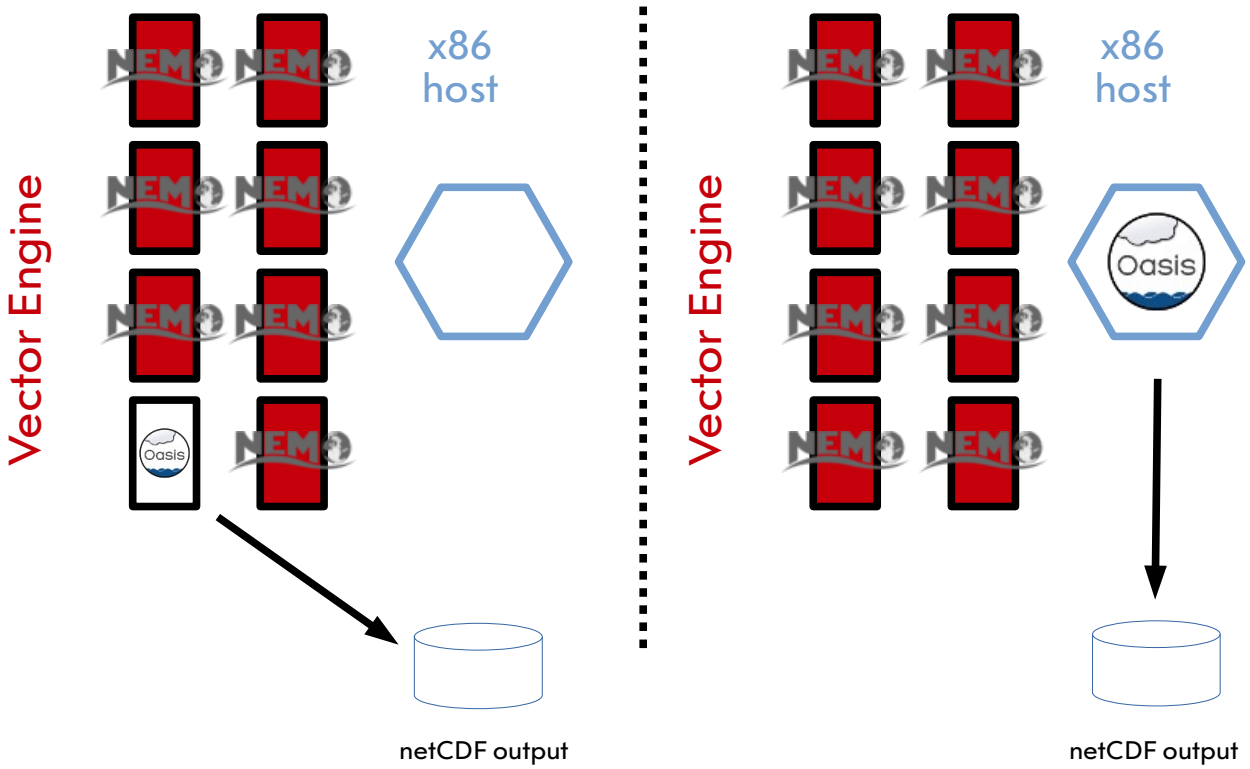




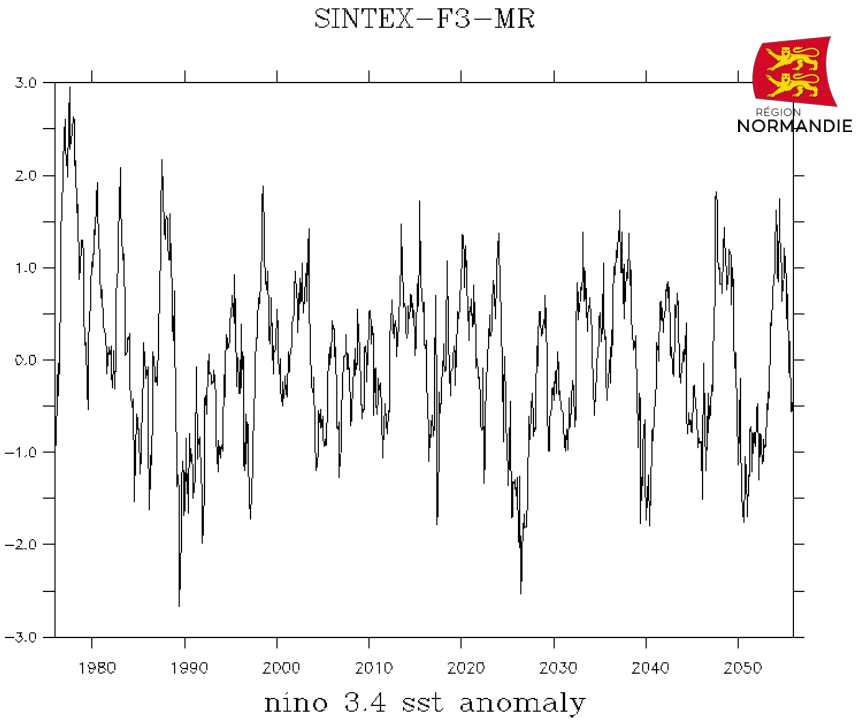
NEC SX-Aurora
TSUBASA

2022

Portage

