

Zentralanstalt für Meteorologie und Geodynamik 

Extreme meteorological situations

Michael Staudinger - ZAMG

Vernet - the shipwreck



W. Turner - Sea (1810)





One dimensional situation



Multihazards



Role of the forecaster in a multihazard situation



Tab. 3.5 Güte der Prognose für den laufenden Tag (06 - 18 Uhr) für die Niederschlagsklasse von 1 – 10mm. Die besten Ergebnisse sind grau hinterlegt.

Parameter	QFA - OBS	AV - OBS	LM - OBS	MET - OBS
Hit	253	212	188	284
False alarm	270	200	167	235
Miss	71	112	136	40
Correct rejection	936	1006	1039	971
Total	1530	1530	1530	1530
Bias	1.6142	1.2716	1.0957	1.6019
POD	0.7809	0.6543	0.5802	0.8765
FAR	0.5163	0.4854	0.4704	0.4528
TSS	0.5570	0.4885	0.4418	0.6817
ETS	0.2944	0.2856	0.2713	0.3877
HSS	0.4548	0.4444	0.4268	0.5587

Role of the forecaster in a multihazard situation



Tab. 3.8 Güte der Prognose für den laufenden Tag (06 - 18 Uhr) für die Niederschlagsklasse von 10 – 20mm. Die besten Ergebnisse sind grau hinterlegt.

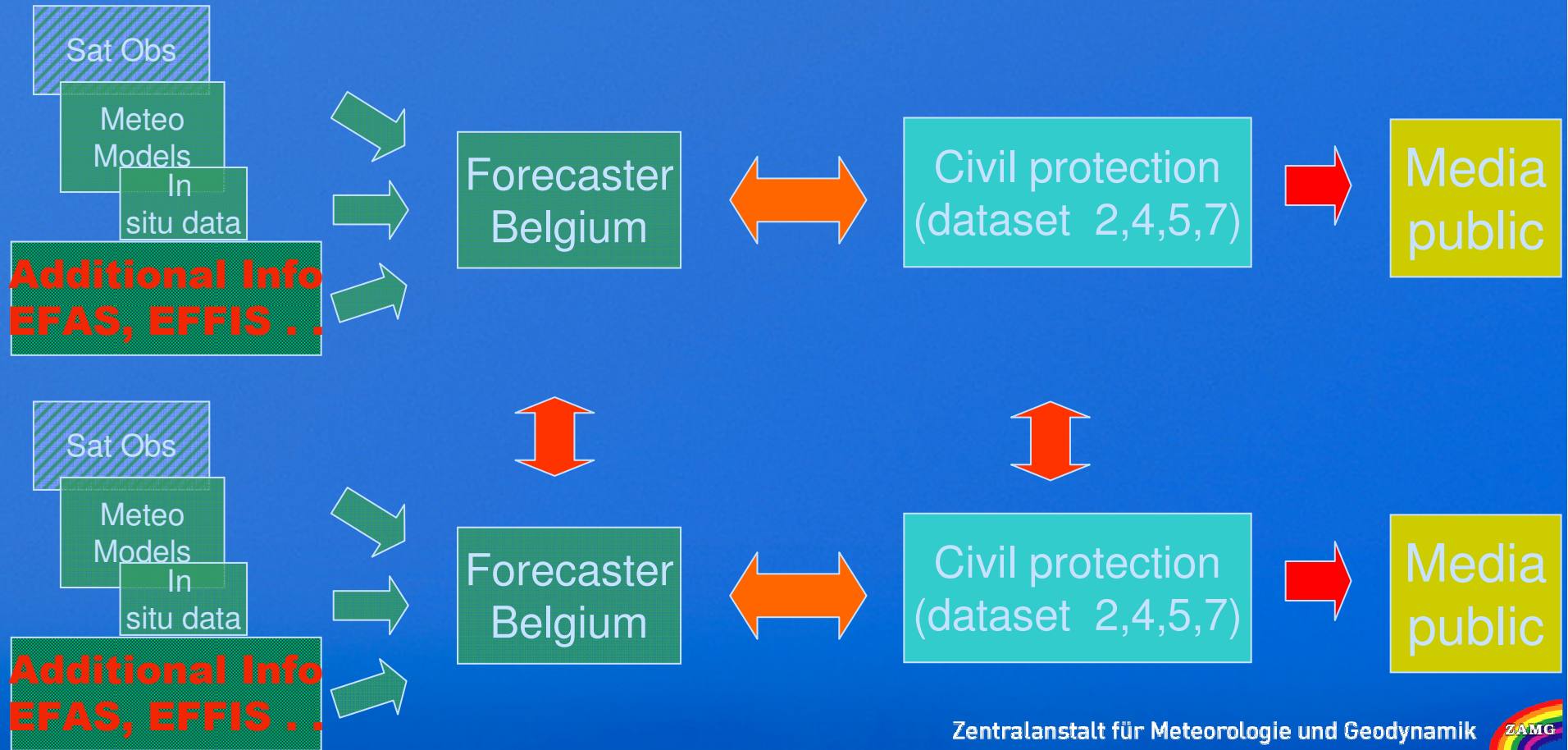
Parameter	QFA - OBS	AV - OBS	LM - OBS	MET - OBS
Hit	18	14	13	25
False alarm	29	37	47	34
Miss	39	43	44	32
Correct rejection	1444	1436	1426	1439
Total	1530	1530	1530	1530
Bias	0.8246	0.8947	1.0526	1.0351
POD	0.3158	0.2456	0.2281	0.4386
FAR	0.6170	0.7255	0.7833	0.5763
TSS	0.2961	0.2205	0.1962	0.4155
ETS	0.1929	0.1314	0.1058	0.2568
HSS	0.3234	0.2322	0.1913	0.4086

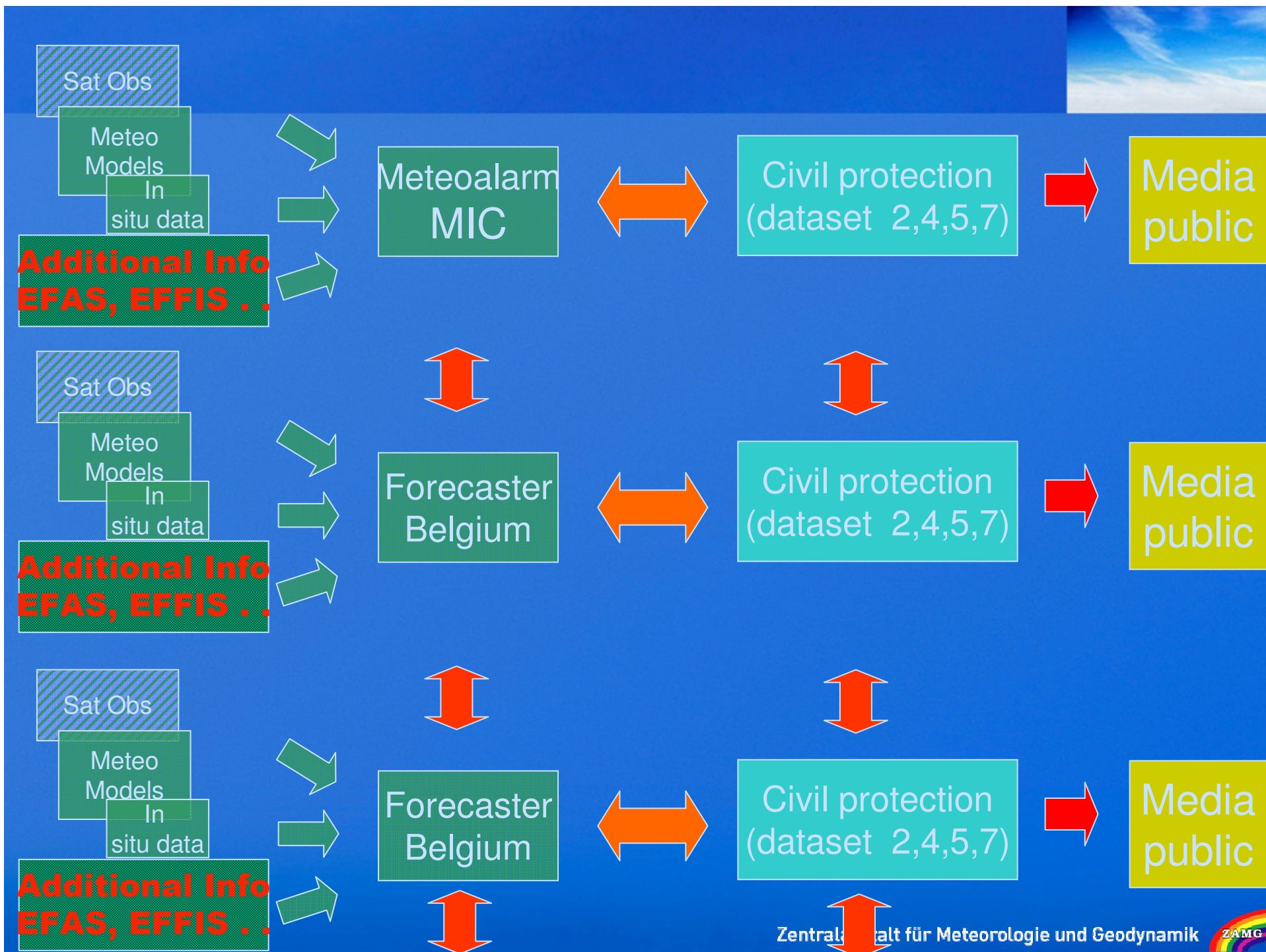
Experiences from previous projects



- METEORISK handled forecasting systems of different countries, different organisational structures and different climatic regions in the Alps
- Transnational harmonised warnings needed by NHMS ***and*** Civil Protection
- Forecasters provide decisive input to the system
- Differences in warning levels can be anticipated with tools (IT forums)
- **Standardisation of warnings created synergies of factor 3 to 10**







forecasters input – cooperation with civil protection



Forecaster at the National Meteorological Service gather essential details on disaster effects through civil protection and other local sources (e.g. ground conditions, forest conditions etc.)

cooperation between countries



Italy



France



Swiss



■ ■ ■ ■ ■

cooperation between countries



Italy



France



Swiss



■ ■ ■ ■ ■

cooperation between countries

Italy



France



Swiss



■ ■ ■ ■ ■

cooperation between countries

Italy



France



Swiss



■ ■ ■ ■ ■

EMMA / METEOALARM Partners:



