Tailoring regional climate information (including quality, value and availability) for assessing impact and risks of different sectors

Richard Jones and Jana Sillmann

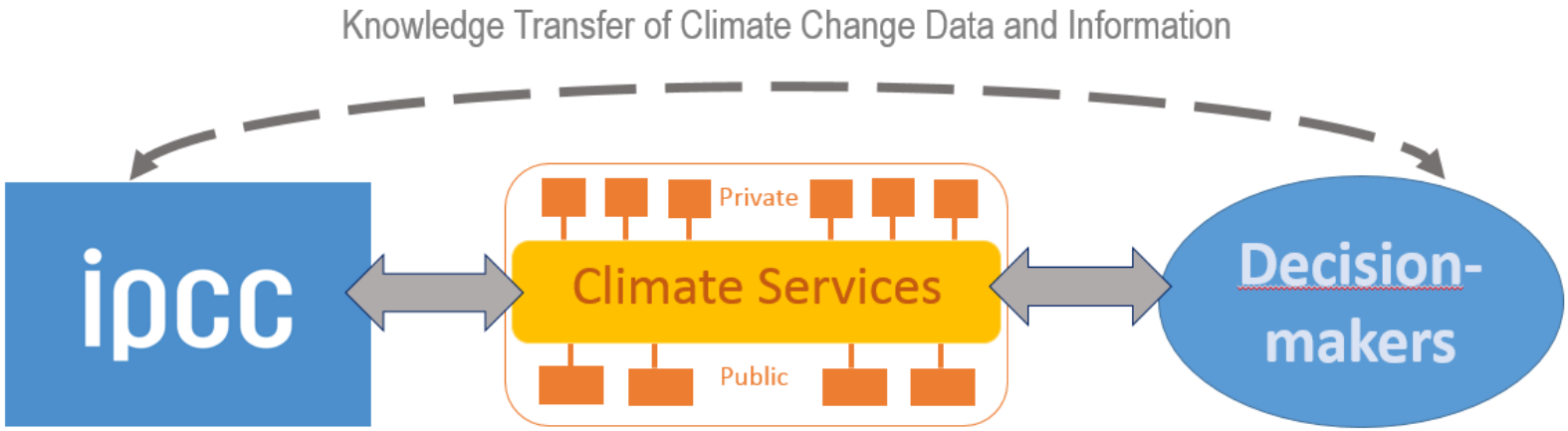
1. Tailoring regional climate information (including quality, value and availability)

2. Assessing impact and risks

3. Different sectors *and regions*

1. Tailoring regional climate information

Tailoring: Extracting most **robust** information from climate sciences and making it **specific** enough for regional impact assessment and other applications