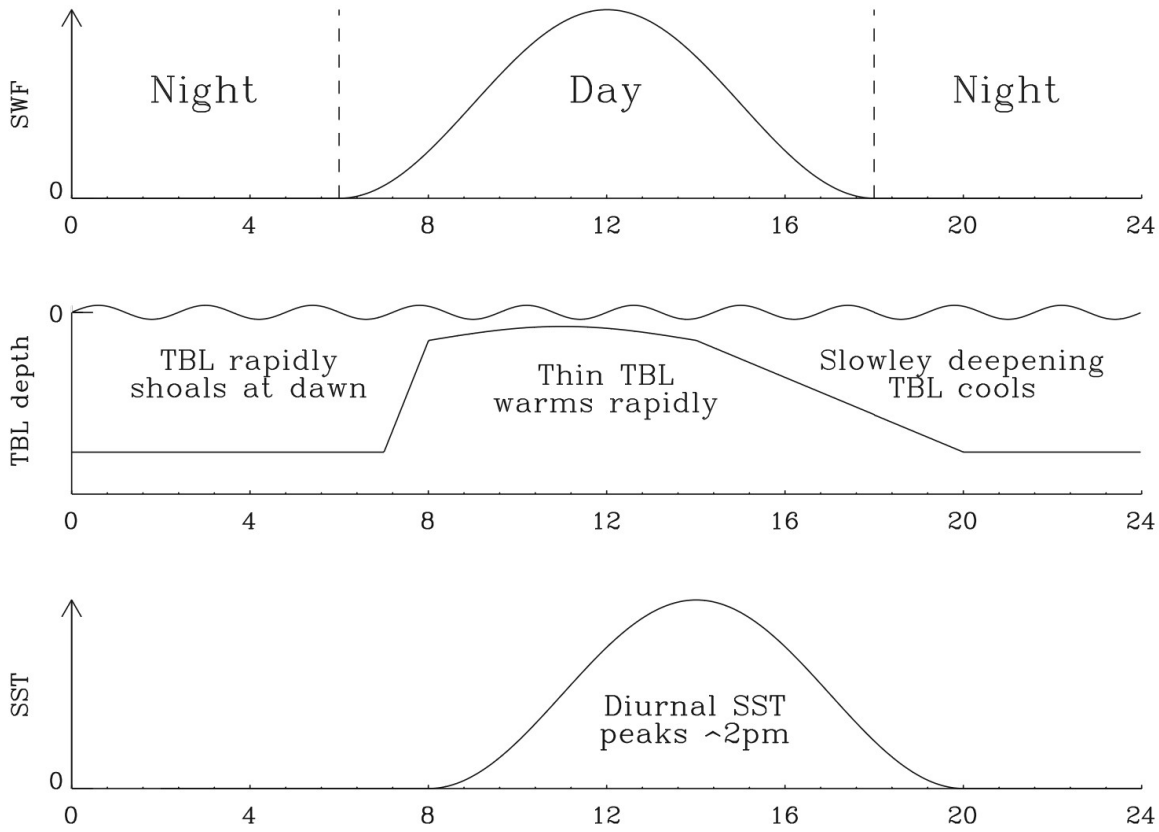

Vector Engine
NEMO
x86
host
Oasis
netCDF output
Vector Engine
NEMO
x86
host
Oasis
netCDF output

