

Table SPM.1 | Extreme weather and climate events: Global-scale assessment of recent observed changes, human contribution to the changes, and projected further changes for the early (2016–2035) and late (2081–2100) 21st century. Bold indicates where the AR5 (black) provides a revised* global-scale assessment from the SREX (blue) or AR4 (red). Projections for early 21st century were not provided in previous assessment reports. Projections in the AR5 are relative to the reference period of 1986–2005, and use the new Representative Concentration Pathway (RCP) scenarios (see Box SPM.1) unless otherwise specified. See the Glossary for definitions of extreme weather and climate events.

| Phenomenon and direction of trend | Assessment that changes occurred (typically since 1950 unless otherwise indicated) | Assessment of a human contribution to observed changes | Likelihood of further changes | |
|--|--|--|---|---|
| | | | Early 21st century | Late 21st century |
| Warmer and/or fewer cold days and nights over most land areas | <i>Very likely</i> {2.6} | Very likely {10.6} | <i>Likely</i> {11.3} | <i>Virtually certain</i> {12.4} |
| | <i>Very likely</i> <i>Very likely</i> | <i>Likely</i> <i>Likely</i> | | <i>Virtually certain</i> <i>Virtually certain</i> |
| Warmer and/or more frequent hot days and nights over most land areas | <i>Very likely</i> {2.6} | Very likely {10.6} | <i>Likely</i> {11.3} | <i>Virtually certain</i> {12.4} |
| | <i>Very likely</i> <i>Very likely</i> | <i>Likely</i> <i>Likely (nights only)</i> | | <i>Virtually certain</i> <i>Virtually certain</i> |
| Warm spells/heat waves. Frequency and/or duration increases over most land areas | Medium confidence on a global scale <i>Likely</i> in large parts of Europe, Asia and Australia {2.6} | Likely^a {10.6} | Not formally assessed ^b {11.3} | <i>Very likely</i> {12.4} |
| | <i>Medium confidence</i> in many (but not all) regions <i>Likely</i> | Not formally assessed <i>More likely than not</i> | | <i>Very likely</i> <i>Very likely</i> |
| Heavy precipitation events. Increase in the frequency, intensity, and/or amount of heavy precipitation | <i>Likely</i> more land areas with increases than decreases ^c {2.6} | Medium confidence {7.6, 10.6} | <i>Likely</i> over many land areas {11.3} | Very likely over most of the mid-latitude land masses and over wet tropical regions {12.4} |
| | <i>Likely</i> more land areas with increases than decreases <i>Likely over most land areas</i> | <i>Medium confidence</i> <i>More likely than not</i> | | <i>Likely</i> over many areas <i>Very likely over most land areas</i> |
| Increases in intensity and/or duration of drought | Low confidence on a global scale <i>Likely</i> changes in some regions ^d {2.6} | Low confidence {10.6} | <i>Low confidence</i> ^e {11.3} | <i>Likely (medium confidence)</i> on a regional to global scale ^b {12.4} |
| | <i>Medium confidence</i> in some regions <i>Likely</i> in many regions, since 1970 ^e | <i>Medium confidence</i> ^f <i>More likely than not</i> | | <i>Medium confidence</i> in some regions <i>Likely</i> ^g |
| Increases in intense tropical cyclone activity | Low confidence in long term (centennial) changes <i>Virtually certain</i> in North Atlantic since 1970 {2.6} | Low confidence ⁱ {10.6} | <i>Low confidence</i> {11.3} | More likely than not in the Western North Pacific and North Atlantic ⁱ {14.6} |
| | <i>Low confidence</i> <i>Likely</i> in some regions, since 1970 | <i>Low confidence</i> <i>More likely than not</i> | | <i>More likely than not</i> in some basins <i>Likely</i> |
| Increased incidence and/or magnitude of extreme high sea level | <i>Likely</i> (since 1970) {3.7} | Likely^k {3.7} | <i>Likely</i> ^l {13.7} | Very likely ^l {13.7} |
| | <i>Likely</i> (late 20th century) <i>Likely</i> | <i>Likely^k</i> <i>More likely than not^k</i> | | <i>Very likely^m</i> <i>Likely</i> |

* The direct comparison of assessment findings between reports is difficult. For some climate variables, different aspects have been assessed, and the revised guidance note on uncertainties has been used for the SREX and AR5. The availability of new information, improved scientific understanding, continued analyses of data and models, and specific differences in methodologies applied in the assessed studies, all contribute to revised assessment findings.

Notes:

^a Attribution is based on available case studies. It is *likely* that human influence has more than doubled the probability of occurrence of some observed heat waves in some locations.

^b Models project near-term increases in the duration, intensity and spatial extent of heat waves and warm spells.

^c In most continents, *confidence* in trends is not higher than *medium* except in North America and Europe where there have been *likely* increases in either the frequency or intensity of heavy precipitation with some seasonal and/or regional variation. It is *very likely* that there have been increases in central North America.

^d The frequency and intensity of drought has *likely* increased in the Mediterranean and West Africa, and *likely* decreased in central North America and north-west Australia.

^e AR4 assessed the area affected by drought.

^f SREX assessed *medium confidence* that anthropogenic influence had contributed to some changes in the drought patterns observed in the second half of the 20th century, based on its attributed impact on precipitation and temperature changes. SREX assessed *low confidence* in the attribution of changes in droughts at the level of single regions.

^g There is *low confidence* in projected changes in soil moisture.

^h Regional to global-scale projected decreases in soil moisture and increased agricultural drought are *likely (medium confidence)* in presently dry regions by the end of this century under the RCP8.5 scenario. Soil moisture drying in the Mediterranean, Southwest US and southern African regions is consistent with projected changes in Hadley circulation and increased surface temperatures, so there is *high confidence* in *likely* surface drying in these regions by the end of this century under the RCP8.5 scenario.

ⁱ There is *medium confidence* that a reduction in aerosol forcing over the North Atlantic has contributed at least in part to the observed increase in tropical cyclone activity since the 1970s in this region.

^j Based on expert judgment and assessment of projections which use an SRES A1B (or similar) scenario.

^k Attribution is based on the close relationship between observed changes in extreme and mean sea level.

^l There is *high confidence* that this increase in extreme high sea level will primarily be the result of an increase in mean sea level. There is *low confidence* in region-specific projections of storminess and associated storm surges.

^m SREX assessed it to be *very likely* that mean sea level rise will contribute to future upward trends in extreme coastal high water levels.