

Transferability Studies With The CLM

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- Transferability project „ICTS“
- Results
 - Daily Cycle
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- Summary and Outlook

What is ICTS ?

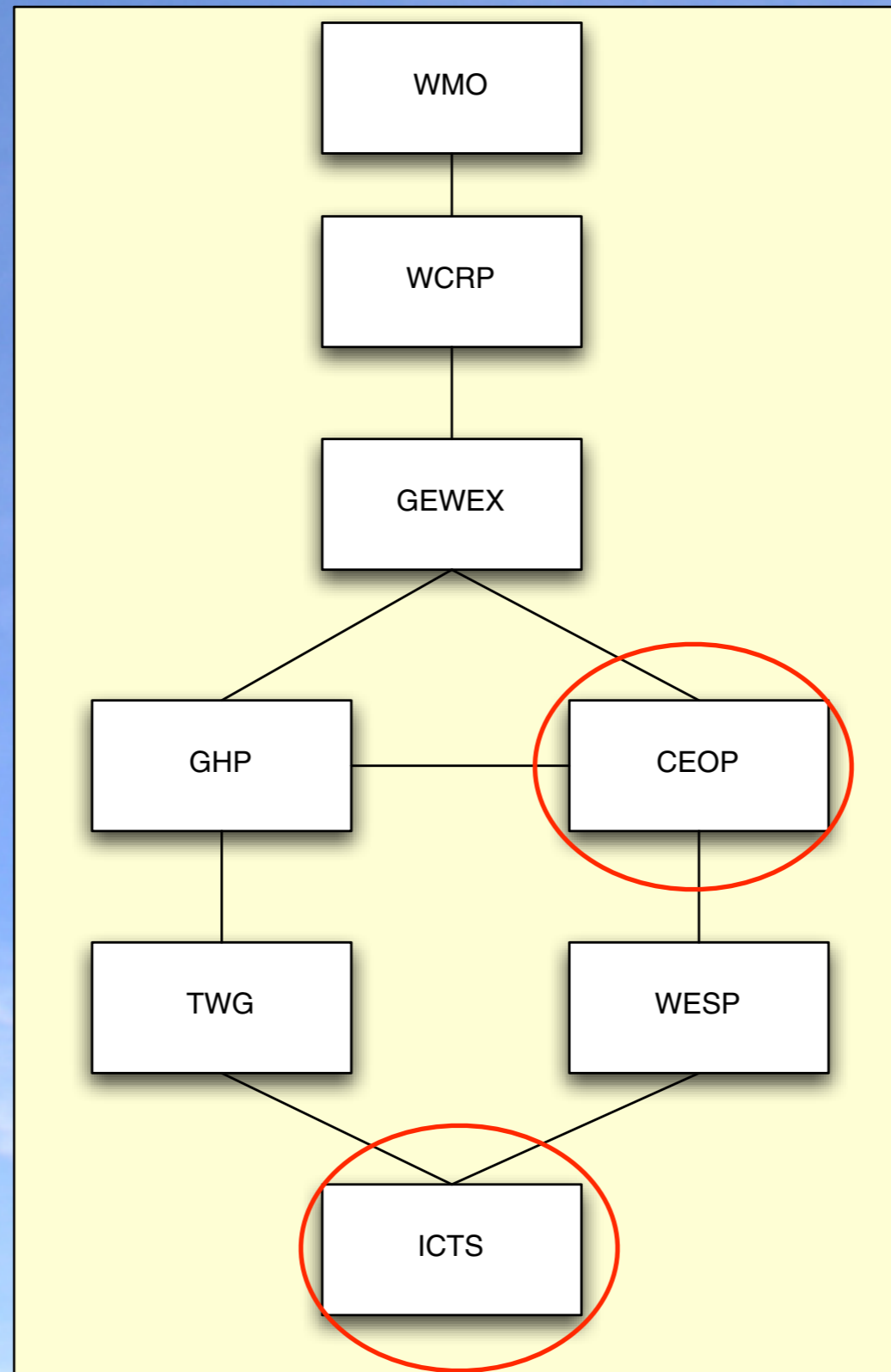
- **Inter Continental Scale Experiment Transferability Study**
 - Simulation with Regional Climate Models (RCMs) in different regions over globe
- **Objectives**
 - Study the **transferability of regional climate models** to areas of different CSE's (i.e. to **different climate regimes**)
 - **Apply CEOP** (Satellite, Reference sites, global analysis and model data) and other available observational **data sets** to validate the energy and water cycle in regional climate models
 - Assess the influence of different driving GCMs



Regional Models Participating

- **CLM** (Climate version of the “Lokalmodel “) / GKSS, Europe
- **RSM** (Regional Spectral Model) / ECPC, N-America
- **RegCM3** (Regional Climate Model) / ISU, N-America / Europe
- **MM5** (Mesoscale-Model) / ISU, N-America
- **GEM-LAM** (Global Environmental Multiscale Limited Area Model) / RPN/MSC and UQ, N-America
- **CRCM** (Canadian Regional Climate Model) / OURANOS, N-America
- **RCA3** (Rossby Centre Atmosphere version 3) / SMHI, Europe
- **C-CAM** (Conformal Cubic Atmospheric Model) / CSIRO, Australia

ICTS in the GEWEX Zoo



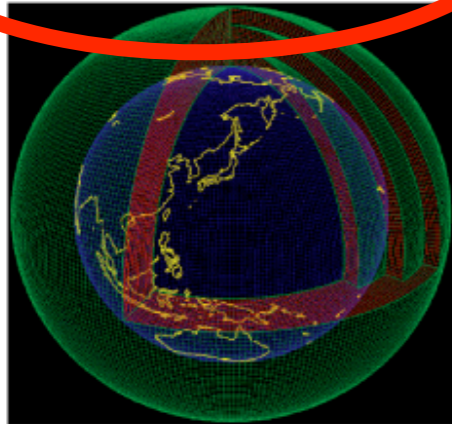
Coordinated Enhanced
Observation Project

Inter Continental Scale
Experiment Transferability
Study

CEOP Data Archives



Model Outputs by Numerical Weather Prediction Centers



Surface Observational (*in-situ*) Data from the 33 CEOP Reference Sites



Satellite Remote Sensing Data

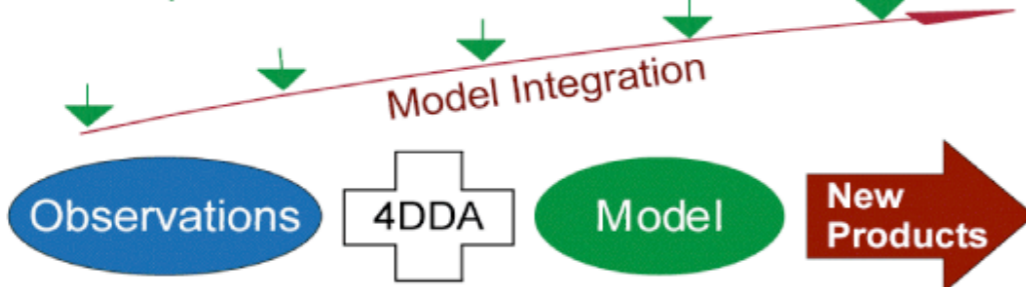


In-Situ Data Archiving Center at UCAR
(Center at University Corporation for Atmospheric Research) of USA
<http://www.ucar.edu/>

MODEL Output Data Archiving Center at Max-Planck Institute of Germany
<http://www.mpg.de/>

Data Integrating/Archiving Center at University of Tokyo and NASDA of Japan
<http://monsoon.t.u-tokyo.ac.jp/ceop/>

Input of Observed Data into Model



Global Land Data Assimilation System at NASA Goddard Space Flight Center of USA
<http://ldas.gsfc.nasa.gov/>



Data Archive Center

CEOP Phase 1 Time Schedule

Year of Activity: 00 01 02 03 04 05 06 07

Planning

Data Collection

EOPs:

EOP-1 (Seasonal OP) → (1 July - 30 Sept 2001)

EOP-2 (Build-up OP) → (1 Oct 2001 - 30 Sept 2002)

EOP-3 (Annual Cycle OP) → (1 Oct 2002 - 30 Sept 2003)

EOP-4 (Water & Energy OP) → (1 Oct 2003 - 31 Dec 2004)

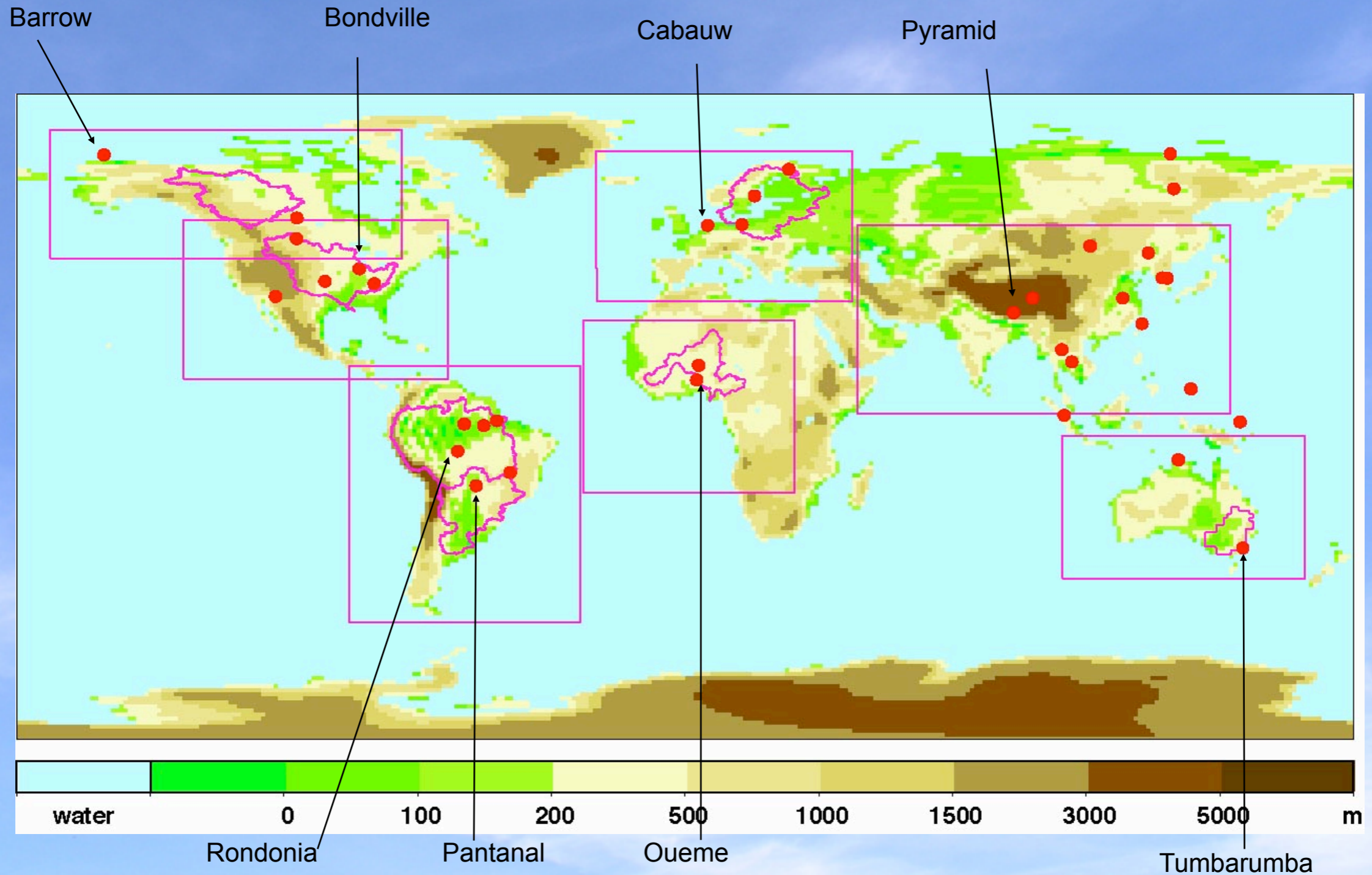
Primary Focus 2 Annual Cycle Data Set (2003 – 2004)

ICTS

ICTS RCM simulation period
5 years climate simulation

Model Simulation Areas & RefSites

(grid mesh 50 km sims)



