Task 3.2: modelling combined processes (leader: INAT)

Semi-distributed hydrology along with subsurface hydraulic redistribution

LISAH
CESBIO
INAT
UNICA

Task 3.2 (LISAH)

Integrated modelling / LISAH

Objectives: simulating ecosystem services (agricultural yield, runoff to impoundments, infiltration to subsurface aquifers) by accounting for sub-hour processes at the agricultural field resolution.

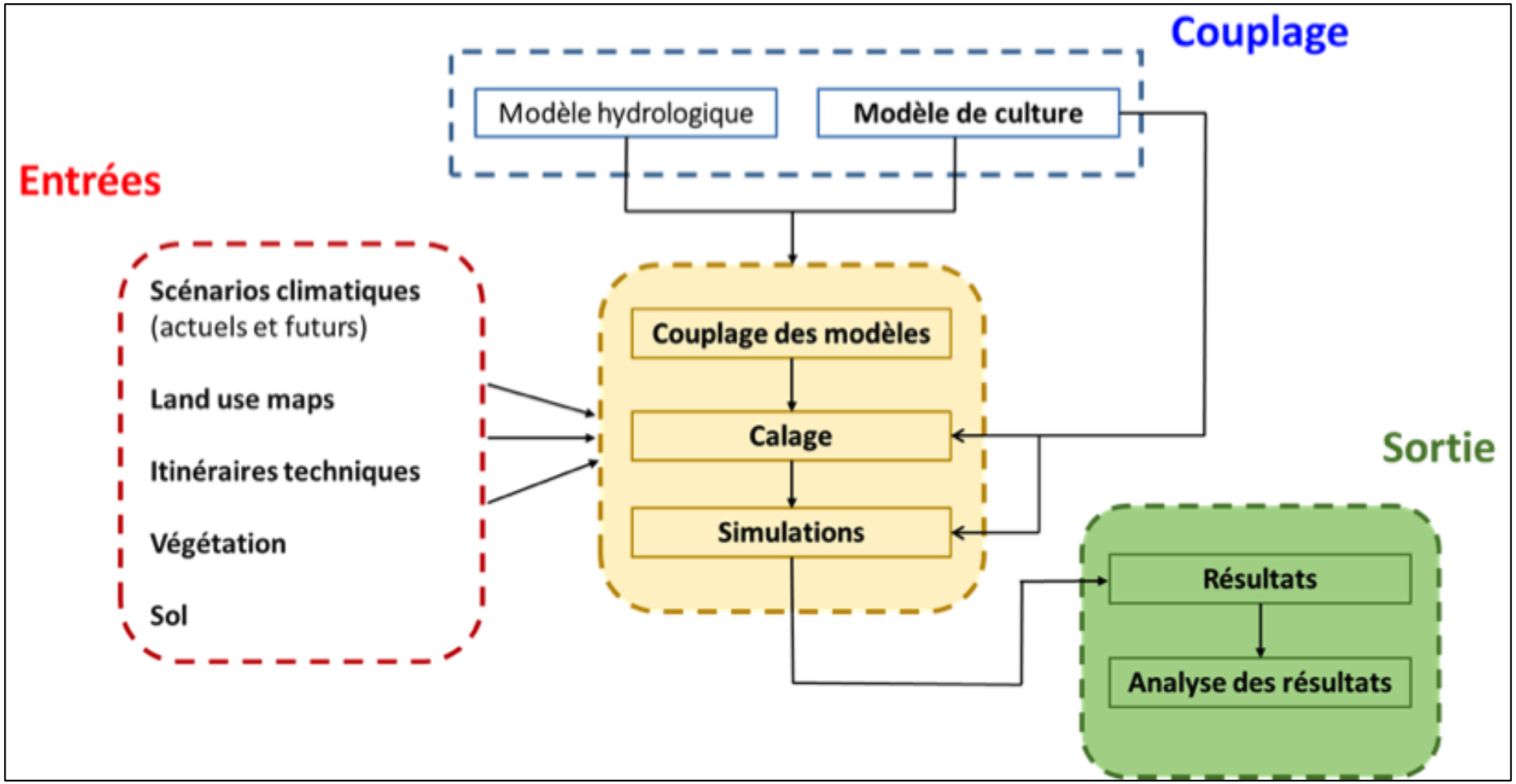
Method: designing and implementing an integrated model that includes crop dynamics and hydrological processes (runoff / lake / aquifer) distributed manner (hydrological connectivities)

