





## Content

<b><a href="http://www.meteoalarm.eu">www.meteoalarm.eu</a></b>	3
<i>Professional users</i>	3
The colours explained	4
<i>Meteoalarm Colour code assignment</i>	5
Wind	6
<i>Some regional winds</i>	7
Rain	8
<i>Danger from river flooding</i>	8
Thunderstorms	10
<i>Lightning tips</i>	11
Snow and ice	12
Mist and fog	13
Extreme heat	13
Extreme cold	15
Coastal and riverside dangers	16
<i>Coastal warnings</i>	16
Forest and bush fires	17
Avalanches	18
Using the 5 day forecast on Meteoalarm's Intranet	19
<i>Meteoalarm Intranet Forecast for days 2 to 5</i>	20
<i>How do I request a Log-in code for Meteoalarm's Intranet?</i>	22



## **www.meteoalarm.eu**

The weather knows no boundaries. That's why meteorologists from Europe's national weather services took the initiative to launch a European website that provides advice on exceptional weather. The address of the website is [www.meteoalarm.eu](http://www.meteoalarm.eu). Pictograms and colour-coded maps of Europe show at a glance where the weather is threatening to become dangerous, both nationally and on a local scale of over 650 regions. Not only are gales, torrential rain, snow and ice, thunder and lightning, fog, extreme temperatures, forest fires and avalanches all indicated, but also weather conditions that lead to increased risk on the coasts, such as storm surges and high waves. The level of risk is colour-coded.

All the countries have agreed on a similar colour coding, based on likely damage, disruption and danger.

Users of the website can surf for more detailed information on the web pages of the co-operating weather services.

### ***Professional users***

Five-day forecasts are available on a restricted basis to professionals involved in national and international crisis management. In this way you are able to assess the chance of severe weather up to five days ahead. (For more information, such as how to apply for your personal user code and password, please mail to: [meteoalarm@zamg.ac.at](mailto:meteoalarm@zamg.ac.at)).



Photo: T.Dijkhuizen



## The colours explained

<b>Green</b>	Is your country coloured green? Then there's nothing to worry about.
<b>Yellow</b>	Yellow means potential danger. The weather is unlikely to be extreme but care is called for in activities that are dependent on the weather. Keep an eye on the weather forecasts and warnings and take no unnecessary risks.
<b>Orange</b>	Orange means danger. Exceptional weather is expected that may cause damage or accidents. Be careful and keep abreast of the latest forecasts and warnings. Keep in mind that some risk may be inevitable. Take heed of all advice given by the authorities.
<b>Red</b>	Red means great danger from extremely severe weather. Major damage and accidents are likely, in many cases with threat to life and limb, over a wide area. Pay constant attention to bulletins and obey the instructions and advice given by the authorities under all circumstances. Keep in mind that exceptional measures may be taken.

## ***Meteoalarm Colour code assignment***

The warning phase colour code assignment is done by each contributing National Meteorological Service (NMS). It is strongly encouraged to relate this assignment strategy to potential damage and impact of the expected severe weather event to society. For each weather parameter, such as wind or snow or rain or etc., simple meteorological thresholds define which colour should be assigned. These thresholds are set by the NMS in charge for the region and of course differ from country to country or sometimes even from region to region within countries.

For example 10 cm's snow within Alpine countries will have lower impact/damage (perhaps a "yellow" colour is enough) than a 10 cm's of snow within the low countries (likely an "orange or red" there is needed). The best practice strategy to set the threshold for each weather parameter is in defining them by analysing the climatological return periods within the geographical domain. Rare severe events, so low return periods, tend to have more impact and therefore should get a higher impact colour.

By using this strategy to define colour assignment strategies all over the Meteoalarm domain, a more or less uniform and semi homogeneous cross boarder colour assignment is reached. Meaning that an "orange in Norway" has more or less the same meaning as an "orange in Portugal". This integrated homogeneous European picture on weather awareness is probably one of the greatest benefits from the Meteoalarm colour assignment approach.



## Wind

Gales and high winds are a definite risk in heavily populated areas, towns and cities, and forests. Gales of Beaufort force 10 or more uproot trees, often felling large areas of forest, and damage to buildings is inevitable. Airborne objects such as roof tiles, fencing, corrugated sheeting and branches broken from trees are a threat to those outside. Gusts of wind, which in severe gales or thunderstorms can reach more than 100 km per hour, are especially treacherous, in particular for road traffic, such as cars with trailers, caravans and lorries, and of course for cyclists and motorcyclists who quickly become a plaything of the wind. Indeed, roads and railways can be blocked, and public transport and air traffic severely disrupted.

