

# First Expert Forum for Producers and Users of Disaster-related Statistics

## Managing climate change-related hazards with official statistics

### WMO Cataloguing of Hazardous Events (WMO-CHE)

WEATHER CLIMATE WATER  
TEMPS CLIMAT EAU



**WMO OMM**

World Meteorological Organization  
Organisation météorologique mondiale

**James Douris**  
**Project Officer**  
**World Meteorological Organization**

**8 June 2021**

# Goals of the WMO-CHE

- The WMO CHE is a Service that will benefit Countries their national loss and damage stakeholders such as disaster management authorities
- Providing hazard event information that is scalable, granular, and usable.

# WMO-CHE the How and Why

Observing and recording weather, climate, water and space weather hazardous events through a standardized operational process just like temperature and wind observations.

## What are the current challenges?

In many cases attribution and context of a recorded loss is not accurately associated to the correct causal hazard or linked to the larger physical system.

## Example:

- Typhoon Haiyan, November 2013, Philippines and Vietnam
- El Nino 2015

# Typhoon Haiyan / Yolanda 2013

## Characteristics

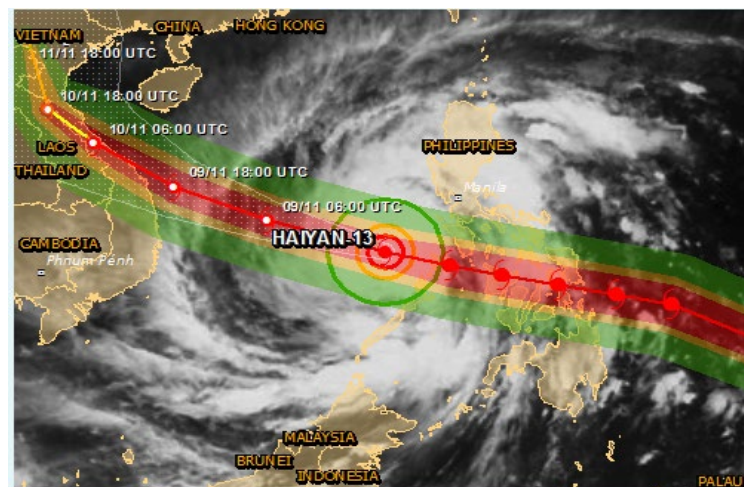
- Max wind: 230 km/h
- Coastal surges: up to 5 meters

## Reported loss and damage

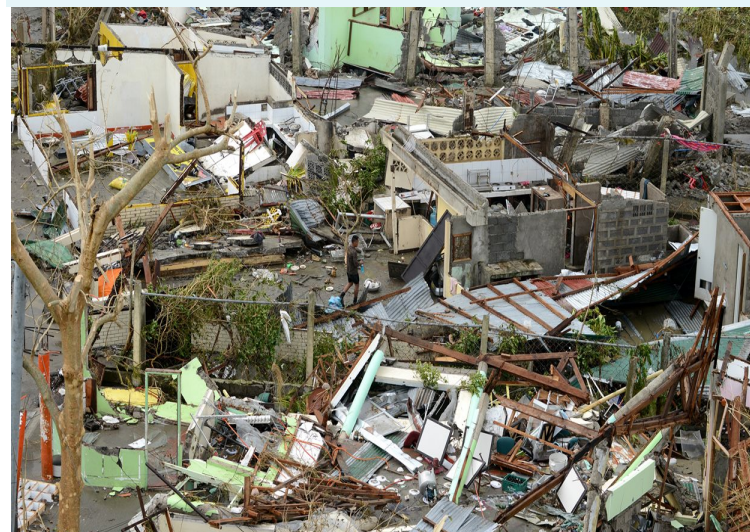
- More than 6,352 deaths with 1,071 missing
- 14 millions people affected
- 850 million USD damage

How are loss and damages attributed to each causal hazard (Wind, storm surge, rain, flooding, disease outbreak, loss of power... etc)? in a systematic and authoritative way and linked to the larger system.

How do we ensure loss and damage is recorded for the lifespan of the hazard (e.g., impacts from all countries Philippines, Vietnam, SIDS) ?



