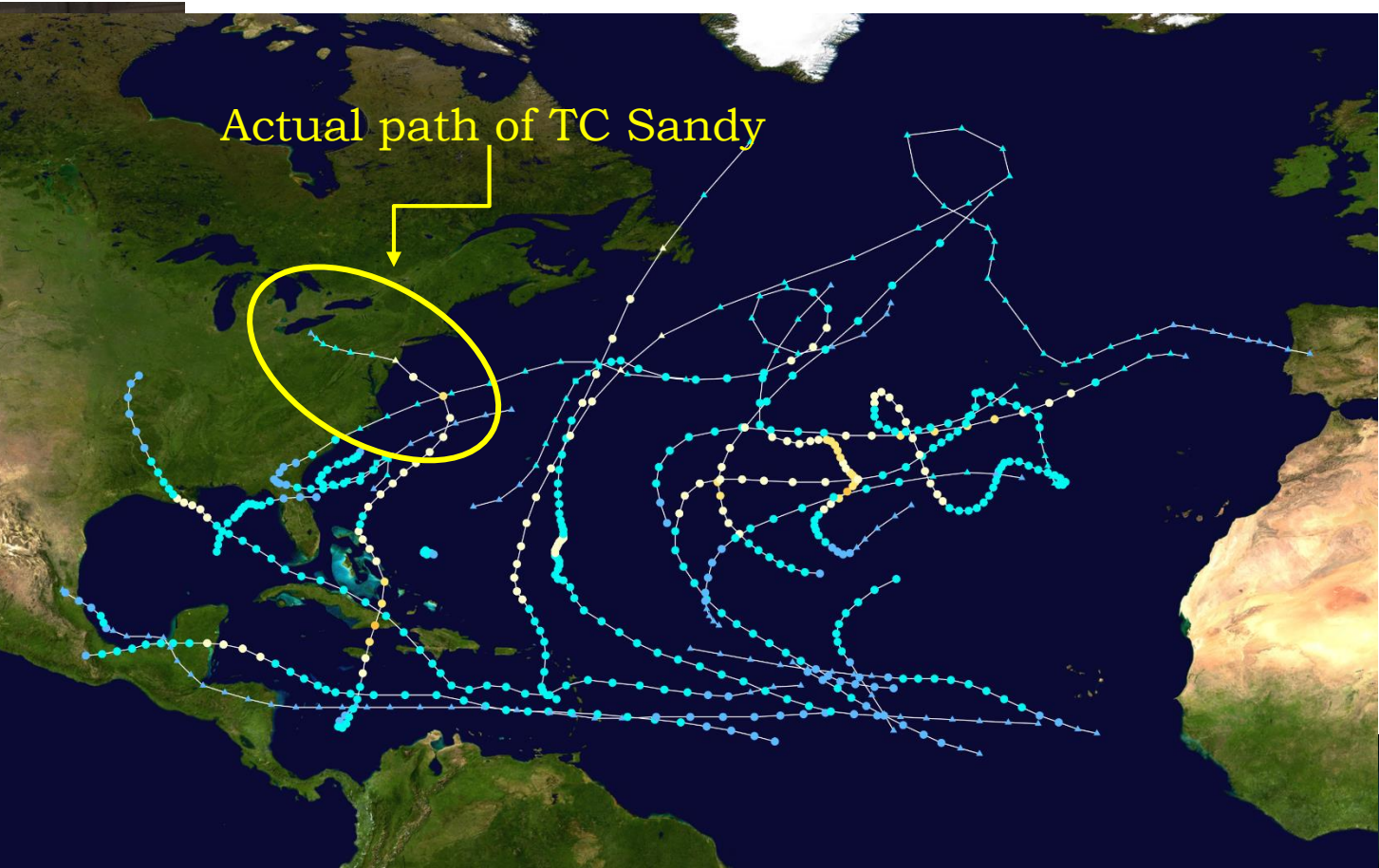


**the beauty  
and the beast  
through the  
eyes of GDCAS**

*Thomas I. Petroliaqkis, Pamela Probst & Alessandro Annunziato  
European Crisis Management Laboratory of JRC*



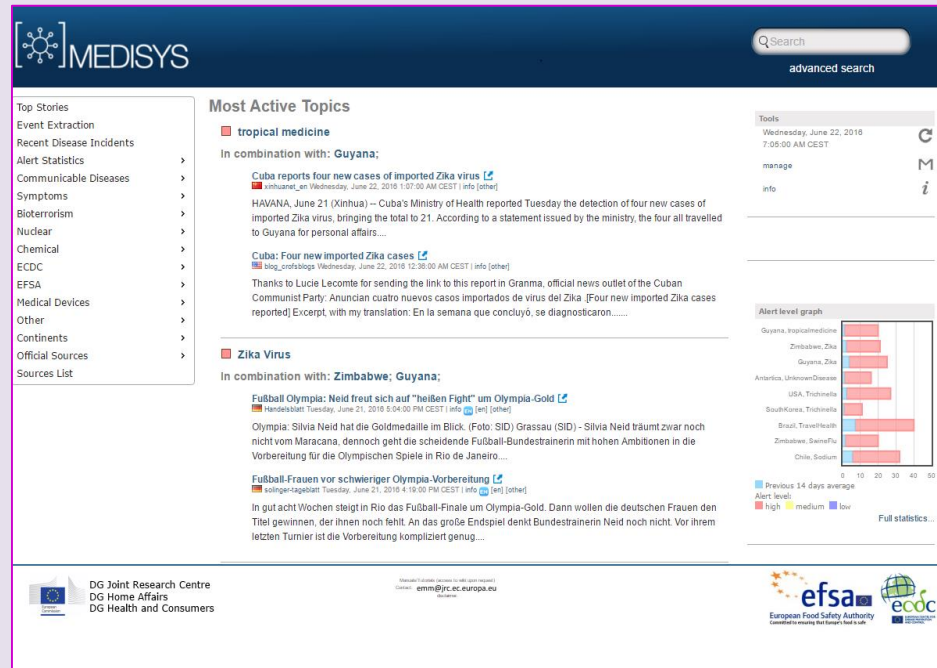


**Is this meeting about the beauty of Sandy ?**

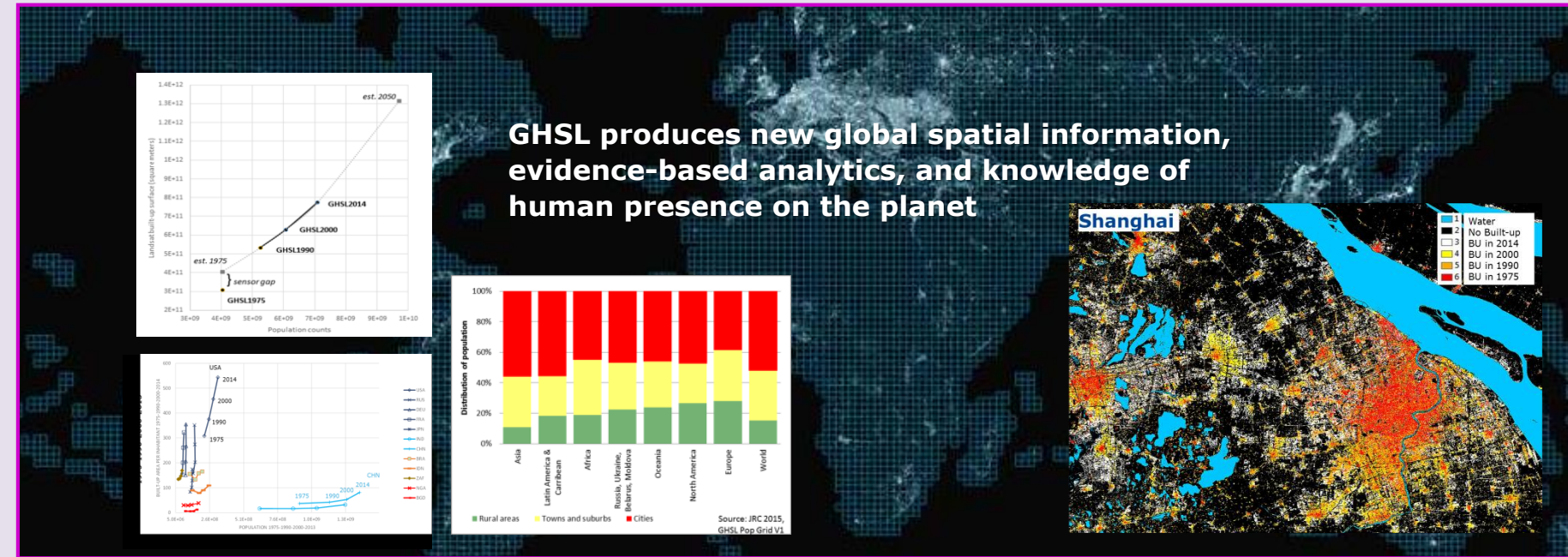


# Joint Research Centre: ECML (European Crisis Management Laboratory)

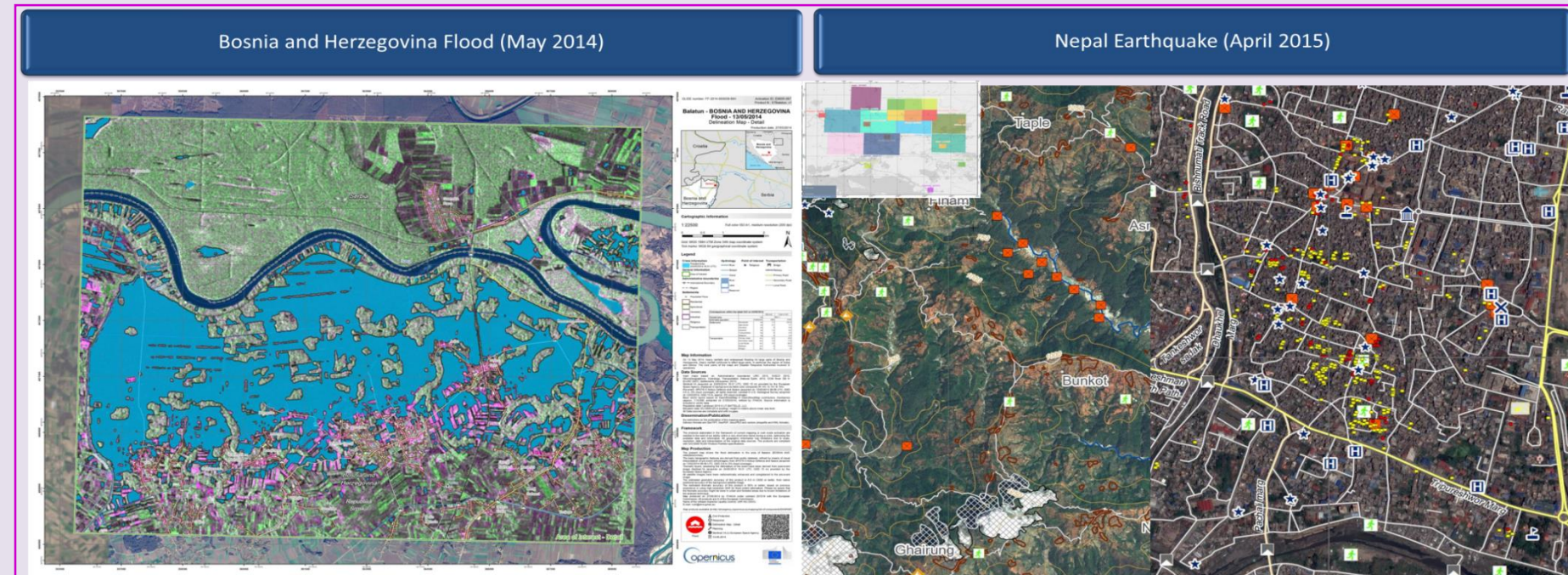
## Open Source Monitoring for Media Analysis and Security



