CEOP 2009 Meeting: Extremes

15 minutes - Extremes

Background and Objectives
Update on activities
Processes, extremes over the Canadian Prairies
Conclusions

BIG ISSUE

August 11, 2009 ..

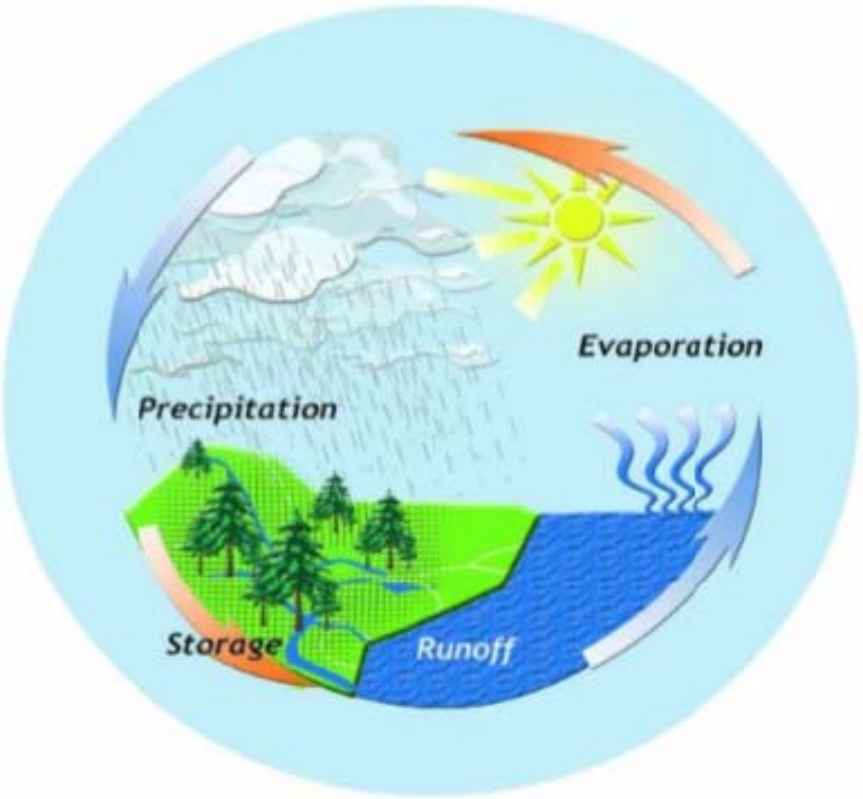
UN Secretary General Ban Ki-moon

... "If we fail to act, climate change will intensify droughts, floods and other natural disasters ... Water shortages will affect hundreds of millions of people ..."

EXTREMES CROSS-CUT

Objectives …

- **To better document, understand and simulate the occurrence, evolution, structure and role of hydrometeorological extremes within the climate system**
- **To contribute to their bette. prediction at various time scales and to addressing societal concerns**



