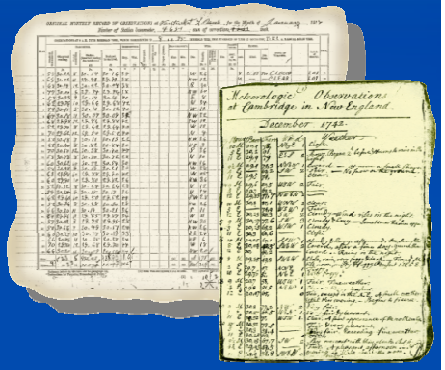
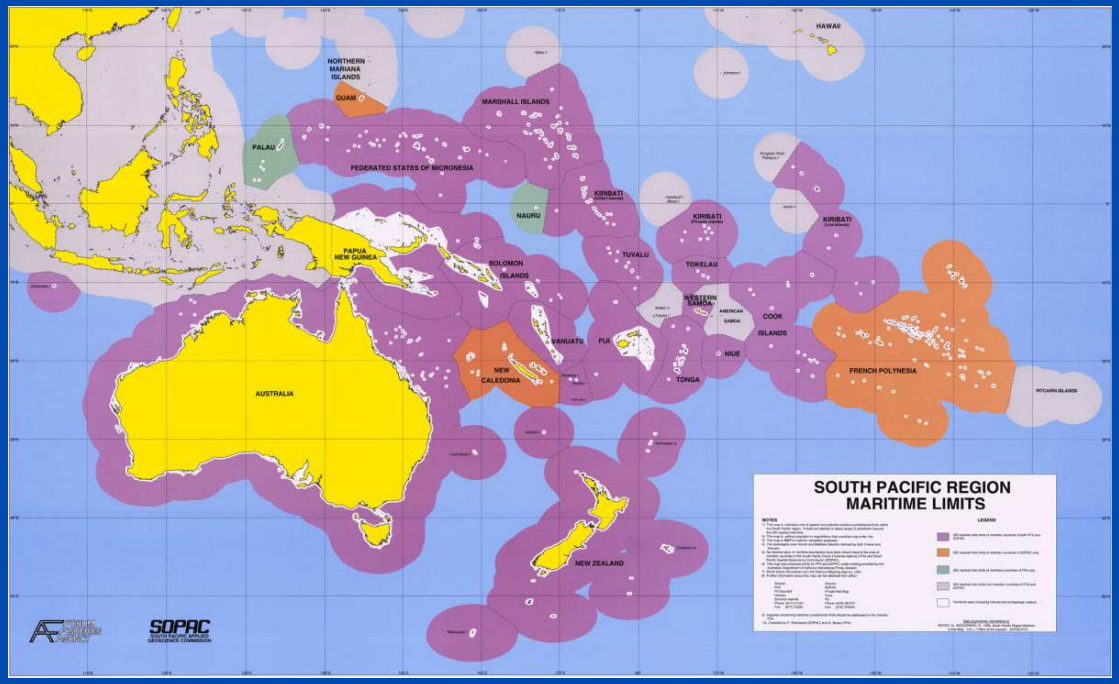
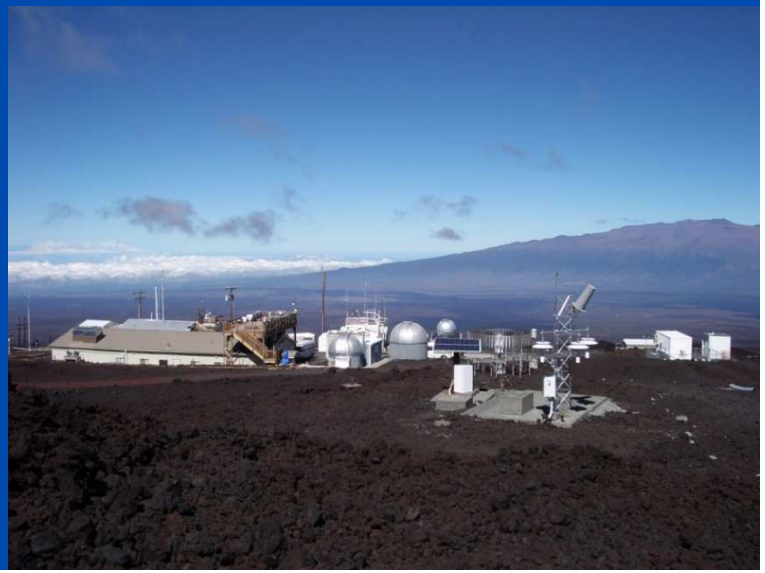
Climate Data Management – Challenges and Opportunities