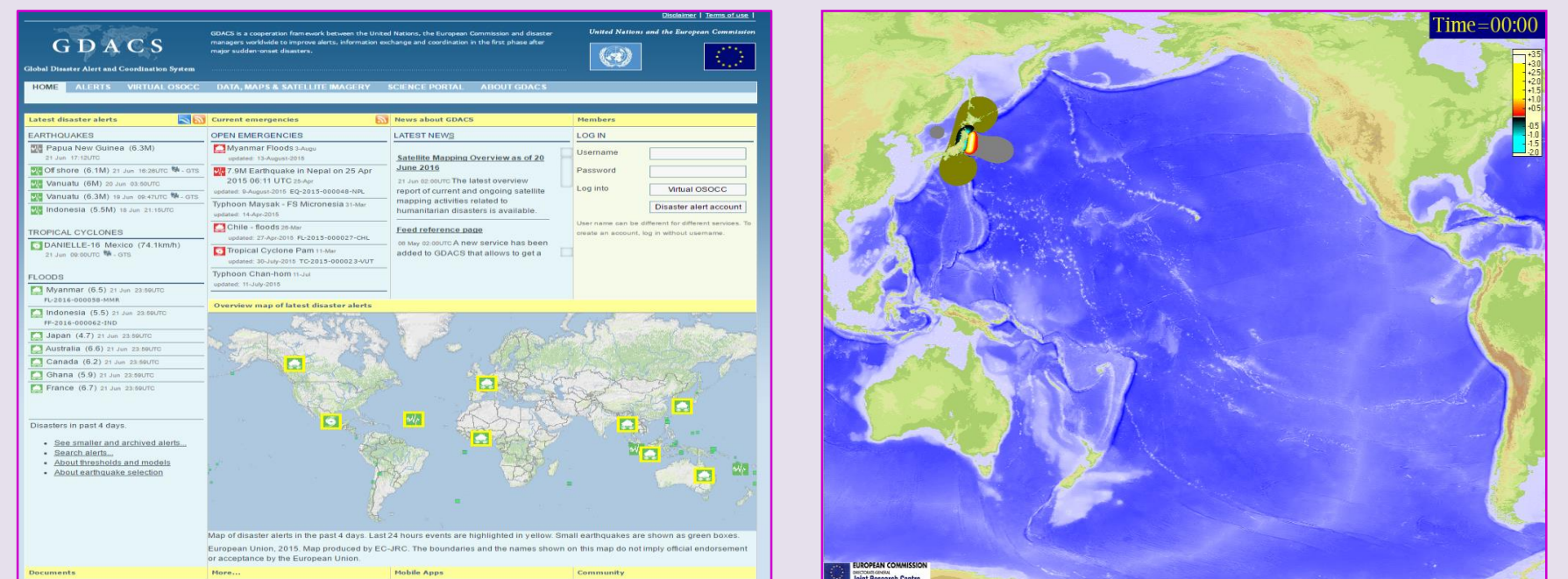
## Global Human Settlement Layer (GHSL)



## Copernicus Emergency Management Service



## Natural Disasters Monitoring and Analysis for Disasters Preparedness by GDACS









# The Global Disaster Alert and Coordination System (GDACS)

GDACS was created as a cooperation framework between the United Nations and the European Commission in 2004, in order to address significant gaps in information collection and analysis in the early phase of major sudden-onset disasters.

For the past decade, GDACS has drawn on the collective capacity of disaster managers and information systems worldwide to facilitate international information exchange and decision-making

- GDACS Alerts**
- **Green alerts** indicate moderate events, where the need for international is not likely
  - **Orange alerts** indicate potential local disasters, where international assistance might be required
  - **Red alerts** indicate potentially severe disasters, where international assistance is expected to be required

- Currently GDACS alerts are issued for
- **earthquakes and possible subsequent tsunamis**
  - **tropical cyclones and**
  - **floods**

## Warning & Alerting



## for TC besides wind force ...

- TCs**
- Storm Surge
    - **Red Alert** > 3 m
    - **Orange Alert** > 1 m < 3 m
    - **Green Alert** < 1 m
  - Total Cyclone Accumulation Alerts
    - **Red Alert** > 500 mm
    - **Orange Alert** > 200 mm < 500 mm
    - **Green Alert** < 200 mm
  - Rain Rate Alerts
    - **Red Alert** > 33 mm/hr
    - **Orange Alert** > 17 mm/hr < 33 mm/hr
    - **Green Alert** < 17 mm/hr

## GDACS Approach for Disasters Alerts **Tsunamis**

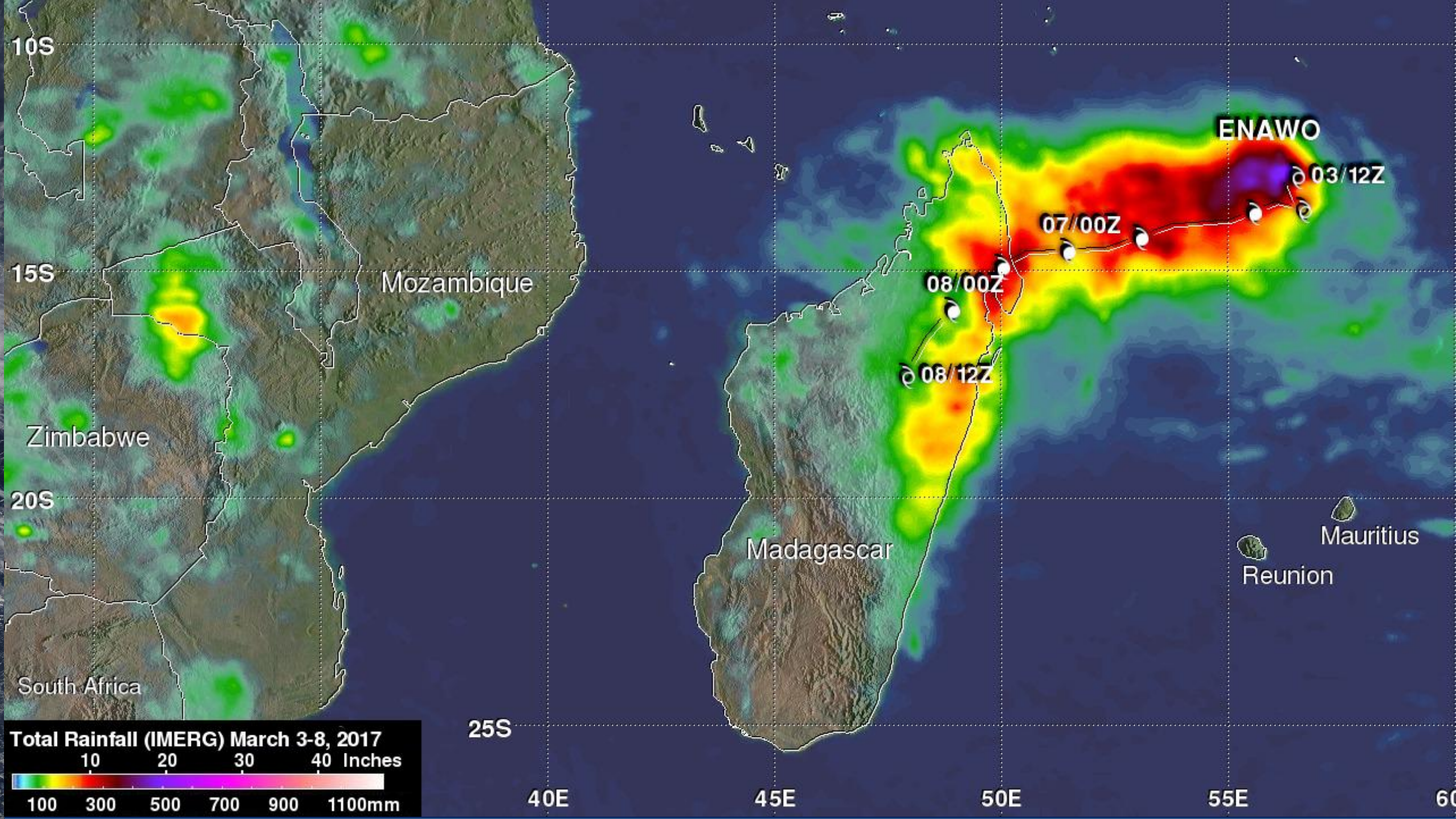
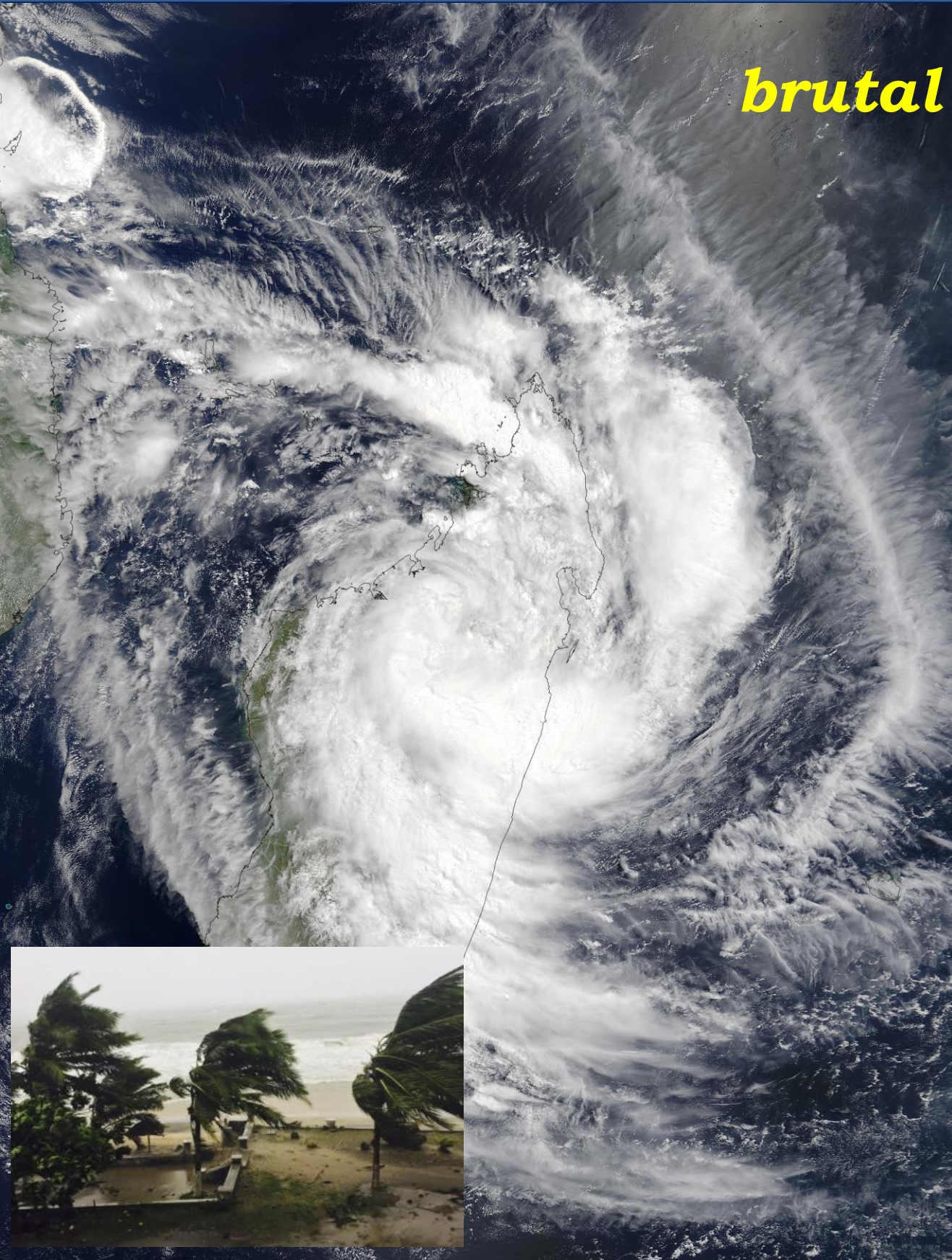
<http://portal.gdacs.org/Models/>

