EUMETNET Meteoalarm and CAP

CAP Workshop 2019, 17th – 18th October, Mexico City

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EUMETNET

- **EUMETNET** is an association of 31 European National Meteorological Services
- **EUMETNET** provides a framework to organize co-operative programs between its members in the various fields of basic meteorological activities.
- These activities include observing systems, data processing, forecasting, research and development and training.

http://www.eumetnet.eu
What is Meteoalarm?

• An impact-oriented, common framework to aggregate and display meteorological and hydrological warnings of EUMETNET members
• Making available warnings in an easy and understandable way to the general public and to European (re)users
• Multi-hazard programme created in the 2000s, operational since 2007
• Currently 37 NMHSs and national partners in Europe are participating, programme lead by ZAMG, Austria

http://www.meteoalarm.eu
The success of Meteoalarm

- A consistent common warning picture
  - Cyclone “Hewart” 2017/10/29

- Integrated regional warning system in 33 languages

- Reach out to European users
  - Ops Center of ERCC, Brussels

- Dissemination of warnings to (re)users via CAP
  - Cascading Effect
The success of Meteoalarm

- yearly partner group meetings (Lisbon 2018)
- concept of uncertainty
- joint development of guidelines and warning concepts
- integration of new partners (Moldova 2017)
- worldwide knowledge transfer
Main Concepts

- Added common value through **consistent warning philosophy**, easy and understandable four level color code
- Warning: **tangible and understandable** description of an expected damage scenario (**information on impacts**) and a clear advice what to do (**instructions**)
- Meteoalarm 3 C’s:
  - **Content**
  - **Communication**
  - **Co-operation**

<table>
<thead>
<tr>
<th>Colour</th>
<th>One word</th>
<th>What to do?</th>
<th>Damage / Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green</td>
<td>Weather report</td>
<td>usual phenomena</td>
<td>- - -</td>
</tr>
<tr>
<td>yellow</td>
<td>Be aware!</td>
<td>caution with exposed activities</td>
<td>exposed objects (avoidable)</td>
</tr>
<tr>
<td>orange</td>
<td>Be prepared!</td>
<td>keep informed in detail, follow advice of authorities</td>
<td>general damages (not avoidable)</td>
</tr>
<tr>
<td>red</td>
<td>Take action!</td>
<td>follow order of authorities under all circumstances! be prepared for extraordinary measures!</td>
<td>extreme damage and / or casualties extreme damage (mostly) on large areas, threatening life and properties (not avoidable, even in otherwise safe places)</td>
</tr>
</tbody>
</table>
Heavy Rain up to 150 mm
Endangered lives of people, expect damage of properties flooding and flash flooding, risk of mudslides and landslides. Expect significant traffic and transport difficulties.

what ?

what happens exactly ?
szenarios, impacts and advisories updates

where, when ?
Storm/Rain October 29, 2018 – European level
Storm/Rain October 29, 2018 - Country level

Wetter-Warnungen: Kroatien

Gefahrenstufenberichte - Detaillierte Informationen über die Warnungen finden sich in den Berichten der einzelnen Länder. Bitte die entsprechenden Gebiete auswählen.

Kosten:
- Kvarner and Kvarneric region
- Middle Dalmatia region
- North Dalmatia region
- South Dalmatia region
- Velebit channel region
- West Istrian coast region

Legende:
- Gültigkeit: Aktuell, Morgen
Storm/Rain October 29, 2018 - Regional level

Wetter-Warnungen: Gospos region

Gültig von 29.10.2018 00:00 CET bis 29.10.2018 23:59 CET
Regen
Hrvatski:
Mjestima precozi ubrzo ispod kida, kako izvan obrine 80-140 mm POSUĐI NA MERE kako bi se zaštitili. Djelujte prema savjetima domaćih od strane nadležnih službi. Obrazlužite se izobranih poplavnih područja i odmah skrenite odlazak iz značajnog rizika za život i možda i evakuacije. Vjerujte ih već prekine u prometovanju i prekini i gubitak energije, komunikaciju i opskrbe vodom. Opasni uvjeti za vožnju zbog smanjenje vidljivosti te proizvodnje na maksimalnim količinama.

English:
Heavy rain locally, rainfall 80-140 mm TAKE PRECAUTIONS to protect yourself. Follow advice provided by relevant authorities. Strong flooding is expected in a large area. Properties will be flooded, lives will be at considerable risk, and evacuations are possible. Major traffic disruptions are likely, along with power outages, communication network failures and water supply interruptions. Difficult driving conditions caused by reduced visibility and wet and slippery roads.

Gültig von 29.10.2018 08:00 CET bis 29.10.2018 23:59 CET
Wind
Hrvatski:
Jak i na udane olujnog susta tvrdi i snažni vjetar, srednja brzina vjetroa 40-75 km/h, najviše u vjetroa 65-110 km/h BIJUÈE SPREMAI na porijeklo, osetljena konstrukcija i rizik od odjeda zbog hruštanja stabala, polovljetnih grana te letih ulošima. Mogu je postupak prema i prekidi opskrbe elektriènom energijom.

English:
Strong SE and S wind with stormy gusts. Average wind speed 40-75 km/h; maximum gust speed 65-110 km/h BE PREPARED for disruptions, building damage and risk of injury caused by uprooted trees, broken branches and flying debris. Traffic interruptions and power outages are possible.

Gültig von 29.10.2018 15:00 CET bis 29.10.2018 23:59 CET
Gewitter
Hrvatski:
Mjestima izraženiji pljucevi i grmljavina, osebilo krajem dana i u noć, vjerojatnost grmljevanje 40-70 % BIJUÈE NA OPREZU zbog moguÊih pada grmljavinskih nevremenih. Posebno pružaje u izdolženim podruËjima kao i to su plane, suane i škvare odnosno otvoreni tereni. Mogu se prekini u aktivnosti na otvorenim.

