The risk of yield loss due to drought
-
The impact of changes of water balance variables

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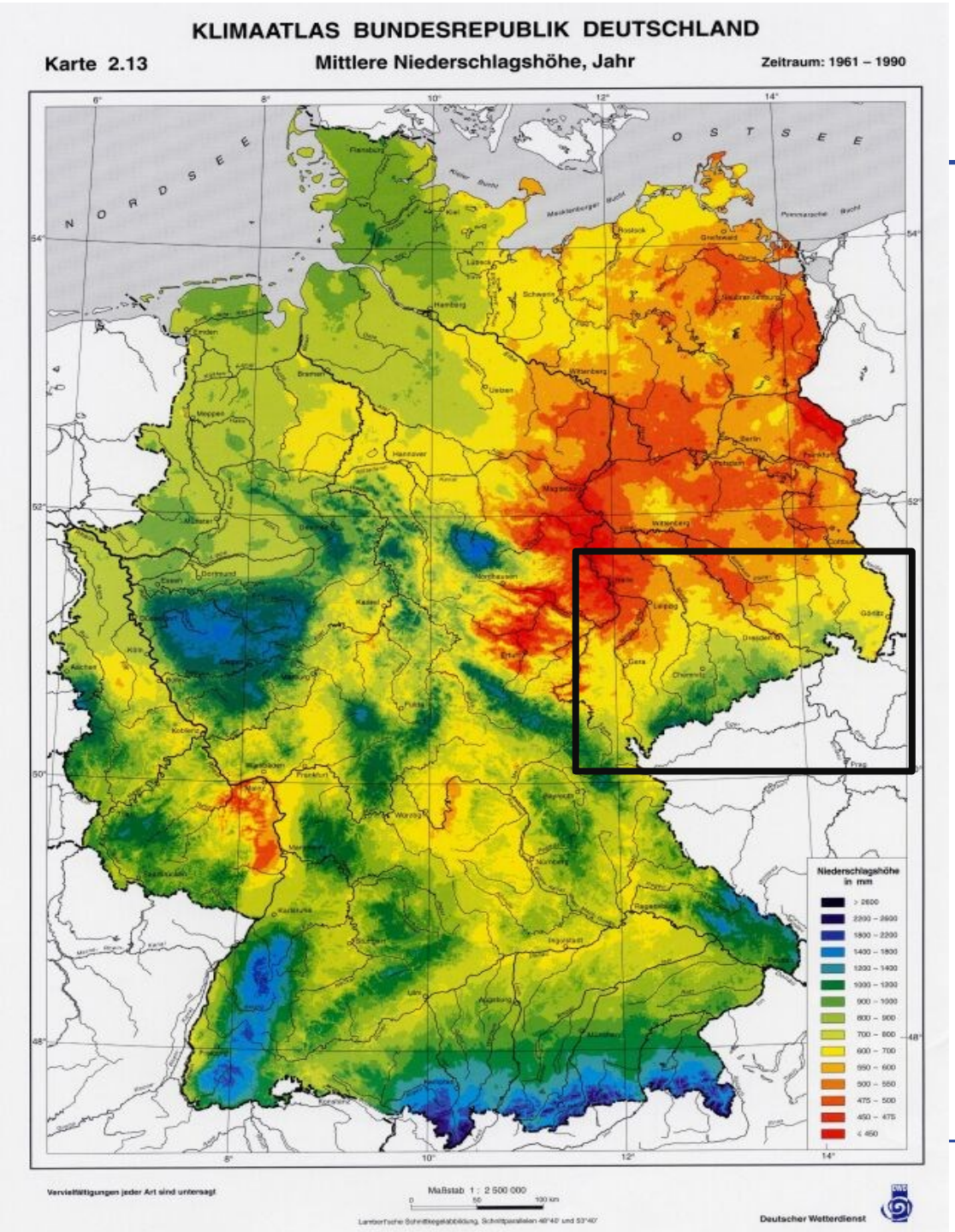


