

# Different Wind Gust Parametrization in Storm Events

Simon Lopez  
MeteoSchweiz

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- **Project with PartnerRe Zürich**
- **Different wind gust parametrizations**
- **Example**
- **Further work**

# Collaboration MeteoSwiss - PartnerRe

- PartnerRe
  - ★ Selection of 100 historical storms

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  - ★ Calculation of the 100 storms with a grid mesh of 7 km

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    - \* duration of assimilation 3 days



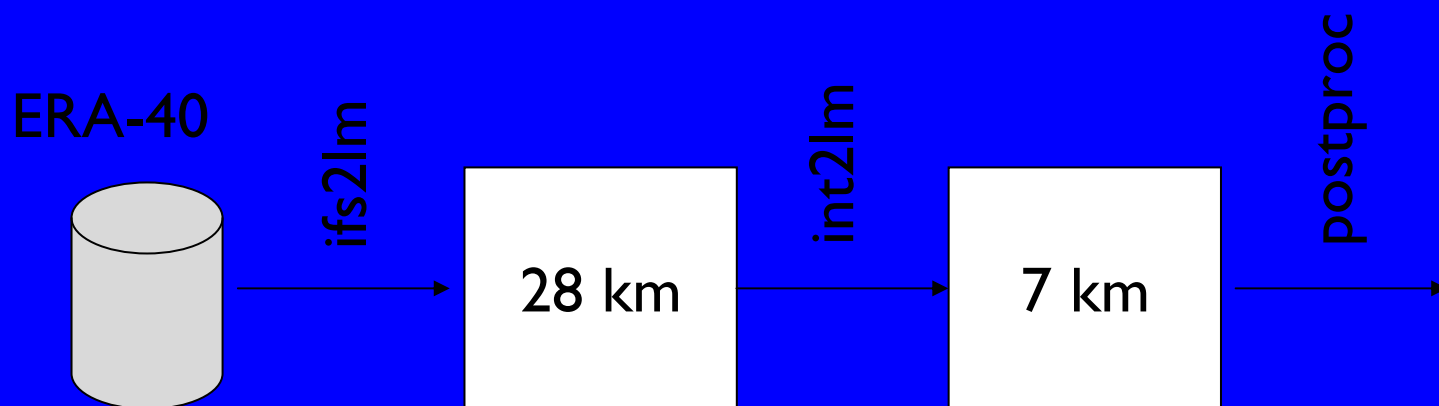
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    - \* with 2 different wind gust parametrizations
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    - \* duration of assimilation 3 days
    - \* Calculation domain: Western Europe
  - ★ Validation of mean wind and wind gust results

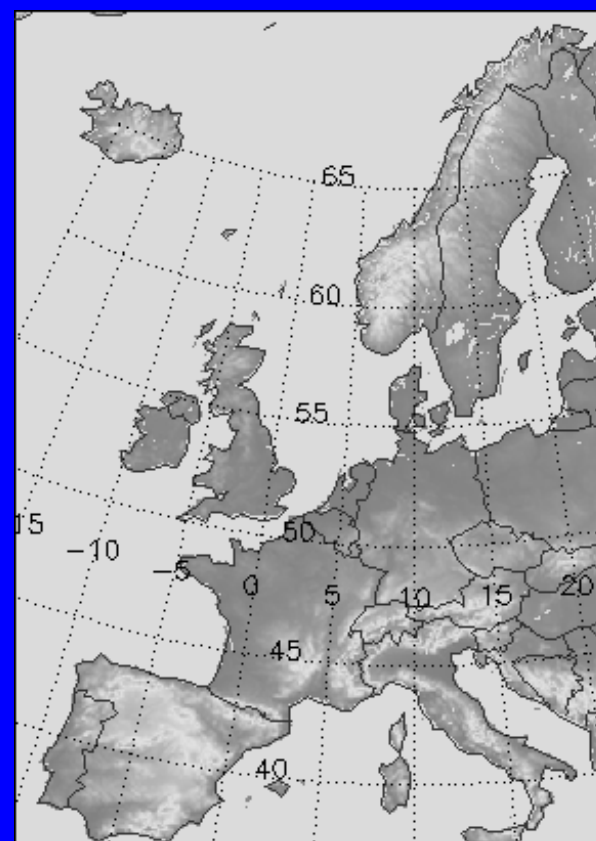
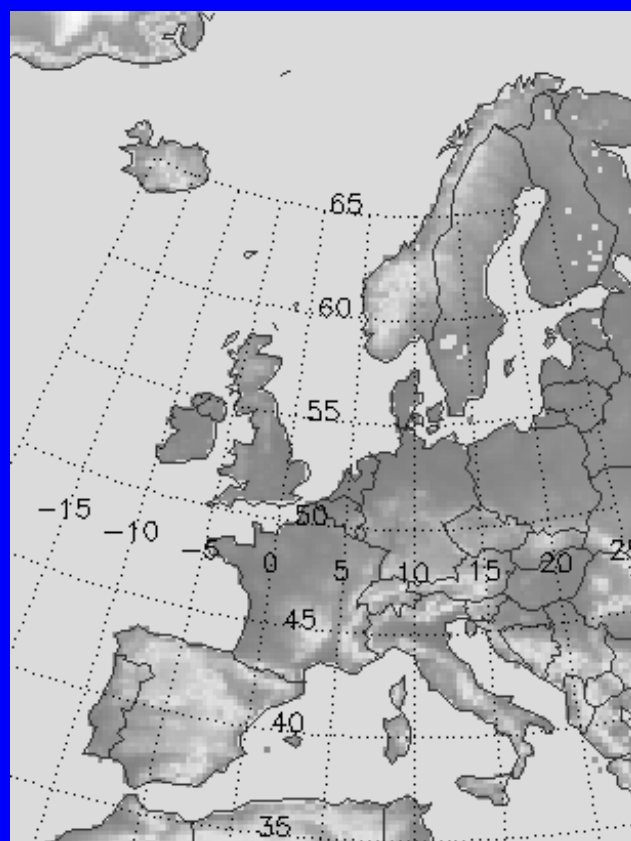
# ERA-40 to 7 km



