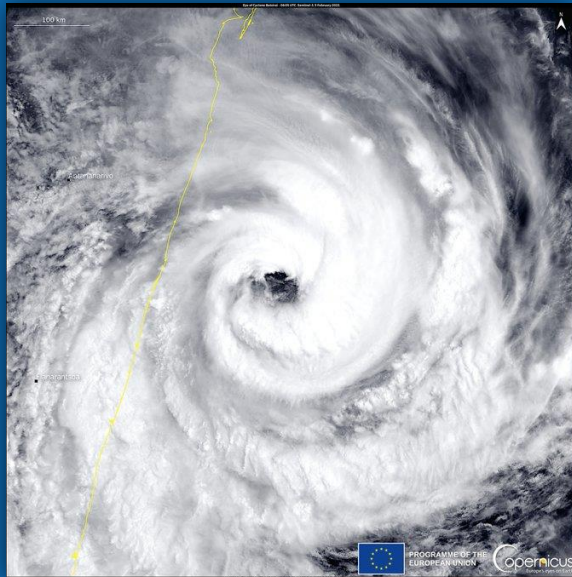


GDACS: TROPICAL CYCLONES



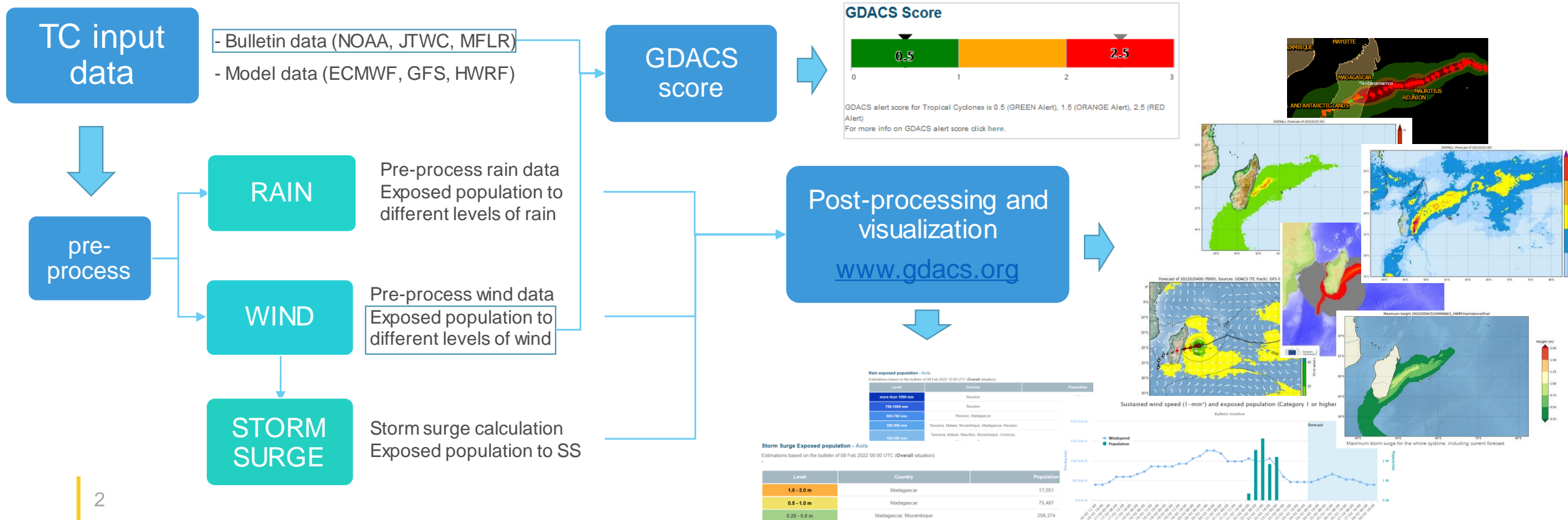
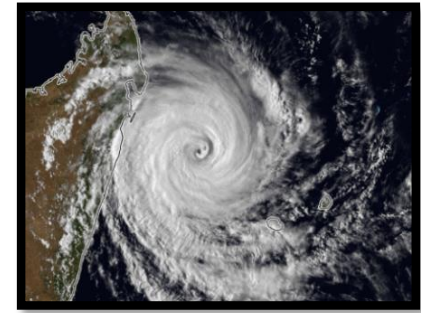
**Authoritative information in the Tropical Cyclone
operational system**

