

Working with climate data: the role of Climate Services Information Systems for NAPs

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WEATHER CLIMATE WATER
TEMPS CLIMAT EAU



WMO OMM

World Meteorological Organization
Organisation météorologique mondiale

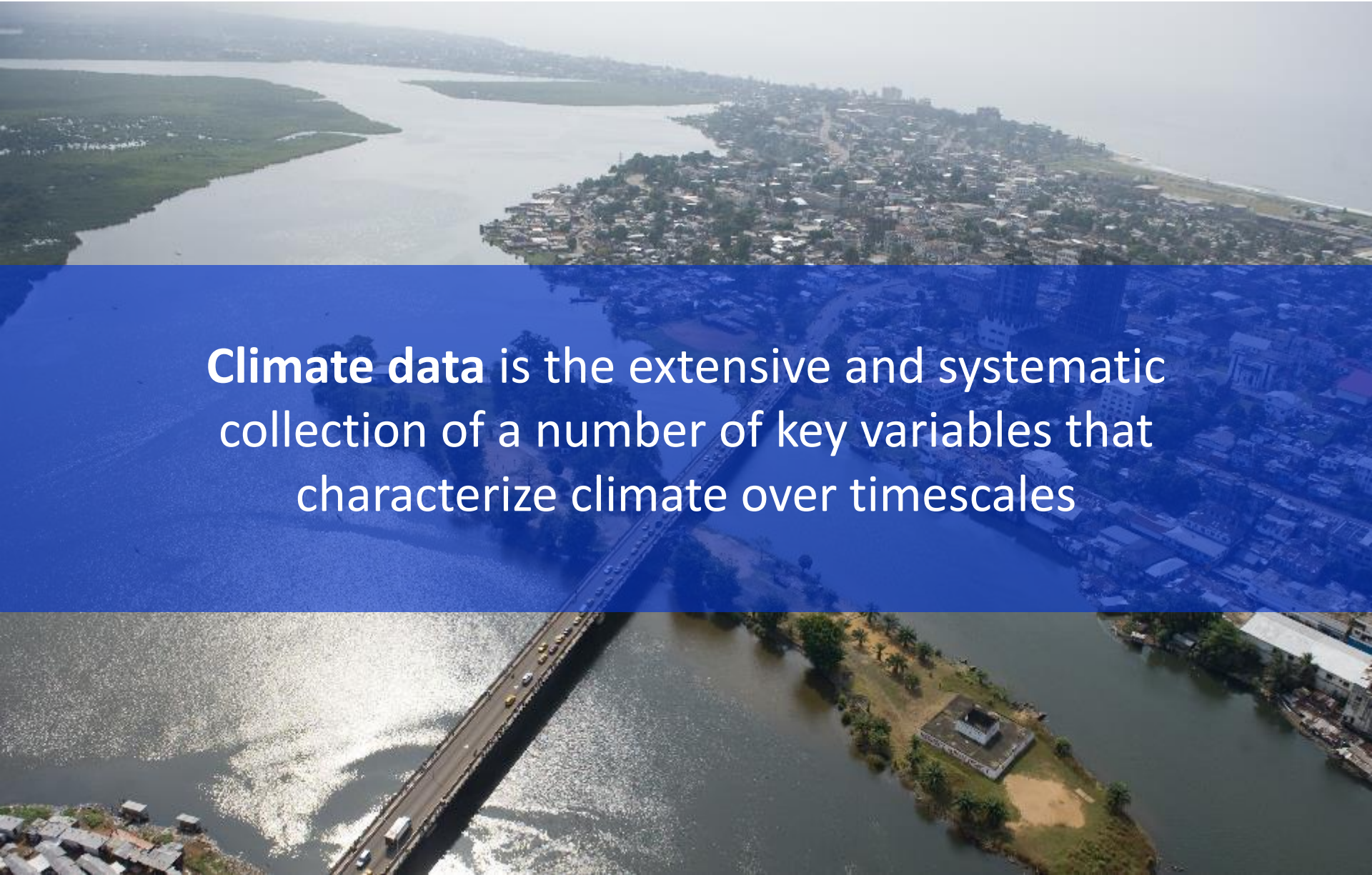
Session outline

What are
Climate
Services
Information
Systems
(CSIS)?

What is the
role of CSIS
in NAPs?

How can CSIS
be scaled up:
best practices

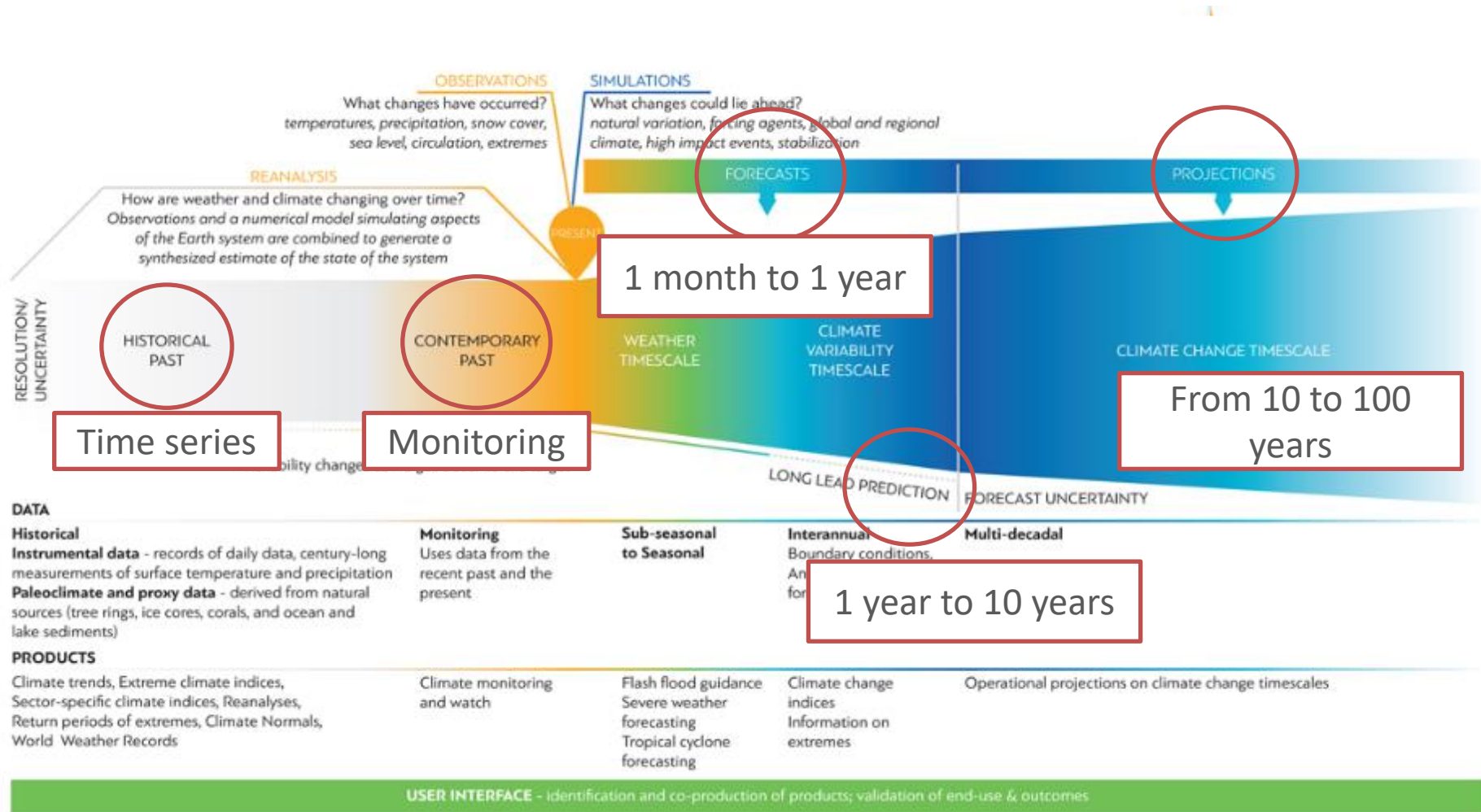
A definition...