Presented by Howard Diamond, NOAA/National Climatic Data Center
Director, World Data Center for Meteorology







RA-V Regional Seminar on Climate Services – Climate Data Management
Honiara, Solomon, Islands 1-4 November 2011

Agenda/Overview

- Challenges in Climate Data Management
- Data Quality Considerations
- Data Standards
- Processing and Quality Control
- Where are the Data?
- Considerations of Data Management
- Summary of Activities and Tools from WMO/CCl
- Why Contribute Data to Global Climate Efforts?
- Relationship to the Global Framework for Climate Services (GFCS)

Consider an island running low on drinking water during a drought

- If you were in charge of the island's long-term water planning, what would you do?

The answer depends on the climatic conditions

- Is this is a once in 200 years drought or a once in 20 years drought?
- What do the seasonal forecasts say?
- What measures can be taken to adapt to the risks?

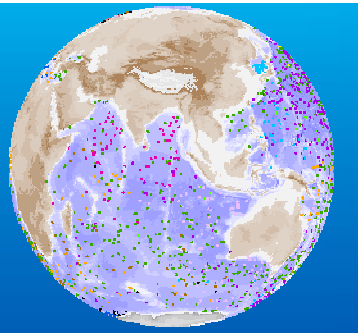
Challenges

- Increasing data volumes and diversity.
- Breadth of expertise needed to manage this variety cannot all exist in one place.
- Changing technology of instruments underscores the importance of preserving information about the measurement methods.
- Many agencies and individuals are involved in data collection. Knowing them all is hard.
- There is increasing importance of real-time data access.

What is Climate Data Management?

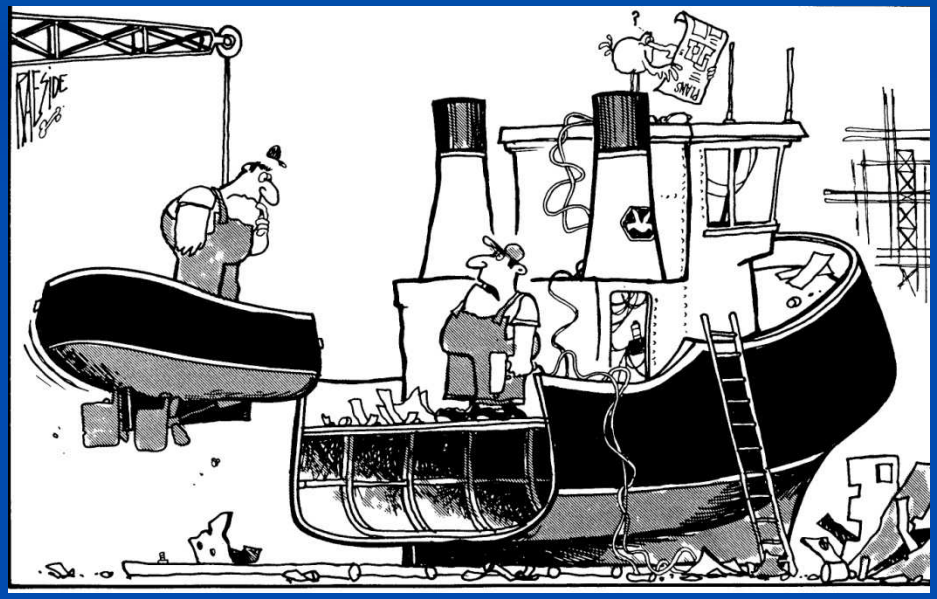
- What data is available?
- Where is it?
- What is the quality of data?
- Who owns the data?
- How do I use the data?