*L. García San Martín, A. Annunziato, J. Abad Pérez, L. Giustolisi, J. Kamberaj,
M. Mastronunzio, O. Necmioglu, V. Salvitti, M. Tucci*

Humanitarian Networks and Partnerships Weeks 2022 – GDACS Annual Meeting

The GDACS System

- GDACS alert system provides **impact estimation in real-time natural hazards**
- Automatic alerts are based on **vulnerability** and **population exposed to strong winds**
- TC alerts are based on bulletin data ➡ Moving towards authoritative data
- New!!!** For SW Indian Ocean now data from RSMC Météo France La Reunion



GDACS Sources

- Bulletin data:**

- Wind data from issued bulletins
- NOAA, JTWC, MFLR

NEW!!

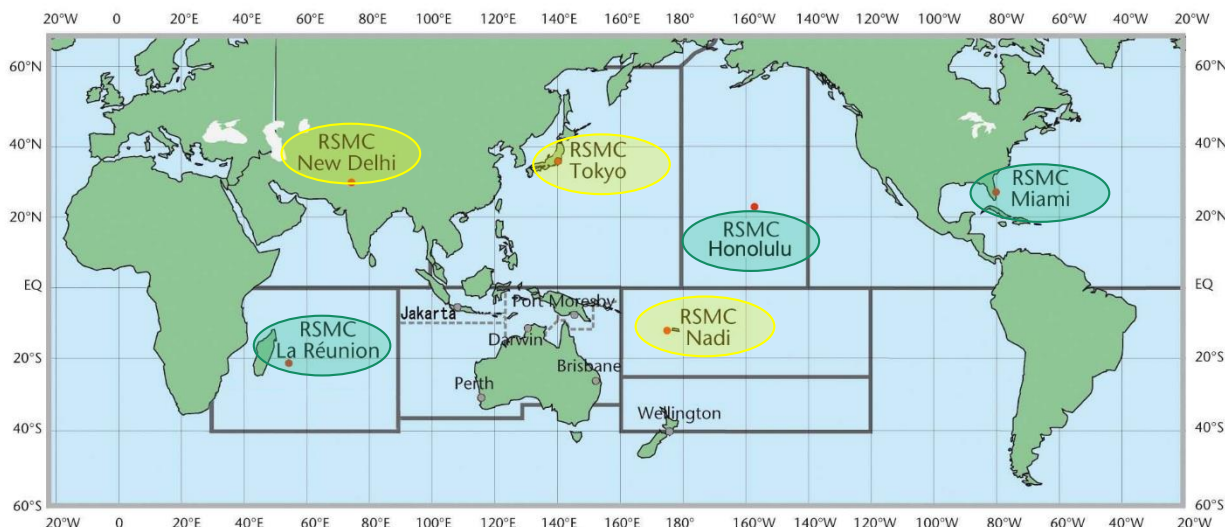


GDACS alert

- The goal: Towards the use of **authoritative data**, when available, from the corresponding **RSMC**

Now 3 basins are covered by authoritative data

- Harmonize** the different data to issue the GDACS alert but at the same time agree with the RSMC the format and data visualization based on their needs
- Close **collaboration** to overcome differences in data input and TC classification



- Basins where GDACS defaults to JTWC data
- RSMC authoritative data included in GDACS



Overall Red alert Tropical Cyclone for BATSIRAI-22
in Madagascar

Summary

Impact

Meteo

GTS

Maps & Reports

Media

Resources

Covid19

08 Feb 2022 12 UTC
click on ▼ to select bulletin time

Meteorological
source:

**GDACS
JTWC**
Primary source

WMO-RSMC
La Réunion
Beta version

GFS

HWRF

ECMWF

Impact based on all weather systems in the area

GDACS Sources



Overall Red alert Tropical Cyclone for BATSIRAI-22
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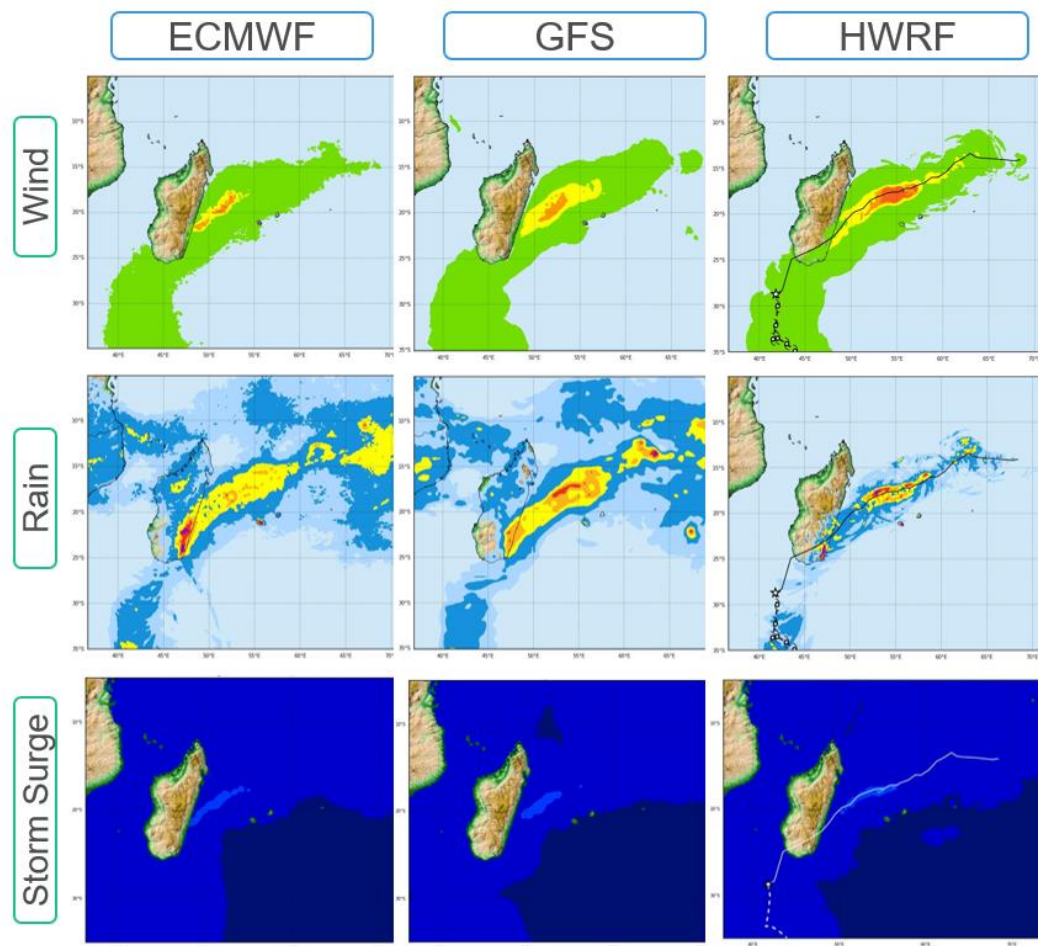
08 Feb 2022 12 UTC
click on ▼ to select bulletin time

Meteorological
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GDACS
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GFS HWRF ECMWF
Impact based on all weather systems in the area



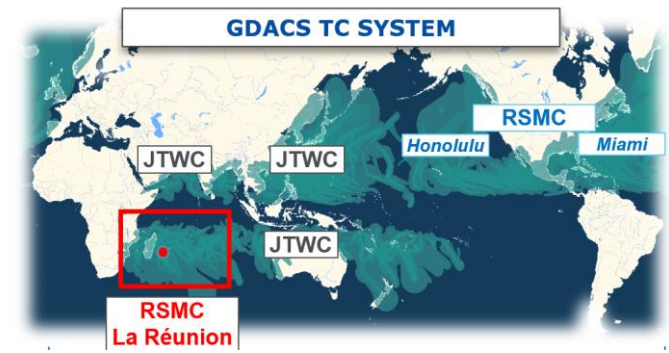
- **Model data:**
 - Wind and rain model data
 - ECMWF, HWRF, GFS
 - Working towards incorporating the atmospheric model used by Météo France La Reunion for the SW Indian Ocean, AROME, with the collaboration of Météo France



