

Climate Change in Saxony

Basic Information

- Source of observational data used: German Weather Service, Czech Hydro-Meteorological Service
- Averaging time periods: Normal climate period 1961-1990 (Reference), 1981-2010; Decades 1961-1970, ..., 2001-2010

Classification

- Climate change is occurring globally and has different effects regionally.
- Anthropogenic influence (greenhouse gas emissions in particular), with a probability greater than 95%, is the main cause of warming since the mid-20th century (IPCC, 2013).
- Saxony follows this development. The decade 2001-2010 was the warmest on record (Fig. 1).

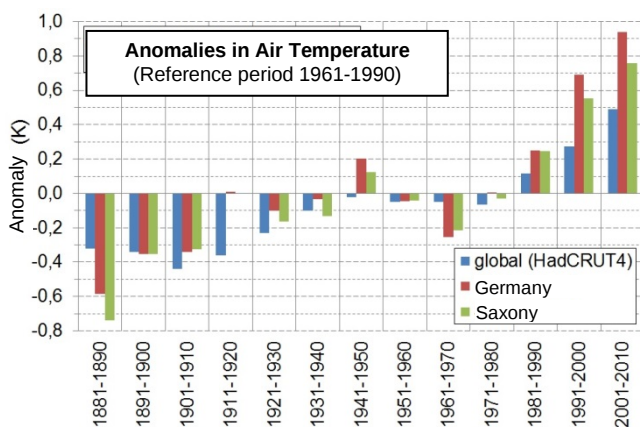


Fig. 1: Anomalies in (K) the annual average air temperature vs. the 1961-1990 reference period

Air Temperature

- Continued warming with **rising heat stress in the summer months**.
- Increase in the average annual temperature of approximately 1 °C, Fig. 2
- Number of summer days ($T_{max} > 25\text{ °C}$) per year increased significantly, particularly outside the low-mountain range: from 28 days (1961-1990) to 35 days (1981-2010, + 25 %), Fig. 2
- Number of frost days ($T_{min} < 0\text{ °C}$) per year decreased from 95 days (1961-1990) to 92 days (1981-2010, - 3 %).
- Severity of winters: increasing trend of fluctuations by decade and from year-to-year.

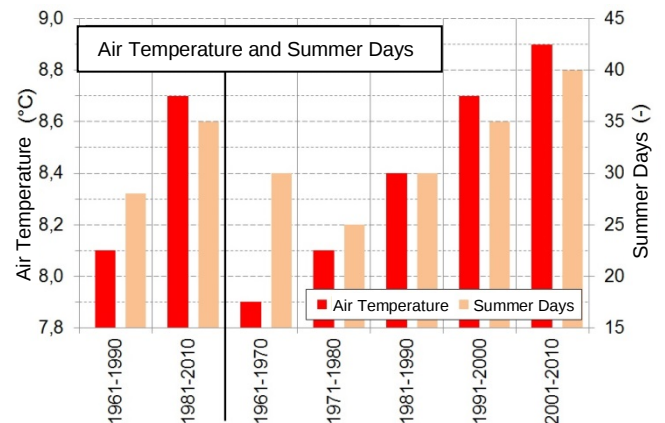


Fig. 2: Average annual air temperature in (°C) and number of summer days per year

Relative Sunshine Duration

- Relative sunshine duration, (percentage measured by maximal possible sunshine duration,) increased from 32 % (1961-1990) to 34 % (1981-2010), Fig. 3.
- A reason for this is improved air quality, (reduced content from aerosols in the air).

