

PISSARO

Forecasting extreme events in the southwest Indian Ocean on a monthly scale

Cyclone hazard anticipation product for inhabited areas of the southwest Indian Ocean

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Introduction

« Raw » S2S TC tracks forecast

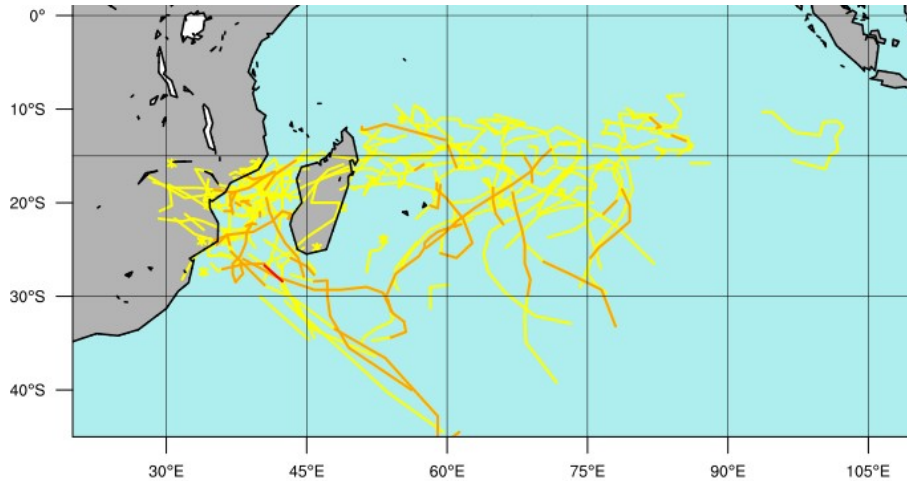


Figure. Set of potential trajectories (forecast 2 weeks in advance) for the week of 18 January 2021 during which cyclone ELOISE was observed. In orange, systems that have reached the tropical cyclone stage in the forecast. Data : ECMWF Source: DIROI/EC team.

Already existing product

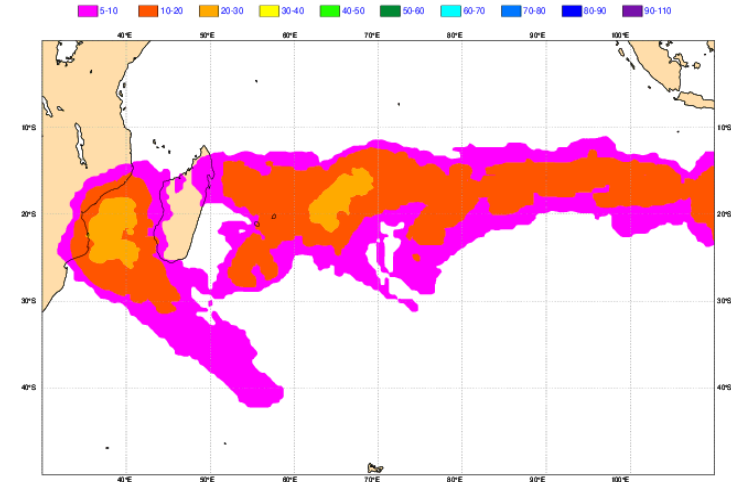


Figure. Proba strike product, 2-week forecast of the probability of a storm or tropical cyclone passing within a 300 km radius for the week of 18-25 January. Source: ECMWF.