European
Commission

RSMC: Météo France - La Réunion

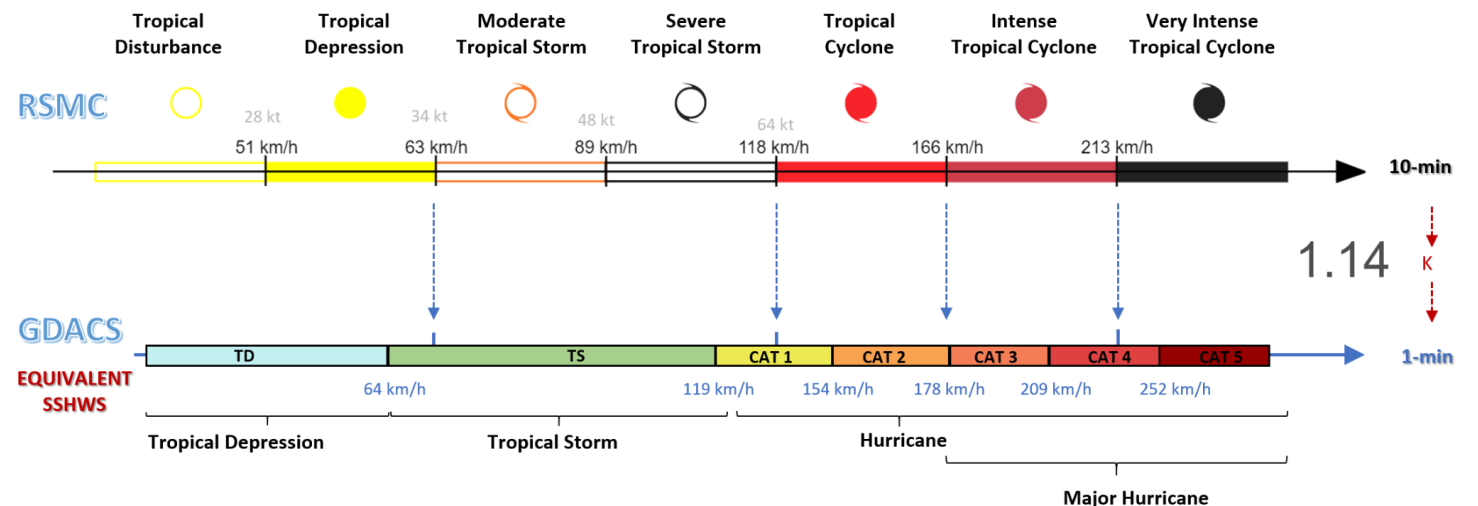
New authoritative source in GDACS Tropical Cyclones for SWIO



2020-2022: Collaboration with WMO and Météo France - RSMC La Réunion, to incorporate the authoritative TC information for the South West Indian Ocean (SWIO) basin

Close collaboration to understand the needs and adapt to GDACS system. Main milestones:

- Adaptation of the MFLR bulletin input data format
- Difference in wind averaging periods 10 min vs 1 min → conversion factor based on WMO recommendations
- Display of different TC classification systems and impact estimation based on 1 min and 10 min averaged sustained winds



RMSC: Météo France - La Réunion



Overall Red alert Tropical Cyclone for BATSIRAI-22 in Madagascar

Summary **Impact** Meteo GTS Maps & Reports Media Resources Covid19

08 Feb 2022 06 UTC
click on ▼ to select bulletin time

Meteorological source:

GDACS JTWC

Primary source

WMO-RSMC La Réunion

10 min - 1 min
Beta version

GFS

HWRF

ECMWF

Impact based on all weather systems in the area

Impact Single TC

Impact 10 min 1 min

Tropical Cyclone BATSIRAI-22 can have a high humanitarian impact based on the maximum sustained wind speed, exposed population and vulnerability.

