European Early Warning Systems: Present and the Future

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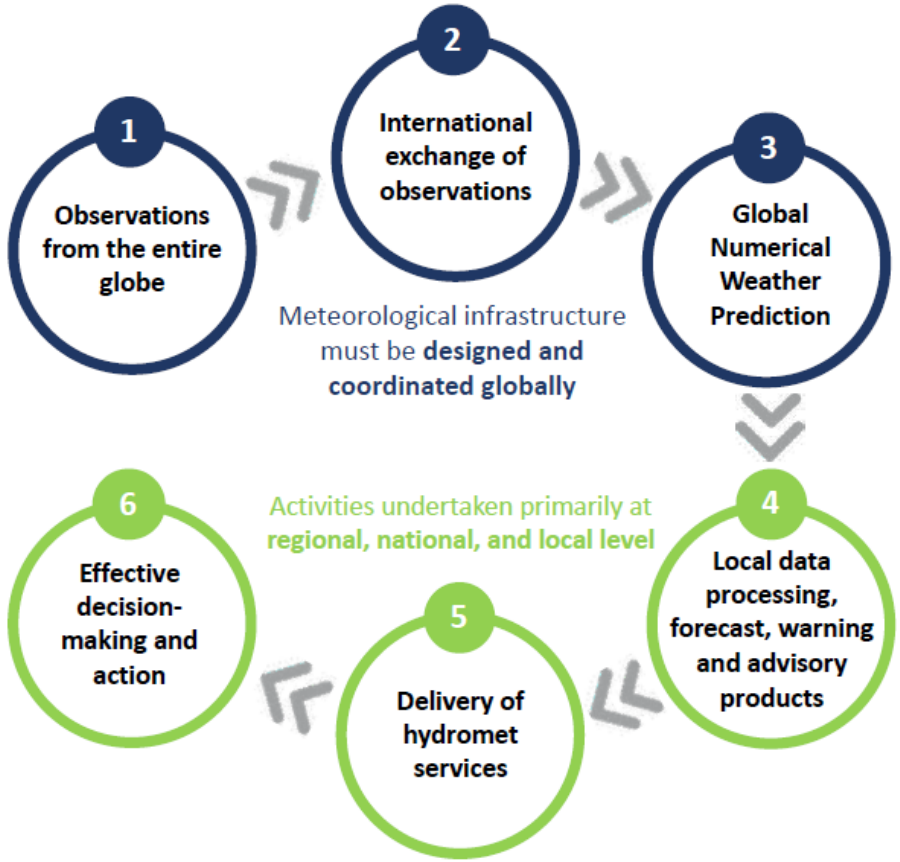
European MHEWS

- A variety **of multi hazard early warning systems (MHEWS)** have been developed and successfully implemented over the last decades at the national, regional and European levels.
- International organizations and partnerships have **long history and proven record of performance** in establishing national and cross-border MHEWSs.
- The **successful implementation** always relies on a **close cooperation** between the NHMSs and all relevant actors, especially the civil protection agencies and the authorities.
- Legal agreements, governing structures and regulations (structure, responsibilities, operational resources) are **essential** for effective, successful and sustainable MHEWS.
- The **multi hazard approach** is becoming increasingly popular. Considering cascades of events, bringing together experts from different fields and the seamless linking of alerting systems.
- We will take a short look on the French **Vigilance**, EUMETNET **Meteoalarm**, **Aristotle-eENSHP** and the **SEE-MHEWS** as examples for successful implementations of MHEWSs in Europe.