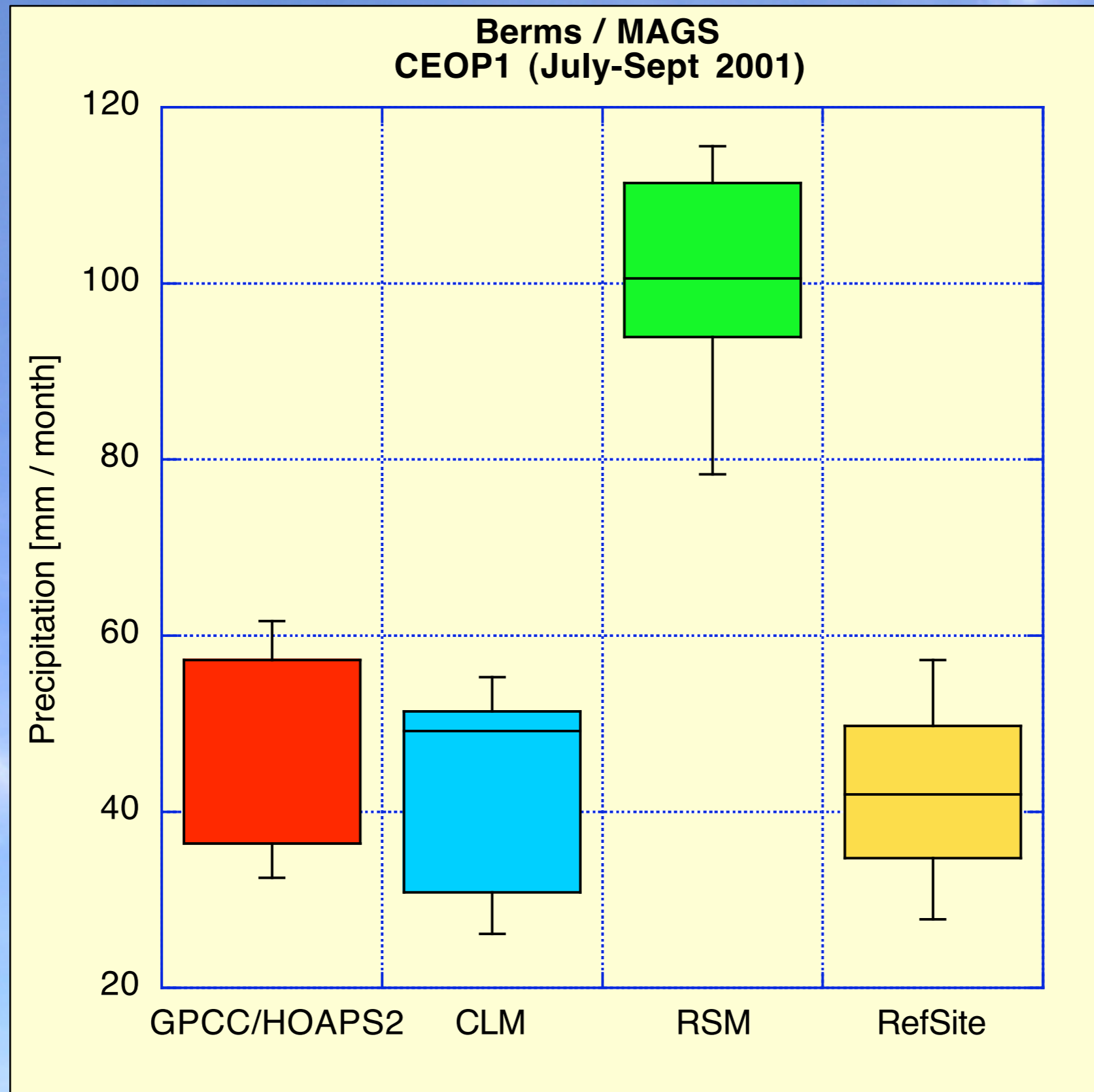


CLM Model Setup

- CLM 2.4.5 (based on LM 3.1)
- 0.5 Degree horizontal resolution / 32 vertical layers
- Spectral nudging
- Kain-Fritsch (latest version)
- Boundary conditions: NCEP-2 Re-Analysis
- Consistent set-up for all regions
- 5 years **continues** simulation !!