- Austria
- Belgium
- Cyprus
- Denmark
- Finland
- France
- Germany
- Greece
- Hungary
- Iceland
- Ireland
- Italy
- Luxembourg
- Netherlands
- Norway
- Portugal
- Spain
- Sweden
- Switzerland
- UK

New partners: Czech republic, Croatia, Latvia, Lithuania, Malte, Slovakia, Slovenia,

Homogenisation of forecasting work

forecasters discussion forum

Browser address: <http://emma.ng-software.at/intranet/forum/forum.asp>

EMMA
European weather warnings

**EUMETNET**
The Network of European Meteorological Services

07.03.2006 logged in: Michael Staudinger | [who is online](#) | [logout](#)

Message of today: --- Please check the changelog frequently --- Dont forget to change your pas

Position: [Emma Intranet](#) | Forum

EMMA - Intranet

Forecasts			
Description	Topics	Posts	Last Post
Ideas and opinions about the current weather situation, especially if it comes towards a warning should be placed in this forum. It will allow an adjustment of opinions for tricky warning situations in real time. [open forum]	1	7	Re:Re:test 02.02.2006 18:30:21 Gerhard Kittel

Threshold			
Description	Topics	Posts	Last Post
The warning concepts in the Europeans countries differ very much at present time. The process towards a more homogenised system will probably be a long way. This discussion forum offers the opportunity to discuss aspects for the usage of different warning levels for the same situation online. This can be done before, during and after an extreme situation in an informal way between forecasters. [open forum]	1	2	Re:threshold 05.01.2006 17:06:59 Michael Staudinger

Technical			
Description	Topics	Posts	Last Post
This forum allows a discussion about technical aspects of the project. Typical entries would be towards a user created "Frequent Asked Questions" and also a way to report bugs or other problems with technical aspects of the website. [open forum]	5	11	Re:questions about required XML data for EMMA 23.02.2006 14:19:11 Michael Staudinger

development: www.ng-software.at | powered by: www.backbone.co.at Your IP: 138.22.167.7

Homogenisation of forecasting work

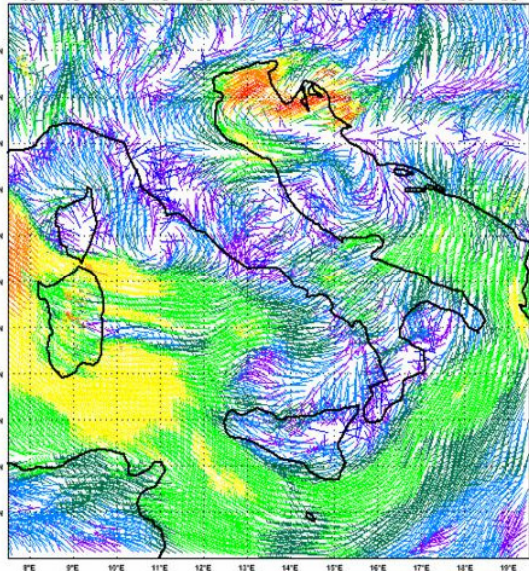
forecasters discussion forum

Heavy rain, bora - 24.9.2004 - Microsoft Internet Explorer

http://www.meteorisk.info/v2/intranet/upload/duo.jpg - Microsoft Internet Explorer

Adresse: http://www.meteorisk.info/v2/intranet/upload/duo.jpg

Venerdì 24 Settembre 2004 00UTC LAMI Forecast t+9 VT: Venerdì 24 Settembre 2004 UTC
Vento a 10m +009h
Aeronautica Militare UGM - Reg. Emilia Romagna - Reg. Piemonte



edit... delete...

ezia Giulia region.

edit... delete...

precipitation map for tomorrow (12+12h). In
last snow level at 1800/2100 m. light falling for

edit... delete...

T. La Rocca, Bove R.

Re: Heavy rain, bora - 24.9.2004
Posted: 24.09.2004 | 09:41:32

We are agree for bora gusts also in the trieste gulf but not for snow up 1200mt, we suppose that the minimum level of snow is about 1700-1800mt, moreover we denote an interesting sinoptic case of cold front splitted by alpine barrier, you see in the satellite image medium-high clouds coming out from alps and cold air remaining behind the barrier, we suppose also moderate Fohn downwind mountains in the Po Valley.

Weblink:
www.meteoam.it

Attached Documents:



Standard set of awareness situations:

Wind (mean wind speed or wind gusts, or any combination)

Rain (heavy rainfall in intensity or in cumulated amount or any combination)

Snow/Ice (heavy snowfall, drifting snow and icing phenomena on the ground resulting from precipitation).

Thunderstorms

Warning parameters



Additional set of awareness situations:

Fog

Temperature extremes (heat or cold waves)

Coastal events (such as storm surge, ...)

Forest Fire (risk of forest fire related to meteorological conditions)

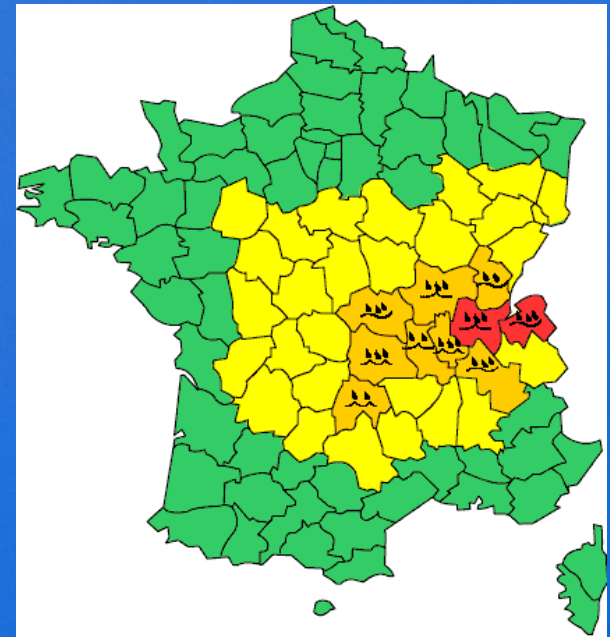
Avalanches

Warning parameters



New types of awareness situations:

Rain and/or Floods



Coastal sea events

Air chemistry (planning phase)

METEOALARM multihazard warning schedule

Redagno 2006



Relationship between:

- Europewide valid criteria (meteorologically)
- Meteorological thresholds for all parameters (valid only locally)
- Correlation of meteorology to typical damage (also multiparameters)
- Advice for behaviour (as part of the definition)

METEOALARM multihazard warning schedule

Redagno 2006



Relationship between:

- Europewide valid criteria (meteorologically)
- Meteorological thresholds for all parameters (valid only locally)
- Correlation of meteorology to typical damage (also multiparameters)
- Advice for behaviour (as part of the definition)

„the key to a successful project are mutual trust, a shared goal and a fair proportion of the gains“ – G. Cooper“

METEOALARM multihazard warning schedule

Redagno 2006



METEOALARM multihazard warning schedule

Redagno 2006



	Treshholds (area related)	Used how often? (per approx. 300 kkm ²)	Damage / Impact	What to do?
green			- - -	usual phenomena
yellow	> 60 km/h	> 30 per year	exposed objects (avoidable)	caution with exposed activities
orange	> 90 km/h	1 to 30 per year	general damages (not avoidable)	keep informed in detail, follow advice of authorities
red	>130 km/h Wind	less then 1 year <i>for large (5000km²) scale phenomena</i>	extreme damage and /or casualties <i>extreme damage (mostly) on large areas, threatning life and properties</i> (not avoidable, even in otherwise safe places)	follow order of authorities under all circumstances be prepared for extraordinary measures

