OWA coupling for AROME OverSeas (Work in progress)

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LACy/Tropical Cyclones

- About LACy and LACy/Tropical Cyclones
- About AROME OverSeas
- OWA coupling using OASIS and SURFEX at LACy
- Future plans

About LACy and LACy/Tropical Cyclones

- The "Laboratoire de l'Atmosphère et des Cyclones" (LACy) is a joined lab between La Réunion University, Centre National de Recherche Scientifique (CNRS) and Météo-France.
- It is hosted by La Réunion University (Tropo and Strato teams) and Météo-France (Tropical Cyclones team=5 MF, 1.5 CNRS + PostDocs, PhD, Master).

About LACy and LACy/Tropical Cyclones

A large activity of LACy is dedicated to observation in the tropics :

- 3 obs. sites, including Maido observatory (more than 50 instruments, 4 LIDARs),
- Member of several International Observation Network (NDACC, SHADOZ, GAW...)
- Many experimental campaigns (ReNovRisk, Bio-Maido...)

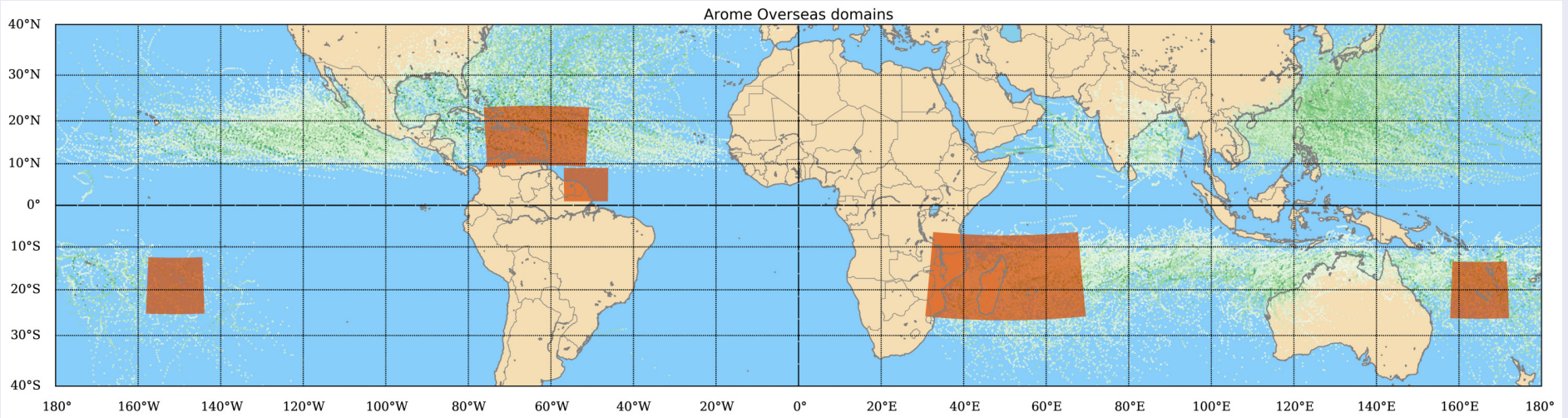
About LACy and LACy/Tropical Cyclones

LACy also works with numerical modeling of the atmosphere.
LACy/CT focusses on tropical cyclone modeling :

- Improve the understanding of TC processes (rapid intensification, interaction with terrain, organisation of convection, internal waves) : Very high resolution runs with Méso-NH, coupled with CROCO and WW3,
- Improve TC mesoscale forecast (NWP research and development for the SWIO RSMC of La Reunion, very close collaboration with CNRM, GMAP and GMME) : AROME-IO
  - Data Assimilation (AROME 3DVAR) : recently, assimilation of SAR wind products, reanalysis of last TC season with/without obs of the ReNovRisk campaign (extra RS, GNSS),
  - Ensemble for AROME Overseas,
  - **OWA coupling for AROME Overseas**.

About AROME OverSeas (G. Faure, O. Nuissier, GMAP)

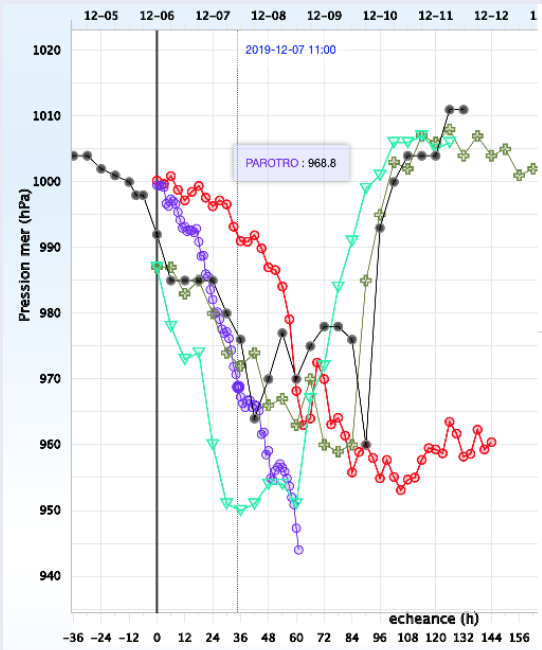
6 domains over French tropical overseas territories