Observation vs. Model MOLTS

MOLTS = Model Output Location Time Series



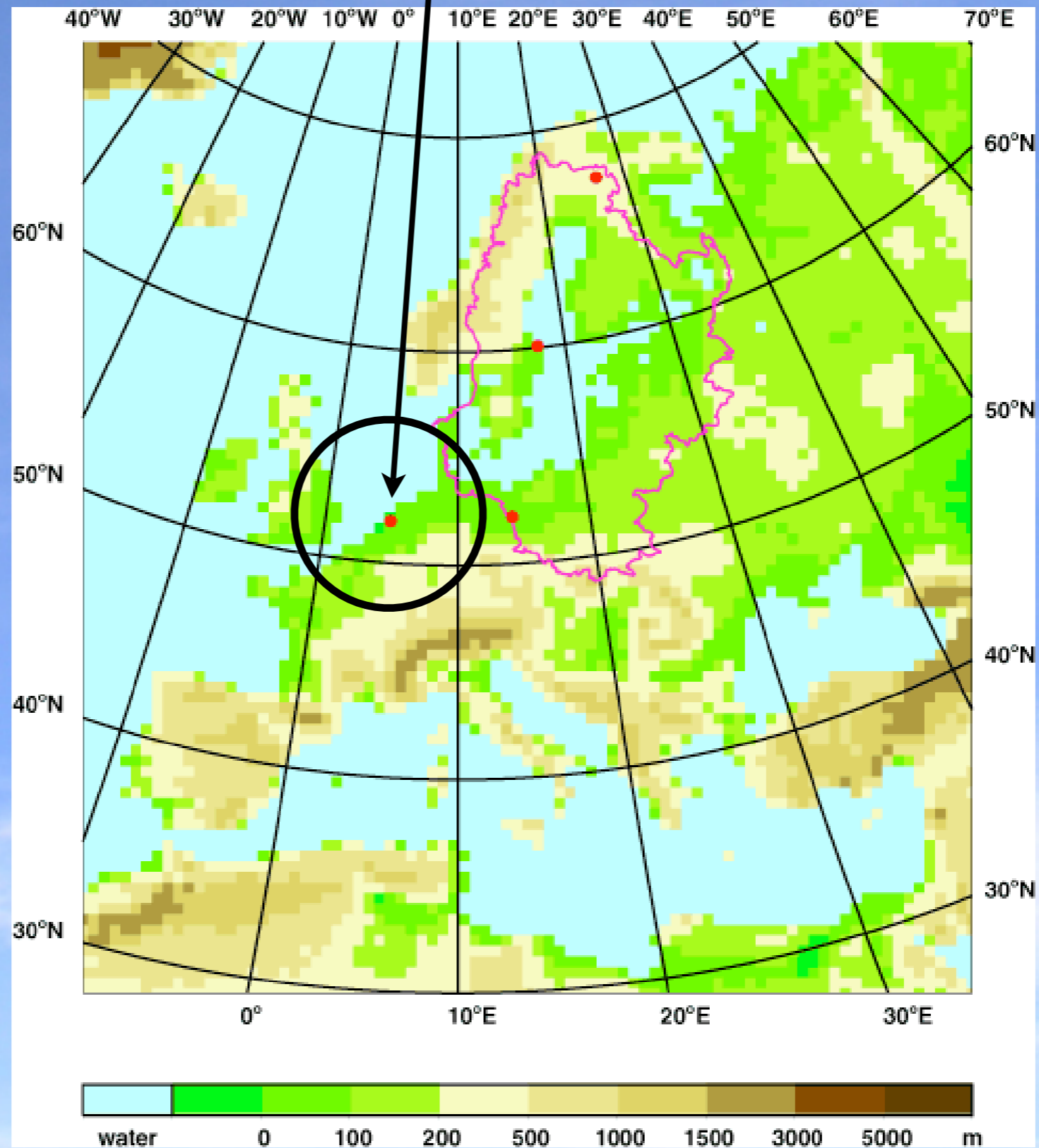
Examples

Diurnal Cycle

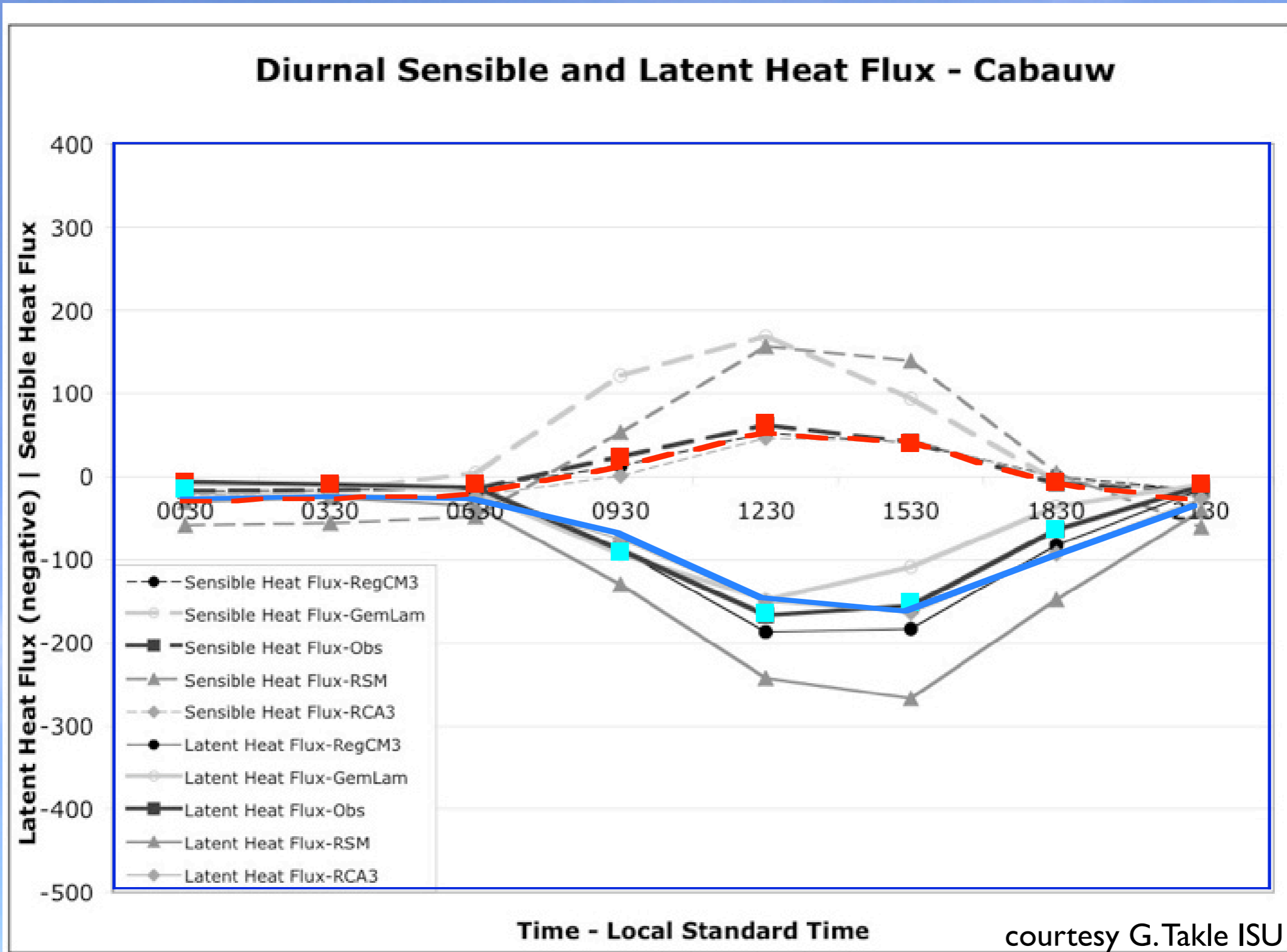
Jul-Sep 2001

Different RCMs vs RefSites

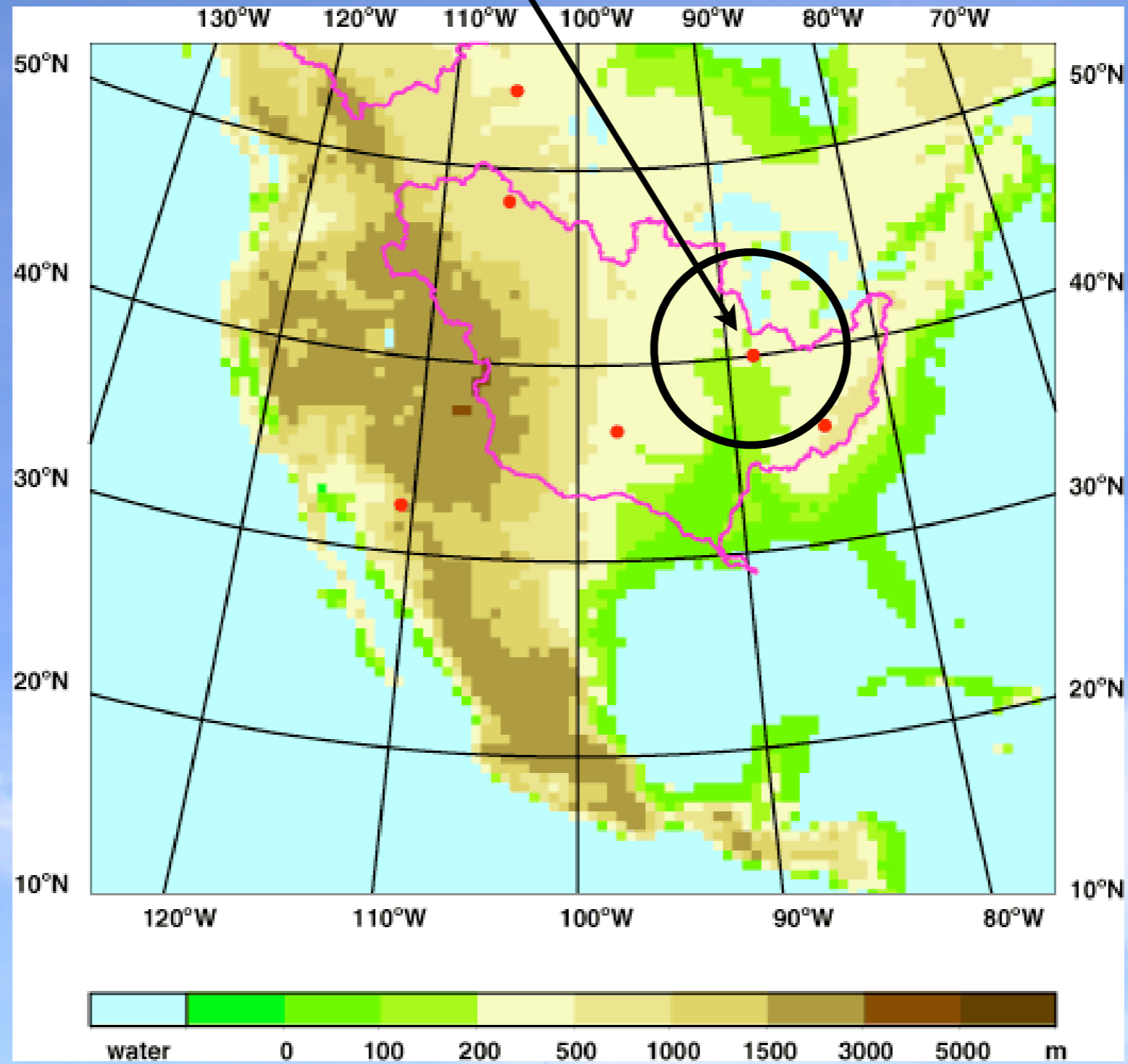
Cabauw



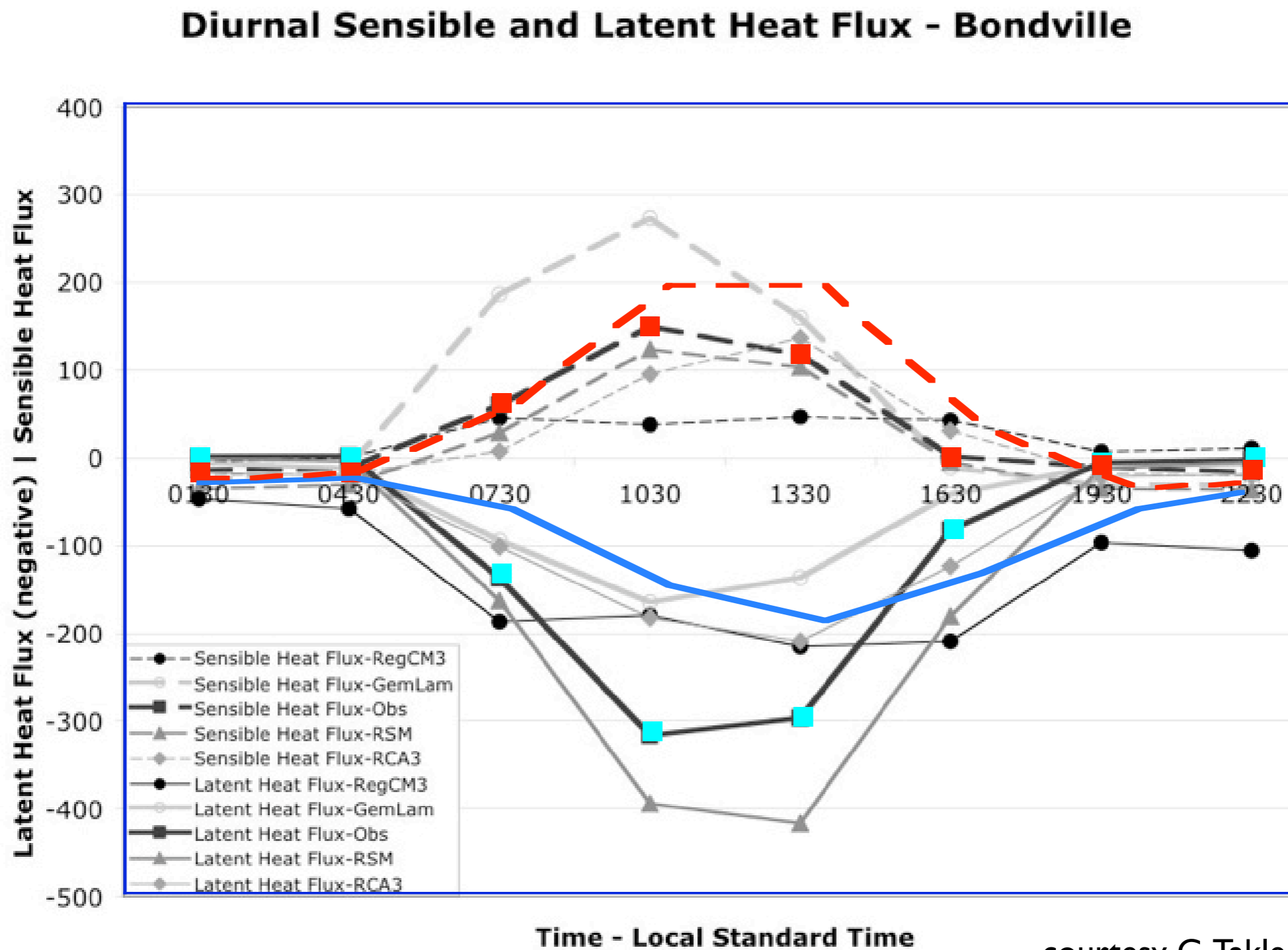
Cabauw (BALTEX / Europe)



Bondville

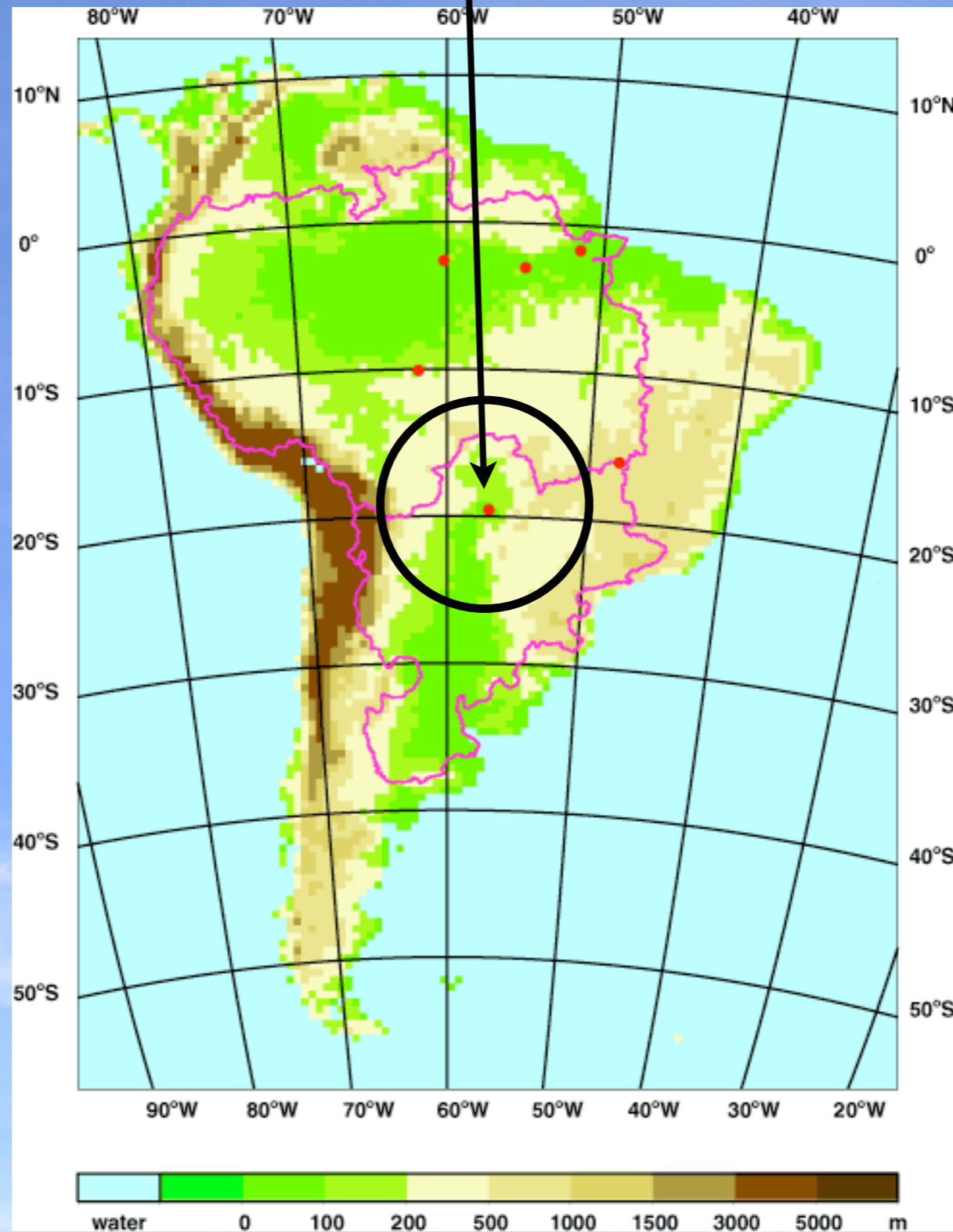


Bondville (GAPP / N-America)