Data Quality Considerations



- Are the data continuous?
- Is there good metadata to document the data?
- Paper versus Digital
- Physical Security (e.g., back-ups, on-site, off-site; paper)
- Have the data been quality controlled – there is obviously a big difference between 100.0 mm of rain and 1000 mm of rain – so are they reasonable?

Data Standards



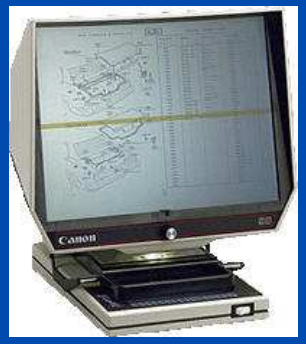
Was that feet or meters?

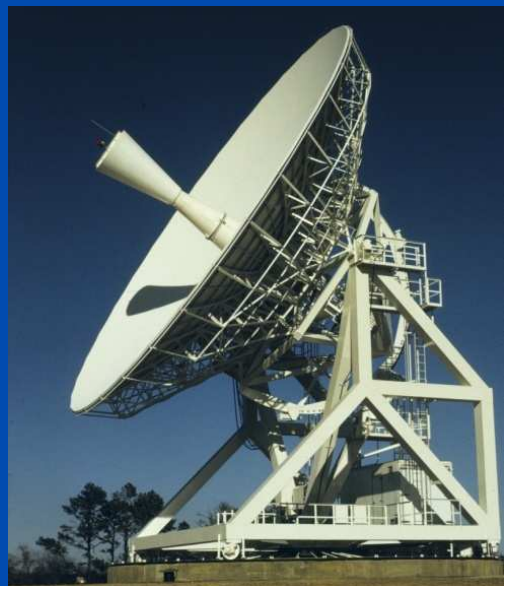
There are many areas where standards will improve interoperability.

- Vocabularies (e.g. variables, taxa, instrument names).
- Discovery metadata.
- Processing (e.g. quality control, browse features).
- Metadata content (e.g. provenance, instrumentation, methods).
- Example is the Z39.50 data interchange standard used by the WMO Information System (WIS)

Processing and QC

- A variable is measured by a variety of instrumentation, with differing precision, accuracy and methods.
- The variable should undergo common QC, with testing influenced by consideration of how the variable was measured.
- QC by experts should augment that done by data centres.
- There needs to be standards for indicating reliability of the measured value for intercomparability of observations.
- Original values must be preserved regardless of whether any changes are made.
- Clear and easily found documentation (e.g., metadata) of the is critical.