Simulations



80 ans simulés océan global + glace de mer + atmosphère

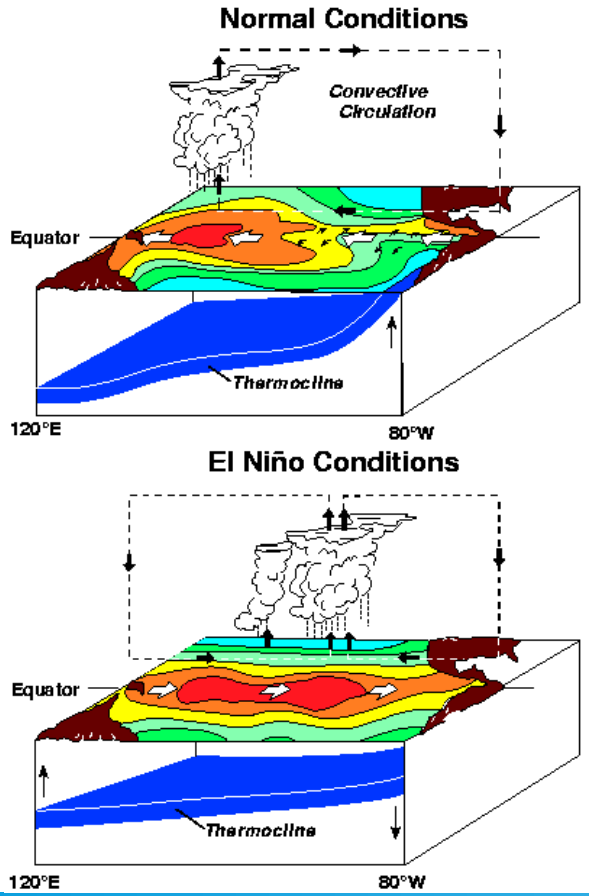
~ 5000 heures VPU

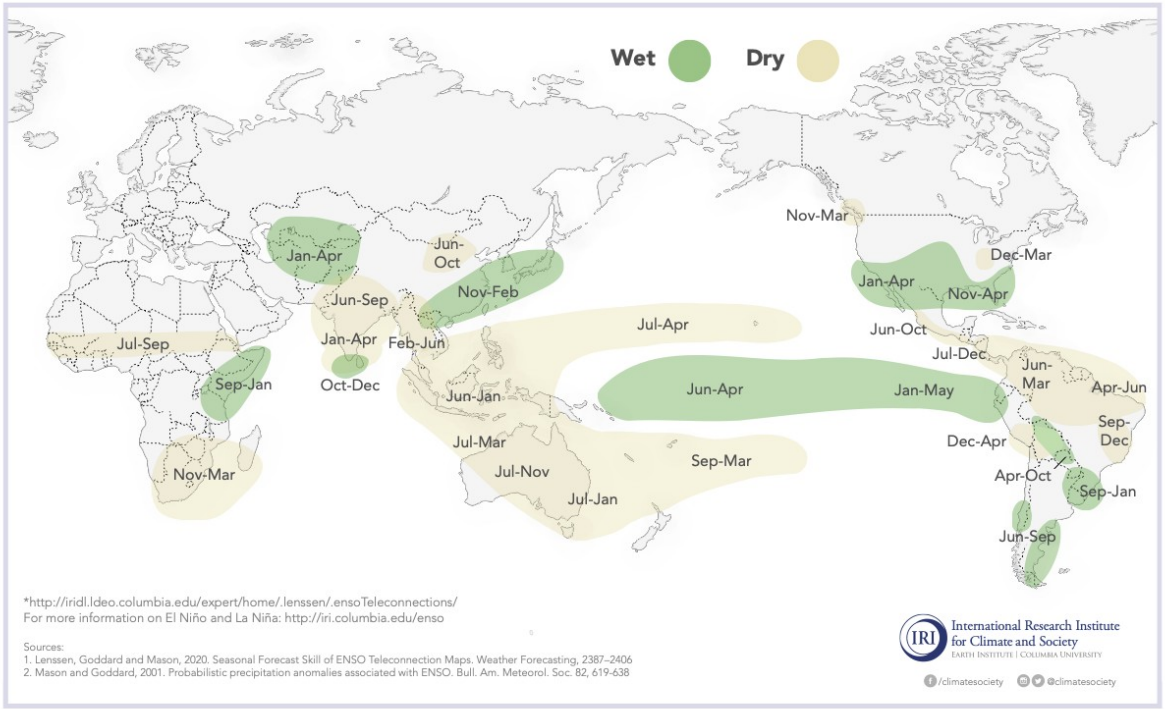


Réchauffement net et rétrécissement de la couche de mélange océanique

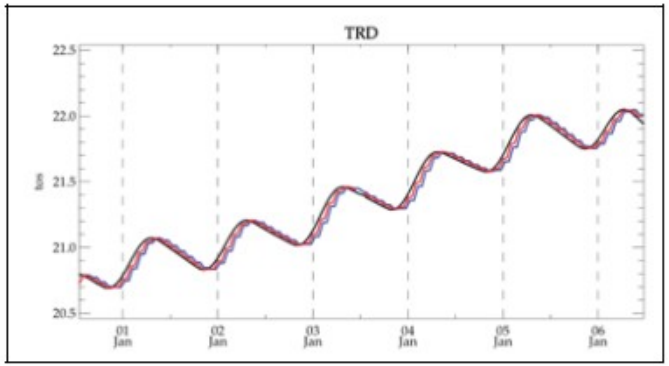
