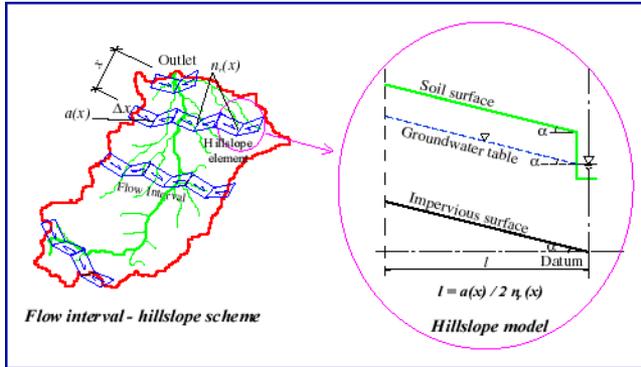


DIAS-based Agricultural Drought Monitoring and Prediction (DADMP)

Toshio Koike

Director, International Centre for Water Hazard and Risk Management (ICHARM)
Professor Emeritus, The University of Tokyo

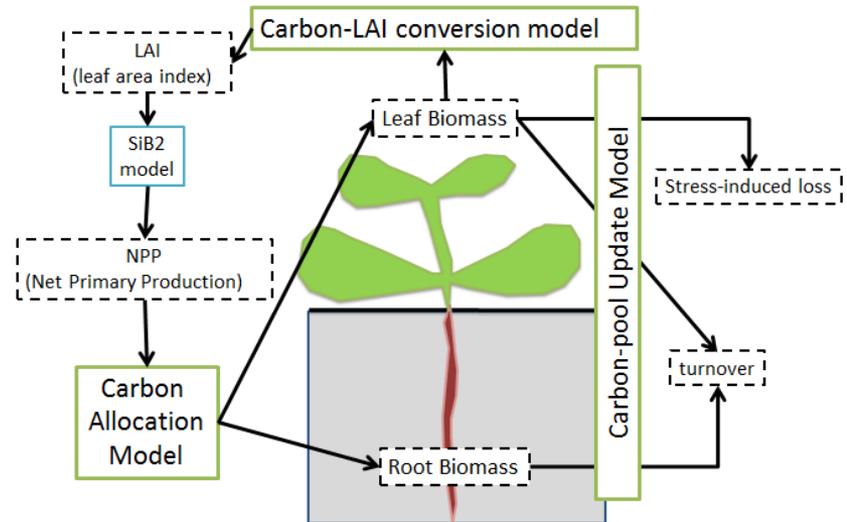
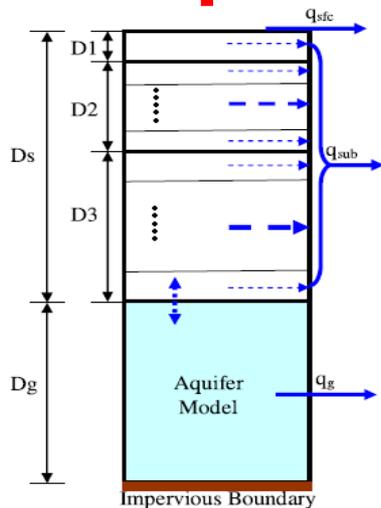
Water and Energy Budget-based Distributed Hydrological Model with Vegetation dynamics (WEB-DHM-Veg)



→ WEB-DHM-Veg can simulate soil moisture, groundwater, river discharge, and **vegetation growth** (and their interactions).

GBHM(river model)

