RAVI – WG CH
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Task Team HMEWS

Hydro-meteorological early warning system

Caroline Wittwer for SCHAPI

Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE

Ministère
de l'Écologie, de l'Énergie,
du Développement durable
et de l'Aménagement
du territoire

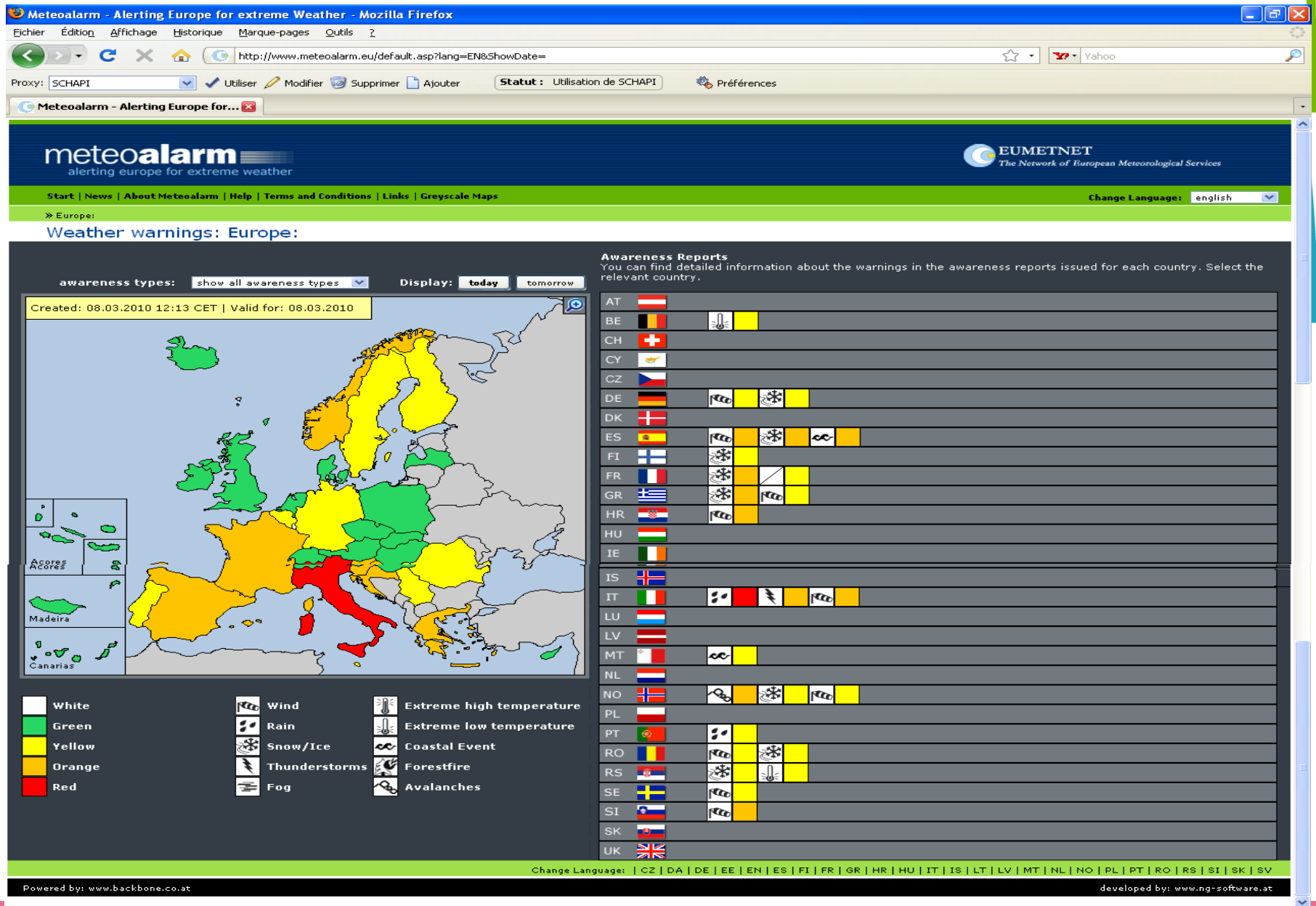
Background

- To create the opportunity to exchange ways to build and/or evolve the hydrological part of a warning system at national and international scale.
- To gather main issues and relevant experiences possibly leading to joint activities within the hydrological services.
- To exchange on practices as a valuable source of improvements.

Objective of TT HMEWS

to provide recommendations on how to build, and use, hydro-meteorological warning systems which include the various types of hazards, such as riverine, coastal, flash, pluvial, urban floods….and other natural hazards (landslide, avalanches, ice jam…)

METEOALARM: the meteorological solution and hydrological hazard????



