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-20t^{h} century (IPCC, 2013).
- Saxony follows this development. The decade 2001-2010 was the warmest on record (Fig. 1).

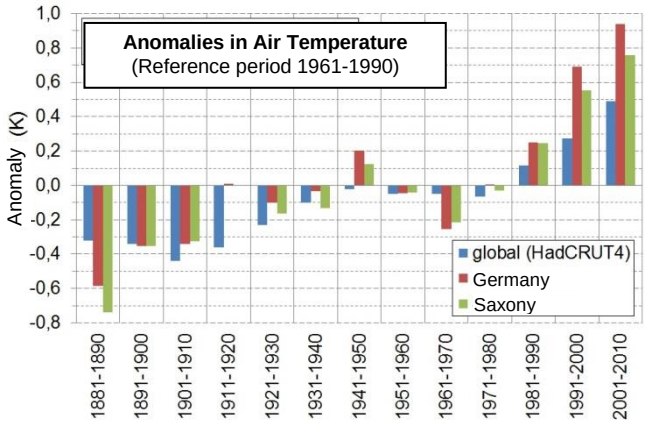

Fig. 1: Anomalies in (K) the annual average air temperature vs. the 1961-1990 reference period

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 (Tmax > 25 °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 (Tmin < 0 °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.

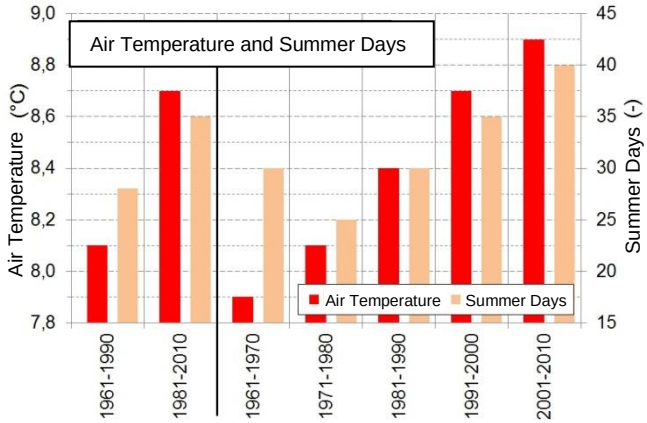

Fig. 2: Average annual air temperature in (°C) and number of summer days per year

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).

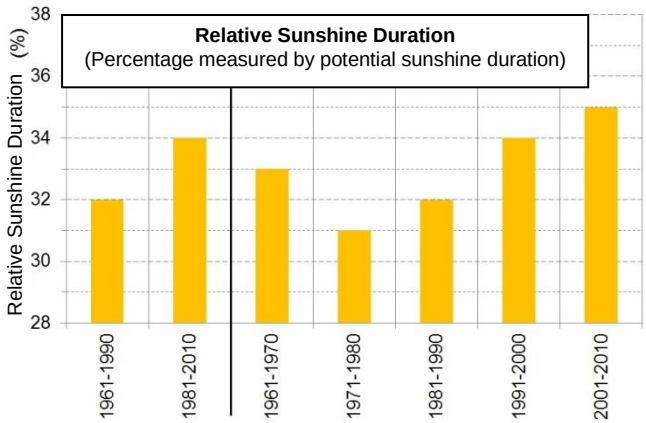

Fig. 3: Annual average of relative sunshine duration in (%)

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.

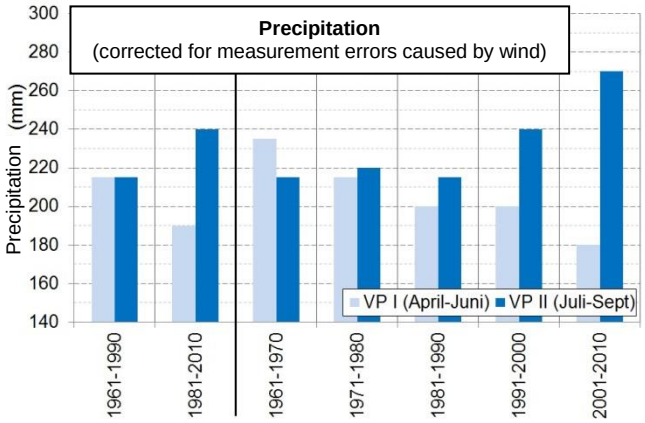

Fig. 4: Average precipitation accumulations in (mm) for the meteorological summer (Apr-Sept)

- 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.