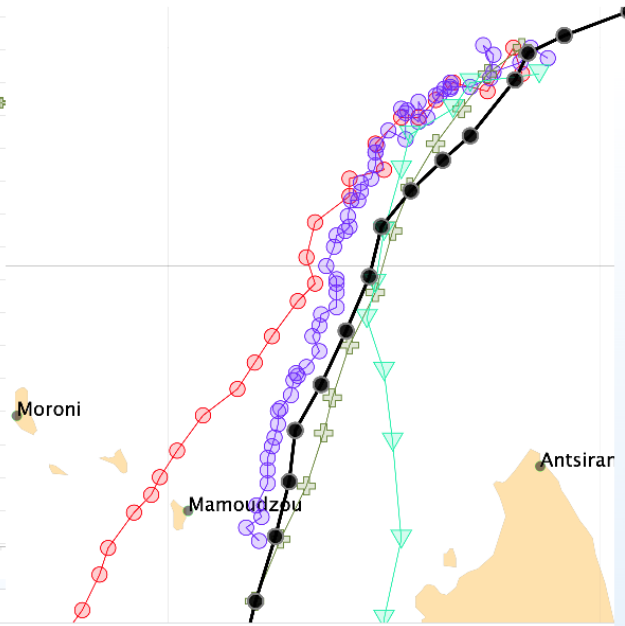


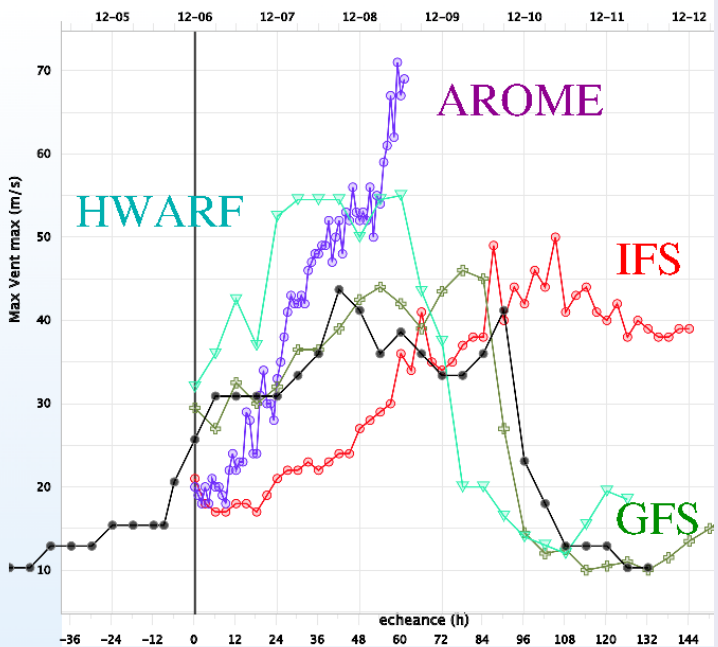
- in operation from 2016,
- dynamical adaptation from HIGHRES IFS, +42h (+78 if needed), 4 times a day,
- 2.5 km hor. resolution, 90 levels, NH with PC cheap,
- **Ocean Mixed Layer Parametrisation, IC from Mercator.**