Requirements MHEWS



Source: Alliance for Hydromet Development

- Meteorology and hydrology demand extensive **international cooperation.**
- Timely, accurate local weather forecasts require **observations** of the initial state of the atmosphere from around the globe.
- NMHSs and their partners collect and exchange standardized Earth system data as input into **numerical weather prediction** models.
- **Global prediction products** are downscaled to regional then to national and local levels by NMHSs.
- NHMSs generate forecasts, **warnings** and **advisory** products and provide/deliver the services to users.
- These NMHS activities are the **first step** in providing early warning services.
- But effective decision making and action requires a **further step.**

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Requirements MHEWS

- Emergency response and disaster risk reductions efforts provide a **further step**.
- Need to establish **strong partnerships** for disaster risk reduction to enhance disaster preparedness and improve decision-making.
- **Legal frameworks** that define the scope of work and the complementary relationship between all national agencies that **are essential partners** in emergency situations.
- These include the NMHS, disaster risk management authority, hydrological service, environment protection agency, health care coordinators and many others.
- In the **crossborder context,** number of actors is multiplied, the need for a comprehensive governance and operating procedures is even greater.
- A regional framework, supported by cross-border agreements, is necessary to **harmonize** operations and the production of warnings and to **coordinate** emergency response.

UNDRR Sendai Framework of Actions (2015-2030)

Paradigm shift in national or local agencies (NMHSs) in:

- Advancing from providers of forecasts and warnings to producers of
  impact-based forecasts and risk-informed warnings
  From what the **weather will be** to **what the weather will do**
- Assuming **active roles** in all aspects of the disaster risk management cycle and providing better **risk-based** decision support services.

To develop and strengthen:

- **people-centred** multi-hazard forecasting and early warning systems,
- tailor them to the **needs of users**, including social and cultural requirements
- and broaden **release channels** for disaster early warning information

Imagine how your user thinks, feels and what she/he reacts on!

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Vigilance (Météo-France)

In December 1999, storm Lothar caused devastating damages in Western Europe.

Météo-France launched **Vigilance** in 2001. The system provides 24-hour advanced warnings of weather-related risks to citizens and public authorities. Key factors for success are:

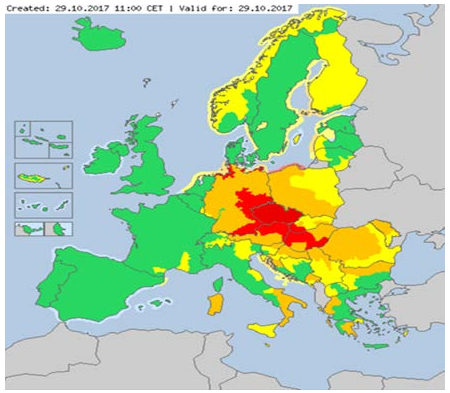
- **Simple, easy-to-understand** information (four warning levels: Red/Orange/Yellow/Green)
- Using most **up-to-date information** – real-time updated information is provided at least twice a day using latest observations and the most recent forecast.
- **Continuous evolvement** – adjustments are made based on user feedback and on yearly assessments (observations and impacts).
- A **multi-user-oriented system** - same information for all (citizens, media and civil protection).
- Progressively integration of new warning parameters (hazards).

The systems served as **best practice example** for the development and the implementation of the national warnings systems of the European NHMSs.

Meteoalarm – alerting Europe for extreme weather

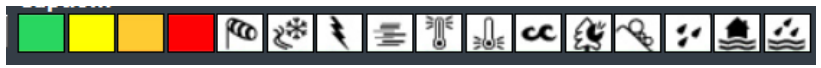
www.meteoalarm.org

What is Meteoalarm?

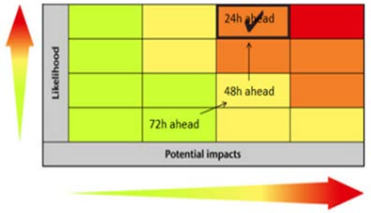


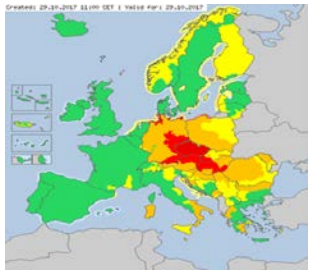
The standardization, aggregation and dissemination of warnings across Europe would take much more coordination. That task was assigned to **EUMETNET.**

Meteoalarm, operational since 2007, is an impact-oriented, common framework to aggregate, display and make available meteorological and hydrological warnings of EUMETNET members in an easy and understandable way to the general public and to European (re)users.