Meteorological source	WMO/RSMC La Réunion - Météo France
Glide number:	TC-2022-000160-MDG
Exposed countries	Madagascar
Exposed population	3.2 million in Tropical Cyclone or higher
Maximum wind speed	194 km/h (10-min*)
Maximum storm surge	0.8 m (07 Feb 04:00 UTC)
Vulnerability	High (Madagascar)
Landfall	between 05 Feb 2022 12:00 - 05 Feb 2022 18:00 in Madagascar

* GDACS: 1-min sustained winds; WMO/RSMC La Réunion - Météo France: 10-min average

Joint Pilot Activity: EC-JRC, WMO/RSMC La Réunion-Météo France

GDACS Score



GDACS alert score for Tropical Cyclones is 0.5 (GREEN Alert), 1.5 (ORANGE Alert), 2.5 (RED Alert)

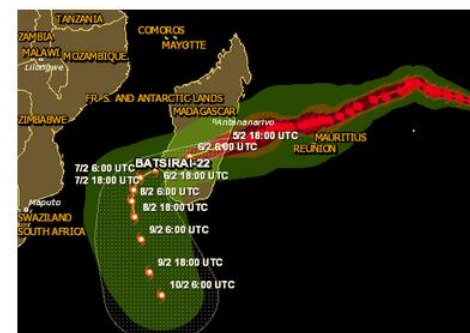
For more info on GDACS alert score click here.

	Wind (10-min*)	Storm surge	Rainfall	GDACS score
Current	74 km/h	n.a.	n.a.	0.5
Overall	194 km/h	0.8 m	n.a.	2.5

Maximum winds, storm surge, rainfall (Current: latest forecast, Overall: entire TC track) based on WMO/RSMC La Réunion - Météo France impact

Wind

10 min 1 min



Overall situation: TC track, Wind buffers (Green: 63-88 km/h, Orange: 89-118 km/h, Red: >118 km/h)

Countries

Country
Madagascar

Provinces

Region Province	Country	Population
Toamasina	Madagascar	1.8 million people
Fianarantsoa	Madagascar	2.8 million people
Toliara	Madagascar	1.9 million people

Populated places

Name	Region Province	Country	City class	Population
Mananjary	Fianarantsoa	Madagascar	City	27000 people
Amboitra	Fianarantsoa	Madagascar	City	30000 people
Fianarantsoa	Fianarantsoa	Madagascar	City	160000 people

Critical infrastructure

Airports, ports, nuclear plants and hydrodams at risk, if affected, are listed below.


Airports

Name	IATA Code	Elevation (m)	Usage	Runway type	IFR	Runway Length (ft)
Mananjary	MNJ	6	Civ	Paved	No	4900
Fianarantsoa	WF1	1115	Civ	Paved	No	4100
Ambalavao		972	Civ	Unpaved	No	3600


Ports

Name	LOCODE	Country
Mahanoro	MGVVB	Madagascar
Mananjary	MGMNJ	Madagascar

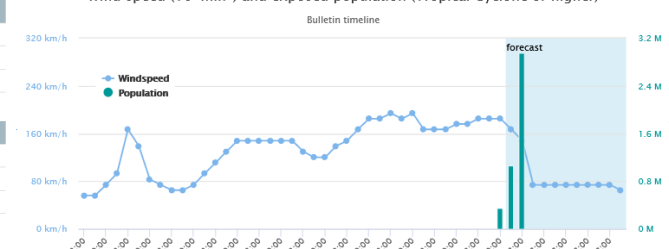
Impact Timeline 10 min 1 min

Alert	N°	Date (UTC)	Max Winds (km/h) (10-min")	Population in Tropical Storm or higher	Population in Tropical Cyclone or higher	Countries
	40	05 Feb 2022 06:00	167	18.1 million	3 million	Madagascar

Bulletin Timeline 10 min 1 min

Alert	N°	Date (UTC)	Category (WMO/RSMC) **	Max winds (km/h) (10-min*)	Population in Tropical Storm or higher	Population in TC or higher	Location (lat, lon)	Countries
	40	05 Feb 2022 06:00	Intense Tropical Cyclone	167	13.4 million people	1.1 million people	-20.4, 50.5	

Wind speed (10-min*) and exposed population (Tropical Cyclone or higher)