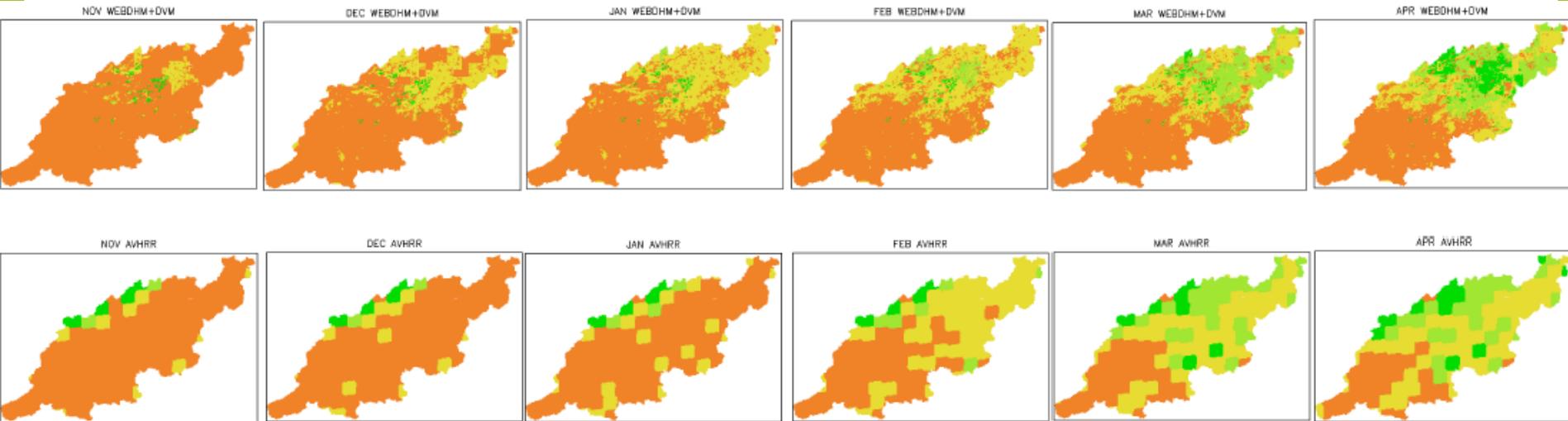
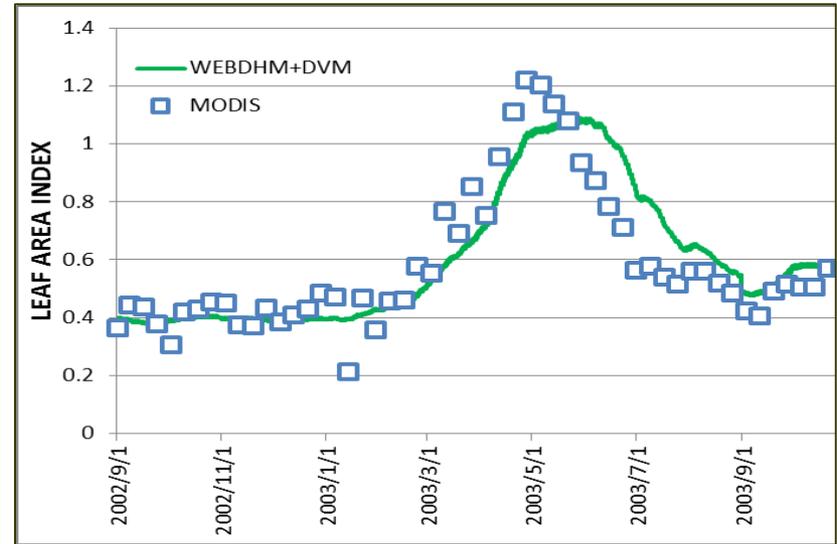
Coupling



Hydro-SiB(Land surface model)