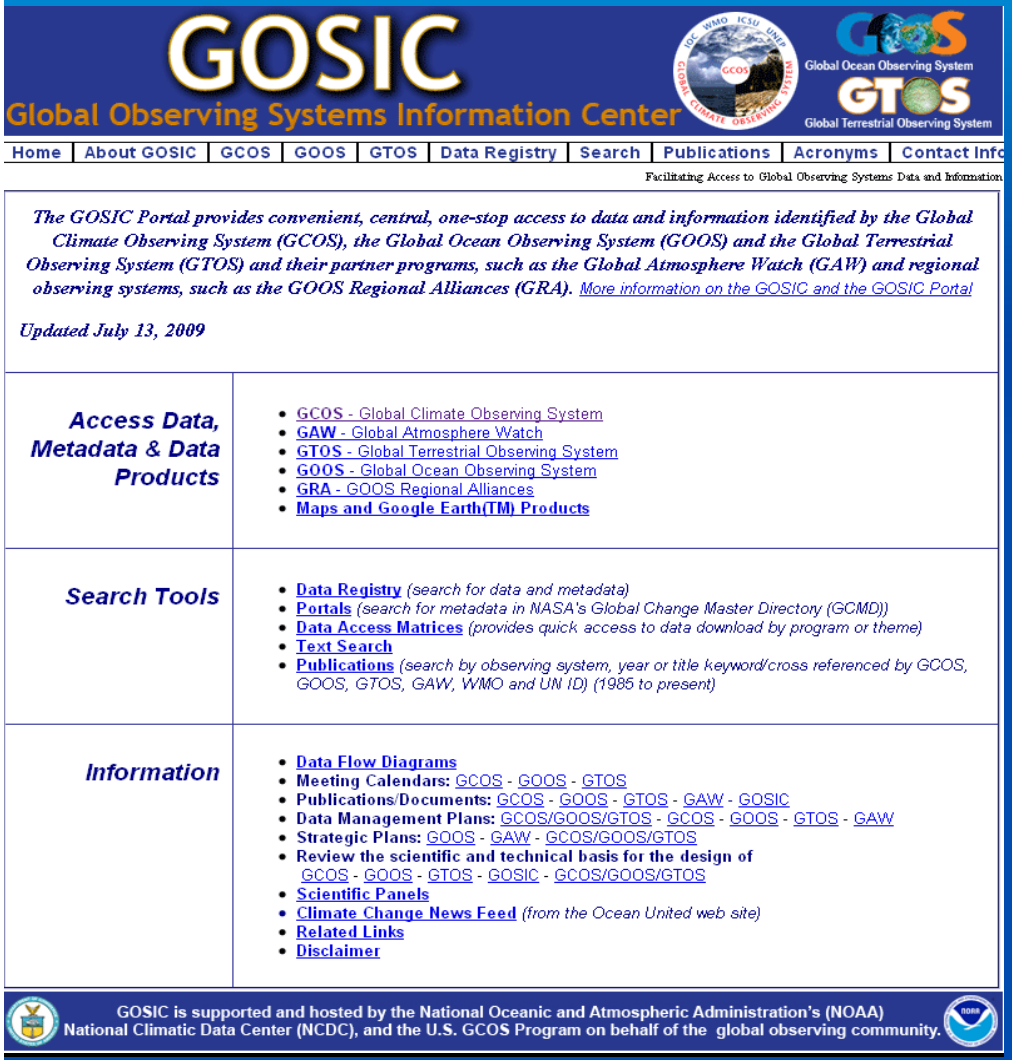




Where are the data?

- National Meteorological Services
- Regional Centers (e.g., NIWA, BoM, IPRC)
- World Data Centers (e.g., NCDC, Hadley Center)
- Universities and international research institutions
- Hard copy archives
- Digital storage on PCs
- Data Portals (e.g., WIS, GOSIC, GEO Portal, etc.)
- PCs/file cabinets/etc…
- Resolution 40 – Can I get to the data?

Global Observing Systems Information Center



Provides more information on GCOS – data, documentation, etc.

URL: http://gosic.org

Data Access – serves as a node of the WMO Information System (WIS)

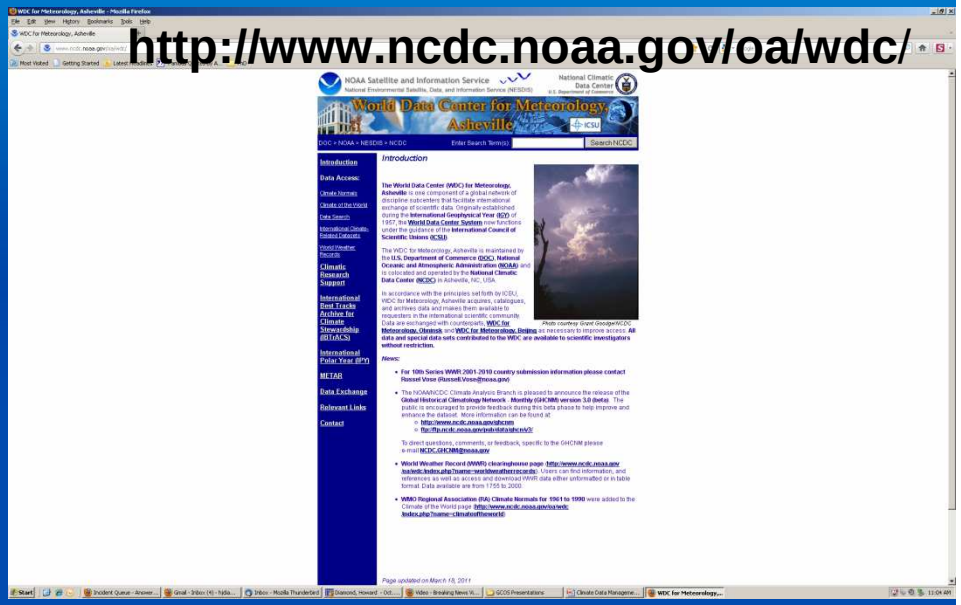
Information about Atmospheric, Oceanic, and Terrestrial Observing Systems