Cycle diurne océanique idéalisé, Bernie et al. (2007)

Interactions d'échelles temporelles en climat tropical
Contexte : très grande échelle temporelle

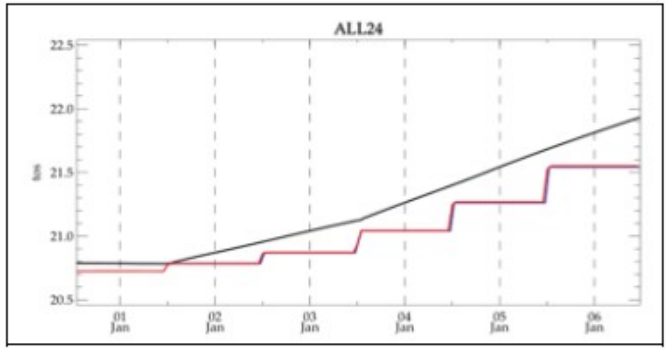




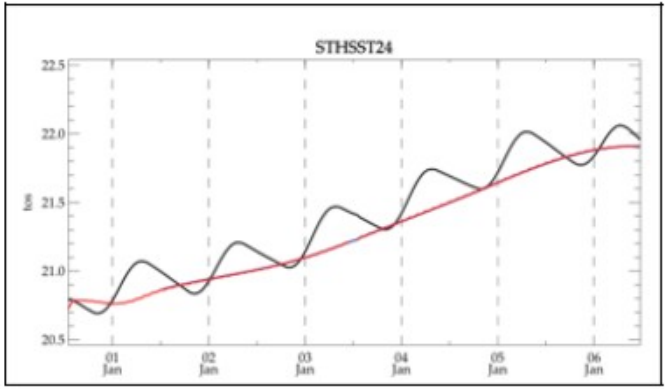
Représentation des phases chaudes et neutres d'ENSO
NOAA / PMEL / TAO