Eco-hydrological Model for Identification of Droughts

LAI: Simulated vs. MODIS

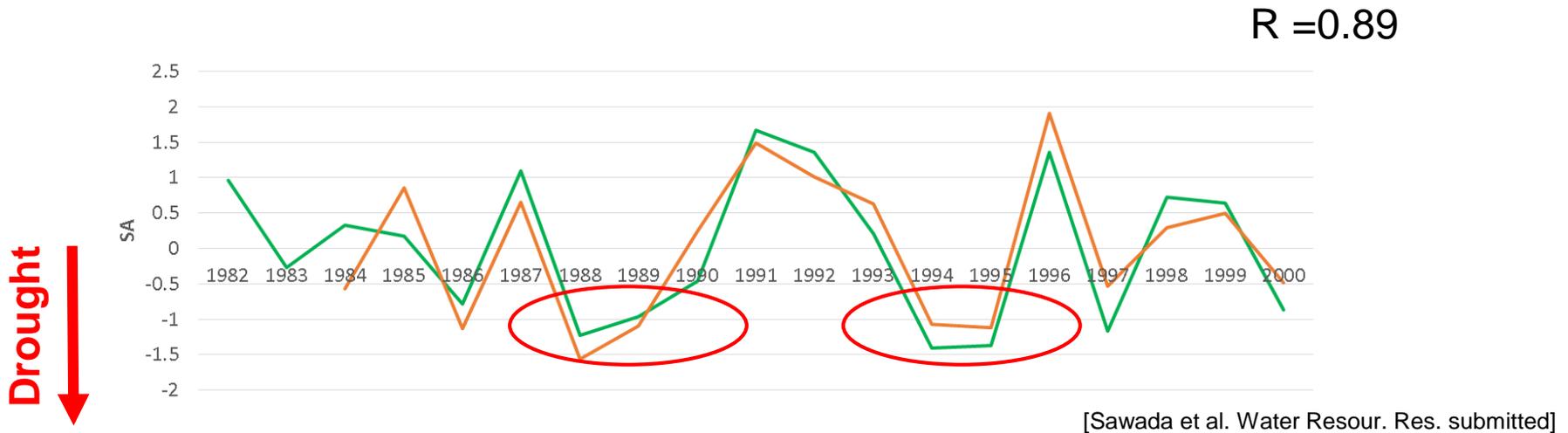


Model Verification

- Agricultural Drought Index -

Drought indices (SA index)

Green: simulated annual peak LAI and Orange: nationwide crop production



→ The drought index calculated from the model-estimated annual peak of leaf area index correlates well with the drought index from nationwide annual crop production.

→ Severe droughts (food shortage) in 1988-1989 and 1994-1995 are reported on FAO report [FAO, 2005]

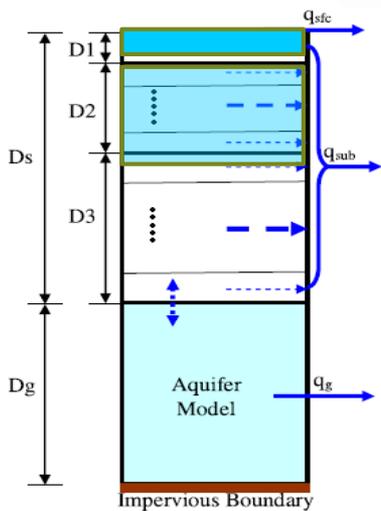
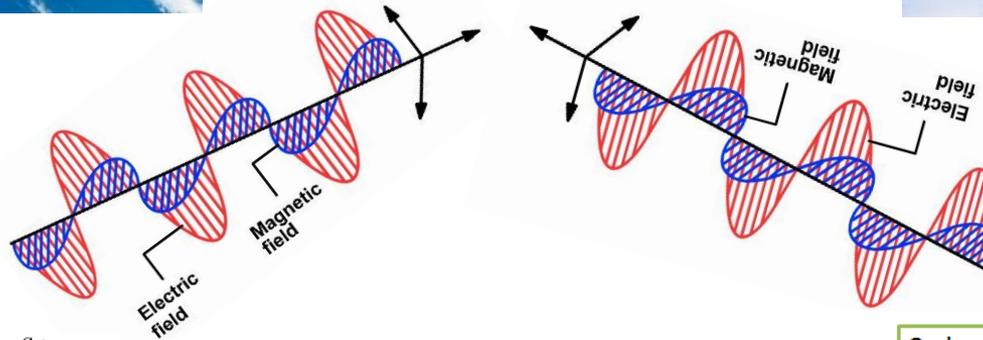
AMSR-E