English:
Thundershows locally, especially in the night. Lightning risk 40-70 % STAY ALERT for possible heavy thunderstorms. Be especially careful in high-exposure areas such as mountains, forests, meadows and open grounds. Intermittents in outdoor activities are possible.
Community Building

• Yearly partner group meetings, topics include:
  – communication with civil protection
  – integration of national partners (hydro-services,…)
  – impact-oriented warnings (damage description and instructions)
  – exchange of case studies and best-practices
  – promoting use of CAP (since 2014) and WMO RAA

• Led to
  – harmonized format of warnings, best practices
  – enhanced cross-border collaboration
  – 31/37 NMHSs delivering CAP, 4 in testmode (as of 10/2019)
Data Collection and Dissemination

- Alerts sent by NMHSs via Common Alerting Protocol (CAP)
- Aggregation and dissemination of alerts in real-time via CAP feeds to (re)users of the data (e.g. apps or services by private sector, WMO GMAS, …)
Status of warnings in Meteoalarm

• **37** NMHSs delivering colour-coded warnings for an agreed set of hazards in a standard technical format
• **12** hazards
• **31/37** transmitting CAP alerts to Meteoalarm, 4 are testing
• **34/37** Countries delivering warning texts
• **29/37** Countries delivering English warning information
• **11/37** Countries delivering „flood“ or „rain and flood“ warnings
• **18/37** Countries delivering impact-oriented warnings, impact information and/or instructions/advisories)
Warning types: IbW, IW and IoW

- **Impact-based warning (~ prod. process)** - Assessment of the expected impact scenario, often multi-hazard
- **Impact-warning (~ prod. process)** - User-specific impact scenarios
- **Impact-oriented warning (~ warning format)** - A warning which has a tangible and understandable description of an expected damage scenario (information on impacts) and/or a clear advice what to do (instructions/advisories) (UNISDR Sendai Framework of Actions)
  - Broader term for all warnings addressing *what the weather will do*
  - Depending on the production process, an IoW may be a climatology-based warning, an impact-based warning, or another type of warning
- Our recommendation is, that NMHSs could start simple with generic damage descriptions/advisories to tell people what the weather will do (IoW)
- Upgrade later to comprehensive IbW-production processes/dynamic texts
Meteoalarm survey on IbW/IoW

• Carried out a survey among Meteoalarm members in August 2018 – May 2019 (79 questions)
• We received filled out questionnaires from 32/37 partners (86% response rate)
• Presentation of results at EMS2019 in Copenhagen (09/2019)
• Publication planned for early 2020
Production process of European NMHSs warnings

Production process of warnings

Fixed thresholds

Climatology-based thresholds

Impact-based warnings
(subjective or objective criteria)

Impact warnings
(individual user criteria – user groups/profiles)

Now: 31 % 66 % 31 % 0 %
Production process of European NMHSs warnings

Now:

- Fixed thresholds: 31% Climatology-based thresholds: 66% Impact-based warnings (subjective or objective criteria): 31% 0%

5 years from now:

- Fixed thresholds: 9% Climatology-based thresholds: 44% Impact-based warnings (subjective or objective criteria): 50% 47%

- How do NMHSs climb the step to IbW?
- How do NMHSs address user needs (user groups/user profiles) to get towards IW?
Feedback loop

- Feedback is often either still missing or not (sufficiently) considered yet!
- It’s important for operational meteorologists to know „what happens out there“ in realtime to verify and eventually adapt their warnings
- Real-time availability and international exchange of ground-truth data is important
- Lacking of standards for feedback (crowdsourced) data
Meteoalarm and CAP – Developments 2018/2019

• Meteoalarm TT on CAP
  • to define mandatory CAP elements for a new Meteoalarm CAP profile
  • to find an agreed position towards OASIS CAP Subcomitee (Event type list)

• Contribution to WMO (CAP/IbW and GMAS)

• Participation in the CAP Workshop 2019 in Hong Kong

• Supporting members to implement CAP
Meteoalarm and CAP - What next

• Meteoalarm TT on CAP to elaborate on
  – Impact-oriented warnings
    • Use of severity, urgency, certainty and other (optional) elements
    • Work on / share (best-practice) examples
  – How to use CAP for low-likelihood high-impact events ("watches", including spatial uncertainty) and risks (e.g. wildfire risk)
  – Meteoalarm “Green Warnings”
    • Broad consensus, that Green (Minor) is not considered as an alert – possible outcome: Meteoalarm will not map/redistribute Green (Minor) warnings
  – Alerting polygons vs. geocode – How to represent national borders in polygons?
  – Refinements of Meteoalarm CAP profile where needed
• Contribution to WMO Guidelines/use-cases on CAP/IoW
Meteoalarm 2.0 - Contentwise

• “Meteoalarm classic” operational since 2007, major redesign required
• Further support EUMETNET members to deliver easy understandable impact-oriented, multi-lingual warnings
• Additional warning parameters
• Incorporation of crowdsourced impact observations
• Worldwide knowledge transfer for regional warning platforms / warning community building
• Support of GMAS (Global Multi Hazard Alert System) concept of WMO
Meteoalarm 2.0 – Technical Aspects

• Based on microservices architecture and MQTT
• Input: Push via SOAP or REST, or pulling ATOM/RSS CAP feeds of NMHSs, output via push or pull (feeds)
• Focus on re-users of the warnings
• New warning parameters (e.g. drought, pollen,…)
• Possibility to process CAP-polygons
• Currently design phase – Start of implementation by the end of 2019
• Operational in autumn 2020
• Retirement of “old” system thereafter
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