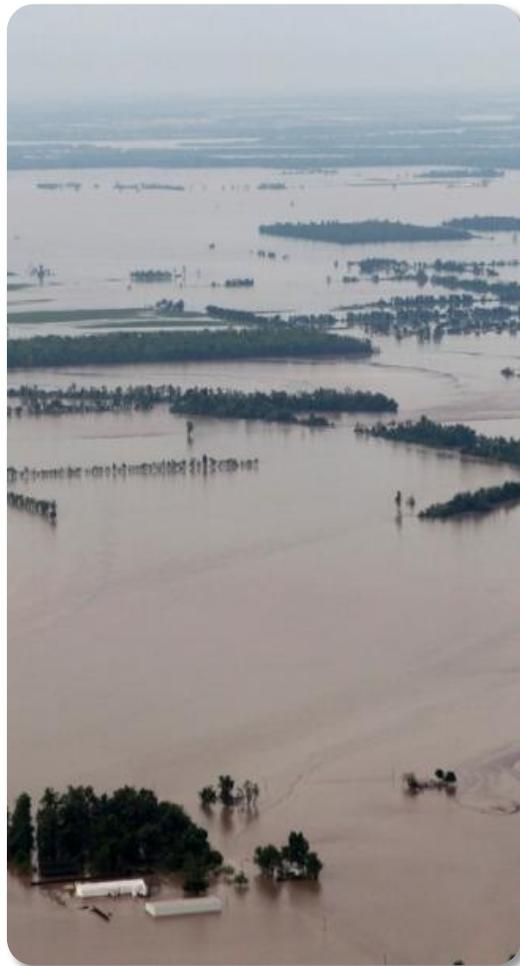


A changing climate leads to changes in **extreme weather** and **climate events** – **the focus of Chapter 3**



Changes in Climate Extremes & their Impacts on the Natural Physical Environment

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Since 1950, **extreme hot days** and **heavy precipitation** have become more common



SREX provides new regional information with structured/formal assessment of uncertainty

There is evidence that anthropogenic influences, including increasing atmospheric **greenhouse gas concentrations**, have changed these extremes

Observed changes in temperature and precipitation extremes, including dryness, in Asian regions since 1950 (1961-90 baseline).

	Tmax (warm days WD & cold days CD) and Tmin (warm nights WN & cold nights CN)	Heat waves/warm spells	Heavy precipitation	Dryness (consecutive dry days CDD, soil moisture anomalies SMA & PDSI)
All Asia	<i>Low confidence</i> to <i>high confidence</i> depending on region. On continental scale: <i>medium confidence</i> overall increase in WD/WN & decrease in CD/CN.	<i>Low confidence</i> (insufficient evidence in several regions) to <i>medium confidence</i> (e.g., increase in parts of China) depending on region.	<i>Low confidence</i> (insufficient evidence or inconsistent trends in several regions) to <i>medium confidence</i> (in a few regions e.g., decrease W Asia).	<i>Low confidence</i> (most regions – spatially varying trends) to <i>medium confidence</i> (e.g., increased dryness in E Asia). Consistent increases some regions – others decreases.
South Asia	<i>Medium confidence:</i> Increases in WD/WN and decreases in CD/CN.	<i>Low confidence:</i> insufficient evidence.	<i>Low confidence:</i> Mixed signal in India.	<i>Low confidence:</i> inconsistent signal for different studies & indices. Decrease in CDD over India. Increased dryness (SMA, PDSI) in central India.