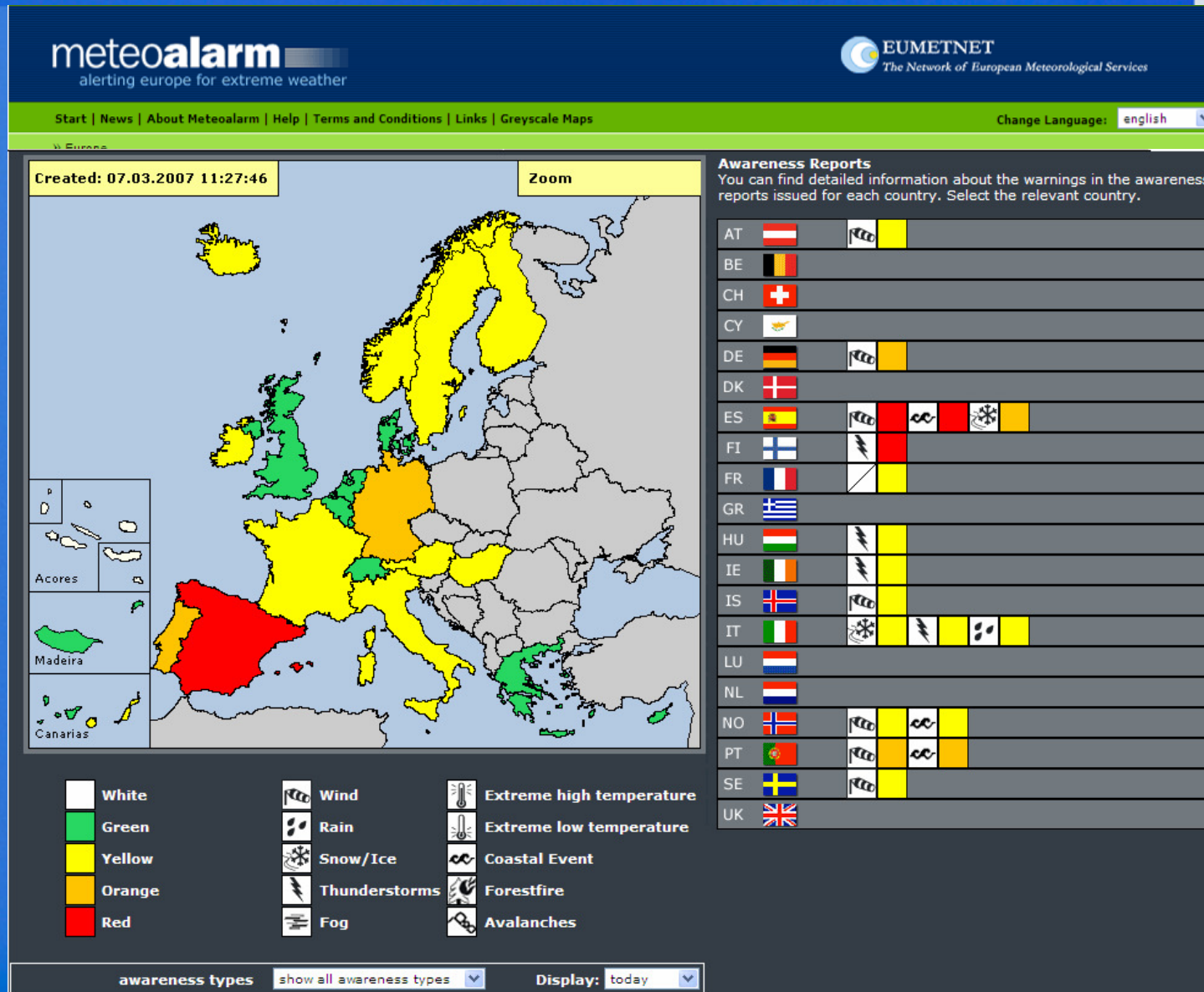
METEOALARM multihazard warning schedule

Redagno 2006

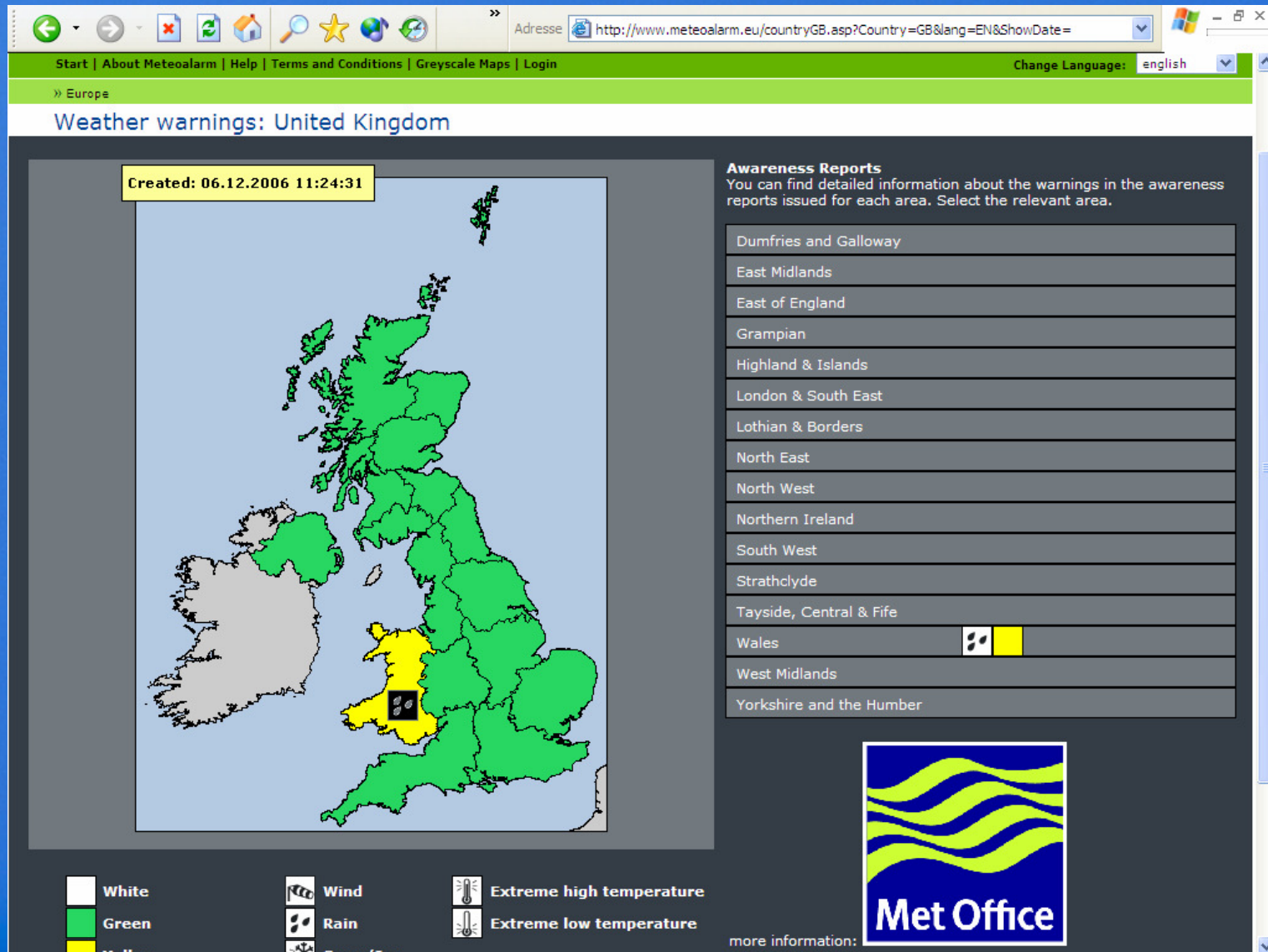


	Treshholds (area related)	Used how often? (per approx. 300 kkm ²)	Damage / Impact	What to do?
green			- - -	usual phenomena
yellow	> 30 mm/12h	> 30 per year	exposed objects (avoidable)	caution with exposed activities
orange	> 54 mm/12h	1 to 30 per year	general damages (not avoidable)	keep informed in detail, follow advice of authorities
red	> 80 mm/12h Rain	less then 1 year <i>for large (5000km²) scale phenomena</i>	extreme damage and /or casualties <i>extreme damage (mostly) on large areas, threatning life and properties</i> (not avoidable, even in otherwise safe places)	follow order of authorities under all circumstances be prepared for extraordinary measures

METEOALARM operational maps for today + tomorrow



METEOALARM operational maps for today + tomorrow



METEOALARM operational maps for today + tomorrow

meteoalarm
alerting europe for extreme weather

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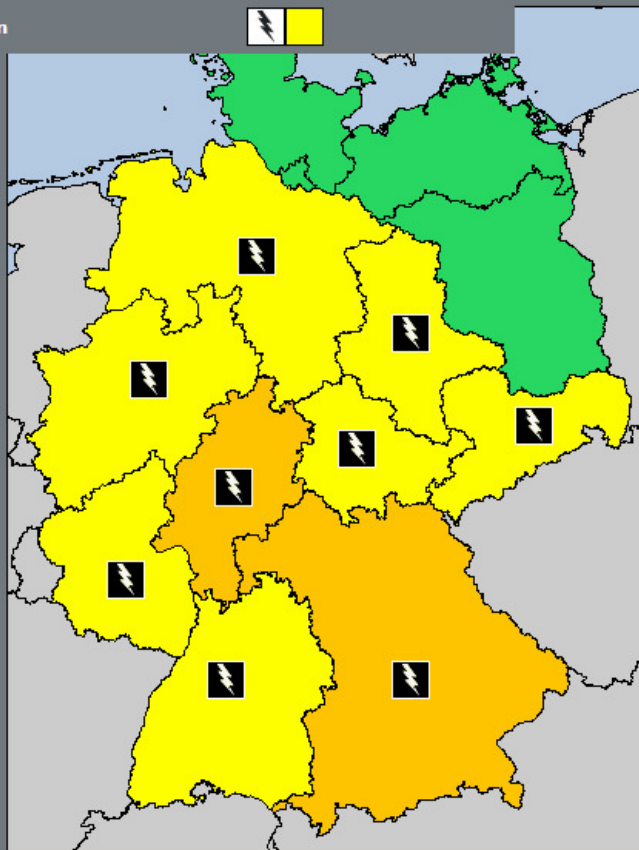
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Sprache ändern: **deutsch**

» Europa

Wetter-Warnungen: Deutschland

Thüringen



Gefahrenstufenberichte

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

Baden-Württemberg			
Bayern			
Berlin und Brandenburg			
Bremen und Niedersachsen			
Hamburg			
Hessen			
Mecklenburg-Vorpommern			
Nordrhein-Westfalen			
Saarland und Rheinland-Pfalz			
Sachsen			
Sachsen-Anhalt			
Schleswig-Holstein			
Thüringen			



Mehr Information:

Weiss

Grün

Wind

Regen

Extrem niedrige Temperatur

METEOALARM operational maps for today + tomorrow

Internet Explorer browser window showing the METEOALARM website.

Adresse: <http://www.meteoalarm.eu/area.asp?lang=EN&ShowDate=&Country=GB&area=214&are>

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Change Language: **english**

» Europe

Warnings for: Wales



06.12.2006 08:00:00 - 06.12.2006 12:00:00

Rain Awareness Level: **Yellow**

Showers continuing this morning, adding to previous totals yesterday and last night and leading to local flooding.

more information: [Go to UK Met Office](#)



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[Back to Countrymap](#)



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METEOALARM operational maps for today + tomorrow



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» Europe

Warnings for: Dél - Dunántúl



Valid from 12.06.2007 13:23:07 CEST **Until** 12.06.2007 23:59:59 CEST

Thunderstorms

Awareness Level: **Orange**

Locally severe thunderstorm might occur accompanied by very high wind (gusts above 90 km/h) or large hail (above 2 cm).