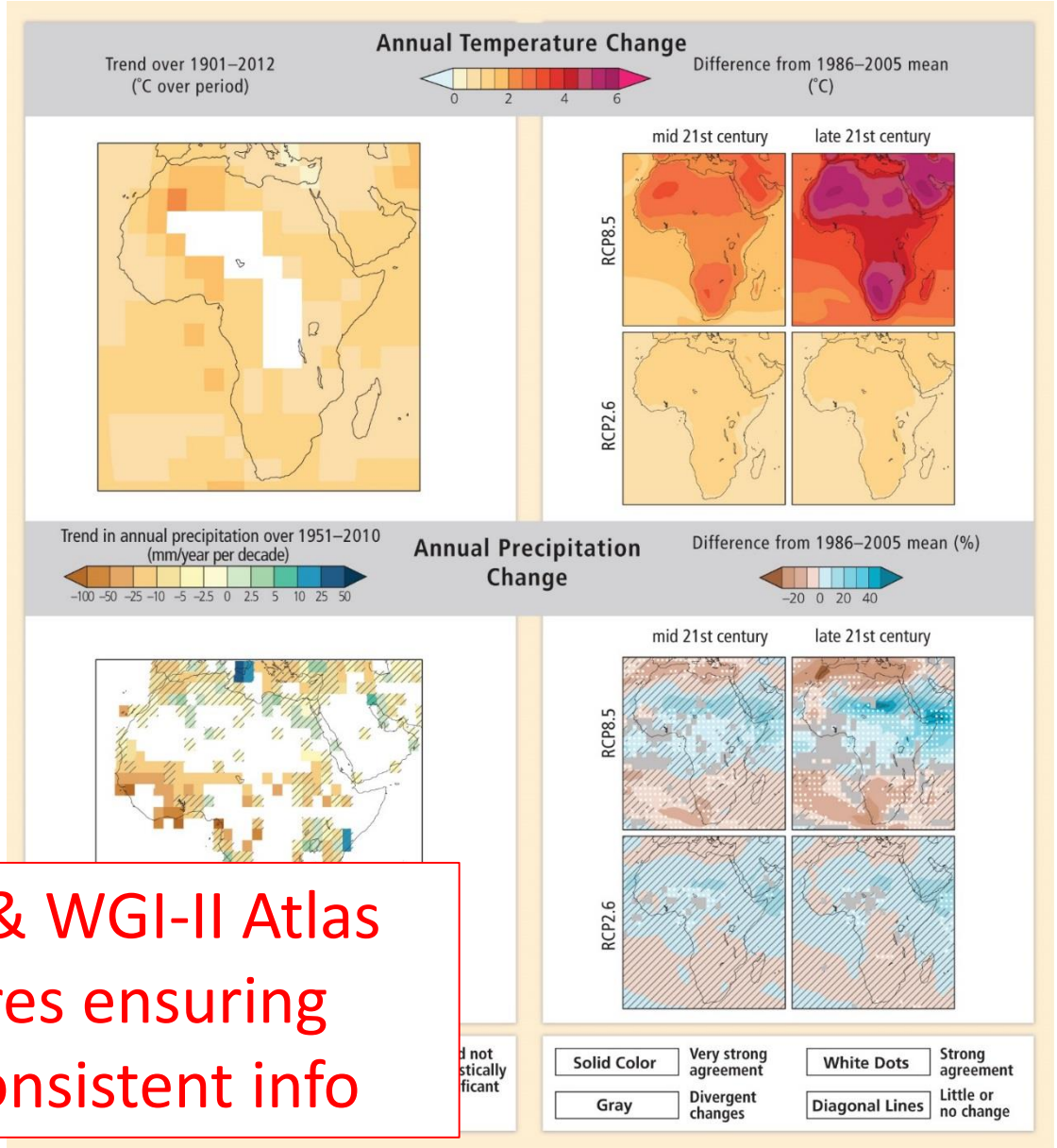


Who are our users?

- WGI, II and III chapter scientists and governments, etc.?

1. Tailoring regional climate information

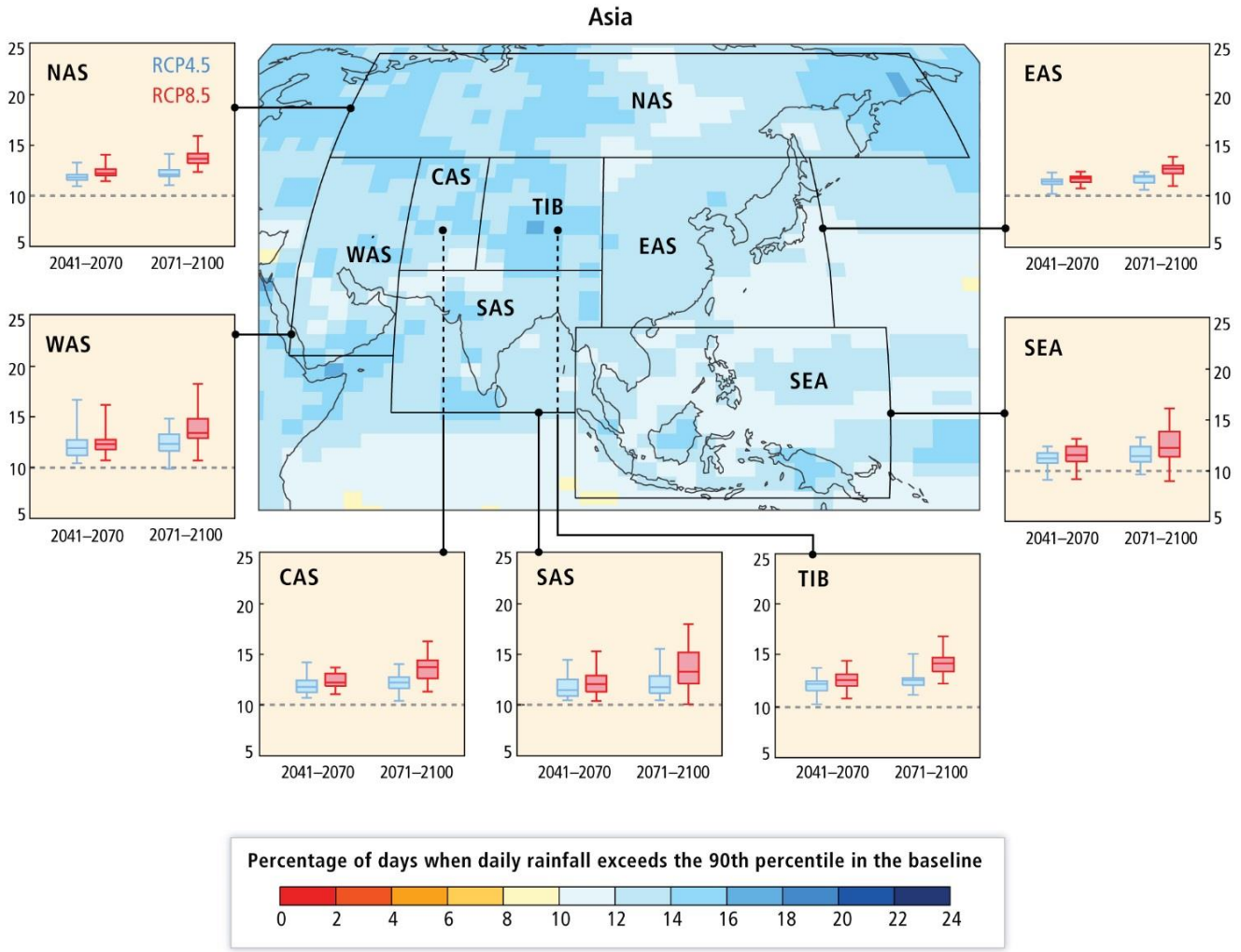
Summary climate trends and changes – AR5 WGII Ch 21/Ch 22



AR6 WGI Ch 12 & WGI-II Atlas co-produce figures ensuring efficiency and consistent info

1. Tailoring regional climate information

Regional change in frequency of 90th %-ile daily rainfall: median (map) and region-average ranges (box-plots)