The JRC has developed a global tsunami wave height calculation model, which is run after each earthquake issued by seismological institutes around the world ... triggered when earthquakes > 6.5 magnitude occur near water

- Tsunami Alerts
  - **Red Alert:** maximum wave height  $\geq 3$  m
  - **Orange Alert:** maximum wave height  $\geq 1$  m
  - **Green Alert:** maximum wave height < 1 m



**brutal beauty ... tropical cyclone enawo hitting Madagascar**  
**gdcas example for tc winds**



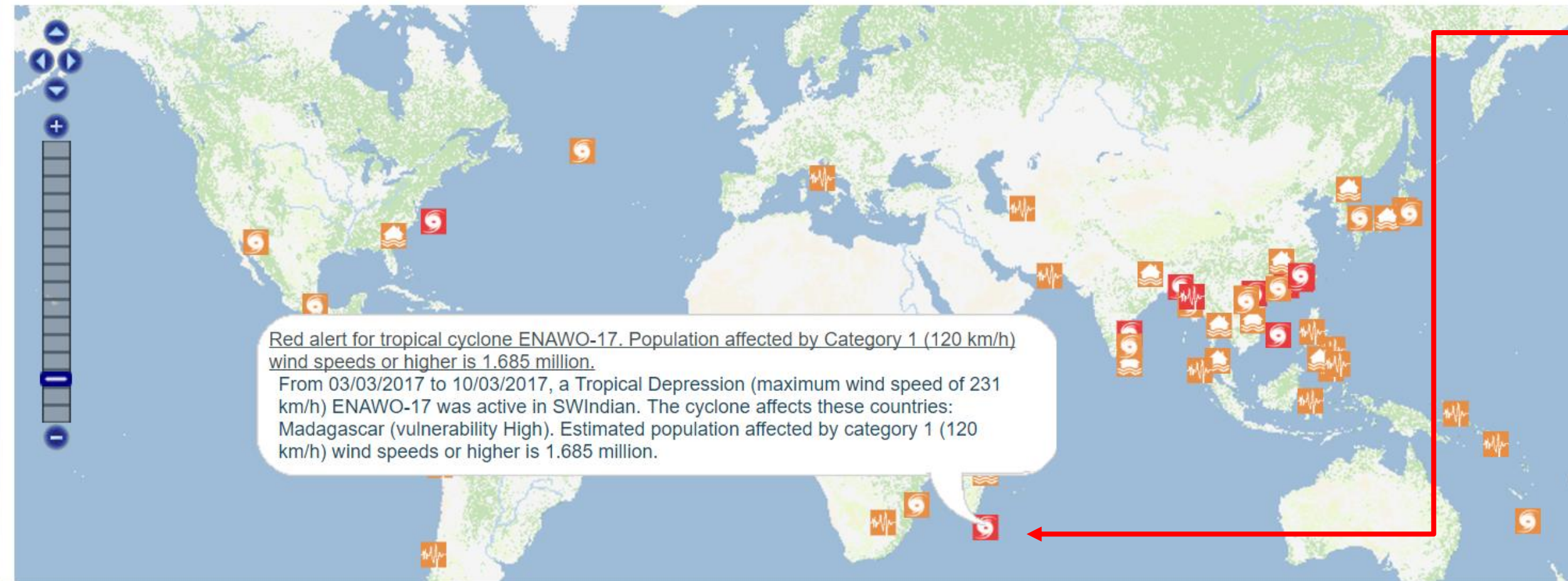




Search disaster events

Click to search all GDACS events by date, type or impact

Event map



Event list














TROPICAL CYCLONES

Event ID	Alert level	Country	Magnitude
1000357		MORA-17, Bangladesh, India	Tropical Storm (maximum wind speed of 120 km/h)
1000350		MAARUTHA-17, Myanmar	Tropical Storm (maximum wind speed of 83 km/h)
1000348		COOK-17, New Caledonia	Tropical Storm (maximum wind speed of 157 km/h)
1000341		ENAWO-17, Madagascar	Tropical Depression (maximum wind speed of 231 km/h)
1000337		DINEO-17, Mozambique	Tropical Storm (maximum wind speed of 130 km/h)
1000333		NOCK-TEN-16, Philippines	Tropical Depression (maximum wind speed of 250 km/h)
1000331		VARDAH-16, India	Hurricane/Typhoon > 74 mph (maximum wind speed of 139 km/h)
1000330		NADA-16, Sri Lanka, India	Tropical Storm (maximum wind speed of 83 km/h)
1000328		OTTO-16, Nicaragua, Costa Rica	Tropical Storm (maximum wind speed of 176 km/h)
1000321		HAIMA-16, China, Philippines	Hurricane/Typhoon > 74 mph (maximum wind speed of 269 km/h)



## Event time line

The storm evolution is shown in the table below. Alert levels and population estimates are related to the area from a point to the next.