Initial task :
inventory of national hydrological systems

Questionnaire with 4 parts:

1 : presentation of the product and organisation

2 : description of the system (alert levels, parameters used to assess the hazard, forecasting method)

3 : dissemination of the warnings

4 : perspectives

Issues to be considered for the inventory:

Which kind of hydrological hazard is covered, for which areas (watersheds, urban areas…)? and other natural hazards?

Who is involved in the production of the warning?

Who is targeted?

Which kind of information is provided (simple level scales, numerical data, forecasts, forecasted uncertainty…)?

What is the lead-time (expected and provided)?

How are the warning providers and the end-users organized?

How do you manage feed-back after an event?

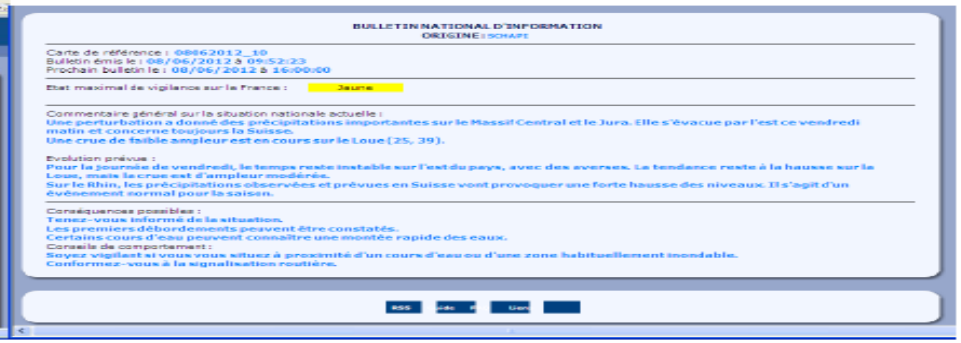
What are our expectations, our projects, the foreseen evolution of our system?

INVENTORY OF HYDROLOGICAL WARNING SYSTEMS FOR ARIV

France	Ministry of Ecology, Sustainable Development and Energy
	SCHAPI Service central d'hydrométéorologie et d'Appui à la Prévision des Inondations National center for flood forecasting

ACCESS PAGE TO THE WARNING SYSTEM

www.vigicrues.gouv.fr



BRIEF DESCRIPTION OF THE ACCESS PAGE (content, orientation and structure, available languages…)

The internet page gives access to national overview and bulletin (first level), as well as information on the vigilance procedures, RSS registration, FAQs (from the bottom tabs). 22 regional more detailed maps and bulletins with identification of the river sections and measuring stations are opened by clicking on one of the regional areas (second level). The third level, reached by clicking on of the icons for real-time stations, is proposing hydrograms, additional information on the stations and statistics.

DESCRIPTION OF PRODUCER, WITH COLLABORATORS IN CASE OF WARNING NETWORK (with number of employees)

SCHAPI is the national coordination centre (35 pers). 22 regional flood forecasting services are responsible for flood forecasting (200 pers) and 28 hydrometry units are responsible for maintenance of the hydrological network (150 pers)

LEGAL DOCUMENTS (availability, link)

Code de l'environnement L564-1-3 related to the organization of flood forecasting
Bylaw of 2 June 2003, replaced by 9 July 2008, related to the creation of SCHAPI
Several "circulaires" for implementation of flood vigilance procedure and operational procedures

TYPES OF HAZARDS CONCERNED BY THE HYDROLOGICAL WARNING SYSTEM

Floods on 21200 km of main rivers, divided into 256 river sections, draining watersheds larger than 100 km2, covering more than 7220 towns (out of 36000) and more than 6 millions of people at risk.

TYPES OF USERS	NAME OF USERS
National civil security	COGIC/ministry of Interior, center of road information, Health Directorate, Ministry of Precariousness and Exclusion
Regional/zonal civil security	Operational zonal centers, Transportation coordination centers
Local civil security	Préfectures at department level, Fire and Rescue centers, Mayors of towns, General councils
Private companies	Agreement with Electricité de France (EDF)
Media	All national and local TV and radio channels (more than 60 contacts, including the French Press Agency)
public	Citizens and all private companies
others…	Territorial public institution in charge of watershed management

PART 2

France	DESCRIPTION OF THE HYDROLOGICAL WARNING SYSTEM

REPRESENTATION OF THE HYDROLOGICAL HAZARD (point, linear, areal....)