Cloud map. The map shows the areas affected by tropical storm strength winds (green), 58mph winds (orange) and cyclone wind strengths (red). (Source: JRC)





# El Nino 2015

## *Characteristics*

- Prolonged drought in vast area, Asia, etc.
- Heavy rain in South America.

## *Example of reported loss and damage*

- Severe impact on sectors: agriculture, forestry, transport, trade, industry, tourism, ...
- Estimated economic impact 25Bn US\$ for Indonesia (2% of GDP).

How are losses and damages (national to global) attributed to El Nino or other slow onset hazards in a systematic and authoritative way?



# Attribution of extreme events to climate change

- If a pattern of extreme weather persists for some time, such as a season, it may be classed as an extreme climate event, especially if it yields an average or total that is itself extreme (for example, drought or heavy rainfall over a season). Natural climate variability (including phenomena such as El Niño) typically generates weather and climate extremes.
- While very few studies have yet found any human signal in small-scale severe weather events such as thunderstorms and tornadoes, there has been progress in attributing individual extreme events that occur over larger scales.
- There is increasing interest in attribution of events relatively soon after the event using already established methods.
- Almost every study of significant heatwaves since 2015 has found that probability has been significantly increased by anthropogenic climate change. For example,
  - Research conducted by Imada et al. (2019) found that the heatwave that affected Japan in July 2018 would have been impossible without human influence.
- Further information on this topic can be found in the **forthcoming WMO Atlas of Mortality and Economic Losses from Weather, Climate and Water Extremes (1970-2019)**.

# WMO-CHE Goals

- Strengthening Members capabilities to record weather, climate, water and space weather events in a systematic way (for forensic meteorology, liability claims, research, and many other disciplines)
- WMO's contribution to the monitoring of the global agenda through an empirical science-based approach
- Strengthening of Member disaster management capacities and MHEWS through improved risk-based information
- Strengthening of WMO leadership related to hydrometeorological and climate related hazards through provision of an agreed upon list of types of events associated with impacts

# A new standard for cataloging hazards

WMO 18<sup>th</sup> Congress (2019) **Adopted** the WMO Cataloguing of Hazardous Events methodology

**Uniqueness of event record** - Assigning a universally unique identifier (UUID) number to each event including key attributes of the event into a data record; and,