ELOISE

January 2021
Tropical cyclone

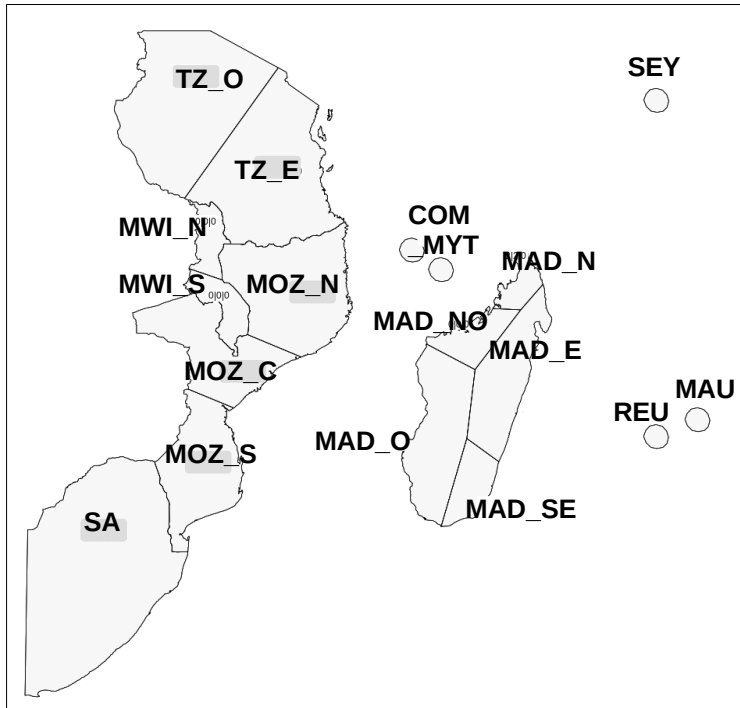


How to adapt the product for PIROI?

The product

Cyclone hazard anticipation product for inhabited areas
of the southwest Indian Ocean

**Produit d'Anticipation de l'aléa Cyclonique pour les Territoires habités
du Sud-Ouest de l'Océan Indien (PACT-SOOI)**



Colour levels express an increasing degree of reliability of the cyclone signal

Niveaux de couleur expriment un degré de fiabilité croissant du signal cyclonique

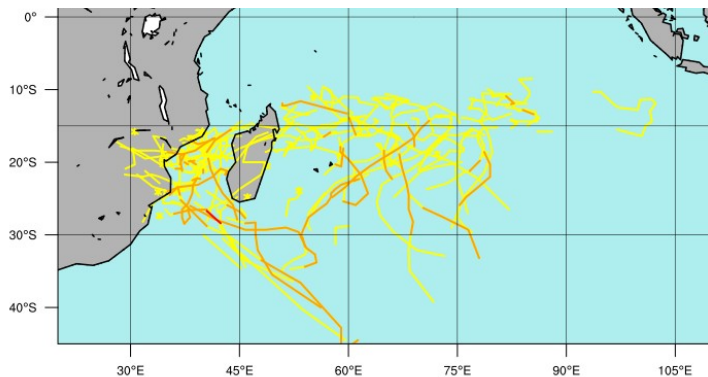
Time ranges:

Week 1 (W1) = D+7 to D+13

Week 2 (W2) = D+14 to D+20

Week 3 (W3) = D+21 to D+27

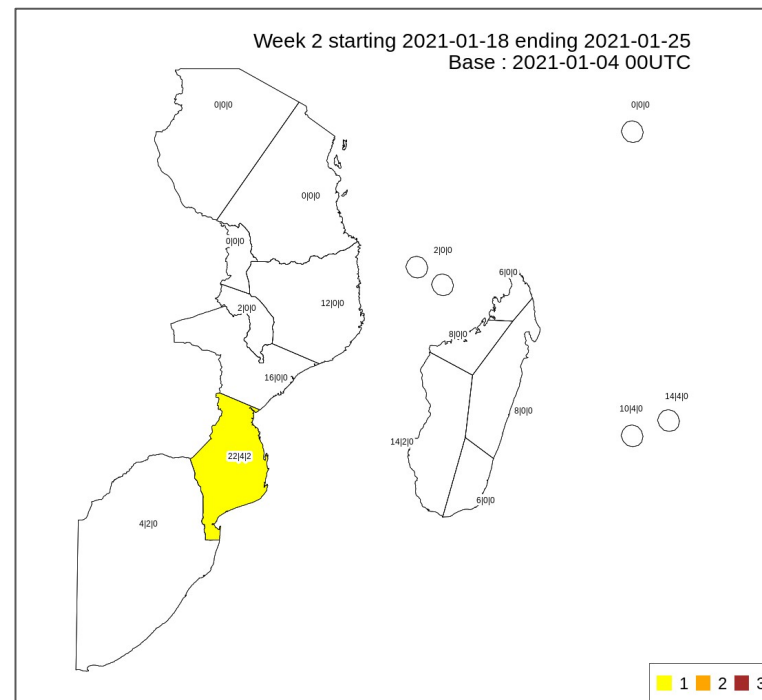
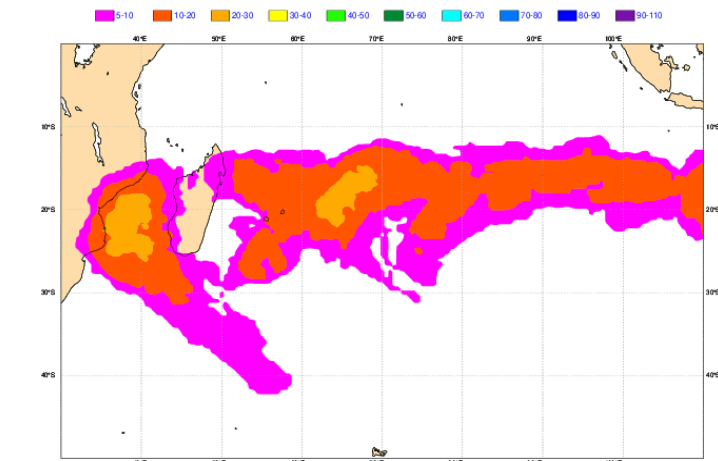
Example of the product