Heves zivatar! Néhol előfordulhat heves zivatar, amit intenzív csapadék, erős vihar (90 km/h fölötti szélökés) vagy legalább 2 cm nagyságú jég kísérhet.

more information: Hungarian Meteorological Service



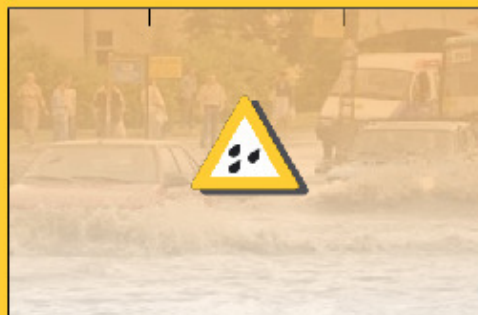
[Back to Europe](#)



[Back to Countrymap](#)



Hungarian
Meteorological
Service



Valid from 12.06.2007 13:23:07 CEST **Until** 12.06.2007 23:59:59 CEST

Rain

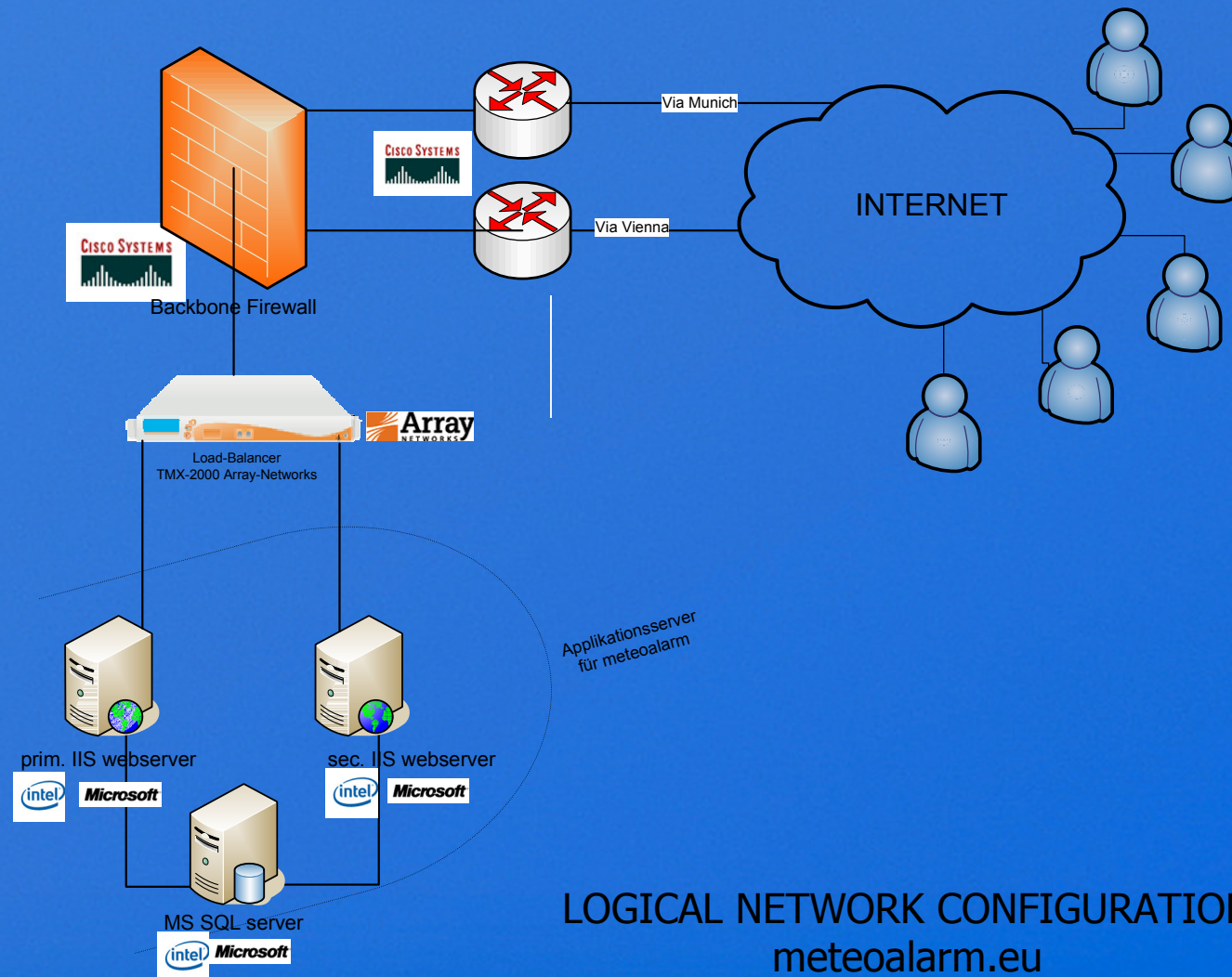
Awareness Level: **Orange**

Locally there may be intensive precipitation with high amount of rain (above 50 mm in 1-3 hours).

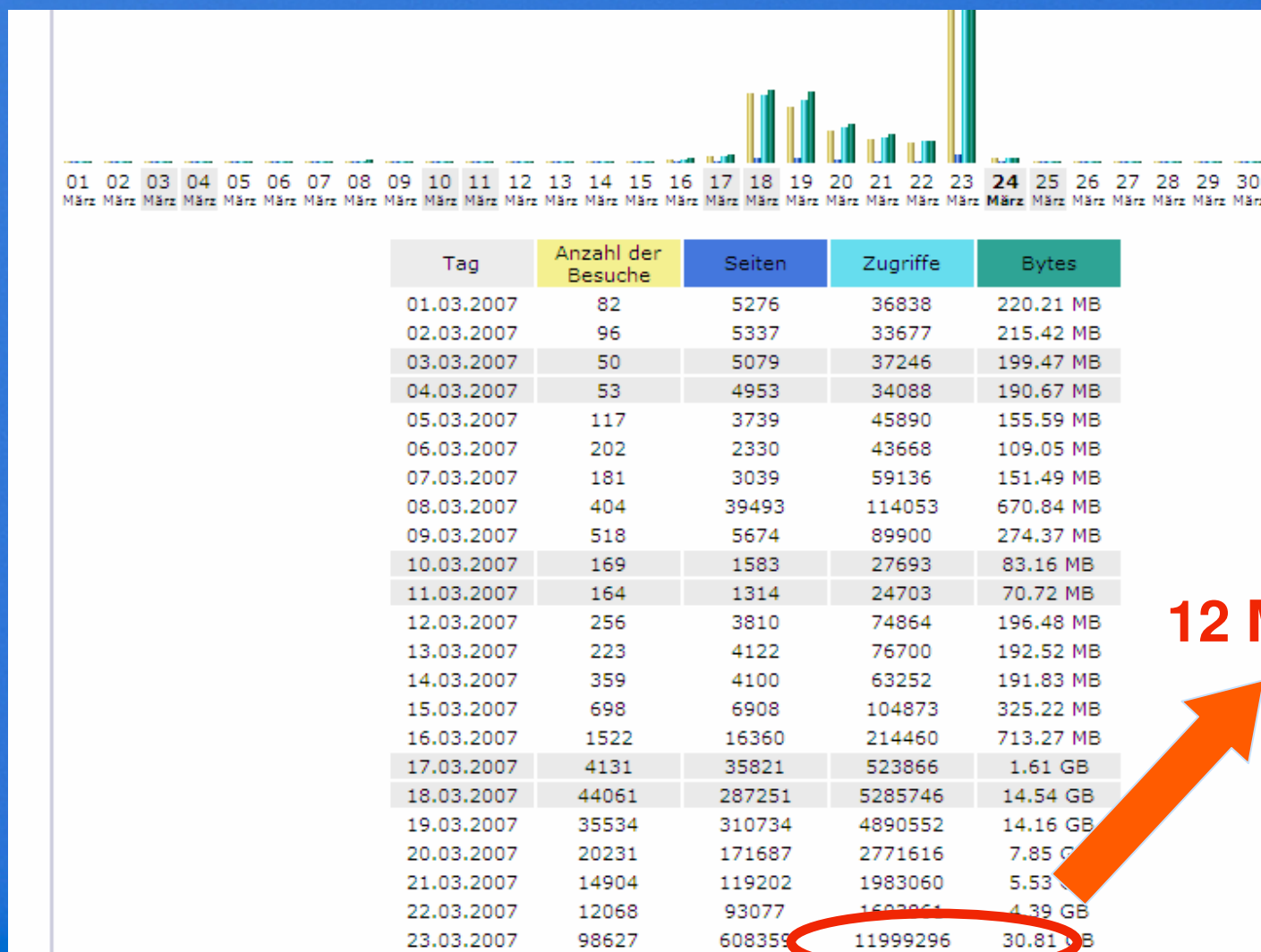
Felhőszakadás! Néhol előfordulhat rövid idő (1-3 óra) alatt 50 mm-nél nagyobb mennyiségű eső.

more information: Hungarian Meteorological Service

Access to the METEOALARM Website



Access to the METEOALARM Website

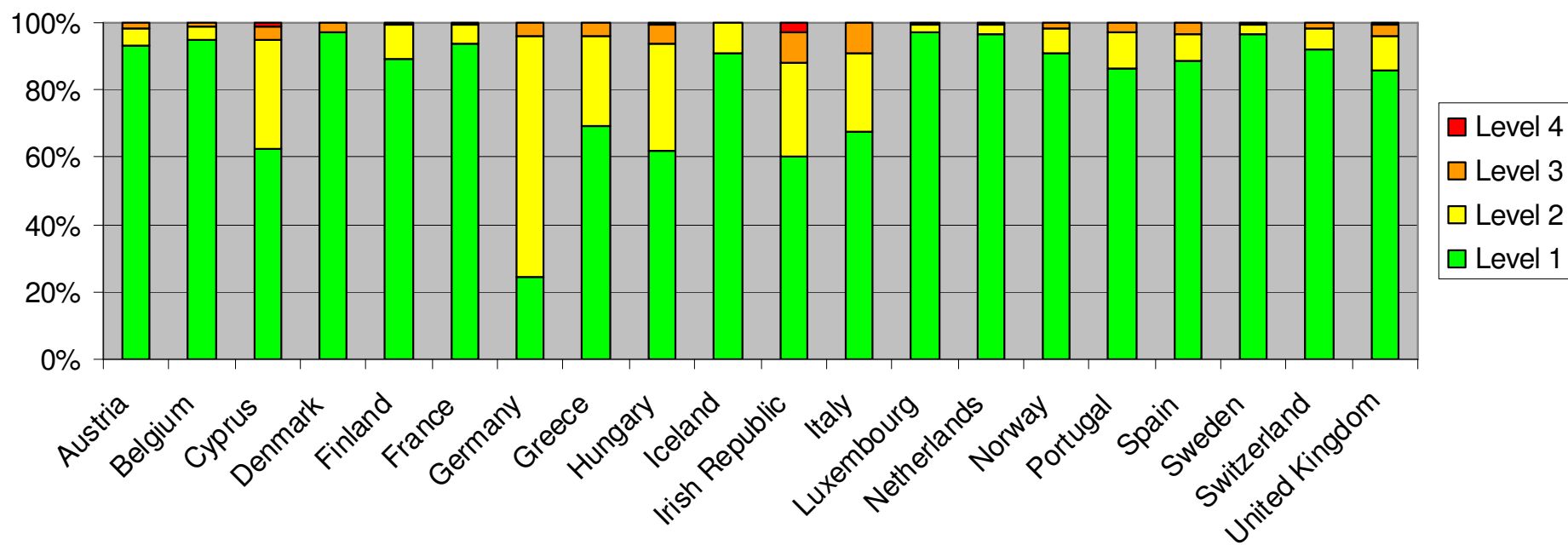


12 Mio hits/d

Evaluation



Percentage of Submitted Warning Levels



Evaluation

Level 4 (red) warnings		
Element	[%]	No
Irish Republic	8,94	37
Spain	0,29	3259
United Kingdom	0,18	18
Austria	0,14	256
Norway	0,11	205
Sweden	0,09	125
Luxembourg	0,08	4
Netherlands	0,08	12
Hungary	0,05	15
Finland	0,03	34
Portugal	0,00	0
Switzerland	0,00	0
Iceland	0,00	0
Cyprus	0,00	0
Belgium	0,00	0
Denmark	0,00	0
France	0,00	0
Greece	0,00	0
Germany	0,00	0
Italy	0,00	0

