EUROPEAN COMMISSION
European Research Area

CEOP-AEGIS

Coordinated Asia-**E**uropean long-term **O**bserving system of Qinghai–Tibet **P**lateau hydro-meteorological processes and the **A**sian-monsoon syst**E**m with **G**round satellite **I**mage data and numerical **S**imulations

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18 research organizations in 8 countries

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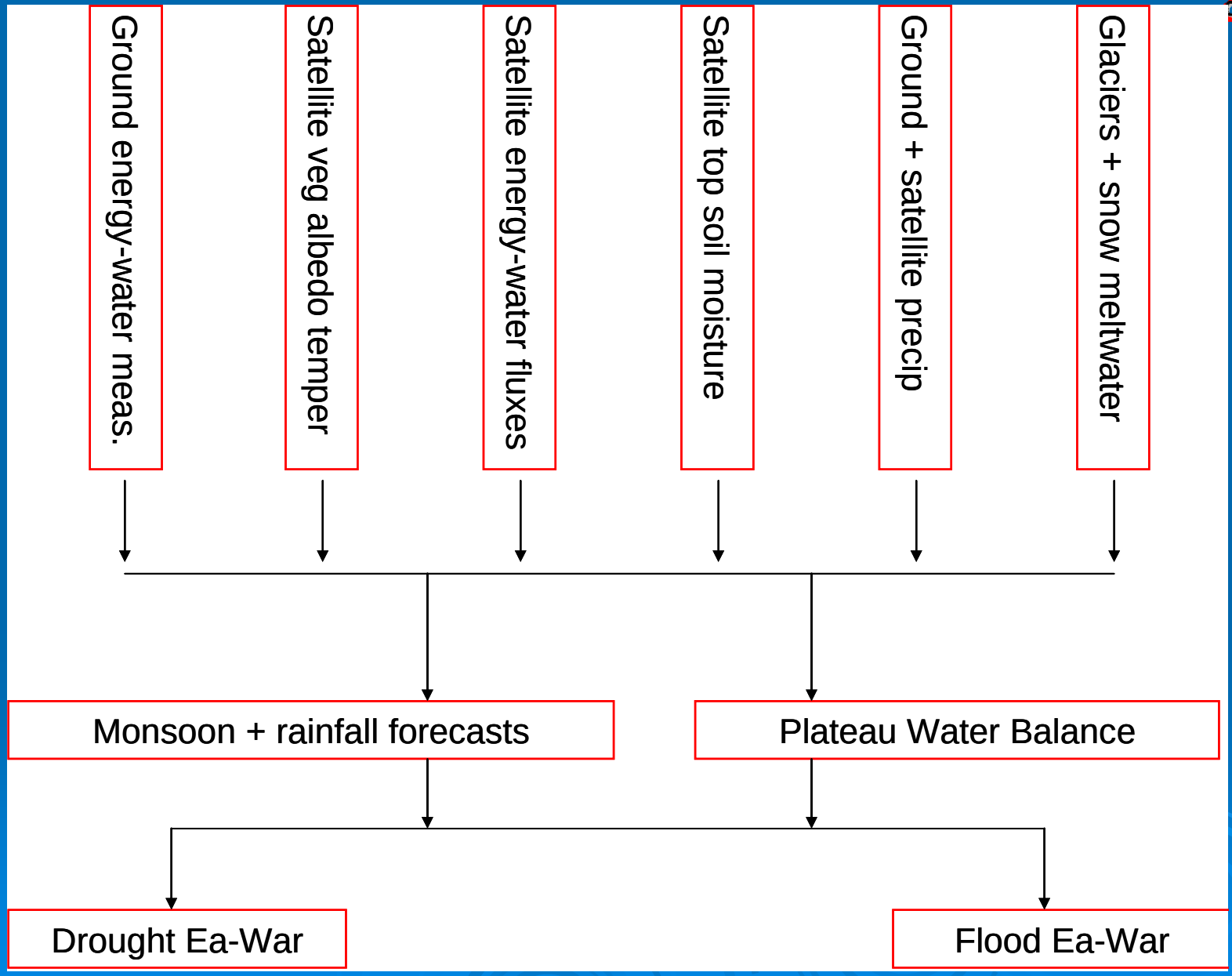
Water resources, hydrometeorology and Asian Monsoon

- Tibet Plateau :
  - Headwater areas of seven major rivers in SE Asia
  - Regulating area for the climate of China and of the Eastern Hemisphere as a whole
  - Exert profound thermal and dynamical influences the onset, maintenance, and withdrawal of the monsoon

