Regional fact sheet - Europe

Common regional changes

Regardless of future levels of global warming, temperatures **will rise** in all European areas at a rate exceeding global mean temperature changes, **similar to past observations** (high confidence).

The frequency and intensity of hot extremes, including marine heatwaves, **have increased** in recent decades and **are projected** to keep increasing regardless of the greenhouse gas emissions scenario. Critical thresholds relevant for ecosystems and humans **are projected to** be exceeded for global warming of 2°C and higher (high confidence).

The frequency of cold spells and frost days **will decrease under** all the greenhouse gas emissions scenarios in this report and all time horizons, **similar to past observations**. (high confidence)

Despite strong internal variability, observed trends in European mean and extreme temperatures cannot be explained without accounting for anthropogenic factors. Before the 1980s, warming by greenhouse gases was partly offset by anthropogenic aerosol emissions. Reduced aerosol influence in the recent decades has led to an observable positive trend in shortwave radiation. (high confidence)

**Observations** have a seasonal and regional pattern consistent with **projected** increase of precipitation in winter in Northern Europe. A precipitation decrease **is projected** in summer in the Mediterranean extending to northward regions. Extreme precipitation and pluvial flooding **are projected** to increase at global warming levels exceeding 1.5°C in all regions except the Mediterranean. (high confidence)

Regardless of level of global warming, relative sea level **will rise** in all European areas except the Baltic Sea, at a rate close to or exceeding global mean sea level. Changes **are projected** to continue beyond 2100. Extreme sea level events **will become** more frequent and more intense, leading to more coastal flooding. Shorelines along sandy coasts **will retreat** throughout the 21st century (high confidence).

Strong declines in glaciers, permafrost, snow cover extent, and snow seasonal duration at high latitudes/altitudes **are observed** and **will continue** in a warming world (high confidence).

Multiple climatic impact-drivers **have already** changed concurrently over recent decades. The number of climatic impact-driver changes **is expected** to increase with increasing global warming (high confidence).

**Projected changes in seasonal (Dec–Feb, DJF, and Jun–Aug, JJA) mean temperature and precipitation at 1.5°C, 2°C, and 4°C global warming relative to 1995-2014.**

Based on EURO CORDEX (40 models) using the RCP 8.5 scenario to compute the warming levels.
Northern Europe (NEU)
- Observed increase in pluvial flooding attributed to human influence and projected to further increase at global warming of 1.5°C (medium confidence) and 2°C and above (high confidence).
- Projected decrease in river flood at global warming of 2°C and above (medium confidence).
- Projected increase in severe wind storms at global warming of 2°C and above (medium confidence).

Western & Central Europe (WCE)
- Projected increase in pluvial flooding at global warming of 1.5°C (medium confidence) and 2°C and above (high confidence).
- Observed increasing trend in river flooding and projected further increase at 2°C and above of global warming (high confidence).
- Projected increases in hydrological, agricultural and ecological droughts at mid-century warming levels of 2°C or above, regardless of the greenhouse gas emissions scenario (medium confidence).

Mediterranean (MED)
- Observed increase in hydrological and agricultural and ecological droughts (medium confidence), projected increase in aridity and fire weather conditions at global warming of 2°C and above (high confidence).
- Projected combination of climatic impact-driver changes (warming, temperature extremes, increase in droughts and aridity, precipitation decrease, increase in fire weather, mean and extreme sea levels, snow cover decrease, and wind speed decrease) by mid-century and at global warming of at least 2°C and above (high confidence).

Eastern Europe (EEU)
- Projected increase in pluvial flooding at global warming of 1.5°C (medium confidence) and 2°C and above (high confidence).
- Projected decrease in river flood at global warming of 2°C and above (medium confidence).
- Projected increase in fire weather at global warming of 2°C and above (medium confidence).

Change in river discharge per unit catchment area corresponding to the return period of 100 years for the mid-21st century

Projected changes for 2041–2060 relative to 1995–2014
- JJA Days with Daily Maximum Temperature above 35°C
- DJF Maximum Annual 1-day precipitation (RX1day)
- Standardized Precipitation Index (SPI-6) drought indicator

Links for further details:
Common Changes: TS.4.3.1, TS.4.3.2.5, 11.3.4, 11.9, 12.4.5, Atlas.8.2, Atlas.8.4
Sub-regions: TS.4.3.2.5, 11.9, Tables 11.16–18, 12.4.5, Atlas.8.2, Atlas.8.4