An aerial photograph of a wide river flowing through a city. The river is the central focus, with a bridge crossing it. The city buildings and greenery are visible on both banks. A semi-transparent blue rectangular overlay covers the middle portion of the image, containing white text.

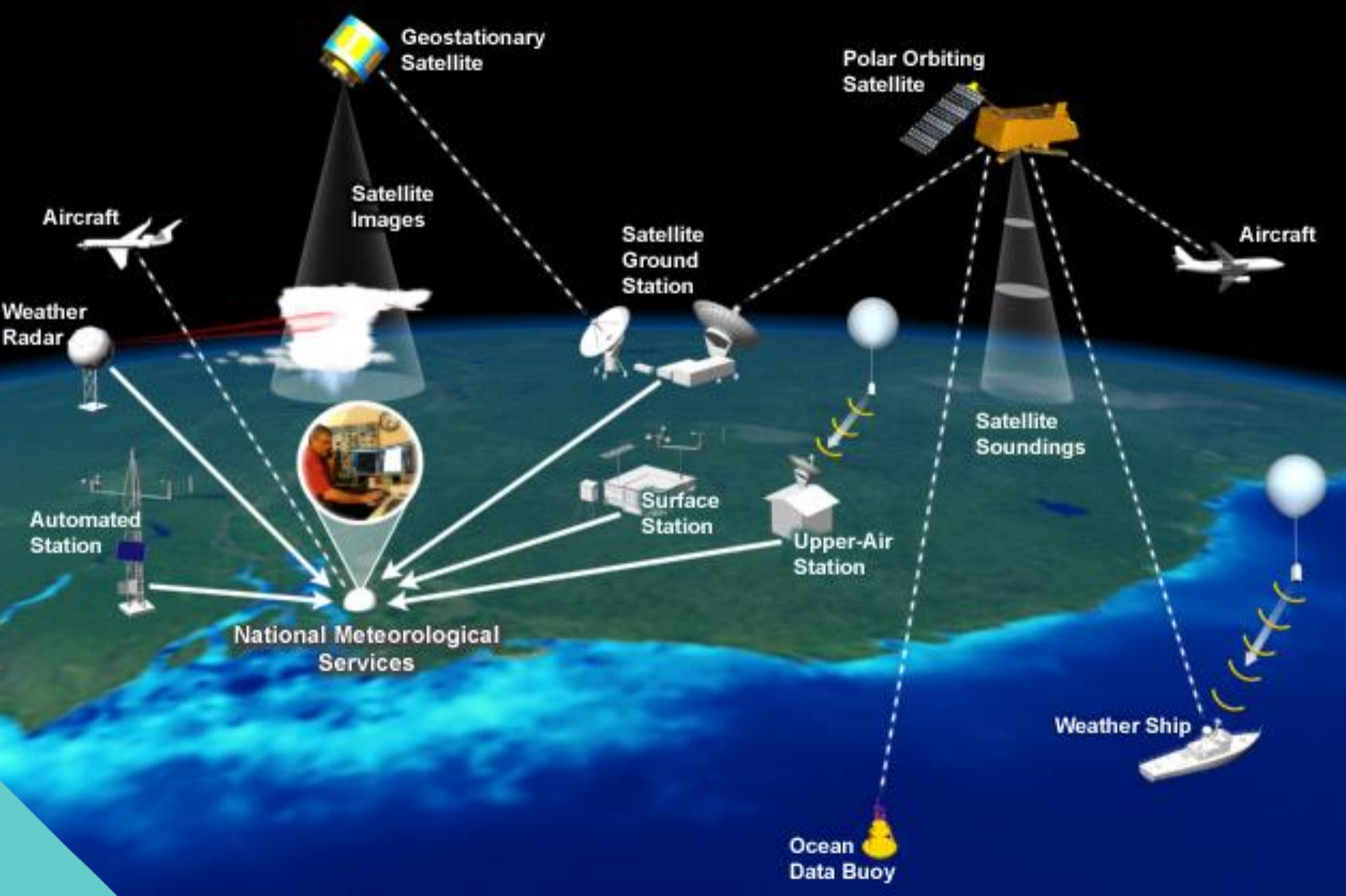
Climate data is the extensive and systematic collection of a number of key variables that characterize climate over timescales

Climate Services Information System (CSIS)

A seamless approach...



WMO Global Observing System



Global Producing and Regional Climate Centres

WMO Global Producing Centres



- **Beijing:** China Meteorological Administration (CMA) / Beijing Climate Center (BCC)
- **CPTEC:** Center for Weather Forecasting and Climate Research / National Institute for Space Research (INPE), Brazil
- **ECMWF:** European Centre for Medium-Range Weather Forecasts
- **Exeter:** Met Office, United Kingdom
- **Melbourne:** Bureau of Meteorology (BOM), Australia
- **Montreal:** Meteorological Service of Canada (MSC)
- **Moscow:** Hydrometeorological Centre of Russia
- **Offenbach:** Deutscher Wetterdienst
Wetter und Klima aus einer Hand
- **Moscow:** Hydrometeorological Centre of Russia
- **Pretoria:** South African Weather Services (SAWS)
- **Seoul:** Korea Meteorological Administration (KMA)
- **Tokyo:** Japan Meteorological Agency (JMA) / Tokyo Climate Center (TCC)
- **Toulouse:** Météo-France
- **Washington:** Climate Prediction Center (CPC) / National Oceanic and Atmospheric Administration (NOAA), United States of America



Reflection time

What are the
time/spatial-
scales that
matter to you
(and to NAPs)?

Capacities underpinning data management

INFRASTRUCTURAL

Observational capabilities:
station networks, remote sensing
platforms

HUMAN

Product generation:
data analysis, model runs

PROCEDURAL

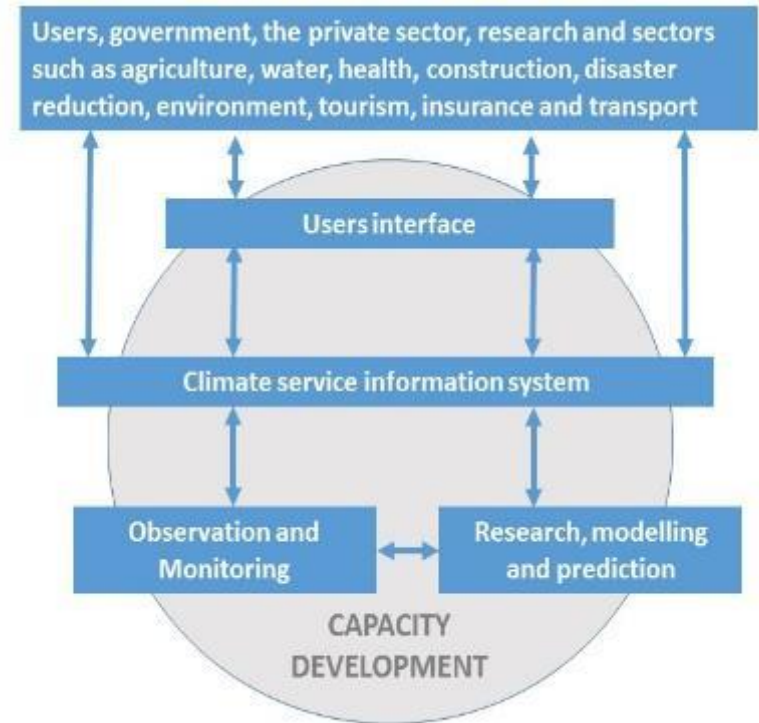
Data management:
organize, manage and exchange
data from observations, analyses
and models