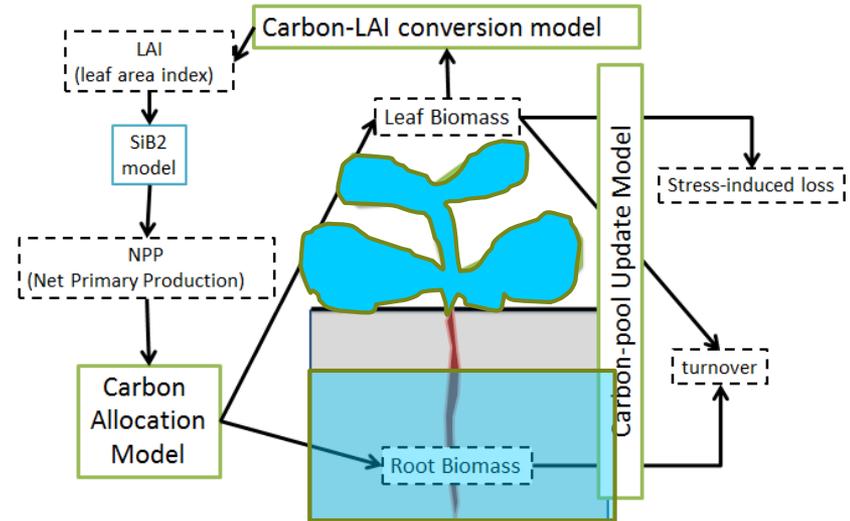
Coupled Data Assimilation



AMSR2



Electronic-Magnetic
Wave
+



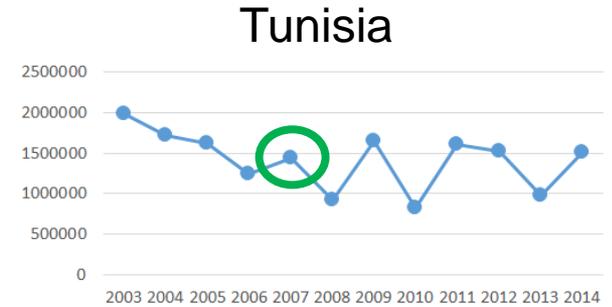
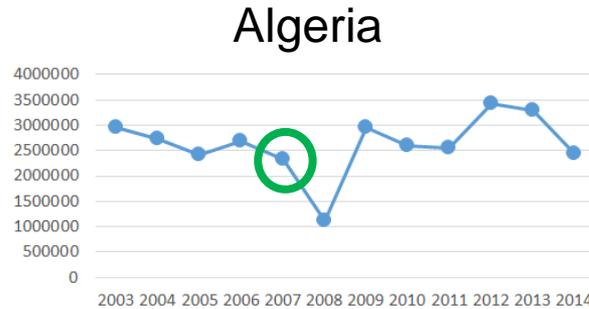
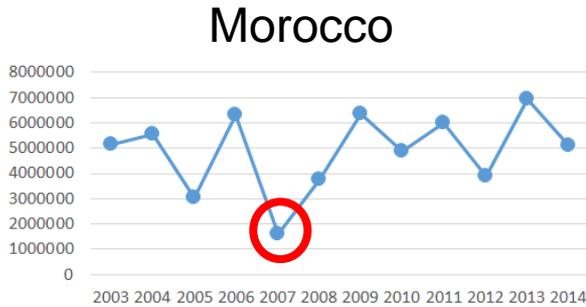
Land surface model