Level 3 (orange) warnings		
Element	[%]	No
Italy	18,47	276
Irish Republic	17,63	73
Greece	11,35	142
Germany	7,7	9097
Spain	3,22	35676
Norway	2,77	5349
Denmark	2,66	371
Hungary	2,04	596
Austria	1,68	3097
Luxembourg	1,17	60
Finland	0,88	1004
Belgium	0,87	1250
Sweden	0,66	942
Netherlands	0,66	103
United Kingdom	0,65	65
Portugal	0,52	215
Cyprus	0,48	6
France	0,34	833
Switzerland	0,03	100
Iceland	0,01	1

Evaluation



Level 4 (red) warnings

Element	[%]	No
Coastal Event	1,06	1348
Snowfall	0,25	1270
Wind	0,20	1090
Forest Fire	0,10	57
Low Temperature	0,04	91
Rain	0,01	44
Thunderstorm	0,01	65
High Temperature	0,00	0
Fog	0,00	0
Avalanche	0,00	0

Level 3 (orange) warnings

Element	[%]	No
Coastal Event	8,86	11276
Wind	4,06	21642
Forest Fire	3,57	2022
Snowfall	2,35	11784
Thunderstorm	1,40	6201
Avalanche	1,11	1301
Low Temperature	1,09	2650
Rain	0,55	2367
High Temperature	0,00	8
Fog	0,00	5

Evaluation - awareness type: Rain



Level 4 (red) warnings		
Element	[%]	No
United Kingdom	0,13	2
Austria	0,02	10
Spain	0,02	32
Luxembourg	0,00	0
Switzerland	0,00	0
Netherlands	0,00	0
Norway	0,00	0
Italy	0,00	0
Portugal	0,00	0
Sweden	0,00	0
Iceland	0,00	0
Denmark	0,00	0
Cyprus	0,00	0
Belgium	0,00	0
Finland	0,00	0
France	0,00	0
Hungary	0,00	0
Greece	0,00	0
Germany	0,00	0
Irish Republic	0,00	0

Level 3 (orange) warnings		
Element	[%]	No
Germany	13,41	773
Greece	12,87	48
Irish Republic	8,70	2
Italy	5,09	27
Hungary	2,37	95
Cyprus	1,53	3
Spain	0,79	1088
United Kingdom	0,56	9
Austria	0,48	219
Luxembourg	0,16	1
Switzerland	0,08	82
France	0,06	20
Portugal	0,00	0
Sweden	0,00	0
Iceland	0,00	0
Belgium	0,00	0
Denmark	0,00	0
Finland	0,00	0
Netherlands	0,00	0
Norway	0,00	0

Level 2 (yellow) warnings		
Element	[%]	No
Italy	94,91	503
Irish Republic	91,30	21
Greece	65,95	246
Germany	49,94	2879
Cyprus	8,67	17
United Kingdom	8,59	137
Spain	7,94	10896
Portugal	4,64	241
Belgium	2,19	783
Austria	1,62	747
Hungary	0,77	31
Luxembourg	0,64	4
Iceland	0,51	35
Switzerland	0,49	484
Netherlands	0,44	11
Norway	0,36	92
Denmark	0,30	7
Sweden	0,02	5
Finland	0,00	0
France	0,00	0

Evaluation - awareness type Wind



Level 4 (red) warnings		
Element	[%]	No
Irish Republic	17,55	33
Sweden	0,48	125
Spain	0,45	730
Netherlands	0,44	12
Austria	0,35	162
Hungary	0,27	13
Finland	0,03	9
Norway	0,02	6
Luxembourg	0,00	0
United Kingdom	0,00	0
Portugal	0,00	0
Switzerland	0,00	0
Iceland	0,00	0
Cyprus	0,00	0
Belgium	0,00	0
Denmark	0,00	0
France	0,00	0
Greece	0,00	0
Germany	0,00	0
Italy	0,00	0

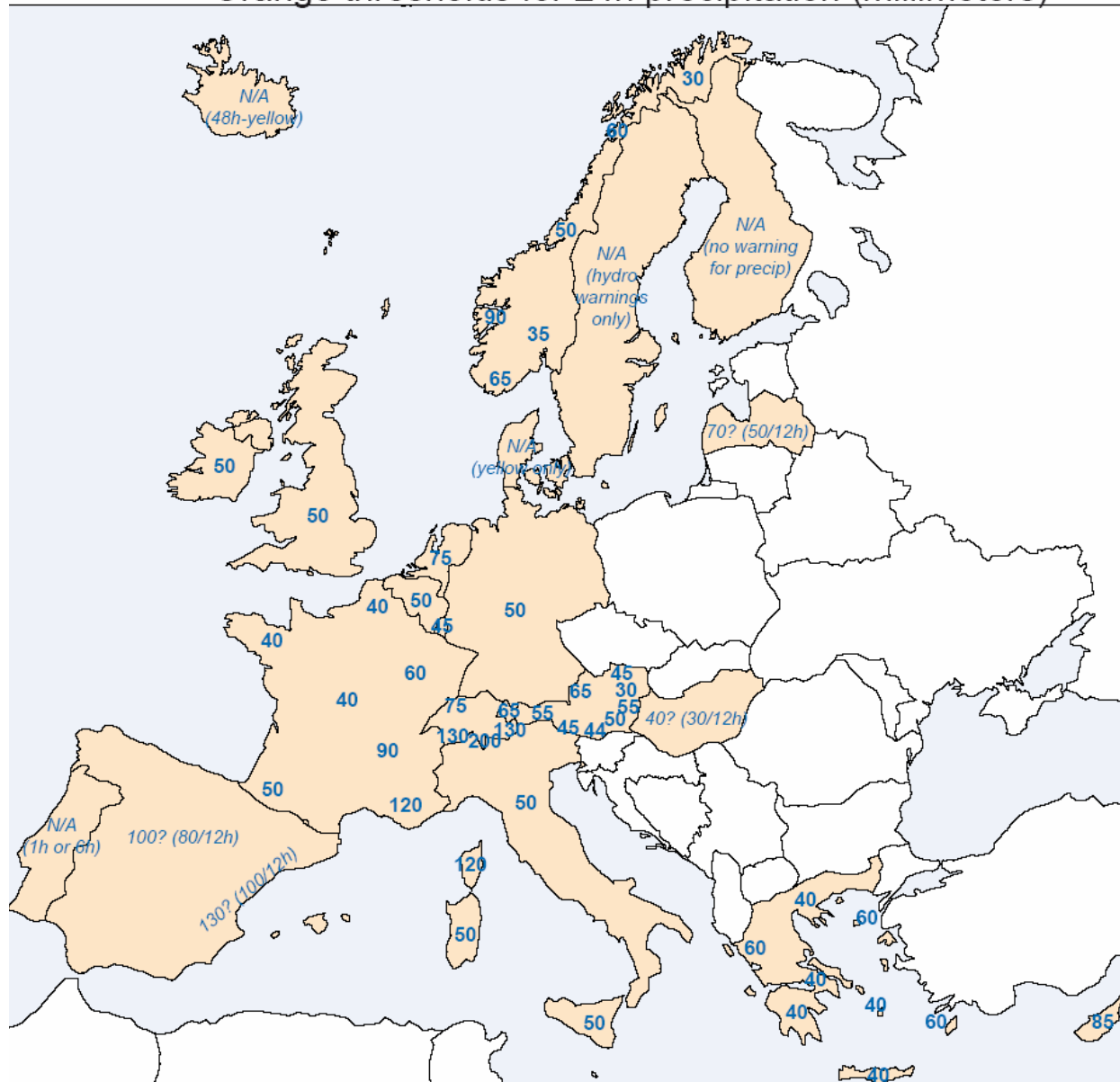
Level 3 (orange) warnings		
Element	[%]	No
Italy	67,86	171
Irish Republic	28,72	54
Spain	8,04	12993
Germany	6,97	3263
Austria	5,08	2337
Greece	5,03	9
Denmark	2,75	64
Sweden	2,73	703
Luxembourg	2,11	16
United Kingdom	2,10	34
Netherlands	2,04	55
Portugal	1,96	108
Finland	1,88	527
Belgium	1,75	630
Norway	1,58	450
Hungary	0,80	38
France	0,51	178
Switzerland	0,01	12
Iceland	0,00	0
Cyprus	0,00	0

Level 2 (yellow) warnings		
Element	[%]	No
Germany	89,72	41984
Greece	75,42	135
Irish Republic	53,72	101
Italy	32,14	81
Norway	18,68	5338
Hungary	14,87	705
Spain	14,02	22671
Austria	12,45	5727
Luxembourg	8,83	67
Portugal	8,03	442
Cyprus	6,69	18
United Kingdom	6,23	101
Sweden	5,58	1437
Belgium	5,56	2004
Netherlands	4,19	113
Iceland	3,41	237
Finland	1,81	509
Switzerland	0,08	84
Denmark	0,00	0
France	0,00	0

Threshold examples



Orange thresholds for 24h precipitation (millimeters)