INSTITUTIONAL

Policy use:
climate information and
prediction into planning, policy
and practices

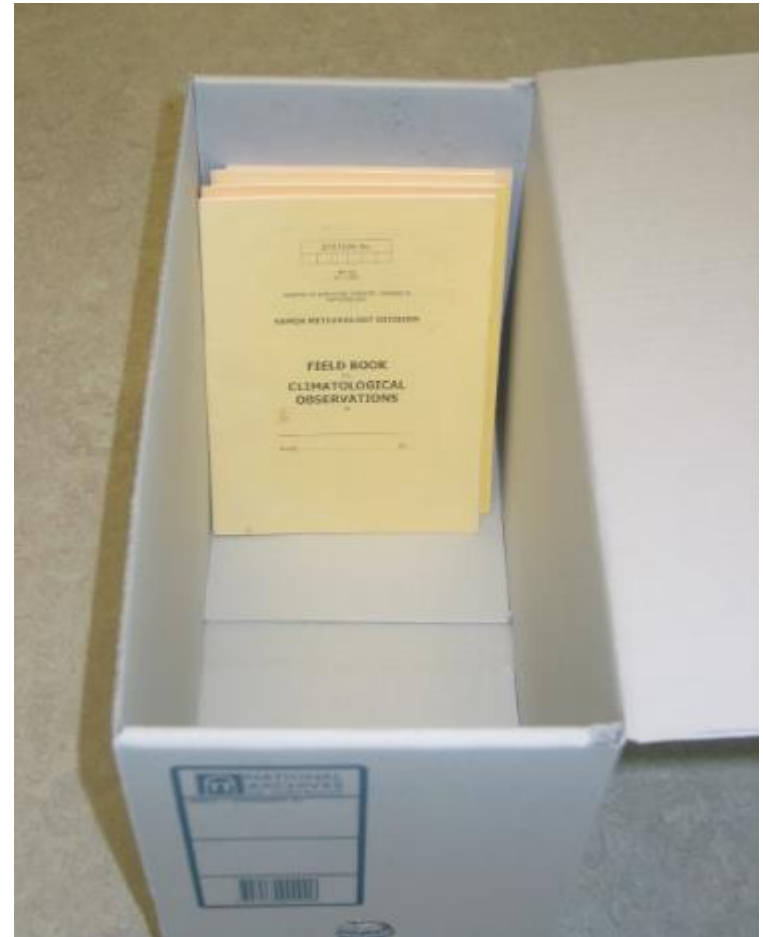
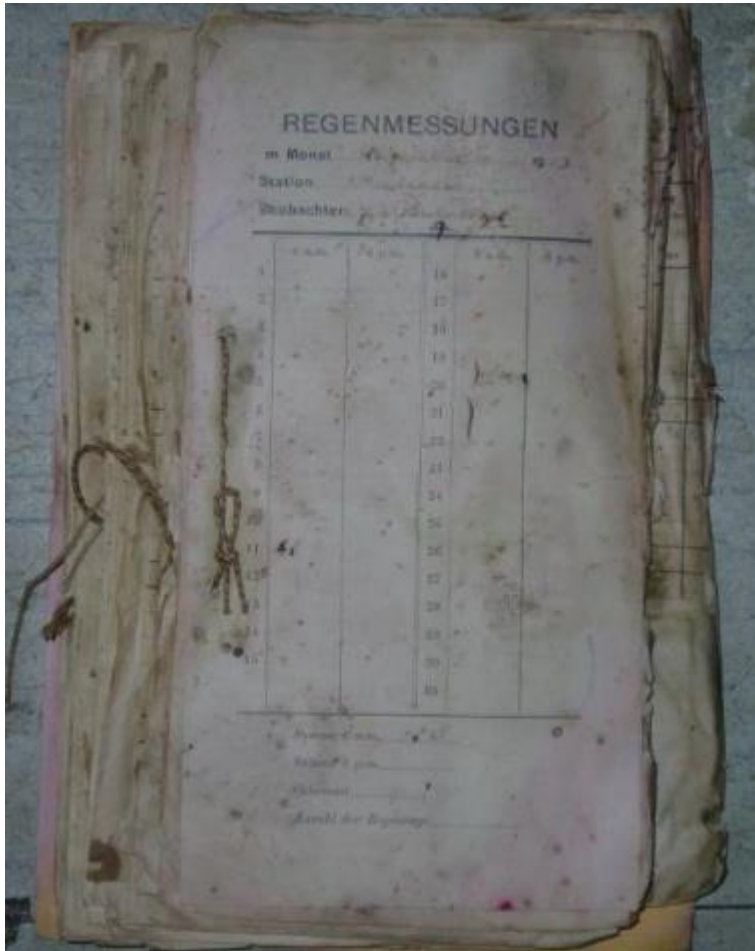
Data issues

- Availability and digitization (data rescue)
- Homogeneity (QC)
- Relevance
- Accessibility and communication



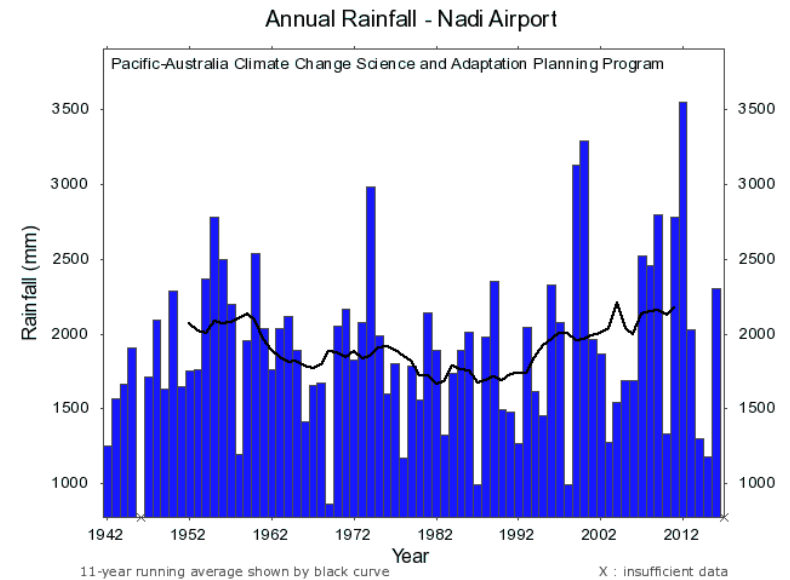
The potential of CSIS can only be realised when the information provided matches the needs of end-users

Data rescue often the first step



Pacific Climate Change Data Portal

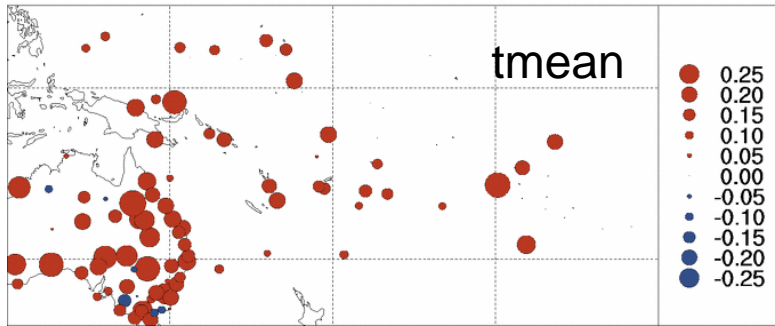
The screenshot shows the Pacific Climate Change Data Portal interface. At the top, there is a navigation bar with the Australian Government logo and the Bureau of Meteorology. The main content area features a search bar and a navigation menu on the left. The central part of the page displays a map of the Pacific region with various weather stations marked by orange dots. A sidebar on the right contains a 'Data' panel with dropdown menus for 'Select a data type', 'Time series period', and 'Country of interest'. The page title is 'Pacific Climate Change Data Portal' and it includes a brief description of the portal's purpose.



