

Climate change – Options for estimating the trend of drought characteristics

State of regional knowledge



Climate change – Options for estimating the trend of drought characteristics (in Saxony)

I contents

- legal basis and objectives
- status quo of risks and vulnerability concerning drought characteristics
- step by step – processing of the complex „drought characteristics“

Climate change – Options for estimating the trend of drought characteristics

Legal and administrative basis for our objectives

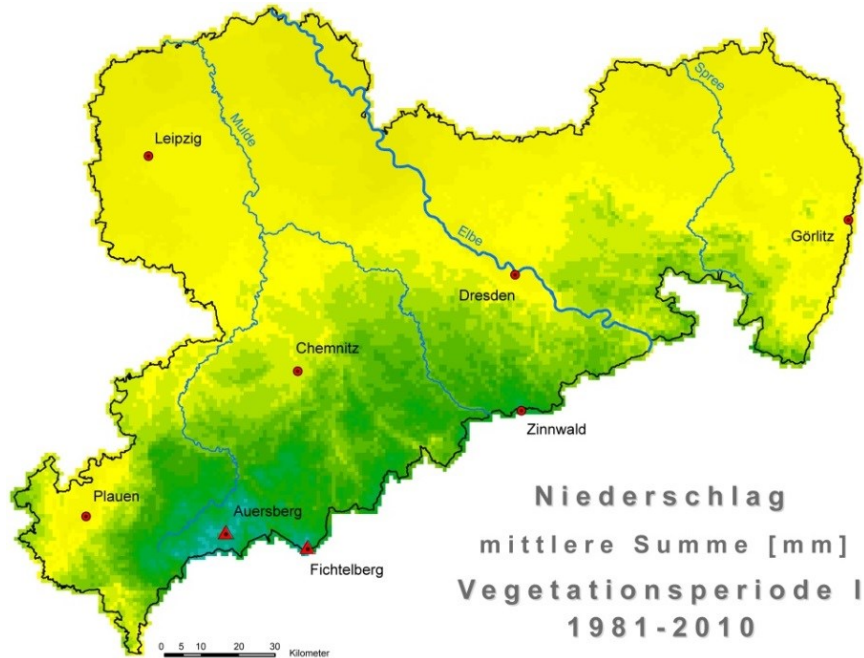
- I Agenda of the Saxon government → "Energie- und Klimaprogramm Sachsen 2012" (EKP), including e. g. the three strategies
 - analysis of the (regional) climate development and supply of climate knowledge;
 - identification of vulnerabilities, estimations of climate risks and impacts and development of adaptation strategies;
 - Promotion of research, strengthening of knowledge and development of cooperations;

- I Implementation of the EKP-tasks → flagship project „risks and chances of climate change in Saxony“, sub-projects:
 - „climate change and extreme weather“
 - „vulnerability and adaptation“
 - „public relation and knowledge transfer“

Development of drought characteristics

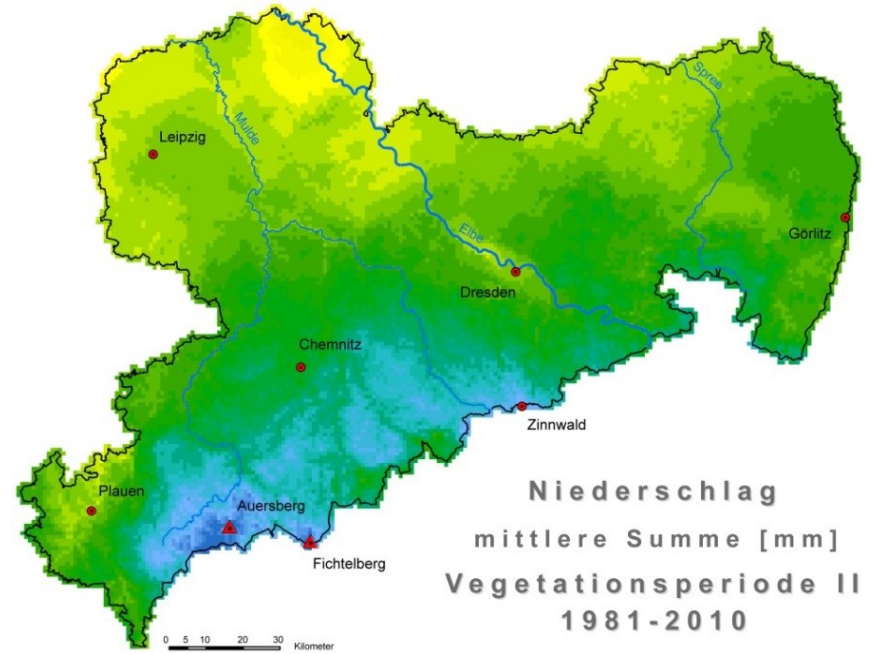
total precipitation in the growing season I & II (1981-2010)