# Domain

28 km

7 km



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# operational gust

drag coefficient for momentum  $c_m$

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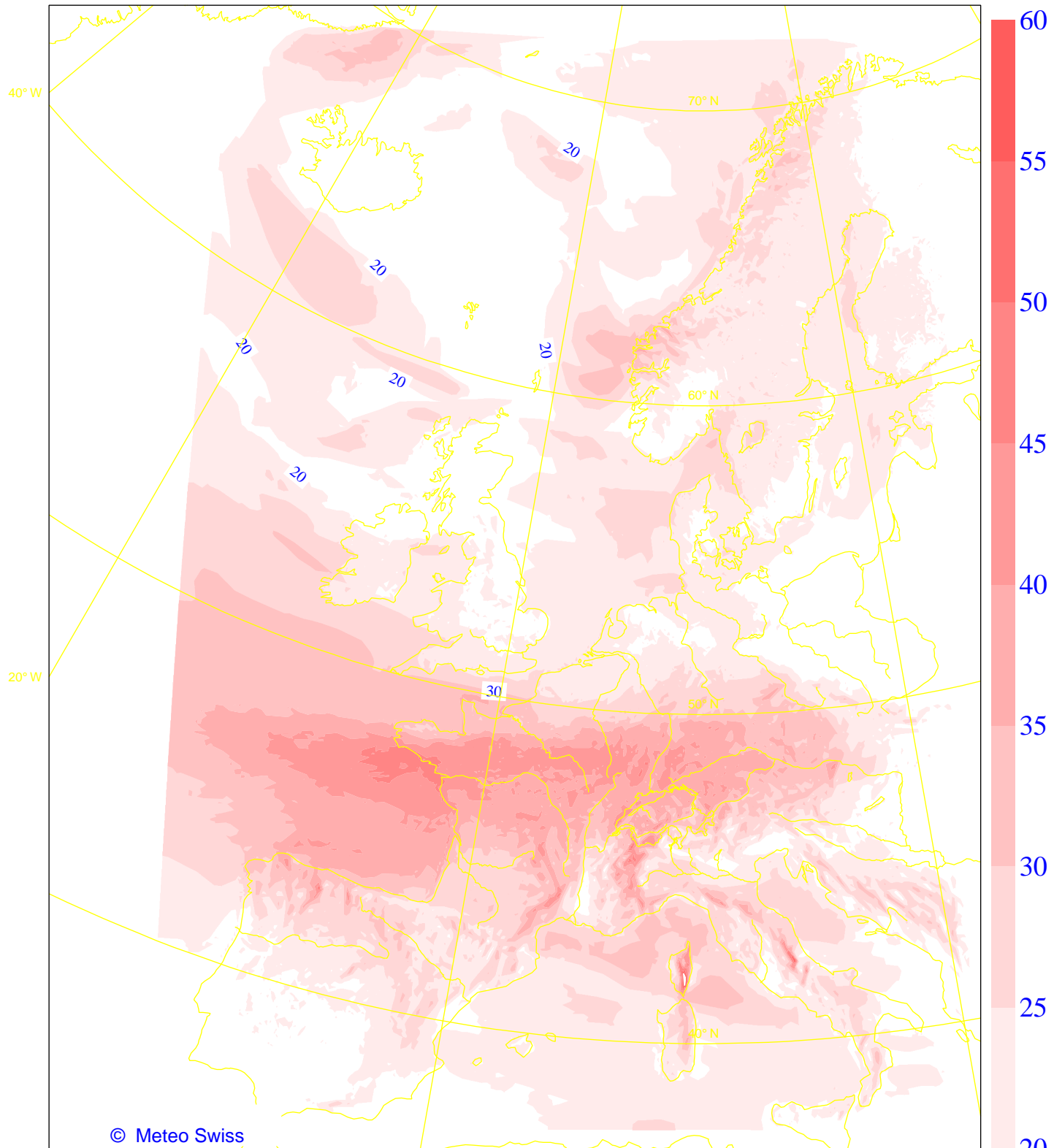
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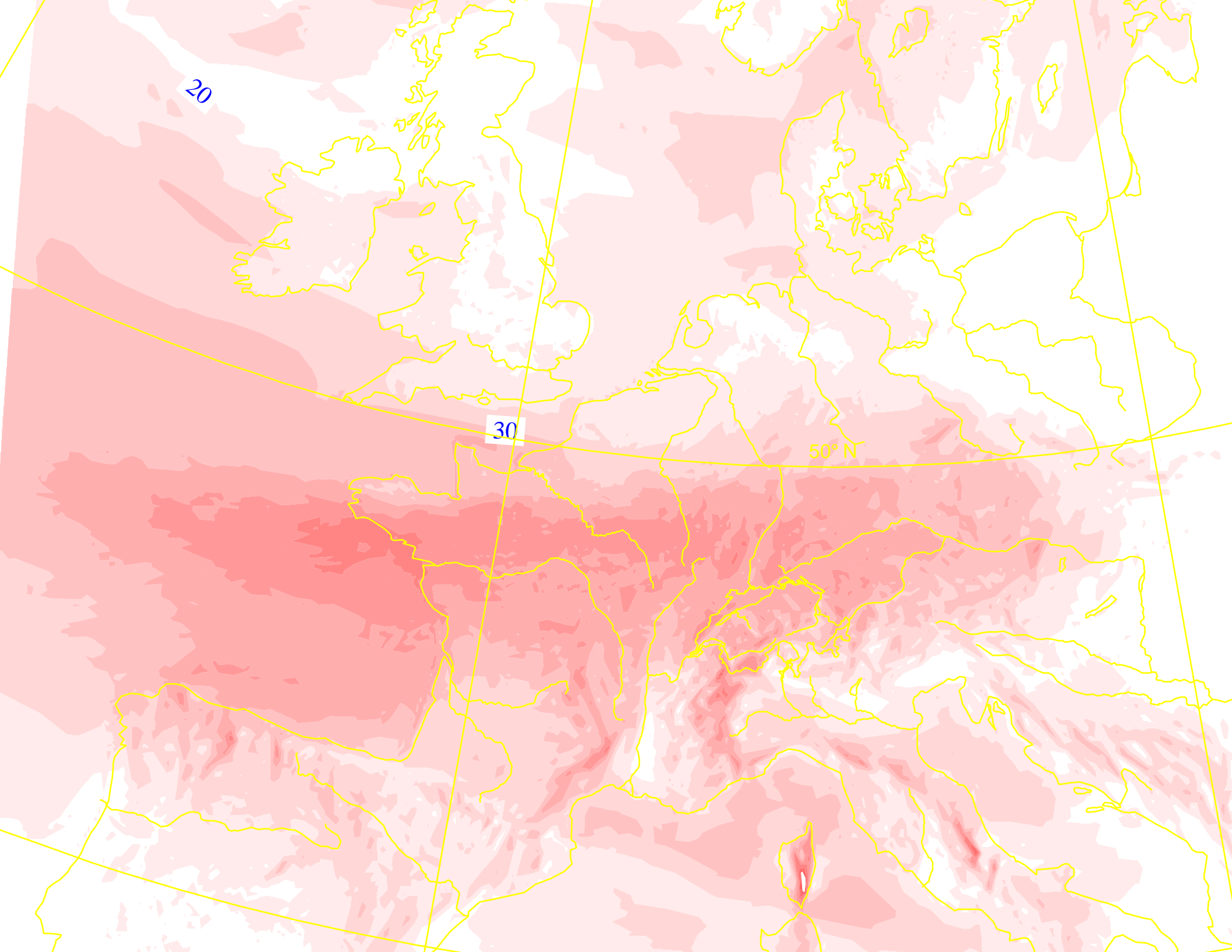
drag coefficient for momentum  $c_m$