courtesy G.Takle ISU

Pantanal



Examples

Annual Cycle

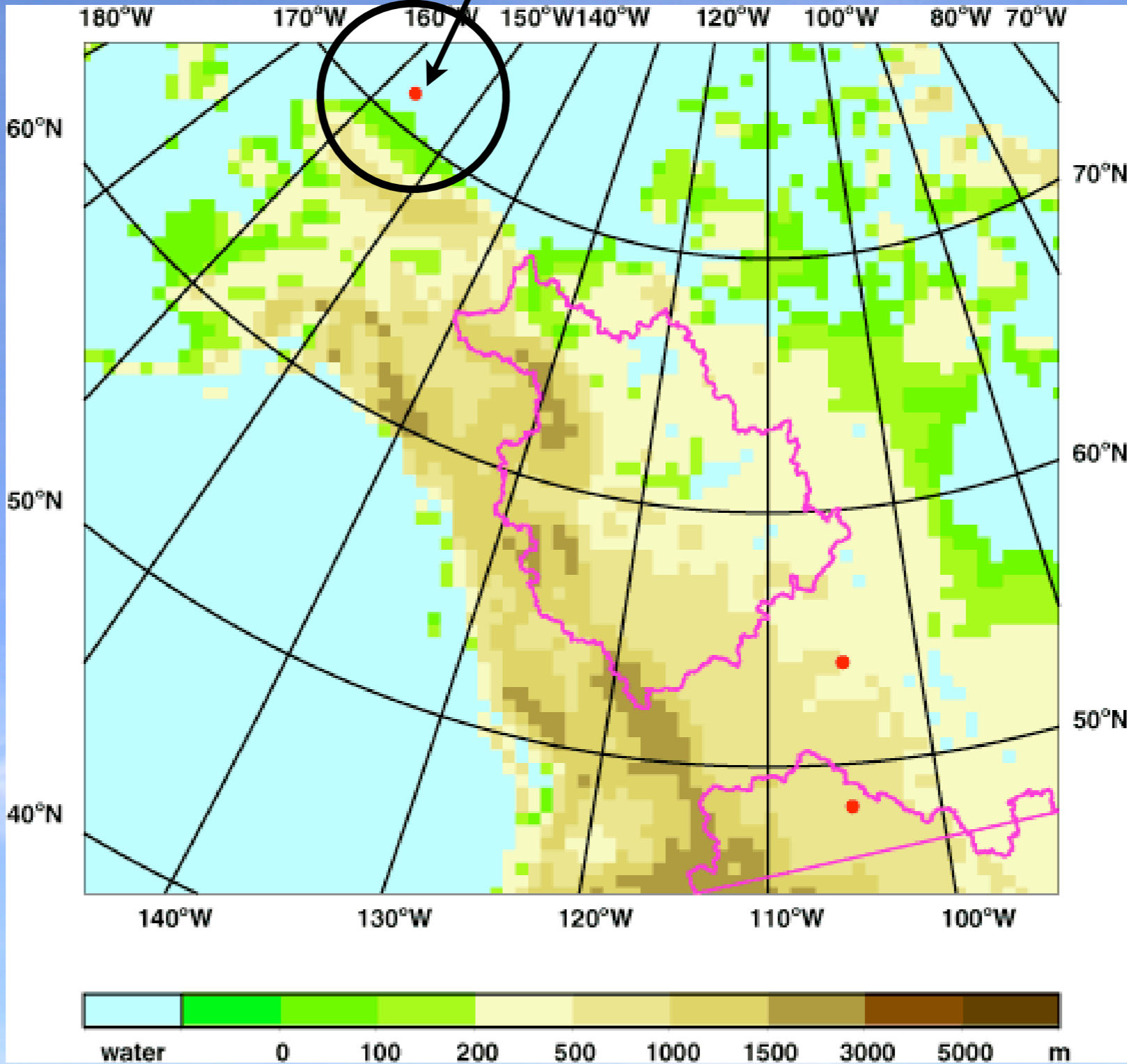
Oct 2002 - Dec 2003

Different RCMs vs different GCMs vs RefSites

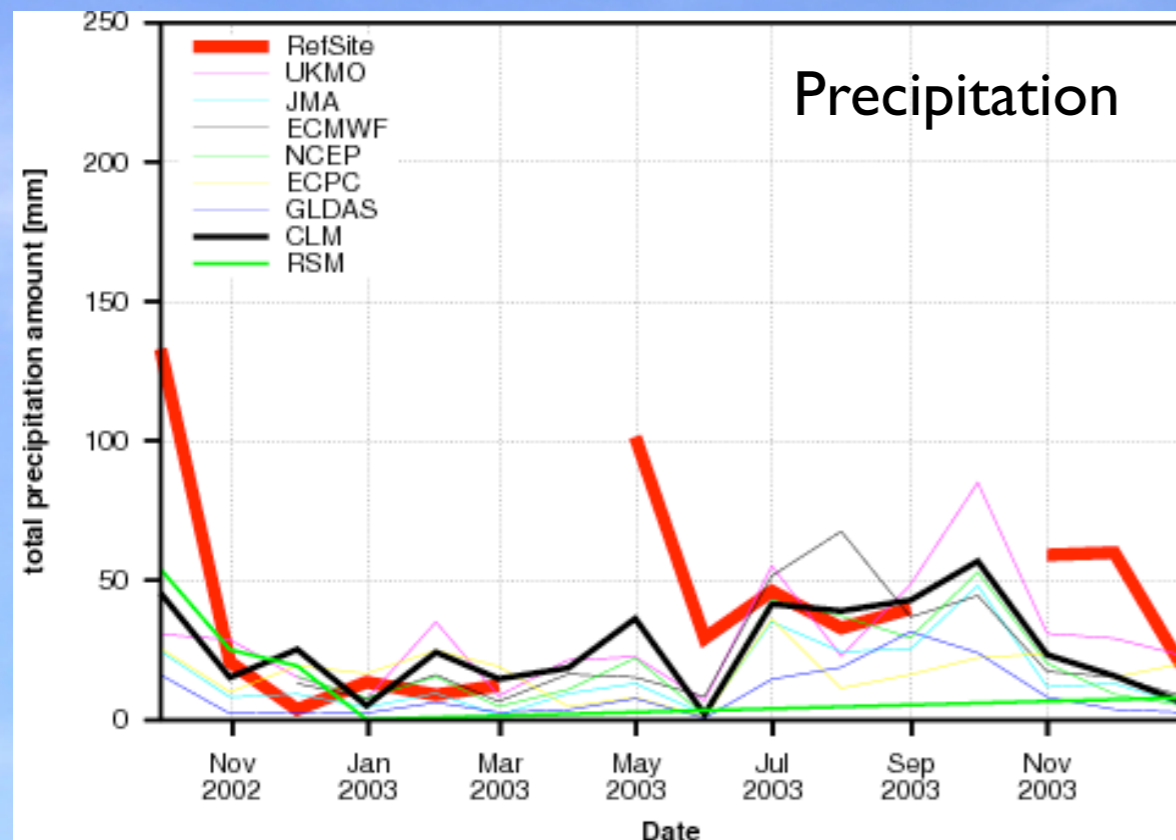
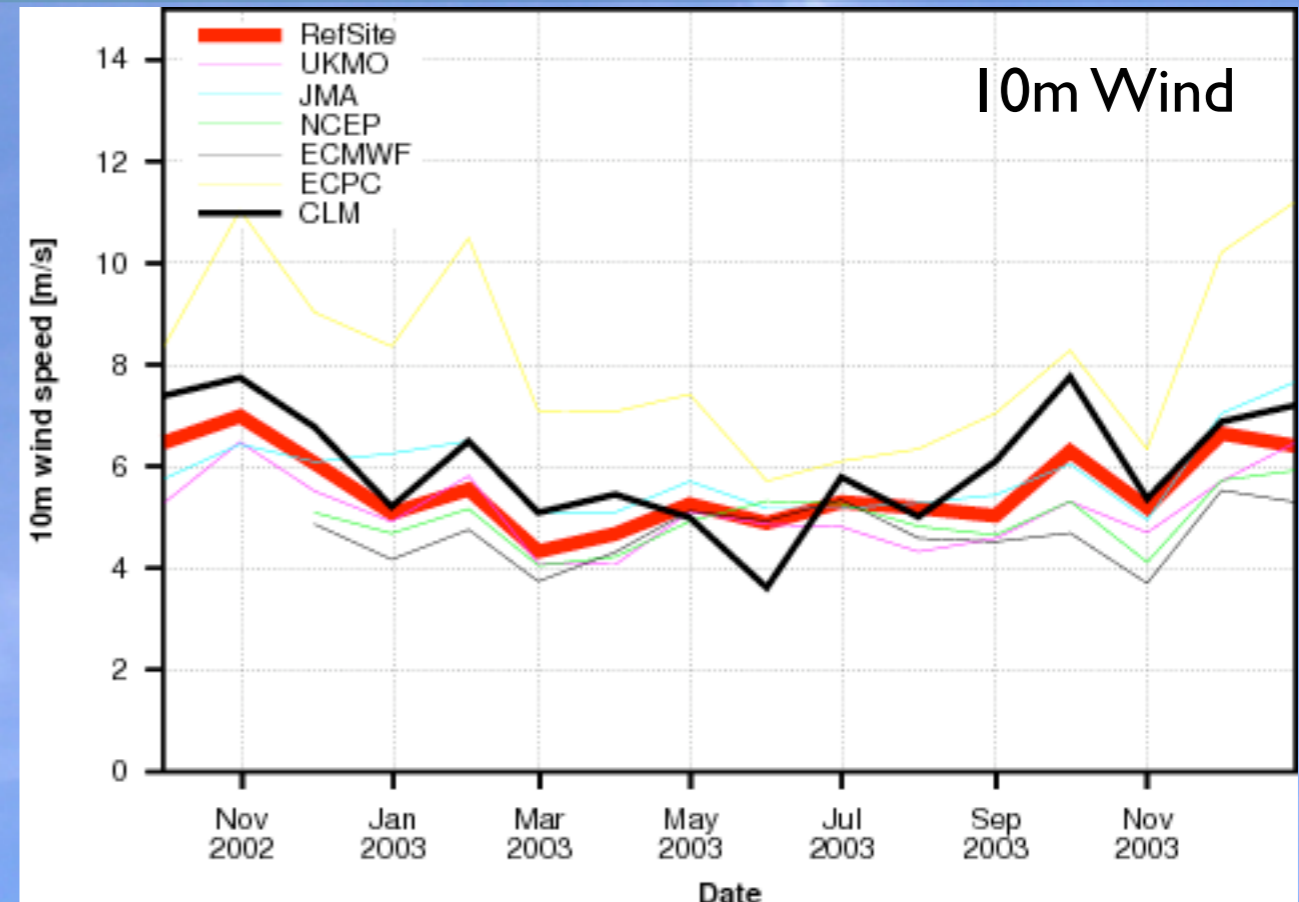
Global (Re-)Analysis Data

- UKMO
 - JMA
 - ECMWF
 - NCEP
 - ECPC
 - GLDAS
 - BMRC
- ➔ provide: (Re-)Analysis and MOLTS (Model Location Time Series)