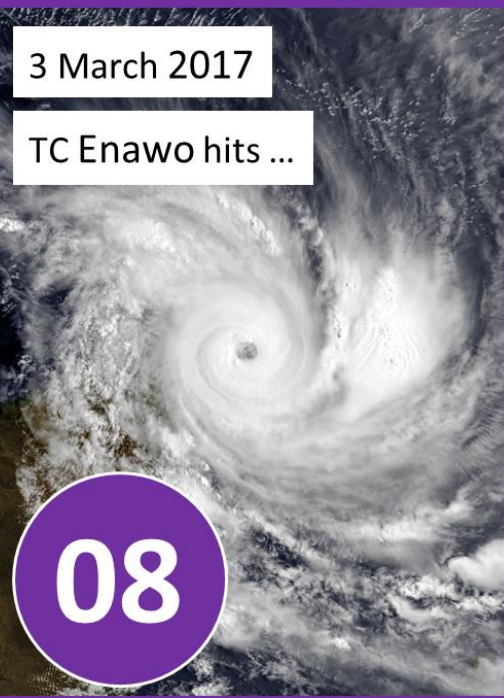
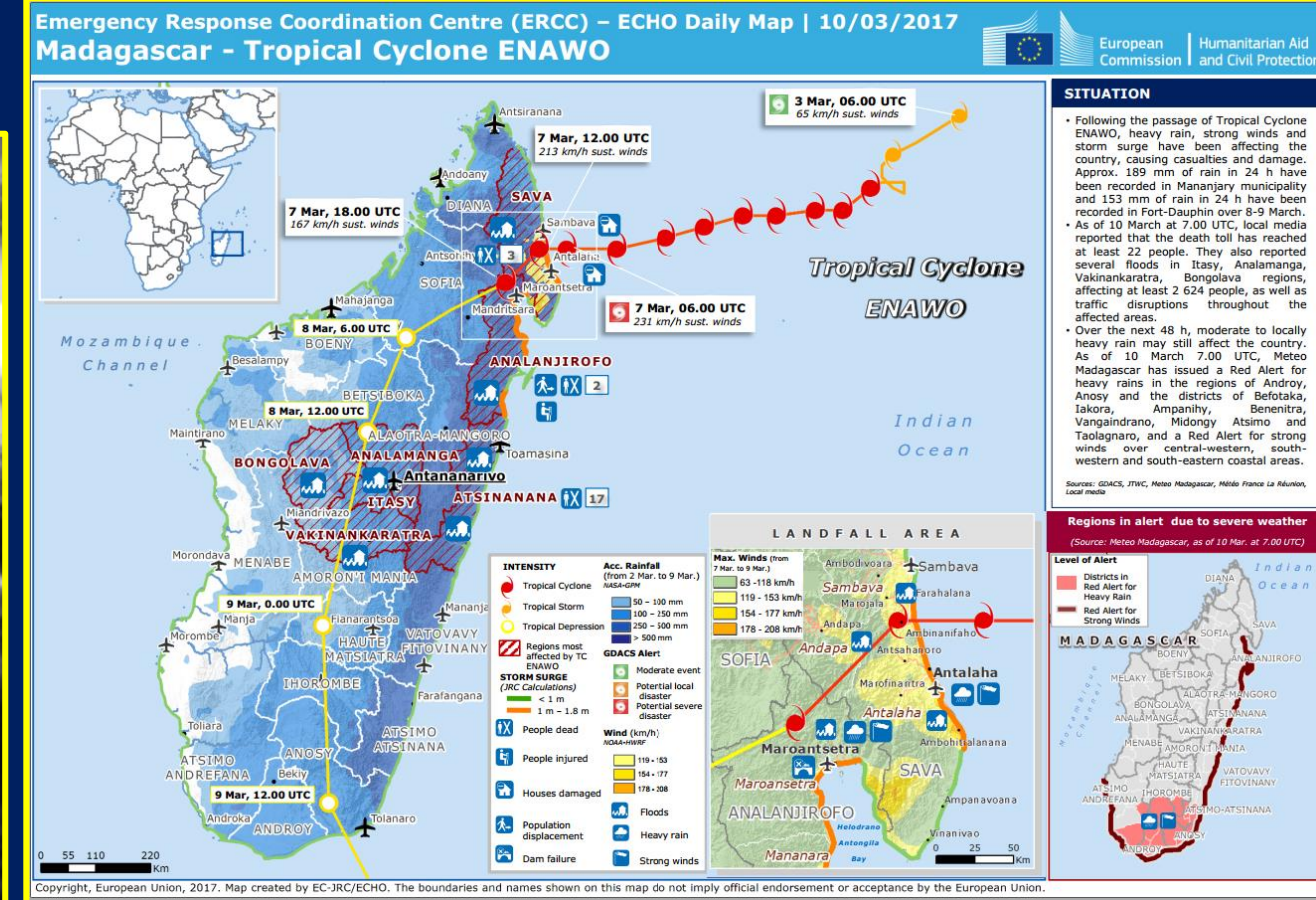
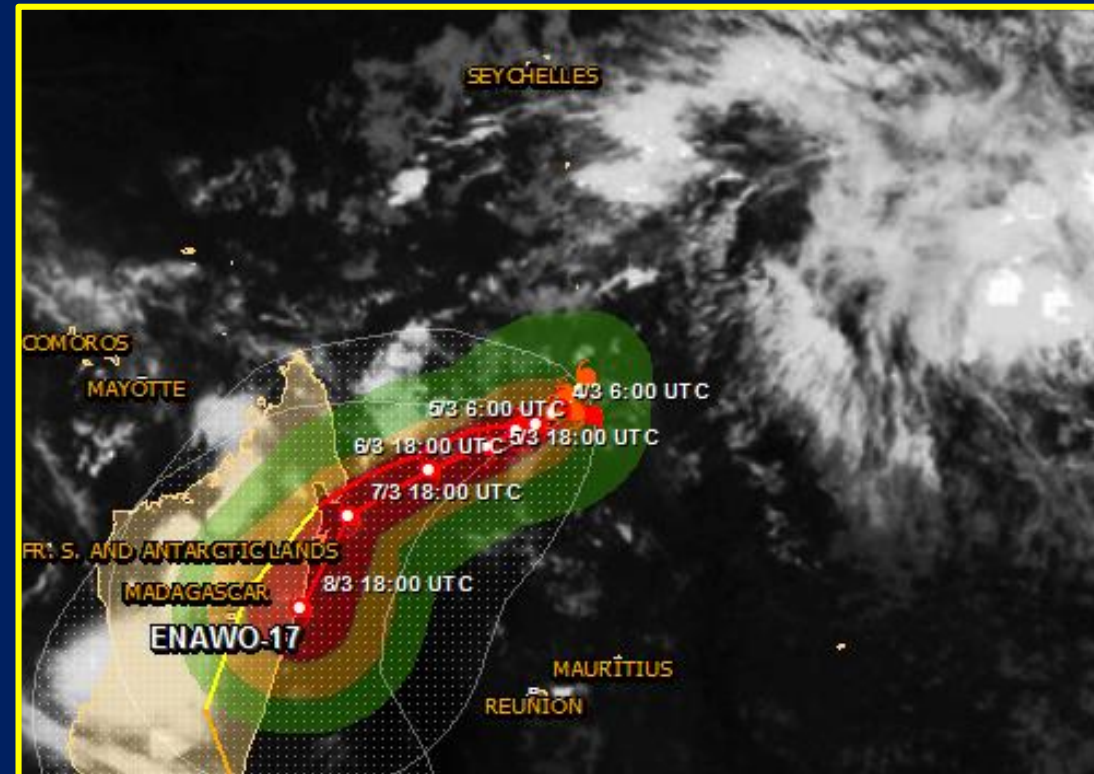
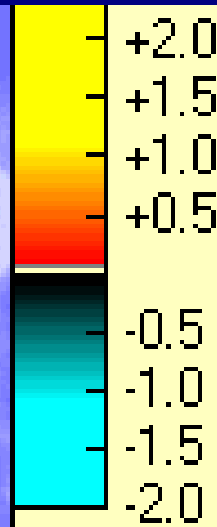
Advisory	Alert color	Date (UTC)	Category	Wind speed	Wind gusts	Population affected by cyclone winds (>120km/h)	Location (lat, lon)
1		03 Mar 2017 06:00	Tropical storm	<b>65 km/h</b> (40 mph)	km/h ( mph)	no people	-12.7, 56.8
2		03 Mar 2017 18:00	Tropical storm	<b>83 km/h</b> (52 mph)	km/h ( mph)	no people	-13.1, 56.3
3		04 Mar 2017 06:00	Tropical storm	<b>102 km/h</b> (63 mph)	km/h ( mph)	no people	-13.6, 56.5
4		04 Mar 2017 18:00	Category 1	<b>120 km/h</b> (75 mph)	km/h ( mph)	no people	-13.7, 56.9
5		05 Mar 2017 06:00	Category 1	<b>139 km/h</b> (86 mph)	km/h ( mph)	no people	-13.5, 56.1
6		05 Mar 2017 18:00	Category 2	<b>167 km/h</b> (103 mph)	km/h ( mph)	no people	-13.9, 55.1
7		06 Mar 2017 06:00	Category 2	<b>167 km/h</b> (103 mph)	km/h ( mph)	no people	-14, 53.8
8		06 Mar 2017 18:00	Category 4	<b>231 km/h</b> (143 mph)	km/h ( mph)	320000 people	-14.5, 52.4
9		07 Mar 2017 06:00	Category 4	<b>231 km/h</b> (143 mph)	km/h ( mph)	1.5 million people	-14.6, 50.6
10		07 Mar 2017 18:00	Category 2	<b>167 km/h</b> (103 mph)	km/h ( mph)	1.2 million people	-15.2, 49.5
11		10 Mar 2017 00:00	Tropical storm	<b>83 km/h</b> (52 mph)	km/h ( mph)	no people	-26.2, 46.8
12		10 Mar 2017 12:00	Tropical depression	<b>56 km/h</b> (34 mph)	km/h ( mph)	no people	-28, 49.3
12		11 Mar 2017 00:00	Tropical depression	<b>46 km/h</b> (29 mph)	km/h ( mph)	no people	-30.6, 49.4



storm surge wise ...



detailed reporting ...

Time=00:00



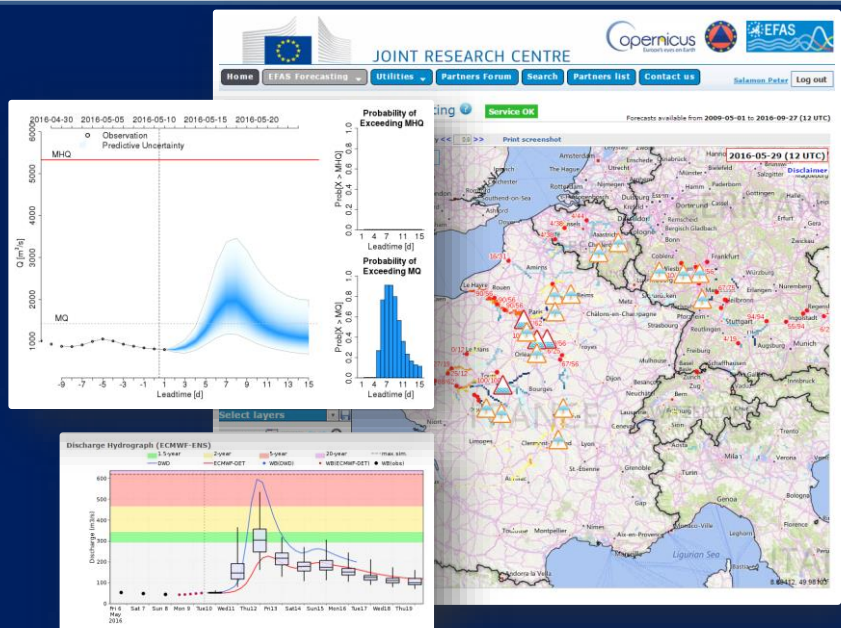
## Vanilla prices are giving scoop shops a giant ice-cream headache

The source of the problem is the distant island nation of 8,500 miles from Boston, where a cyclone in March devastated the farms that supply more than 80 percent of the world's vanilla beans. In the wake of the storm, some distributors have resorted to rationing supplies. For local scoop shops, it's a giant ice-cream headache.

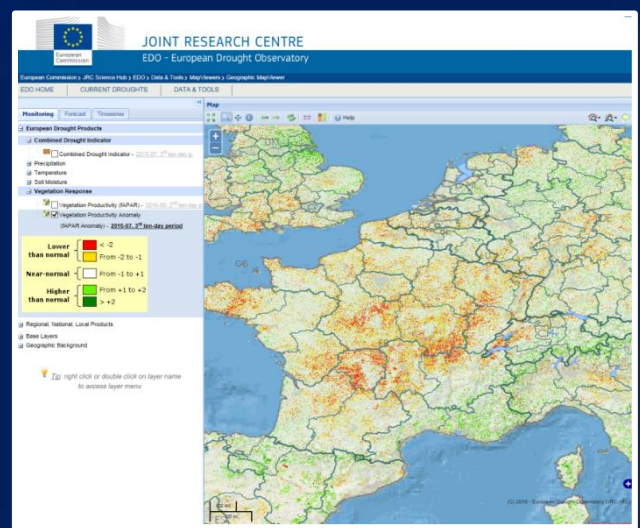


# Joint Research Centre: Natural Disaster Early Warning Systems



**European Flood Awareness System (EFAS)**

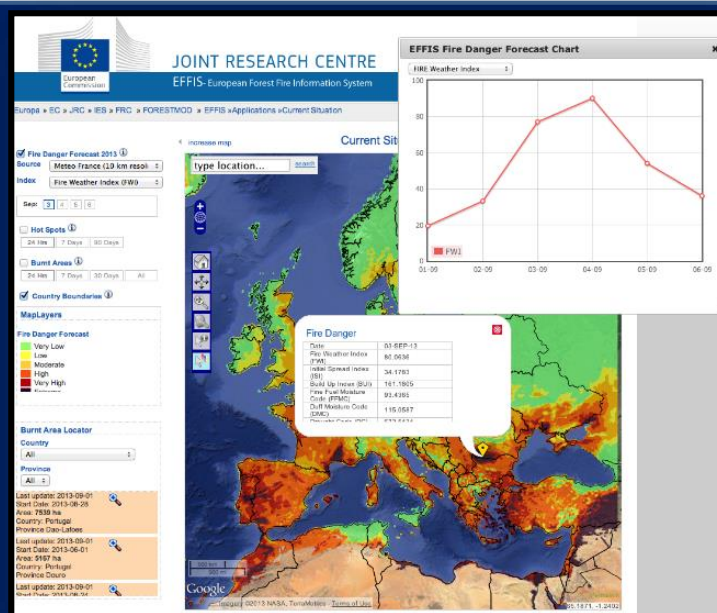
GLOFAS: Global Flood Awareness System  
GEO CA-28 community on Global Flood Risk Monitoring