Interrelation of project technical elements

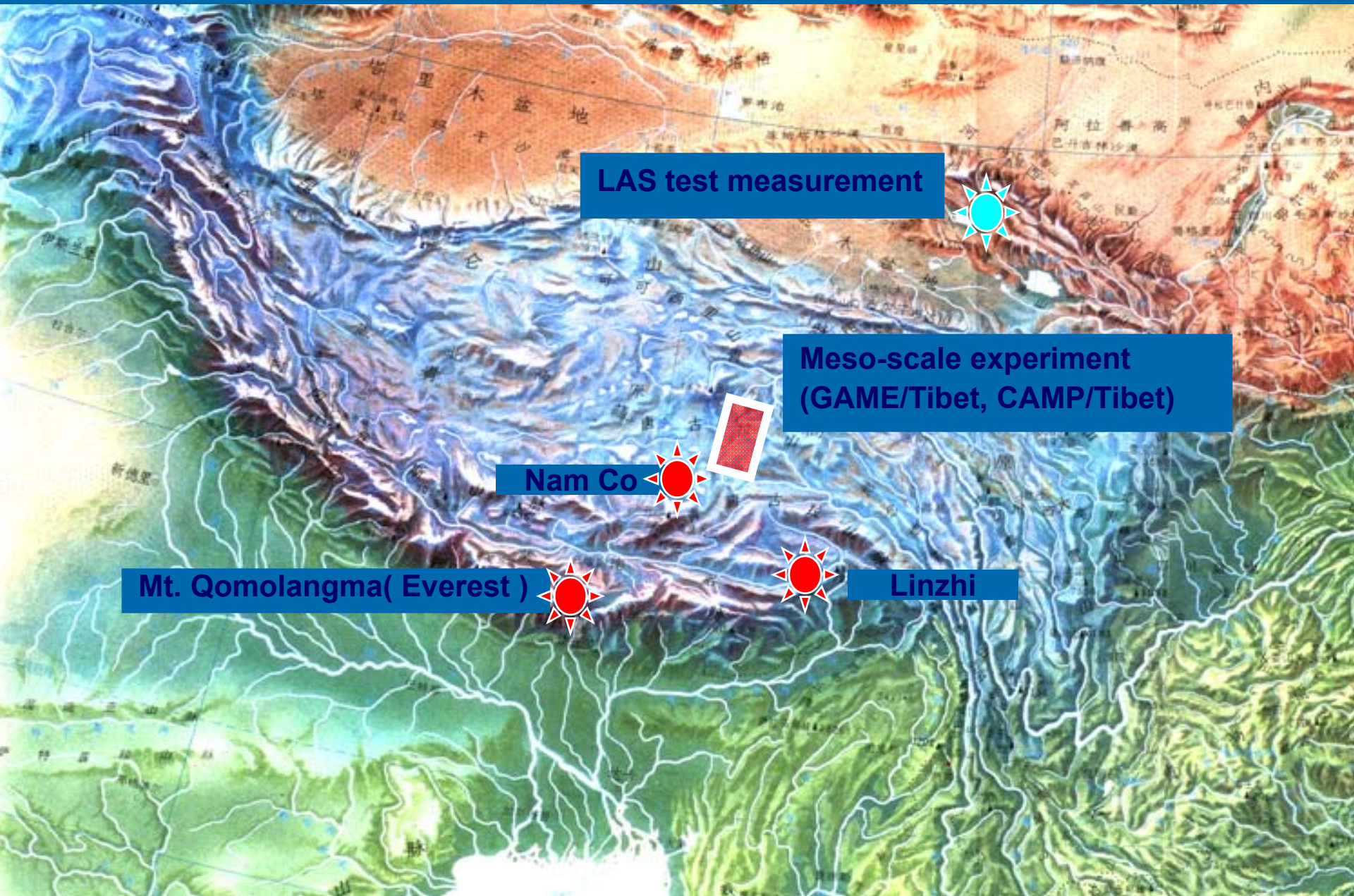


CEOP-AEGIS-WP1

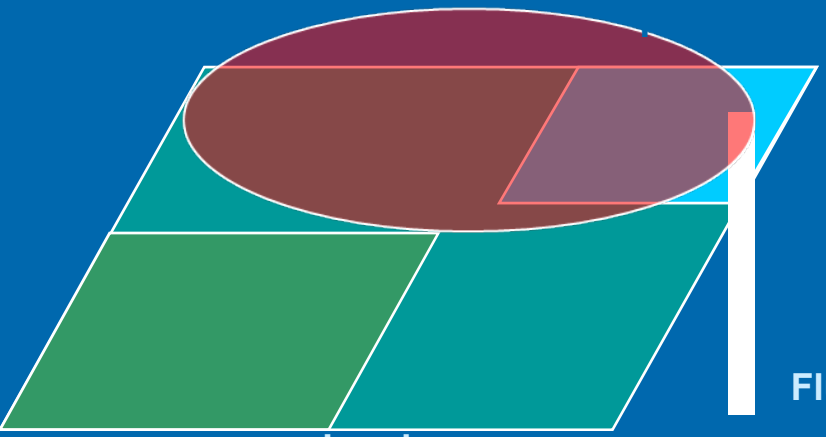
Ground-based observations of radiative and turbulent fluxes and soil moisture over the Tibetan Plateau

Atmospheric and soil data collection

ITP, CAREERI, BNU, Univ. Bayreuth, Univ. Strasbourg, ITC, Univ. Ferrara



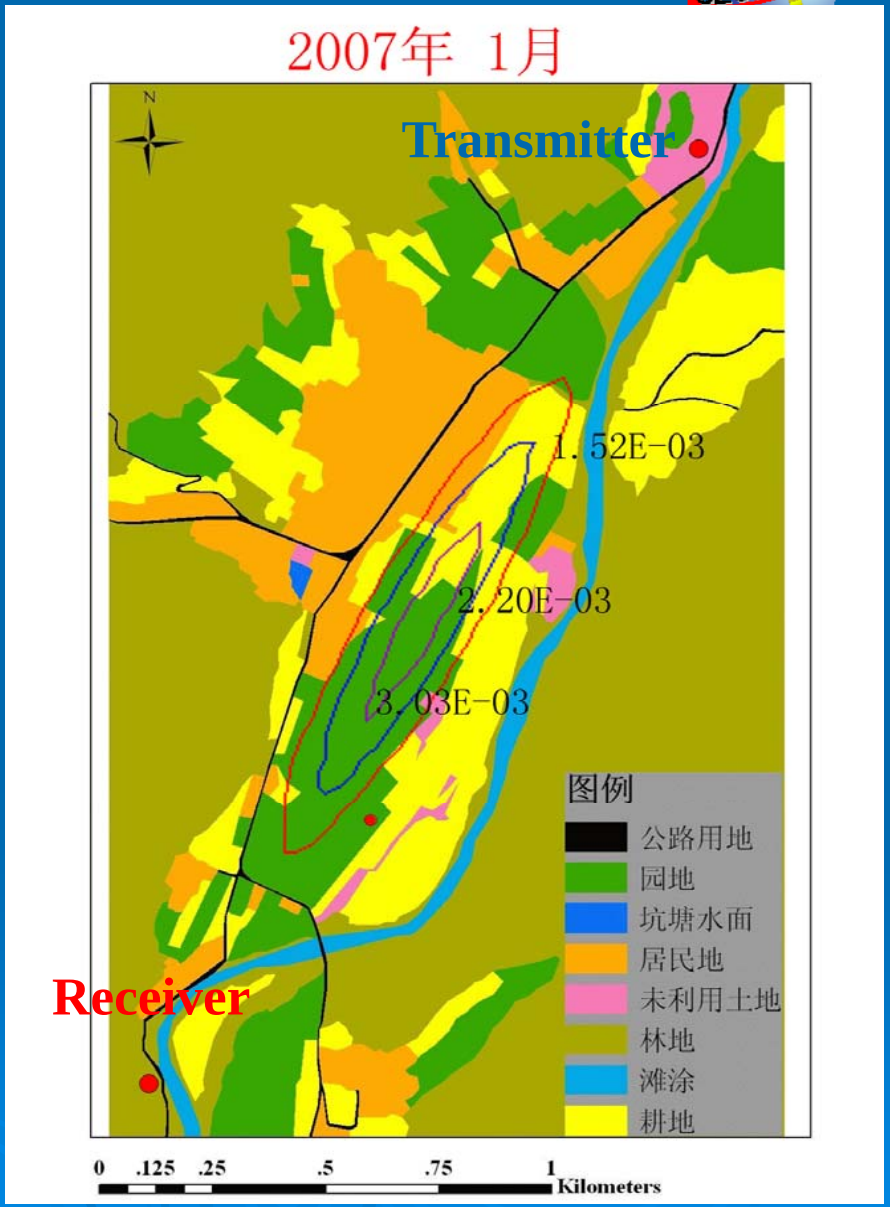
Eddy covariance, scintillometers and footprints