1. Tailoring regional climate information

Chapter 12 and Atlas

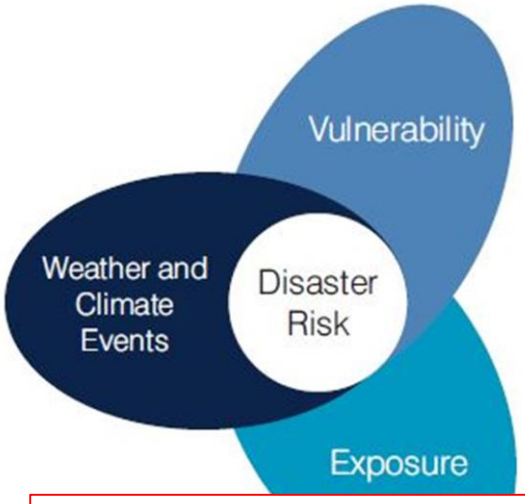
- Balance between robustness of regional changes and providing information that is specific enough
- Treatment and communication of ranges of plausible future outcomes
- IPCC generating guidance on how to provide regionally specific and robust climate (change) information (i.e. on hazard probability/intensity)

2. Assessing impact and risks

Indicators: Identification of relevant variables across chapters to quantify and illustrate hazards and how they may change and to use this information in impact and risk assessment

- Climate extremes (events, indices)
- Slow onset (e.g. Sea-level rise, aridification)
- Variability-related events (e.g. ENSO, IOD driven)

…



Human development indicators

SDG indicators

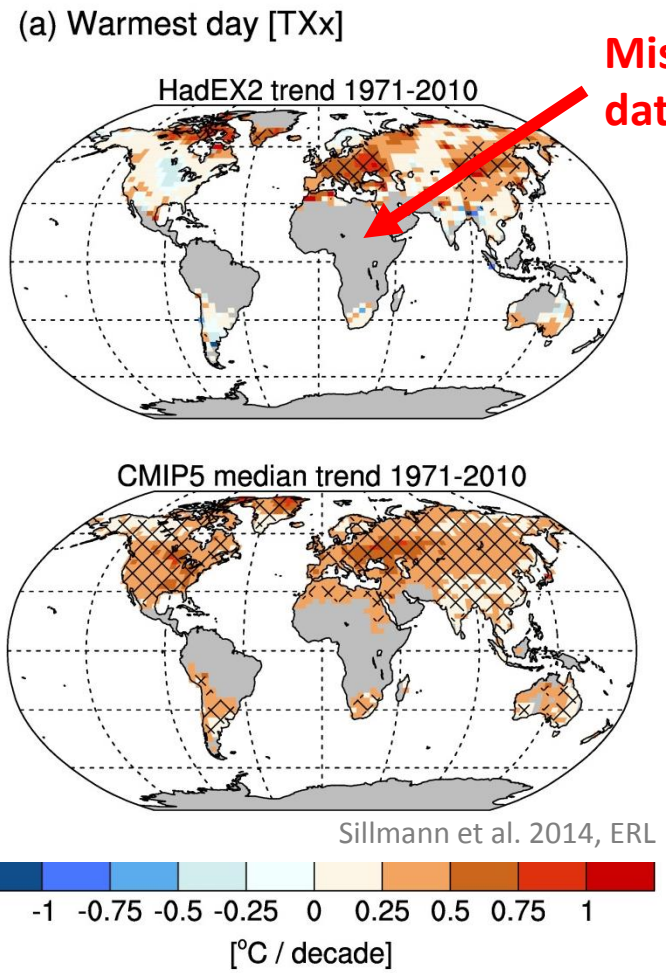
SSPs

…

BUT…we are also missing a lot of aspects by using indicators!