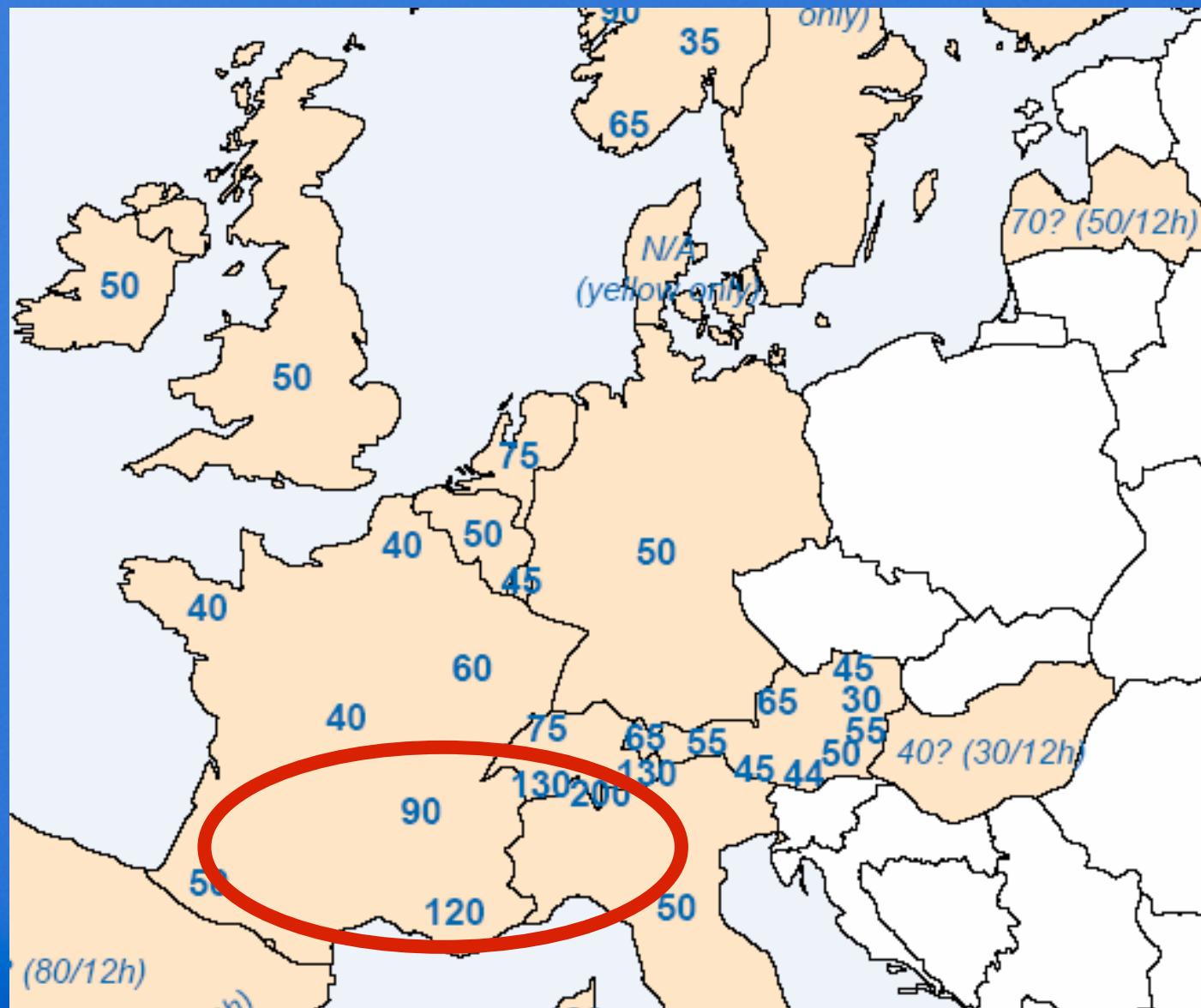


Threshold examples

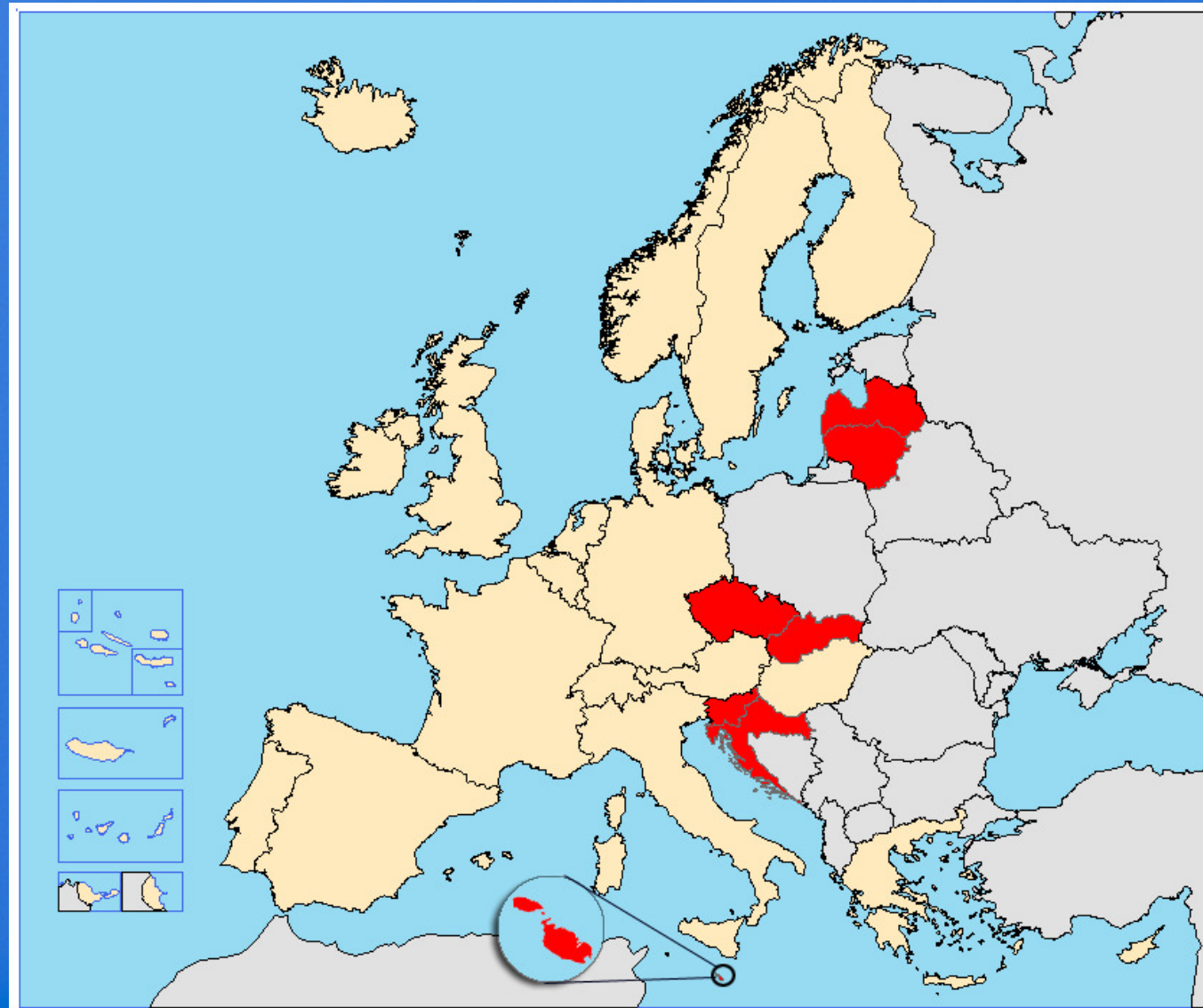
Orange thresholds for 24h precipitation (millimeters)