New product
developed within
the framework of
PISSARO
(experimental)

**Cyclone hazard
anticipation
product for
inhabited areas
of the southwest
Indian Ocean**

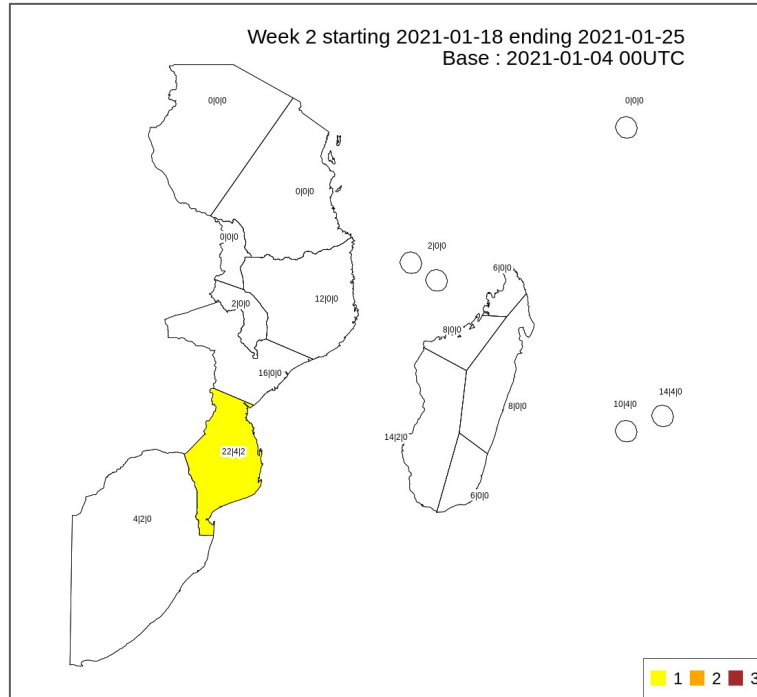
**Put into
production by
F. Bonnardot**



Example of the product

New product
developed within
the framework of
PISSARO
(experimental)

**Cyclone hazard
anticipation
product for
inhabited areas
of the southwest
Indian Ocean**



How to interpret the PACT-SOOI?

If one (or more) zone is coloured, there is a signal of a potential occurrence of one (or more) tropical storm or tropical cyclone on this zone, in a radius of 300 km and for the specific week. The level (1 to 3) indicates the increasing degree of reliability of the prediction.

Definition of the levels

They are defined by thresholds on the probability of max winds (associated with values of storm or cyclone stage) for each zone and adapted according to the forecast timeframe.

Probability of max wind for each zone: **$P = (P_{MAX34} + P_{MAX48}) / 2$**
(sensitivity tests were made on the type of probability: P90, P75, PMAX)

Thresholds:

	WEEK1	WEEK2	WEEK3
Lev. 0	< 10 %	< 10 %	< 5 %
Lev. 1	10 – 25 %	10 – 15 %	5 – 15 %
Lev. 2	25 – 45 %	15 – 25 %	15 – 20 %
Lev. 3	≥ 45 %	≥ 25 %	≥ 20 % (?)