Deutscher Wetterdienst
Wetter und Klima aus einer Hand

LANDESAMT FÜR UMWELT, LANDWIRTSCHAFT UND GEOLOGIE

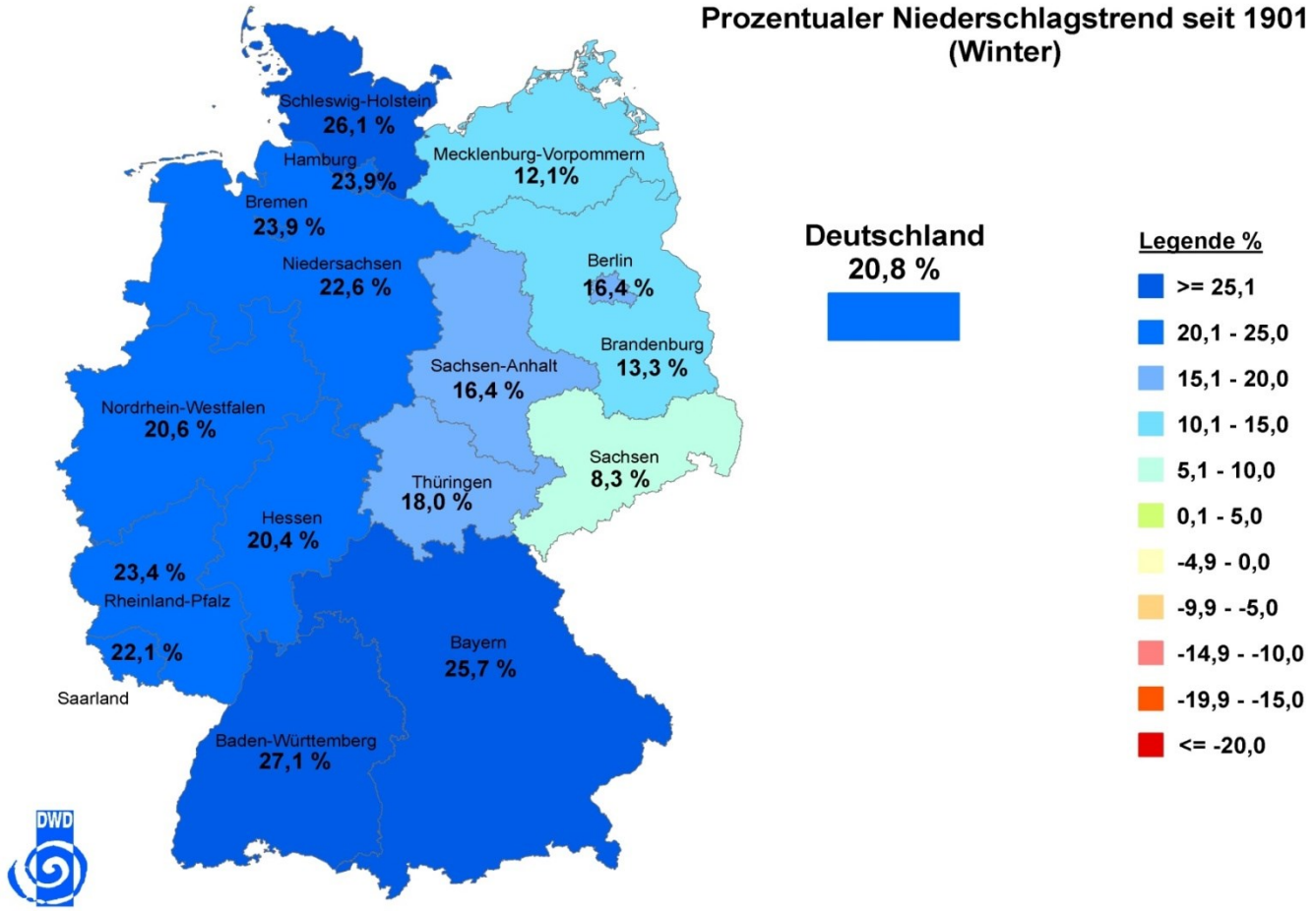
Freistaat SACHSEN

The situation 1961-1990:

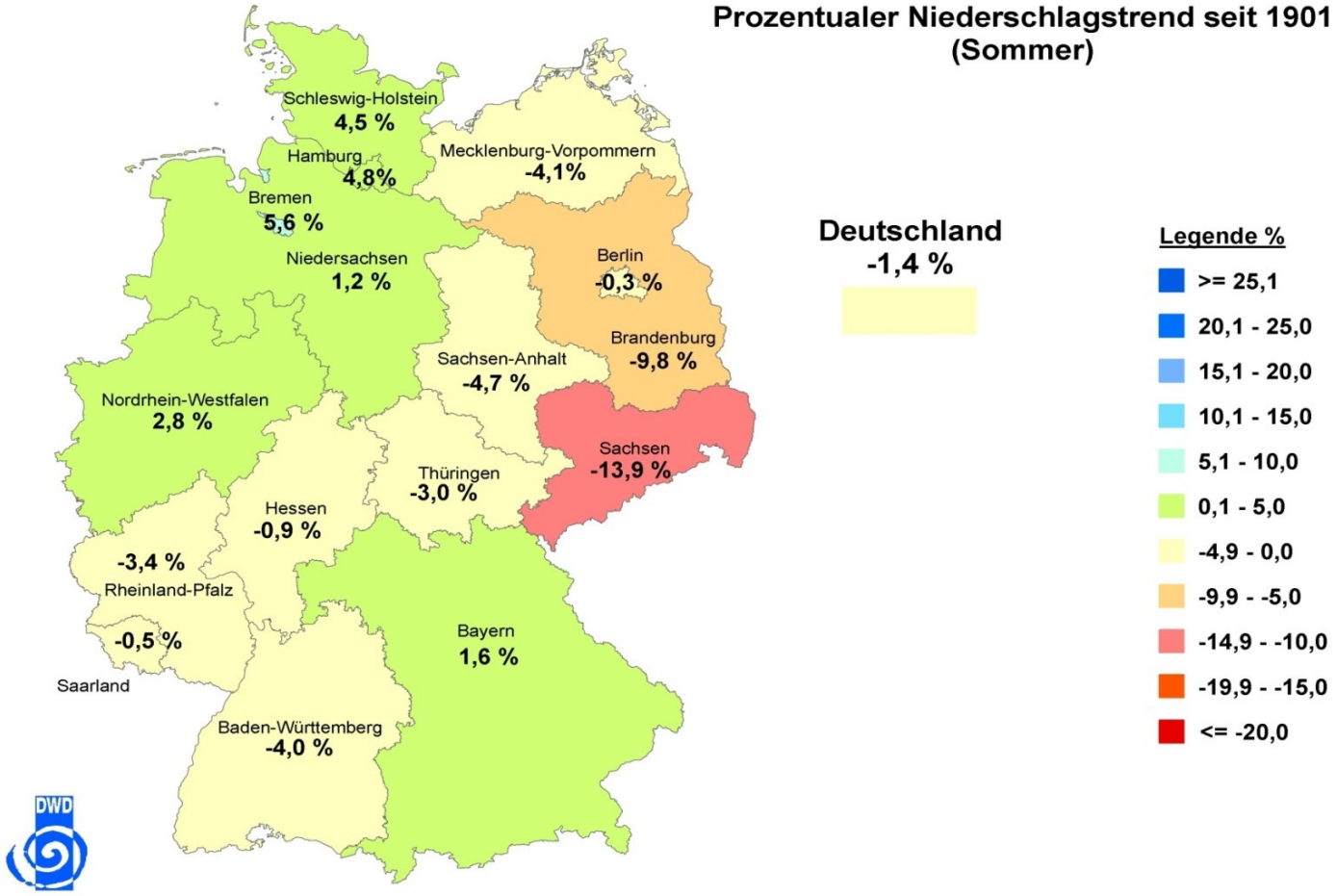
Annual avg. precipitation sum in Saxony:

~ 500 mm - ~ 1200 mm

Climate change
… seasonal precipitation changes in winter



Climate change
… seasonal precipitation changes in summer



What ist the diference in water demand by different fruit species?

Weidelgräser und Luzerne	600 bis 900 l/kg
Gerste, Roggen, Hartweizen (Cereals)	400 bis 500 l/kg
Hackfrüchte (Mais, Beta-Rüben)	300 bis 400 l/kg
Kartoffeln, Wicken, Sonnen-Blumen, Melonen, Weichweizen, Kohl, Buchweizen	500 bis 600 l/kg
Raps, Erbsen, Bohnen, Hafer, Gurken, Klee	600 bis 700 l/kg
Soja, Lein, Kürbis, Kohlrübe	über 700 l/kg
Hirsen	200 bis 300 l/kg

The avg. (2011-2015) cereal yield is about 8 t/ha.

What data are available?