At <http://www.bom.gov.au/climate/pccsp/> - covers observed climate change

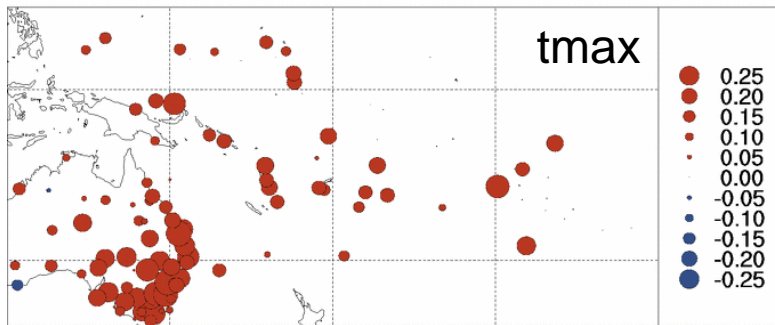
Trends in Annual Temperature (since 1961)

Trend in Annual Mean T (hom) 1961-2010 (°C/decade)



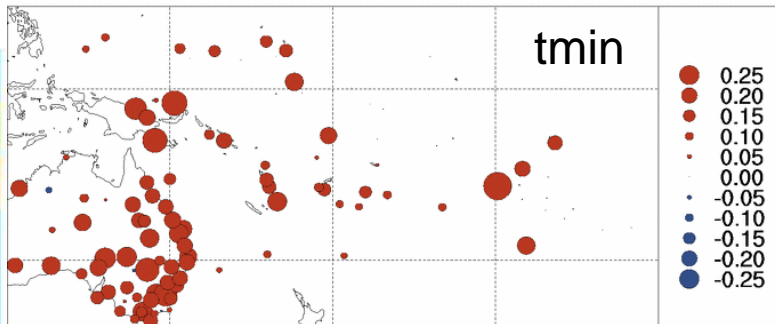
Warming at every site – stronger around PNG and the far East Pacific. Amounting to near 0.8 ° C

Trend in Annual Max T (hom) 1961-2010 (°C/decade)



Slightly less warming in the North Pacific

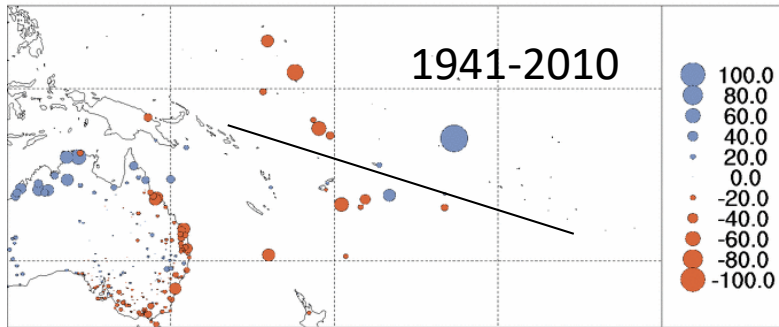
Trend in Annual Min T (hom) 1961-2010 (°C/decade)



Warming tends to be greatest where SSTs are warming most rapidly (and rainfall increasing)

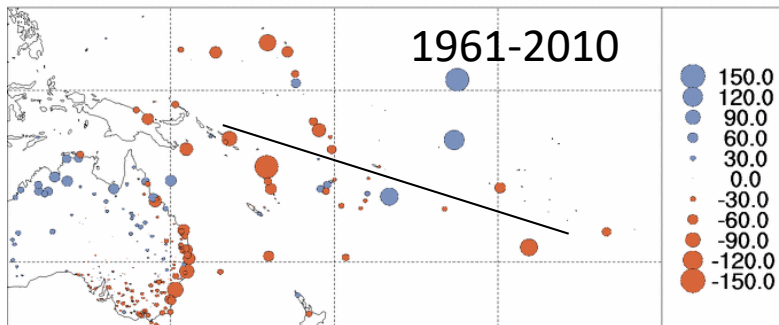
Trends in Annual Rainfall

Trend in Annual Rainfall (hom) 1941-2010 (mm/decade)

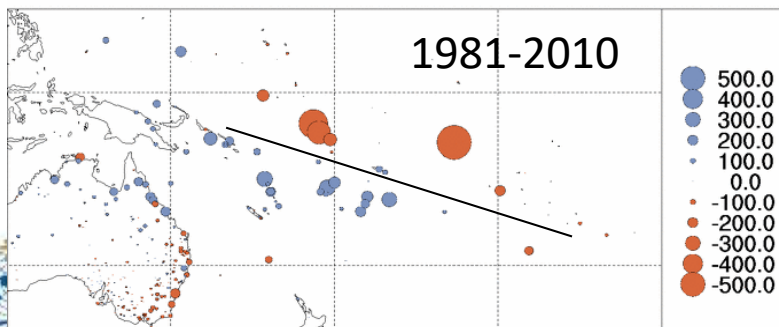


Since 1941 and 1961 general declines SW of the SPCZ, increases to the NE

Trend in Annual Rainfall (hom) 1961-2010 (mm/decade)