190 mm
-12 % vs. 1961-90



**growing season I
(AMJ)**

240 mm
+12 % vs. 1961-90



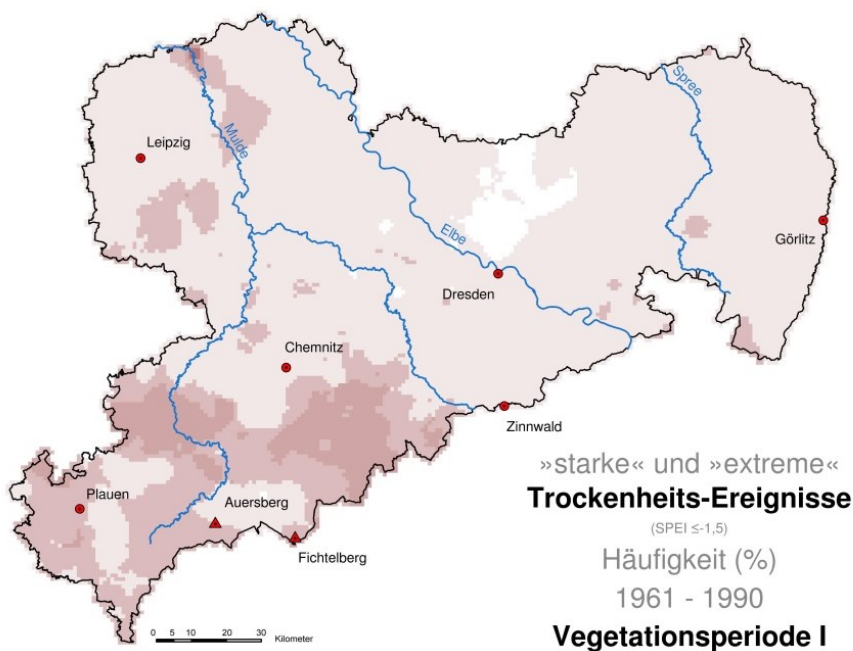
**growing season II
(JAS)**



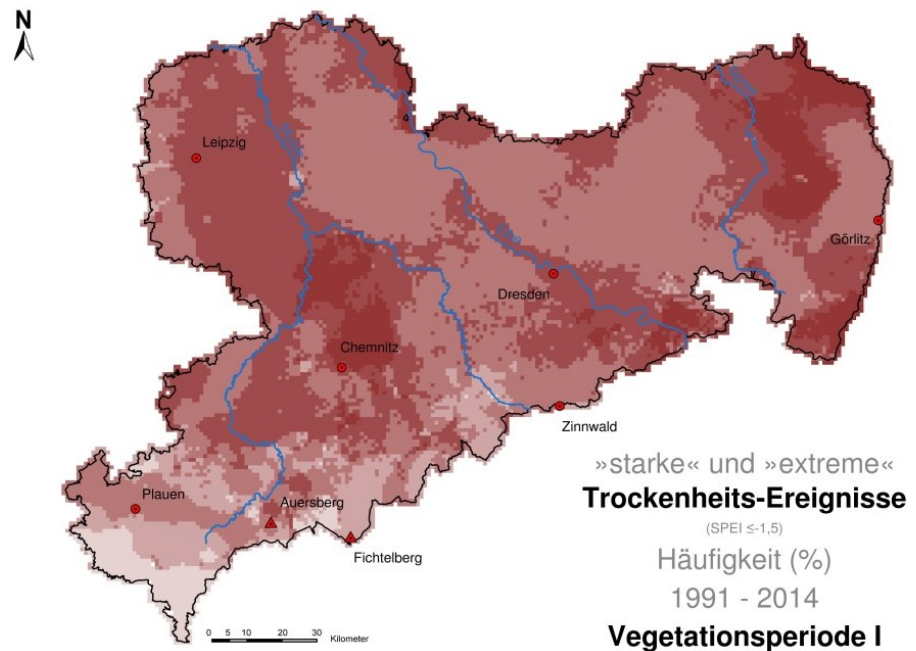
Development of drought characteristics

Drought incidents at growing season I (AMJ)

■ Frequency of »strong« or »extreme« drought incidents ($\text{SPEI} \leq -1,5$)