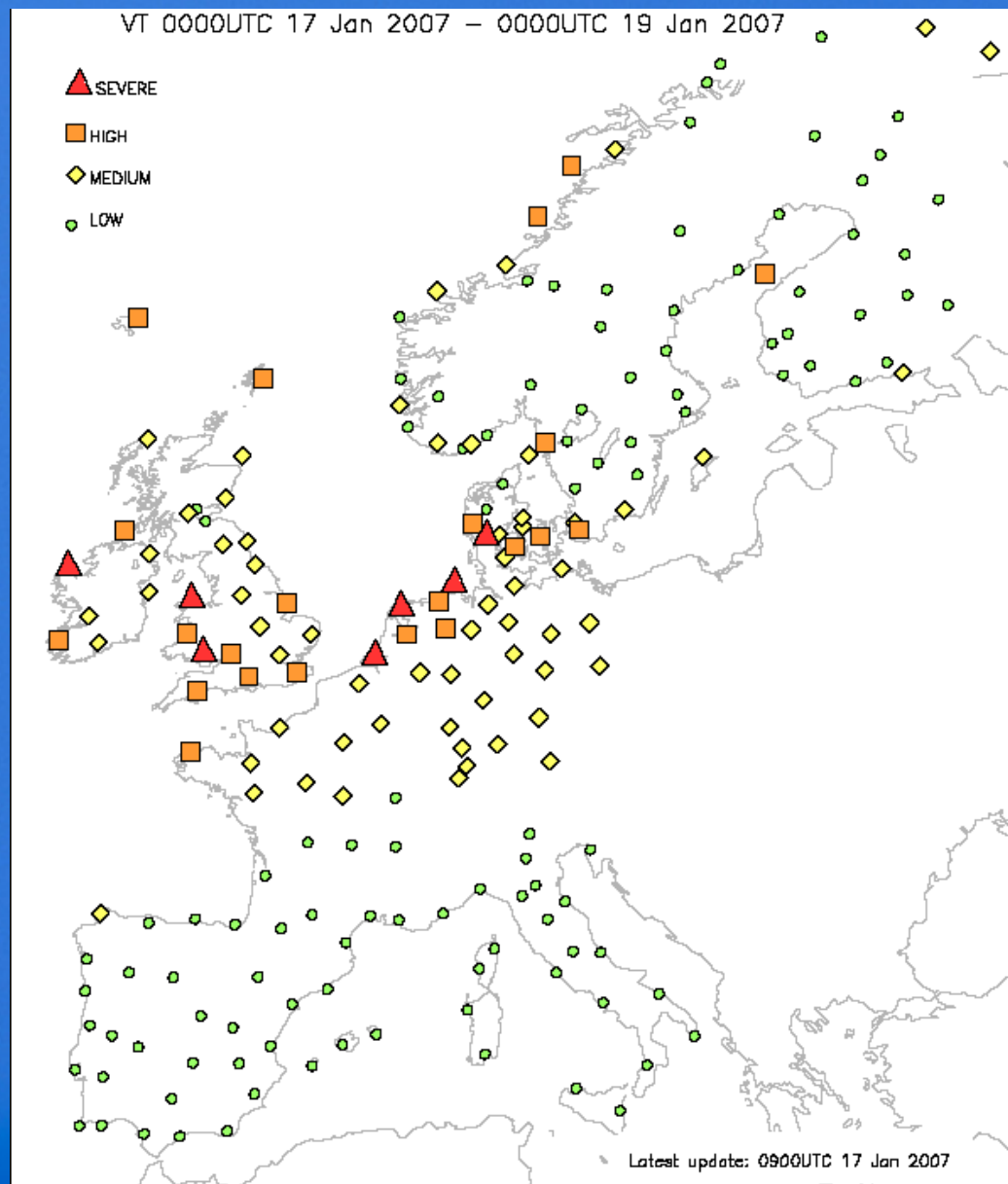
Threshold examples



New member states – operational till Dec 2007



Integration of FP6 project results - Windstorm

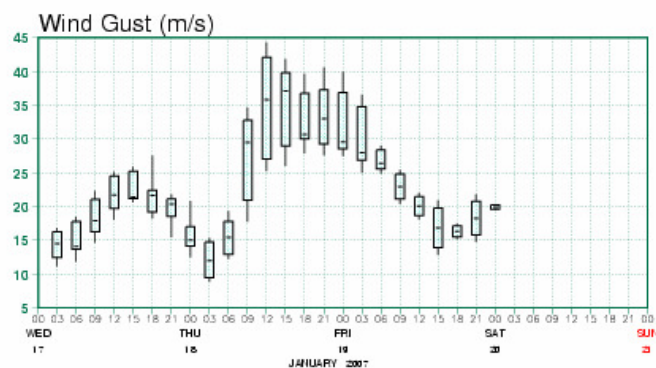
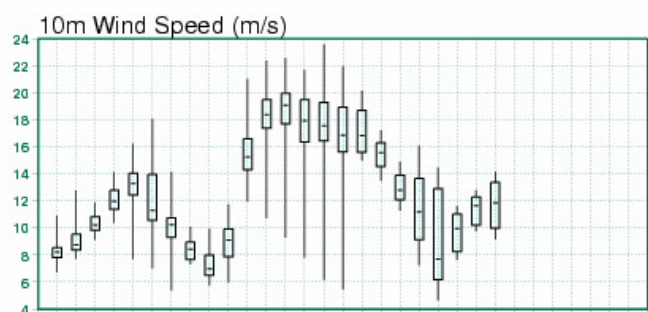


Source: Paul Davies, MetOffice

Integration of FP6 project results - Windstorm

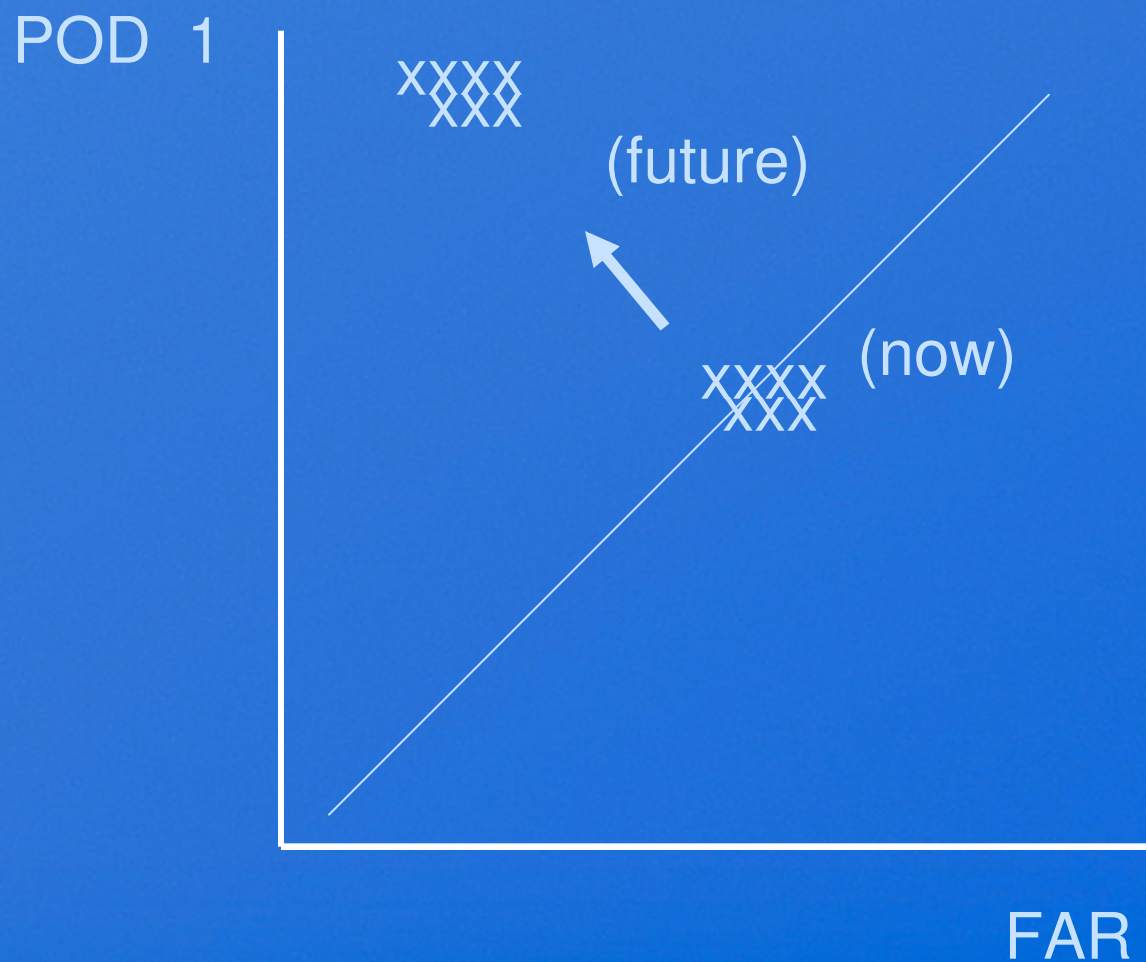


PEPS Ensemble Meteogram
VLISSINGEN (06310) 51.5° N 3.6° E
RAW - EPS Forecasts : 17 January 2007 00 UTC

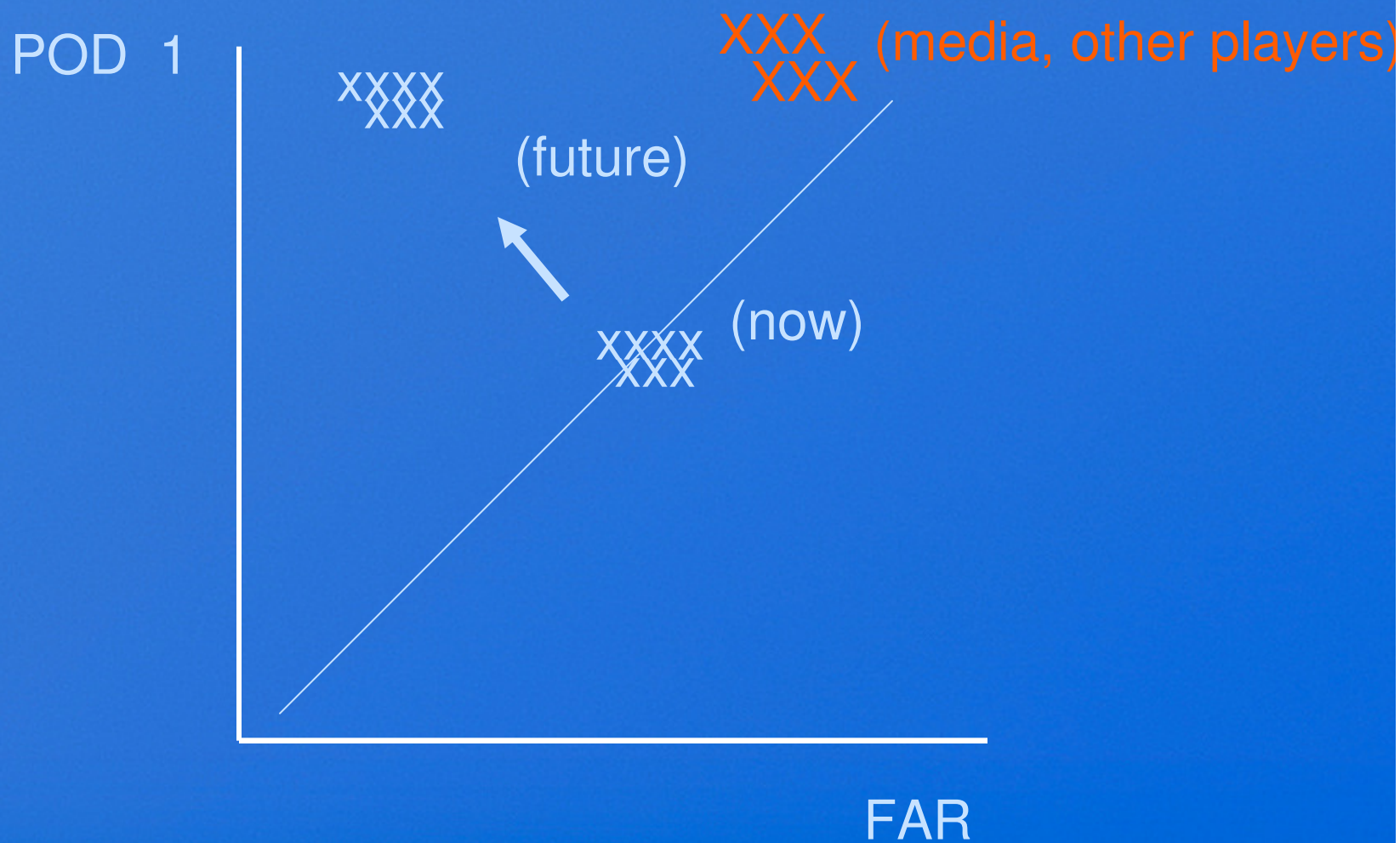


Source: Paul Davies, MetOffice

Warnings and competition at the wrong place/time



Warnings and competition at the wrong place/time

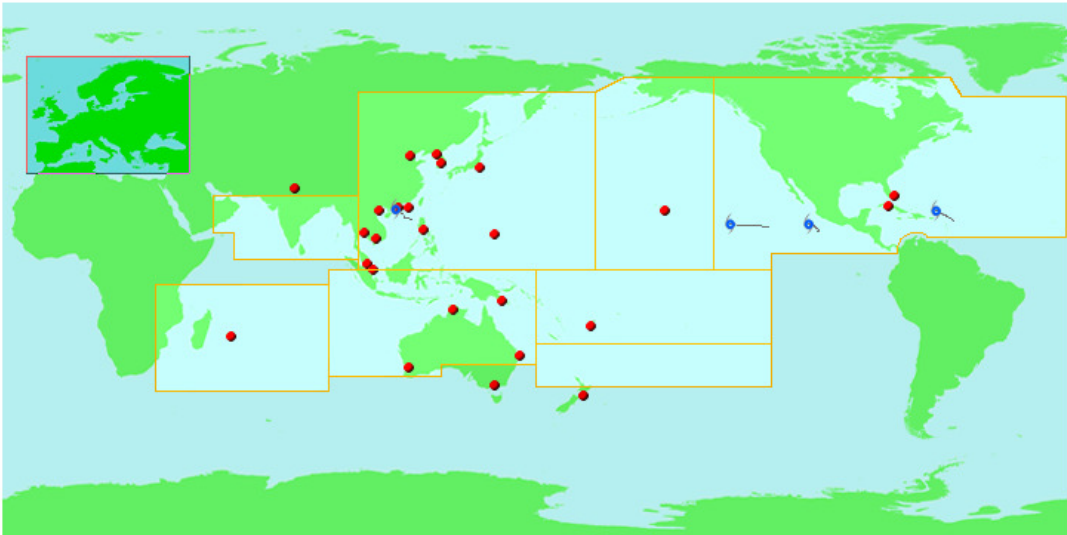


Link WMO - METEOALARM

Adresse <http://demo.severe.worldweather.org/>

**World Meteorological Organization**

Severe Weather Information Centre
Official Observations. Official Warnings.