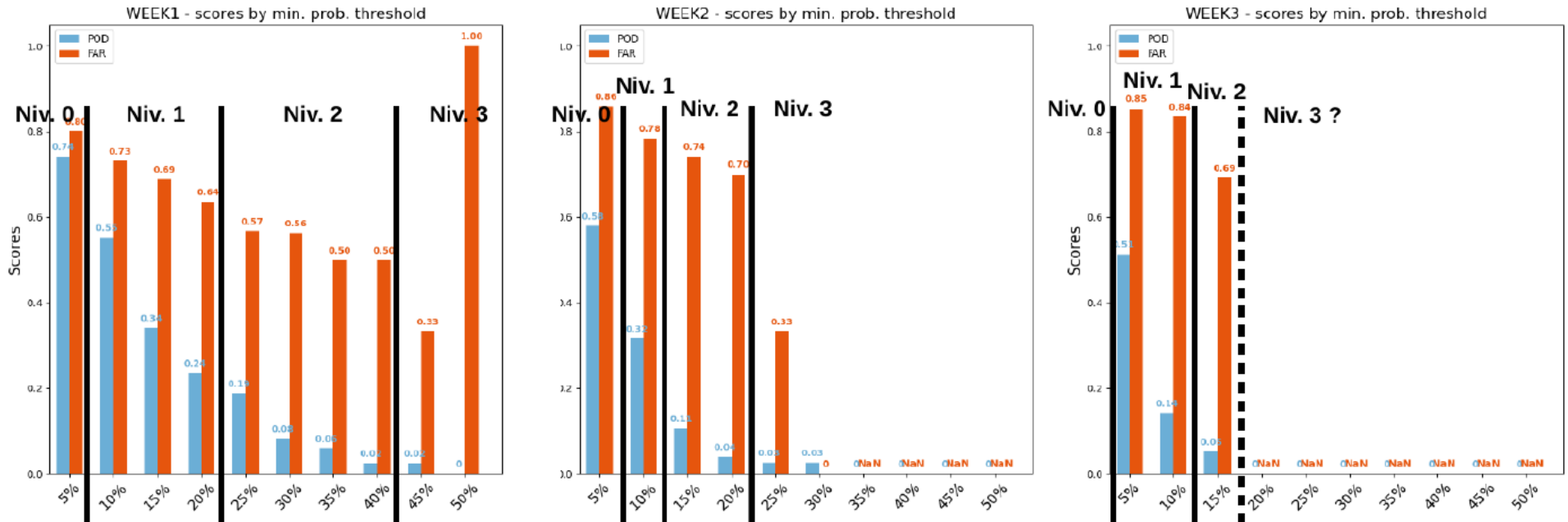
Calibration of the levels

Comparison between the forecast (from Dec. 2017 to Apr. 2021, 85 runs by week of timerange) and the « observations » (RSMC best-tracks, including 43 TS or TC)

Scores:

$$\text{POD} = (\text{hit_TC} / (\text{missed} + \text{hit_TC})) / \text{FAR} = (\text{false_alarm} / (\text{hit_TC} + \text{false_alarm}))$$

Uncertainty = missed + false_alarm



Calibration of the levels

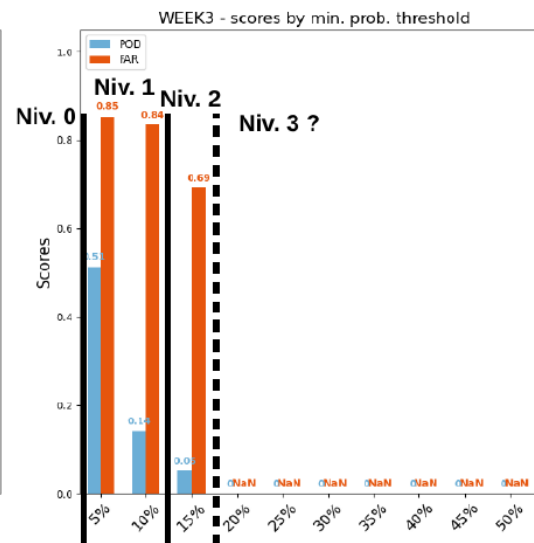
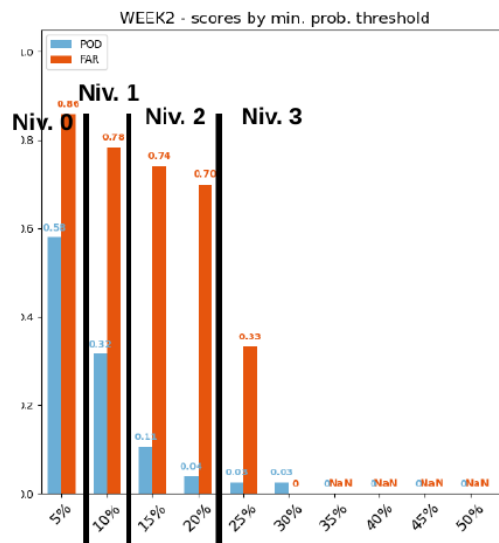
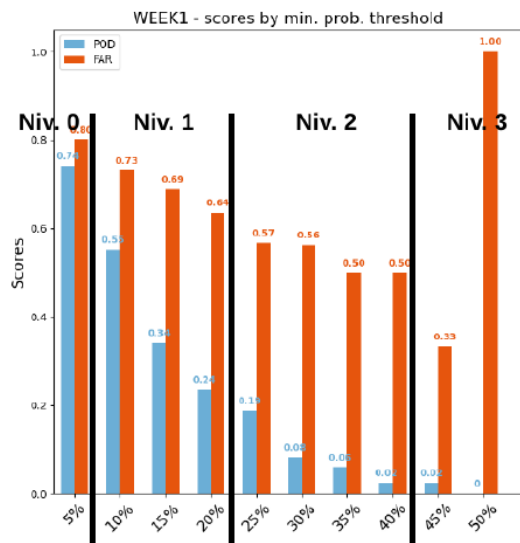
Application of the following criteria on the data between December 2017 and April 2021:

Pre-requisite: uncertainty < 10 %

CRITERIA

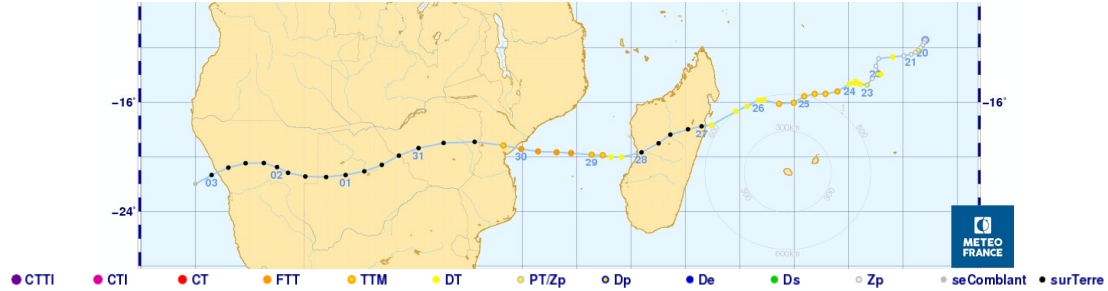
Thresholds:
 $(MAX34+MAX48)/2=0$

Lev. 0 W1 : POD > 50 % ; W2 : POD > 30 % ; W3 : POD > 20 % FAR < 2,5*POD	
Lev. 1 W1 : POD > 15 % ; W2 : POD > 10 % ; W3 : POD > 5 % FAR < 1 – POD	
Lev. 2 No criteria on POD Max. FAR of 33 %	

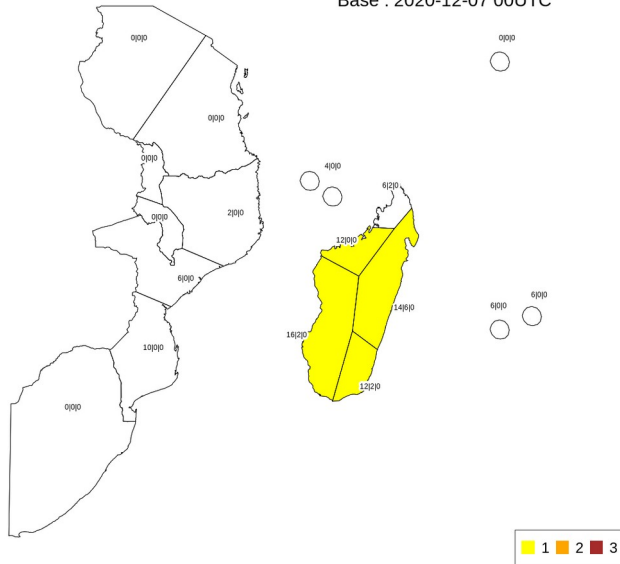


Examples (1)