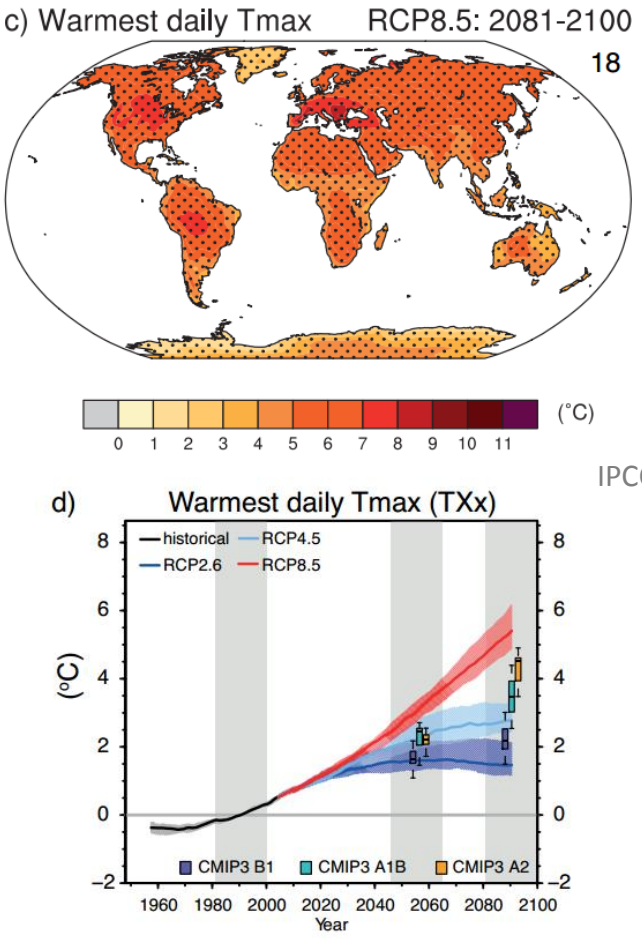
2. Assessing impact and risks

EXAMPLE: HEAT STRESS



Sillmann et al. 2014, ERL

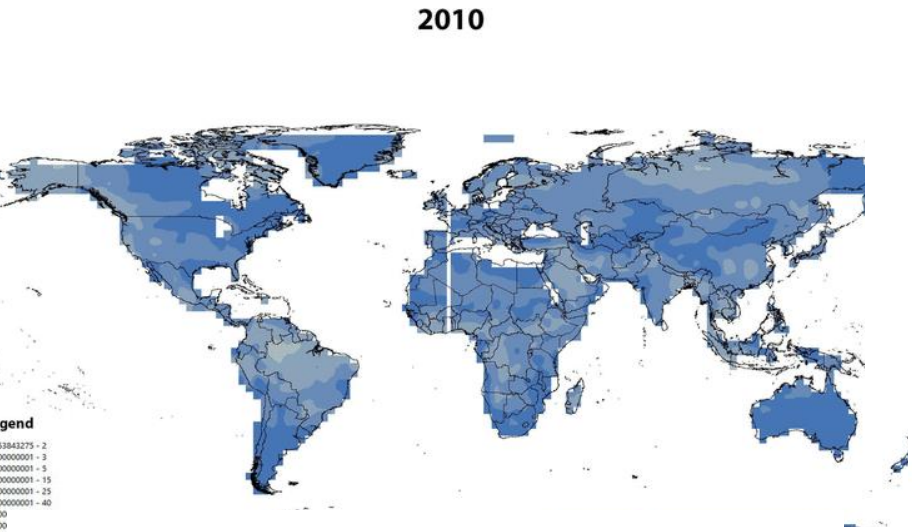
Long-term Projections



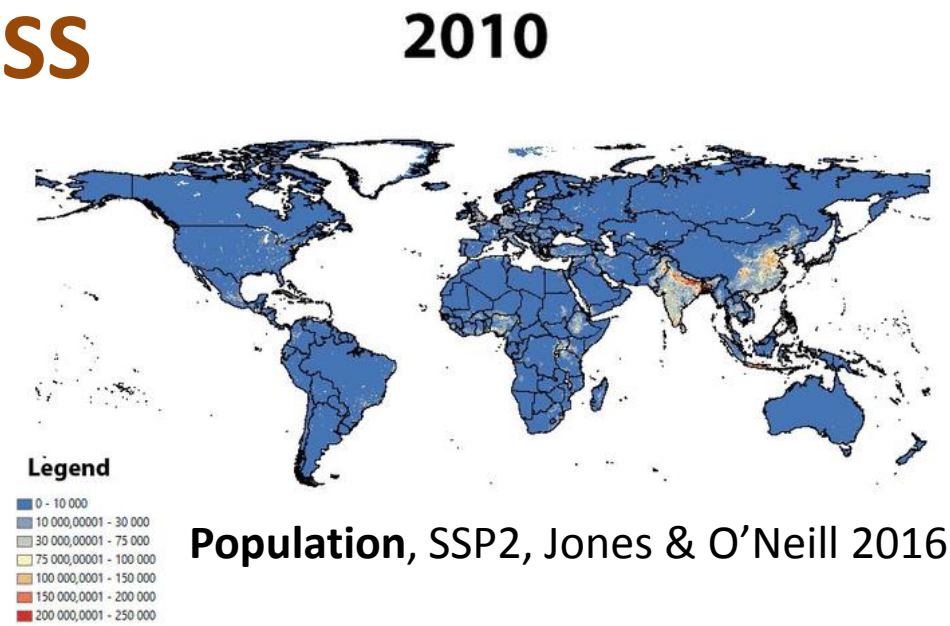
IPCC 2013, Ch. 12

2. Assessing impact and risks