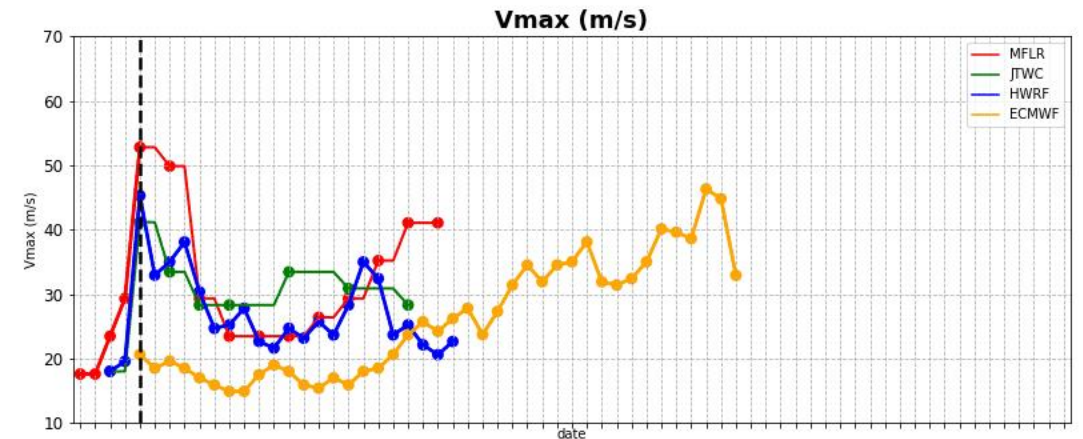
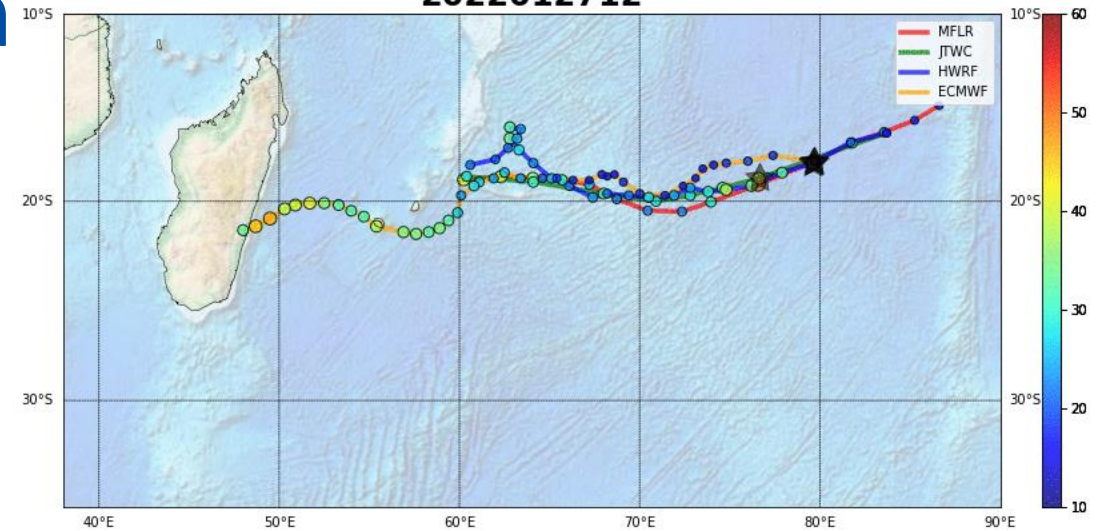


European Commission

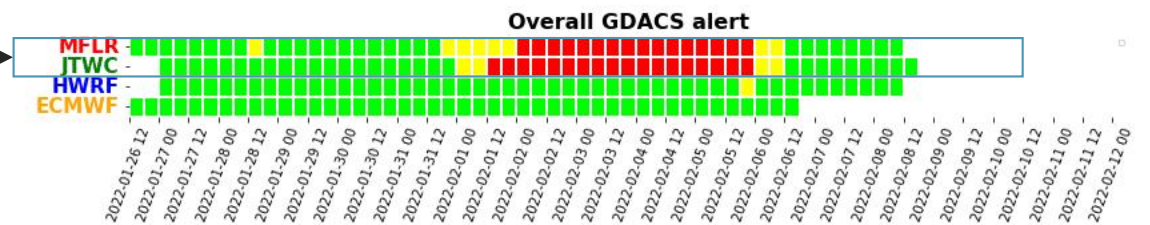
GDACS source comparison

- The advantage of having different sources and methodologies
- The need to understand the different types of data
- GDACS alert is based on wind exposure from bulletin data
- Bulletin data does not report rain

TC BATSIRAI: Track comparison
2022012712



!!! GDACS alert based on wind exposure
from bulletin data!



