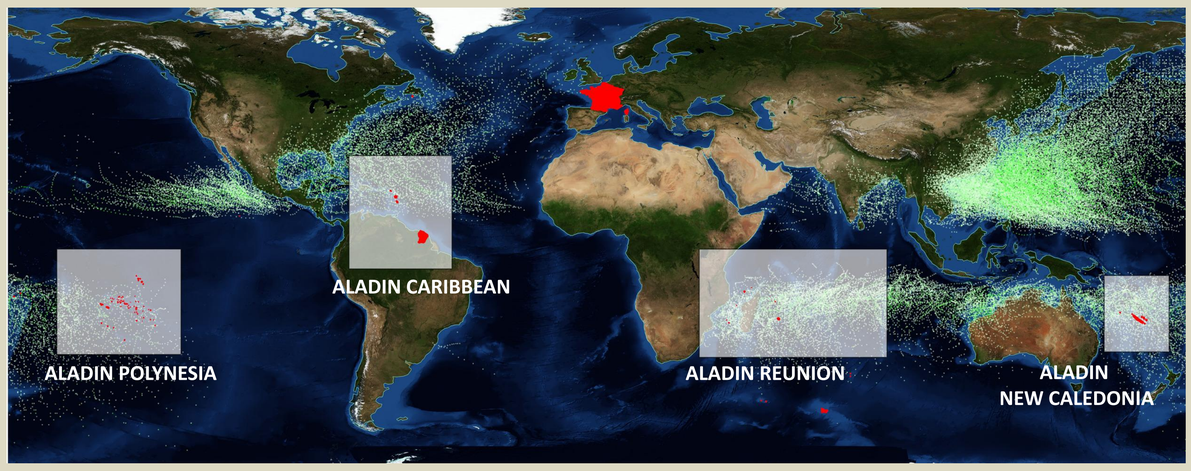
# A new operational convection-permitting NWP system for tropical cyclone forecasting in the SW Indian Ocean (P50A)

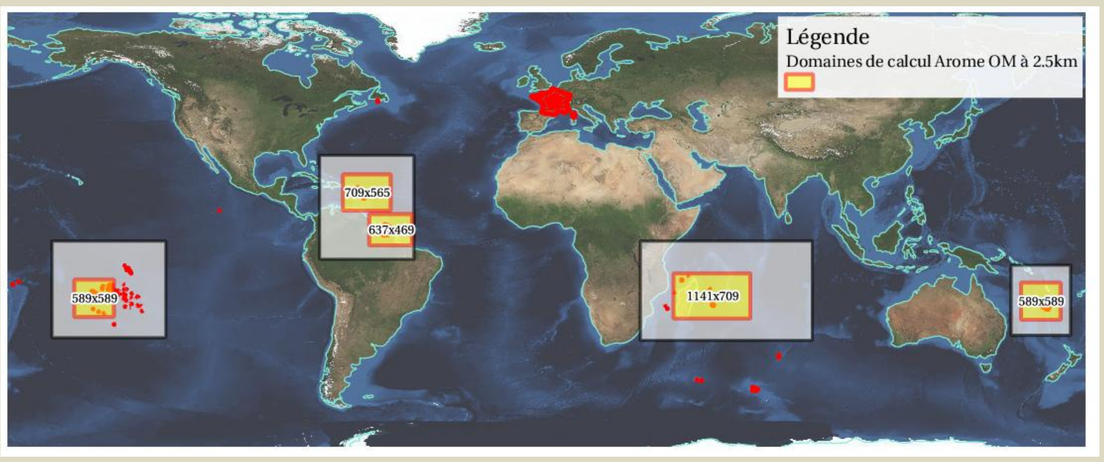
**O. Bousquet , D. Mékiès, S. Bielli , M. D. Leroux, D. Barbary, C. Barthe, R. Lee-Ah-Siem**
**LACy, UMR 8106, St Denis de La Réunion, France**

**G. Faure, T. Montmerle, P. Brousseau, M. Plu**
**CNRM-GAME,UMR 3570, Toulouse, France**

Since 2006, the French Weather Service, Météo-France, operates 4 regional models (8 km horizontal resolution) to provide operational forecast products in French Overseas territories (Fig. 1). All models are based on the ALADIN model. They are all equipped with a 3D-Var data assimilation scheme and use pseudo-observations (e.g., "wind bogus" WG) to improve tropical cyclone initialization.

**Figure 1: The 4 Overseas ALADIN domains overlaying a global tropical cyclone climatology map**

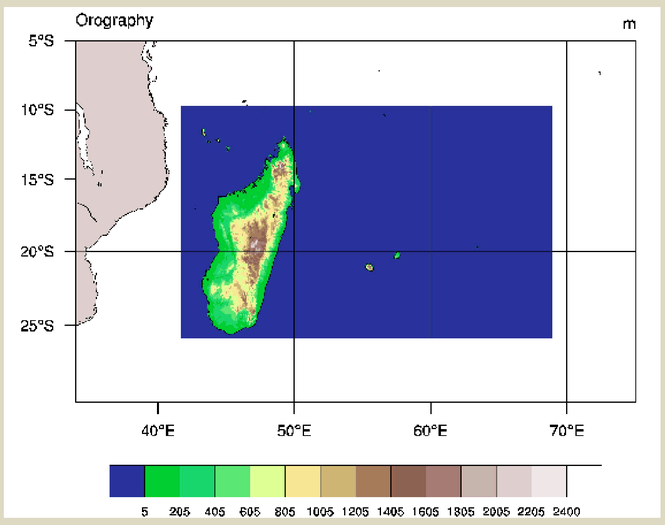



Within three years the ALADIN Overseas models will be replaced with (six) non-hydrostatic, high-resolution (2.5 km), NWP systems based upon the AROME model used in mainland France (Fig. 2). Overseas AROME models will benefit from enhanced physical parameterizations and will take their initial conditions from either the ECMWF deterministic model, or from a limited area 3D-Var data assimilation cycle allowing to assimilate data from available local weather radars.