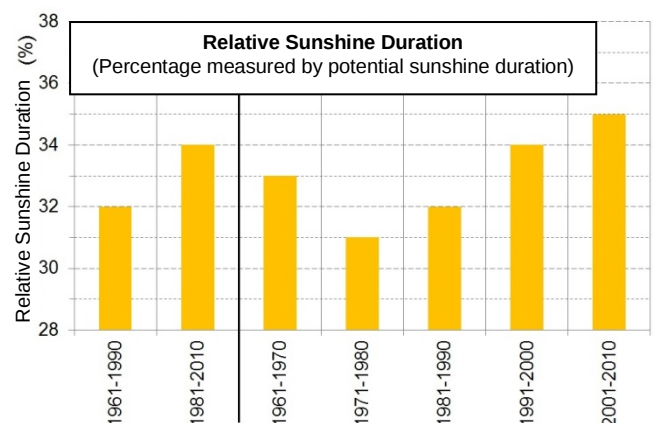


Fig. 3: Annual average of relative sunshine duration in (%)

Precipitation

- The fluctuations in annual **precipitation accumulation** are more pronounced than their trend.
- In the summer (Apr- Sept): reduction in the **growing season I** (April to June) – **heightened risk of drought** – Increase in the growing season II (July to September), Fig. 4.

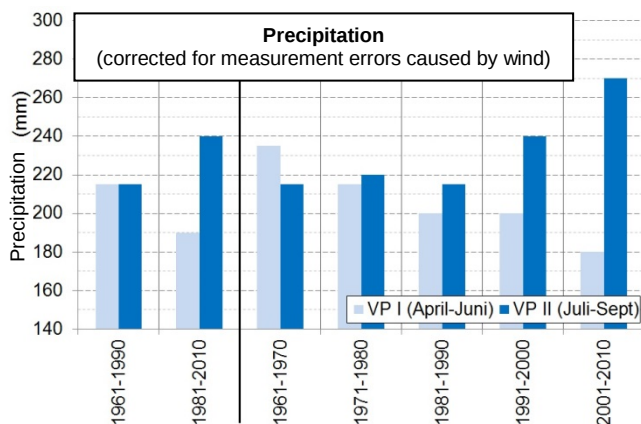


Fig. 4: Average precipitation accumulations in (mm) for the meteorological summer (Apr-Sept)

- Extensive increase especially in the **frequency** (particularly in the growing season II, in the average area of **18 %**, Fig. 6) and **intensity** of **heavy rain** events R90p and R95p (including the greatest 10 % resp. 5 % of existing measured values in a course of time) per year, Fig. 5.