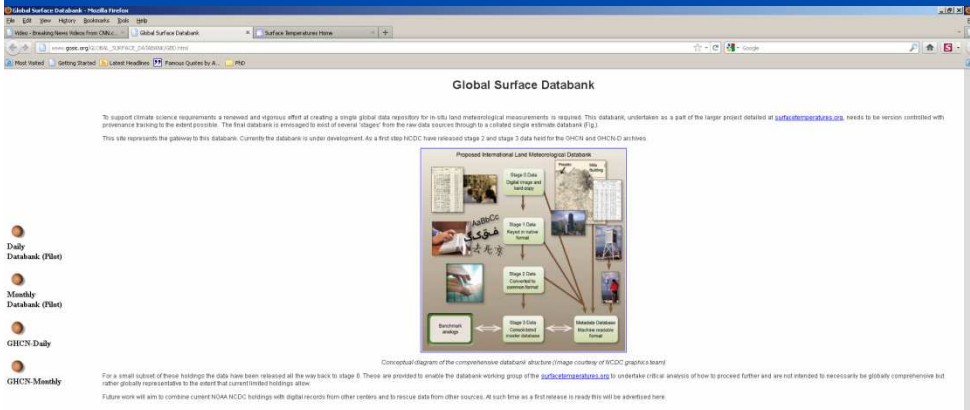
Goal: Easy access to data across multiple data centers

Why Contribute Data to Global Climate Efforts?

- Everyone benefits and all contributions are valued
- Improves inputs to models
- Contributes to key studies - IPCC
- Berkeley Earth Surface Temperature project – Data are key to countering claims that the Earth is not warming
- More complete databases of QC'd global climate data benefits climate services world-wide – intent of the GFCS – and something all of society will benefit from

http://www.ncdc.noaa.gov/oa/wdc/





http://www.gosic.org/GLOBAL_SURFACE_DATABANK/GBD.html

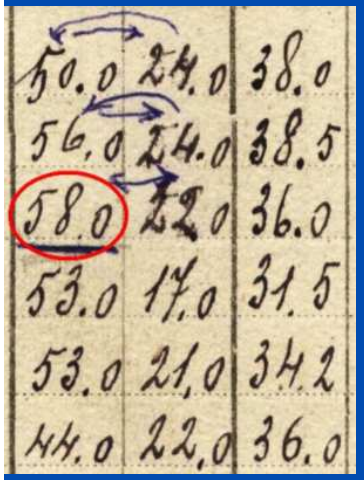
http://www.surfacetemperatures.org/

Some Considerations of Data Management

- Historical Data
- Assessments and Monitoring
- Climate Predictions
- Adapting to Climate Risks

Historical data

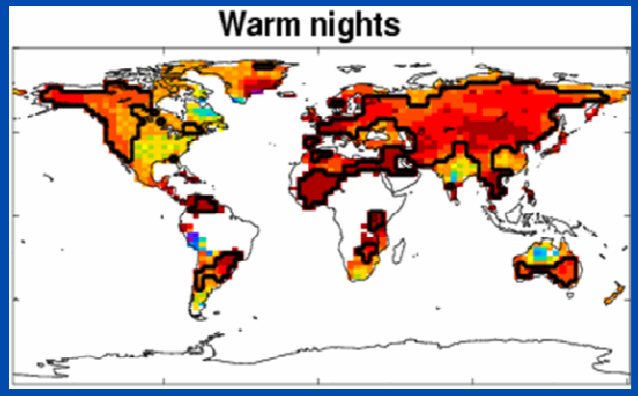
- Are the original observations on paper forms rescued and digitized?
- Are the data managed in such a way that you can get easy access to them?
  - These are the domain of CCl Panel I: Climate Data Management