**European Drought Observatory (EDO –**

**ongoing EMS service evolution)**

GEO CA-16 community on Global Drought Information System



**European Forest Fire Information System (EFFIS)**

GWIS: Global Wildfire Information System



**Global Disaster Alert and Coordination System (GDACS)**

Earthquakes, tsunamis, cyclones, high-impact weather events



European Civil  
Protection  
Mechanism



**Emergency Response and  
Coordination Centre  
(ERCC)**





# Supporting ERCC (European Response and Coordination Center) of EC

## Selected High-Impact Events in early 2017 as examples ...

Emergency Response Coordination Centre (ERCC) – ECHO Daily Map | 03/01/2017  
PHILIPPINES – Tropical Cyclone NOCK-TEN/NINA

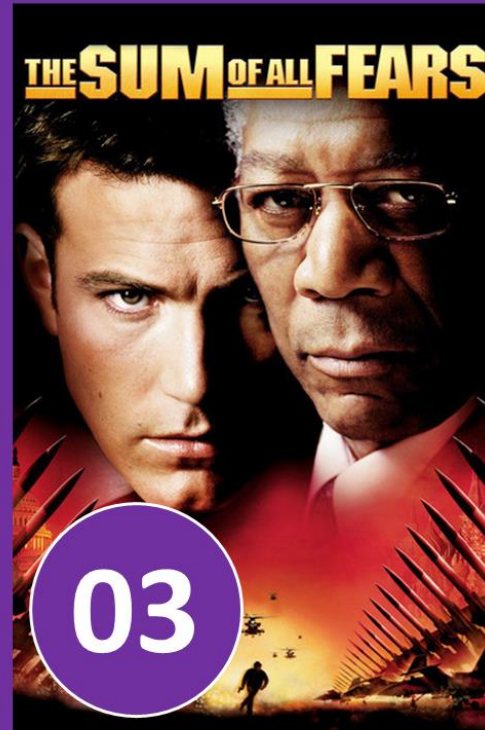
Emergency Response Coordination Centre (ERCC) – ECHO Daily Map | 04/01/2017  
Central and Eastern Europe – Severe weather

Emergency Response Coordination Centre (ERCC) – Daily Map | 05/01/2017  
Denmark – Peak water levels on 4 January 2017 (UTC)

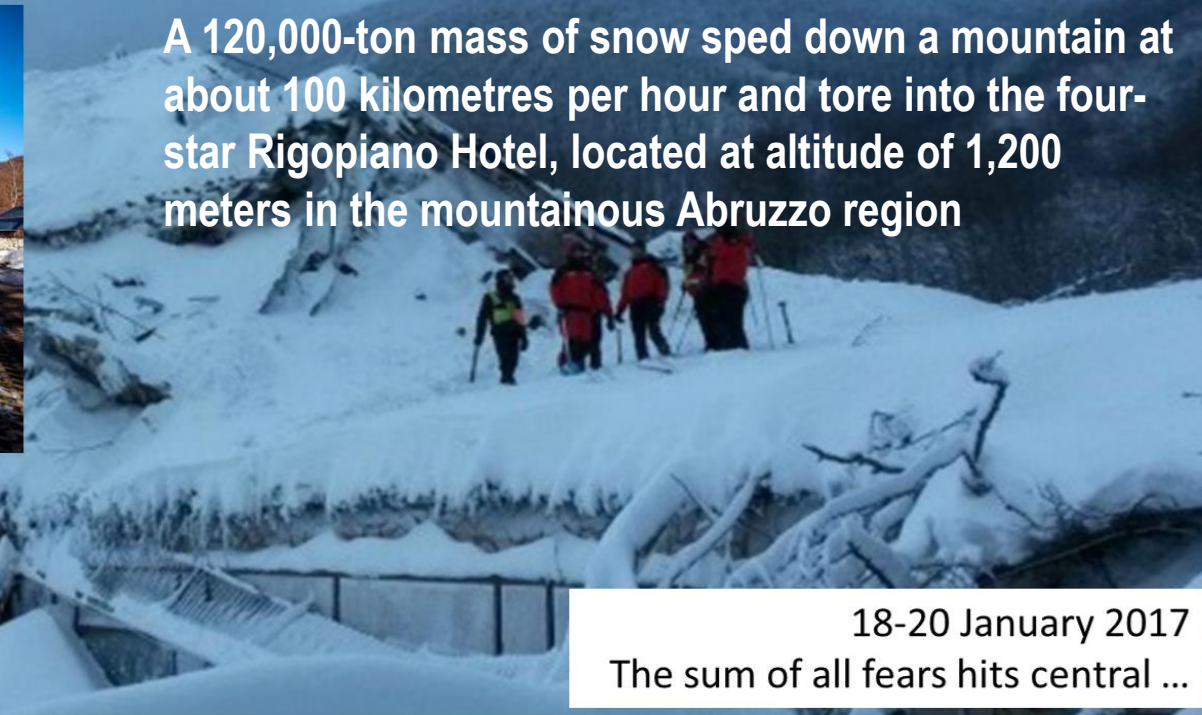
Emergency Response Coordination Centre (ERCC) – ECHO Daily Map | 09/01/2017  
South-eastern Europe/the Balkans – Severe weather

Emergency Response Coordination Centre (ERCC) – ECHO Daily Map | 10/01/2017  
Thailand – Severe weather

Emergency Response Coordination Centre (ERCC) – ECHO Daily Map | 11/01/2017  
Central and south-eastern Europe – Severe weather



*Earthquakes Avalanches  
Snowstorms ...  
and a hotel buried totally  
under snow*



A 120,000-ton mass of snow sped down a mountain at about 100 kilometres per hour and tore into the four-star Rigopiano Hotel, located at altitude of 1,200 meters in the mountainous Abruzzo region

18-20 January 2017  
The sum of all fears hits central ...

Emergency Response Coordination Centre (ERCC) – ECHO Daily Map | 19/01/2017  
Central Italy 5.1 – 5.5 Mw Earthquakes and Severe Weather



European Commission

Humanitarian Aid and Civil Protection

The Sum of All Fears ... Four earthquakes of 5.1 to 5.5 M in L'Aquila province on 18 January 2017 resulting in an avalanche burring Rigopiano hotel and at least 25 people during intense snowstorm(s)

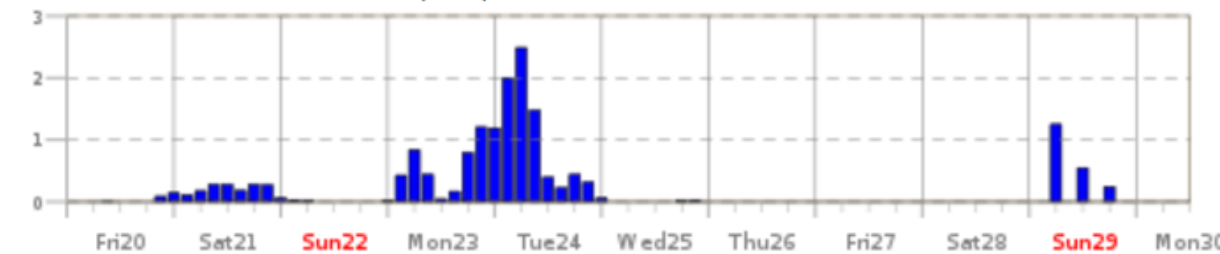


# The Sum of All fears ...

### Time Series

Data values near location 42.56°N 13.37°E, Campotosto, Italy

Total precipitation over the last 6 hour (mm)

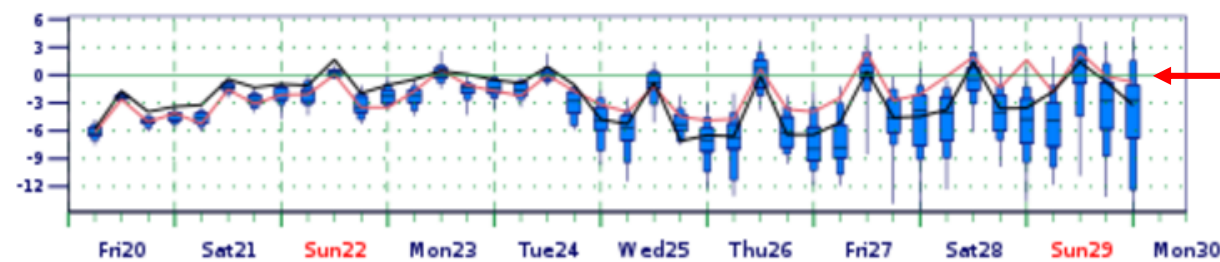


### Meteograms

Location: 42.56°N 13.37°E, Campotosto, Italy

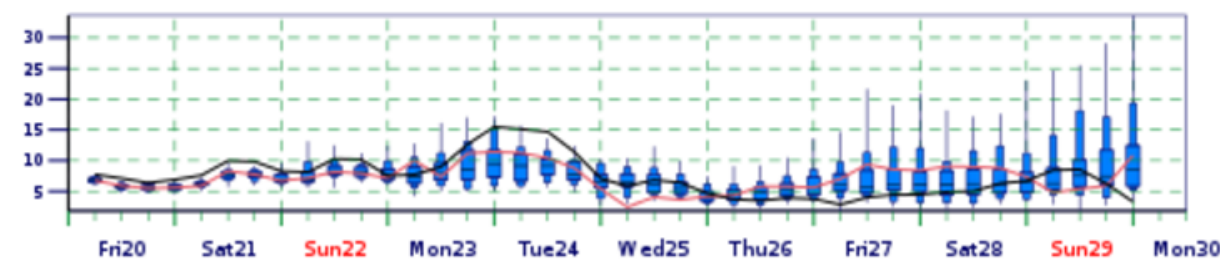
10-day epsgram 2m Temperature (°C)