- the yield in the past (every year)
- the water demand of the fruit species
- the water storage capacity of the soil in every village (~constant) → nFK_{We}
- the precepitation amount (RR) in the past and in the future (different modells)
- the potential evapotranspiration (ETP) in the past and in the future (diff. mod.)

} KWB

$$KWB = RR - ETP$$

We calculated the time between start of the vegetation (early spring) and June 30th (main growth period).

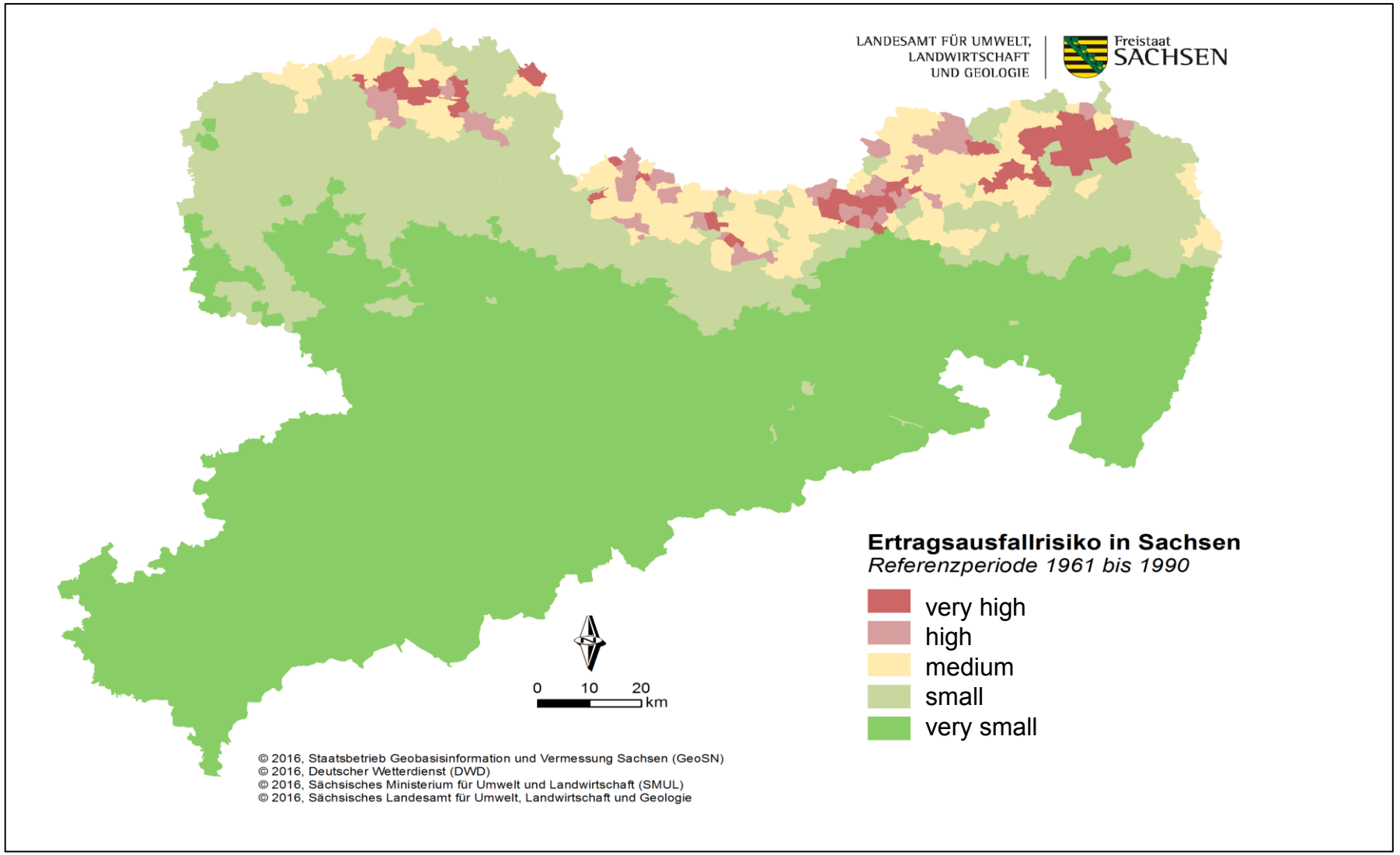
What is the core of the calculations?