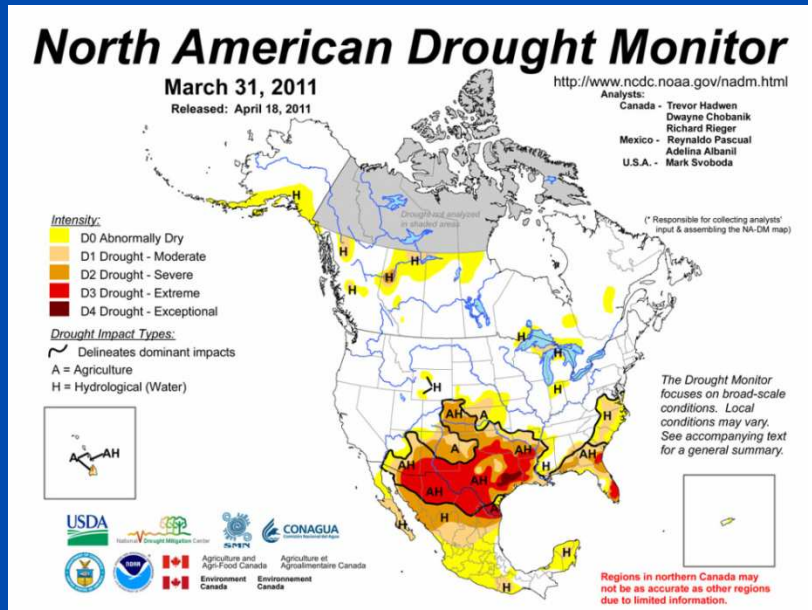


Original records of the highest temperature ever recorded by a meteorological station. Courtesy of Khalid Ibrahim El Fadli, Libyan National Meteorological Center. Max, Min and 9 am temperatures

Assessing and monitoring

- Can you easily put the current drought into accurate historical context?
- Are you actively monitoring climatic developments in real time?

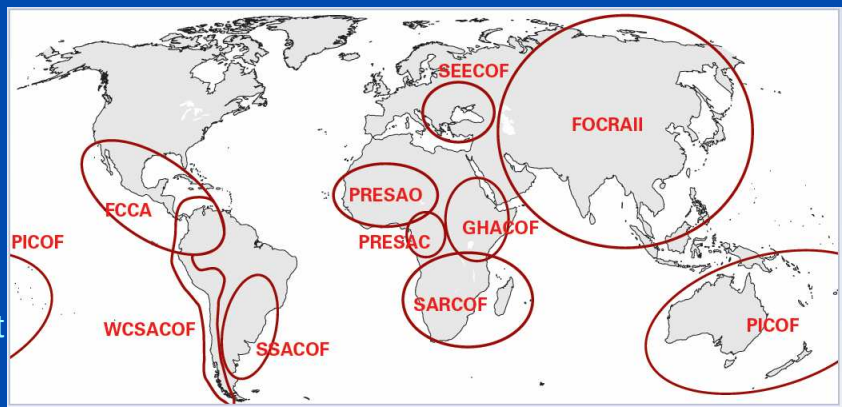




Climate predictions

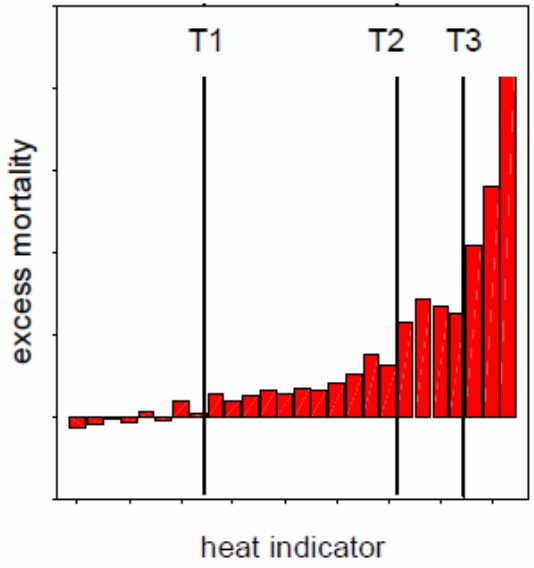
- Do seasonal forecasts predict lessening or worsening of the drought?
- Can you quickly get access to the most reliable forecast products and disseminate them to your key stakeholders?