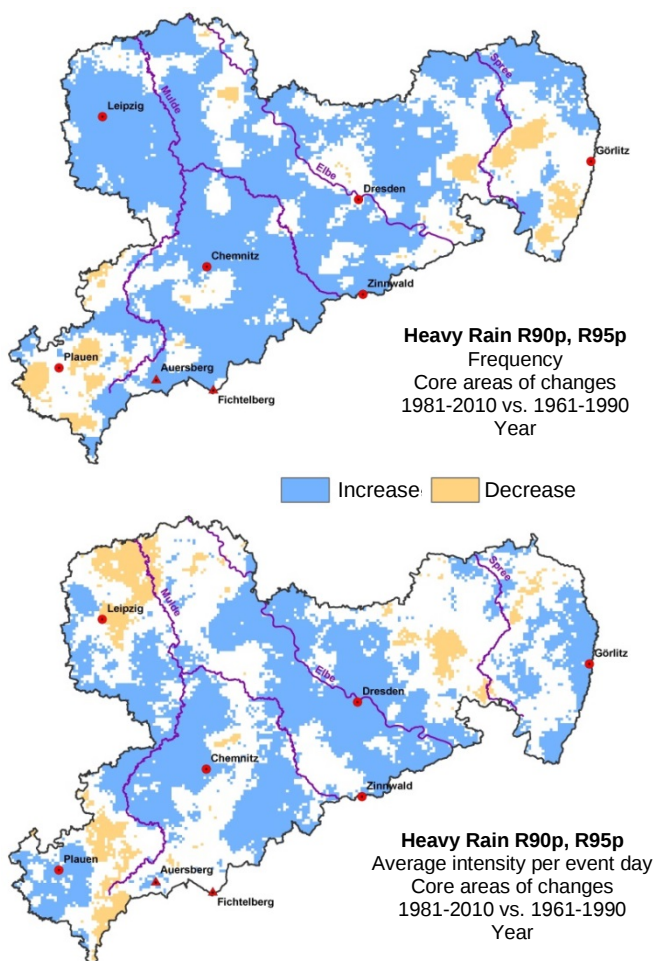


Fig. 5: Core areas of changes for heavy rain events (R90p, R95p) 1981-2010 vs. 1961-1990, above: **frequency** (ratio in-/ decrease: 12:1), below: **intensity** (ratio in-/ decrease: 6:1)

- Increase in the ratio of heavy rain to precipitation accumulation in the **growing season II**, i.e. dry periods will be broken by heavy rain events, thus **increasing risk of erosion**

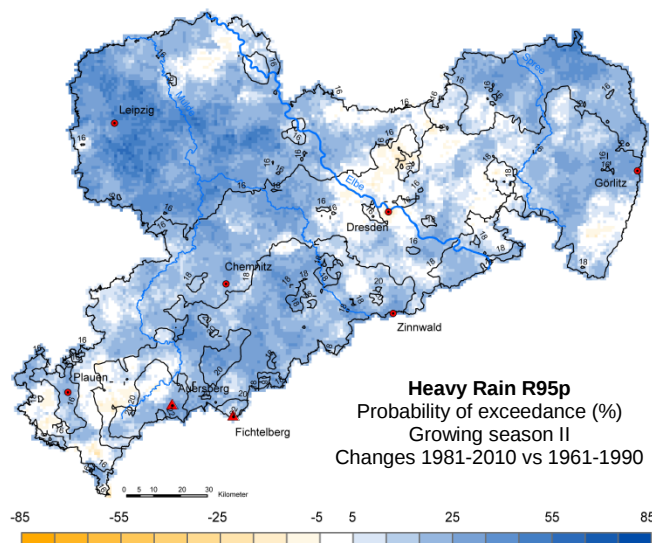


Fig. 6: Changes in the probability in (%) of occurrence heavy rain events R95p, 1981-2010 vs. 1961-1990, growing season II

Climatic Hydrological Balance

- Difference from corrected precipitation (corrected for measurement errors caused by wind) and potential evaporation exhibited by pronounced seasonal cycles. (Fig. 7)

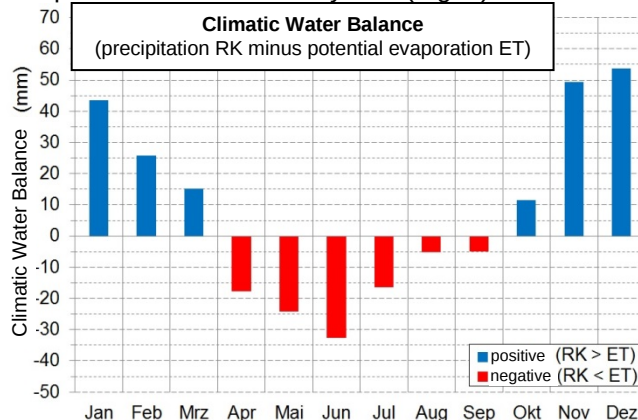


Fig. 7: Average seasonal cycle of climatic water balance (mm), Dresden-Klotzsche (1981-2010)

- In summer (Apr-Sept): Worsening in the growing season I, improvement in the growing season II

Sources and Links:

- HadCRUT4 (Fig. 1): www.cru.uea.ac.uk
- IPCC (2013): Climate Change 2013 - The Physical Science Basis, www.climatechange2013.org
- LfULG (2014): Analysis of the Climate Development in Saxony, series (in progress)
- Regional Climate Information System of Saxony, Saxony-Anhalt and Thuringia: www.rekis.org