Challenges in Using Common Alerting Protocol for Delivering Impact-based Warning Services
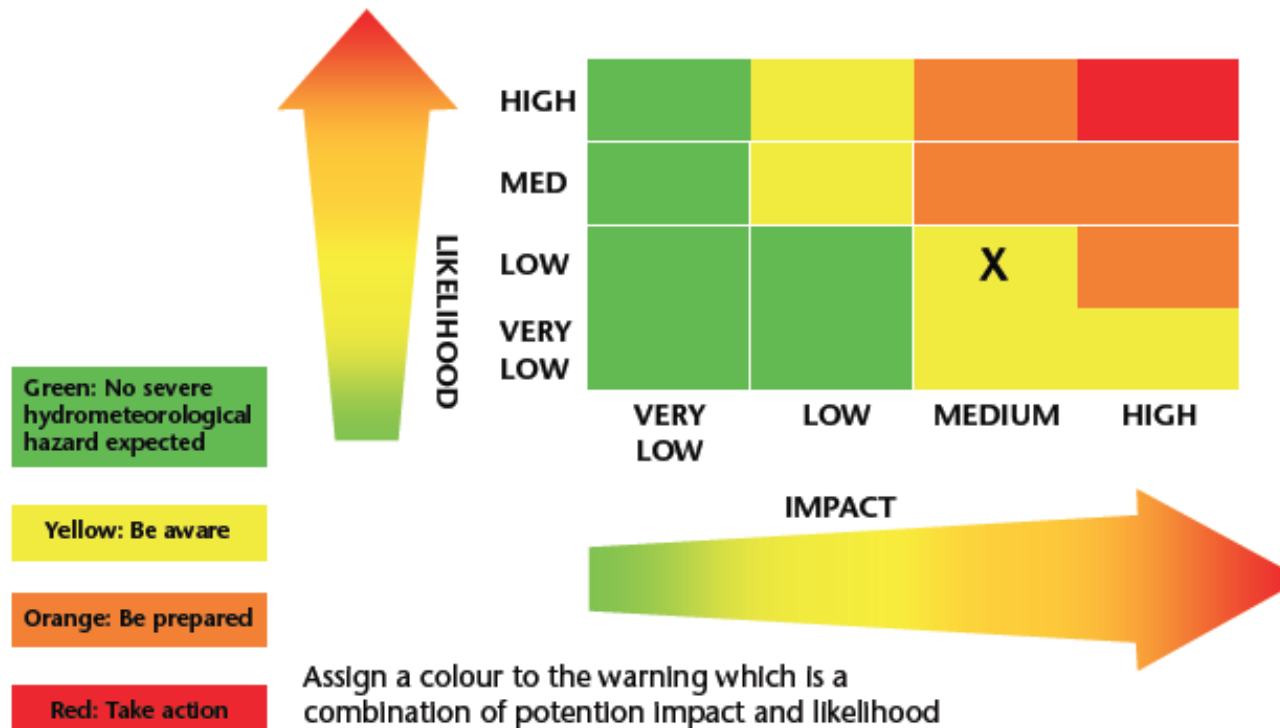
Armstrong Cheng

Hong Kong Observatory

香港天文台
HONG KONG OBSERVATORY

# Impact Forecasting Risk Matrix

Figure 2. Risk matrix

WMO-1150 Guidelines on Multi-hazard Impact-based Forecasting and Warning Services

Tropical Cyclone Warning in Hong Kong

	Social Impact / Actions	Severity	Certainty	Urgency
T1	Standby	Moderate	Possible	Future
T3	No school for kinder-garden	Severe	Observed	Immediate
Pre-T8	All going home	Severe	Likely	immediate
T8	No school and work	Severe	Observed	immediate
T9	No subway	Severe	Observed	immediate
T10	Stay at safe place	Extreme	Observed	immediate

香港天文台
HONG KONG OBSERVATORY

Mapping to the hypothetic risk matrix

	Minor	Moderate	Severe	Extreme
Observed			T3, T8, T9	T10
Likely			Pre-T8	
Possible		T1		
Unlikely				