Concepts





Meteoalarm **extended warnings** to add expected impacts and advisories. UNDRR Sendai Framework compliant (priority 4: “people centred multi-hazard early warning systems”).

Impact-based warning decision done on a national basis.

Uses **unified symbols** for different hazards, **polygons** to designate affected areas

Easily readable output in **Common Alert Protocol** (CAP) format. Dissemination of warnings to (re)users via RSS/ CAP feeds and APIs.

Meteoalarm 3 C‘s: Content, Communication and Co-operation

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Meteoalarm – alerting Europe for extreme weather

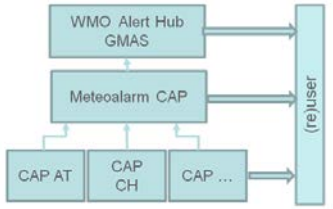
www.meteoalarm.org

Hard facts

- **Integrated regional warning system** in 33 languages.
- **Authoritative warning information** from 37 NMHSs in WMO Region VI.
- Operational since 2007.
- **Easy and understandable** four level colour code.
- 12 warning parameters.
- Supports impact descriptions and instructions/advisories.
- Added common value through consistent warning philosophy.
- easy access to information for all, including technical platforms.
- Considered as best practice.

Community building

Communication with civil protection on national and European basis (ERCC), integration of national partners (hydro services,…)



Joint development of guidelines and warning concepts

Enhance cross-border collaboration through workshops and communication tools

Exchange of best-practices: „How is it done in your country“?

Yearly partner group meetings

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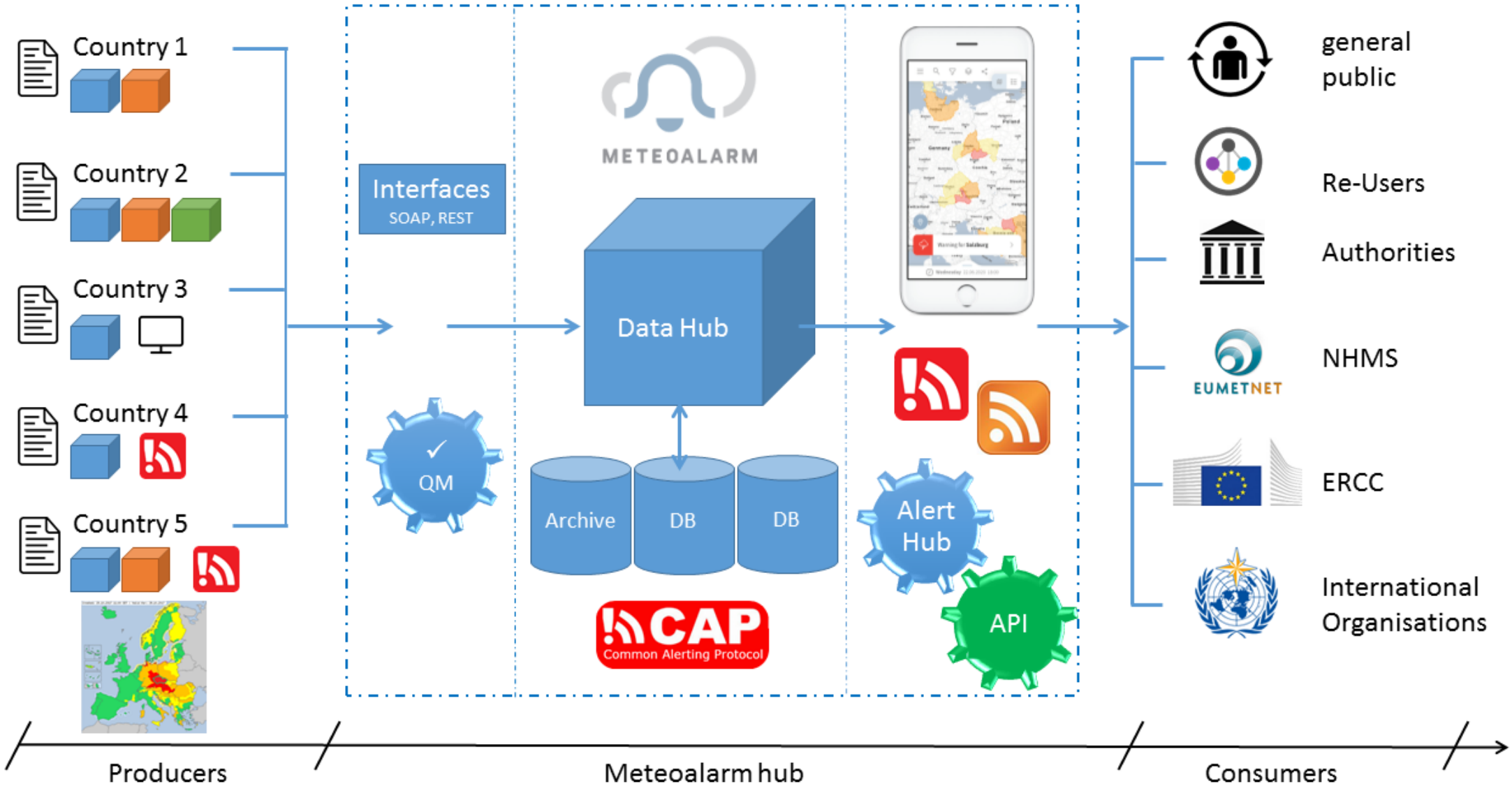
EUMETNET Meteoalarm – Flow of information