1961-1990

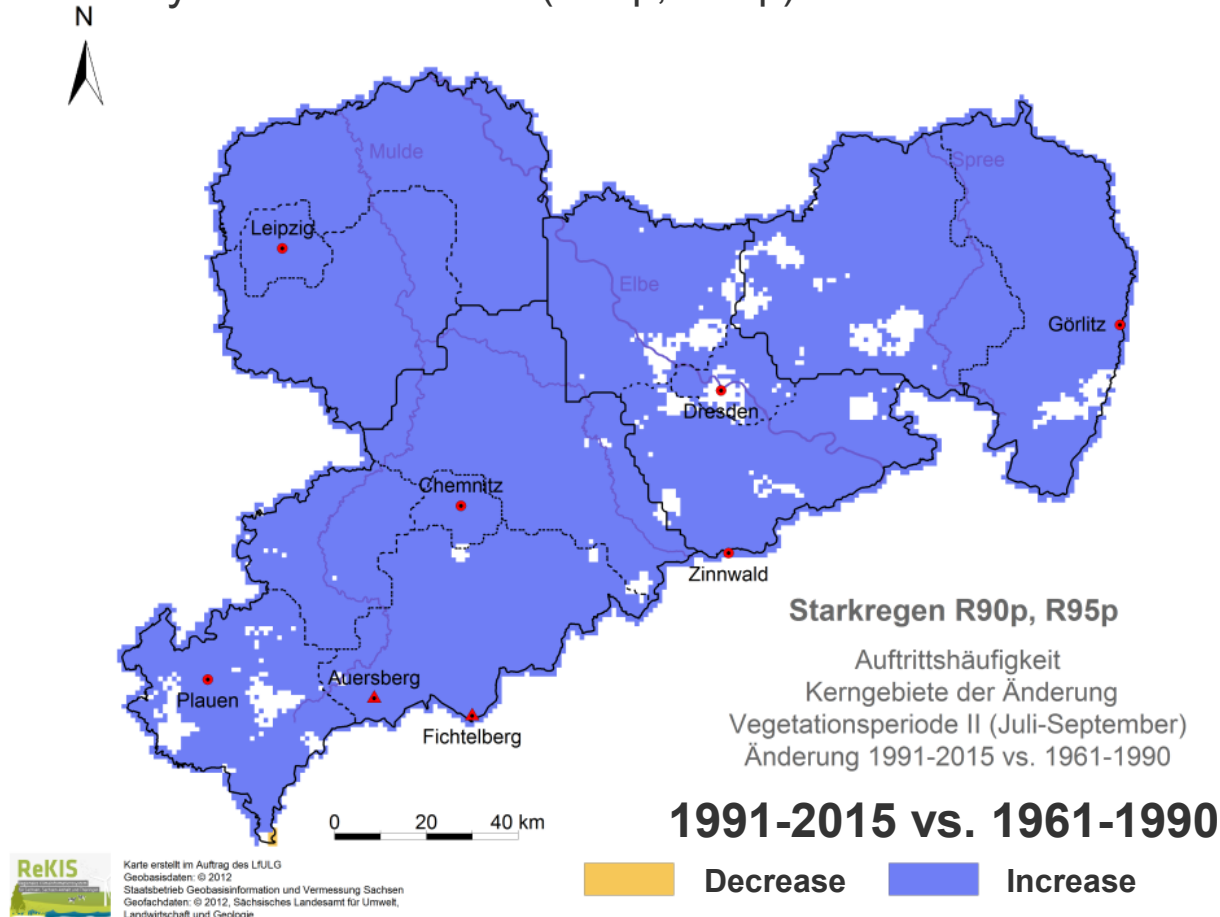


1991-2014

Development of drought characteristics

Heavy Rain incidents: growing season II (JAS)

Frequency of Heavy rain – incidents (R90p, R95p)



Development of drought characteristics in Saxony

Summary ...

I ... concerning the climate analysis 1961 - 2015

- Growing season I → increasing drought risks
notably on the basis of decreasing precipitation sums
- Growing season II → increasing risks for erosion, local floods (smaller catchment areas)
 - increasing sums of precipitation
 - sums including increasing part of heavy rains
 - periods of dryness interrupted by heavy rain - incidents!

risks	Apr	Mai	Jun	Jul	Aug	Sep
	VP I			VP II		
drought						
heavy rain						

Development of drought characteristics in Saxony

Sympton of the actual develoment

I Current trend 2014 to 2016

- comparativly very high temperature level

in combination with

- **cumulative** water deficit (particularly in winter and spring)

leads to

- drastically agricultural, forestry and hydrological (incl. ground water) regional drought

Options for estimating the trend of drought characteristics

Next activities

I Tasks of provided activities (according our area of responsibility and general objectives)

- Development of methods to analyse and estimate the temporal development of drought characteristics concerning changing climate conditions in Saxony (step by step)

I framework

- no operational system
- aimed to regional climatological conditions for dryness / drought
- using (target group orientied) drought characteristics

Options for estimating the trend of drought characteristics

upcoming activities

I Necessary data base (indicators, indices)

- Meteorology:
 - consistent data base (1961 – 2020 – 2100)
(long-term observation, medium-term forecast*, long-termn projections)
 - large-scale weather situation
- Remote sensing (e.g. NDVI-data, snow cover)
- Hydrology ... («Handbook of Drought Indicators and Indices», WMO 2016)

* Forecast with the scale years to decades
(BMBF-Projekt „MiKlip“)

Options for estimating the trend of drought characteristics

summary of our experineces

- main consequence → integration of characteristics of the regional climate change seems to be more porpuseful ... (z.B.)
 - modification of summary drought characteristics (SPI / SPEI = monthly precipitation sums) by supporting the indices with incident-related informations (e.g. percentage of heavy-rain-incidents)
 - Preference of SPEI compared to SPI
 - combination of drought characteristics

Thank you!



Email: andreas.voellings@smul.sachsen.de
johannes.franke@smul.sachsen.de



Climate change – Options for estimating the trend of drought characteristics status quo

Vergleich der Andauer Trockenperioden bezogen auf den SPI und SPEI unter Berücksichtigung verschiedener Verdunstungsansätze
Referenzperiode 1961 bis 1990