Dynamic Vegetation Model

Drought analysis

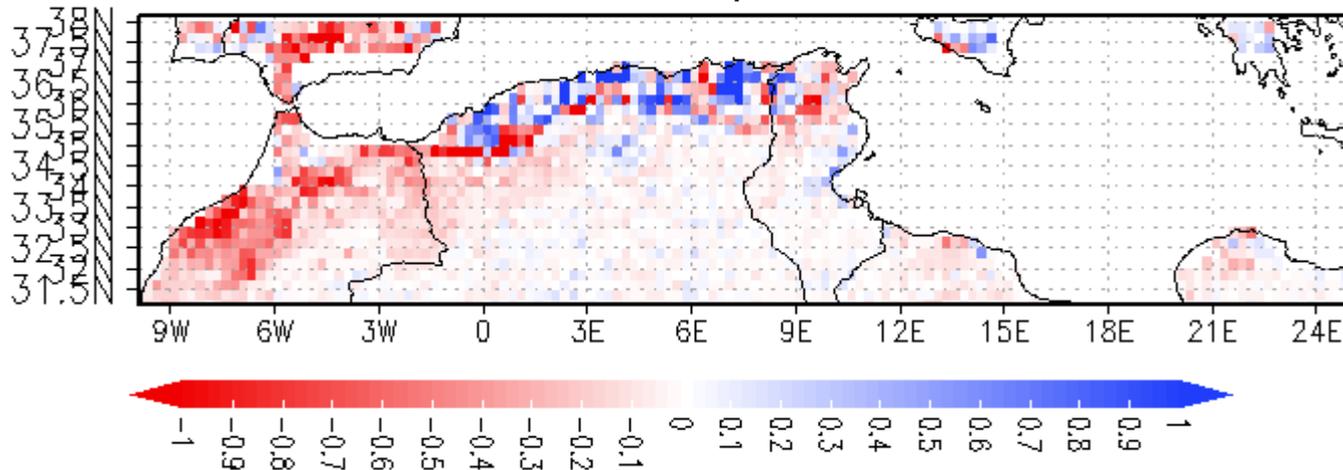
Wheat production

2007 Morocco Drought



LAI anomaly from CLVDAS

LAI anomaly 20070401

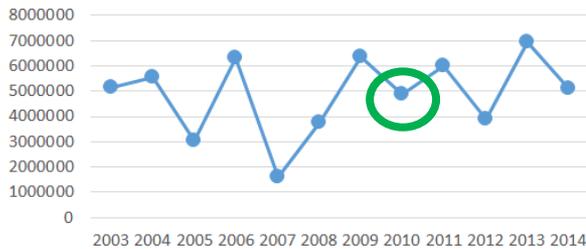


Drought analysis

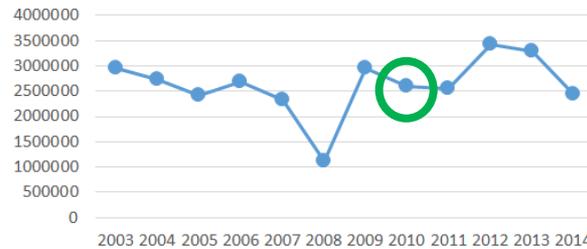
Wheat production

2010 Tunisia Drought

Morocco



Algeria

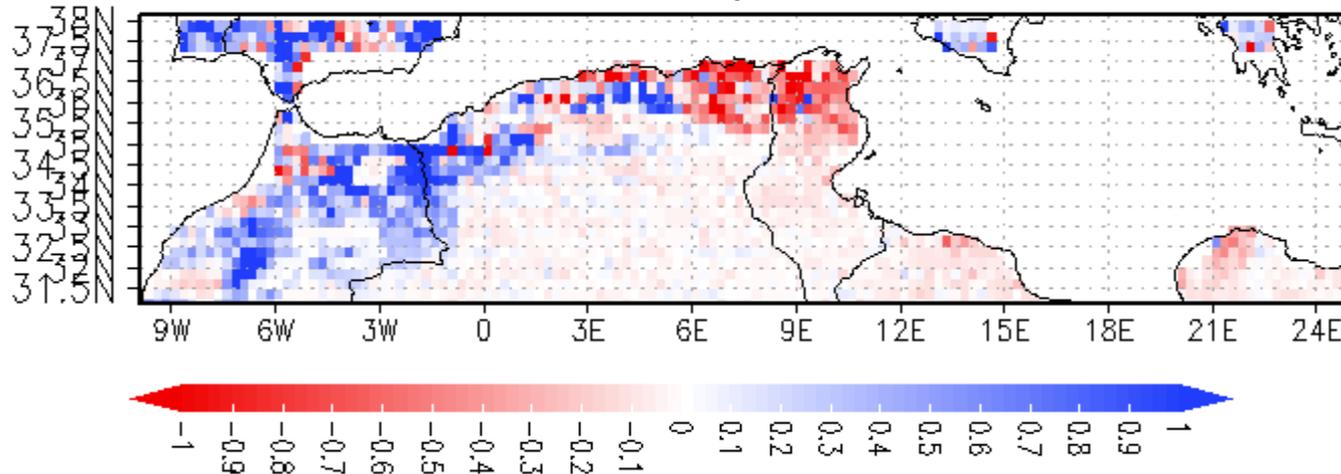


Tunisia



LAI anomaly from CLVDAS

LAI anomaly 20100401

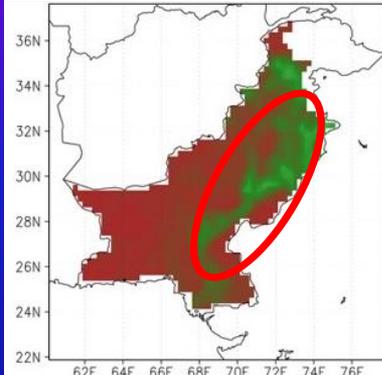
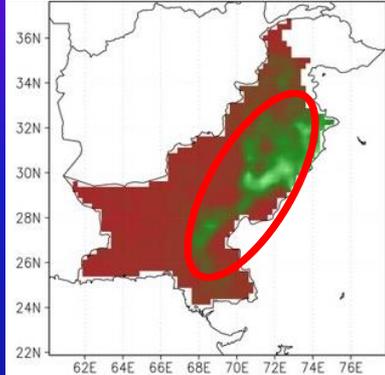