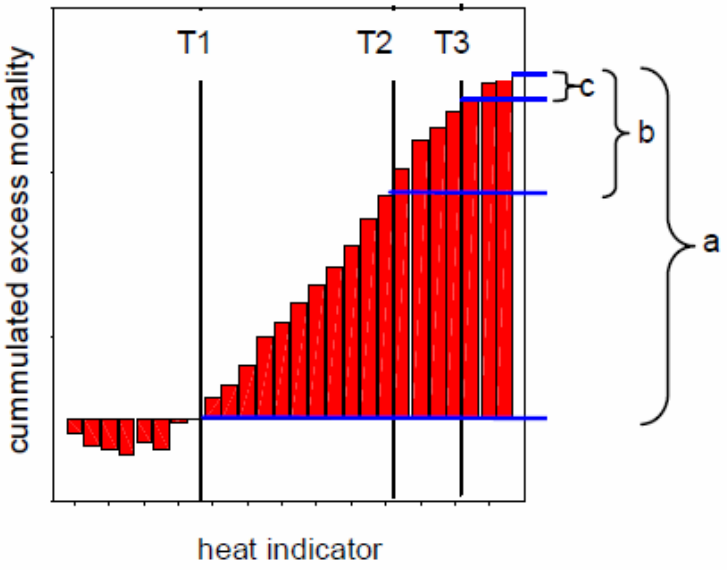
Regional Climate Outlook Fora



Adapting to climate risks

- Can you assess the risk of the drought continuing?
- Can you adapt and plan for the relevant risks?
  - These are the domain of Panel IV: Climate Information for Adaptation and Risk Management





Relationship between temperature and excess mortality. Warning systems can prevent mortality above certain thresholds.

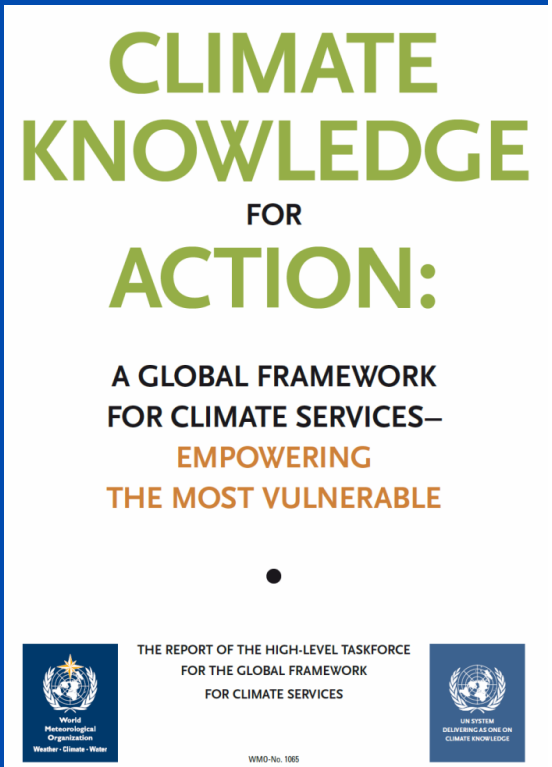
Summary of CCl Activities Supporting Data Management

- Development of a data rescue portal
- Climate Database Modernization Systems – improved functionality
- Guiding the development of normals and making them more useful
- Shepherding World Weather Records [http://www.ncdc.noaa.gov/oa/wdc/]
- Indices of extremes from daily data and defining extreme events
- Official source of world weather and climate events [http://wmo.asu.edu/]
- Guiding evolution of Climate Information & Predictions Services (CLIPS)
- Foster, coordinate and guide Regional Climate Centers
- Preparing a document defining Climate Risk Management
- Developing socio-economic sector-specific climate indices (CAgM & CHy)
- Support data access via the WIS

WMO/CCl has a Facebook page to help facilitate the exchange of information – see http://www.facebook.com/pages/WMO-Commission-for-Climatology/250818188276296