$$Wg = U_{30} + \alpha \sqrt{c_m} U_p = U_{30} + 7.2 u_*$$

$$u_*^2 = c_m U_p^2$$

opr Windböe 1999 12 26 UTC + 19h



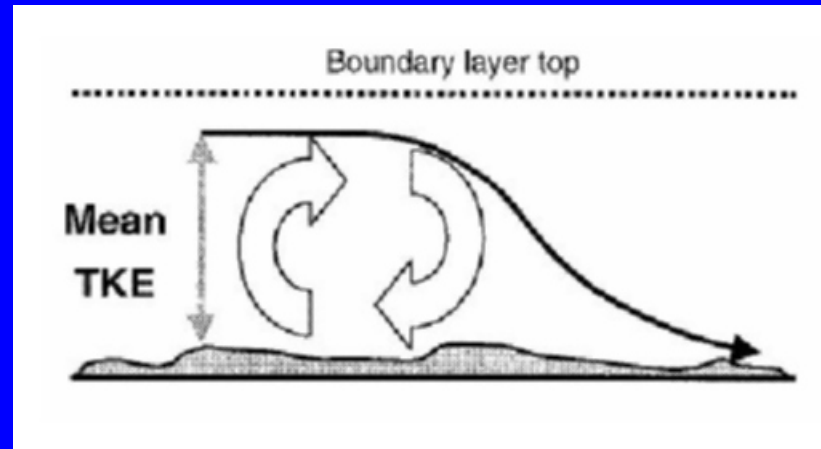


20

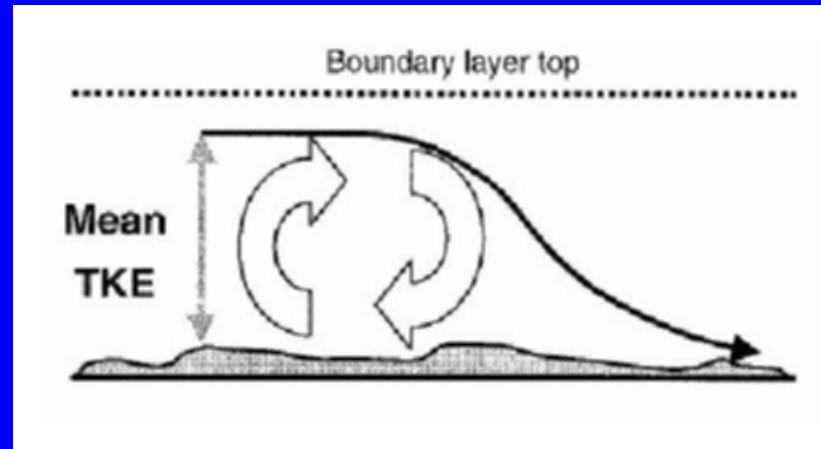
30

50° N

# Parametrization with TKE

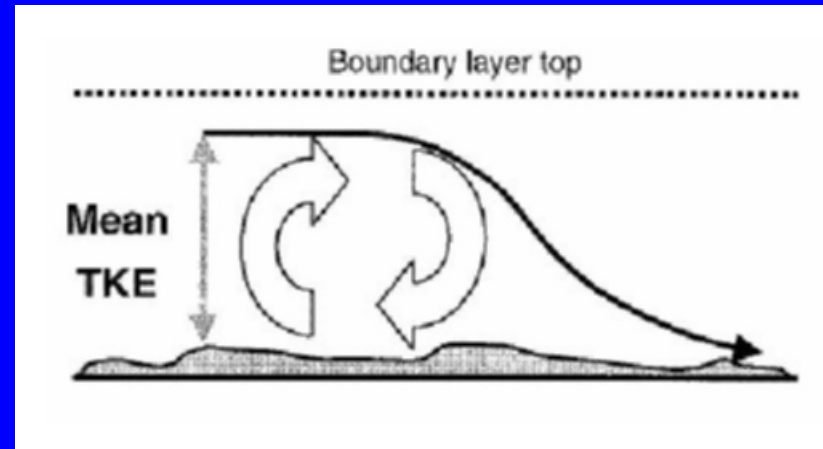


# Parametrization with TKE



$$\frac{1}{z_p} \int_0^{z_p} E(z) dz$$

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$$\frac{1}{z_p} \int_0^{z_p} E(z) dz \geq \int_0^{z_p} g \frac{\Delta\theta_v(z)}{\theta_v(z)}$$