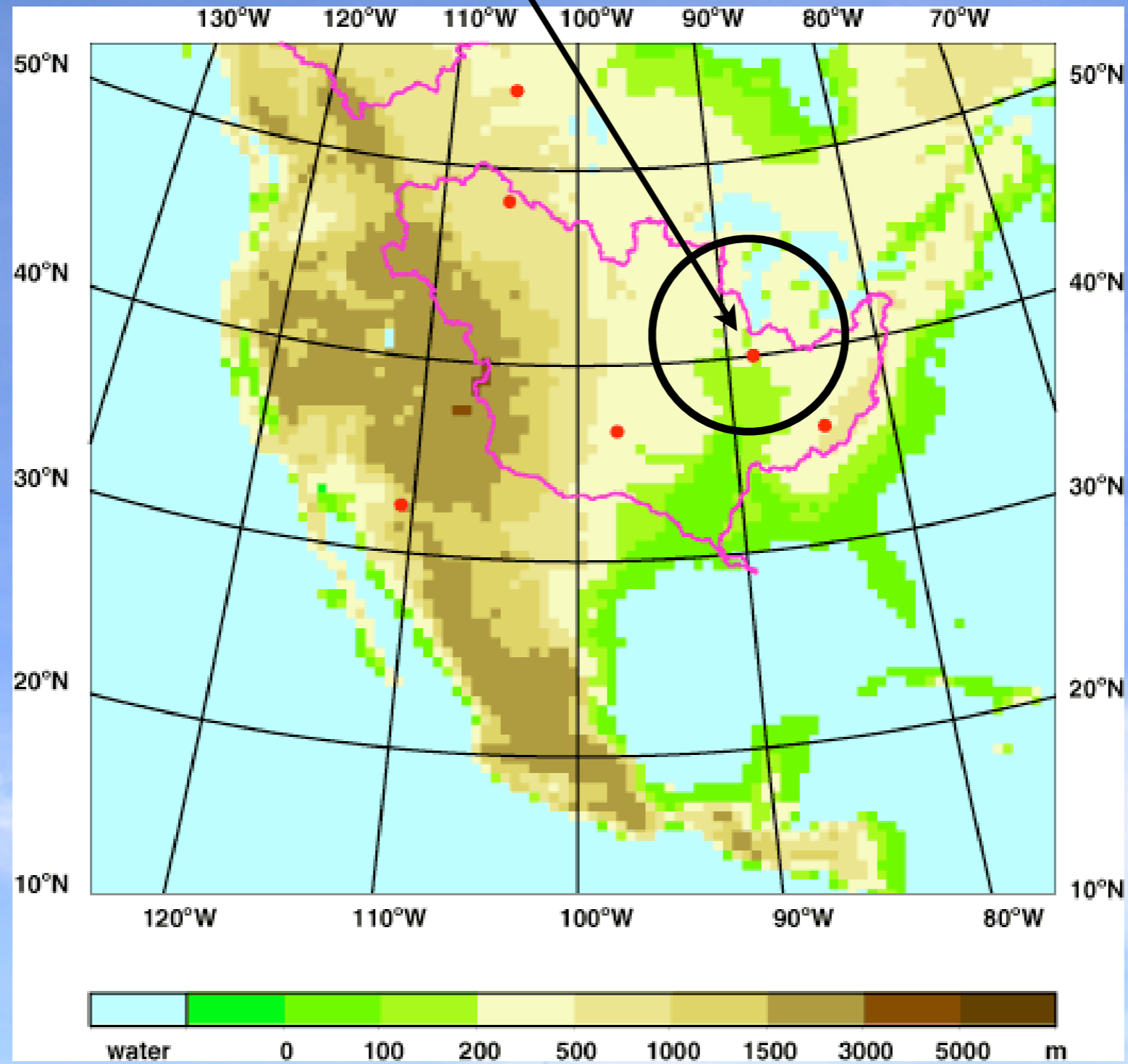
Barrow



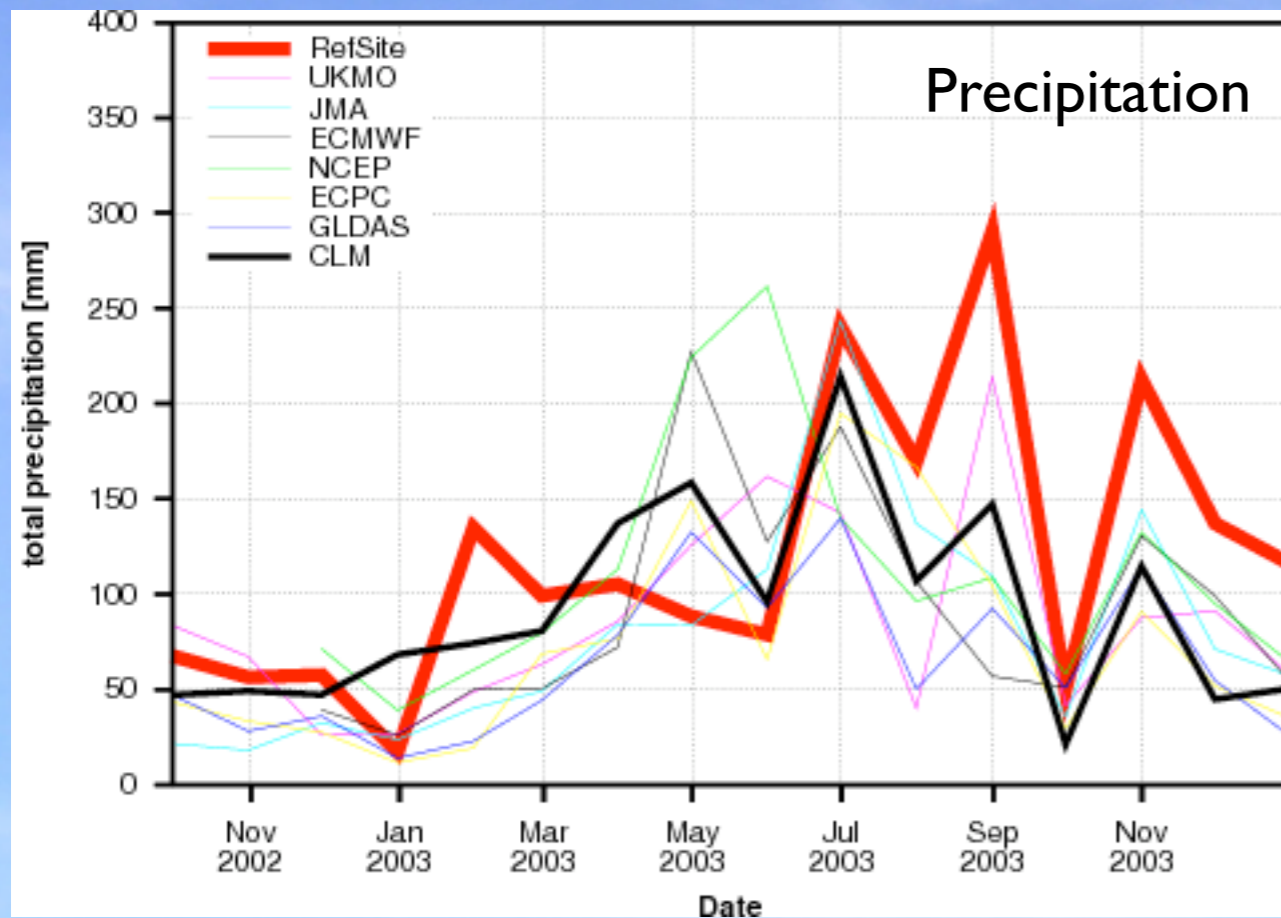
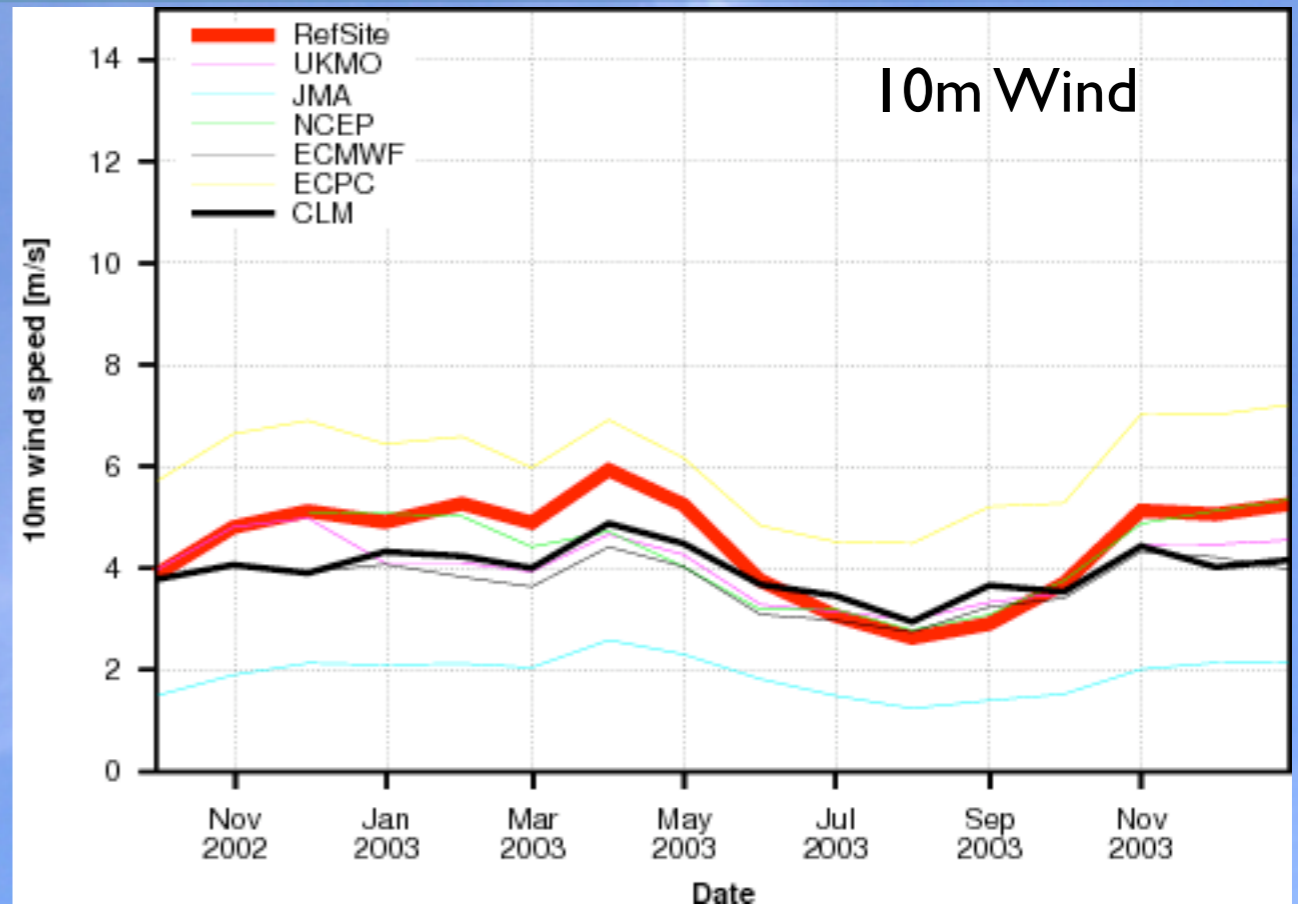
Barrow (MAGS / N-America)



