



The SPICy project aims at tackling the issue of cyclonic coastal and inland floods forecast in the French Overseas. Under the responsibility of RSMC La Réunion, the southwest Indian Ocean (SWIO) has a similar TC activity to that of the North Atlantic [1]. La Réunion island is exposed to cyclone-induced hazards such as devastating winds, torrential rain, marine and river inundations. It is a small (60 km wide) and steep (3 km high) volcanic island with a complex orography. Therefore, the potential coastal impact is tightly related to the track and intensity evolution of tropical cyclones (TCs) transiting nearby in a context of rather great forecast uncertainty (mean position errors are about 80 and 150 km at 24 and 48 h lead times).

METHODOLOGY

A three-step method is used to build ensemble scenarios for TC track and intensity around the RSMC official forecast and then generate associated probabilities.



MODEL EVALUATION

Overall, these hybrid probabilistic forecasts ("clim-eps", green line in the right plot) are more skillfull than:

- The original EPS forecasts (dashed blue line)
- The EPS forecasts realigned on the RSMC official forecast (blue line)
- The 40 climatology-built forecasts (red line)



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Probabilistic Forecasts of TC-induced Hazards in Reunion Island

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FIG. 3: 40 climatology-built probabilistic forecasts around the official RSMC forecast (dashed black line). Each forecast provides the evolution of TC position (left) and maximum wind in kt (right) up to 72-h leadtime.







FIG. 5: The 19 CLIM-EPS weighted scenarios for TC position (left) and maximum wind in kt (right) up to 72 h.

PROBABILISTIC PRODUCTS OF TC-INDUCED HAZARDS AT LOCAL SCALE

The main hazards under surveillance are: strong winds, storm surge and waves, coastal flooding, torrential rain and river floodings. Risk managers and public agencies need both a reliable forecast and an estimation of its uncertainty (e.g., probability that the intensity will exceed relevant thresholds on 10 sub-regions of La Réunion).





(a)

FIG. 6: (a) Probability of wind exceeding 64 kt on La Réunion on 2014/01/02 from 06 to 12 UTC (TC Bejisa) and (b) the evolution of wind gusts predicted at a specific location (Le Port town) from 2014/01/02 00 UTC up to 72 h lead time with the 50%- (blue) and 80%- (grey) probability envelopes.

CONCLUSIONS AND PERSPECTIVES

- plications such as waves or storm surge modelling
- \rightarrow Added value for decision-making processes



RSMC Regional Specialized Meteorological Center SWIO Southwest Indian Ocean

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- tion, Mon. Wea. Rev., 121, 2030–2045.
- Wea. Rev., 123, 2791–2801.
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 \rightarrow A method to generate TC track and intensity ensemble scenarios with probabilities

 \rightarrow Mesoscale modeling is used to downscale the scenarios and generate ensemble wind and pressure fields to evaluate the wind impact and associated uncertainty and for further ap-

 \rightarrow Needs computing time optimization to match operationnal constraints

 \rightarrow Needs finer horizontal resolution for more accuracy in expected winds at local scale (2km)

ACRONYMS

References

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