Global Energy and Water cycle Experiment

FOCUS

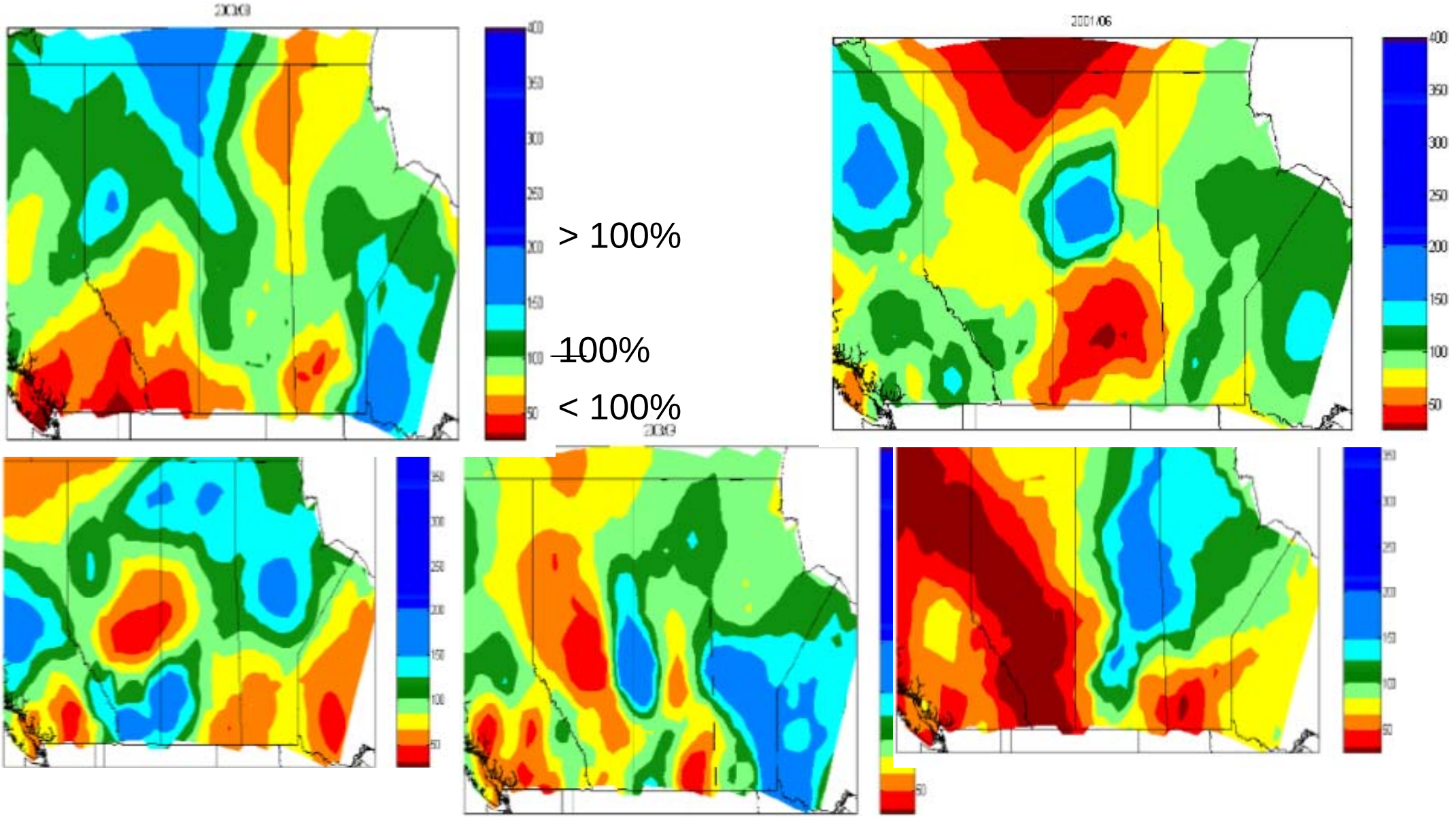
- **Extremes of Interest**

Drought
Heavy precipitation
Floods
Low Flows
…

- **And, in some instances**

Inter-meshing of these extremes

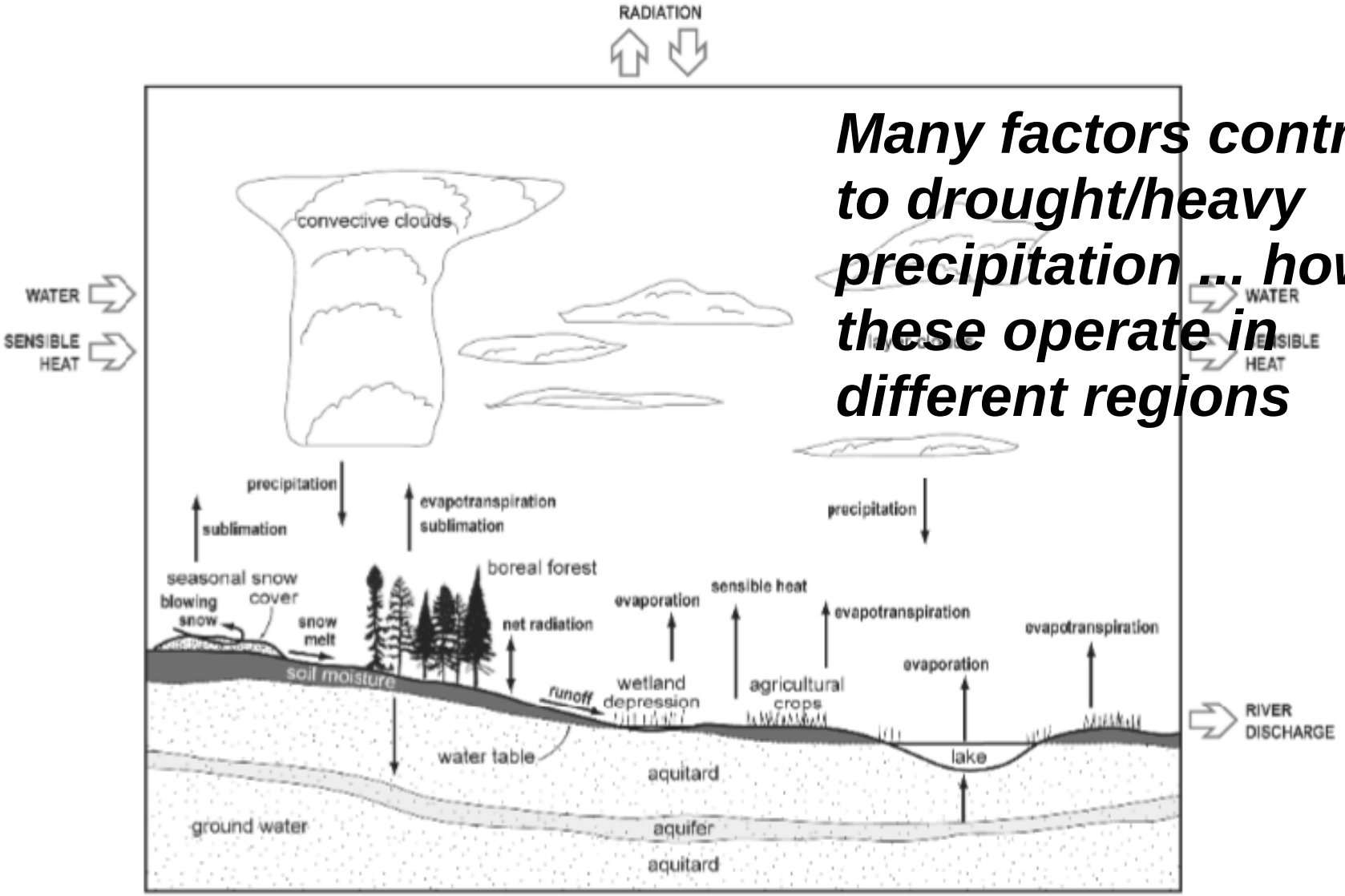
MONTHLY-SCALE PRECIPITATION GRADIENTS During 1999-2005 Drought



SUB-ISSUES

- **How we define extremes?**
- **What datasets are available to assess the presence and characteristics of extremes?**
- **How do extremes develop, evolve and end within the climate system?**
- **What is the role of these extremes within the climate system?**
- **Have extremes changed in occurrence and character and why or why not?**
- **How can this progress be used to improve predictions and to better assess extremes in a changing climate?**
- **How can we contribute to ensuring that society can best cope with extremes?**

WATER AND ENERGY CYCLING



Many factors contribute to drought/heavy precipitation … how do these operate in different regions

A BIG ISSUE

How to move forward?