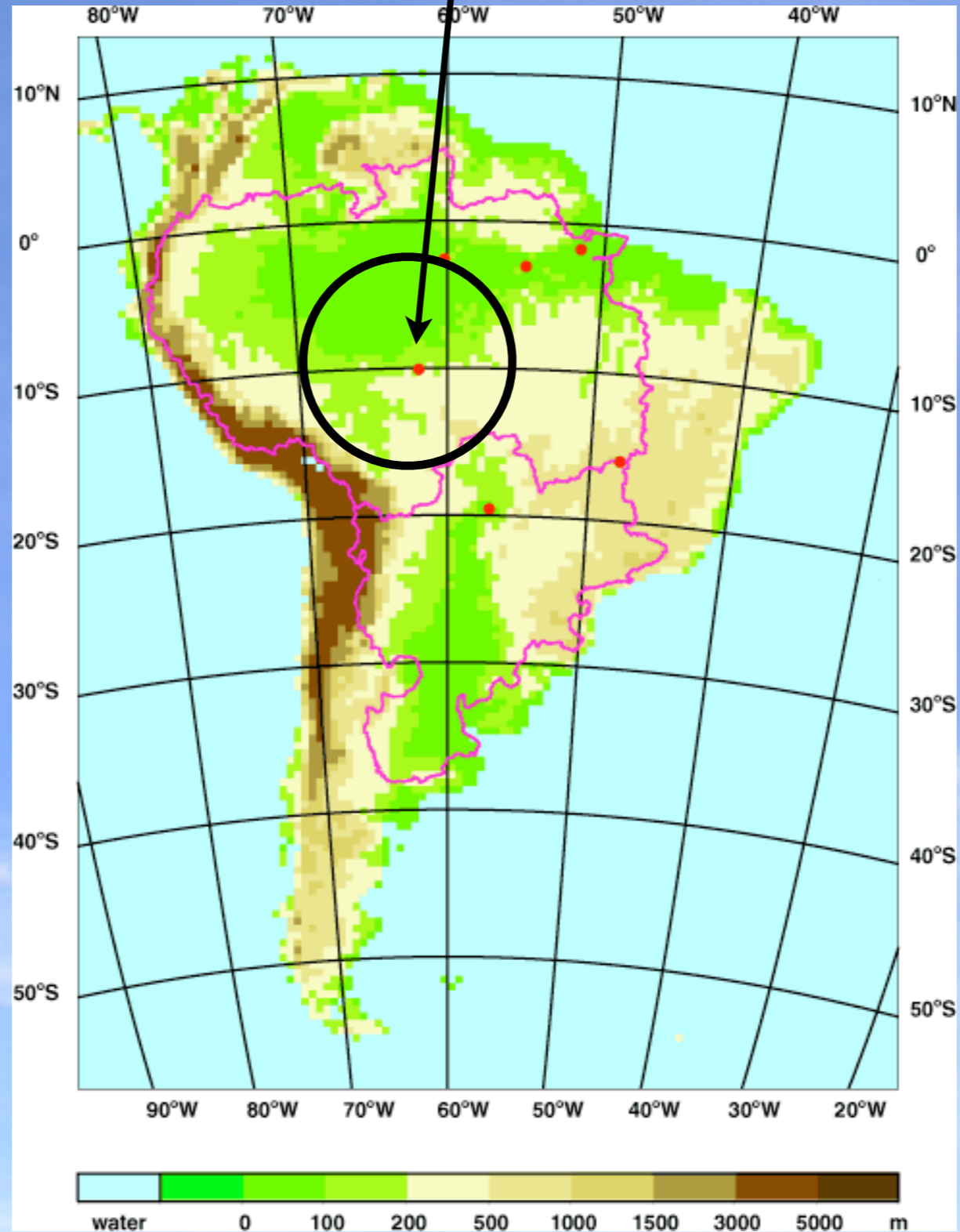
Bondville



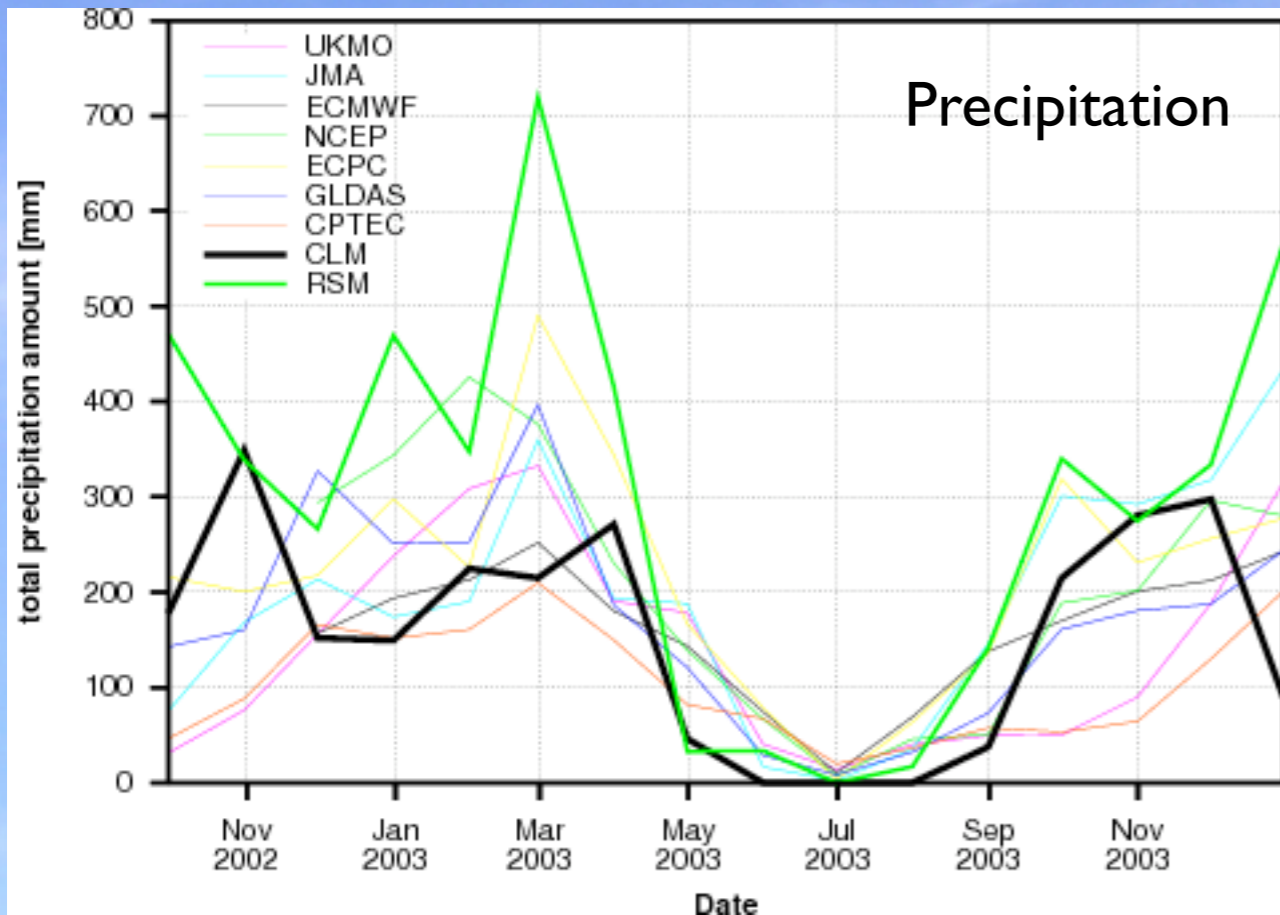
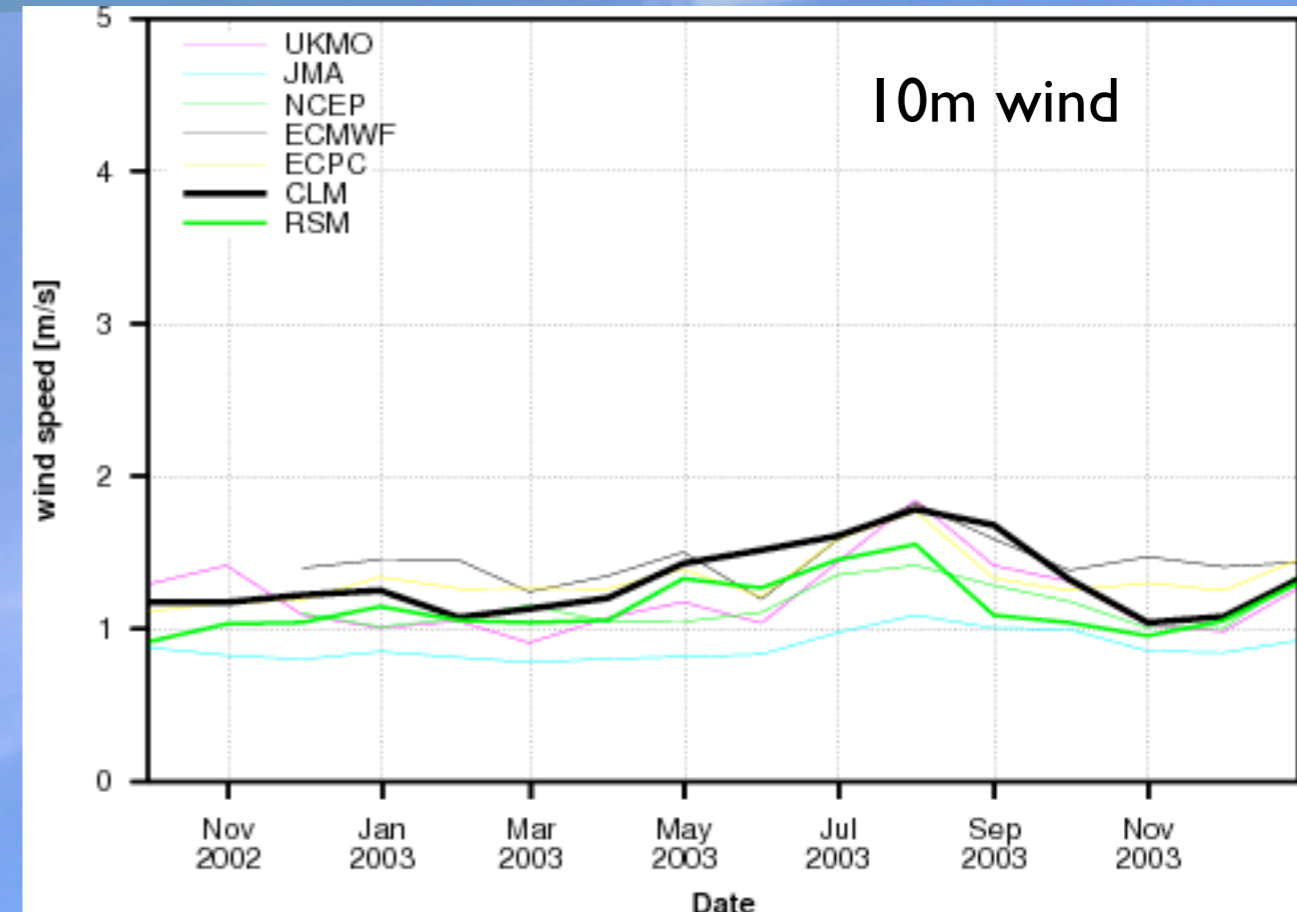
Bondville (GAPP / N-America)