$$YLR = KWB / nFK_{WE} [\%]$$

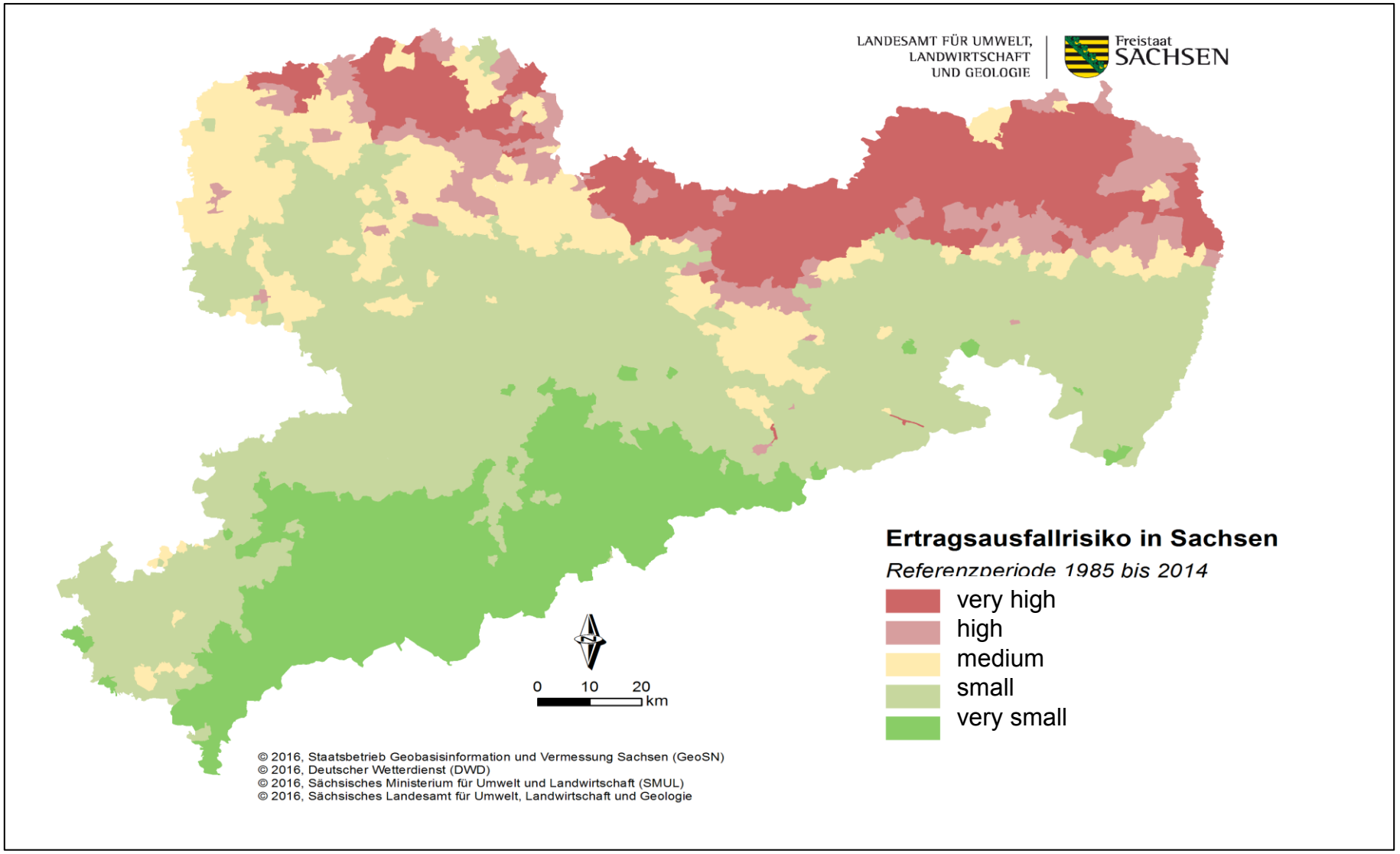
YLR – Yield Loss Risk; Potential use of water content in the soil

How can the risk of yield loss be calculated?