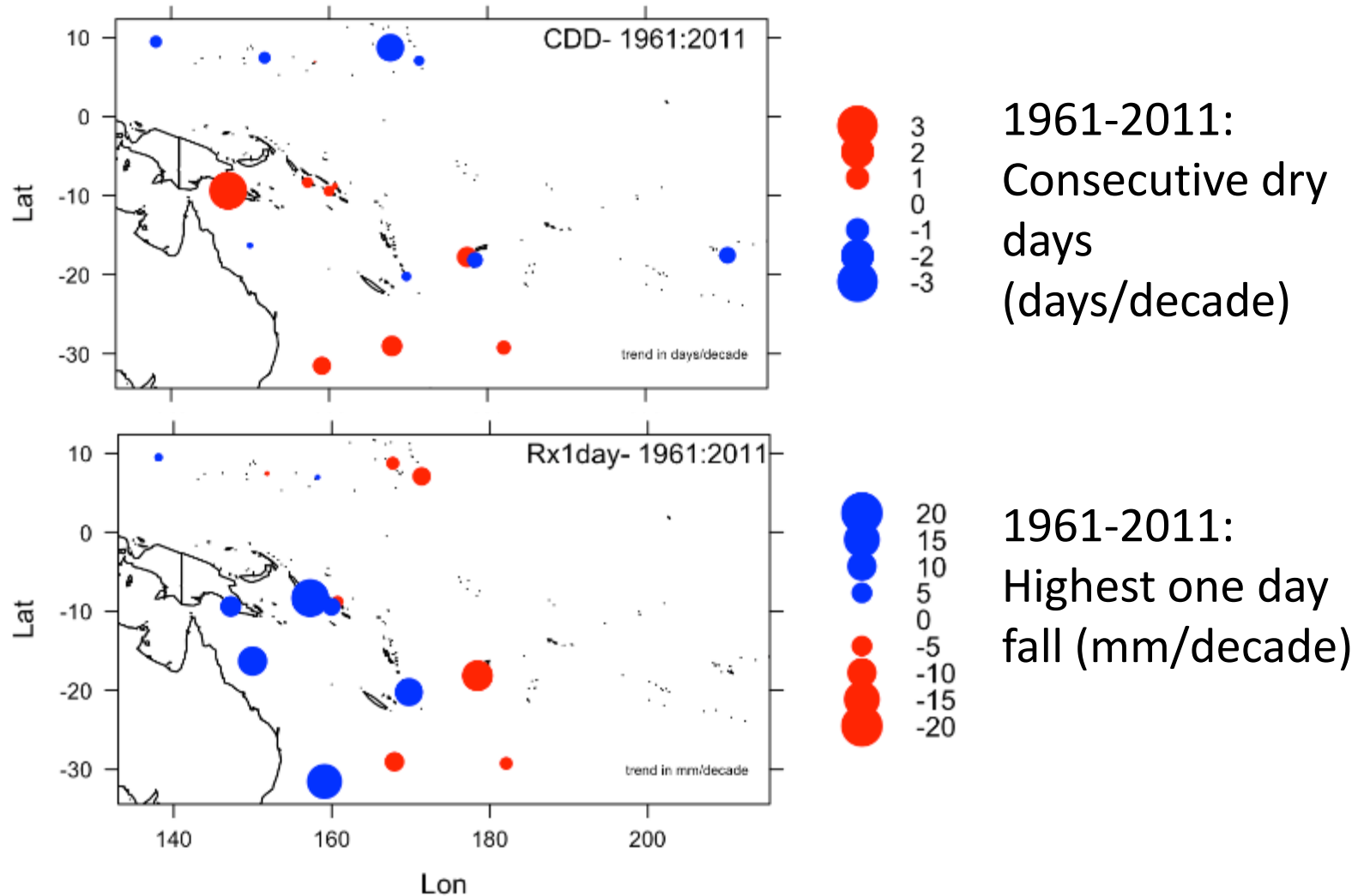


Trend in Annual Rainfall (hom) 1981-2010 (mm/decade)