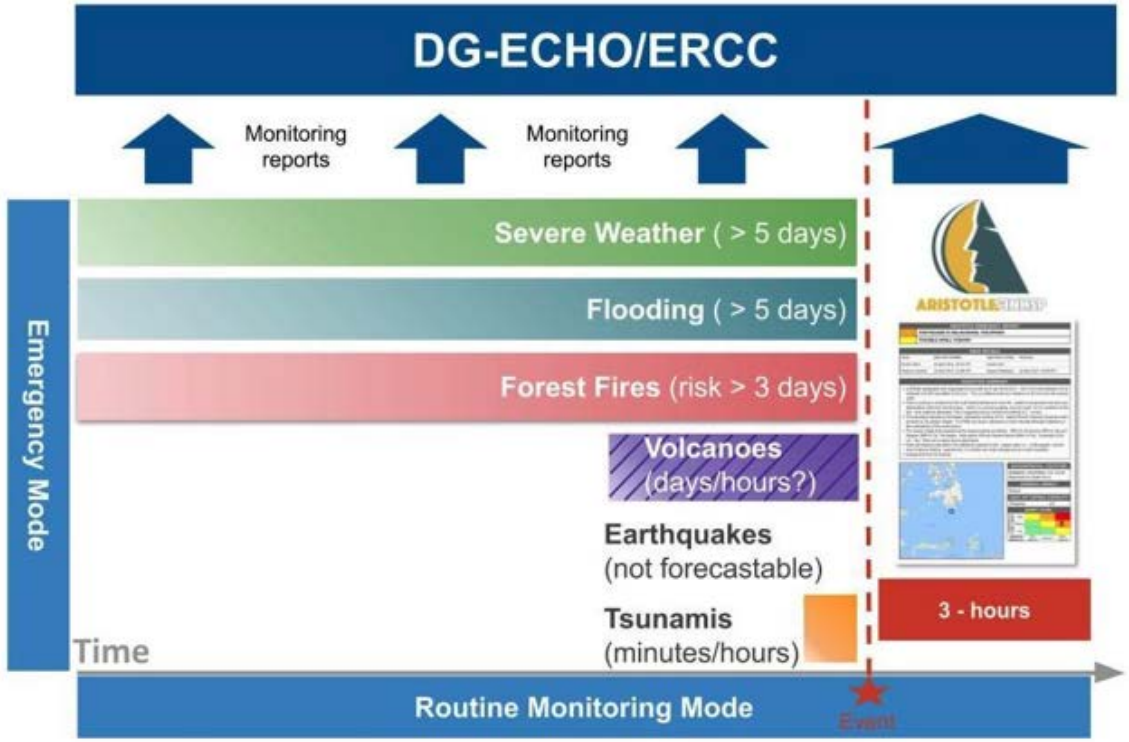


ARISTOTLE-eENSHP (European Natural hazard scientific partnership)

An **operational multi-hazard expert advice system** to support the monitoring and analysis functions of the Emergency Response Coordination Centre (ERCC) of the European Commission.