Mountain winds are another story. On summits the wind speed is generally greater than in the valleys but even there the force of the wind can be increased by local relief and channelling through mountain passes. This is sometimes just a local feature, but it may also affect large areas. The Mistral is infamous, a cold north-westerly gale in the Rhône valley in France, which penetrates far south to the Mediterranean coast. The warm dry Föhn winds, which particularly in the Alps and Pyrenees can increase to force 10 or more, are also well known.



Photo: KNMI



## **Some regional winds**

**Föhn:** The Föhn is a warm dry subsiding airflow descending from the northern flanks of mountain chains. It is especially prevalent in the Alps and Pyrenees, but a somewhat weaker version can be observed in other parts of Europe, for example in Scandinavia. The relative humidity in the Föhn can often decline down a mountainside to less than 20%, and the temperature can rise considerably. On the south side of the Alps the Northern Föhn blows from the north.

**Mistral:** The Mistral is a cold north to northwesterly wind that often blows in the Rhône valley in France where the wind flow is squeezed through a narrow valley between mountain sides, and further accelerated. The Mistral transports cold air from northern latitudes far south into the Mediterranean area. In the western part of the Mediterranean it is called the Tramontana.

**Sirocco:** The Sirocco is a hot dry wind from the Sahara desert which often blows in Mediterranean countries, conveying particles of desert sand to the north.

**Bora:** The Bora is a cold northerly wind mainly occurring along the Adriatic coast.



Photo: T.Dijkhuizen



## Rain

Flooded areas, boats rowed along streets and people despairingly trying to salvage whatever they can, these are the images we so regularly see on the television, but by then of course it is too late. The site [www.meteoalarm.eu](http://www.meteoalarm.eu) gives advance warnings on when and where in Europe so much rain is expected that flooding will result, and also on how great is the risk of torrential down-pours. If Meteoalarm shows droplets in an area coloured red then it's better to avoid travel in that part of Europe, as the situation may be life threatening.

Major floods are usually the result of persistent intensive rainfall. Melt water from snowfields can also raise river levels considerably. If under such circumstances active rain cells repeatedly pass over the catchment areas of rising rivers they will soon burst their banks. This happens especially in the winter when there is little evaporation, the vegetation can hardly retain any water, and the ground is saturated. All the water, including that from higher ground, cascades into streams and rivers unable to cope with it.

### ***Danger from river flooding***

But rivers can also burst their banks even in fine, dry weather. Most of the time this is caused by extensive rainfall at upstream locations along the river and/or



Photo: Red Cross, Germany





because of melting snow. Avoid unpleasant surprises if you're planning a journey through parts of Europe where rivers are found.

Heavy rain is generally caused by deep depressions in the Mediterranean region, the Alps, the Pyrenees, or in middle or northern Europe. The most active areas of rainfall are often concentrated in areas where cold air from the north of Europe clashes with very warm and humid air from the Mediterranean. A classic example is the Genoa depression in the Bay of Genoa which causes torrential rains, especially on the south flanks of the Alps. The mountain chains force the air to rise which may intensify the downpours. Such orographic rains, as they are called by meteorologists, can generate more than 10 cm of rain in a day. Periods with extremely heavy rainfall accompanied by thunderstorms are an annual, mainly summertime, occurrence in Europe. Heavy snowfall followed by rapid thawing, combining to cause disruptive flooding, occur annually too. Sometimes we find the heaviest rains in the Alps, or in Austria and Switzerland, or in northern Italy, but at other times they may for example occur in the Sudeten highlands on the border of the Czech Republic and Poland. Severe thunderstorms can also cause serious flooding and damage on a local scale.

The website [www.meteoalarm.eu](http://www.meteoalarm.eu) shows at a glance the areas where heavy rain is expected to cause rivers to burst their banks, and how serious the situation is.



Photo: P.P. Hattinga Verschure



## Thunderstorms

Lightning in open terrain is almost always a threat to life. If a thunderstorm is in the offing you can't be careful enough. It's not just the lightning, because thunderstorms are often accompanied by cloudbursts and torrential rainfall, and occasionally by hailstones as large as tennis balls, and dangerous gusts of wind. These all easily cause damage, not just from felled trees or severed branches, but also through lightning strikes themselves, which may lead to complete districts experiencing a blackout. The torrential rains may cause streams and rivers suddenly to burst their banks. In such surges of churning water, burbling brooks change into wide fast flowing rivers, turning picturesque campsites into a living hell. Landslides and avalanches of mud can cause enormous damage, and lead to casualties every year.