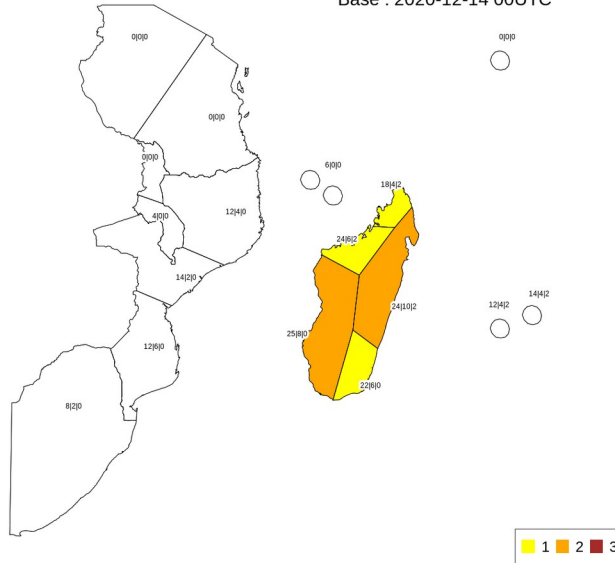
Illustration on case study: CHALANE



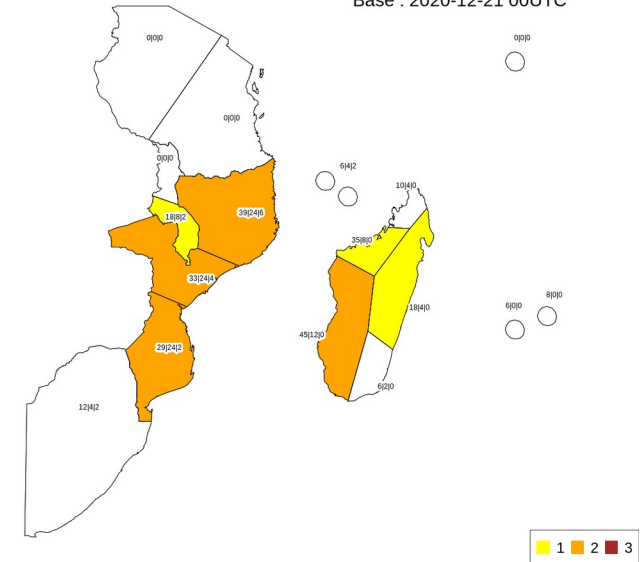
Week 3 starting 2020-12-28 ending 2021-01-04
Base : 2020-12-07 00UTC