- **Immediate** (Red)
- **Expected** (Orange)
- **Future** (Yellow)
- **Past** (Green)
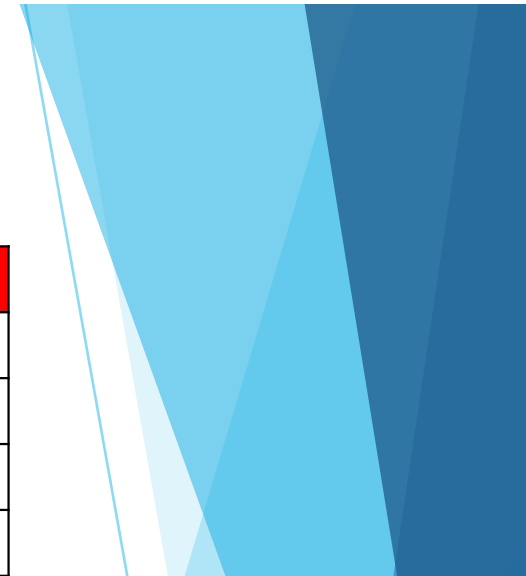
Instead of whether to take action, it should be how imminence the action has to be taken.

Green: No severe hydrometeorological hazard expected

Yellow: Be aware

Orange: Be prepared

Red: Take action

Assign a colour to the warning which is a combination of potention impact and likelihood
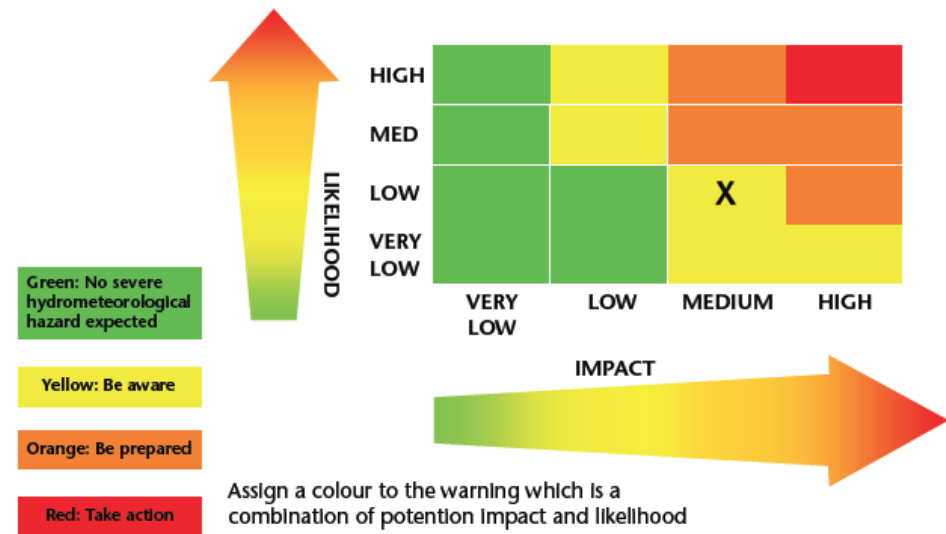
(Source: Met Office, United Kingdom)

Figure 2. Risk matrix

Other Examples

Very Strong Black Ice

for **Czech Republic**

Language: English

Issued time: 2018-11-30 14:50:34 (UTC+00)

Event: Very Strong Black Ice

Effective time: 2018-11-30 14:50:34 (UTC+00)

Onset time: 2018-11-30 15:00:00 (UTC+00)

Expire time: 2018-12-01 08:00:00 (UTC+00)

Download

Urgency: Immediate

Severity: Extreme

Certainty: Likely

Český hydrometeorologický ústav

Czech Hydrometeorological Institute

Description

Immediate glaze and black ice formation in a thicker layer during freezing rain.