Since 1981, declines to the NE of the SPCZ, increases to the SW

Annual Trends in Rainfall Indices



What CSIS can offer to NAPs

- Location, timing, duration, severity of high impact weather and climate events

WEATHER EXTREME INDEXES

- Information on potential sectoral climate change impacts

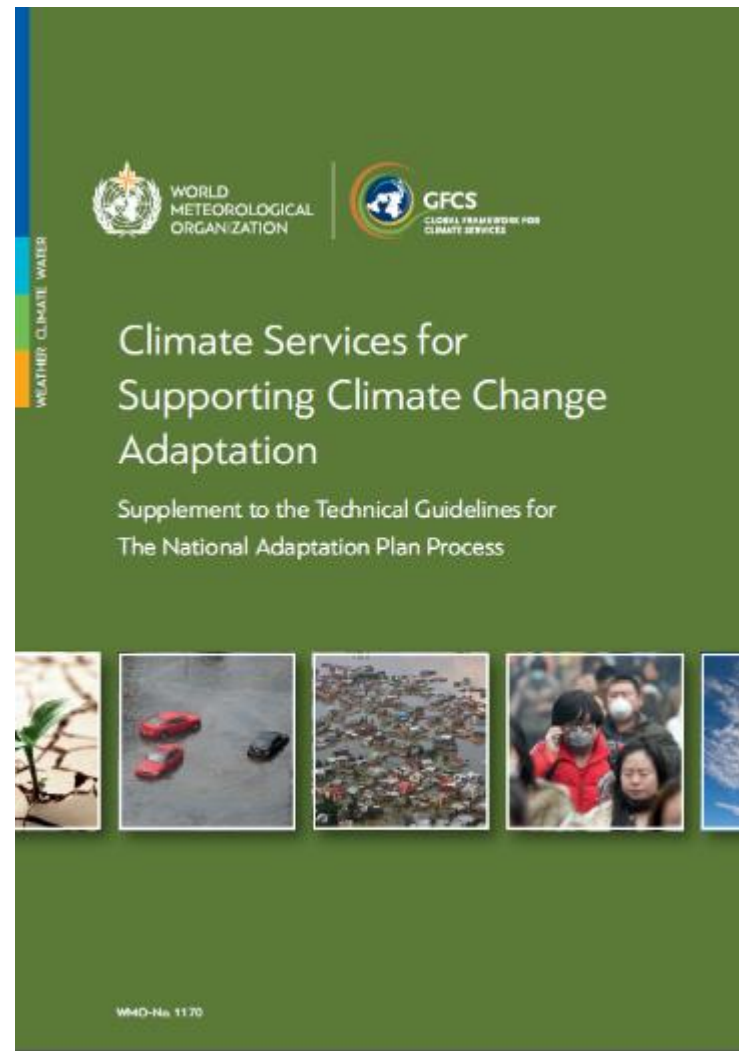
SECTOR-SPECIFIC INDEXES

- A platform for initiating preparedness by different users

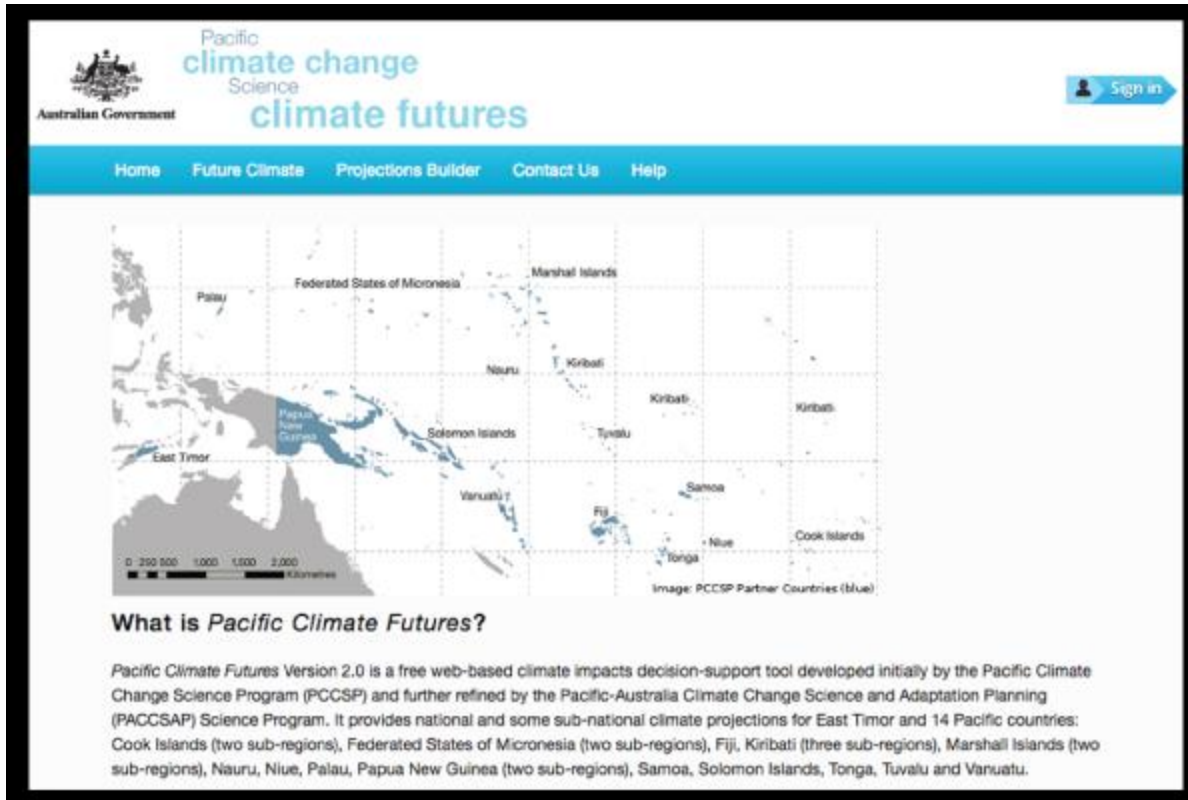
CLIMATE OUTLOOK FORUMS

- A baseline to strengthen capacities for effective climate services

NATIONAL FRAMEWORKS FOR CLIMATE SERVICES



The Pacific Climate Futures tool



The screenshot shows the website for the Pacific Climate Futures tool. At the top left is the Australian Government logo. The main header reads "Pacific climate change Science climate futures". A "Sign in" button is in the top right. A navigation bar contains "Home", "Future Climate", "Projections Builder", "Contact Us", and "Help". The central feature is a map of the Pacific region with labels for countries and territories: Palau, Federated States of Micronesia, Marshall Islands, Nauru, Kiribati, Solomon Islands, Tuvalu, Samoa, Vanuatu, Fiji, Niue, Cook Islands, and East Timor. A scale bar at the bottom left of the map indicates 0, 500, 1000, 1500, and 2000 Kilometres. A caption below the map reads "Image: PCCSP Partner Countries (blue)".

What is Pacific Climate Futures?

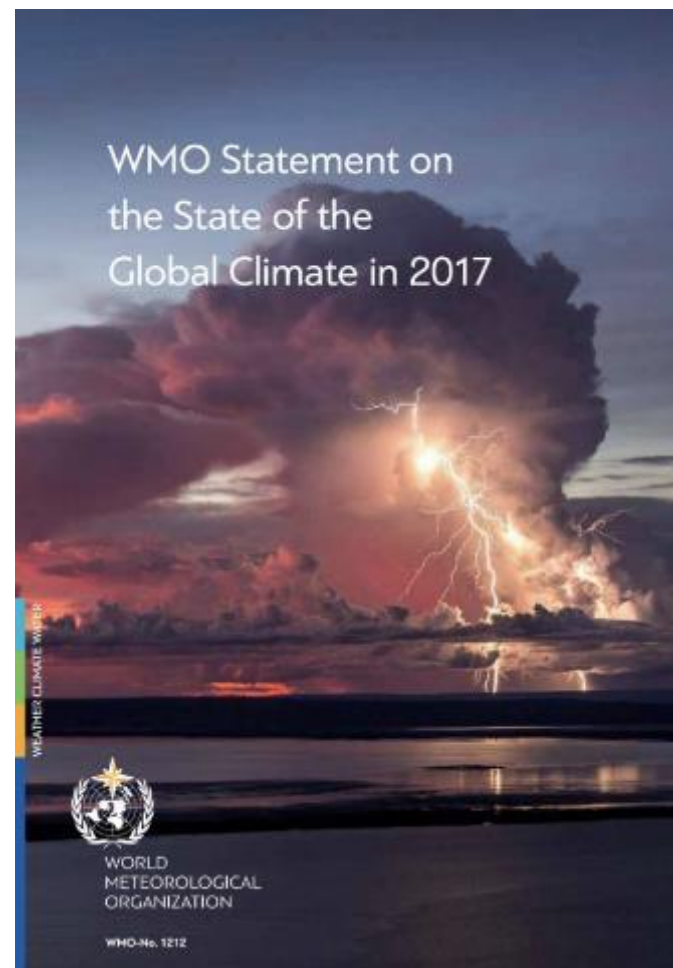
Pacific Climate Futures Version 2.0 is a free web-based climate impacts decision-support tool developed initially by the Pacific Climate Change Science Program (PCCSP) and further refined by the Pacific-Australia Climate Change Science and Adaptation Planning (PACCSAP) Science Program. It provides national and some sub-national climate projections for East Timor and 14 Pacific countries: Cook Islands (two sub-regions), Federated States of Micronesia (two sub-regions), Fiji, Kiribati (three sub-regions), Marshall Islands (two sub-regions), Nauru, Niue, Palau, Papua New Guinea (two sub-regions), Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu.

<https://www.pacificclimatefutures.net/en/>

Weather and climate indicators and indexes

Headline indicators

- Variables or parameters used to describe weather conditions and trends (*precipitation, temperature, sea surface T, GHGs, sea ice, glaciers, extremes*)
- Derived from physical and observational networks
- Deployed for global and aggregated analysis



Headline indicators will ensure consistency for the UNFCCC Global Stock-take (starting in 2023)

Weather and climate indicators and indexes

Indexes of extreme events

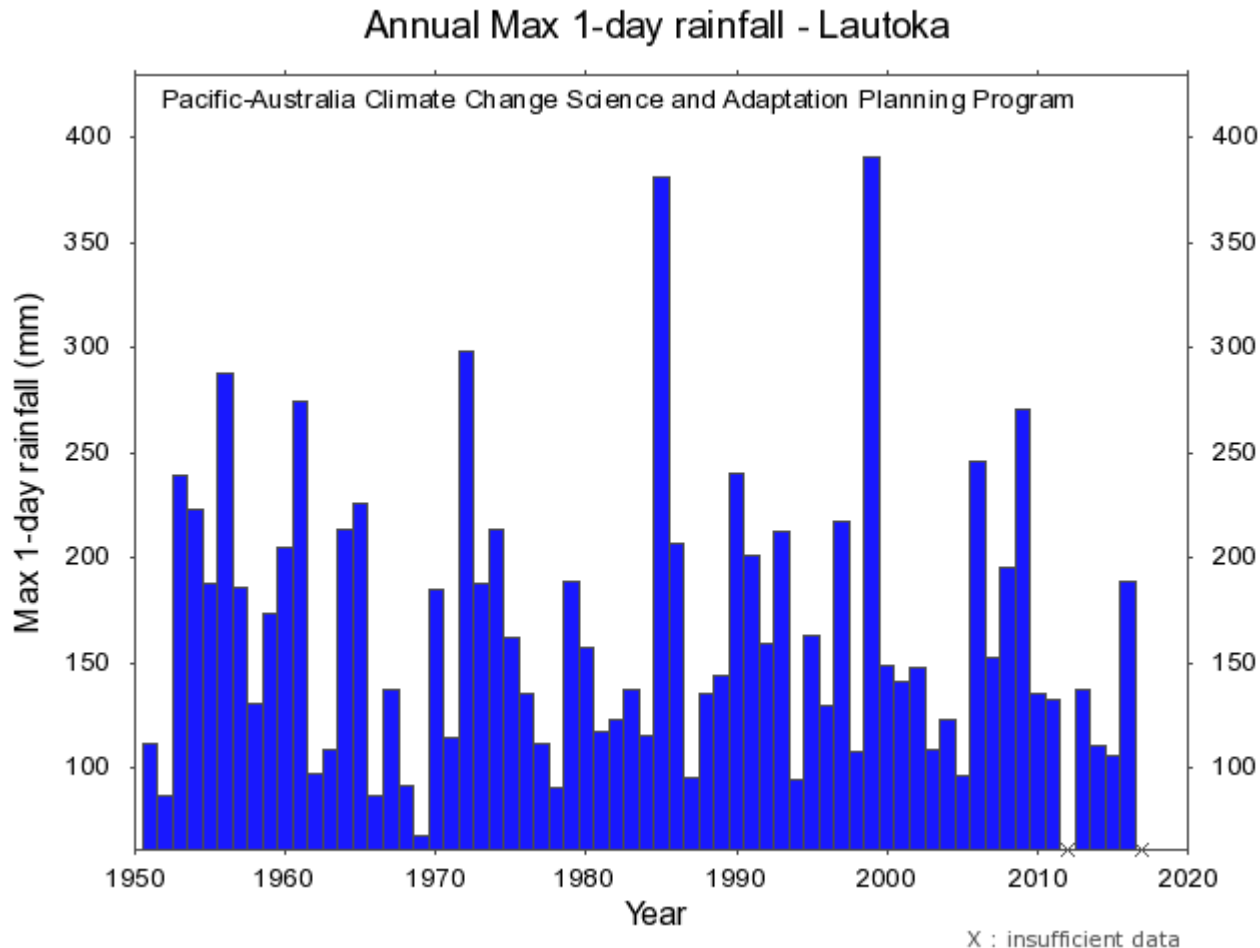
Many practical problems in policy planning require knowledge of the behavior of extreme values.