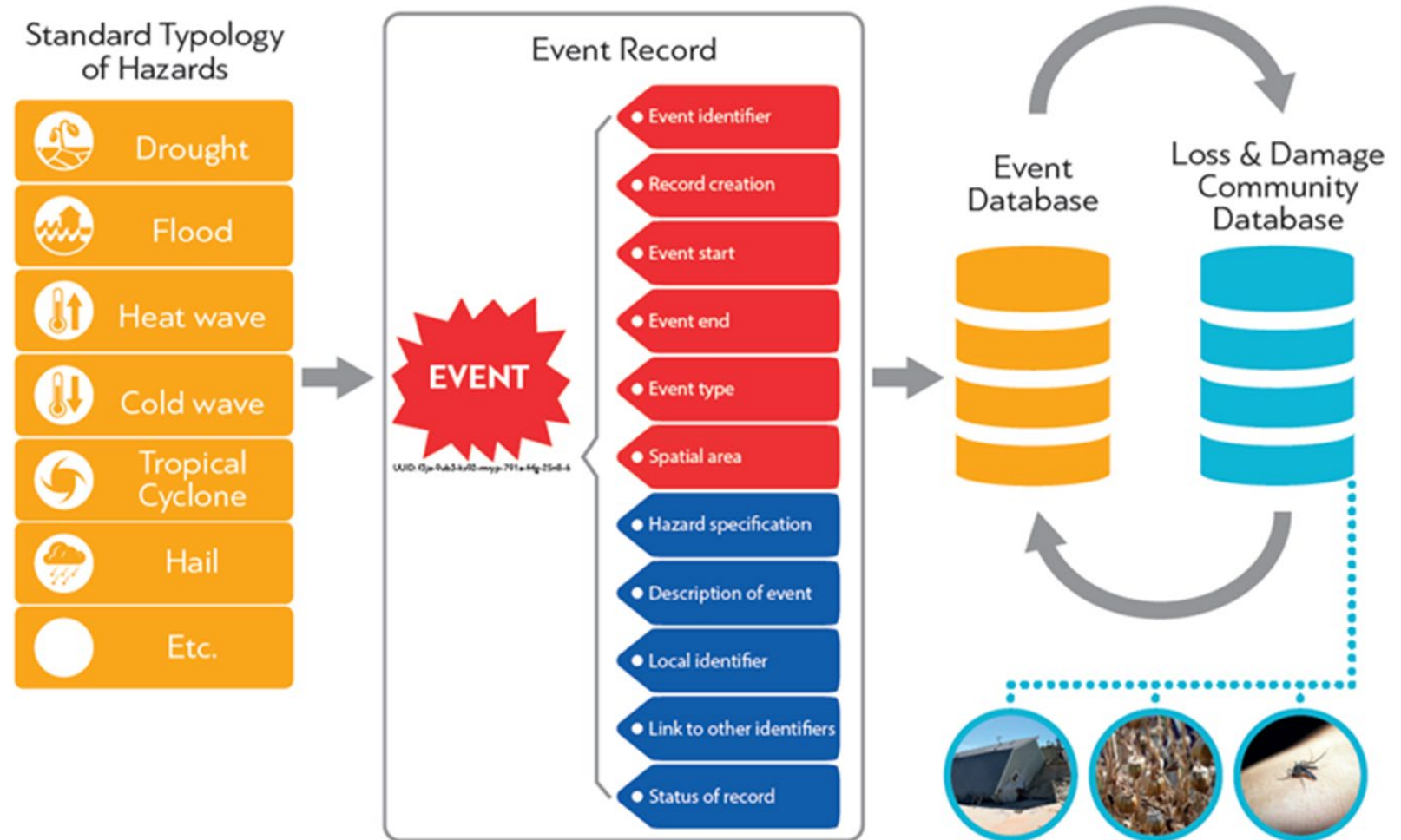
**Events List** - A standard living list defining typology of events that could have impact on society.

**Scalable** - Enables empirical linking of events (e.g., a cyclone, leading to heavy rain, strong winds, storm surge flooding and landslides) to better reflect the larger system (synoptic scale).

**Flexible** - Provides the flexibility for addressing regional and national specificities

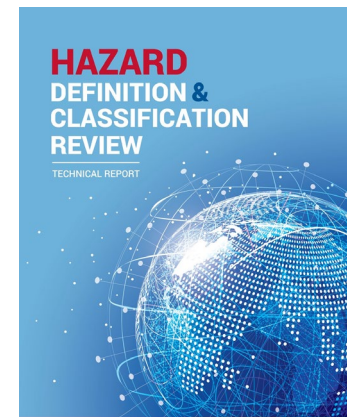


# The Cataloguing Methodology



# WMO Events List

- Initial list of event types with which losses and damage are potentially associated
- **Authoritative list of event types (hazards)** that is non-technical and practical which will facilitate standardization of event terminology that is under the mandate of the WMO.
- **Not intended to be a hierarchical** list based on causalities but to be a flat list to facilitate observation and recording. Hierarchies should be developed or codified during the post-event analysis based on the actual linkages between and among hazards that caused losses.
- Can be amended by countries and regions through the appropriate WMO governance mechanism
- **Synergizes with the UNDRR / ISC Hazard Definition & Classification Review: Technical Review**  
<https://council.science/events/hazards-report/>
- In the coming year, the WMO events list is expected to be expanded to the UNDRR / ISC Hazard list for hydromet, climate and space weather hazards.