Wind gust

$$Wg = \sqrt{U^2(z_p) + V^2(z_p)}$$

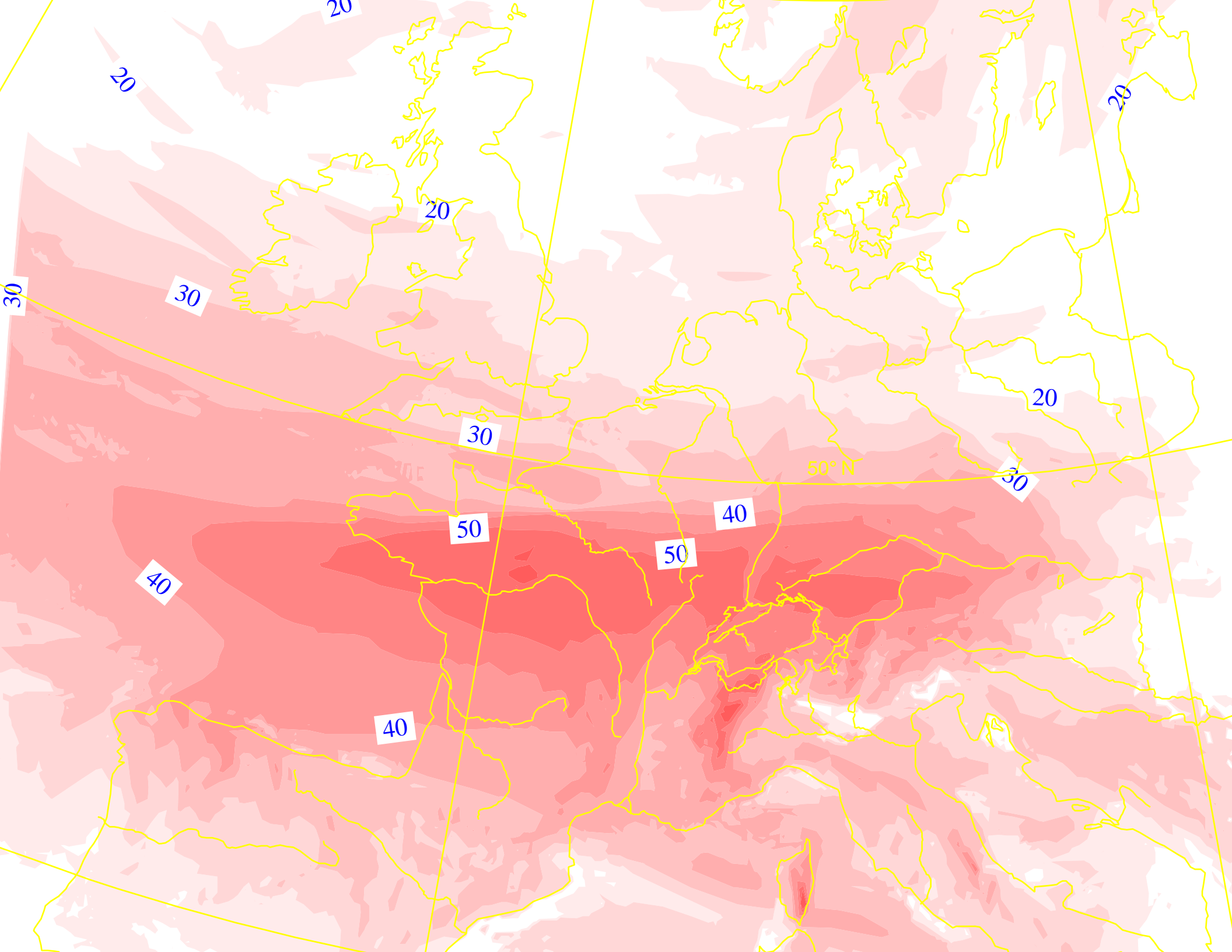


Wind gust

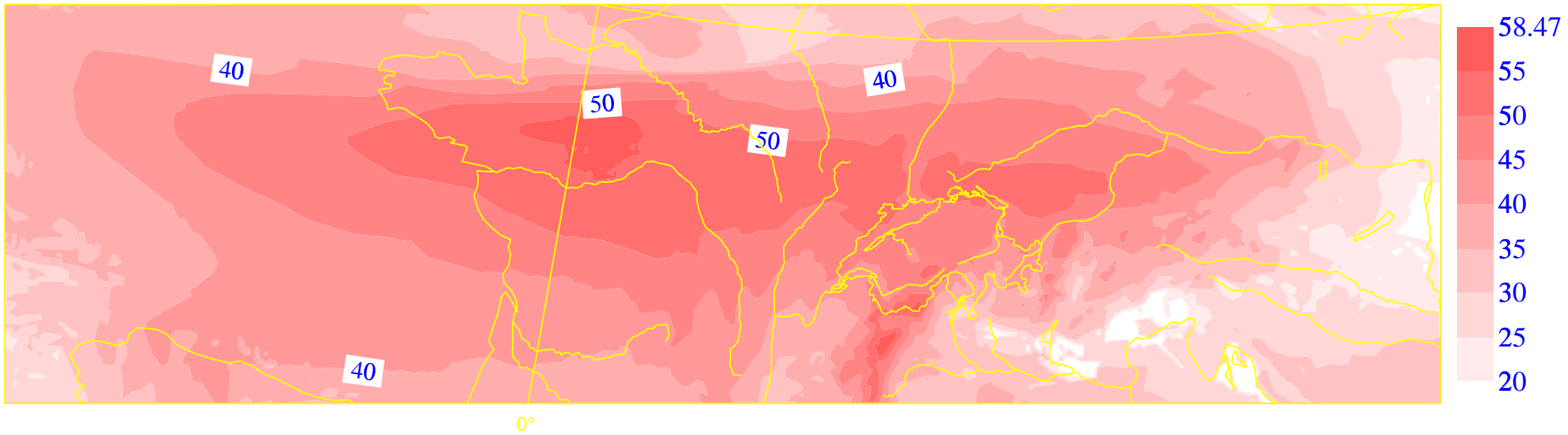