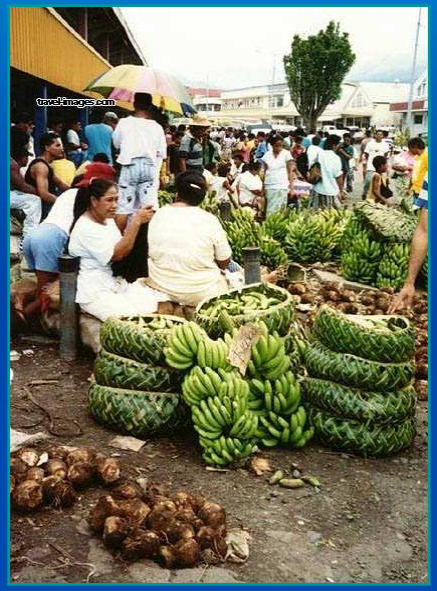
Global Framework for Climate Services

- The GFCS is a critical global climate effort
- Good Climate Data Management practices will help us get to the kind of reliable, consistent, and high-quality climate data required for efforts like GFCS to succeed

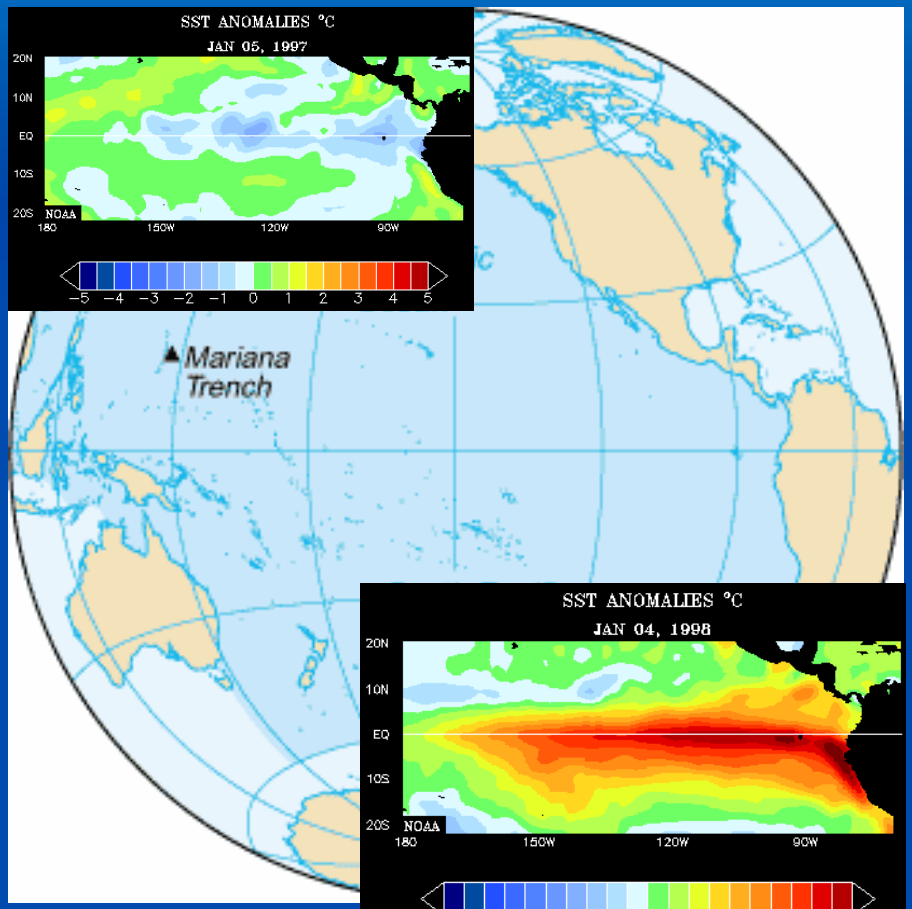


Goal: To fulfill societal needs and development through a well resourced Pacific Climate System (including Data Mgmt)

Natural Resources & Environment



Agriculture



Cultural

Village Communities

Water

Thank you! Any Questions?

My sincere thanks to Tom Peterson, President of WMO/CCl, for providing inputs and advice regarding this presentation

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