Base date: Friday 20 Jan, 00 UTC, adjusted to 1382m height



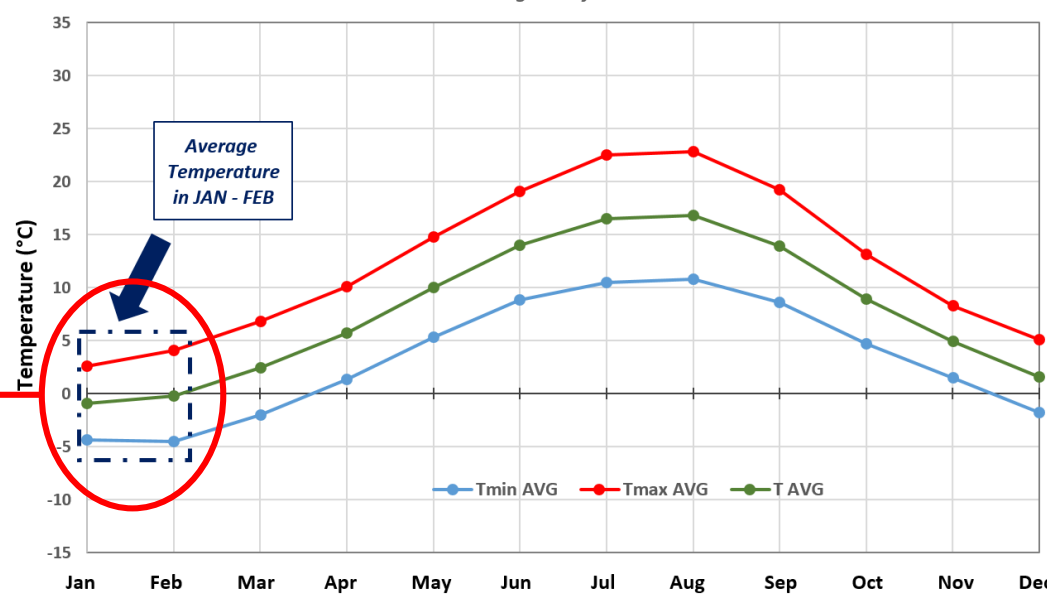
10-day epsgram 10m wind gust (m/s)

Base date: Friday 20 Jan, 00 UTC

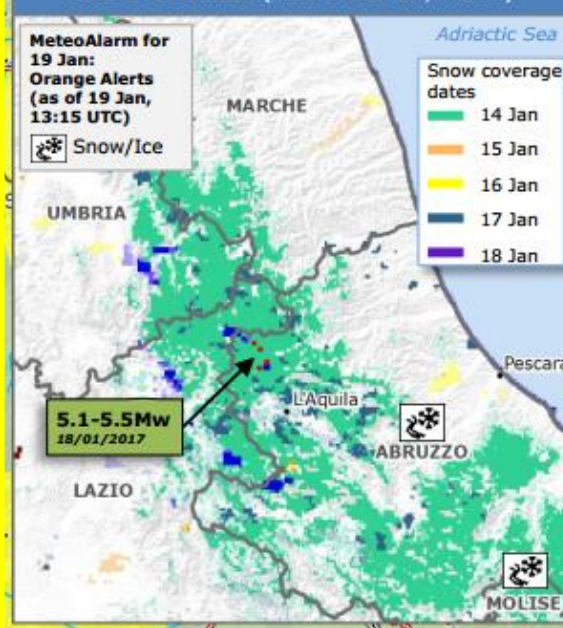


### CAMPOTOSTO (1430 m a.s.l.): Monthly Average Temperatures, °C

Climatological information

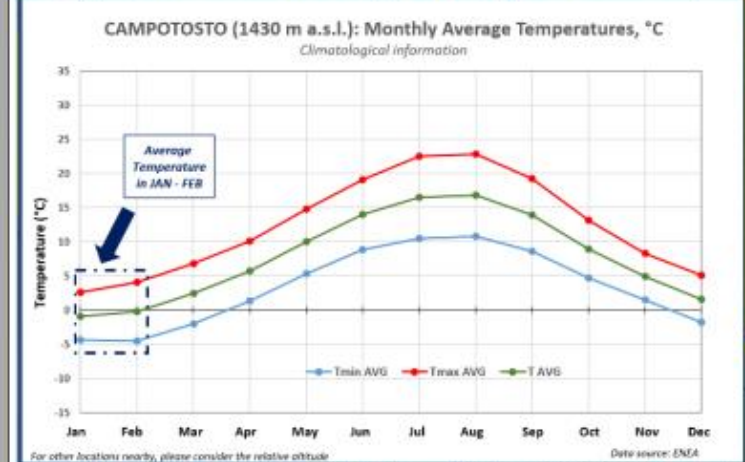
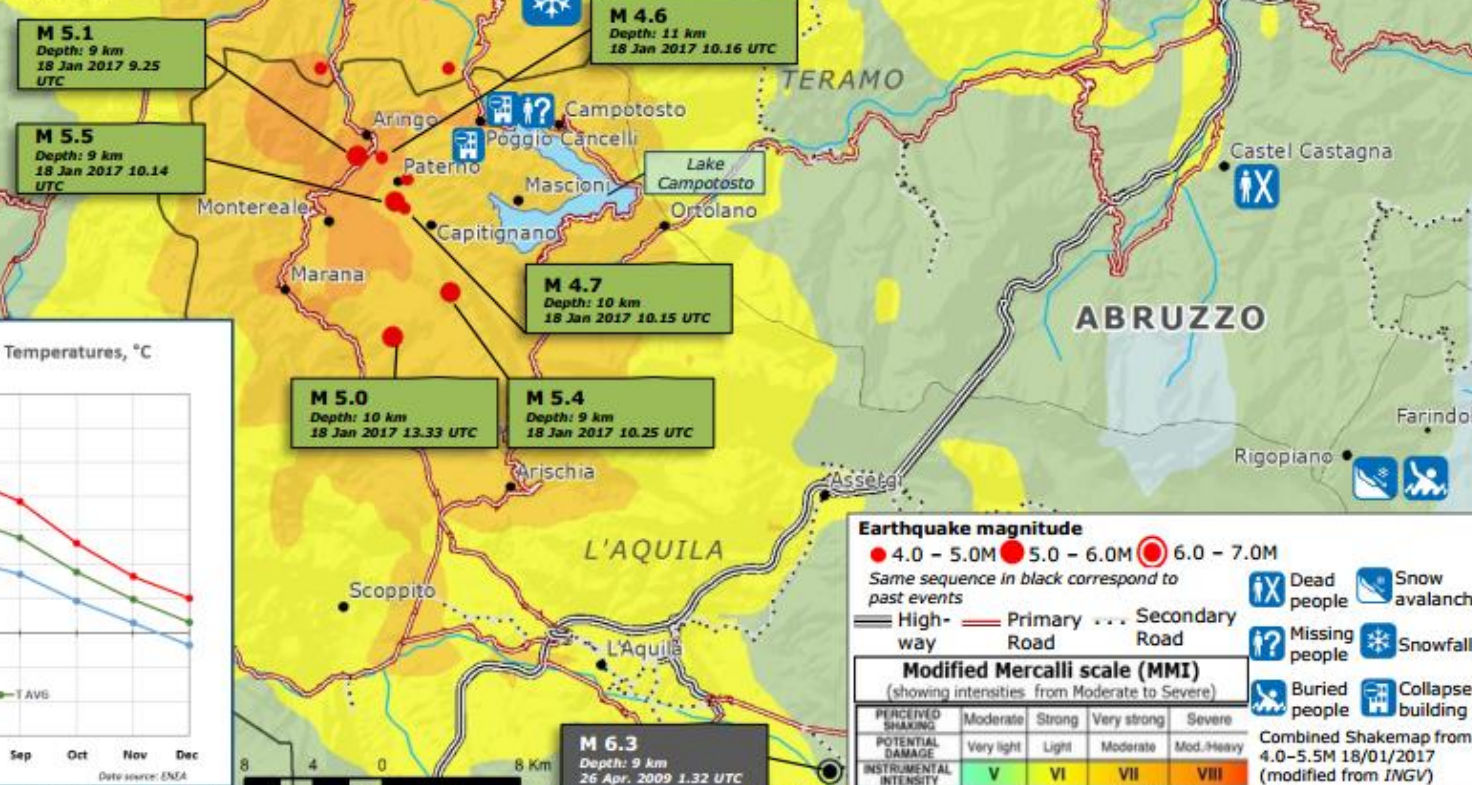


### SNOW COVERAGE (From 14-19 Jan, MODIS)



LOCATIONS	FORECAST (Tmin / Tmax)	
	20 Jan	21 Jan
AMATRICE	-2 °C / 1 °C	-6 °C / 1 °C
CAMPOTOSTO	-4 °C / -1 °C	-3 °C / 0 °C
MONTEREALE	-2 °C / 0 °C	-5 °C / 1 °C
CAPITIGNANO	-2 °C / 1 °C	-5 °C / 1 °C

Source: MeteoAM (as of 19 Jan, 11 UTC)



### SITUATION

The area has been affected by severe weather, including strong winds, snowfalls and very low temperature, over the last few days with serious impact on the electric power distribution and road networks

Search and rescue teams and emergency vehicles have made a great effort to reach the hotel because of the snow blocking the approach road



# Several cities in Peru are underwater, and the 'coastal El Niño' isn't done yet

21 March 2017



## WATCH THE DRAMATIC MOMENT A WOMAN EMERGES FROM MUDDY FLOODWATERS

Amidst cows struggling to stay afloat in the muddy floodwaters, a dramatic moment is caught on video when a mud-soaked woman, Evangelina Chamorro Díaz, emerges with only minor injuries.

<http://news.nationalgeographic.com/2017/03/woman-escapes-peru-flood-mudslide/> At least 273 people were killed



4 April 2017

## Devastating Mudslides in Colombia

ALAN TAYLOR | APR 4, 2017 | 29 PHOTOS | IN FOCUS





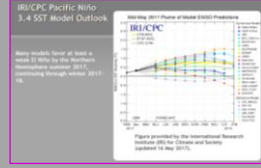
EUROPEAN COMMISSION  
JOINT RESEARCH CENTRE

16 April 2017

### ENSO: Recent Evolution, Current Status and Predictions



Update prepared by:  
Climate Prediction Center / NCEP  
29 May 2017



### Weather situation in Northern South-America

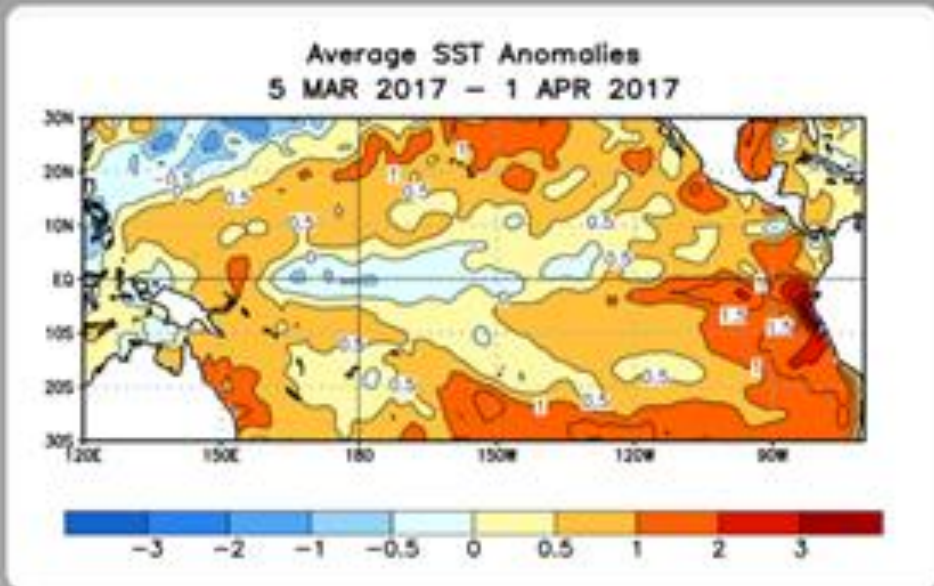
Peru, Bolivia, Colombia, Ecuador, Brazil

### Executive Summary

Since mid-March 2017 heavy rains have affected nearly all of Peru leading to catastrophic flooding and landslides. On 1 April a mudslide hit the city of Mocoa, Colombia, causing more than 200 casualties. This report provides an outlook regarding El Nino conditions, meteorological and hydrological conditions as well as a large scale assessment of precipitation triggered high landslide risk areas.