Agriculture

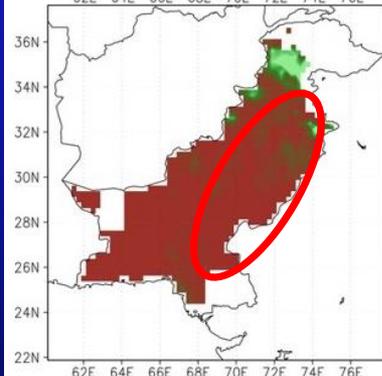
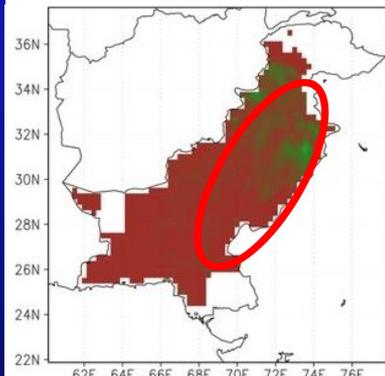
Winter, 2007

Summer, 2007

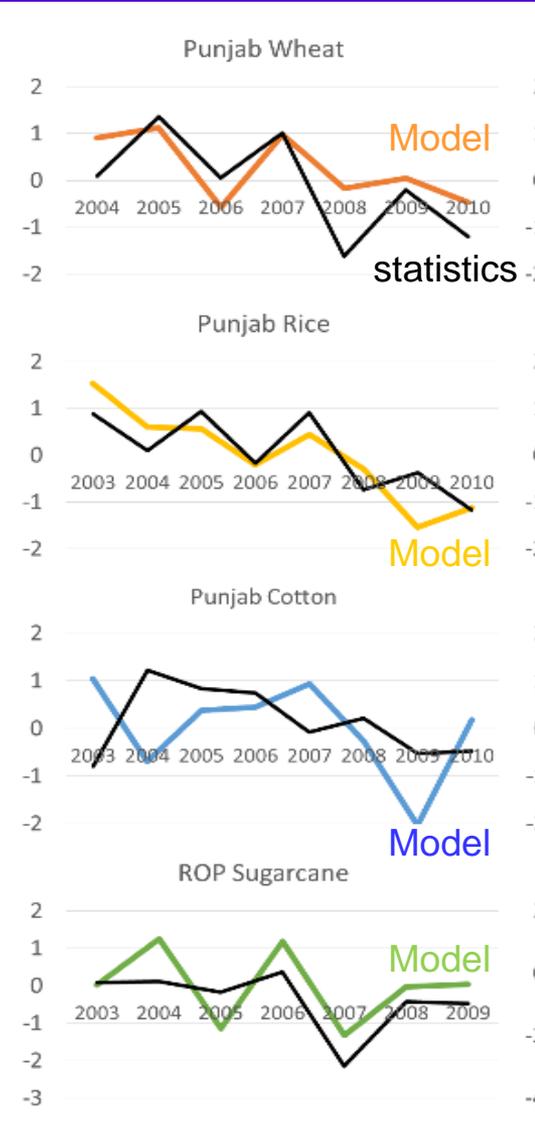
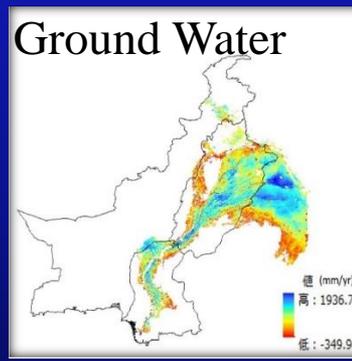
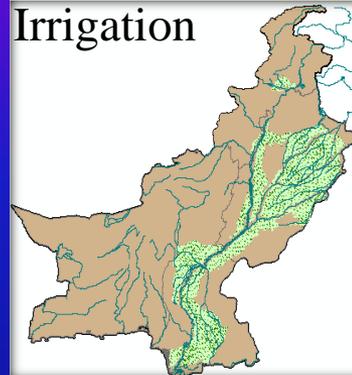
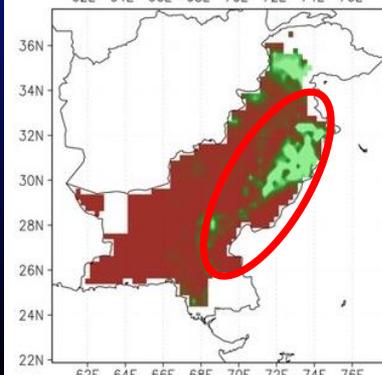
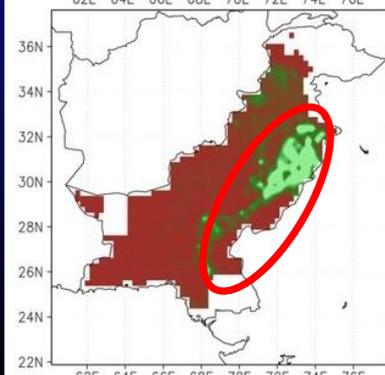
Satellite