Extremes workshop (May 2008) ... many ideas

CEOP meeting (Sept 2008) .. smaller list

SPECIFIC ACTIONS - 1

Ongoing …

- Update the Extremes related activities underway within the various components of CEOP

Many elements of CEOP ...

HyMEX (HYdrological cycle in the Mediterranean Experiment) - aims at a better quantification and understanding of the hydrological cycle and related processes in the Mediterranean, with emphases put on high-impact weather events and regional impacts of global change

MDB (Murray Darling Basin) - Observe, understand and model the dynamics of the coupled water, energy and carbon cycles of the Murray Darling Basin, a developed, semi-arid zone Basin

La Plata Basin (LPB) What climatological and hydrological factors determine the frequency of occurrence and spatial extent of floods and droughts? How predictable is the regional weather and climate variability and its impact on hydrological, agricultural and social systems of the basin?

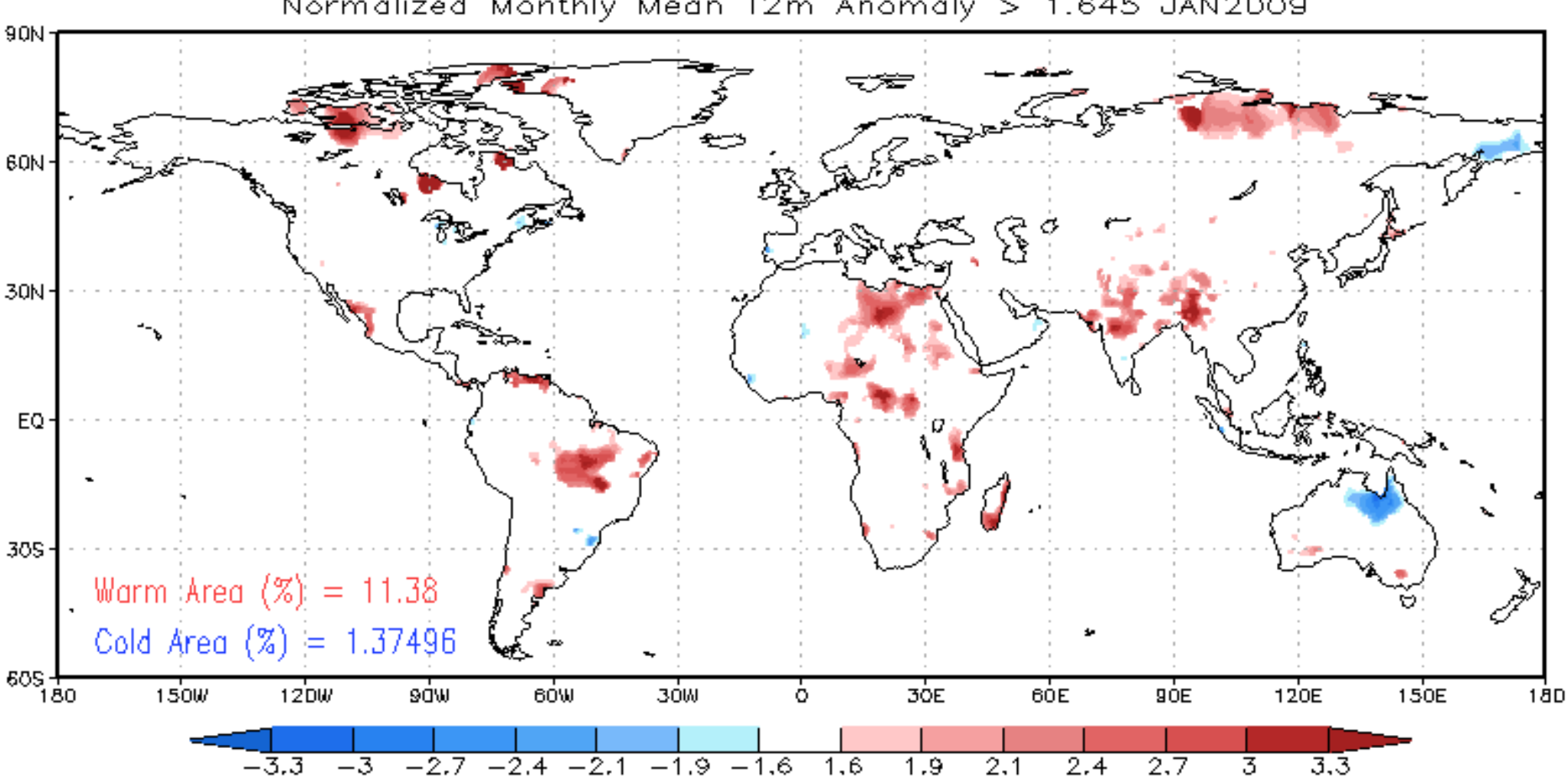
...