**Figure 2: The six Overseas AROME domains**

The sub-division of Météo-France in La Réunion Island has been formally designated as Regional Specialized Meteorological Centre **(RSMC)** for the provision of forecasts and warnings of hurricanes in the south-west Indian Ocean (SWIO). The new, convection-permitting, numerical weather prediction (NWP) system **"Arome Indian Ocean"** (Fig. 3) will provide high resolution forecasts of tropical disturbances developing in the area of responsability of Météo-France.




This model will cover a domain of approximately **3000 km x 1500 km** over **90 vertical levels** at the horizontal **resolution of 2.5 km** and will be equipped with a **3D-VAR** mesoscale assimilation scheme allowing for the assimilation of high space-time resolution observations such as radar (reflectivity and radial winds), GPS and new satellite data, available within the model-covered area.

**Figure 3: Domain of AROME "Indian-Ocean"**

# Cyclone Béjisa (04S)

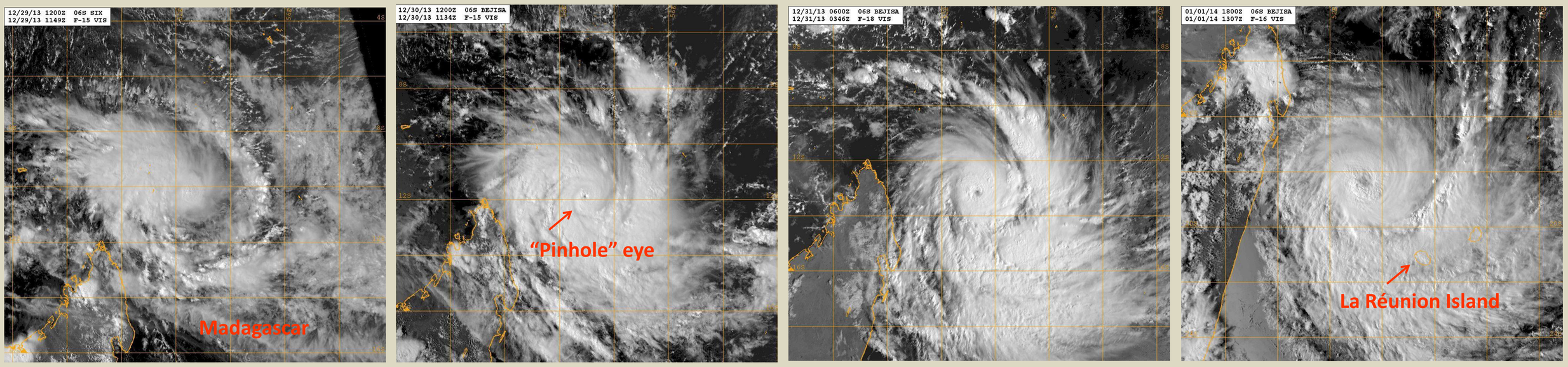



Figure 4: Time series of satellite observations of cyclone Béjisa (04S) from 12 UTC, 29/12/2013 to 18 UTC, 01/01/2014

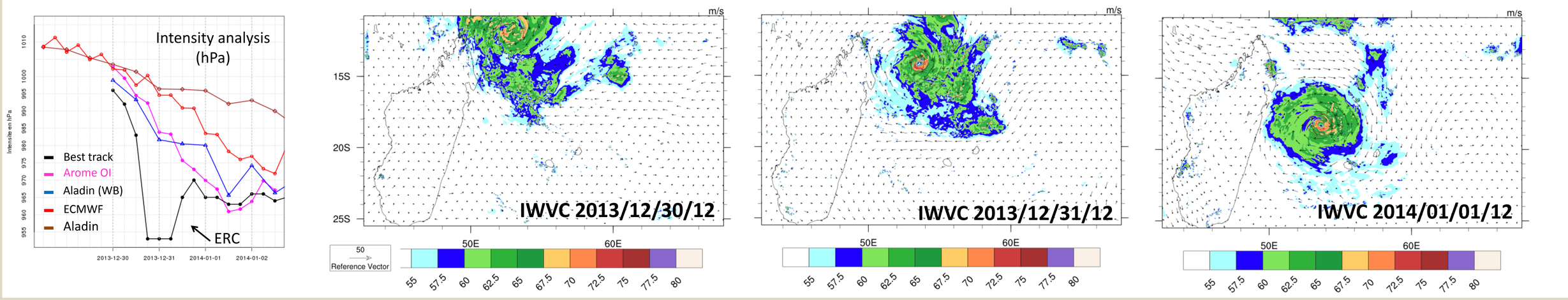



Figure 5: (Left) Intensity (pressure) analysis from various models including Arome Indian Ocean (purple) from 30 Dec 2013 to 02 Jan 2014
Other panels show analyzed integrated water VAPOR content (iwvc, kg/m2)) and 850 hPa wind field (m/s) valid at 12 UTC on 30/12/13, 31/12/13 and 01/01/14

*31st Conference on Hurricanes and Tropical Meteorology - San Diego – 2014*
*contact: olivier.bousquet@meteo.fr*

**This study was conducted as part of the research project *PRECYP*, funded by the MAIF Foundation**