Partners: Consortium of mandated European research and service institutions providing natural hazard information at national level.

Aim: To deliver to the ERCC global 24x7 multi-hazard scientific advice in a single and unified multi-hazard scientific assessment of the ongoing and future events.

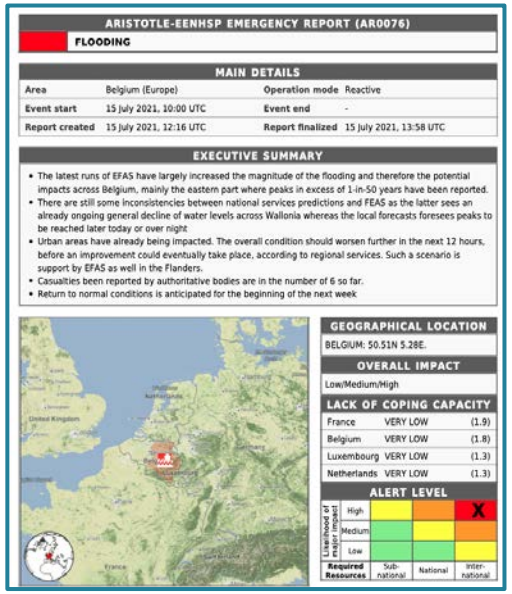


enhanced European Natural Hazard Scientific Partnership
Contract n. ECHO/SER/2020/830887+830888

ARISTOTLE-eENSHP: Operational modes and products

Emergency response mode (ERM)

- +3 hours after activation by ERCC (reactive or proactive)
- Multi-hazard impact oriented reports
- Verbal interaction with the ERCC



ARISTOTLE-EENHSP EMERGENCY REPORT (AR0076)

FLOODING

MAIN DETAILS

Area	Belgium (Europe)	Operation mode	Reactive
Event start	15 July 2021, 10:00 UTC	Event end	-
Report created	15 July 2021, 12:16 UTC	Report finalized	15 July 2021, 13:58 UTC

EXECUTIVE SUMMARY

- The latest runs of EFAS have largely increased the magnitude of the flooding and therefore the potential impacts across Belgium, mainly the eastern part where peaks in excess of 1-in-50 years have been reported.
- There are still some inconsistencies between national services predictions and FEAS as the latter sees an already ongoing general decline of water levels across Wallonia whereas the local forecasts foresees peaks to be reached later today or over night
- Urban areas have already being impacted. The overall condition should worsen further in the next 12 hours, before an improvement could eventually take place, according to regional services. Such a scenario is support by EFAS as well in the Flanders.
- Casualties been reported by authoritative bodies are in the number of 6 so far.
- Return to normal conditions is anticipated for the beginning of the next week

GEOGRAPHICAL LOCATION

BELGIUM: 50.51N 5.28E.

OVERALL IMPACT

Low/Medium/High

LACK OF COPING CAPACITY

France	VERY LOW	(1.9)
Belgium	VERY LOW	(1.8)
Luxembourg	VERY LOW	(1.3)
Netherlands	VERY LOW	(1.3)

ALERT LEVEL

Likelihood of major impact	Sub-national	National	International
High			X
Medium			
Low			
Required Resources			

ARISTOTLE-eENHSP Lite report
Volcanic Hazard Group

Date created: September 19, 2021 - 17:22
Author e-mail: aristotle.ingvoe at ingv.it

Geographic location: Cumbre Vieja, La Palma (Spain)
Event timing: 19 September 2021

Description |

Description of events: The Cumbre Vieja volcano, located in the South of La Palma, began erupting at approximately 15:15 local time on 19 Sept 2021, following eight days of intensifying seismic activity associated with a magmatic intrusion. Early images and videos shared via social media indicate that a fissure opened up on the western flank of Cumbre Vieja, ejecting columns of ash and gas, lava fountains and lava flows. Light ash fall has been reported.