..

SPECIFIC ACTIONS - 2

Other specific steps currently underway include:

- Assess current definitions of extremes and determine if further ones are needed
- Assess existing extreme event catalogues (heat waves, floods, droughts on a global basis from 1948 to present) and as appropriate incorporate this into the Extremes information base.
- Produce a high resolution dataset on global precipitation
- Pull together at least one comprehensive, continental-scale dataset on multi-year drought
- Assess whether re-analyses are capable of detecting and determining the trend of extremes over the last 30 years
- Provide a recipe book for others to follow in terms of conducting comprehensive drought studies
- Assess whether a review article on extremes is warranted.



1-month temperature anomalies

Precipitation, temperature, soil moisture available.

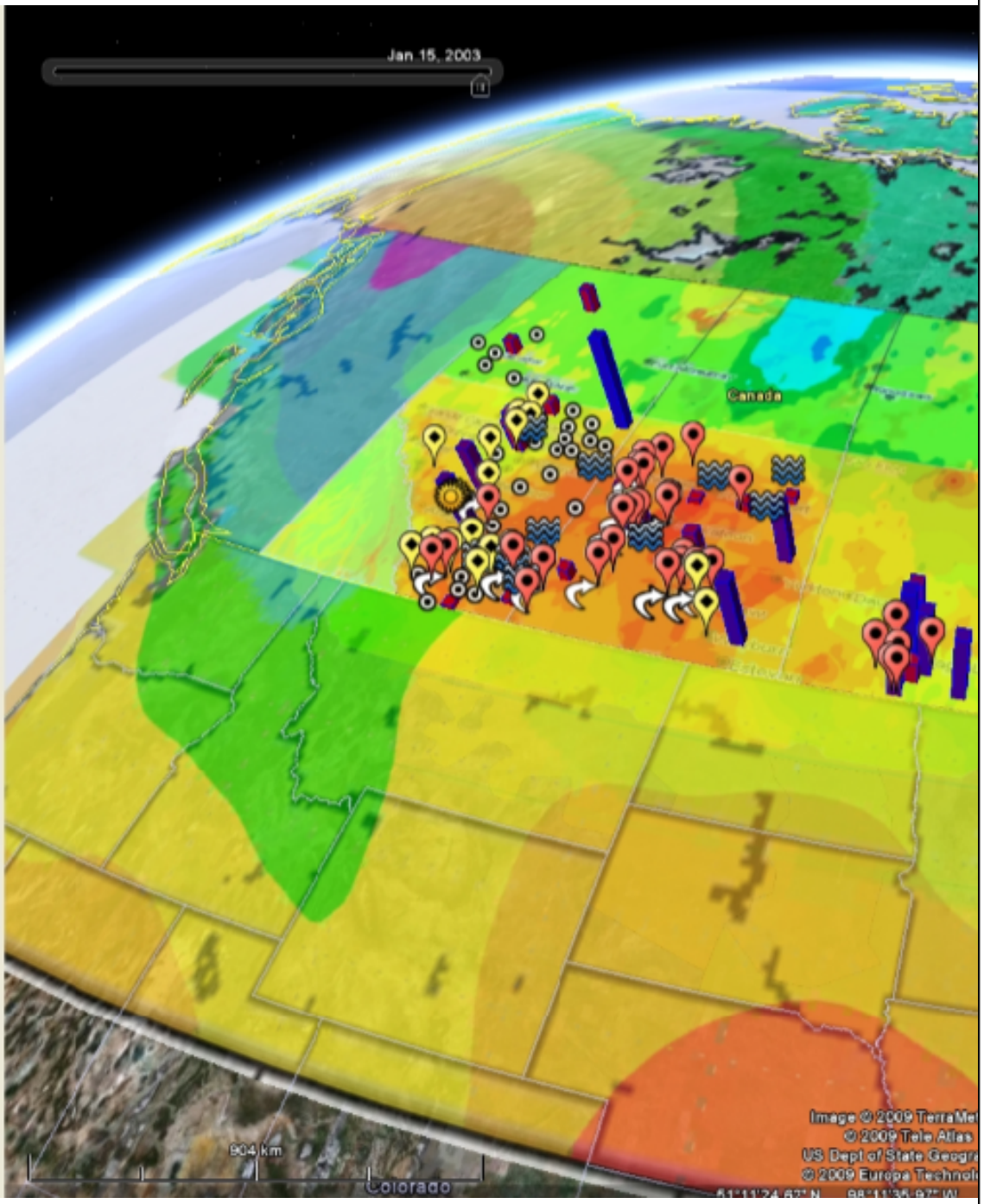
Climate Prediction Center analyses. Period: 1948 –

