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

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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 3-DVar data assimilation scheme and use pseudo-observations (e.g., “wind bogus” WG) to improve tropical cyclone initialization.

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 3-DVar data assimilation cycle allowing to assimilate data from available local weather radars.

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 3-DVAR 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.

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.

Cyclone Béjisa (04S)

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

Figure 2: The six Overseas AROME domains

Figure 3: Domain of AROME “Indian-Ocean”

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) and 850 hPa wind field valid at 12 UTC on 30/12/13, 31/12/13 and 01/01/14.