### SST Departures (°C) in the Tropical Pacific During the Last Four Weeks

During the last four weeks, equatorial SSTs were near-to-below average across the central Pacific Ocean, and above-average across the eastern Pacific.

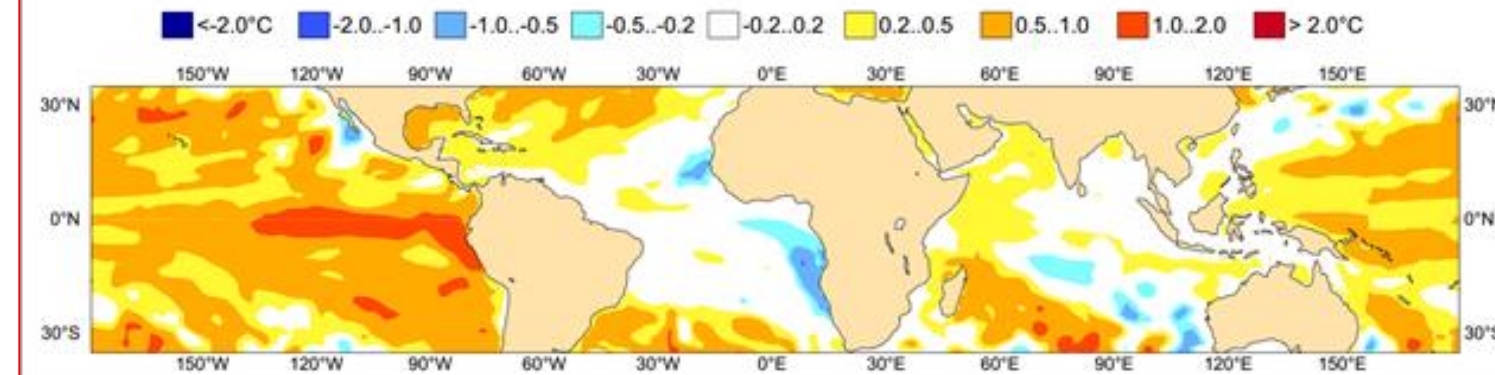


It should be noted that from the first weeks of March, the Climate Prediction Centre (CPC) of NOAA based on well-established scientific criteria has determined that current conditions would reflect neither El Niño nor La Niña temperatures, calling the current weather patterns “El Niño Southern Oscillation (ENSO) neutral.

The region of Colombia impacted by flooding is in a similar coastal region just north of the Peruvian Coastal El Niño – one that is also experiencing warmer-than-usual temperatures. The coastal El Niño could portend a more severe El Niño weather pattern later in the year, or it could potentially be the result of broader changes in a framework of a changing climate.

ECMWF Seasonal Forecast  
Mean forecast SST anomaly  
Forecast start reference is 01/03/17  
Ensemble size = 51, climate size = 450

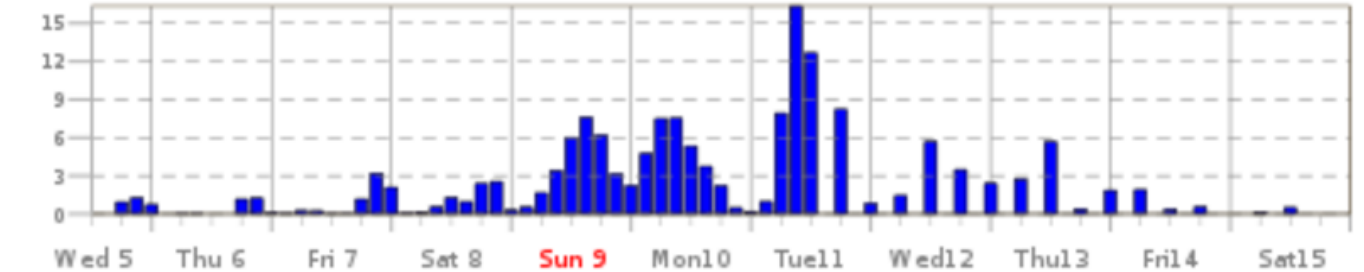
System 4  
AMJ 2017



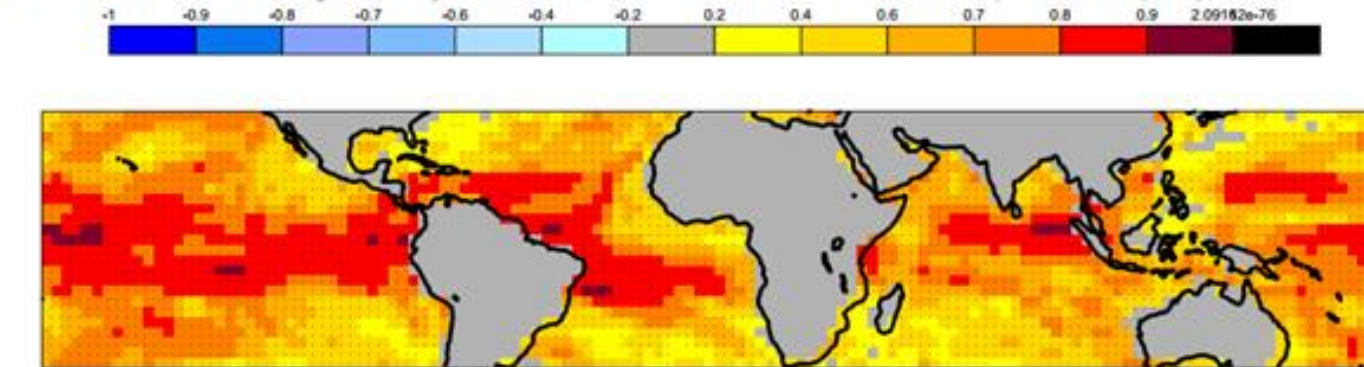
### Time Series

Data values near location 1.15°N 76.65°W, Mocoa, Colombia

Total precipitation over the last 6 hour (mm)



Anomaly Correlation Coefficient for ECMWF with 15 ensemble members  
Sea Surface temperature  
Hindcast period 1981-2010 with start in March average over months 2 to 4  
Black dots for values significantly different from zero with 95% confidence ( 1000 samples)



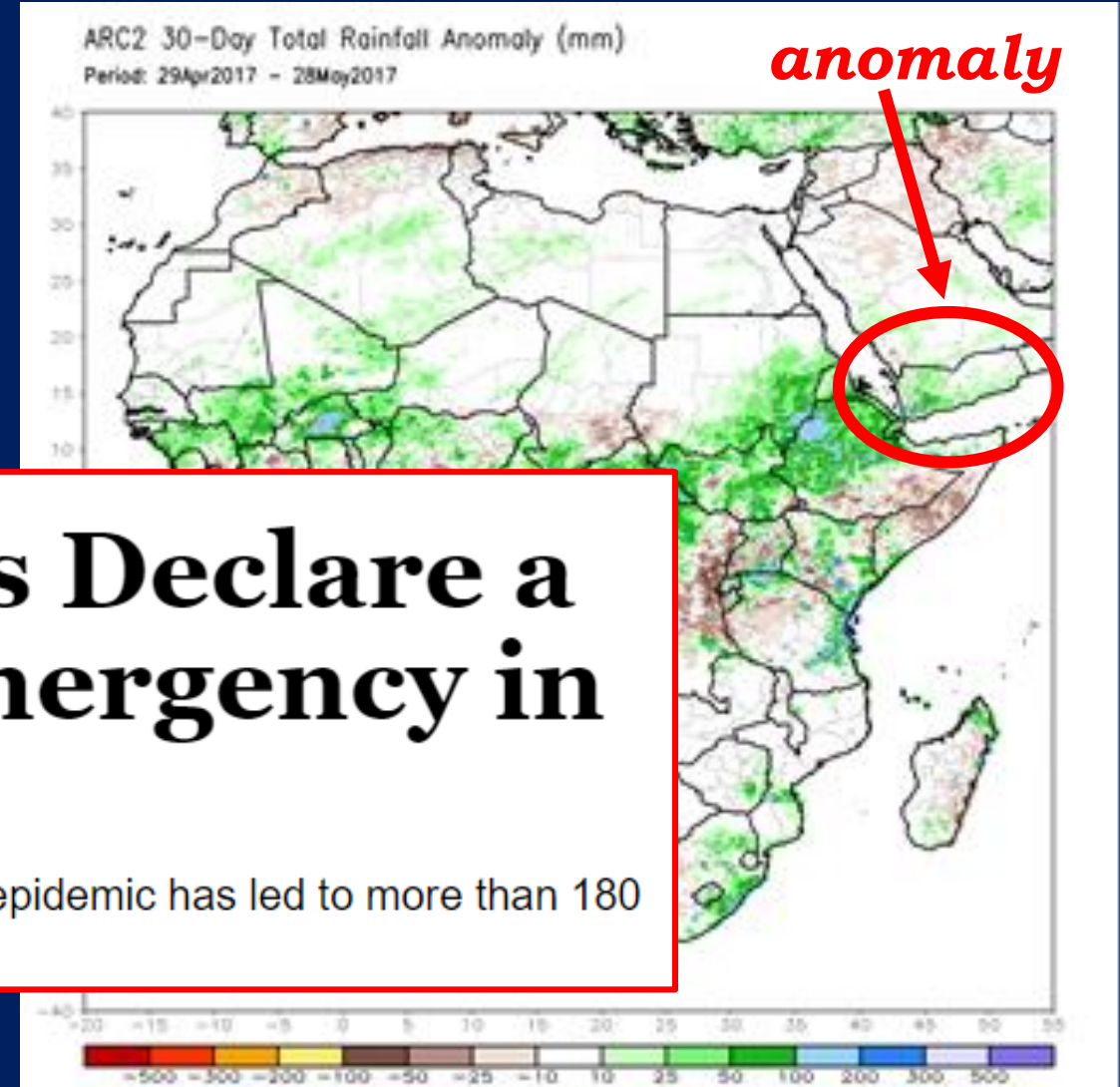
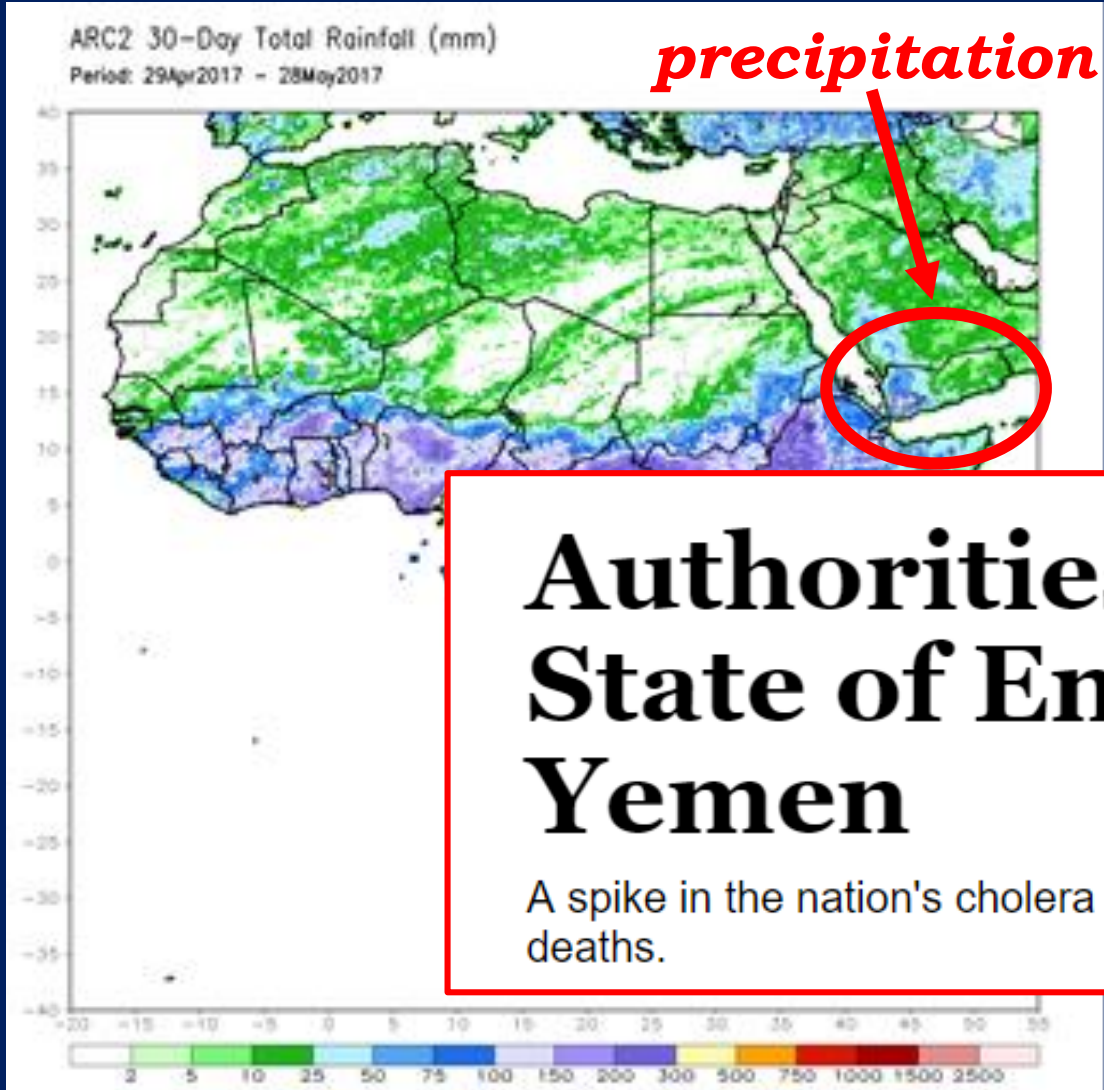