Last Updated at 2006-08-03 06:49 UTC [Past Positions](#)

 **NOTES**

- ▶ Click on the symbol  or  for advisories and warnings on the tropical cyclone.
- ▶ Click on the symbol  for information from individual WMO Members participating in the [web site](#).
- ▶ Click on individual boxes to view zoom-in maps.
- ▶ This page is best viewed with a display resolution of 1024 x 768 pixels.

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Participating Members
Notes To Users
Links
World Meteorological Organization
GMDSS
Official World City Forecasts
Meteoalarm (alerting Europe for extreme weather)
Disclaimer
This World Meteorological Organization (WMO) web site is developed and

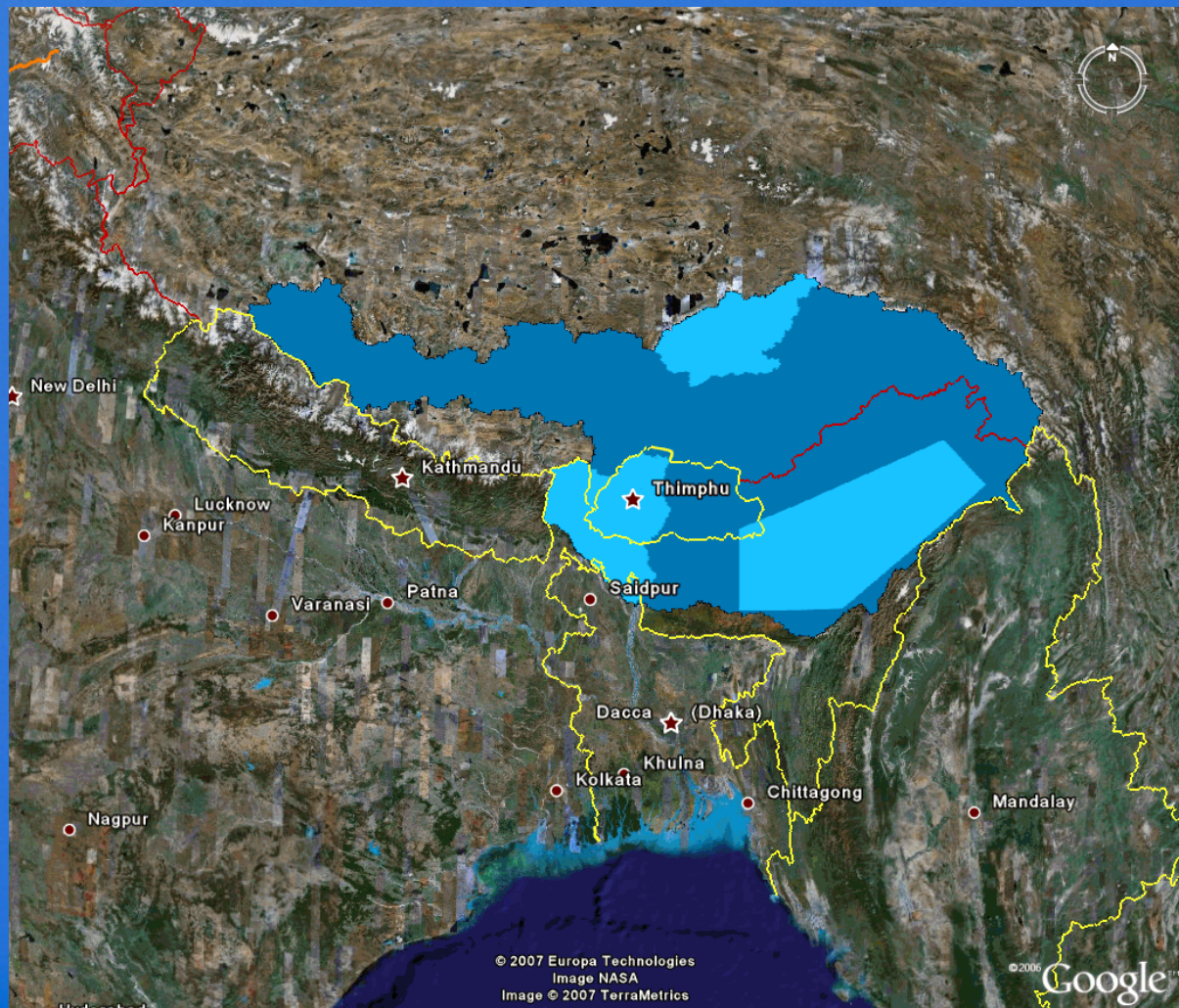


Twinning European and South Asian River Basins to enhance capacity and implement adaptive management approaches

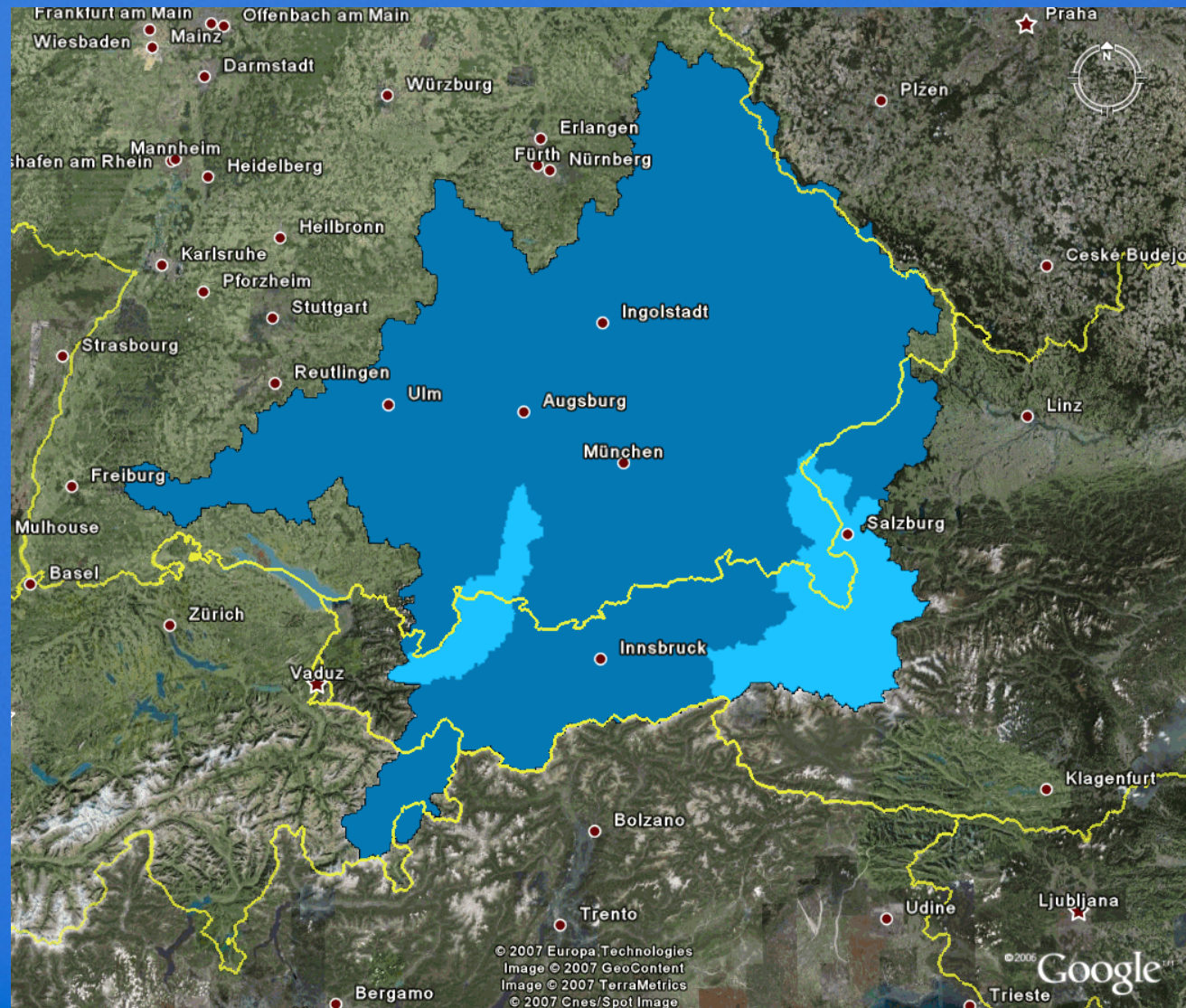
Harmonised integrated water resources management (IWRM) approach
(European Water Initiative)

- **Headwater river systems of alpine mountain massifs**
- Transfer of professional IWRM expertise
- approaches and tools based on case studies carried out in twinning European and Asian river basins

Upper Brahmaputra river basin



Upper Danube river basin





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- Terrain classification from SRTM and ASTER images
- Analyses of snow and glacier distribution and change detection
- Permafrost and potential slope instabilities
- Land use and land cover and change detection
- Wetland functions and groundwater recharge
- Hydrological systems analysis and delineation of Hydrological Response Units (HRU)



Txs for your attention!