Mountains are particularly notorious for sudden complete changes of weather with warmth and sunshine followed by cold and snowfall, even in the middle of summer. Under such conditions it's not unusual for temperatures to drop 20 degrees in a very short time.

The most severe thunderstorms generally occur in the summer when there is humid air and exceptional warmth. In particular, when cooler air approaches, enormous thunderclouds can develop with tops reaching 15 km or more, able to contain vast quantities of water. Thunderstorms in the mountains can certainly be treacherous, since the growth of thunderclouds may be hidden from hill walkers and mountaineers by the higher summits, resulting in them not being aware of what is taking place close by.

The meteorologists at [www.meteoalarm.eu](http://www.meteoalarm.eu) follow such developments closely and can often give you a warning before the first thundercloud has developed!



## Lightning tips

- \* Look for shelter, certainly when the thunderstorm is nearby.
- \* Sound travels about a kilometer in 3 seconds. If thunder is heard within 10 seconds of the lightning stroke then it is dangerously close
- \* When thunder is in the air, close all windows because of the risk of dangerous gusts of wind and driving rain.
- \* If there is a lightning strike close by the current will follow a path along pipes or wiring. This may cause damage to electronic equipment connected to cable networks such as televisions, network telephone systems and computers.
- \* It is advisable during thunderstorms to disconnect aerials, cables, telephone lines and the electricity, and not to take a bath or shower.
- \* The safest place is in a closed car.
- \* If you are caught in the open by a thunderstorm and can't find a place to shelter then it is best to make yourself as small as possible by crouching on your haunches. Keep the feet together, to prevent the current passing through your body.
- \* Never shelter under a solitary tree, along the edge of a wood, or next to metal fencing.



Photo: A. Eektimmerman



## Snow and ice

When it begins to thaw after a period of frost it often first warms up higher in the atmosphere. It then begins to rain while the surface remains frozen. That leads to freezing rain and black ice, which are very treacherous forms of slipperiness. Just a small amount of rain can make surfaces as smooth as a mirror in just a few minutes. Icing can arise from the freezing and refreezing of wet road surfaces, but road traffic is generally more inconvenienced by snowfall, especially if accompanied by high winds. Snowdrifts several meters high can result from blizzard conditions such that whole areas are cut off and remain inaccessible for days on end. It's the same old story every winter, unsuspecting travellers getting stuck in the snow. In your isolation, the situation generally gets more and more hopeless, as your car gets buried deeper and deeper in the snowdrifts and it can cool down inside to below freezing point!

The site [www.meteoalarm.eu](http://www.meteoalarm.eu) warns of extreme winter weather conditions. It gives you the opportunity to postpone your journey, or to take along blankets and provisions, and to be on the lookout for potential deterioration in the weather. Consulting the website is a "must do" for anyone going to or from winter sports areas.



Photo: T.Dijkhuizen



## Mist and fog

Poor visibility poses great risks for road traffic. Motorists cannot be warned enough to reduce speed and keep their distance in foggy weather. If a bank of fog suddenly looms up the visibility can become very poor in an instant. A low sun can also completely blind motorists, especially if the car windows are misted up. If the temperature is near or below freezing mist can freeze on road surfaces and create treacherous slippery conditions. Mist and fog are a reduction of normal visibility to less than 1000 meters caused by small airborne water droplets. If the visibility drops to less than a few hundred meters then there is serious danger for road traffic. Mist and fog generally arise from cooling at sunset or before dawn. Whether mist forms depends on a number of factors, not just weather and wind, but also the type of ground, the vegetation, the relief, and the presence of sources of warmth in the vicinity, such as towns and cities. Mist and fog can therefore be very localized and may develop above snow, causing visibility to drop to less than 10 meters. It is then very easy, particularly in mountainous areas, to become disorientated and get lost.