$$Wg = \sqrt{U^2(z_p) + V^2(z_p)}$$

Boundary height

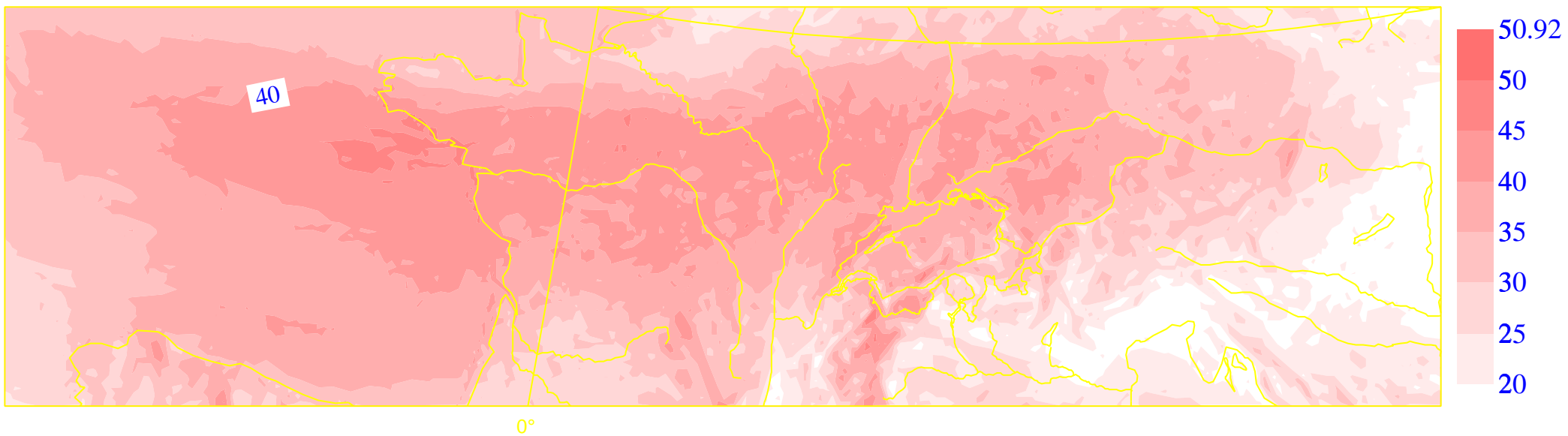
$$E_{top} = 0.01 \cdot E_{surface}$$



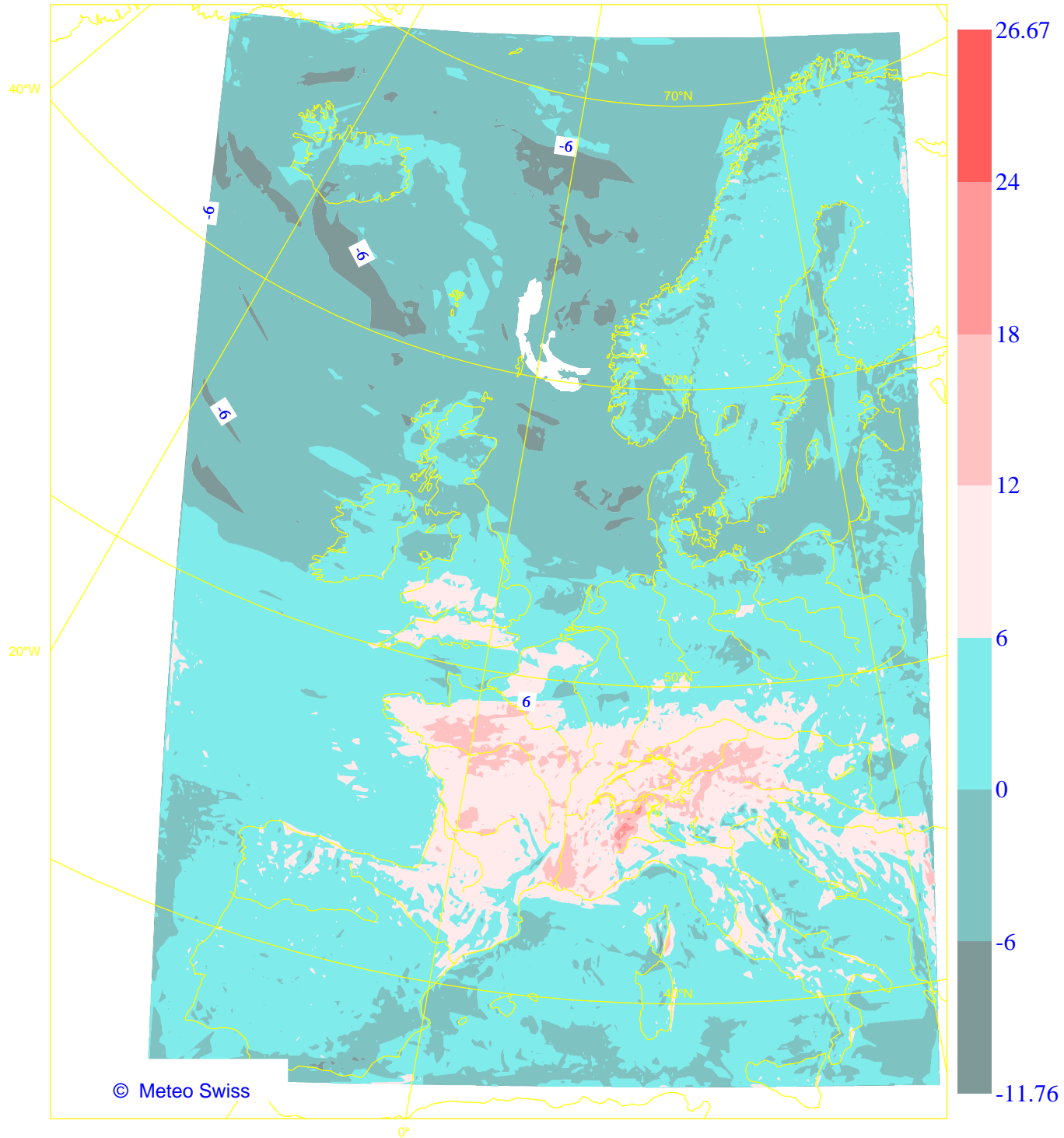