Couplage bi-horaire

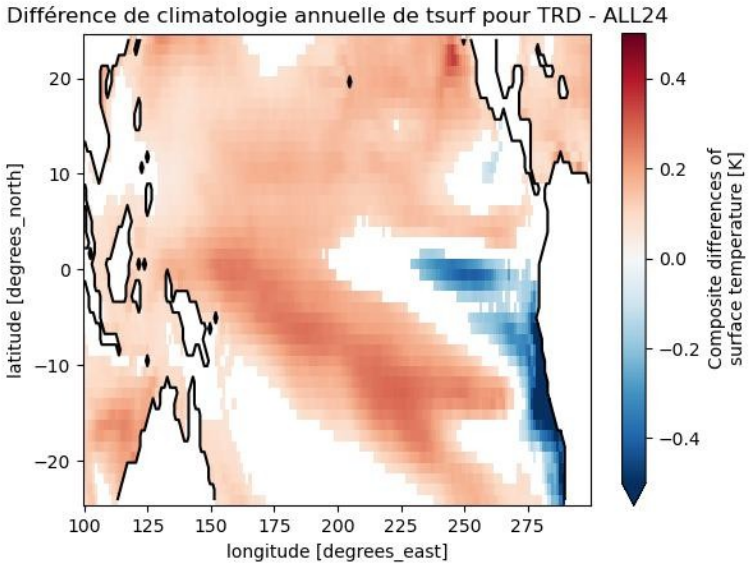


Couplage journalier

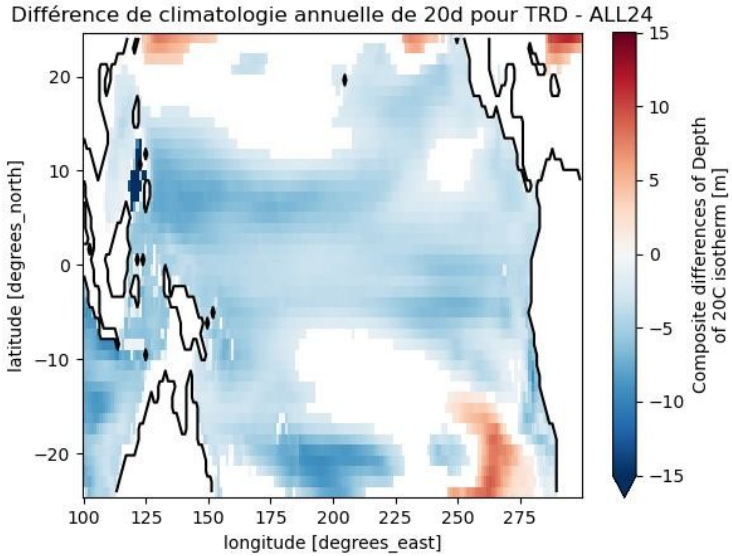


Couplage bi-horaire lissé

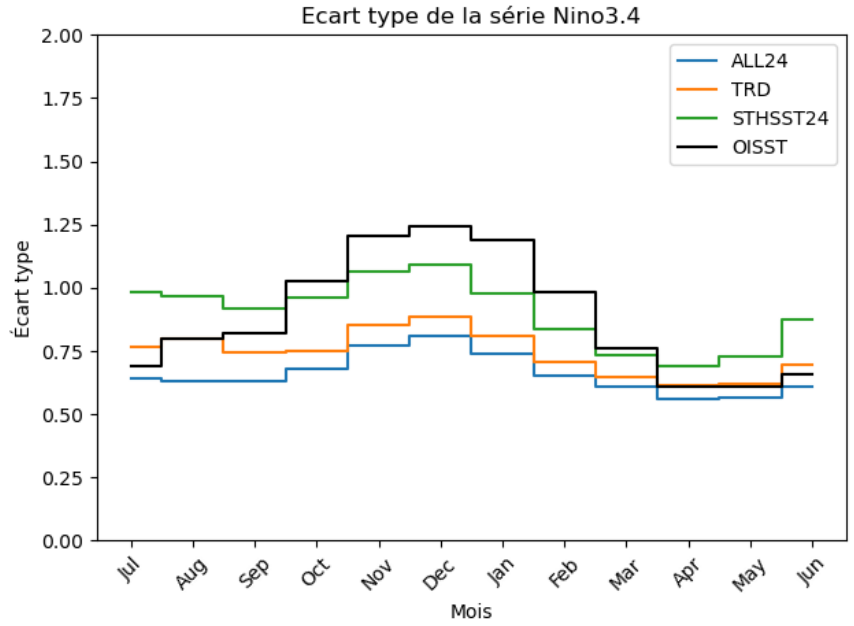
Interactions d’échelles temporelles en climat tropical
Effets de la fréquence de couplage sur l ‘état moyen



Les températures de surface se réchauffent



La thermocline s’approfondit



Séparation de l’effet dû au changement d’état moyen et de l’effet direct de la fréquence bi-horaire de couplage océan-atmosphère

Perspectives

PSyclone

AUSTRAL
SUPERCALCULATEUR POUR LA RECHERCHE EN NORMANDIE

RÉPUBLIQUE FRANÇAISE
RÉGION NORMANDIE
UNION EUROPÉENNE
CRIANN

? RISC-V

Merci !

Maisonnave E. & Masson S., 2025: Setting up the mid-resolution SINTEX-F3 coupled model, Technical Report, hal-05093724, Sorbonne Université, CNRS, France

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