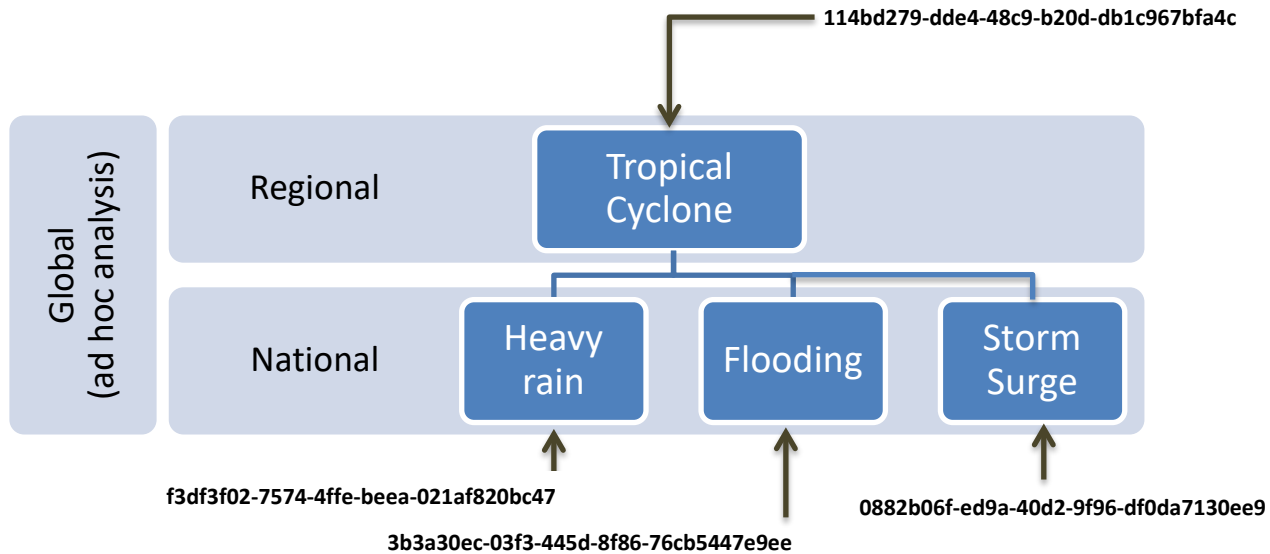
# Events list (Initial global common list)