Linear for riverine flood

In preparation : areal for inundation along river courses

ALERT LEVELS AND INFORMATION PROVIDED TO THE USERS (public, decision maker) (please add lines as required)

COLOR AND/OR ICON	TEXT OF THE MESSAGE DESCRIBING THE EVENT	POTENTIAL DAMAGE/CONSEQUENCE CAUSED BY THE HAZARD	TEXT OF THE MESSAGE DESCRIBING THE BEHAVIOR TO ADOPT (if issued)
green	No vigilance required		
yellow	Risk of high or rapid rising water	No significant damage Flooding of limited extent, mainly in natural areas, some small roads can be cut, ford are closed	Requires particular vigilance in the case of seasonal and/or outdoor activities, in the vicinity of a river stream or a Follow the road signs
orange	Risk of flood with considerable overflow	Overflow liable to affect significantly daily like and security of people and property	Be informed before any travel and outside activity Avoid vicinity of river courses Do no walk or drive on any flooded area or close to a river
red	Major risk of flood	Direct and extensive threat to people and property Extensive flooding impacting social and economic activities	Stay informed and avoid any travel Observe the security instructions of authorities Do no walk or drive on any flooded area or close to a river Safeguard your properties against flood

EXPLANATION ON THE METHOD USED TO DEFINE THE VARIOUS ALERT LEVELS (magnitude of event, probability, expected damage...)

The green to yellow, yellow to orange and orange to red thresholds have been defined on the basis of the vulnerable areas along river courses and historical information. At each of the forecasting stations, the past floods have been gathered and the thresholds have been set depending on the extent and level of flooded areas.

COMMENTS ON SIMILAR ALERT LEVELS USED FOR OTHER WARNING SYSTEMS (eg meteorological, urban...) if relevant

MétéoFrance produced the first vigilance system for meteorological hazards in 2001. In 2007, a unique portal was decided by the Ministry of Interior. Both systems are prepared independently and merged just before dissemination on the MeteoFrance website. New pictograms had to be designed for this joint procedure: rainfall-flood in 2007 and flood in 2011.

After major coastal floods in 2010, additional vigilance was prepared by MétéoFrance for coastal waves and surge (not coastal flooding).

A new service was also opened in 2011 for intense rainfall warning (based on radar data) for local communities (after

PART 3

France	DISSEMINATION OF THE WARNINGS PRODUCED BY THE NATIONAL SERVICE		
WARNING TYPE (maps, text messages….)	**USERS/RECIPIENTS OF THE WARNING**	**MEAN/METHOD OF DISSEMINATION**	**FREQUENCY OF ISSUE**
Maps and bulletins (national and 22 local)	List of about 400 users (civil security at national, regional and departmental level, institutions (MétéoFrance, electricity companies..), managers of water resources	Internet pushed either on www.vigicrues.gouv.fr or on rescue website (with password)	Twice a day and more as soon as a new map is issued if a section becomes yellow or more
Maps and bulletins (national and 22 local)	Public Media through media unit of MétéoFrance	Internet pulled	Twice a day and more as soon as a new map is issued if a section becomes yellow/orange/red
Discussion as soon as an orange threshold is determined	National operational interministerial crisis centre COGIC/ministry of Interior	Phone call	At each new issue of a map with orange and red river sections
Message (teasing)	List of about 50 media	e-mail	At the beginning of an orange/red event
Discussion for information exchange	Crisis centre (civil security at various levels, MétéoFrance, other partners if necessary)	Visio conference	Depending on severity of event

DETAILS ABOUT THE INFORMATION PATH BETWEEN THE NATIONAL SERVICE AND THE DIFFERENT USERS' TYPES	
USERS' TYPES	**EXPLANATION (is the transfer of information short or through other intermediate actors?)**
Prefect at departmental administrative level	Each regional flood forecasting center call their prefects (most of the watersheds are covered by several departments) within 5 to 10 min following the forecast of orange and red warning level. The prefects are responsible for triggering the alert procedure. They contact the mayors (in charge of the security of the population) and the local civil security services for action.
Interministerial crisis centre (COGIC)	As soon as a regional flood forecasting center forecasts an orange and red warning level, the information is transmitted to SCHAPI by phone. SCHAPI calls immediately COGIC, which is responsible for security actions at national level. This rapid procedure is backed up by written bulletin and maps at regional and national level.
Public	Population have access to warning levels, explanations and behavioral advice either on self demand on internet (vigicrues website), or through alert procedure of mayors and prefects.

EXAMPLES, REFERENCES OF RELEVANT MESSAGES

A list of pre-defined actions has been set by the Ministry of Interior for each of the color ranges, advising on behaviors at home, outside along river courses, on the roads.