GDACS alert score

The example of Batsirai: 121 death toll, thousands displaced, emergency response activated.

- **Issue:** Bulletin derived estimated data overestimates exposure to winds, because there is no reduction after landfall due to bulletin timestep of 6 hours

Is GDACS score a good alert system? **YES!**

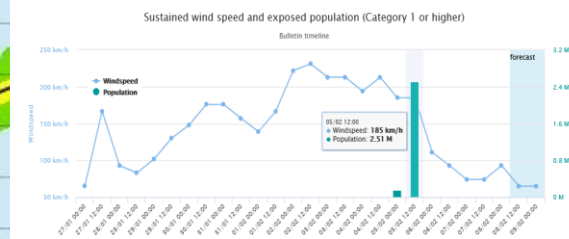
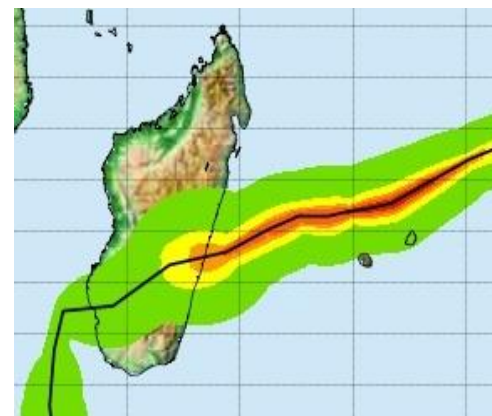
- Scoring system based on **11 years of calibration:** the alert level is reliable, even if the wind is overestimated.

Is GDACS going to improve? **YES!**

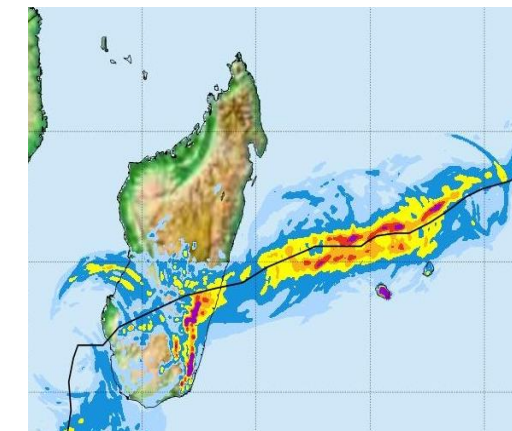
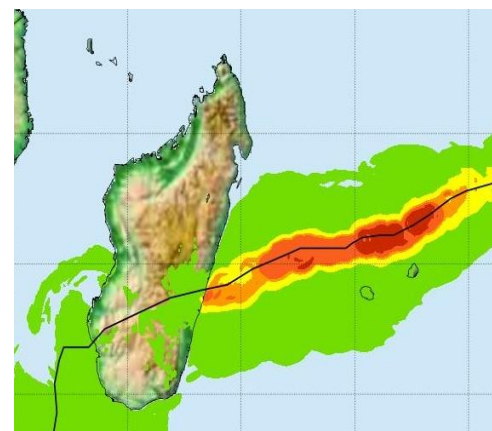
- In 2022 we are working on a more accurate impact system accounting for **rain** and **storm surge** effects, as well as **wind**, without losing consistency and objectivity



Wind estimates from **JTWC bulletin**. **RED ALERT**



Wind estimates from **HWRf model data**:



GDACS Tropical Cyclone future

- Collaborate with WMO and other RSMCs to understand their needs and include their authoritative data in GDACS, working together to fulfill their needs and provide solutions to the humanitarian community
- Include authoritative warnings from Meteo Community (GMAS) into GDACS for meteorological related events
- Improve the alert system to get the most accurate level for the impact forecast, including rain, wind and storm surge
- Listen to all the needs and ideas that you may have