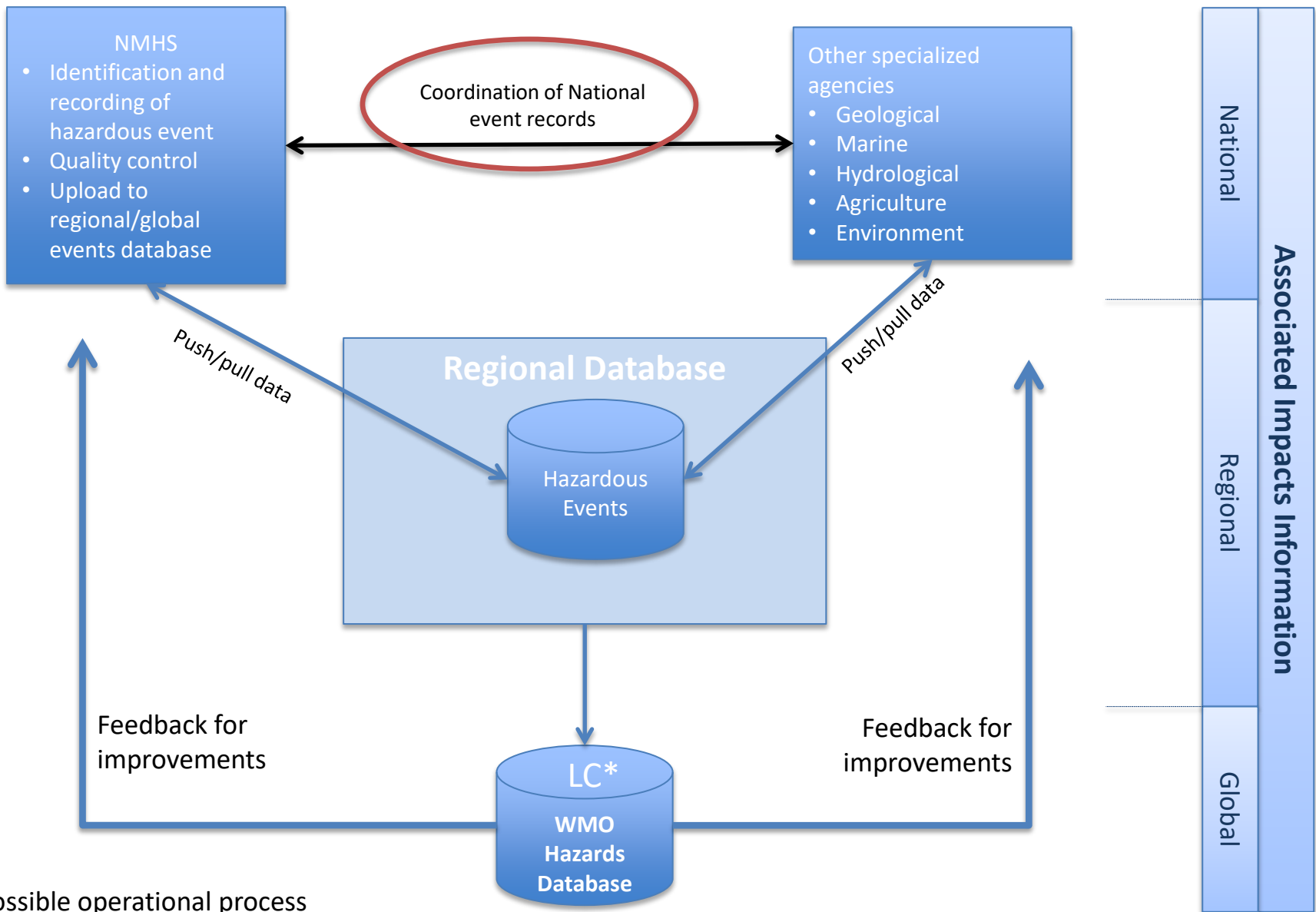
1. Avalanche
2. Cold wave
3. Drought
4. Dry spell
5. Dust storm
6. Sandstorm
7. Extra-tropical cyclone
8. Flood
9. Fog
10. Freezing rain
11. Frost
12. Hail
13. Haze/Smoke
14. Heat wave
15. High Seas
16. Rogue waves
17. High UV radiation
18. Icing
19. Landslide
20. Mudslide
21. Debris flow
22. Lightning
23. Pollen pollution/Polluted air
24. Rain
25. Wet Spell
26. Snow
27. Snowstorm
28. Space weather event
29. Storm surge/Coastal flood
30. Thunderstorms
31. Squall lines
32. Tornado
33. Tropical cyclone
34. Tsunami
35. Volcanic ash
36. Wild land fire/Forest fire
37. Wind