PART 4

France	PERSPECTIVES
NEW DEVELOPMENTS, FUTURE ACTIVITIES	
In preparation: • graphical visualization of forecasts on the water-level/flow hydrographs (available on the vigicrues website) • forecast of inundation along the national river network In preparation at longer term: flash flood on small watersheds (~50 km2)	
PLANS AND REQUIREMENTS FOR IMPROVING THE HYDROLOGICAL WARNING SYSTEM (institutional, technical, methodological…)	
At 2-5 years	• A national real-time and historical new version of the HYDRO database and visualization platform tested, installed in all services and operational • A real-time modeling plate-form allowing simultaneous running of several hydrological and hydraulical models • A program for running automatic hydrological interpretations of flood events • Improved modeling through assimilation of water-level/flow data at the beginning of the events • A new service for announcing danger of flash floods in watersheds of about 50 km2 • A historical database of flood events
At 5-10 years	Integration of remote sensing information into the procedures (data transfer, flood extend, snow equivalent…)
ADDITIONAL COMMENTS	
Every 3 years, SCHAPI proposes strategic plans to the general directorate for risk prevention (ministry of sustainable development)	

LIST OF REFERENCES, LEAFLETS, DOCUMENTATION… (provided on separate files or links)

- Leaflets about vigilance procedure (English)
- Information for each of the regional centers (French) from this link: http://www.vigicrues.gouv.fr/som_aide.php
- Leaflet on the job of hydrological forecaster (French) http://www.developpement-durable.gouv.fr/IMG/pdf/previsionniste_de_crues.pdf

Answers from 10 countries

Austria	**5 States: Upper, Lower Austria, Salzburg, Tyrol, Styria**
Finland	**Finnish Environment Institute, Hydrological Simulation and Forecasting System**
France	**Ministry in charge of Sustainable Development, SCHAPI**
Greece	**Ministry of National Defense, National Meteorological Service**
Latvia	**Ministry of Environmental Protection and Regional Development, Environment Geology and Meteorology Centre**
Netherlands	**Ministry of Infrastructure and Environment, Water Management Centre**
Norway	**Ministry of Petroleum and Energy, Water Resources and Energy Directorate**
Slovak Rep.	**Ministry of Environment, Hydrometeorological Institut**
Sweden	**Swedish Meteorological and Hydrological Institute**
Switzerland	**Office fédéral de l'Environnement, section Prévisions hydrologiques**

Some relevant results (1)

- Mainly riverine floods are considered but also lakes, droughts, nutrients (P,N,C), landslides…
- Similar users (ministries, private electricity companiesm public, regional and local authorities)
- Linear, areal, watershed representation (also text form)
- 3 to 5 alert levels are provided (green to red but also blue, magenta, dark red)
- similar criteria are used to define the thresholds: return periods **but** different values, also levee levels, regulation levels, vulnerable zones
- Lead times variable: from hours to several days, even 3 to 6 months

Some relevant results (2)

- Mainly rainfall-runoff models but also 1D even 2D, and decision-tools
- Evaluation through return of experience with users and some time with score and accuracy systems
- Observed and deterministic forecast disseminated to public, often probabilistic forecasts for professionals
- Dissemination frequency varies in normal conditions and crises but also between countries
- Many improvements under work: extension of surveillance, small catchments, probabilistic warnings, uncertainty, extension to landslide and avalanches, graphical visualization of forecast, historical database, SMS warnings, testing of FEWS

Some relevant results (3)

- Even more improvements at 2-10 years: model improvements, local forecasts, better use of radar, snow melt, extension to flood area and flood risk maps, real-time run of 1D models, shorter time steps, nowcasting, operational use of FEWS plateform , quality management framework, modernization of network and communication, integration of remote sensing, extension to drought and water scarcity, closer professional coordination, virtual centre, improved web interface….

Participation to related expert/working groups

Regional Cooperation in MHEWS and Risk Assessment in South-East Europe (WMO/DRR - UNDP, Feb. 2011)

Advisory committee Associated Programme on Flood Management (June 2010, 2011, 2012)

Workshop on Intercomparison of FF models (FFI – IHP Sept. 2011)

Workshop on Flash Flood Model Concept (Sept. 2011, Istanbul) by A. Marchandise

Expert Meeting on Improving the efficiency of FF services (FFI – Oct. 2011)

Executive council (June 2012)

Commission for Hydrology (Nov. 2012)

How do we go forward?

Obtain more national inputs for the inventory?

Webspace for disseminating the results of the inventory and related national information?

Educational modules on best practices?

- to explain the procedures
- to propose exercises (decisions on forecasts, scenarios, messages to users…)
- to include historical post event analyses

Identify very focused task teams (probabilistic forecasts, snow melt, multi-hazards, remote sensing…)?

Assess the link to MeteoAlarm?

Improve coordination with related WMO projects

NB (initally): Pilot site for designing a joint hydro-met warning system ???

Thank you
for your comments