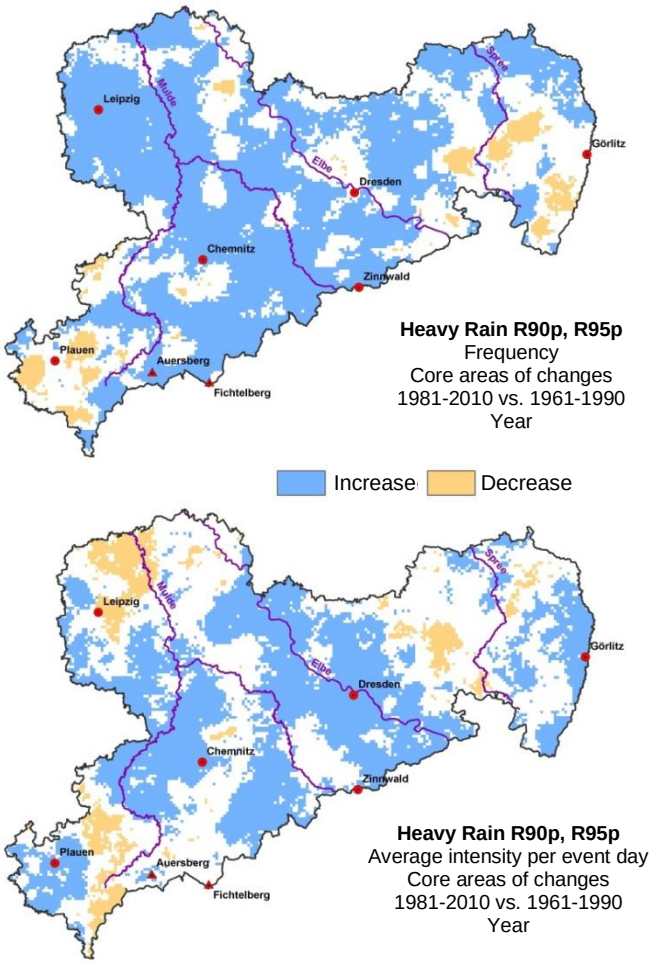

Fig. 5: Core areas of changes for heavy rain events (R90p, R95p) 1981-2010 vs. 1961-1990, above: frequency (ratio in-/ decrease: 12:1), below: intensity (ratio in-/ decrease: 6:1)

- 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

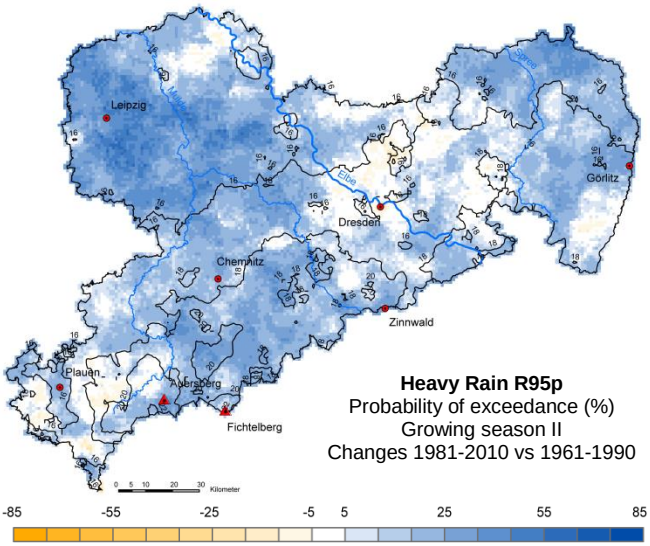

Fig. 6: Changes in the probability in (%) of occurrence heavy rain events R95p, 1981-2010 vs. 1961-1990, growing season II

Climatic Hydrological Balance

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

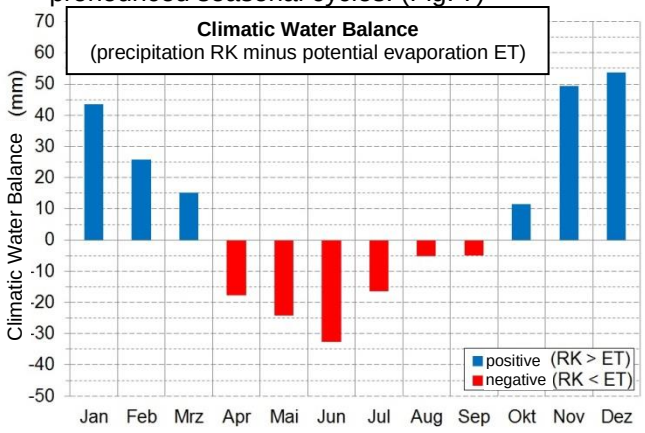

Fig. 7: Average seasonal cycle of climatic water balance (mm), Dresden-Klotzsche (1981-2010)

- 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

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