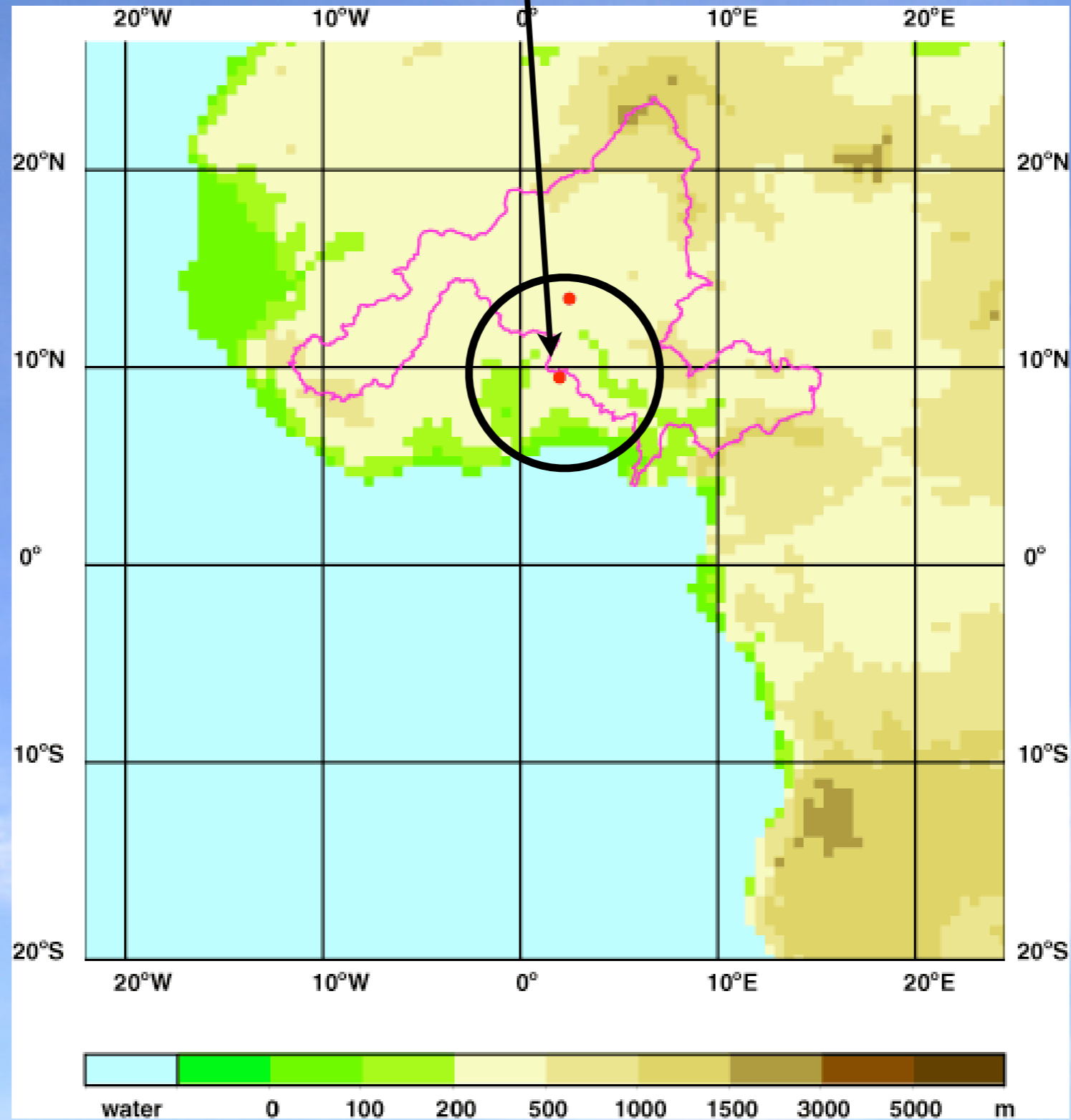
Rondonia



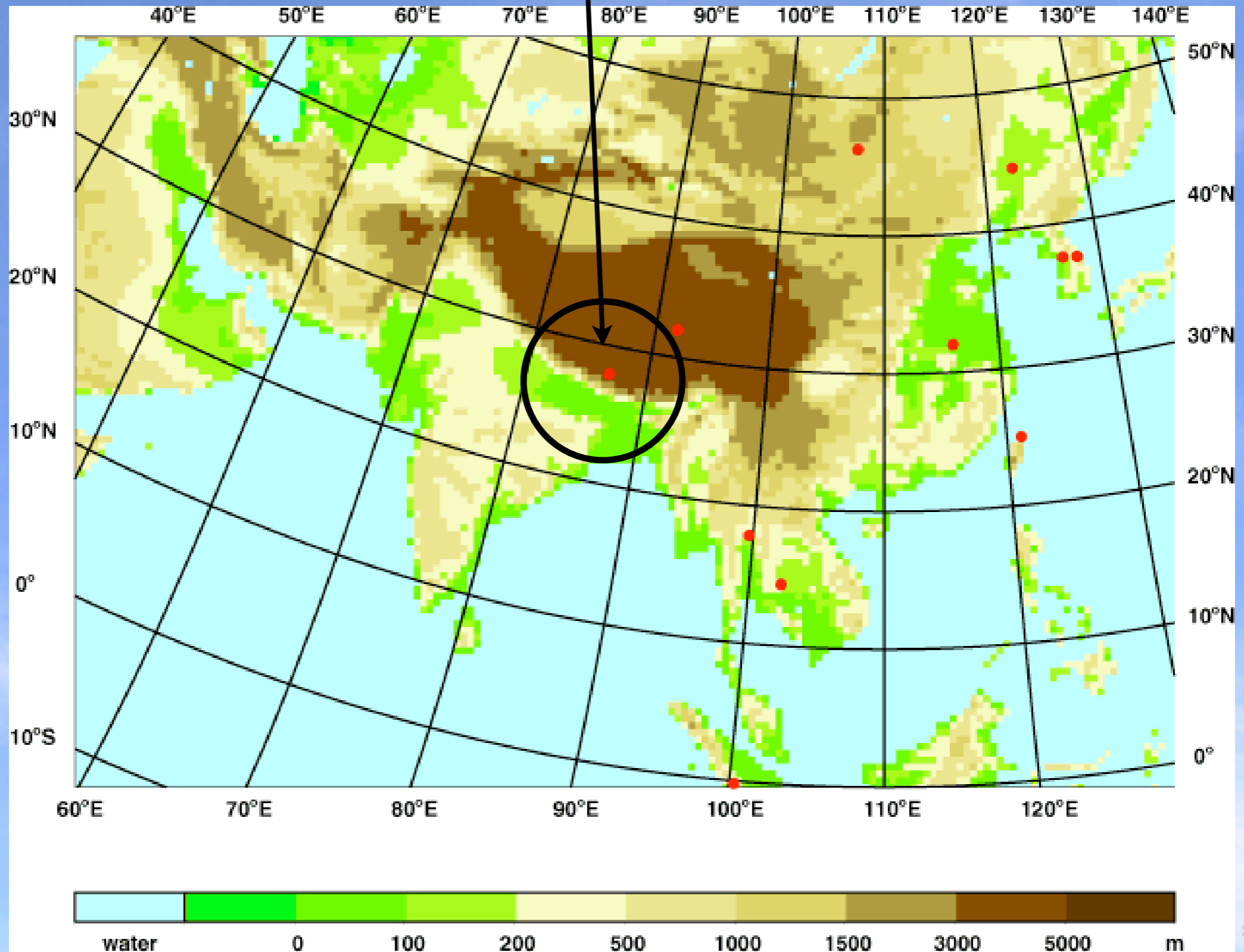
Rondonia (S-America)



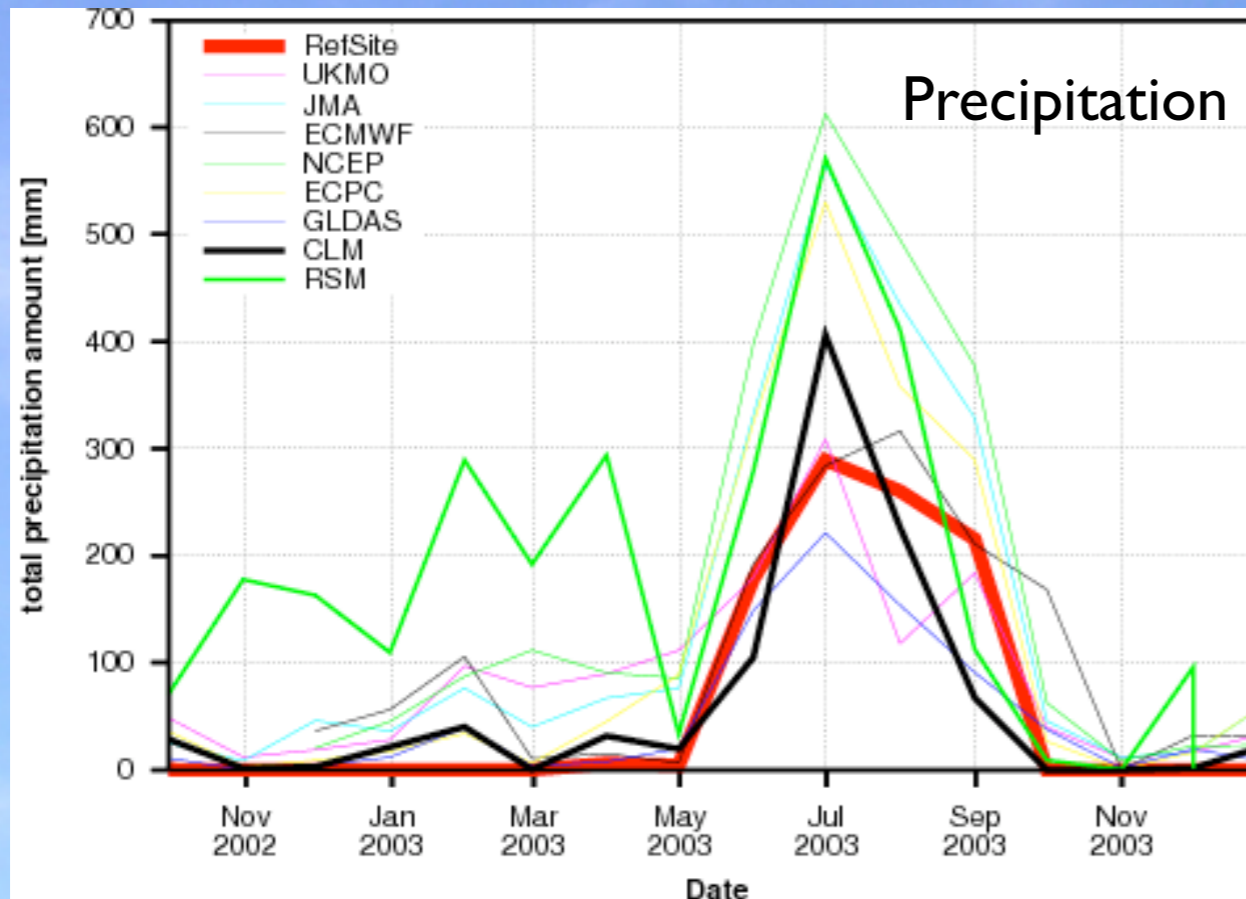
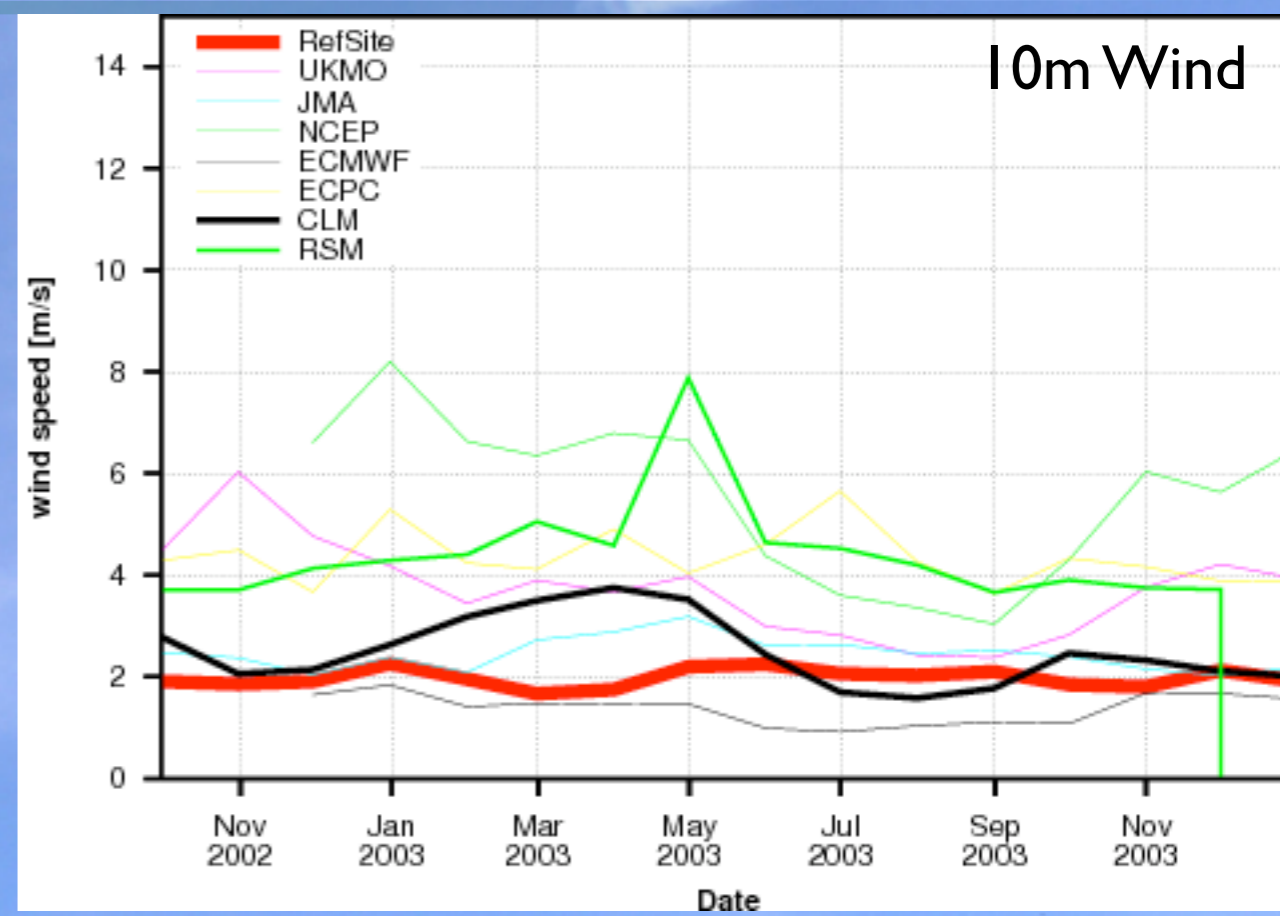
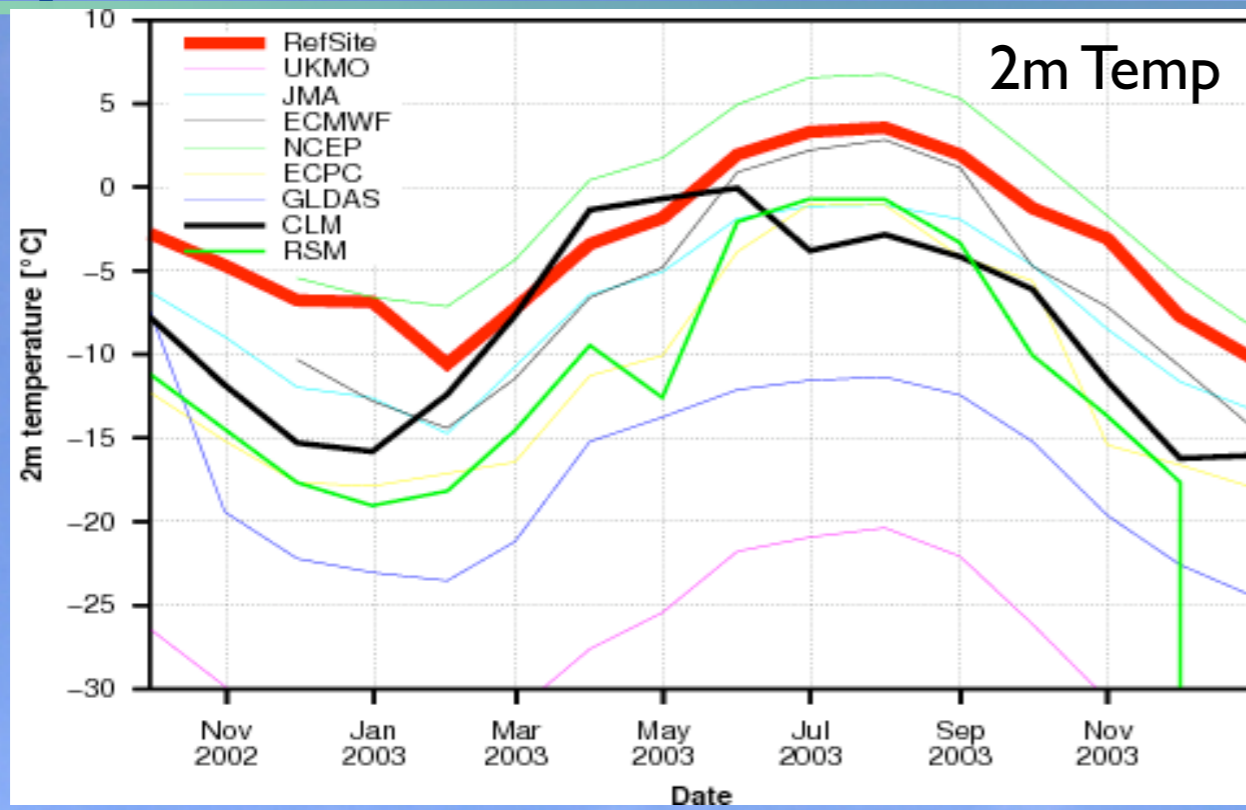
Oueme