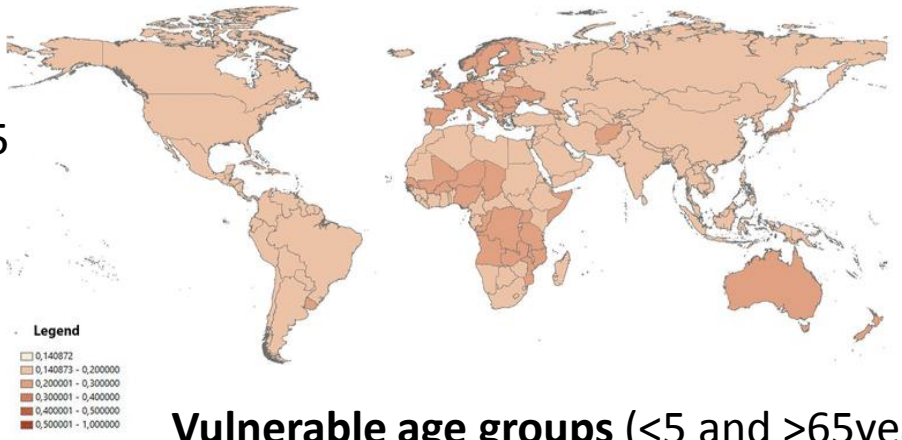
EXAMPLE: HEAT STRESS



Heatwave Magnitude Index, Russo et al. 2015



Population, SSP2, Jones & O'Neill 2016



Vulnerable age groups (<5 and >65years), UN ESA

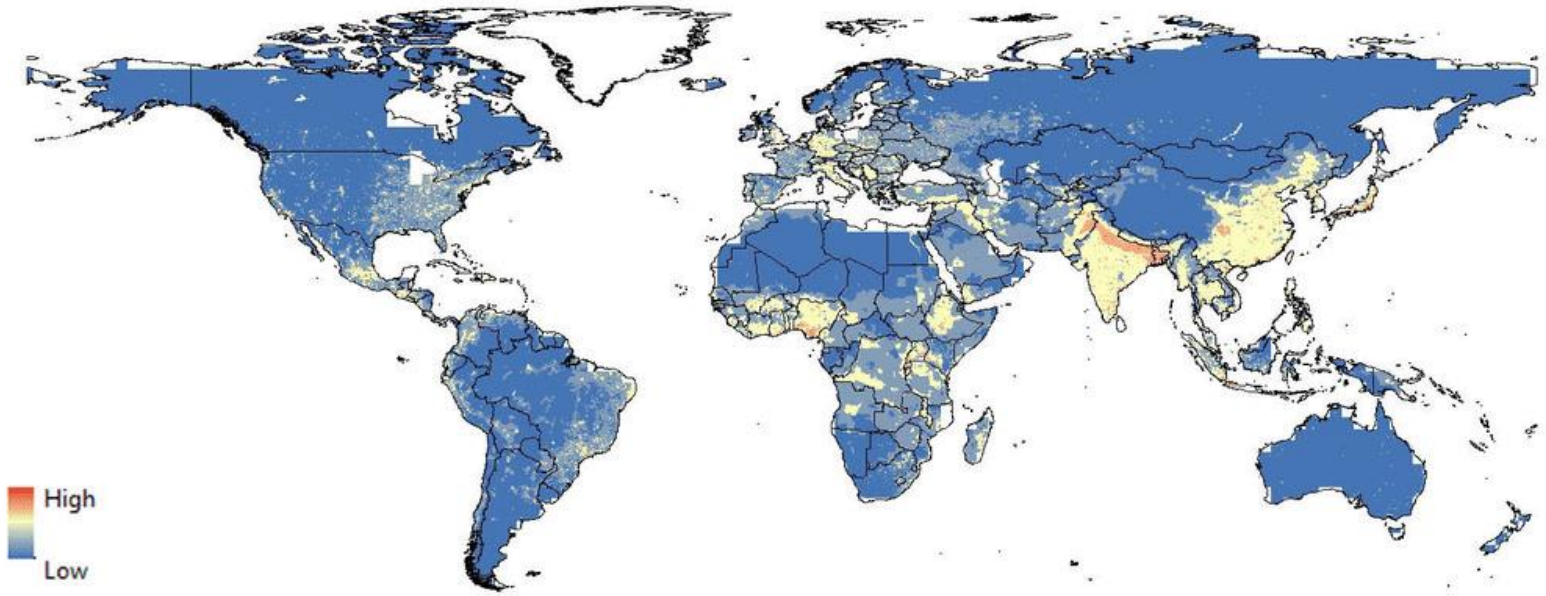
How to combine different scales and uncertainties?