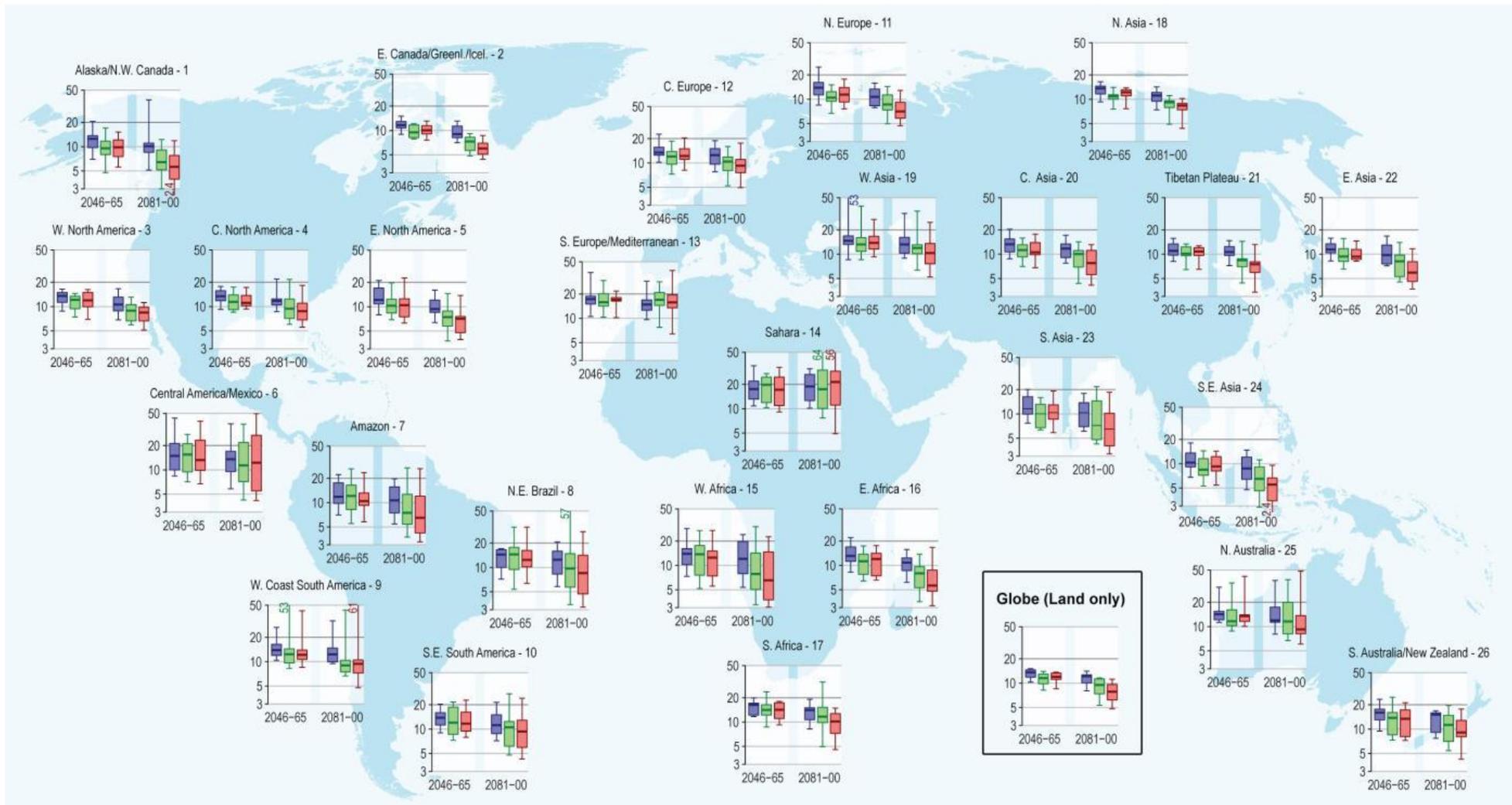
See Table 3.2 for all 7 Asian regions and full details

Projected changes in temperature and precipitation extremes, including dryness, in regions of Asia. For 2071-2100 (wrt 1961-1990) or 2080-2100 (wrt 1980-2000) - GCMs/RCMs and A2/A1B.

	<i>Tmax (warm days WD & cold days CD) and Tmin (warm nights WN & cold nights CN)</i>	<i>Heat waves/warm spells</i>	<i>Heavy precipitation</i>	<i>Dryness (consecutive dry days CDD, soil moisture anomalies SMA & PDSI)</i>
All Asia	High confidence WD/WN likely to increase and CD/CN likely to decrease in all regions.	Low confidence (parts of SE Asia) to high confidence (likely increases in most continental regions).	Low confidence (S & W Asia) to high confidence (likely increase in N Asia) depending on region and index.	Low confidence: Inconsistent change in CDD and SMA between models in large part of domain.
South Asia	High confidence WD/WN likely to increase and CD/CN likely to decrease.	High confidence: Likely more frequent and/or longer heat waves and warm spells on annual time scale.	Low confidence: slight or no increase in %DP10. Some model consistency regarding increase in RV20HP. Low confidence: More frequent and intense HPD over parts of S. Asia	Low confidence: Inconsistent signal of change in CDD and SMA.