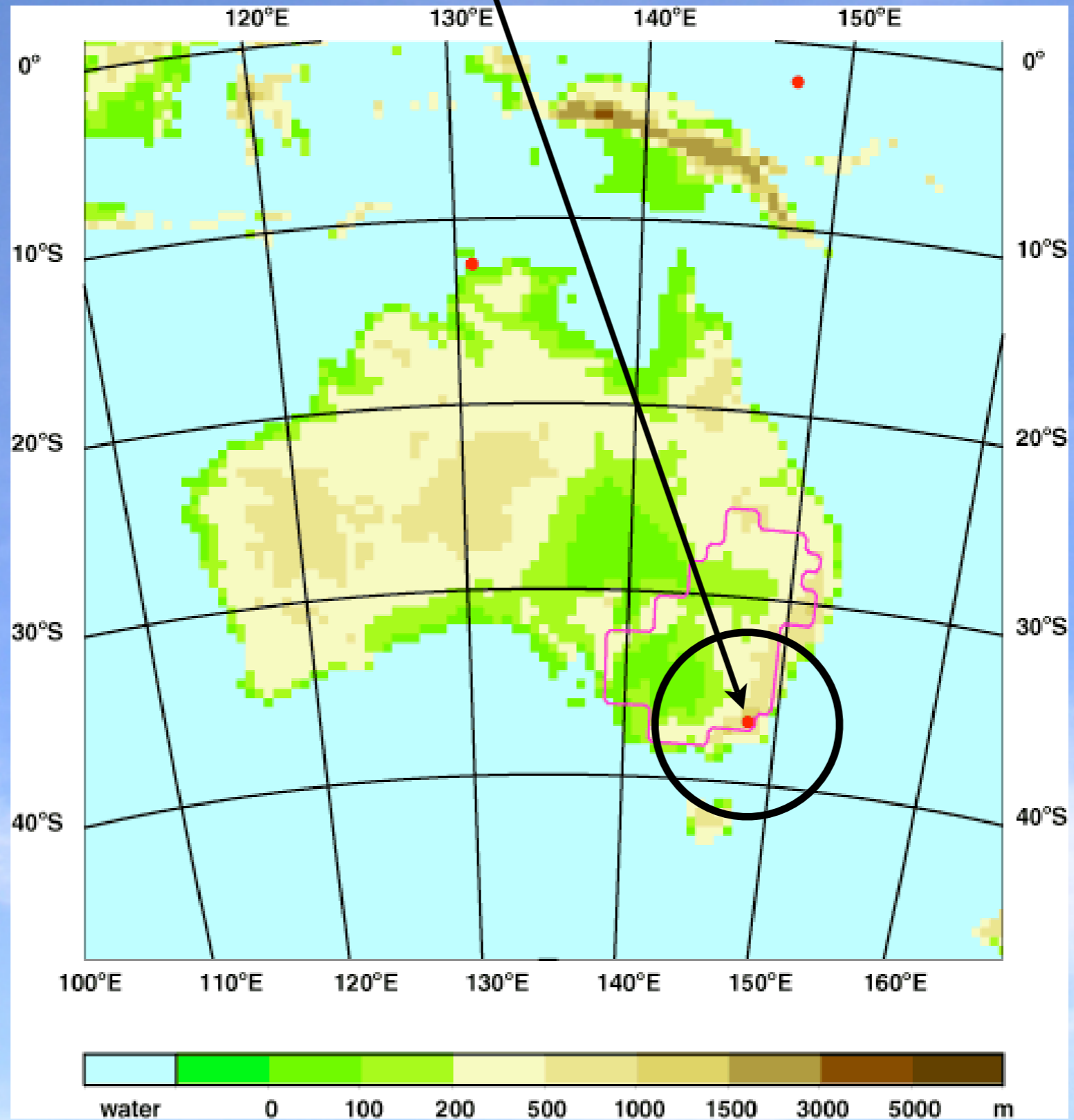
Pyramid



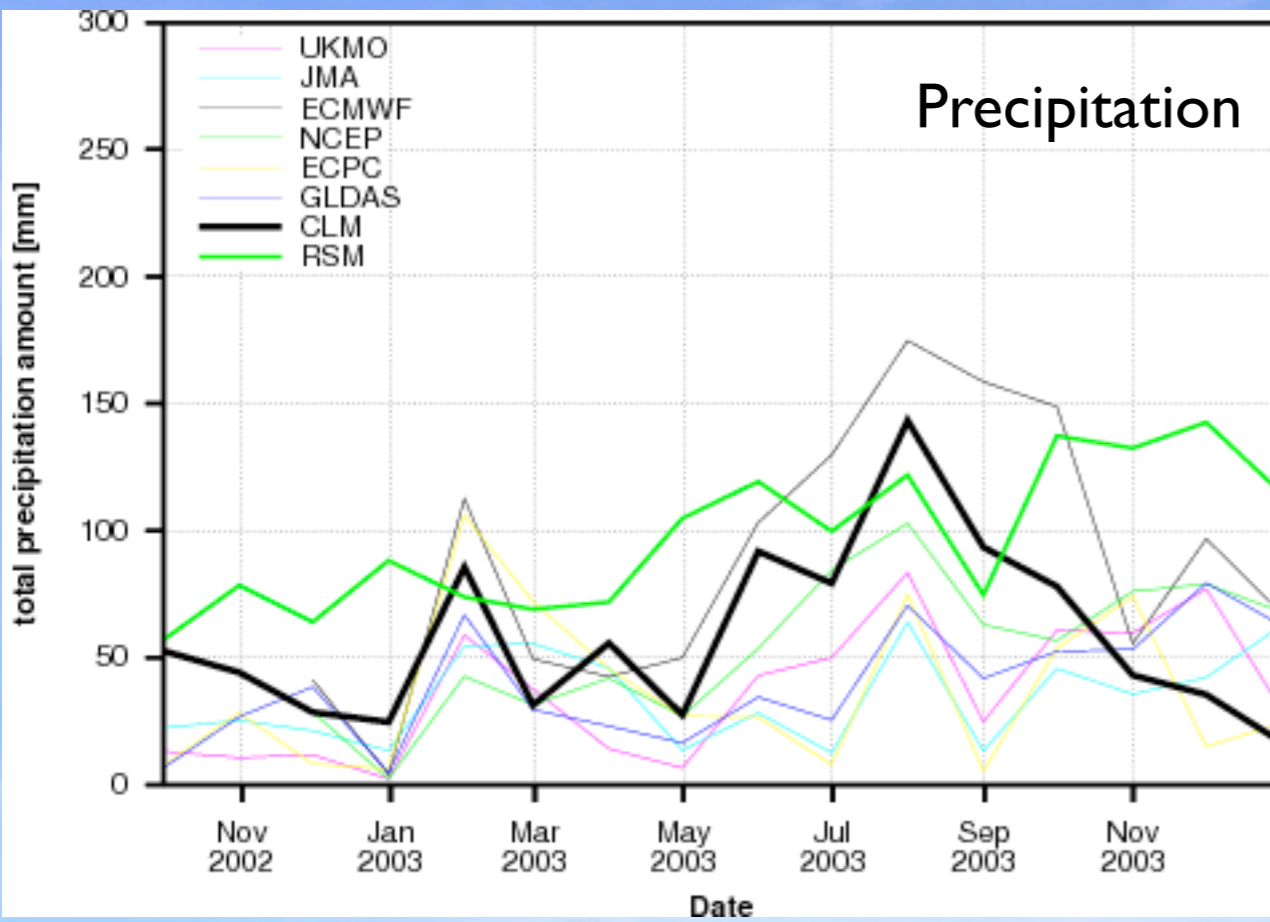
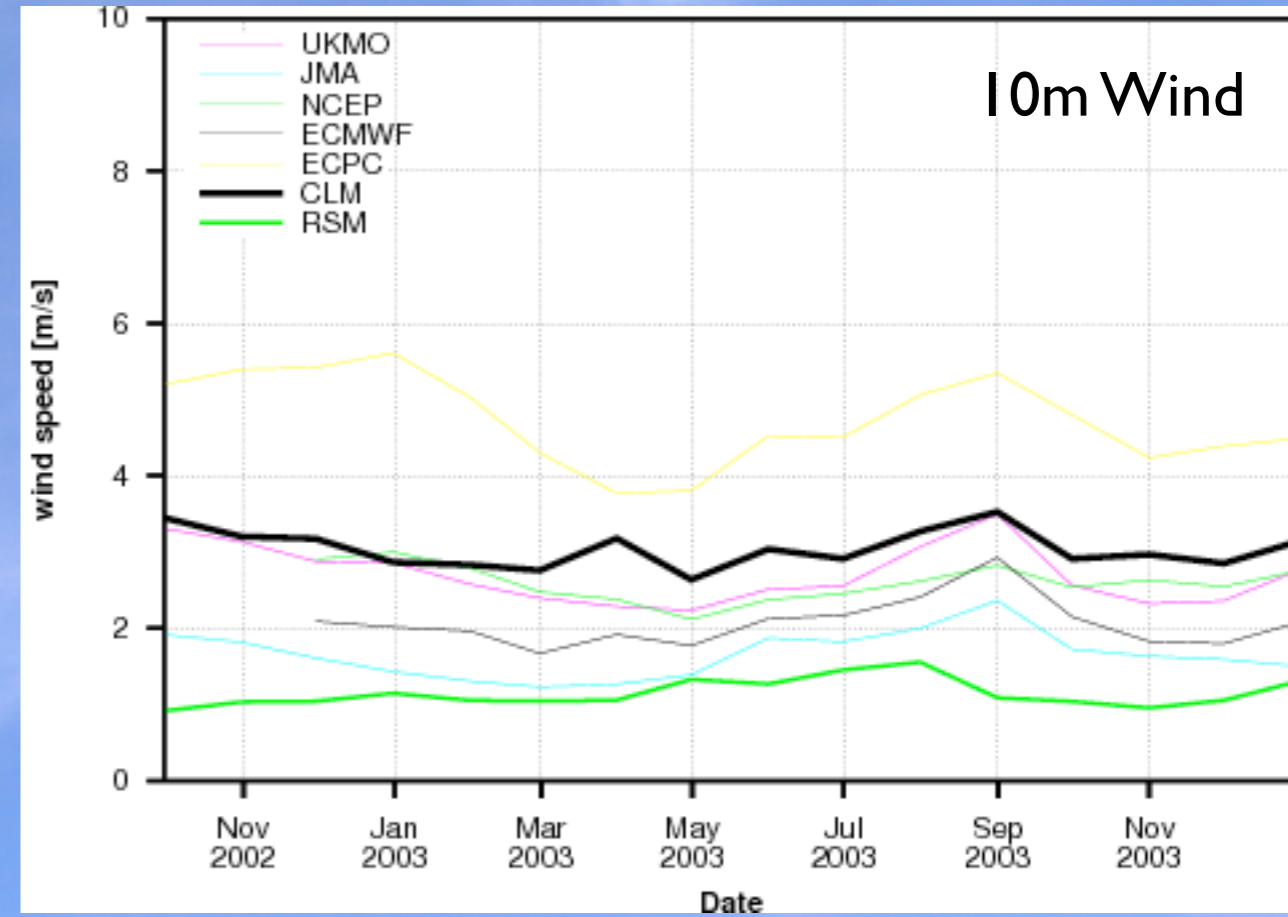
Pyramid (Asia / Himalaya)



Tumbarumba



Tumbarumba (Australia)



Summary

- Maximum in daily cycle of latent heat later in the afternoon than observed (also an issue for other RCMs)
- Missing annual precipitation maximum over AMMA region (Africa)
- Monsoon maximum over northern India captured, but smaller width of maximum than observed
- Precipitation results are generally in the rang of global analysis data
- Near surface wind in better agreement with RefSite data than global analysis



Outlook

- Additional Simulation based on the latest combined CLM/LM version
- Higher horizontal resolution
- Simulation with different boundary conditions

Thank You !

Longterm Simulations