Instructions

Walking and driving will be almost impossible. People should stay at home. High probability of injuries and accidents, strong impact on transport and industry. Problems with energy supply, danger of falling branches or broken trees are very likely.
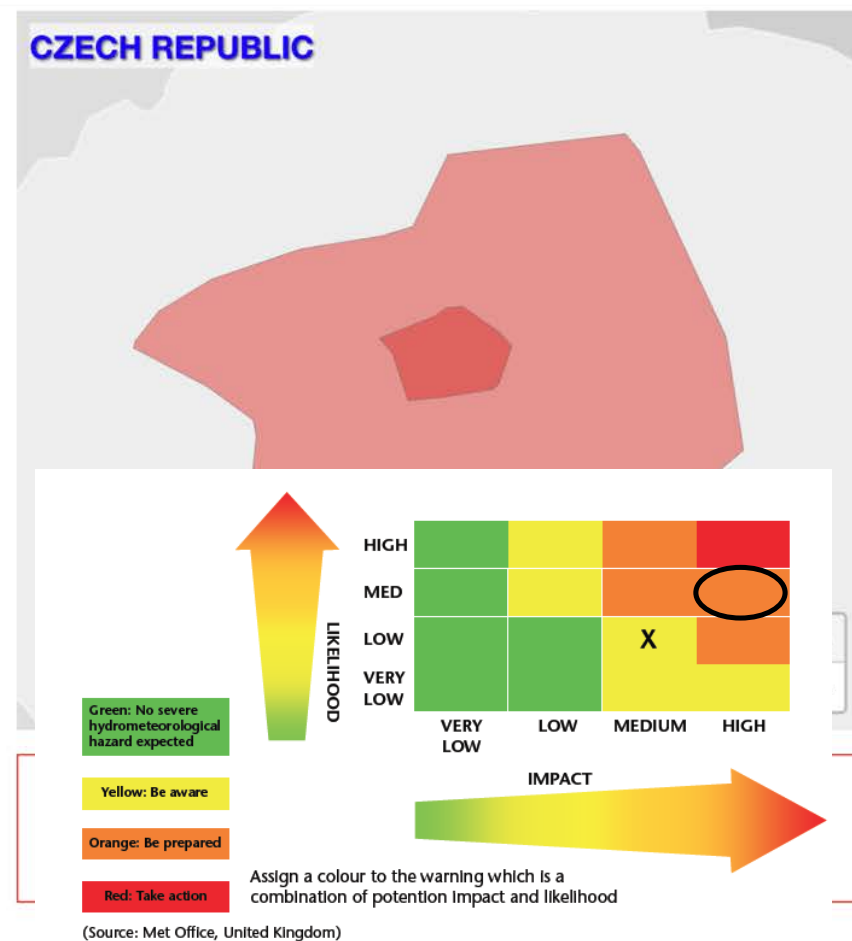
CZECH REPUBLIC

Green: No severe hydrometeorological hazard expected

Yellow: Be aware

Orange: Be prepared

Red: Take action

HIGH
MED
LOW
VERY LOW

LIKELIHOOD

VERY LOW   LOW   MEDIUM   HIGH

IMPACT

X

Assign a colour to the warning which is a combination of potention impact and likelihood

(Source: Met Office, United Kingdom)

Figure 2. Risk matrix

Other Examples

THUNDER STORM WARNING

for **Kuwait**

Issued time: 2018-11-22 20:15:37 (UTC+03)

Event: Thunder storm

Effective time:

Expire time: 2018-11-23 06:00:00 (UTC+03)

Download

Urgency: Immediate

Severity: Severe

Certainty: Observed

KNMC

Kuwait Meteorological Service

Description

Increasing in clouds and scattered heavy rain during next few hours and may be thundery at times associated with fresh wind more than 60 km/h and wave height 7 ft. and visibility will decrease over some areas.