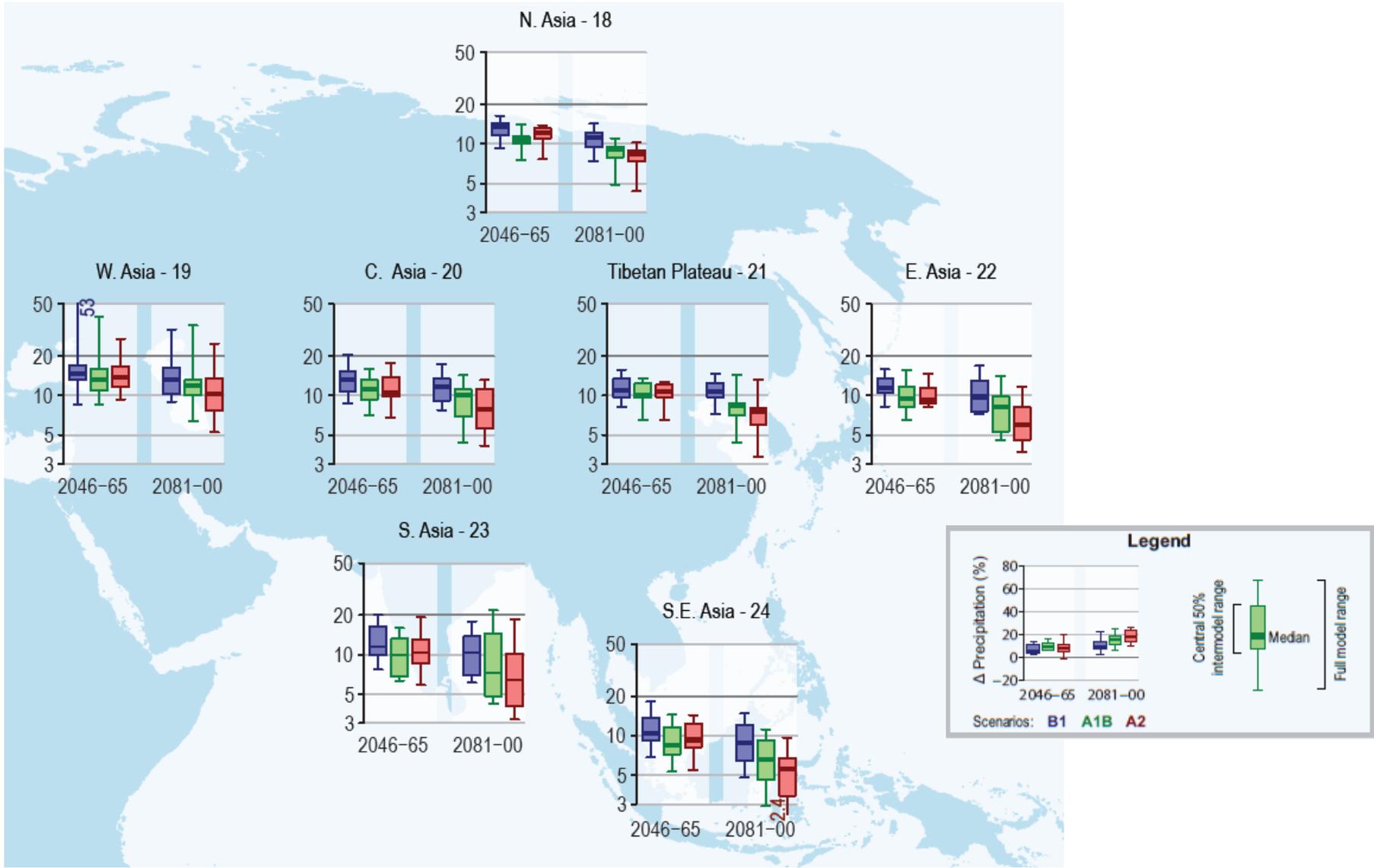
See Table 3.3 for all 7 Asian regions and full details. *Likely* = 66-100% probability

For the first time, estimates of the magnitude of changes in some extremes are provided



In many of the 26 regions considered, the *time between* “20-year” (unusually intense) rainstorms will *decrease*

Projected return periods for a daily precipitation event that was exceeded in the late 20th century on average once during a 20-year period.



This event happens more like every 10 years (or even more frequently) by the end of the 21st century in all Asian regions except W. Asia, depending on which emissions scenario is followed.

Also assessed changes in phenomena related to weather & climate extremes, and impacts on physical environment:

Monsoons

- *Low confidence* in observed trends and their attribution due to insufficient evidence
- *Low confidence* in projected changes due to insufficient agreement between climate models

Tropical cyclones (typhoons)