Indexes: computed numerical representations of weather extremes (N° of days exceeding thresholds and departing from a normal)

The WMO Expert Team on Climate Change Detection and Indexes developed [27 extremes indices](#)



Extremes indices – 1-day rainfall

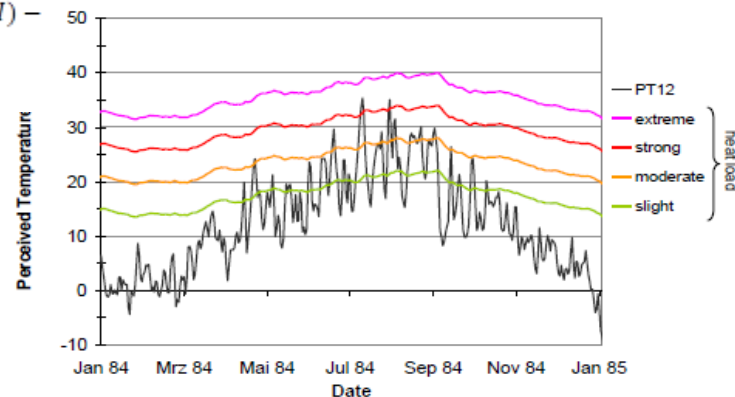


Sector specific indexes: health

- Heat-stress index combines meteorological variables (T and H), with heat-budget models describing the body's heat gains and losses

$$\text{Heat Index (HI)} = -42.379 + 2.04901523(T_f) + 10.14333127(RH) - 0.22475541(T_f)(RH) - (6.83783 \times 10^{-3})(T_f^2) - (5.481717 \times 10^{-2})RH^2 + (1.22874 \times 10^{-3})(T_f^2)RH + (8.5282 \times 10^{-4})(T_f)(RH^2) - (1.99 \times 10^{-6})(T_f^2)(RH^2)$$

- Health-warning systems: source of advice on how to avoid negative health outcomes
- Short-term measures: watch/warning messages
- Long-term measures: public education and urban planning and design



Example of the thresholds used in the German Heat-Health Warning System (WMO, 2015)



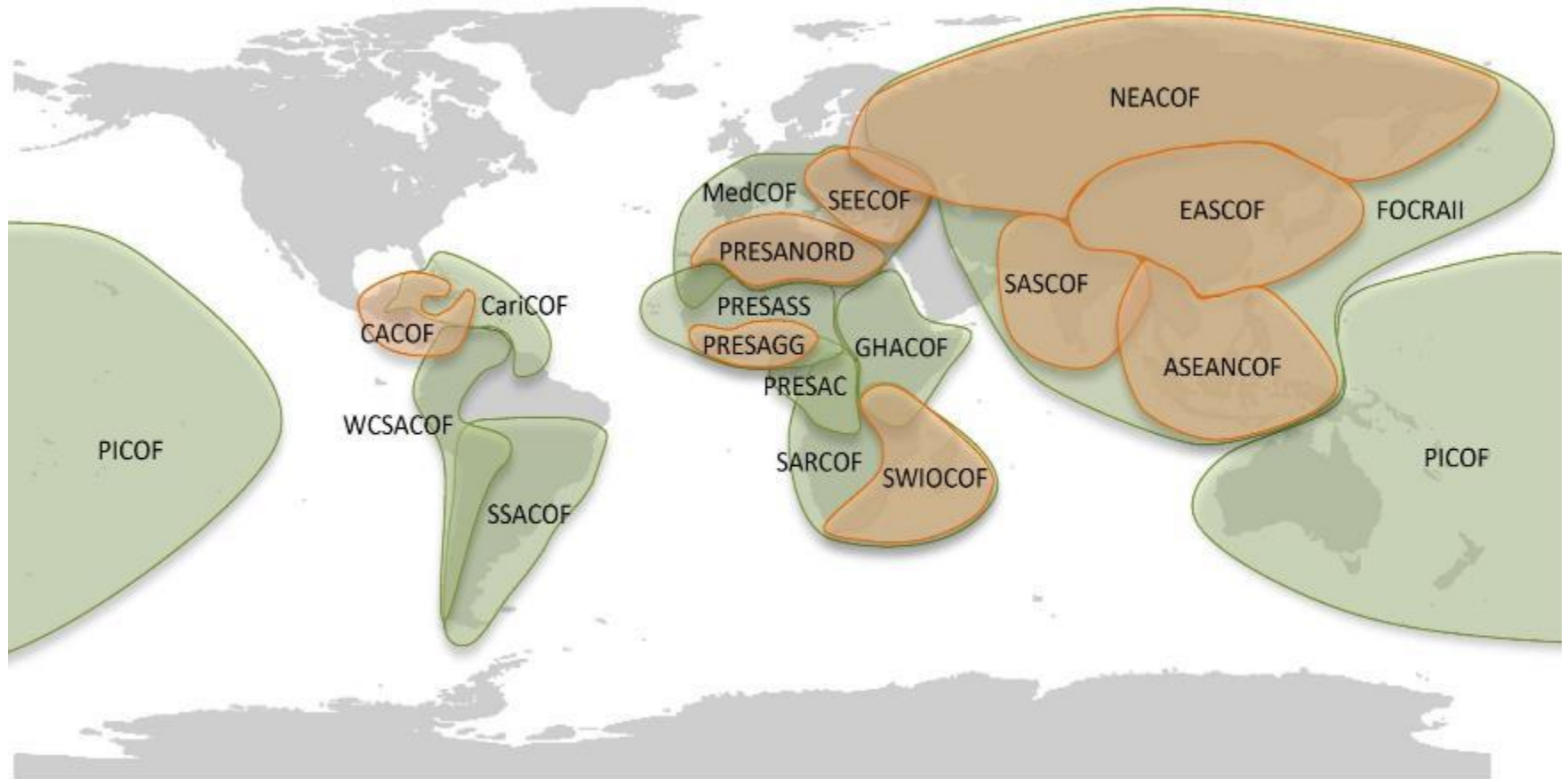
Example of the thresholds used in France – Meteo-Alarm (WMO, 2015)

Monitoring extreme events through indexes

- Quantitative assessment, risk identification and management sector impacts
- Cost-benefit analysis and climate-proofing
- Simplify complex relationships and provide useful communication tools
- Gain a uniform perspective on observed changes and support future projections of extremes