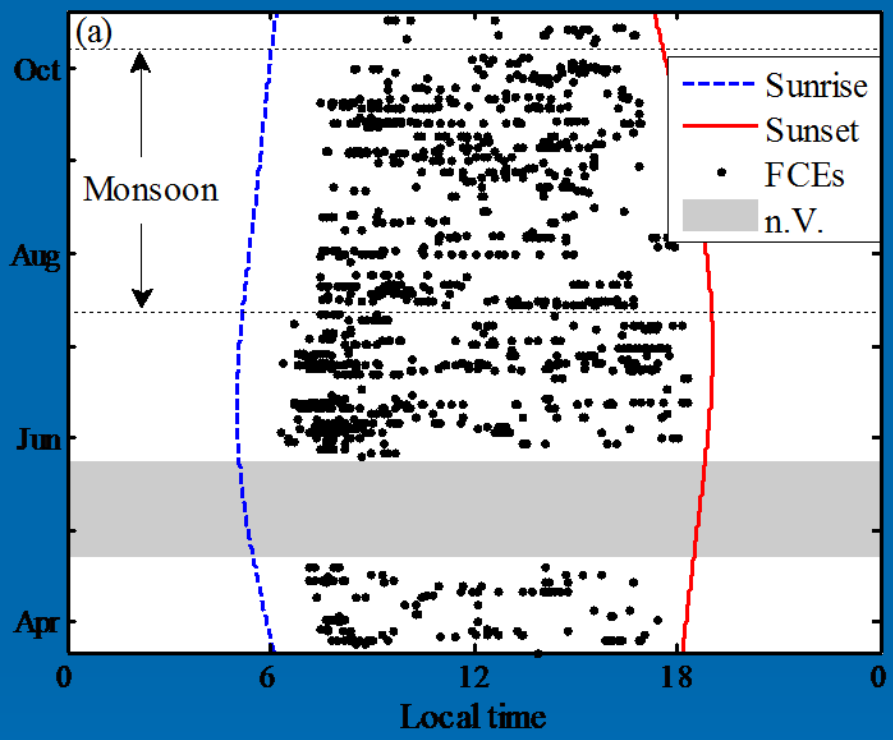
Land use map

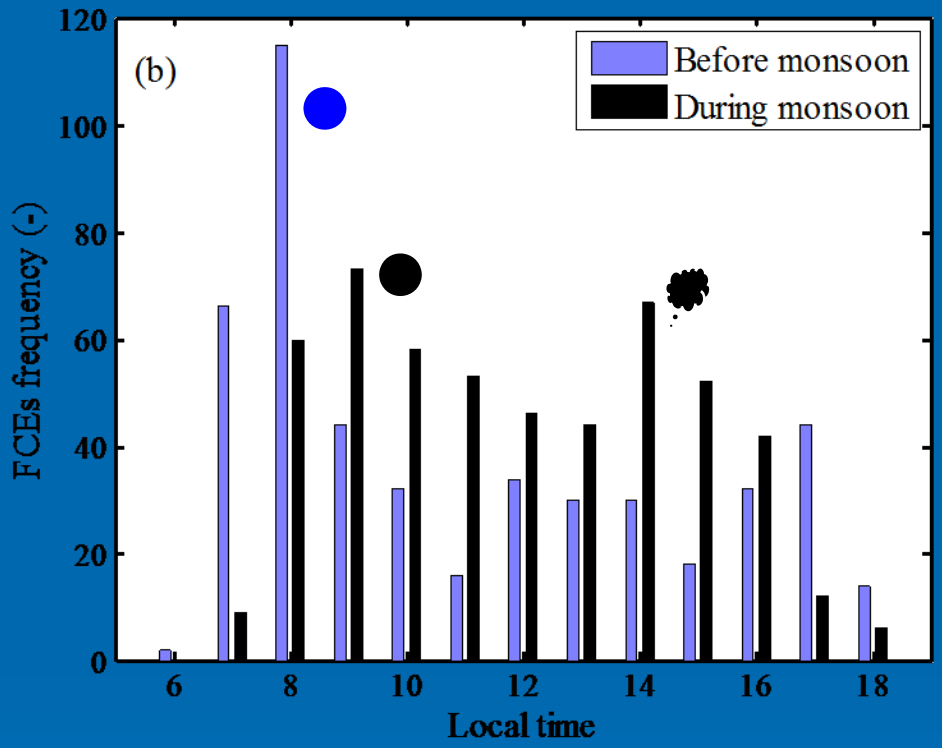
Flux tower

Monthly variation of LAS flux contribution area
(8:00am -17:00pm Jan – Dec, 2007）



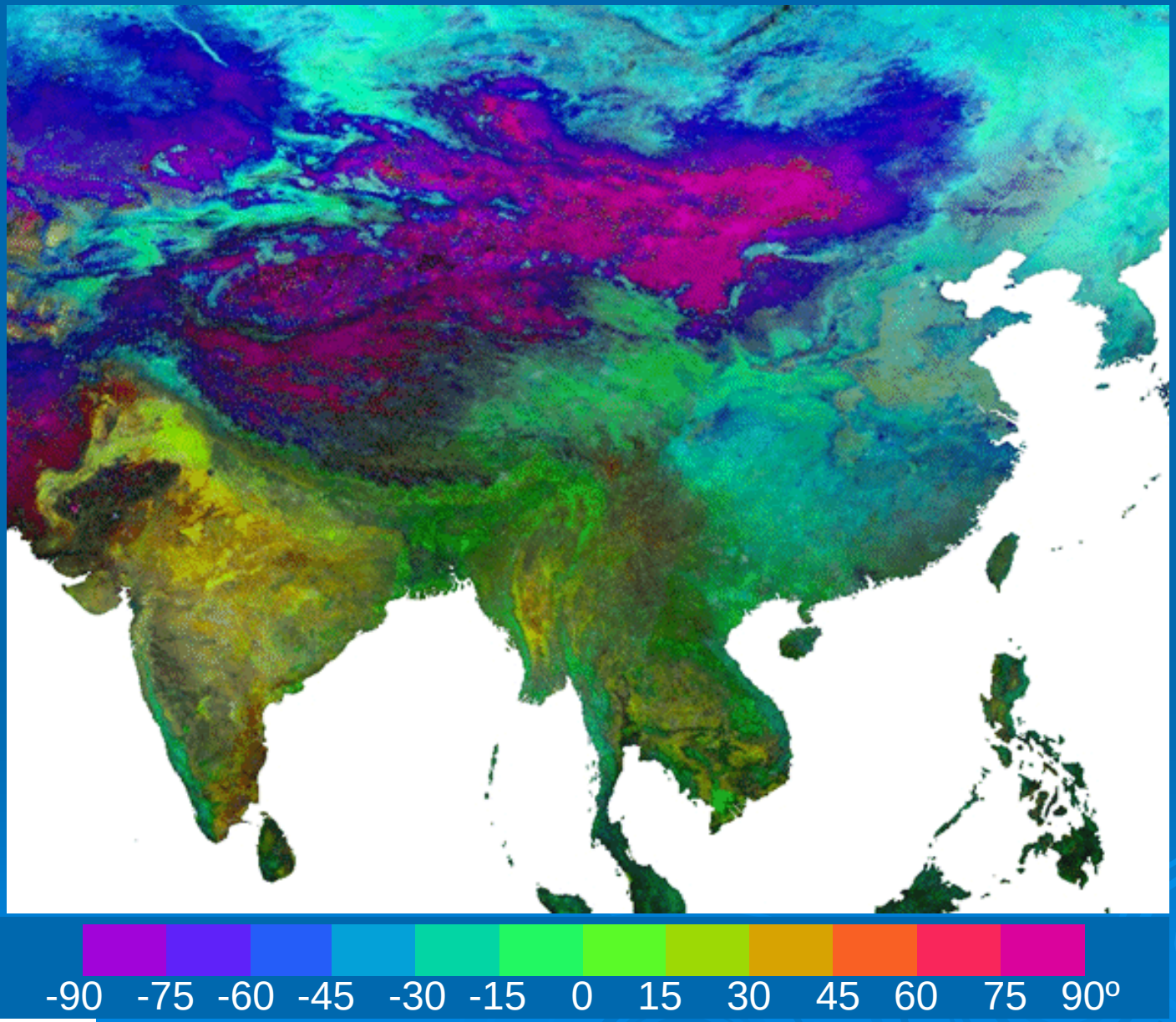
Free Convection Events in relation to monsoon





- Before monsoon, FCEs mostly occur in the morning hours. During the monsoon, the distribution is bi-modal with an afternoon mode closely related with cloud-cover