2. Assessing impact and risks

EXAMPLE: HEAT STRESS

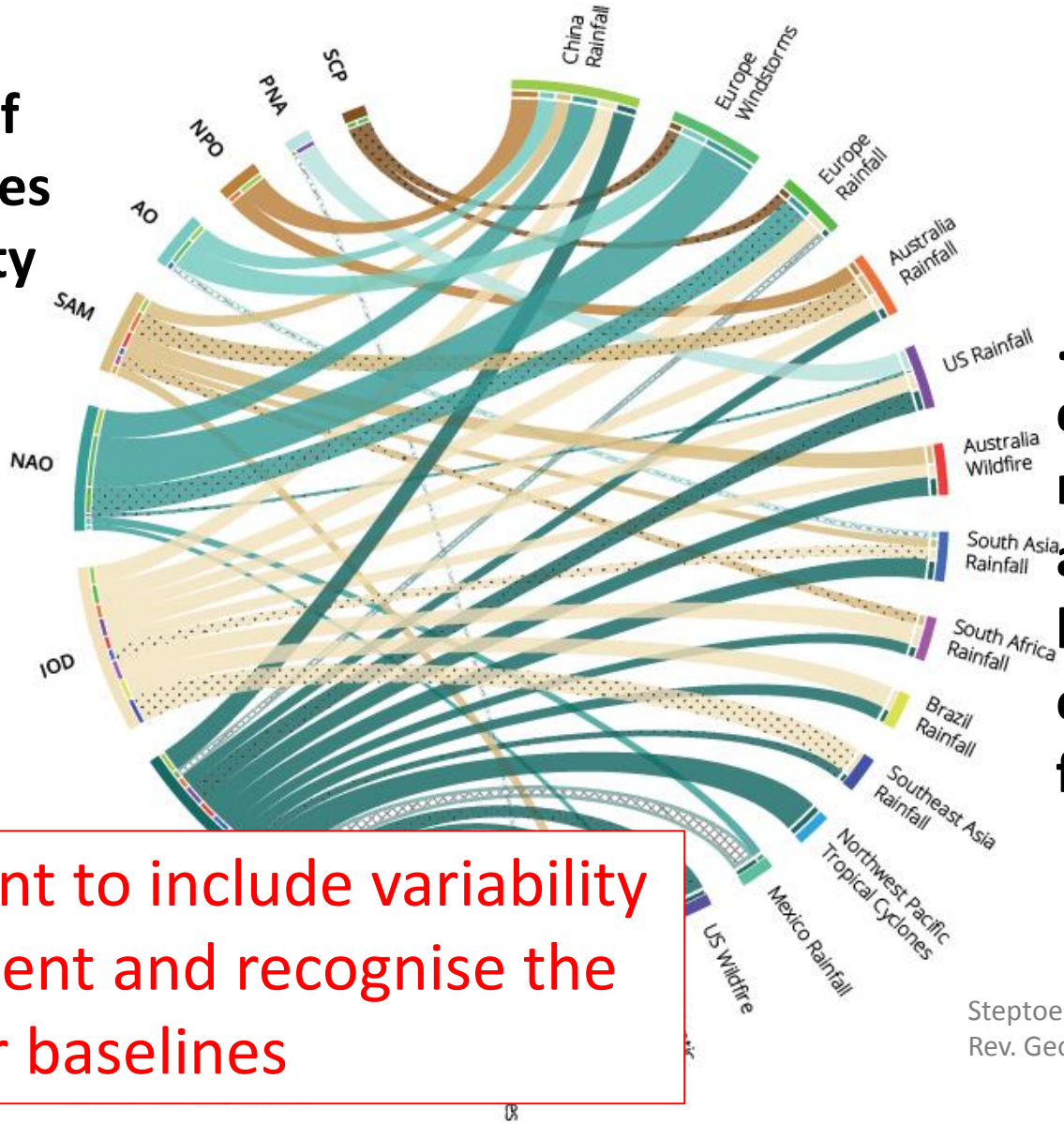
2010

Climate change risk = Hazard probability x Vulnerability x Exposure



2. Assessing impact and risks

Influence of major modes of variability …

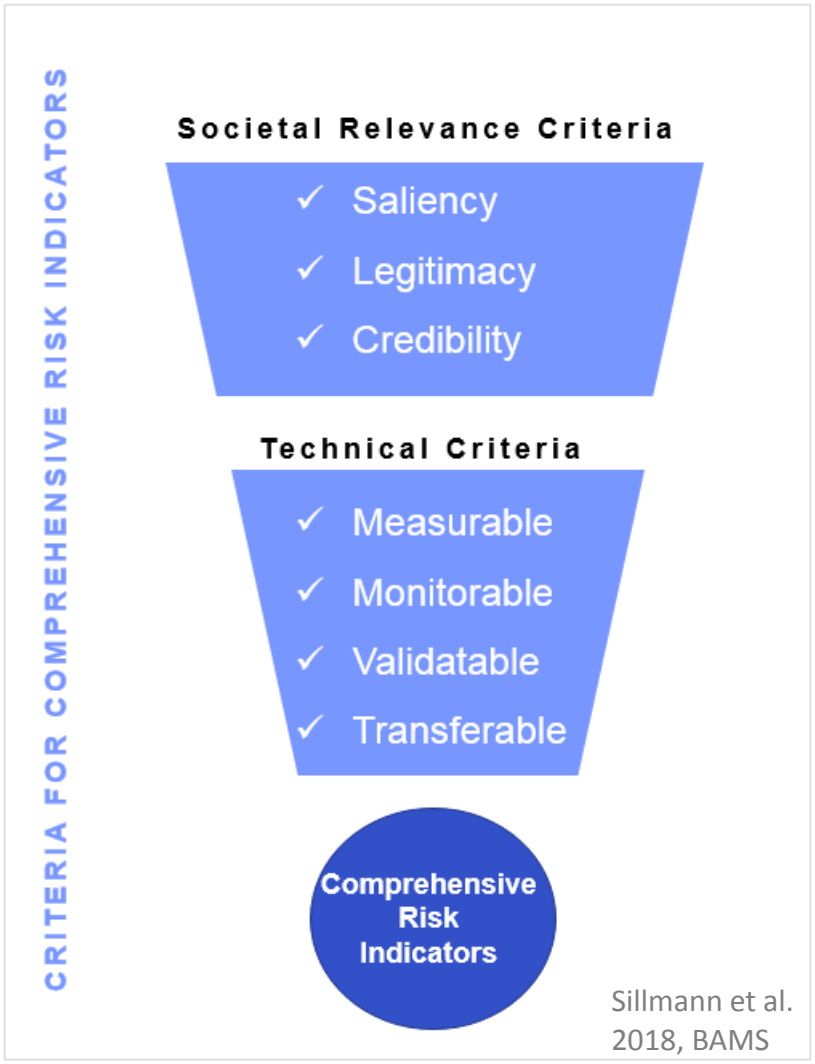


… on regional extreme events relevant to assessing multi-hazard resilience e.g. in insurance, food security

Important to include variability component and recognise the need for baselines

Steptoe et al. 2018, Rev. Geophys

2. Assessing impact and risks



Sillmann et al. 2018, BAMS

Issues to consider for choosing indicators:

Scale and relevance

Aggregation and accuracy

Data quality and availability

What about qualitative information?

2. Assessing impact and risks

Chapter 12 and Atlas

- Hazard versus risk indicators (incl. vulnerability and exposure aspects)
- Static versus dynamic
- Treatment and visualization of uncertainties (e.g. model agreement, trend significance, scenario choice)