Photo: K.Floor



## Extreme heat

To cool down we yearn for water in lakes and at the seaside, or for the cool mountain breezes, but by no means can everyone escape extremes of heat. That may be impossible, and tropical warmth can keep us awake at night. High temperatures do not cause immediate danger, but a heat wave lasting a number of days with very high temperatures does indeed create risks. A heat wave can be particularly hazardous for seniors and people in poor physical health. Days on end with temperatures above 40 C, scarcely any wind and muggy weather related to high relative humidity, have been a source of anxiety for many people in recent summers, and it is the expected pattern for summers to come. As a result of global warming we shall be facing hot summers and tropical temperatures more often.

**[www.meteoalarm.eu](http://www.meteoalarm.eu)** will show at a glance in which countries and regions of Europe heat waves are breaking all records. As a result of hot summers certain countries have already installed warning systems for heat waves. Meteorologists cooperate closely on this with health authorities, who give advice on dealing with heat, such as to avoid exertion, drink a lot, keep out of direct sunshine, wear light clothes, use a fan or air-conditioning, take a cold shower more often, and keep an eye on elderly persons.



Photo: S.Jak



## Extreme cold

Freezing air from the Arctic can penetrate far into the south of Europe causing bitterly cold conditions. If the sky is clear it may cool down rapidly at night, especially above freshly fallen snow and when the air is calm. Even during the daytime it may freeze all day, and severe wind chill is felt if it is windy. If at the same time it is snowing it may be almost impossible to stay outdoors. Every year arctic conditions take their toll, especially among the homeless.

The temperature of the atmosphere generally declines gradually with height, but on occasions it may instead rise. Meteorologists call that an “inversion” (reversal of the normal fall in temperature). It may then be warmer on mountain summits than in the valleys, by as much as 10 C. The warmer air lies on top of the colder air like a blanket. Then the cold conditions and pollutants cannot escape, causing the surface temperature to decline further, and the air to become more and more unhealthy with persistent fog and smog.



Photo: WMO





## Coastal and riverside dangers

In coastal areas the wind is generally stronger, but the local population is used to it. Waves as high as houses, caused by a severe gale or hurricane, can cause dangerous conditions and damage on the coast. Ice floes reaching the coast and slabs of drift ice forced up and over each other can be a hazard. The worst disasters of all are caused by sea surges, extremely high sea levels along the coast caused by high winds. If the peak of such a storm coincides with a spring tide large areas can be inundated. Infamous are the historic floods caused by persistent north-westerly gales along the North Sea coastlines. In particular, a series of gales one after another can raise water levels considerably and endanger the protecting dykes. The most severe storms occur mainly in the winter half of the year, but even in the summer it can blow a gale. In that case the main risk is of sudden gusts of wind during thunderstorms. This is an exceptionally unpleasant surprise for the carefree holidaymaker on the beach who is not used to so much wind.

### ***Coastal warnings***

Those who go wind or kite surfing, or sailing, are advised to consult the special coastal warnings on meteocalm. These warnings cover an area up to 22 km (12 nautical miles) from the coast.



Photo: M.Appelman





## Forest and bush fires

The risk of forest and bush fires is closely related to the weather. If it hasn't rained for a long time and it is very warm the countryside dries out and fire can easily break out. Many fires are a result of people's carelessness but lightning strikes can also ignite them. Strong winds can fan the flames and spread the fire in a particular direction, sometimes at a speed of 25 km per hour. In regions with mountains and coastline the fires can spread very unevenly as a result of local winds from the sea or the hillsides.

Global warming is leading to further desiccation in the Mediterranean area, resulting in an increased fire risk. A number of meteorological services already publish warnings of forest fire danger levels. Various meteorological data are used in model calculations to estimate the fire risk. Aircraft and satellites are now used extensively to follow the extent of forest fires, enabling them to be fought as effectively as possible.



Photo: John McColgan, Alaska Fire Service



## Avalanches

What would the Alps or Pyrenees be without snow? Winter sport enthusiasts look forward to it every year, but there mustn't be too much of it. Excessive snowfall can isolate whole areas. In addition the danger of avalanches is then exacerbated, so that your winter sport holiday in the mountains can end dramatically. Every year avalanches kill dozens of skiers. Avalanches of snow may occur under totally different circumstances, both during periods of frost and of thaw, especially when a warm (Föhn) wind is blowing. In such a case the top layer of snow melts rapidly, especially if the sun is shining. This layer of snow can then easily start to slide. Wet snow or slush can also easily cause avalanches from the weight of the large amounts of water they contain. Rain and thawing, often in springtime, cause wet or surface avalanches that slide or roll down mountainsides or plunge into valleys.