Huug Van den Dool, NOAA

GLOBAL DATASET

One example:

- For drought
- Chris Kummerow is interested in using GPCP information
- Use a subset of data (1996-2009) that has higher space and time resolution than the nominal 2.5 degree, 30 day product.
- Issue - how best to do this



Selection of Data used in DRI

- GRACE Satellite Data
- Observational Groundwater
- Observational Meteorological Stations
- Gridded Temperature and Precipitation
- Hydrometric Stations
- In-situ Soil Moisture
- Dust Strom Occurrence
- Eddy Correlation
- Reanalyses Products
- Satellite Derived Cloud Data
- Spring Pond Counts
- Modelled Soil Moisture
- Modelled Evapotranspiration
- Modelled Plant Available Water
- Modelled Spring Freshet, SWE, SCA….
- Snowcover Area
- Historical seasonal/monthly forecasts
- and much more……..

COLLECTIVE ARTICLE(S)

Paper 1:

Given the importance of the issue and the gap in comprehensive studies, this study represents one step forward. In particular, its objectives are:

- To articulate the scientific motivation that underpins the multi-regional approach towards addressing extremes within CEOP.
- To provide some results on simulation and other capabilities
- To identify scientific gaps and research requirements

Through this study, there will be a demonstrated scientific basis for addressing extremes in a coordinated manner.

Paper 2? ... collective progress, model capabilities, implications

SPECIFIC ACTIONS - 3

- Assess the capabilities of remote sensing techniques for monitoring extremes
- Assess to what extent the same mechanisms are responsible for 'ordinary' precipitation as opposed to 'extreme' precipitation
- Agree on the complete dataset needed to characterize extremes
- Include data set developers (for GPCC and GPCP, for example) in trend and related studies since they are familiar with the data issues such as inhomogeneities
- Assess the need for data rescue efforts for vulnerable data records in many countries
- Assess weaknesses in simulations and predictions of extremes
- Undertake comparative analyses of extremes in reanalysis data and long-term forecasts and actual extremes inferred from data as a way to find where large differences exist.
- Assess the feasibility of using high-resolution models for downscaling during extremes

CONCLUSIONS

Critical issue

Lots of individual activities on extremes within CEOP

A few collective activities underway

Moving ahead

this/next week .. meet and clarify (updates, actions, ...).