Instructions

Take appropriate action

KUWAIT

KUWAIT

Green: No severe hydrometeorological hazard expected

Yellow: Be aware

Orange: Be prepared

Red: Take action

LIKELIHOOD — HIGH / MED / LOW / VERY LOW

IMPACT — VERY LOW / LOW / MEDIUM / HIGH

Assign a colour to the warning which is a combination of potention impact and likelihood
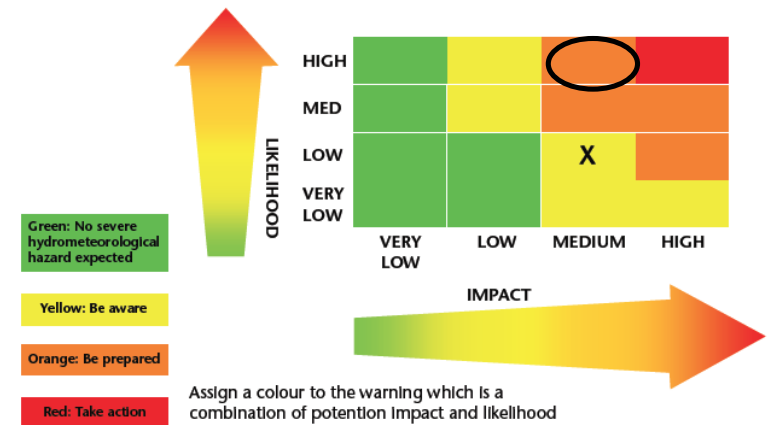
(Source: Met Office, United Kingdom)

Figure 2. Risk matrix

Proposal

▶ In the IBF scheme, instead of providing information on how likely responses are to be taken (viz. Be aware for yellow; Be prepared for orange; Take action for red), it could be revised to reflect the imminence of the responses to be taken.

▶ In the context of providing early warning in extreme weather forecasting, it may be beneficial to provide information for taking actions as early as possible to mitigate potential severe impacts.

香港天文台
HONG KONG OBSERVATORY

Forecasting considerations – Early warning approach

Forecast track issued at 09UTC 14 Sept
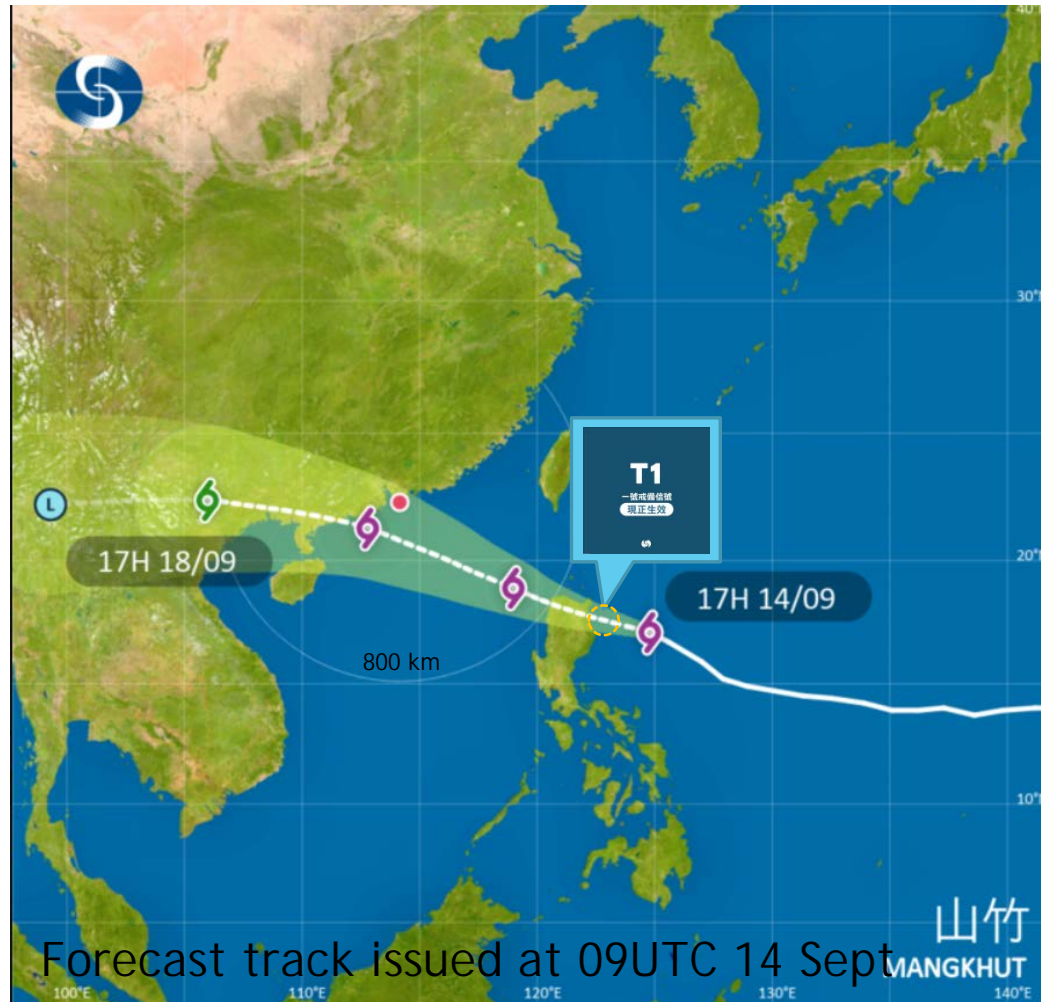
As Mangkhut is a fast moving storm with a large circulation, the Standby Signal No.1 was issued at 22:20 pm (HKT) on 14 Sept 2018 when Mangkhut was still about 1110 km from Hong Kong