# Cascading Event Records

Event UUID: random string of 32 characters



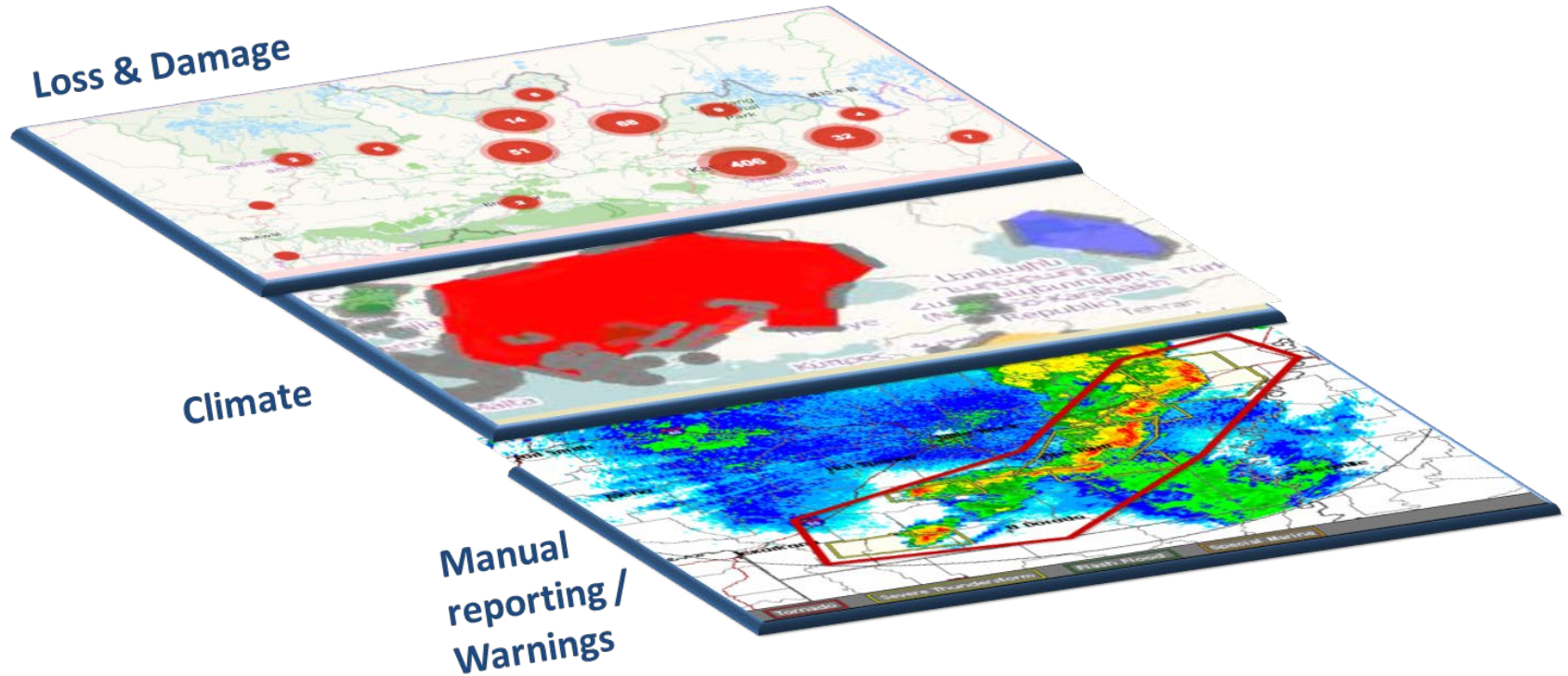


Possible operational process  
 Could be a global database with regional input

\* **Possible Lead Center for global hazard information**  
 \*\* Information on historical and ongoing extremes



# Applications: Layering of Information



- Layering of event information enables new possibilities for analysis and application.
- Provides a platform for:
  - Higher quality impact-based forecasts
  - Enhanced research into the historical relation between/among hazards
  - Detailed hazard and impact information for risk analysis (higher granularity of data)
  - Many other applications....