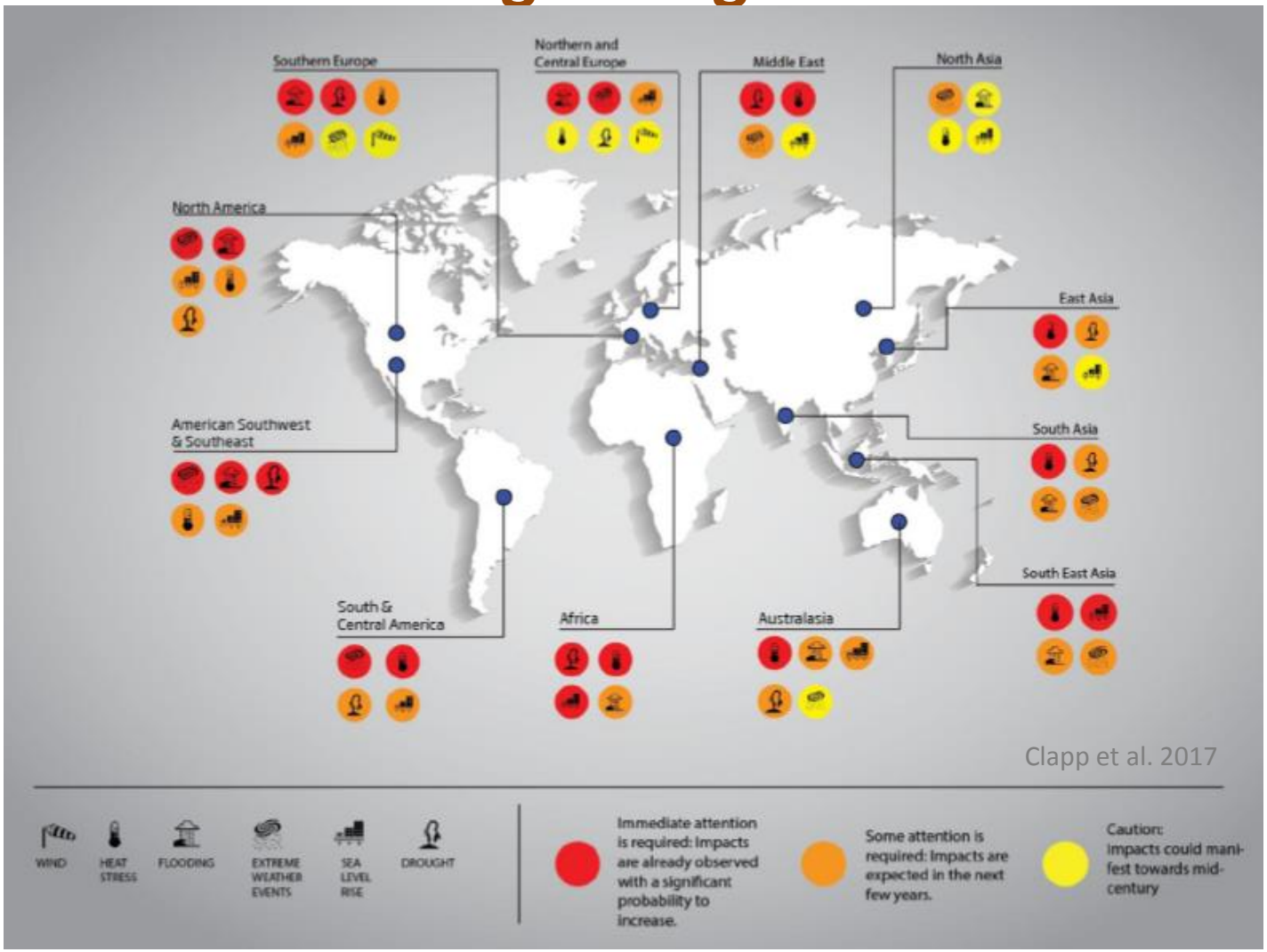
3. Different sectors and regions

Contrasting categories for risk assessments

- Urban and rural
- Developed and developing countries/regions
- Infrastructure and social systems
- Sectors within regions and sectors across regions
- Etc.

3. Different sectors and regions

EXAMPLE: Categorizing climate risk for investors



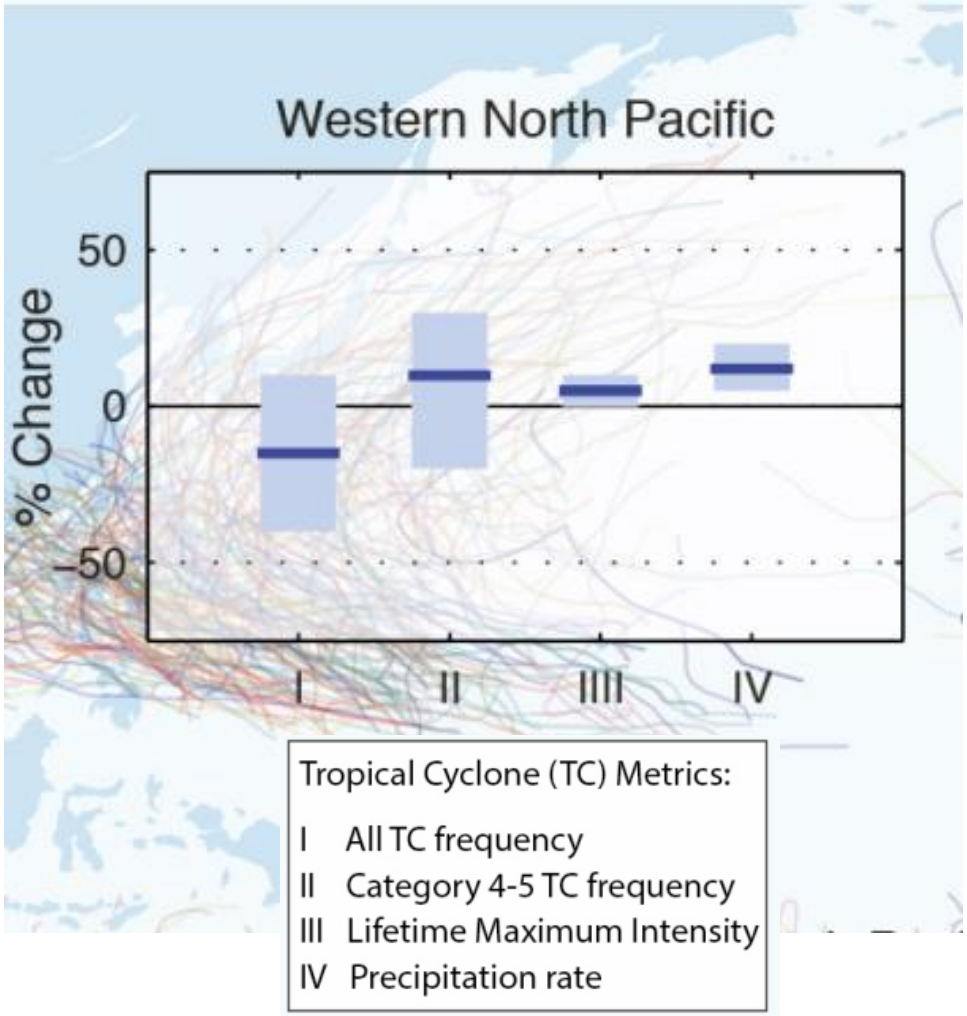
Tailoring regional climate information for assessing impact and risks of different sectors

