

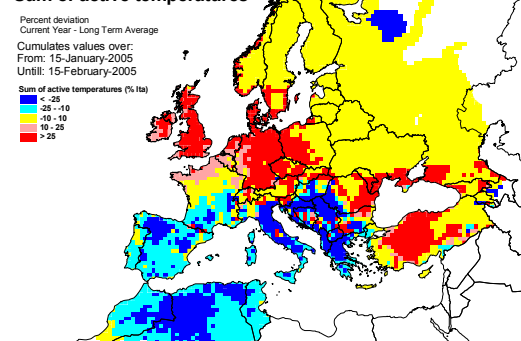
Protective snow layer limited the effects of the extreme low temperatures in Eastern Europe. Unusual cold and dry weather in the Iberian Peninsula.

OBSERVED TEMPERATURE AND RAINFALL

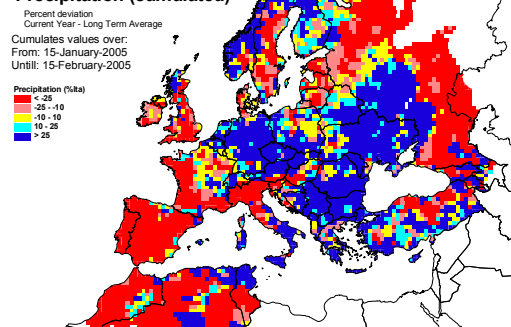
For the considered period, the increase of sum of active temperatures was **higher** than usual (more than 25% from long term average) in Ireland, UK, Denmark, Germany, western Poland, eastern Romania and central Turkey (areas in red in the map of sum of active temperatures). The evolution of the sum of active temperatures was close to normal in the rest of eastern Europe and central France. Large areas of western Mediterranean Basin were cooler than usual. In some spot areas in **central Spain**, the crops were again exposed to by the **unusual low temperatures** (sometimes below -15°C) combined with poor snow layer. **Very low values for minimum temperature** (down to -36°C) were recorded in **eastern Europe**, fortunately for the local winter crops, these low temperatures were **associated with thick protective snow layers** (in general more than 8 cm). The frost risk is discussed in the second part of this bulletin.

Precipitation higher than normal were recorded in Scotland (more than 120 mm), Benelux, Germany, Czech Republic and large areas around north and western Black Sea as well as Tunis, southern Italy, Balkans (especially in Peloponnisos, Greece) and southern half of Turkey. **Very dry** conditions became **persistent** in the **Iberian Peninsula**. Ireland, large areas from UK, France, northern Italy, Sweden, Russia and northern Turkey were also the subject of drier than usual conditions.

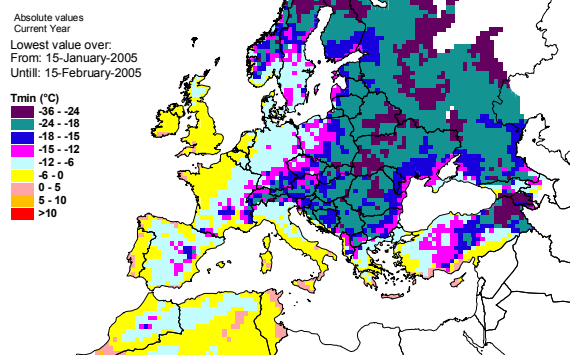
Sum of active temperatures



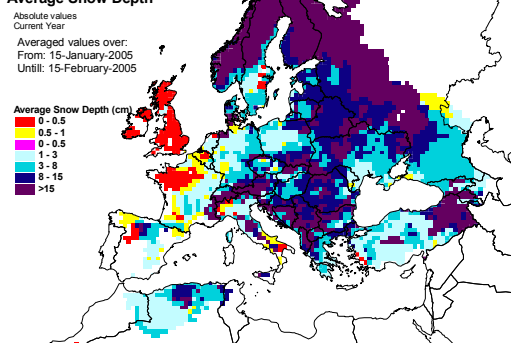
Precipitation (cumulated)



Minimum temperature



Average Snow Depth

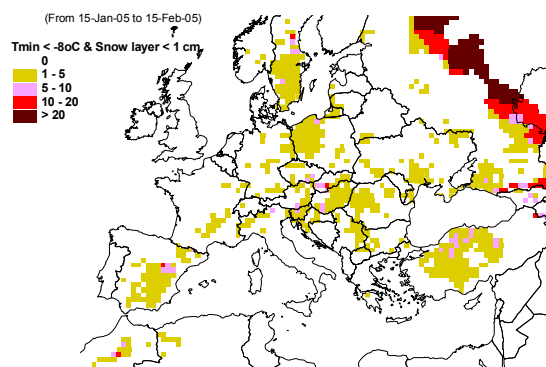


FROST RISK Analysis:

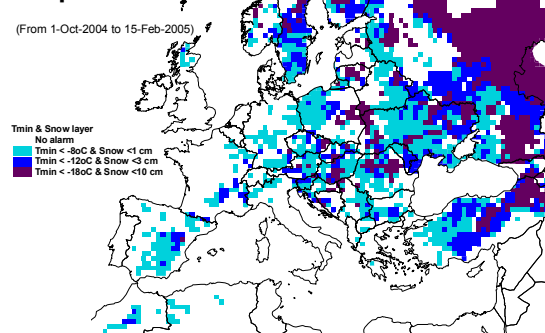
Areas in southern Spain, western Poland, Hungary, Transylvania, and central Turkey were exposed for up to 5 days at different combination of low temperatures and snow covers. In general, **the occurrence of very low temperatures was preceded by moderate low temperatures** and in this scenario it was possible the achievement of a **good "hardening" condition**, enabling the full resistance of the winter crops to low temperatures. A very dangerous weather scenario concerning the occurrence of a sudden frost after a warm period was skipped. In addition, in **Eastern Europe, the thick snow layer minimized the impact of the very low temperatures** on winter wheat crops (for example, at an external temperature of -30°C a snow layer of 15 cm is able to ensure at crown level a temperature of -12°C). In **Spain, protection offered by snow was insufficient** and in limited areas it is expected a reduction in plant population of about 10% (larger damages are possible as a function of the genetic frost resistance of the local cultivars). Leaf area of winter wheat crops was reduced especially in eastern Europe. Due to the known lower resistance, the situation of winter barley it is expected to be worse.

Besides the alternation of warmer days with very cold days, the next risks concern the eventuality of a cold spring with a slow melting of the excessive snow layer, creating together with dead leaves favourable conditions for diseases development. On the other hand, the snow melting will contribute to replenish the soil moisture.

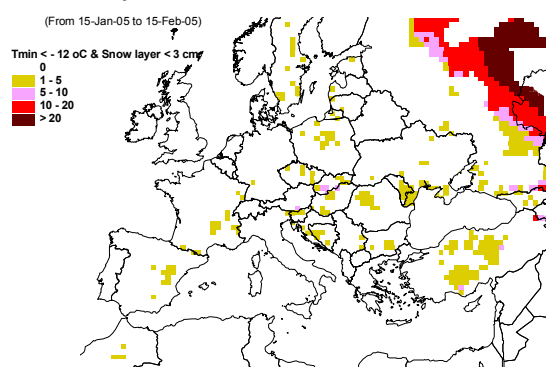
Number of days with frost stress



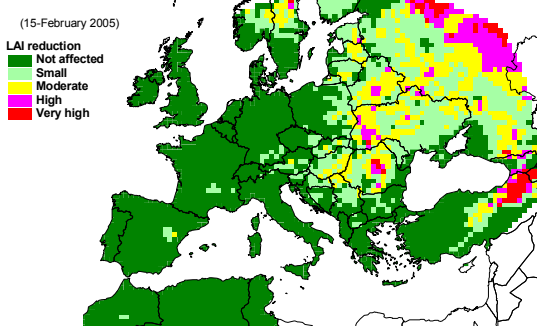
Map of frost risk



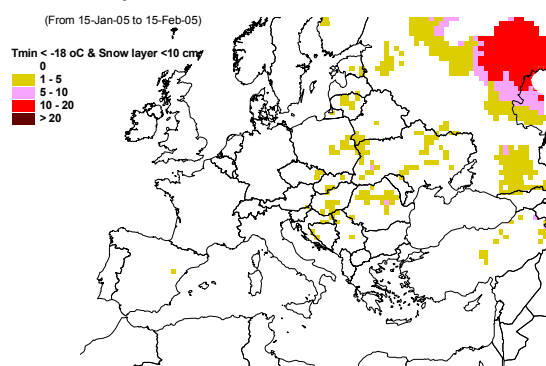
Number of days with frost stress



Estimated effect of low temperatures on Leaf Area Index



Number of days with frost stress



Killing temperature for winter wheat as effect of hardening