Description of impacts: Vegetation and farmland in the immediate vicinity has been burned and lava flows have cut off a road. Some buildings have been affected. While no exclusion zone has been designated as yet, the La Palma authorities advise the public not to go near the eruption site. Evacuations of nearby communities and animals are underway. Evacuations had begun prior to the eruption, in the communities of Las Manchas (Las Manchas de Abajo, Jedey, San Nicolás and El Paraíso), which includes the municipalities of El Paso and Los llanos de Aridane; El Charco (Fuencaliente), La Bombilla (Los Llanos de Aridane and Tazacorte) and El Remo and Puerto Naos (Los Llanos de Aridane). PEVOLCA have raised the alert level from Yellow to Orange (on a four level scale from Green to Red) The volcano is monitored by the Instituto Volcanologico de Canarias (INVOLCAN). The volcano last erupted in 1971. La Palma is home to approximately 85,000 people.

Sources/references:

Global Volcanism Program: https://volcano.si.edu/volcano.cfm?vn=383010
INVOLCAN: http://www.involcan.org/ INVOLCAN
social media: https://twitter.com/involcan https://www.facebook.com/INVOLCAN
Instituto Geografico Nacional: https://www.ign.es/web/ign/portal/vic-serie-palma
PEVOLCA: https://www.volcanesdecanarias.org/conoce-el-pevolca/
Cabildo de La Palma: https://twitter.com/CabLaPalma

Glossary

Effusive eruption: eruption that predominantly produces lava flows
Fissure: a linear volcanic vent
Lava flow: flow of molten rock whose flow path
Seismic Tremor: ground vibrations related to movement of magma within the ground

Routine monitoring mode (ROM)

- Provided 3 times a week
- Information on potential events developing or updates or those which occurred/are occurring
- (Possible) Verbal interaction with the ERCC

Scientific and Technical Advisory Facility (STAF)

- Remote expert advice service to DG ECHO/SAS (Situational Awareness Sector) during an event
- Provide scenario-based medium-term support to SAS (e.g., impact studies)

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SEE-MHEWS (South-East European Multi-Hazard Early Warning Advisory System)

- Frequent severe **hydrometeorological events** have led to substantial loss of life, livelihoods and extensive damages events in South-East Europe.
- In response, in 2016 WMO initiated a **transboundary approach** for the development of the South-East European Multi-Hazard Early Warning Advisory System (SEE-MHEWS).
- The aim was to **strengthen capacity** in the region and provide operational forecasters with **effective tools** to improve forecasts and warnings.
- An advanced **policy framework** was required to facilitate collaboration and effective functioning between entities at the national and regional levels, especially in transboundary context.
- Forecasters from different countries to **work together** on the identification of potential hazards and their impacts on a **collaborative platform**.
- **Collaborative supports** of national authorities in making harmonized decisions on early actions to mitigate potential impacts.
- A **prototype operational advisory system** was implemented. NMHSs were active in the implementation of the system components, including data preparation and exchange.
- The aim of the third phase is to **fully operationalize** the system. To move form the pre-operational (demonstration) phase to full operations.

Major Challenges and Future

- The **successful implementation** always relies on a **close cooperation** between the NHMSs and all relevant actors, especially the civil protection agencies and the authorities.
- Many of European NMHSs already provide **IBWs.** Nevertheless, most if NMHSs are still in the transition phase from using fixed thresholds or climatology-based thresholds to impact-based warnings using subjective or objective criteria.
- The **technological advances** are quite impressive (e.g. cell broadcasting). But we still have to tailor the systems to the needs of users, including social and cultural requirements and broaden all relevant release channels including social media for sharing disaster early warning information.
- The huge potential benefits of multi hazard early warning systems can only be realized with a **successful crossing of the last mile** - that the warnings, and other related information generated are received, understood, and acted upon by the different user groups or individual users in future.
- We have to ensure the consistent and timely **flow of information** from the producers of the warnings to the decision makers, various user groups and the general public.
- **GMAS** can make extensive use of cooperation principles and technical solutions that have been successfully implemented.