Week 2 starting 2020-12-28 ending 2021-01-04
Base : 2020-12-14 00UTC

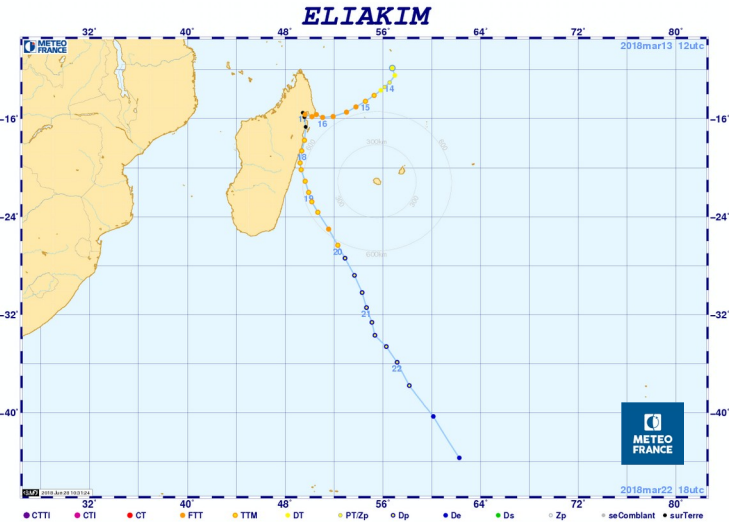
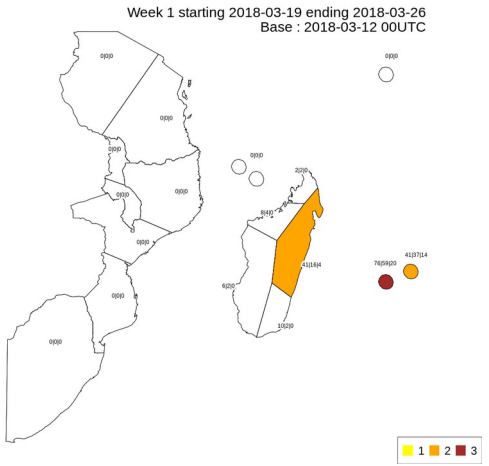
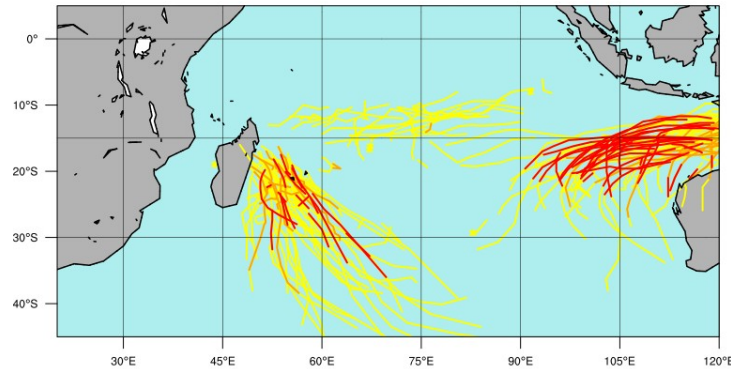
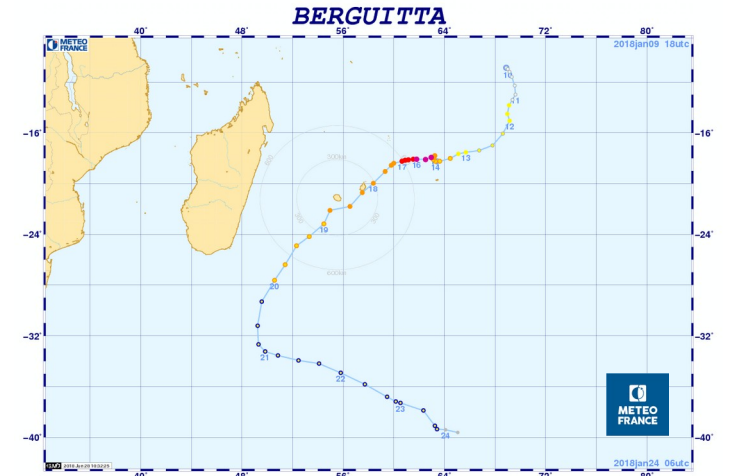
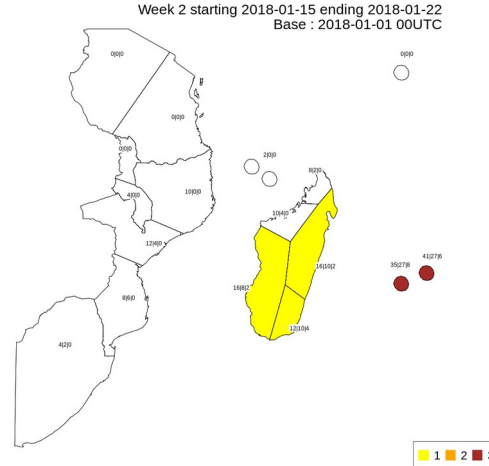
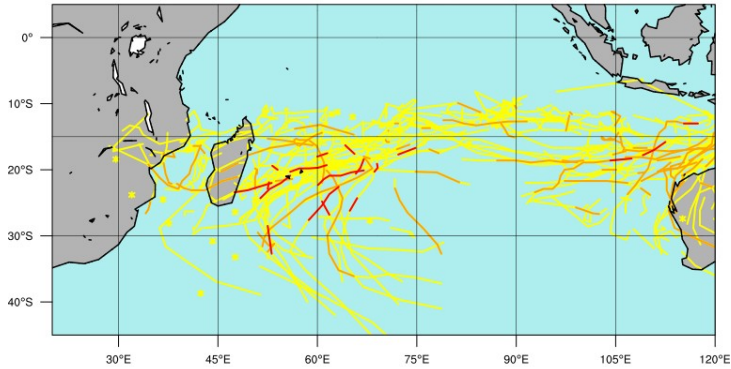


Week 1 starting 2020-12-28 ending 2021-01-04
Base : 2020-12-21 00UTC



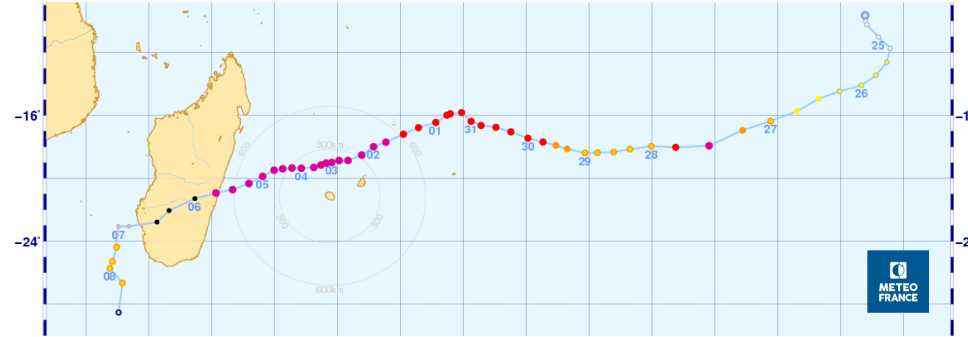
Examples (2)