# Example of applications

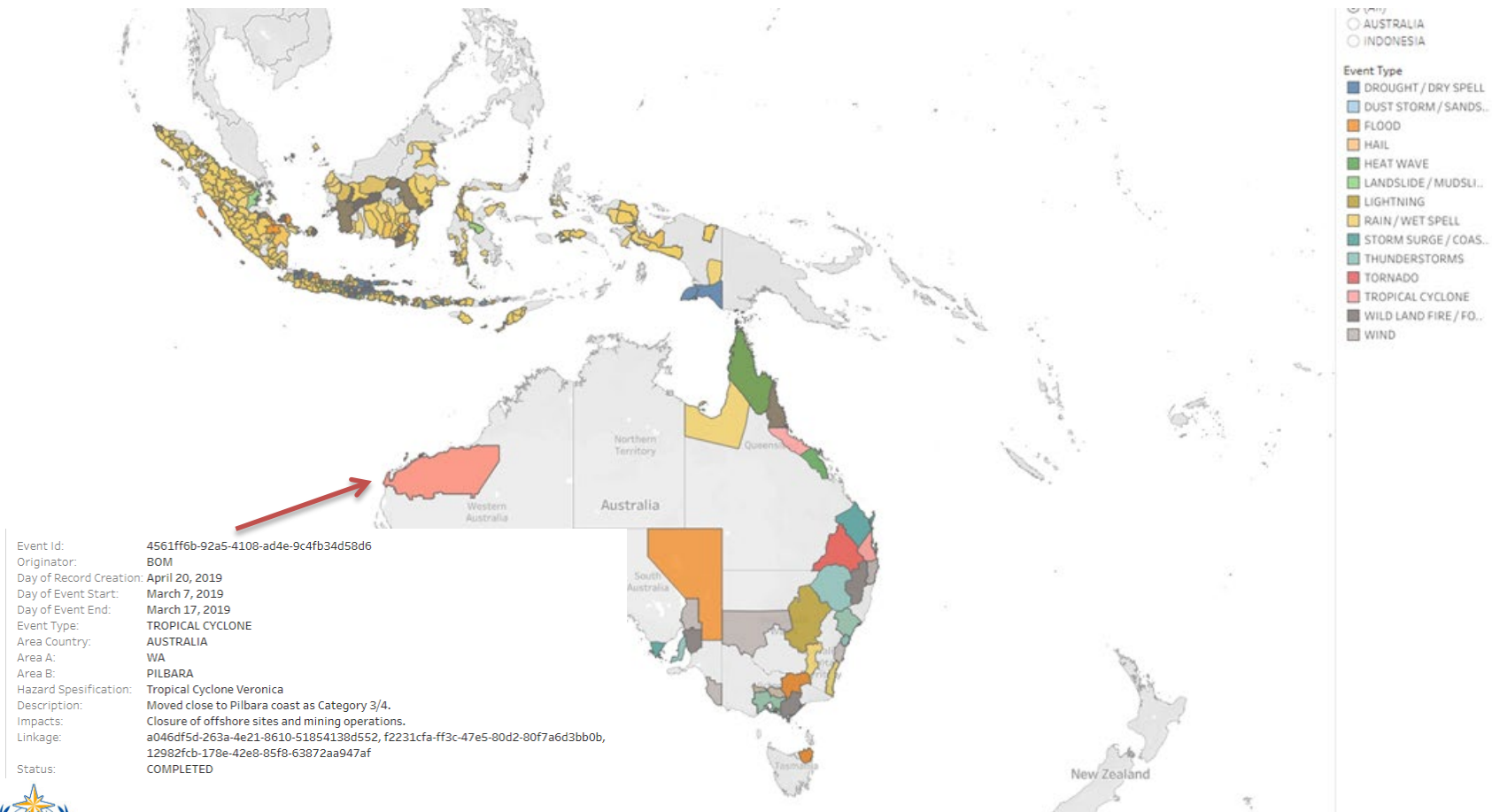
- Tracking global policy indicators
- Risk management (public and private sector)
  - Risk identification (hazard component, empirical methodology of understanding hazards, how hazards interact with other hazards and their combined impacts)
  - Risk reduction (e.g. empirical methodology to quantify past events as input to developing building standards, land use planning, strengthening MHEWS and disaster planning )
  - Risk transfer (insurance, risk facilities, cat bonds)
- Research
  - Tracking event trends in event frequency, severity and distribution
  - On causal contributions of hazards, exposure and vulnerability to losses