Heavy snowfall accompanied by low temperatures can result in avalanches of powdery snow, thick clouds of snow which descend at high speed, sometimes up to 200 or 300 km per hour. Such a thick cloud of snow has enormous destructive power, mainly through the pressure wave that precedes it and the wind that accompanies it. Such avalanches can easily kill because victims' lungs are filled with powdery snow, which may literally suffocate them as it melts.

The colour coding of [www.meteoalarm.eu](http://www.meteoalarm.eu) offers you up to the minute coverage of the severity of the avalanche risk in parts of Europe.



## Using the 5 day forecast on Meteoalarm's Intranet

Instructions for users in the civil security services domain

### **Medium-range Weather Forecasts**

Medium-range weather forecasts up to 5 days ahead are principally intended to identify trends in the development of the weather. These trends are based on the results of computer calculations for instance such as from the European Centre for Medium-Range Weather Forecasts (ECMWF).

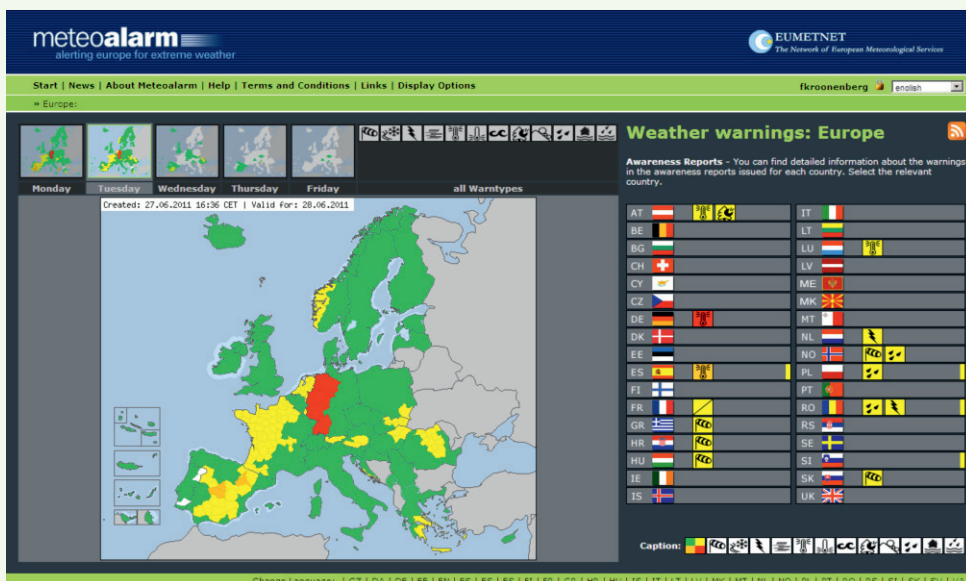
### **Ensemble Method**

Within the ECMWF the cooperating European National Meteorological Services (NMSs) have developed a special forecasting method which takes account of uncertainties due to the chaotic behavior of the atmosphere. This so-called Ensemble Prediction System (EPS) generates 50 possible outcomes of the expected weather pattern, for a 15 day forecasting horizon, for each of the 15 days.

Such an ensemble of outcomes for the coming days generates a set of data which allows statistical analysis to determine the probabilities of various weather patterns. For example, the chance that the temperature at a particular location will exceed 30C on a certain day. Or, to take another example, the chance that in 5 days' time the wind speed at a certain place will exceed 75 km/h.

Longer term developments are of course less certain than the forecasts for today and tomorrow. The Meteoalarm team has developed a method, especially for professional users, to give an indication of the probability of extreme or hazardous weather up to 5 days ahead.

Users involved in the domain of national and European civil security services are able to access Meteoalarm's webpages for European weather alerts for 2 to 5 days ahead, by using a user code and password.



### ***Meteoalarm Intranet Forecast for days 2 to 5***

The colour codes used in that part of the website reserved for professional users are presented in the same way as in the public part of the site. The colours for the levels of warning for the various days are as given in the colour chart on the next page. Certain countries take account of the local impact that the weather can have when determining the initial phasing of the warning. The consequences of extreme weather are for example generally less severe during the night or a quiet weekend than during working days or peak holiday periods when there is considerable movement of people and traffic.