Tropical Storm Batsirai. Image: NASA

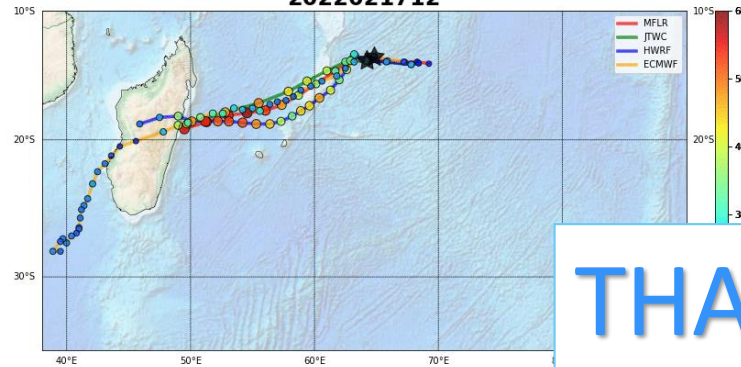


Global Disaster Alert and Coordination System

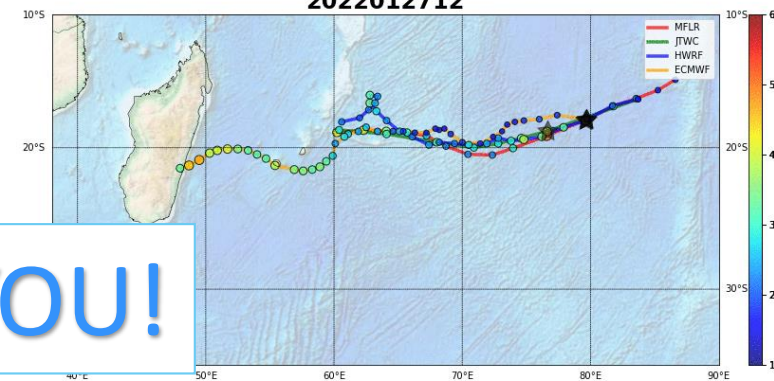
GDACS is a cooperation framework between the United Nations, the European Commission and disaster managers worldwide to improve alerts, information exchange and coordination in the first phase after major sudden-onset disasters.



TC EMNATI: Track comparison
2022021712

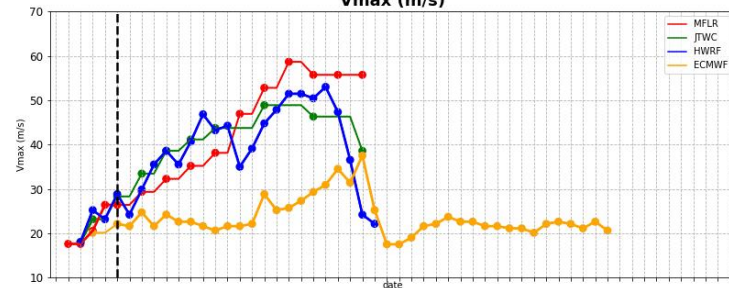


TC BATSIRAI: Track comparison
2022021712

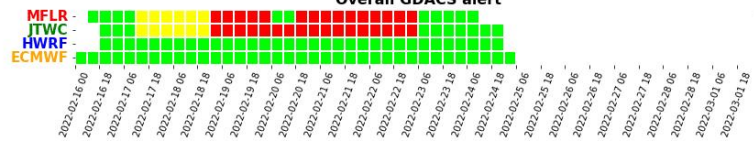


THANK YOU!

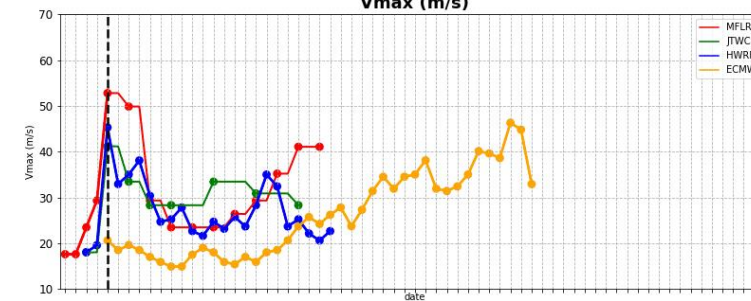
Vmax (m/s)



Overall GDACS alert



Vmax (m/s)



Overall GDACS alert