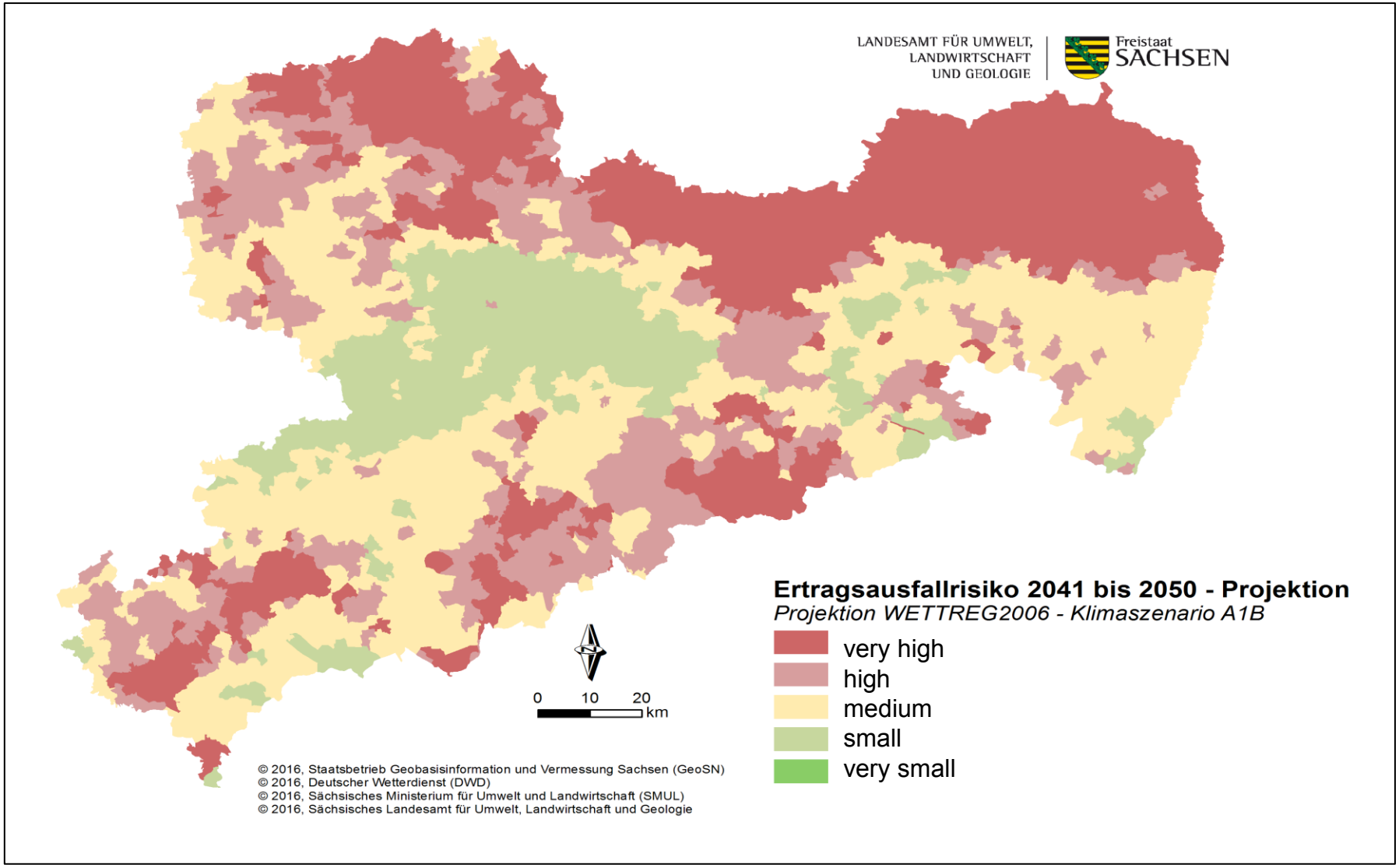
Class	Potential use of water content in the soil KWB / nFK_{We}	Risk of yield loss according to drought
1	110 % or higher	very high
2	< 110 up to 90 %	high
3	< 90 up to 66 %	medium
4	< 66 up to 33 %	small
5	< 33 %	very small



The risk of yield loss in the past (1961-1990)



The risk of yield loss at present (1985-2014)



The risk of yield loss in the future (2041-2050; only one RCM result presented)

Summary

- The yield loss risk is described by simple climatological and pedological parameters

- The method shown is able to reproduce yield loss in the past and at present

- The method is open for the results of all RCM

Thank you für your attention!

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The Icemountain lettuce looks very mingy.
Oh well, global warming will show no mercy.