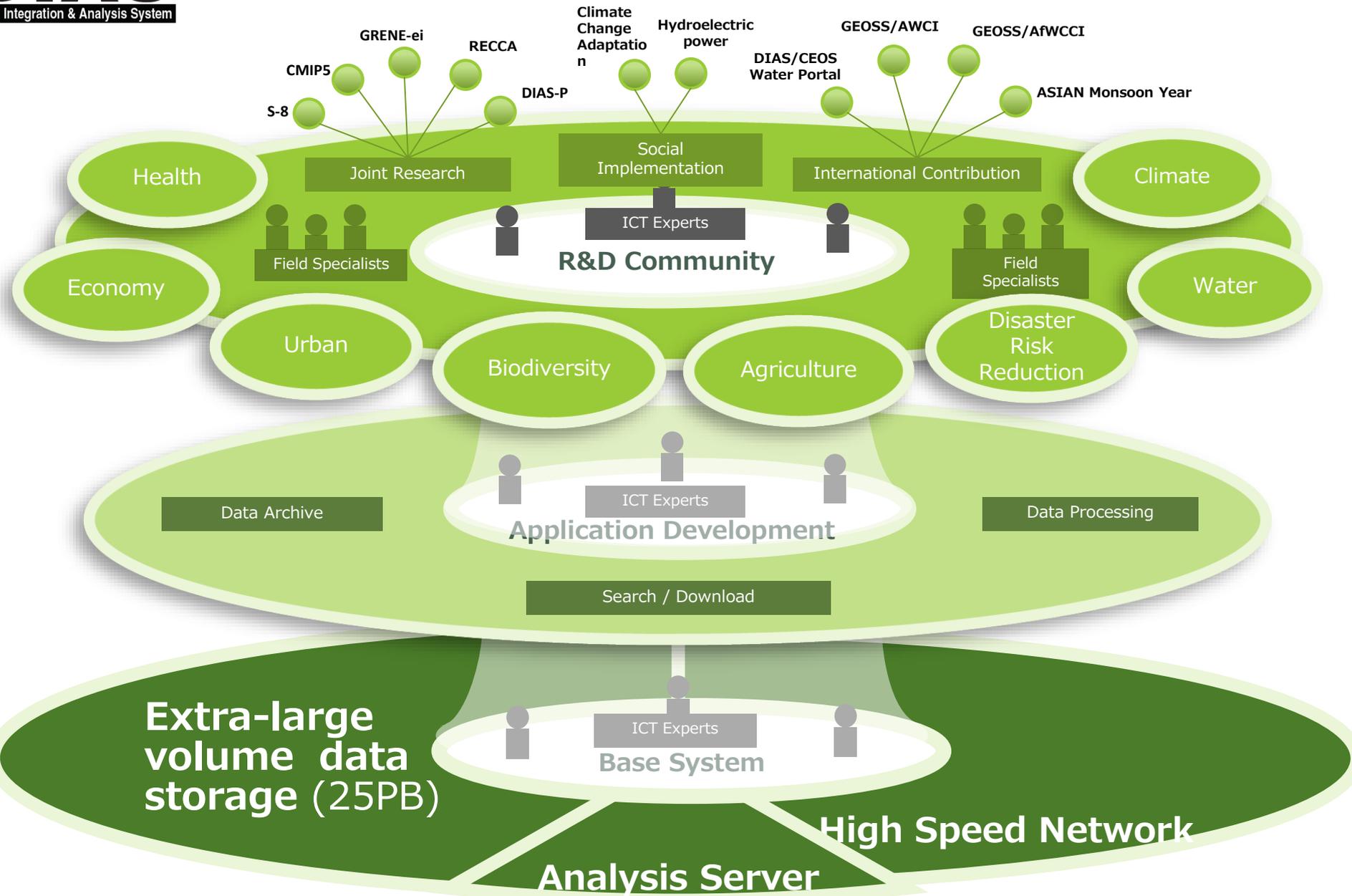
Preliminary



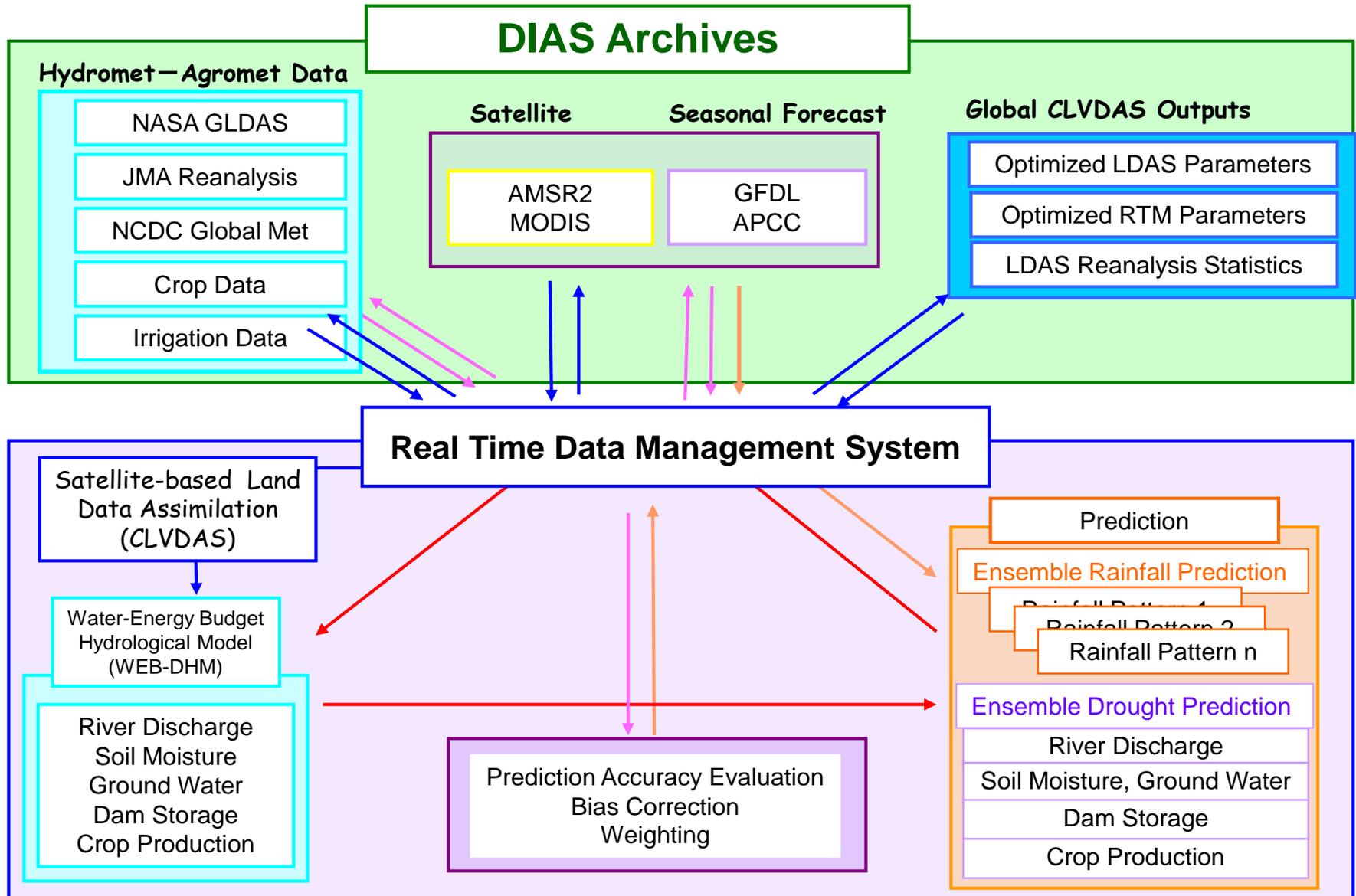
Improved



Challenges to variety, volume, velocity and veracity.



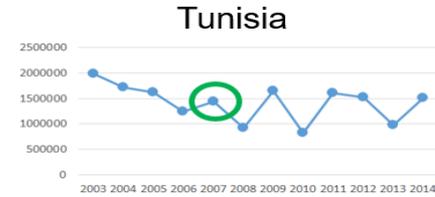
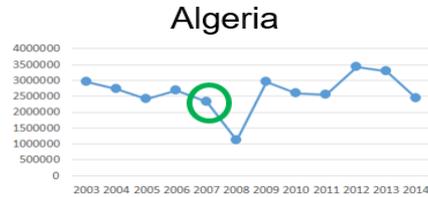
Drought Monitoring and Prediction



Drought Monitoring and Prediction

Wheat production

2007 Morocco Drought



LAI anomaly from CLVDAS

LAI anomaly 20070401