### Brasseur wind gust

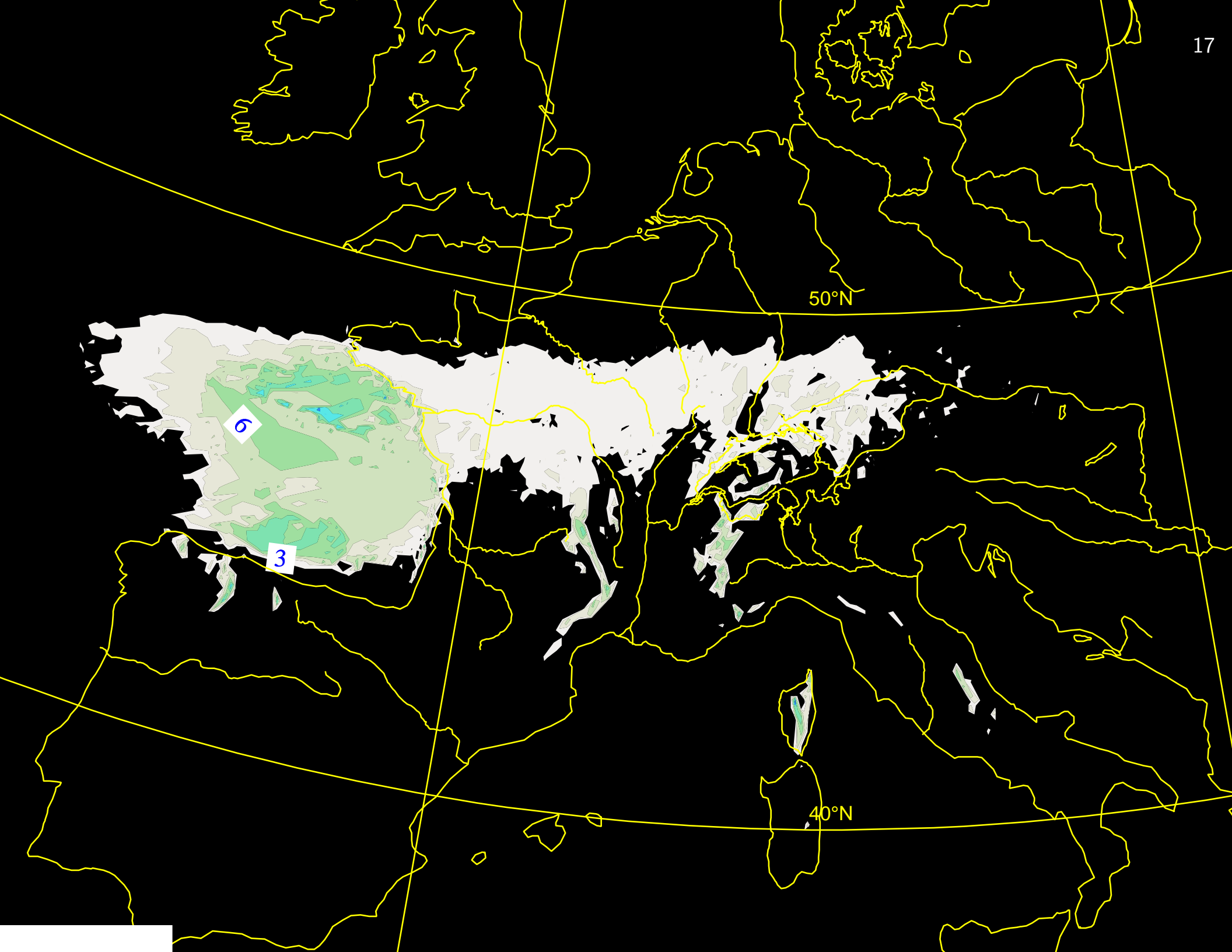


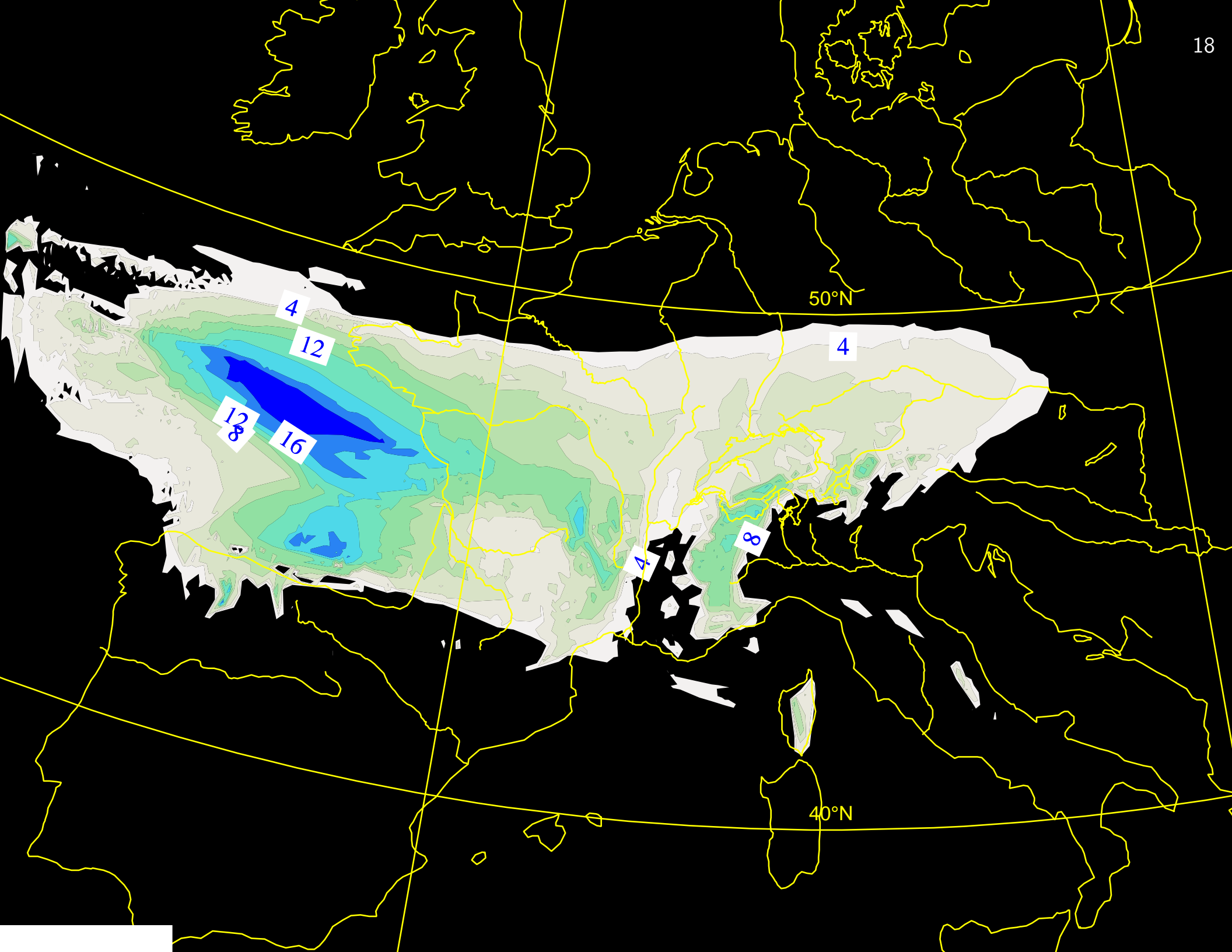
### Opr. wind gust



# Brasseur - Opr wind gust







## Further work

- Validation of mean wind over Europe
- Validation of wind gust over Switzerland
- Calculation of the rest of the storms