LST vs NDVI correlation

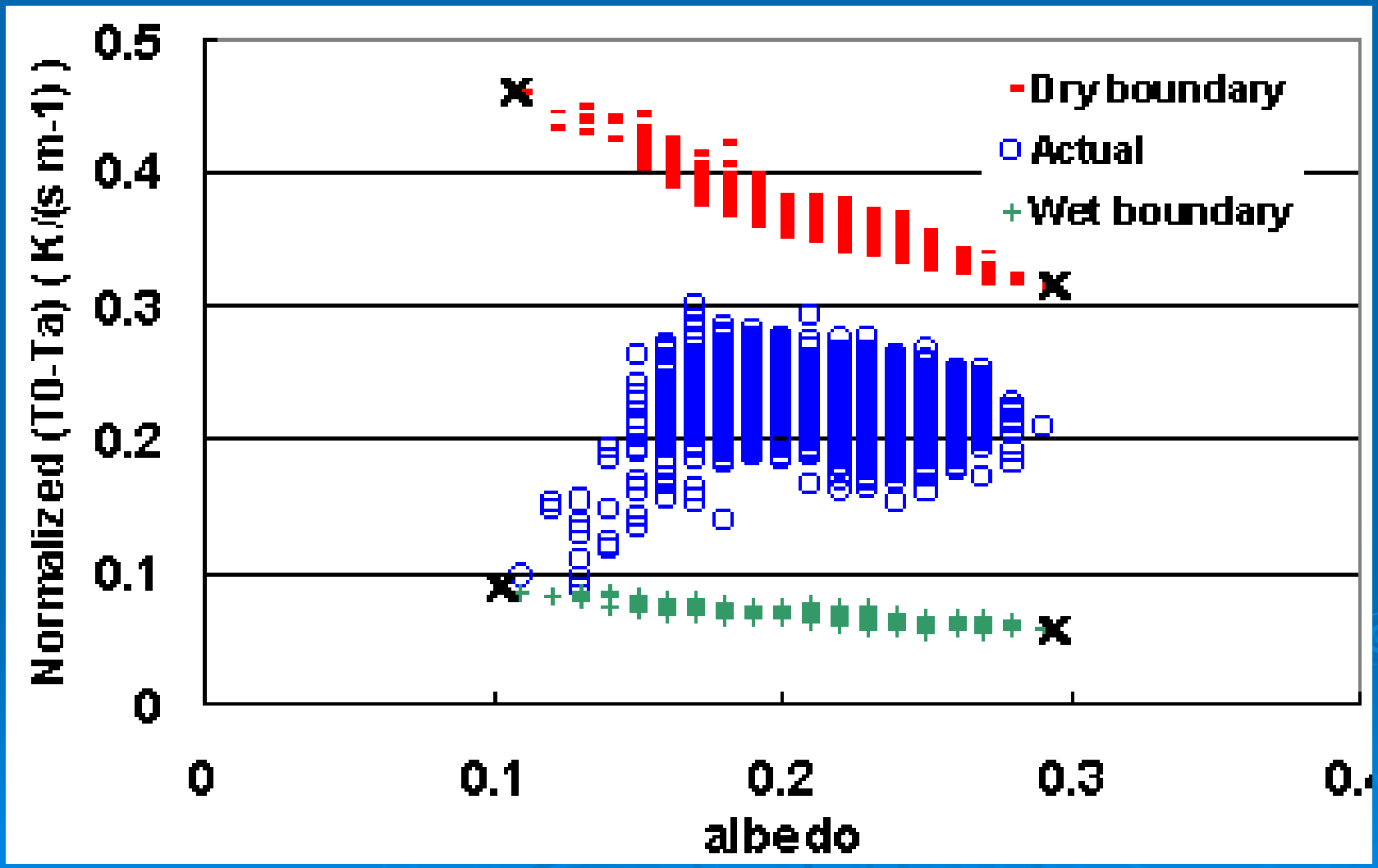


- IHS of LST vs. NDVI correlation
- Colors indicate θ values;
- Intensity codes d values, characterizing NDVI-LST annual cycle;
- Saturation codes R^2 values;