## Two pilots of the WMO-CHE

---

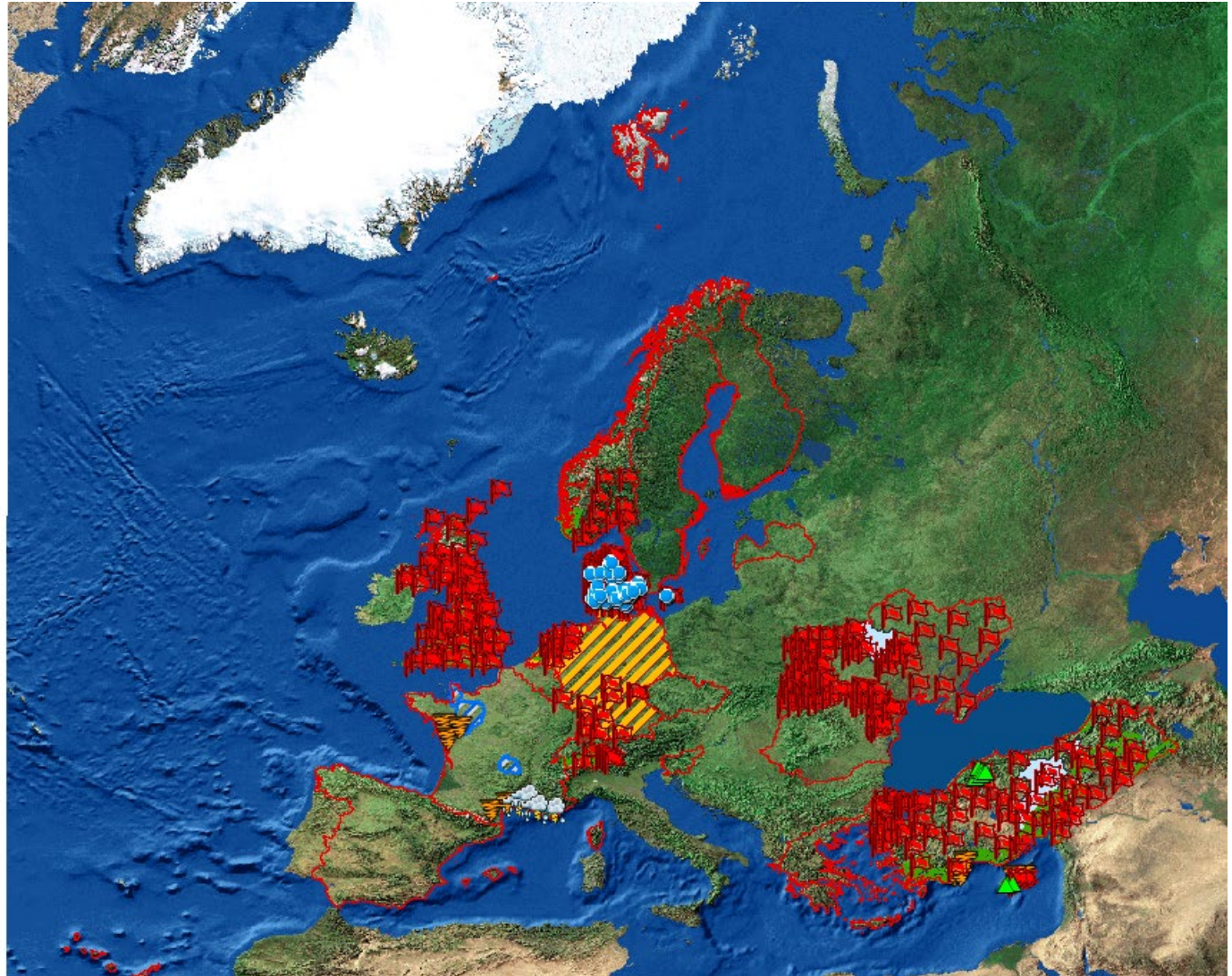
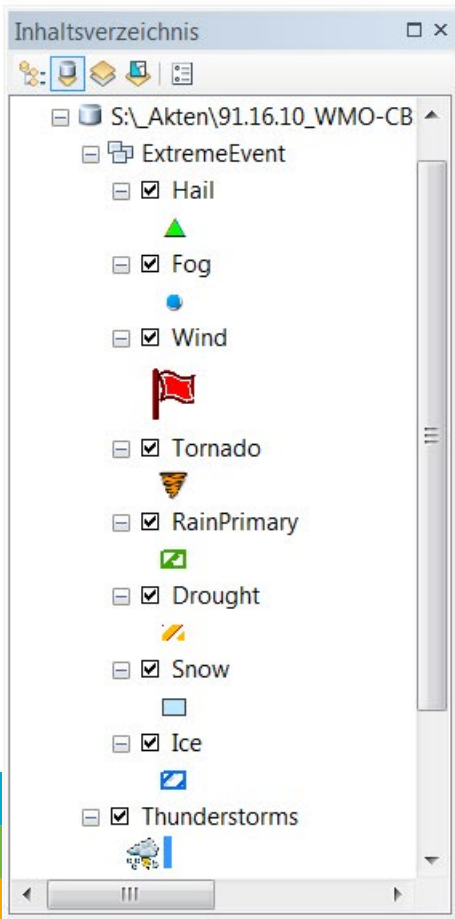
# Testing the new Standard Asia and South Pacific

1,300 records of hazardous events from August 2018 to today.





# in Europe





# Thank you

WMO Cataloguing of Hazardous Events



**WMO OMM**

World Meteorological Organization

Organisation météorologique mondiale