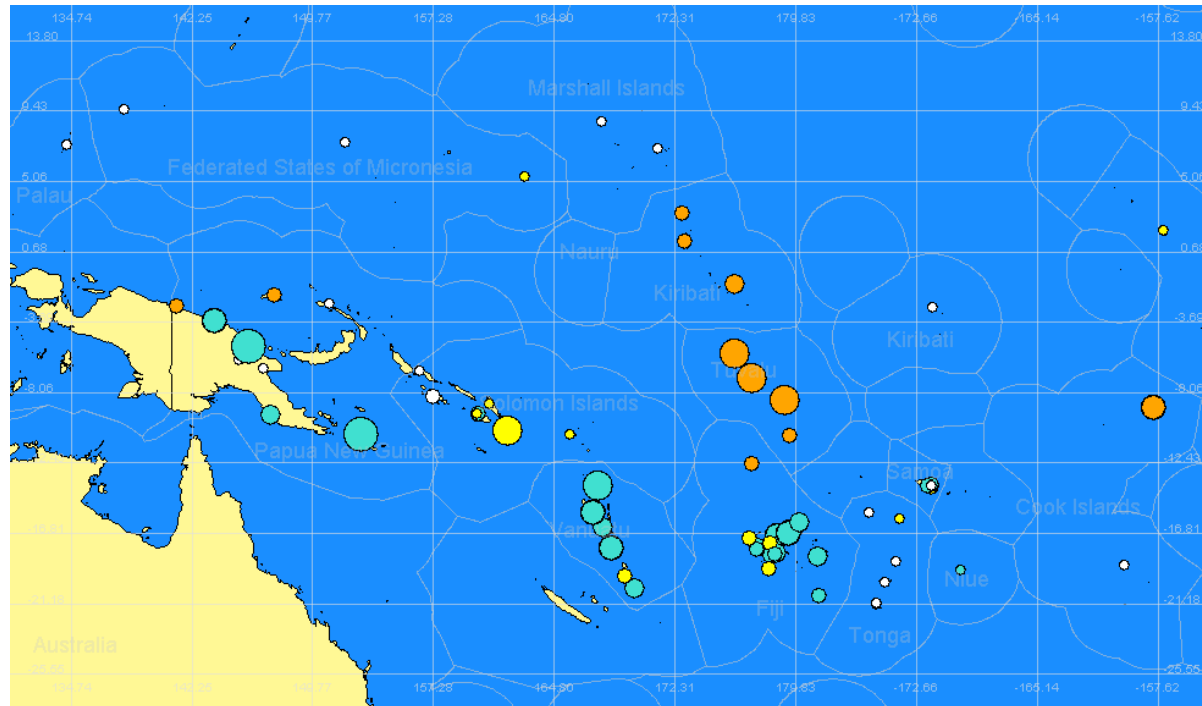


Regional climate outlook forums worldwide



<https://public.wmo.int/en/our-mandate/climate/regional-climate-outlook-products>

Example seasonal climate outlook product



Can do either dynamic or statistical outlook models

Most Pacific systems so far are statistical

Legend

- Bias towards below-normal rainfall
- Bias towards normal rainfall
- Bias towards above-normal rainfall
- No bias in forecast (Climatology)

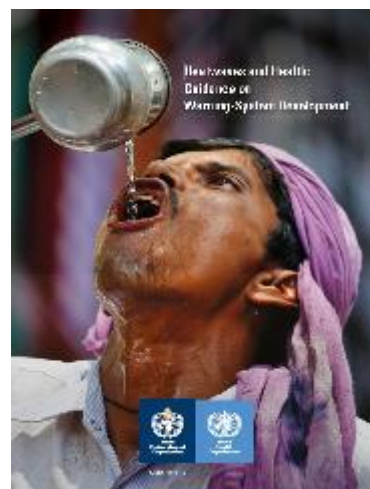
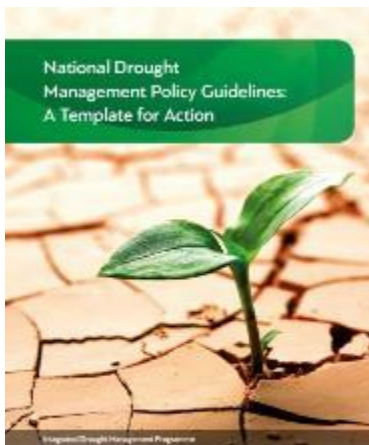
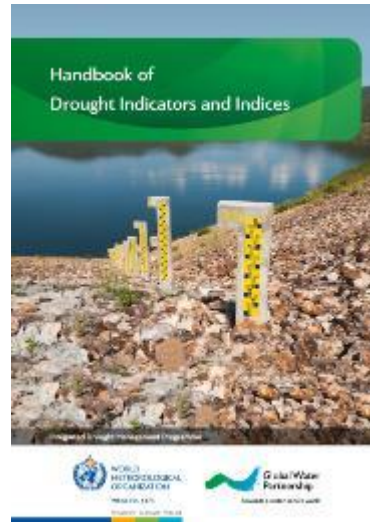
Larger "bubbles" represent higher forecast skill (based on LEPS scores)

Outlook for June to August 2018

(from Pacific Islands Climate Outlook Forum,

<https://www.pacificmet.net/products-and-services/online-climate-outlook-forum>)

Useful resources



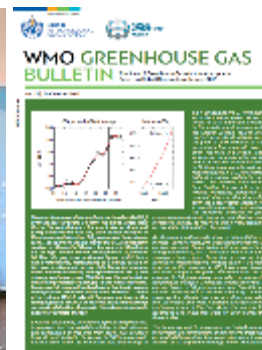
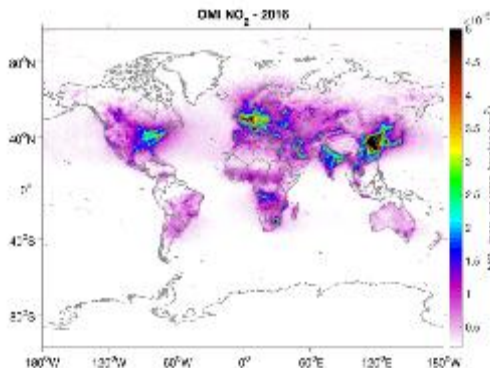
Climate Services Toolkit

- Guidance**
References to WMO guidance documents relevant to key pillars including Climate Services Information Systems
- Software Tools**
Links to selected software for development of climate services (e.g. grid, regional, and local levels)
- Help Desk**
Access to frequently asked questions and answers, climate services, web-technology, and CST feedback form
- Training Resources**
References to training courses on the WMO online professional competence for climate services development
- Climate Data**
Links to selected tools for climate data management, analysis, visualization, projections, and downscaling
- User Forum**
Access to online for CST users discussions, updates, and access to climate services topics of shared interests

<http://www.wmo.int/cst/>

WMO coming support to NAPs

- **New partnership agreements:** FAO (climate & agri services), UNFCCC (Status of the Global Climate Report & GHG Monitoring), private sector engagement
- **Early warning services** (seasonal & El Nino/La Nina bulletins) and **climate and disasters briefings** for UN agencies (Global Meteo-alarm)
 - Enhanced global greenhouse gas budget monitoring
 - Country databases/Pool of experts to support implementation
 - Guidelines on Quality Management, Capacity Building, Cataloguing of Extreme Events and Revision of Headline Indicators
- **Strengthening regional to national capacity development** and collaboration activities



Thank you

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public.wmo.int



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