It is not always a case of beauty since ECML prepares many types of reports. Some of them can be rather ugly from the very beginning  
 The latest case refers to the new outbreak of cholera over Yemen

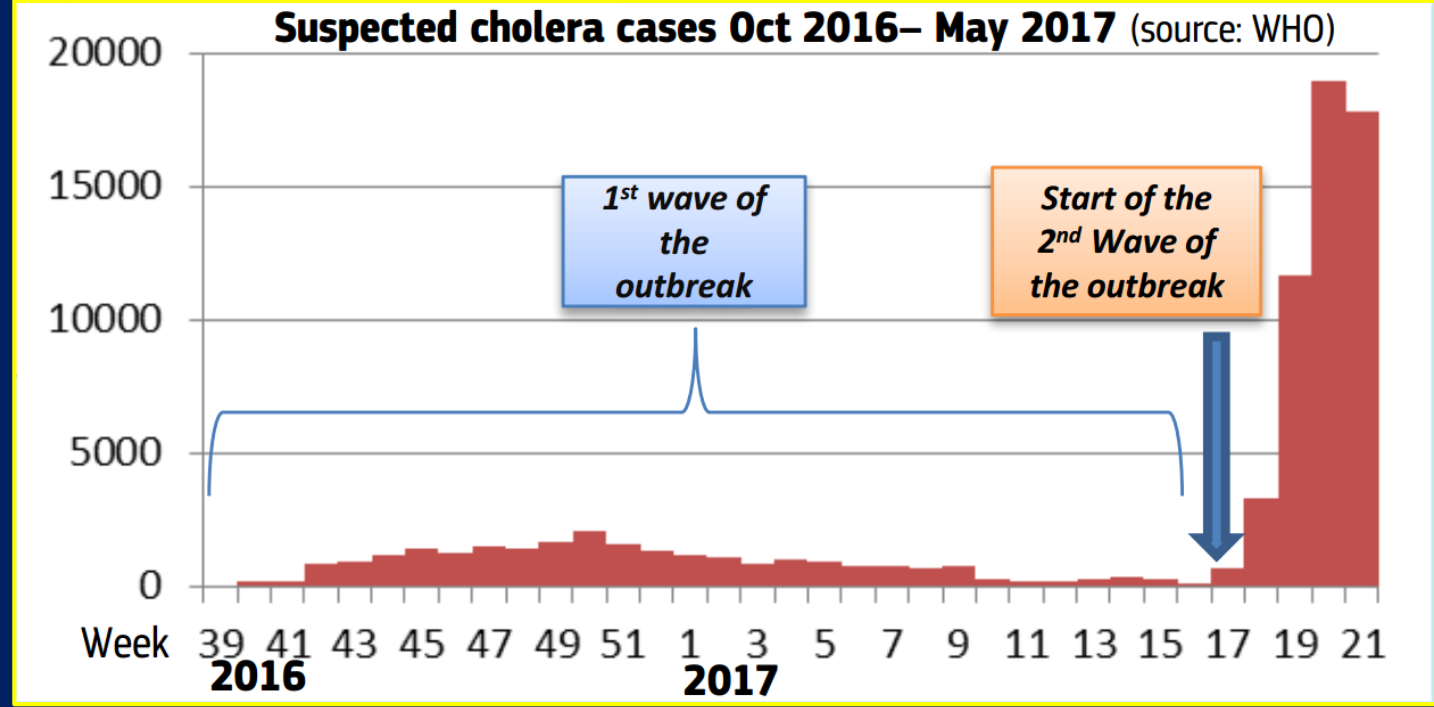


Week 17 April 24, 2017

Between 27 April and 27 May 532 deaths have been confirmed over Yemen while more than 65,000 are suspected cholera cases. This latest outbreak seems to be linked to the recent warm weather & rains ...



**Authorities Declare a State of Emergency in Yemen**  
 A spike in the nation's cholera epidemic has led to more than 180 deaths.



RESEARCH ARTICLE

Identification of Climatic Factors Affecting the Epidemiology of Human West Nile Virus Infections in Northern Greece

Nikolaos I. Stilianakis, Vasileios Syrris, Thomas Petroligakis, Peeter Pärt, Sandra Gewehr, Stella Kalaitzopoulou, Spiros Mourelatos, Agoritsa Baka, Danai Pervanidou, John Vontas, Christos Hadjichristodoulou

Published: September 15, 2016 • <https://doi.org/10.1371/journal.pone.0161510>







*beware of that brutal beauty ...*

WORLD NEWS

## The science behind the brutal beauty of Mediterranean cyclones

<http://www.euronews.com/2014/11/10/the-science-behind-the-brutal-beauty-of-mediterranean-cyclones>



*Malta, 7-8 November 2014*



# inside the beauty of early 2017 events there existed the ... beast

3-7 January 2017 & 11-12 January 2017

Two Arctic Cold Outbreaks hit central Europe & Balkans

Blocking ridge strengthens across N Atlantic & W Europe

Arctic airmass pushed across East-Central Europe

01

artific outbreak >30

Frozen Fox as found by a hunter close to the source of Danube in ...

Donauquelle in Donaueschingen

6 February 2017

Heavy snow and avalanches have killed more than 100 people and injured dozens in Nuristan ...

Avalanches over Pakistan and ...

05

avalanche >100

16 March 2017

Northeast Braces for Potentially Historic March Blizzard

Total Observed Snowfall March 14th - 16th, 2017

09

blizzard >7

11 January 2017

During a Zud event animals die primarily due to starvation not being able to graze, or in other cases directly from the cold ...

Zud ...

Dzud (Zud) on-going winter event

causing massive loss of livestock in ...

02

15 February 2017

Bush Fires in ...

wildfire threatens city of Christchurch

bush fire 11

State of emergency declared as residents flee Christchurch bushfires

06

3 April 2017

Mudslides over Mocoa ...

landslide >250

More than 200 dead, many missing in ... mudslides

10

THE SUM OF ALL FEARS

earthquake / snowstorm 29

Earthquakes Avalanches Snowstorms ... and a hotel buried totally under snow

18-20 January 2017

The sum of all fears hits central ...

03

27 February 2017

3 Dead, 7 Missing After Heavy Rains in ...

flood 3

Floods kill three, leave millions without water

Torrential downpours cause floods, mudslides

07

10 April 2017

Tropical Cyclone Cook

Early Week

- Wind gusts 140 - 150 km/h
- 125-250 m of rain
- Coastal flooding

Tropical Cyclone Cook hitting ...

TC 1

08

30 January - 2 February 2017

Forest Fires over ...

Vichuquen 15 ←

Llico 22 ↑

Los Cristales 7 ←

forest fire 11

It is going to take only an interval of only 25 days for the same country to be hit by heavy rains ...

04

3 March 2017

TC Enawo hits ...

Vanilla prices are giving scoop shops a giant ice-cream headache

The source of the problem is the distant island nation of 8,500 miles from Boston, where a cyclone in March devastated the farms that supply more than 80 percent of the world's vanilla beans. In the wake of the storm, some distributors have resorted to rationing supplies. For local scoop shops, it's a giant ice-cream headache.

TC 81

08

11 April 2017

Mudslides may portend a new El Nino chaos ...

mudslide >130

Mud Erased a Village in Sign of Larger Perils in South America

Barba Blanca Village

12