Clim INVEST

Tailored climate risk information for financial decision makers

3. Different sectors and regions

Example: Typhoons and resilience in the Philippines



The latest IPCC findings provide only basin-wide information on tropical cyclone projections

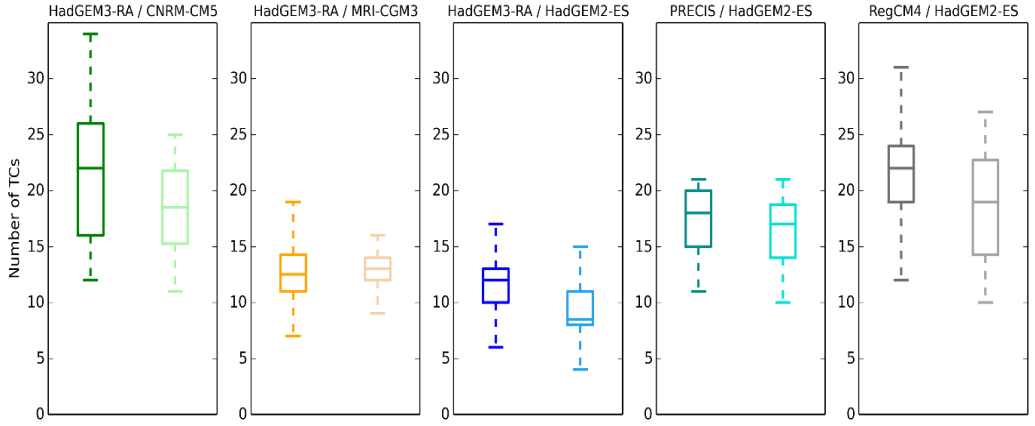
(Figure 14.17 (IPCC WG1, 2013): *Expected change in tropical cyclone activity based on expert judgment after subjective normalisation of the model projections for the period 2081 to 2100 compared to 2000 to 2019.)*

Implies reduction in frequency and increase in intensity/precipitation

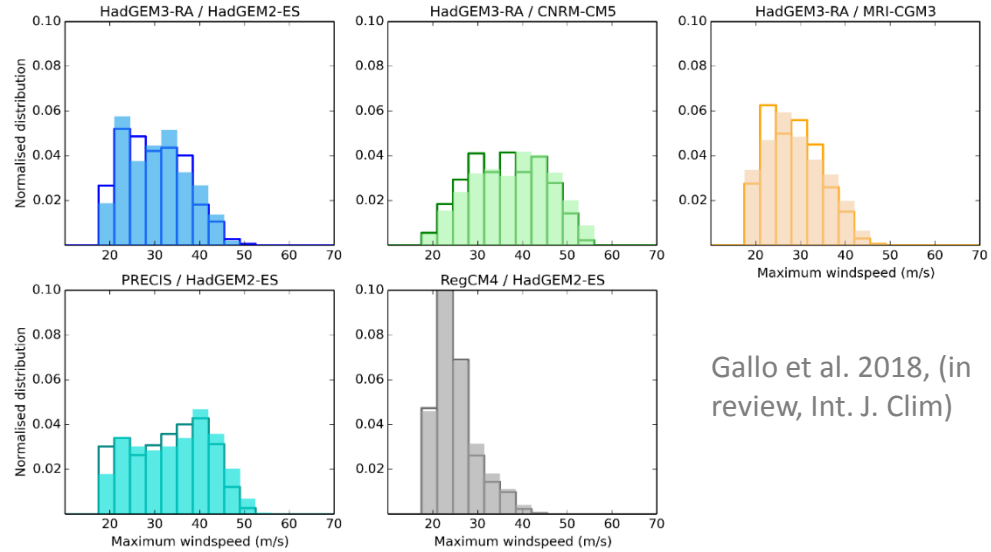
3. Different sectors and regions

Generating country-relevant information

Reduction in frequency in 5 RCMs



Increase in intensity



Gallo et al. 2018, (in review, Int. J. Clim)

CMIP5 analysis

Assess quality of cyclone drivers
Exclude clearly implausible models
Select from remainder a sub-set with representative changes in typhoons

RCM historical and future simulations

Domain sensitivity of genesis/tracks
Compare reanalysis-driven simulations with observed tracks

Analysis and synthesis

Assess key processes and typhoon-specific variables
Extract key messages to provide country-level interpretation of IPCC findings

4. Summary and questions

- **“Tailoring" is context-specific**
  – What does this mean for development of “generic” tailored products?

- **Good examples exist of tailored regional climate information**
  – Can we use these as guidance on generating tailored information?

- **For impacts/risk assessments show hazard, vulnerability and exposure combined**
  – How relevant are dynamic/interactive graphics?
  – Where is the best place to show these (Atlas, WGII)?
  – How to deal with plausible ranges, missing data, etc.?