8

Urgency

| urgency | cap. alertInfo. urgency. code | The code denoting the urgency of the subject event of the alert message (REQUIRED) | (1) The <urgency>, <severity>, and <certainty> elements collectively distinguish less emphatic from more emphatic messages.

(2) Code Values:

"Immediate" - Responsive action SHOULD be taken immediately

"Expected" - Responsive action SHOULD be taken soon (within next hour)

"Future" - Responsive action SHOULD be taken in the near future

"Past" - Responsive action is no longer required

"Unknown" - Urgency not known |

High-Priority Alerts

POLICY AND TECHNICAL ISSUES IN SYSTEMS OF EMERGENCY ALERTING

Criteria to Distinguish High-Priority Alerts - The designation "high priority" should be defined as any valid CAP alert that satisfies these six criteria for specific CAP element values:

alert/status = Actual	(not = Exercise, System, Test, nor Draft)
alert/msgType = Alert or Update	(not = Cancel, Ack, nor Error)
alert/scope = Public	(not = Restricted nor Private)
alert/info/urgency = Immediate or Expected	(not = Future, Past, nor Unknown)
alert/info/severity = Extreme or Severe	(not = Moderate, Minor, nor Unknown)
alert/info/certainty = Observed or Likely	(not = Possible, Unlikely, nor Unknown)

▶ Implication: Alerts coded with <urgency> as "Future" are NOT treated as high priority alerts.

▶ Sounds reasonable for hazards like tornado, tsunami, etc.

▶ … but perhaps not for some meteorological and hydrological hazards

香港天文台
HONG KONG OBSERVATORY

severe weather watch for widespread glaze

for **Germany**

Language: English

Issued time: 2018-11-29 17:56:00 (UTC+01)

GERMANY

Event: widespread glaze

Effective time: 2018-11-29 17:56:00 (UTC+01)

Onset time: 2018-11-30 06:00:00 (UTC+01)

Expire time: 2018-12-01 10:00:00 (UTC+01)

Download

Urgency: Future

Severity: Severe

**Certainty:** Likely

DWD

Deutscher Wetterdienst

Description

There is a high potential for the development of widespread glaze.

Instructions

This is a notice to alert you to approaching severe weather. It is meant to help you to get prepared and take precautions in good time. We advise you to pay careful attention to the latest weather forecasts.

GERMANY

CZECH REP.