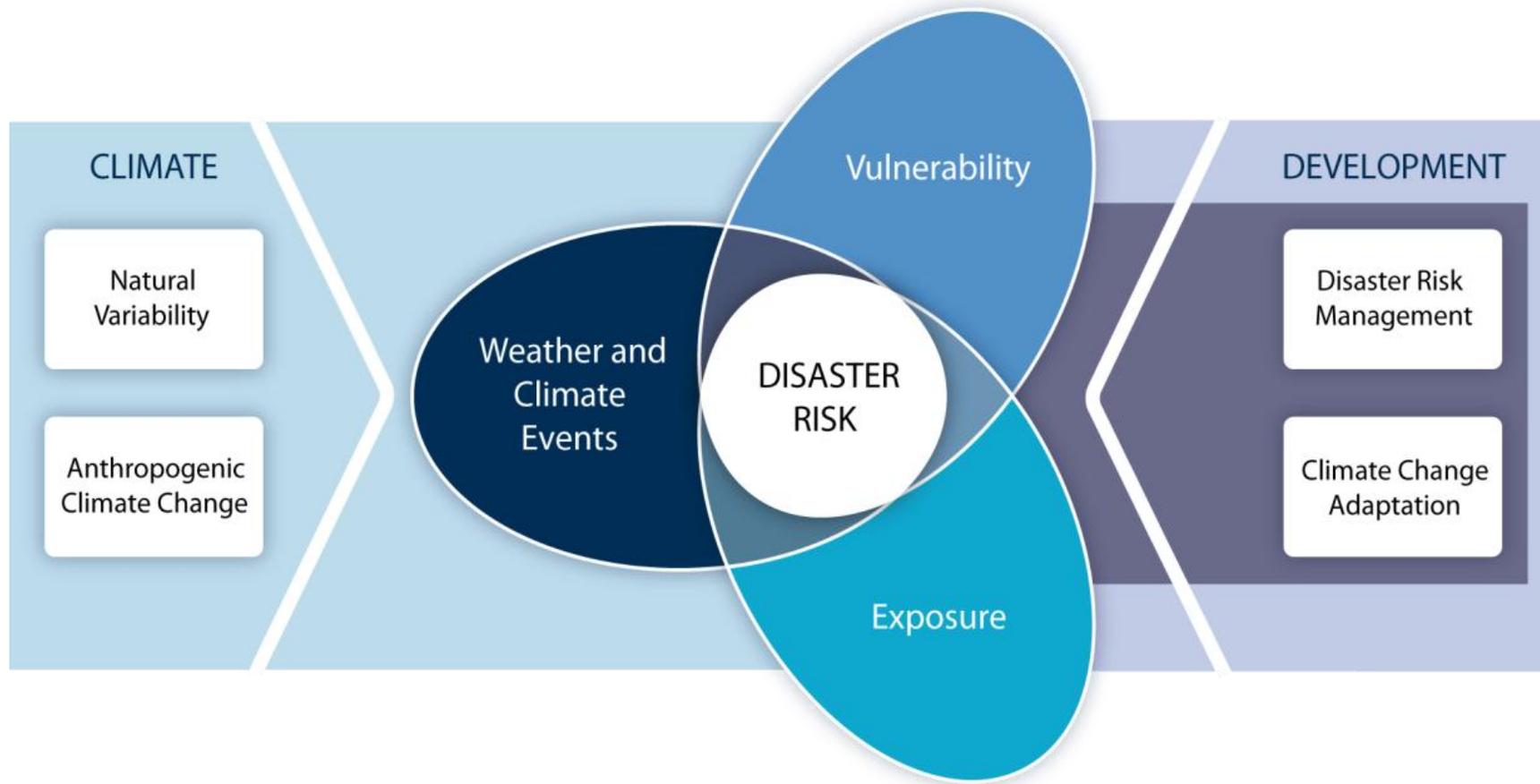
- *Low confidence* that any observed long-term (i.e., 40 years or more) increases in tropical cyclone activity are robust, after accounting for past changes in observing capabilities
- *Low confidence* in attribution of any detectable changes to anthropogenic influences
- *Likely* decrease or no change in frequency of tropical cyclones (projections)
- *Likely* increase in mean maximum wind speed, but possibly not in all basins (projections)
- *Likely* increase in heavy rainfall associated with tropical cyclones (projections)

Extreme sea level and coastal impacts

- *Likely* increase in extreme coastal high water worldwide related to increases in mean sea level in the late 20th century
- *Likely* anthropogenic influence on observed changes via mean sea level contributions
- *Very likely* that mean sea level rise will contribute to upward trends in extreme coastal high water levels
- *High confidence* that locations currently experiencing coastal erosion and inundation will continue to do so due to increasing sea level, in the absence of changes in other contributing factors

See Table 3.1. *Very likely* = 90-100% probability.

Increasing vulnerability, exposure, or **severity and frequency of climate events** increases **disaster risk**



- **SREX provides significantly expanded information on the severity and frequency of extreme climate events compared to AR4 - in particular on the regional scale**
- **Level of certainty in projection strongly depends on the considered extreme, region and season**