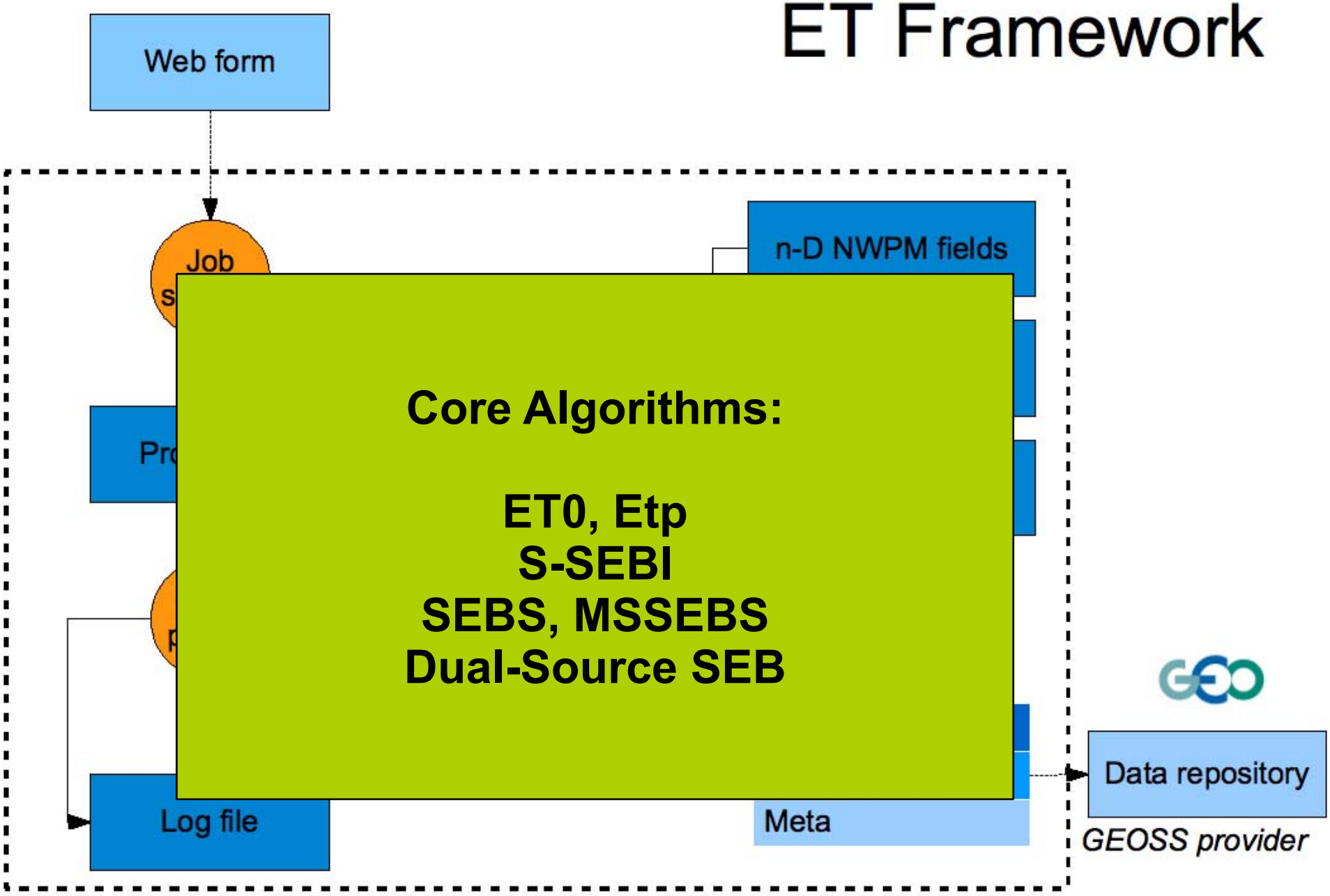
Julien and Sobrino, 2009

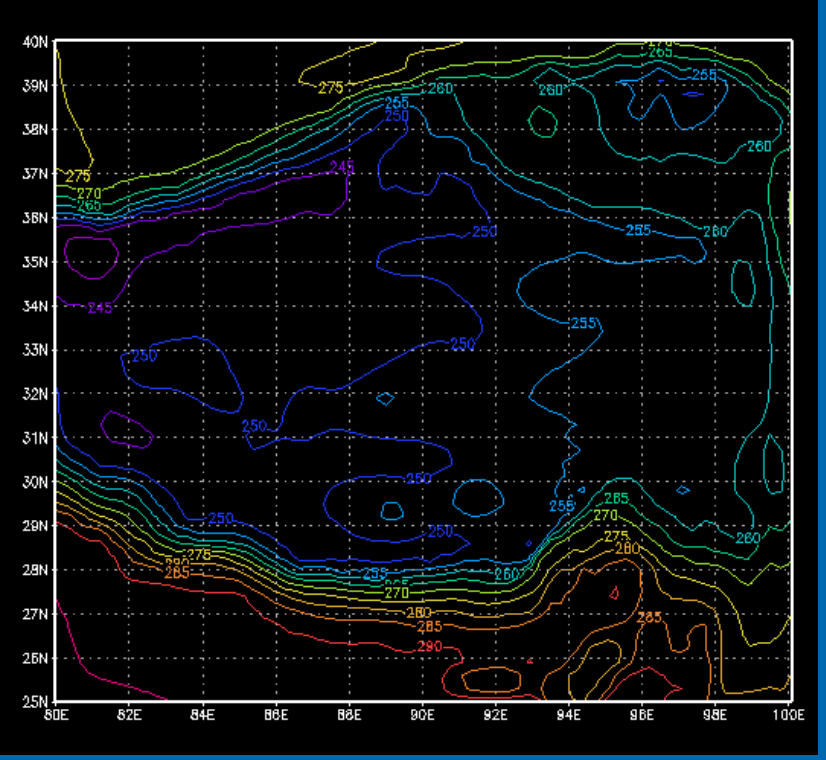
SEBI dry and wet reference states

Menenti and Choudhury, 1993; Jia et al. 2001

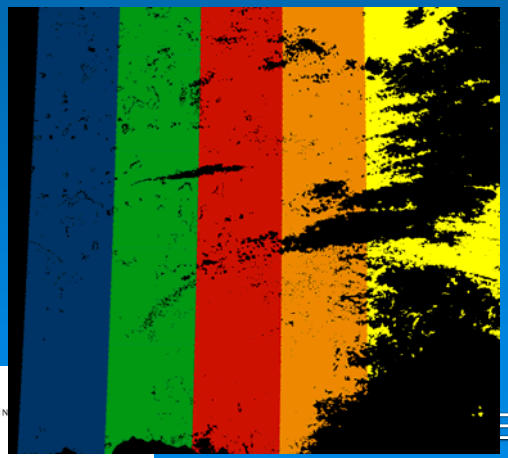


ET Framework



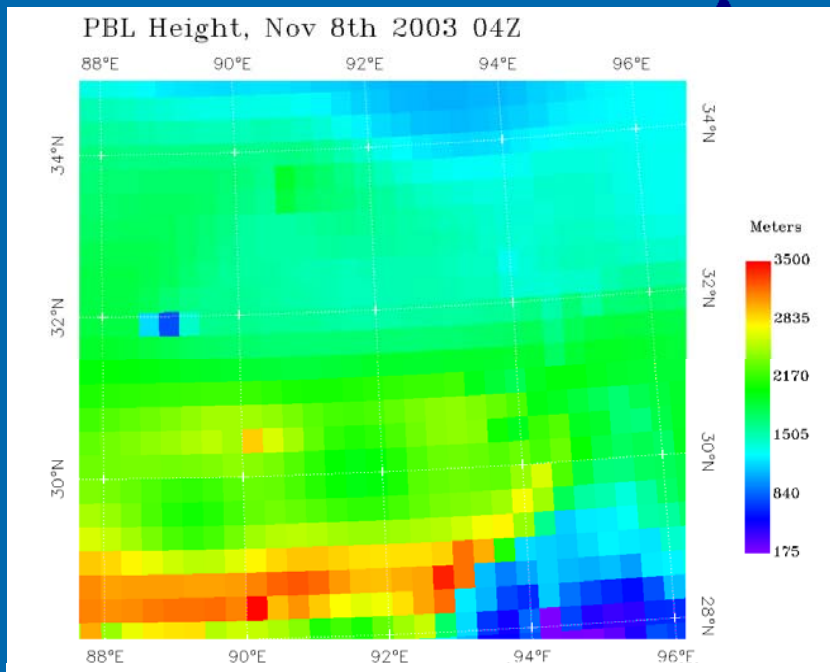


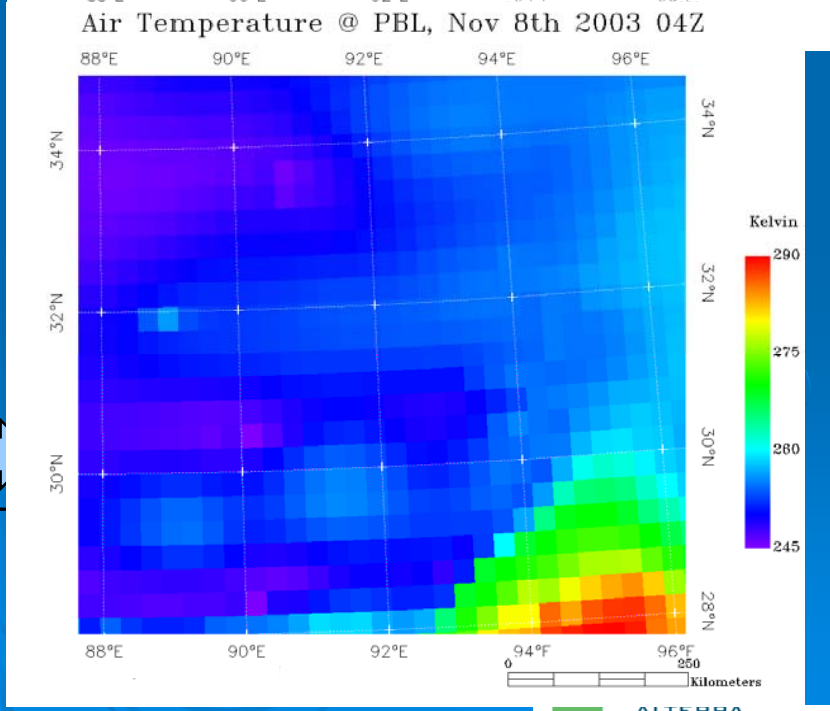
Atm. model over QTP, 30' time step



T,p,q,u,v @ PBL
q,p @ 2m