AUSTRIA

LIECHTENSTEIN

SWITZERLAND
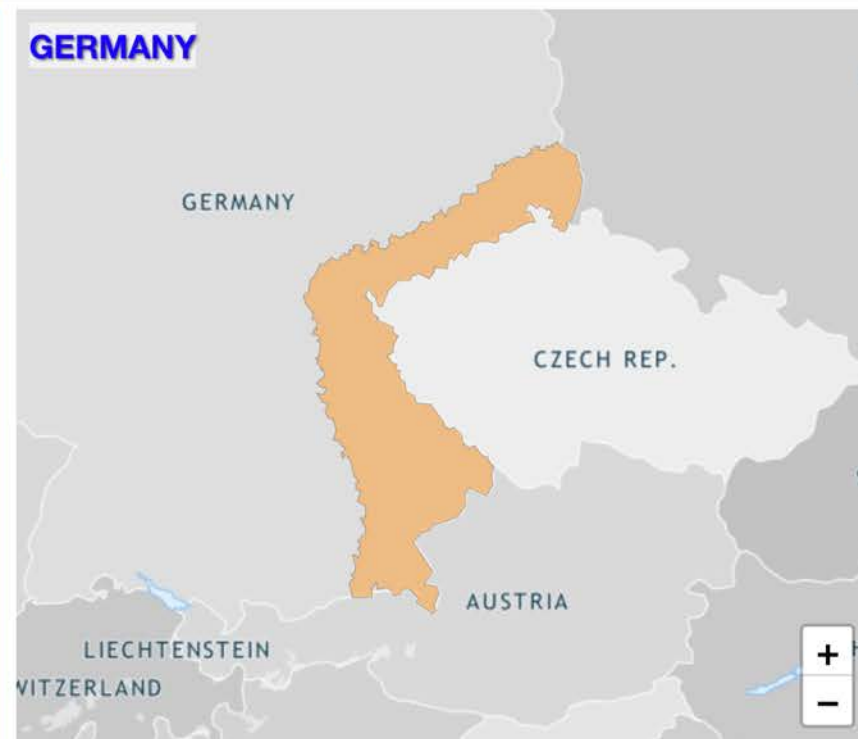
Affected area

Gemeinde Nordhalben; Gemeinde Taufkirchen (Vils); Gemeinde Sankt Wolfgang; Stadt Kronach; Stadt Sayda; Mitgliedsgemeinde in Verwaltungsgemeinschaft Hohenpolding; Stadt Dorfen; gemeindefreies Gebiet Rotter Forst-Nord; Stadt in Verwaltungsgemeinschaft Creußen; Gemeinde Bischofsgrün; gemeindefreies Gebiet Rotter Forst-Süd; Gemeinde Bindlach; Stadt Bad Berneck i. Fichtelgebirge; Stadt Coswig; gemeindefreies Gebiet Frauenforst; Gemeinde Weißenborn/Erzgeb.; Gemeinde Blankenstein;

Discussions

▶ A dilemma of "early" warnings with "Future" in the \<urgency\> field not being treated as "High-priority" alerts

▶ Urgency is context/hazard specific

▶ Possible way-outs

   ▶ CAP to revise the definition of code values for \<urgency\>

   ▶ Revise the definition of "High-priority Alerts" to accommodate the need of WMO community

   ▶ WMO community to define "High-priority Alerts" for dissemination of meteorological and hydrological related alerts

香 港 天 文 台
HONG KONG OBSERVATORY

"AllClear"

CAP elements - alert/status, alert/msgType, and alert/scope: The system of emergency alerting could define more precisely what is regarded as appropriate use of the allowed values of the status element (Actual, Exercise, System, Test, and Draft), the msgType element (Alert, Update, Cancel, Error) and the scope element (Public, Restricted, Private). However, it is very important to understand that the value of "Cancel" in the CAP msgType element means the referenced alert was a mistake; it does not mean that the hazard threat has resolved. To indicate a hazard threat has resolved, one would issue a CAP alert with msgType value of "Update" and a responseType value of "AllClear".

- In an "AllClear" alert, it is probably that the code value of <severity> will not be "Extreme" and "Severe" and thus not treated as High-Priority Alert.