Quid level 3 ? 4 times on 4 cyclonic seasons

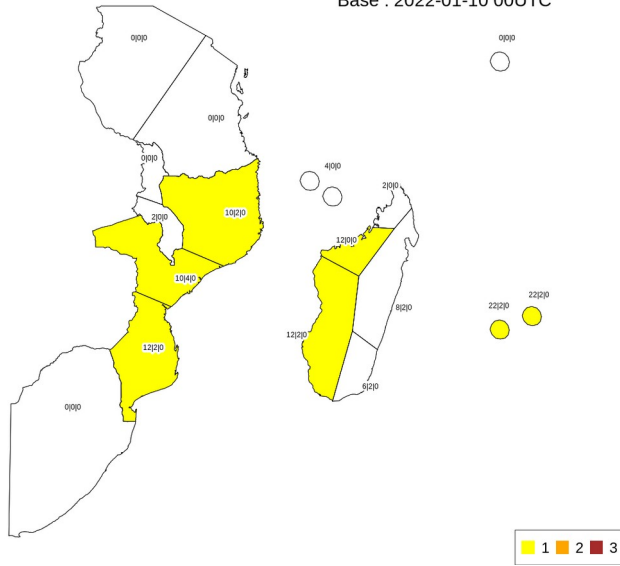


Examples (3)

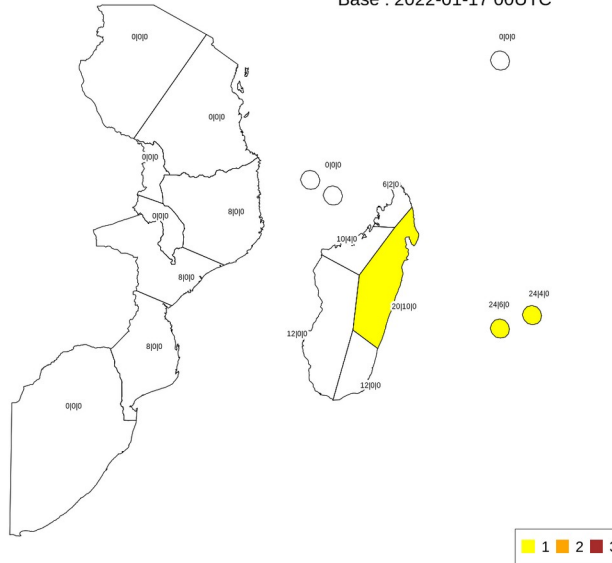
Illustration on case study: BATSIRAI



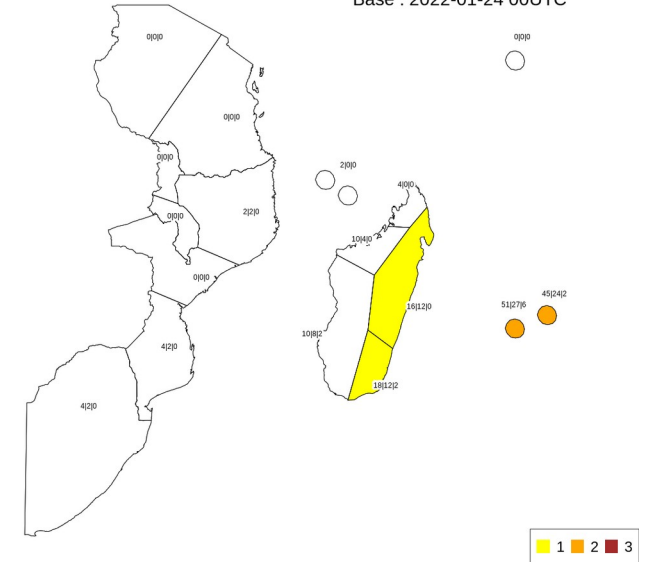
Week 3 starting 2022-01-31 ending 2022-02-07
Base : 2022-01-10 00UTC



Week 2 starting 2022-01-31 ending 2022-02-07
Base : 2022-01-17 00UTC



Week 1 starting 2022-01-31 ending 2022-02-07
Base : 2022-01-24 00UTC



Summary and outlooks

Summary

- Calibration
- Presentation to the PIROI (targeted user)

Outlooks

- Refining the zoning
- Calculation of scores on the 2021-2022
- Naming color level
- Test of the product by the PIROI

Thank you for your attention!

PISSAR 

The product will be available the next season
on the website pissaro.re !!!

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