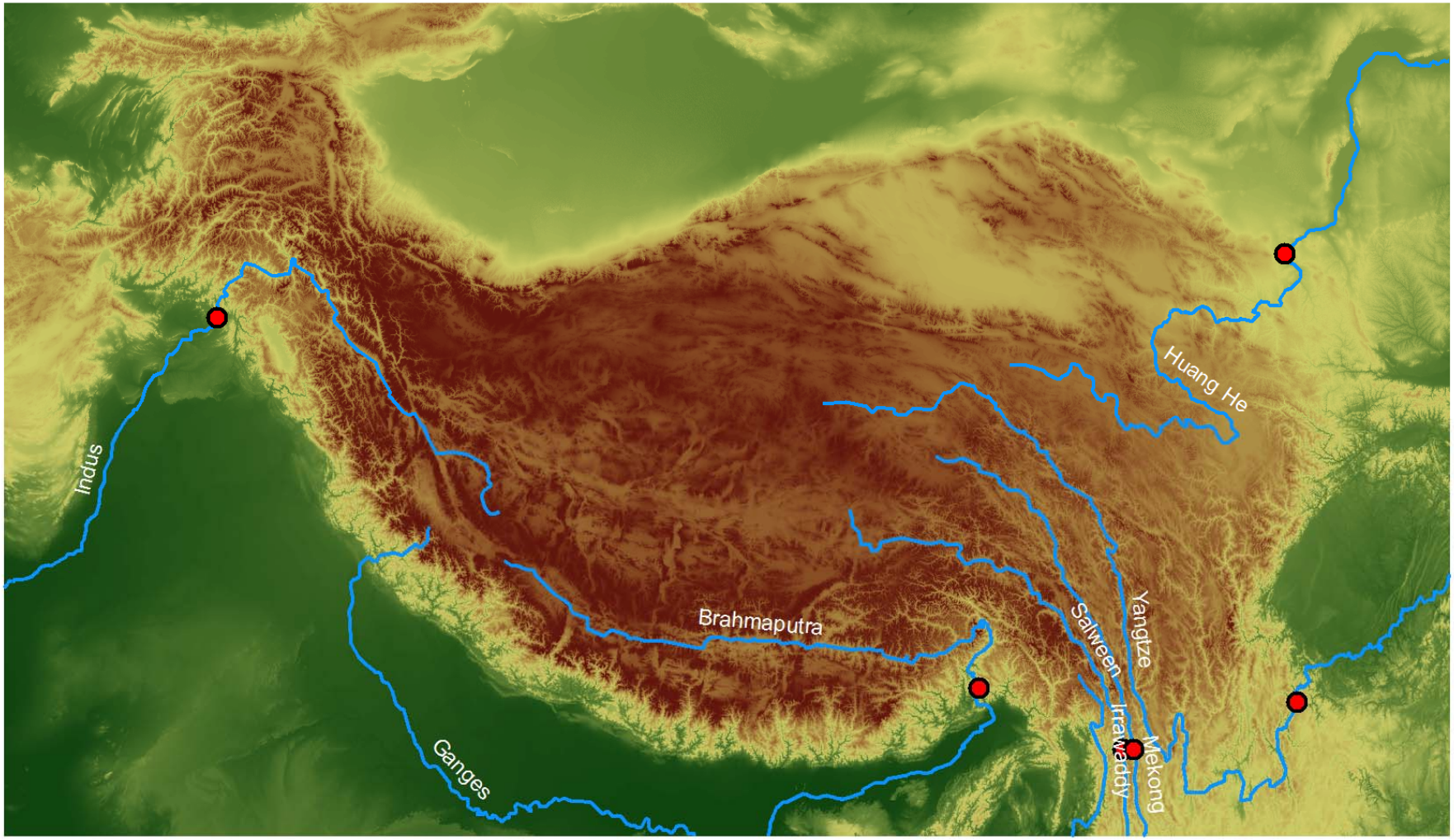
Pixel time of acquisition of LST





Tibetan plateau water yield

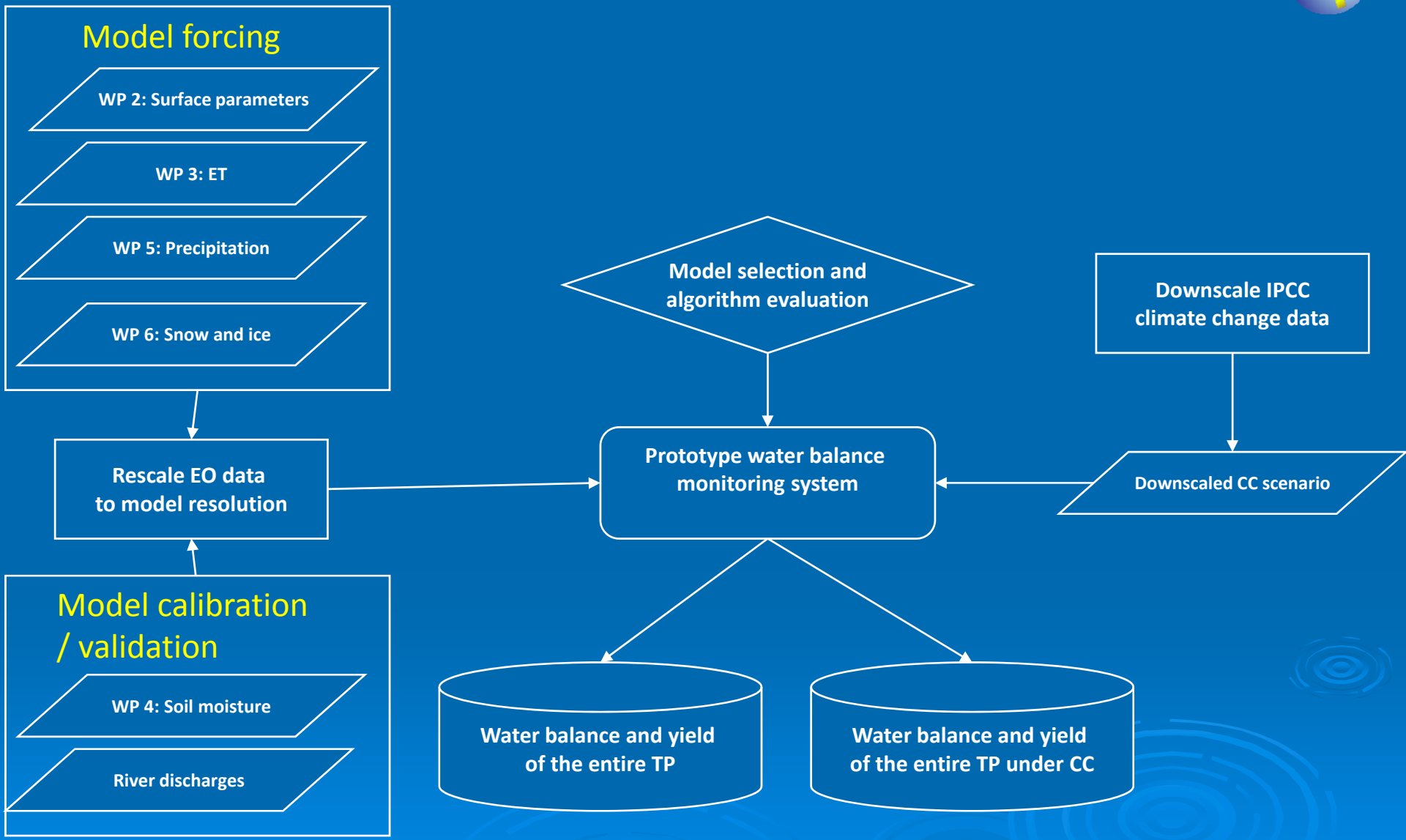
Immerzeel et al., 2009



WP 8 : Partners

- IGSNNR, China
- NIT, Rorkee, India
- ITP, China
- CMA, China
- FutureWater, SME, the Netherlands
- Ariespace, SME, spin-off University of Naples, Italy

Flow chart WP8



Model structure

Model resolution:

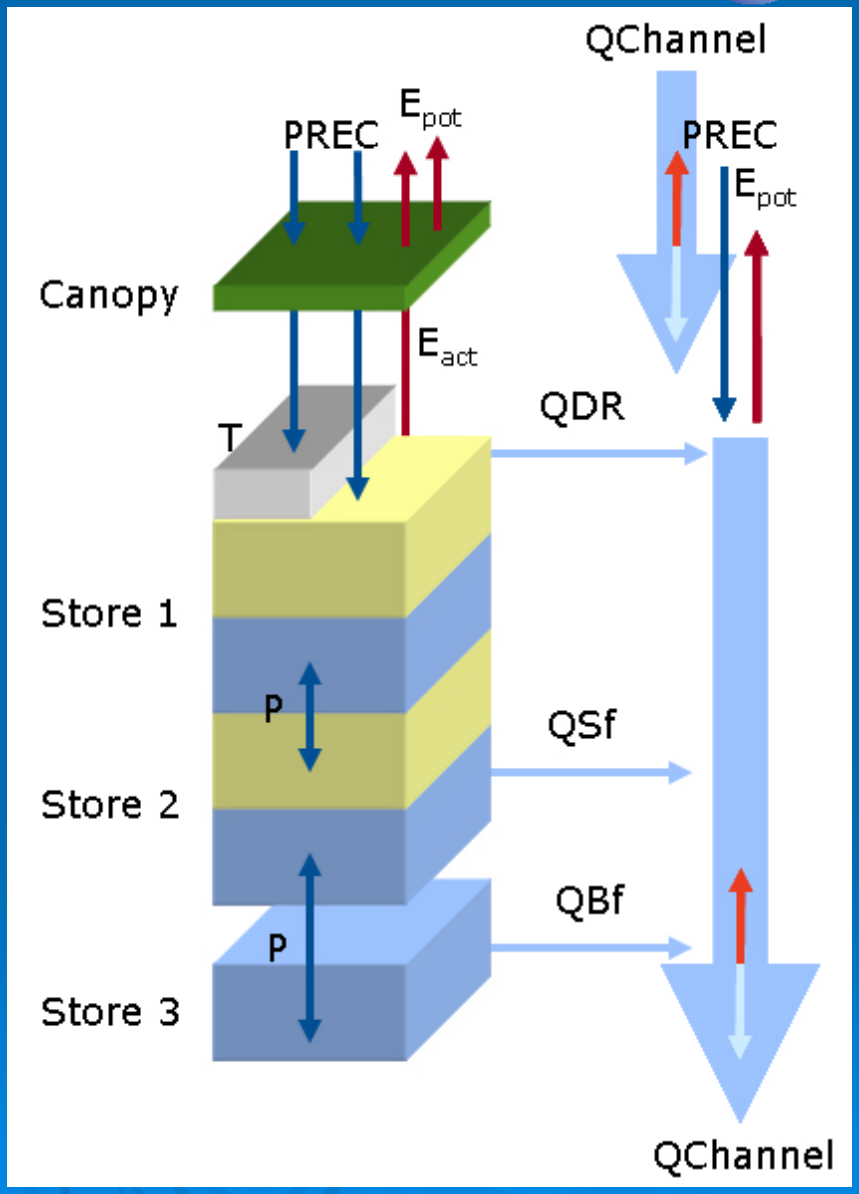
- Regular grid of 5 km with regular surface area;
- Daily time step.

Each cell describes:

- The vertical flow of water through four compartments:
  - Canopy;
  - Three soil compartments.
- Soil and canopy are fed by rainfall and snowmelt and depleted by evapotranspiration;
- The transfer of runoff to the drainage network.

Between cells:

- Routing of water along drainage network;
- Surface water represents either streams or lakes that can cover multiple cells and buffer stream flow.



Plateau Water Balance: Data Requirements

input data

topographical:
- DEM
- slope length
- local drainage dir.

soil physical:
FAO data
- theta sat.
- K sat.
- ..

vegetation:
Olson's global eco-system classification
- vegetation cover
- interc. storage

routing:
- fraction of water
- lakes
- Manning
- river morphology

model forcing:
- rainfall
- actual evapotranspiration
- air temperature

TibWatMod

output data

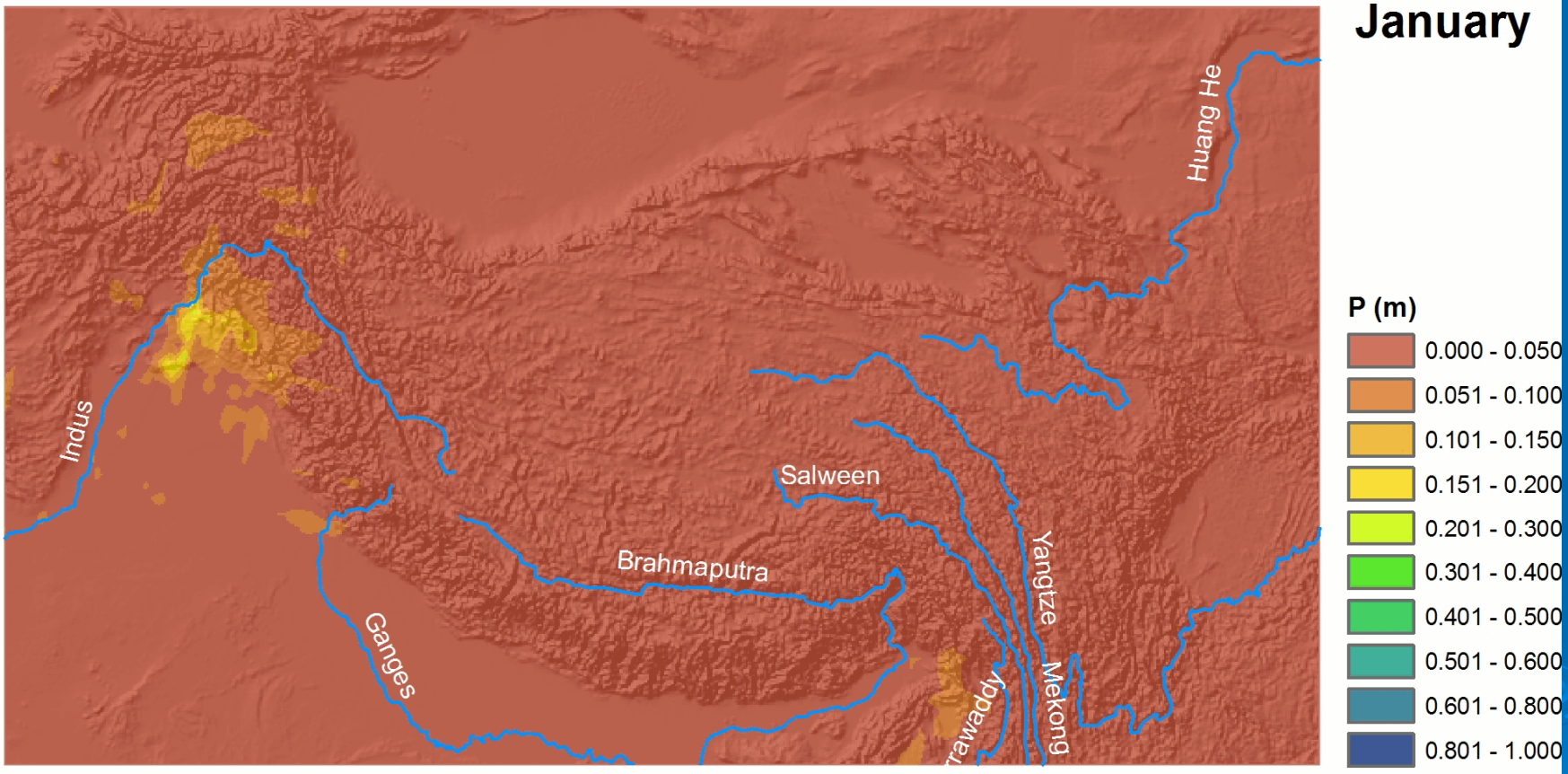
waterbalance:
- soil moisture
- surface flow
- interflow
- baseflow
- snowcover
- storage in layers 1, 2 and 3
- groundwater recharge