Alert level	Green	Yellow	Orange	Red
Level of confidence				
0 - 5% Negligible probability				
5 - 30% Limited probability				
30 - 60% Reasonable probability				
>60% High probability				

*Meteoalarms Color coding chart for Day 2 – 5*

The level of warning and the associated depicted color coding also depends on the level of confidence of the extreme weather occurring. The greater the certainty, the higher the warning phase. If the chance of a weather event that deserves the red warning level is only 40% then Meteoalarm assigns the color orange to the region in question on that day. If the chance exceeds 60% then the issued Meteoalarm warning level will be red.

Users can follow the development of the probability of severe weather on a day to day basis by following changes in the colour codes.

The table on the next page gives the relation between colour codes and the expected impact and damage levels of the weather, and is coupled to advice on steps to take. The colour coding also gives an indication on how unusual such expected weather phenomena are by how rarely they occur.



Colour	One word	What to do?	Damage / Impact	Used how often?	Meteo Thresholds and parameters e.g. Rain (area + impact related)
Green	Weather report	Usual phenomena		Usual phenomena	(Examples)
Yellow	Be aware!	Caution with exposed activities	Exposed objects (avoidable)	>30 per year	>54 mm/12h
Orange	Be prepared!	Keep informed in detail and follow advice of authorities	General damage (not avoidable)	1 to 30 per year	>80 mm/12h
Red	Take action!	Follow order or advice of authorities under all circumstances and be prepared for extraordinary measures	Extreme damage and/or casualties (mostly on large areas, threatening life and property (not avoidable, even in otherwise safe places)	less than 1 per year + <i>large scale phenomena</i>	>140 mm/12h

### ***How do I request a Log-in code for Meteoalarm's Intranet?***

If you, as a professional user within civil security services, wish to access Meteoalarm's Intranet we advise you to contact your own NMS through Meteoalarm's central email address.

This central address is [meteoalarm@zamg.ac.at](mailto:meteoalarm@zamg.ac.at) This approach allows us to get your national Meteoalarm representative in touch with you. You can also use this email address to share your experience with Meteoalarm with us, and to give us feedback with comments and suggestions to allow us to further improve the site.

We would like to point out that 5 day forecasts are not yet available for all countries. However, in the near future, more and more European NMSs will introduce medium-range weather warnings.

## Cooperating weather services

Zentralanstalt für Meteorologie und Geodynamik (ZAMG)  
L'Institut Royale Météorologique (RMI)  
MeteoSwiss  
Meteorological Service of Cyprus  
Czech Hydrometeorological Institute (CHMI)  
Deutscher Wetterdienst (DWD)  
Danmarks Meteorologiske Institut (DMI)  
Estonian Meteorological and Hydrological Institute (EMHI)  
Agencia Estatal de Meteorología (AEMET)  
Finnish Meteorological Institute (FMI)  
Météo France  
Hellenic National Meteorological Service  
Meteorological and Hydrological Service of Croatia (DHMZ)  
Hungarian Meteorological Service (OMSZ)  
Met Éireann  
Icelandic Met Office  
Servizio Meteorologico Aeronautica Militare  
Luxembourg Meteorological Service  
Latvian Environment, Geology and Meteorology Centre (LEGMC)  
Malta Airport Metoffice  
Koninklijk Nederlands Meteorologisch Instituut (KNMI)  
Norwegian Meteorological Institute (met.no)  
Polish Institute of Meteorology and Water Management (IMGW)  
Instituto de Meteorologia IP Portugal  
Meteo Romania  
Republic Hydrometeorological Service of Serbia (RHMS)  
Swedish Meteorological and Hydrological Institute (SMHI)  
National Meteorological Service of Slovenia (meteo.si)  
Slovenský Hydrometeorologický Ústav (SHMU)  
UK Met Office  
National Institute of Meteorology and Hydrology of Bulgaria (NIMH)  
Hydro Meteorological Service of the Former Yugoslav Republic of Macedonia (HMS - FYROM)  
The Institute of Hydrometeorology and Seismology Montenegro

## Colophon

Text by Harry Geurts, KNMI / Translation: Donald Hatch  
Concept by Studio KNMI / Published by KNMI, The Netherlands



**[www.meteoalarm.eu](http://www.meteoalarm.eu)** is developed for Eumetnet, the Network of European Meteorological Services. This initiative is supported by the WMO, the World Meteorological Organisation, to which all the participating countries belong.

*Copyright: KNMI, De Bilt, The Netherlands, 2013*

*Source: Meteorisk, Michael Staudinger, ZAMG, Austria*