- Thus, users will probably not able to recognize a high-priority alert is cleared as quick as the alert is issued or updated.

香港天文台
HONG KONG OBSERVATORY

Event Field Usage

▶ Event should be a hazard (e.g. flood, heavy rain, etc., not the name of the bulletin) that will affect the recipients who are located at the area where the alert is targeted.

▶ The hazard mentioned in the Event field may sometimes be the classification name of a meteorological system (e.g. tropical cyclone) when the general public is accustomed to associate the meteorological system in question (e.g. tropical cyclone) with hazards (gale, heavy rain).

▶ The use of meteorological system name in the Event field is to help conveying alerts to users about the multi-hazard nature of the system (e.g. tropical cyclone may bring gale, heavy rain, storm surge, ...).

▶ It should also avoid adding impact information in the Event field (e.g. "Red" heavy rain, "Minor" flood, etc.). The Headline field may be used to conveyed a complete warning message to users, e.g. Red rainstorm warning will be effective ..., Minor flood is expected over the ..., etc.)

香港天文台
HONG KONG OBSERVATORY

Moving System – e.g. Tropical Cyclone
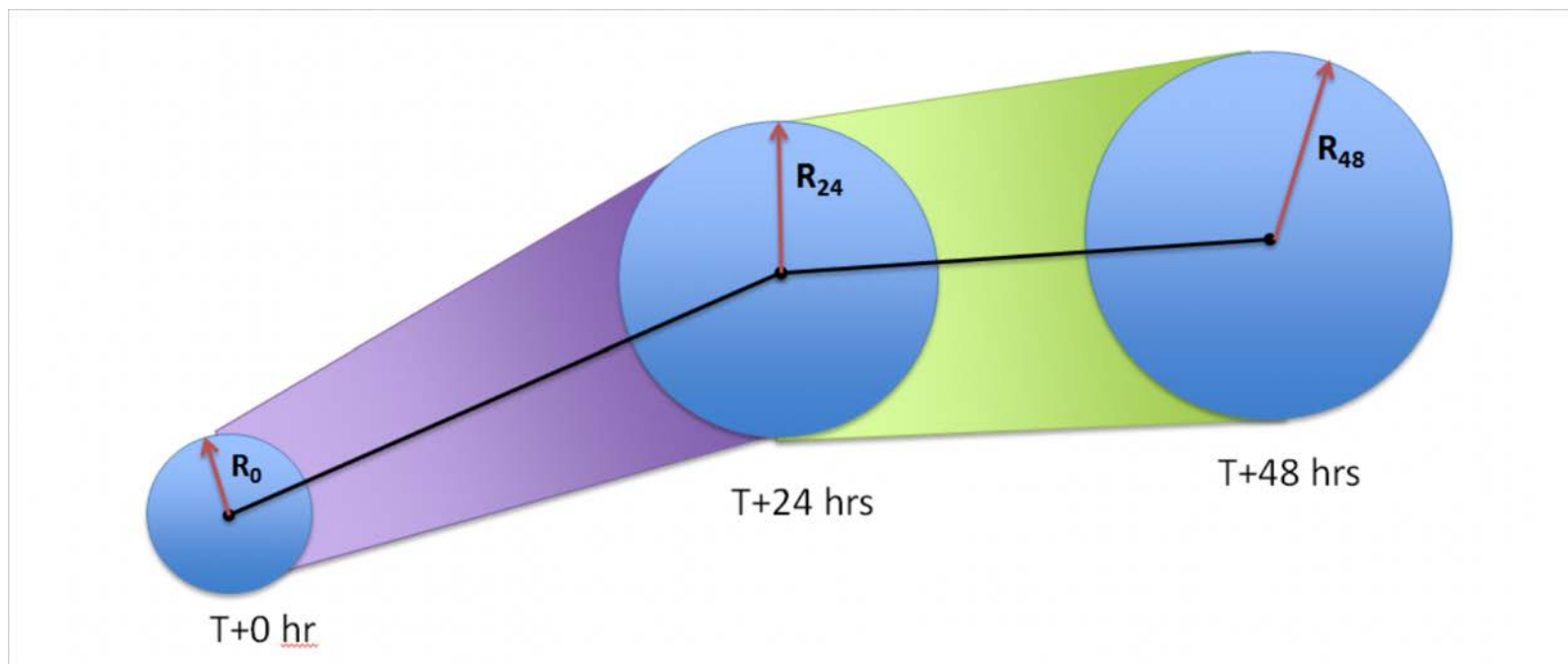
> ► However, it may not be desirable to use CAP to provide warnings to multiple locations at different time on a meteorological system that moves from one place to another (e.g. coding warnings based on the forecast track of a tropical cyclone).