About AROME OverSeas

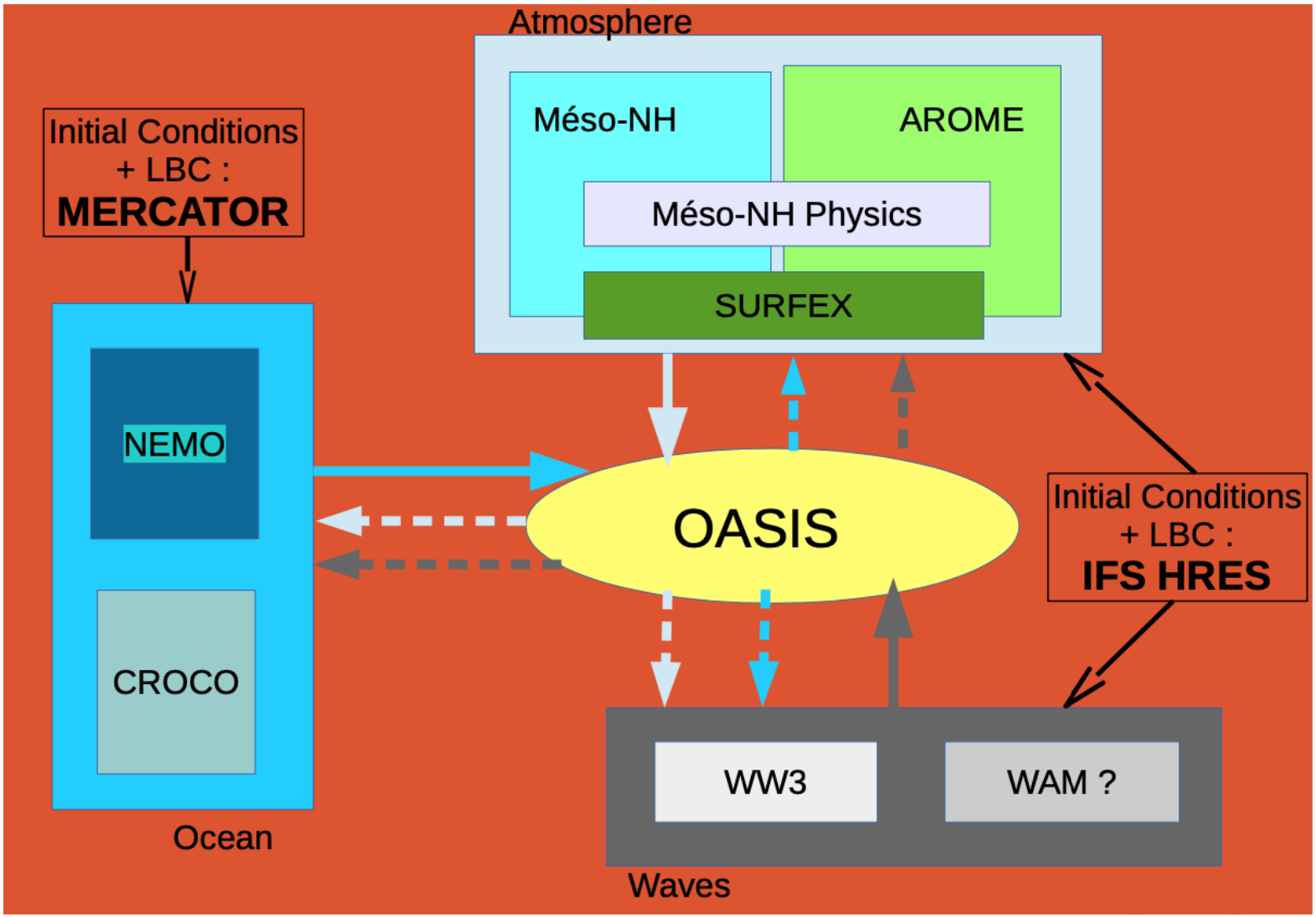
TC Belna, December 2019





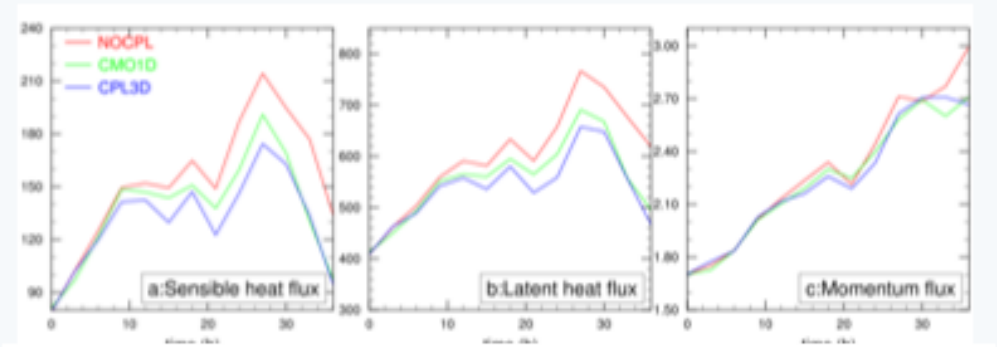


OWA coupling using OASIS and SURFEX at LACy



OWA coupling using OASIS and SURFEX at LACy

Example: MésoNH-NEMO (Bielli et al, 2020)



3 different simulations of Cyclone Bejisa (2014) : no coupling, 1D couling, 3D coupling

Surface fluxes

SST change between 01/01/2014 06UTC and 02/02/2014 12UTC

OWA coupling using OASIS and SURFEX at LACy

AROME-WW3-NEMO

- Vortex exp : AROME (CY43t2, coupling with Ocean already in SURFEX.V8) - NEMO (3.6), adapted from HYMEX exp (C. Lebeaupin, GMME),
- Coupling with WW3 in progress (coupling with SURFEX from a MesoNH pack, hopefully in SURFEX.V9)
- Mercator Ocean Analysis (Copernicus) available only on Wed. : mini AROME-NEMO suite to cycle the Ocean from Wed. to any initial date, OBC from MERCATOR forecasts (NEMO forced by IFS wind).

Plans

Laetitia's PhD

- Characterized the impact of OA coupling versus 1D OMC parametrisation versus constant SST for a large number of TC in the SWIO basin.
- Analyse and validate results from the online wave model,
- Test the new WASP (M-N Bouin, GMME/IFREMER) surface flux parametrisation (coupled with the wave state) in case of TC wind strength,
- Evaluate the coupling of the OWA system with LIMA microphysics through a simplified prognostic scheme for marine aerosol emission (Ovadnevaite et al, 2014) implemented in SURFEX and coupled with waves.

Plans

- "Home" phasing for CY46, 47, 48, hopefully enter an official cycle at some stage (including an optional link with OASIS and NEMO in gmkpack)
- Visit of Hilde Haakenstad and Øyvind Breivik this summer to test the configuration with polar lows,
- Evolution of AROME Overseas operational configuration ?