routing:
- discharge
- water levels

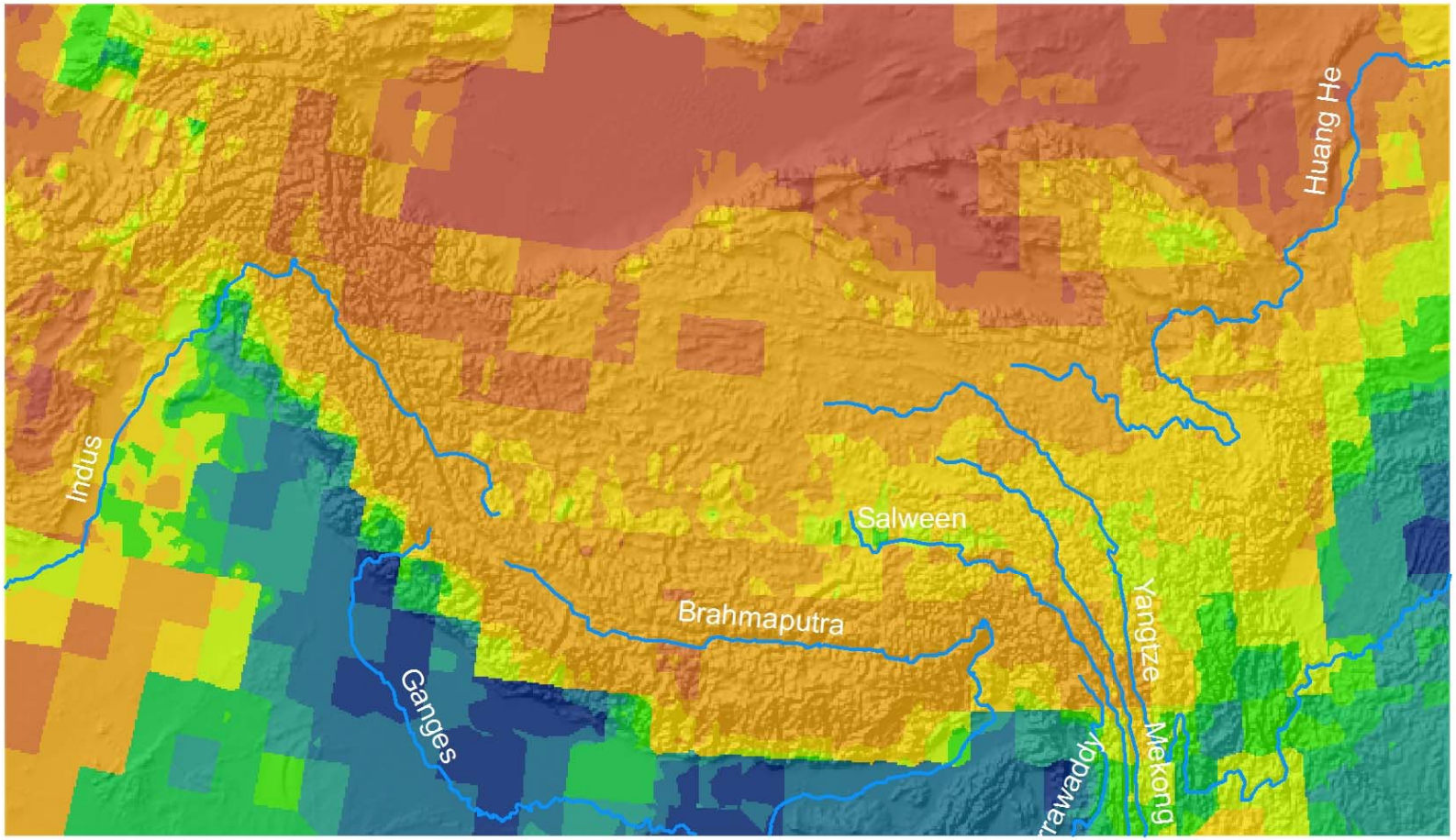
Model description - prototype

- **TibWatMod** is based on the PCRGLOB-WB (PC Raster GLOBal Water Balance) model (Van Beek, 2007; Univ. Utrecht, The Netherlands).
- Resolution of 5 km x 5km - 708 x 408 cells
- All data in Albers Equal Area projection
- Forcing
  - TRMM 3B42 precipitation
  - ERA40 ET_{act}
  - Air temperature

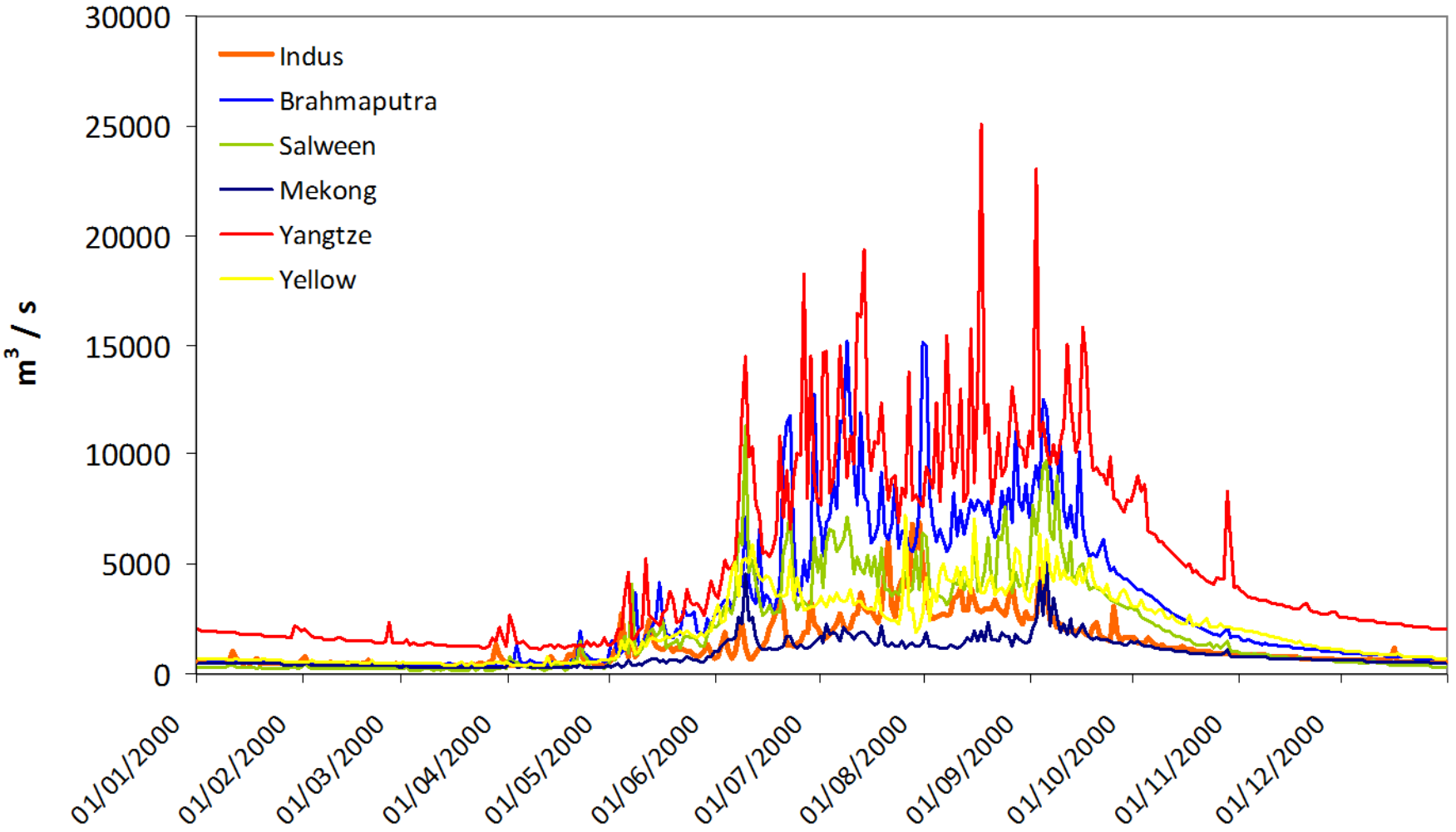
Monthly TRMM 3B42 precipitation 2000



Actual evapotranspiration 2000



First results: routed discharge



Thank you!
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