Use of Description and Instruction Fields

Moderate wind warning

for **France**

Language:
English

Issued time: 2018-11-29 05:01:33 (UTC+00)

Event: Moderate wind warning
Effective time: 2018-11-29 05:00:00 (UTC+00)
Onset time: 2018-11-29 05:00:00 (UTC+00)
Expire time: 2018-11-30 05:00:00 (UTC+00)

Download

Urgency: Future
Severity: Moderate
Certainty: Likely

METEO FRANCE
Toujours un temps d'avance

Meteo France
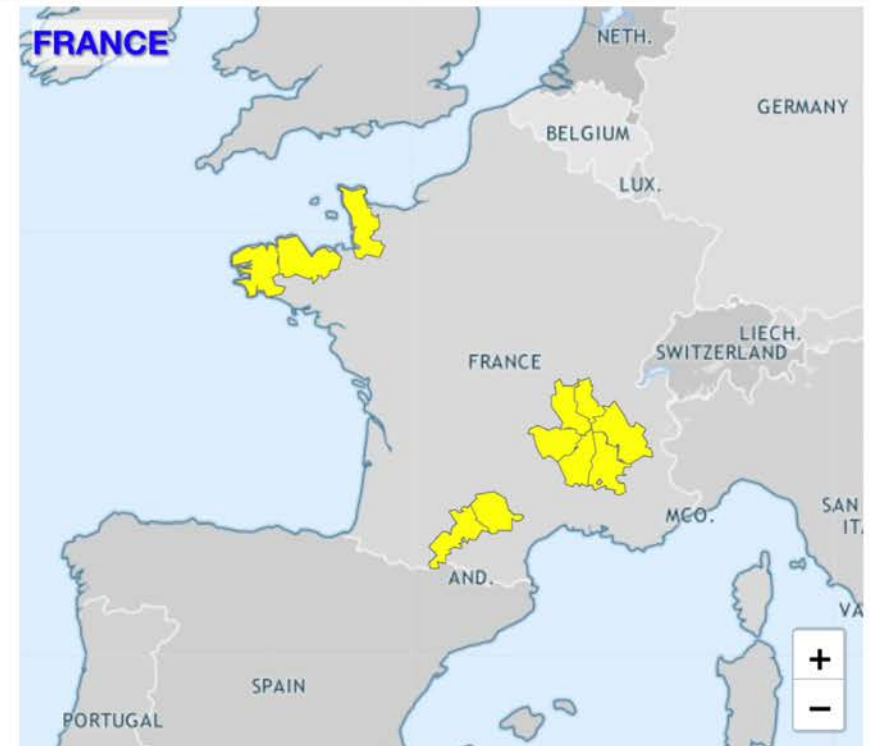
Description

Although rather usual in this region, locally or potentially dangerous phenomena are expected. (such as local winds, summer thunderstorms, rising streams or high waves)

Instructions

Be aware and pay attention to the latest weather updates, especially if you carry out activities exposed to weather or close to a stream or shoreline.

Affected area

Ain; Ardeche; Cotes d'Armor; Drôme; Finistere; Haute Garonne; Isere; Loire; Haute Loire; Manche; Rhone; Tarn

Questions and Comments?

Armstrong Cheng

yccheng@hko.gov.hk

香港天文台
HONG KONG OBSERVATORY