Integrated modelling / LISAH

Means

- Available dataset, almost analysed in TK2.1
- Available models: MHYDAS for surface hydrology, DAHM-reservoir for lac-aquifer exchanges, AqYield (+C02) or SAFYE for crop dynamics
- Available coupling platform: OpenFLUID
- 1 forthcoming ALTOS post-doc wo will works on (1) the integration of the three aforementioned processes, (2) the multi-process based calibration, and (3) the numerical simulation on the basis of scenarios
- 1 ongoing PHD who works on coupling surface hydrology / crop modelling

Integrated modelling / LISAH



Integrated modelling / LISAH

Partnership

- INRGREF

Roadmap

- Need to clarify overall objectives, including, for each process, which resolution, which parameterization strategy (e.g., soil infiltrability ?), which calibration / validation strategy (temporal window, requested data, calibration procedure)
- Need to articulate between PhD and post-doc
- Need to define post-doc profile and to find a candidate.

Integrated modelling / LISAH

Difficulties

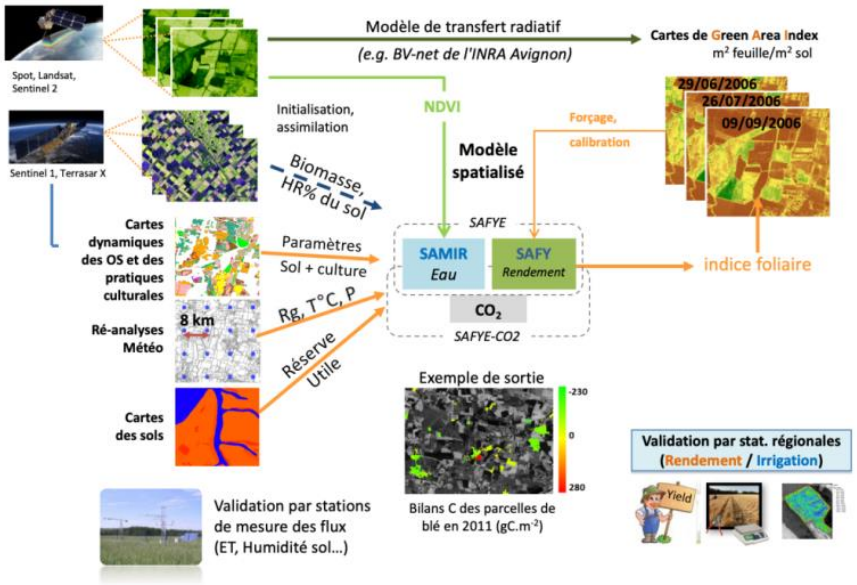
- Difficulty to brainstorm internally at LISAH because of the confinement and individual situation of many of the key colleagues in the project.
- Risk of rushing into action on the wrong track.
- If brainstorming with only a few people, risk of non-adherence/ incomprehension of others about the choices made.
- Postponement of the brainstorm until the resumption of activities (May-June?).
- Means postponing the recruitment of the post doc until the beginning of the school year at best, probably in the autumn.

Task 3.2 (CESBIO)

- Coupling distributed hydrology modelling along with crop growth modelling (Cap Bon)
  - coupling of MHYDAS distributed hydrological modelling and SAFYE crop growth/ET model within the OpenFLUID platform.

  > Expertise provided from CESBIO on SAFYE Python version

- Hydrological modelling and climate forcing (Tensift)
  - Methodological innovations: comparing SAMIR-WEAP-MODFLOW simulations against SAFRAN-ISBA-MODCOU ones to highlight the impact of spatial variability in climate forcing at the catchment extent.



Task3.2: INAT

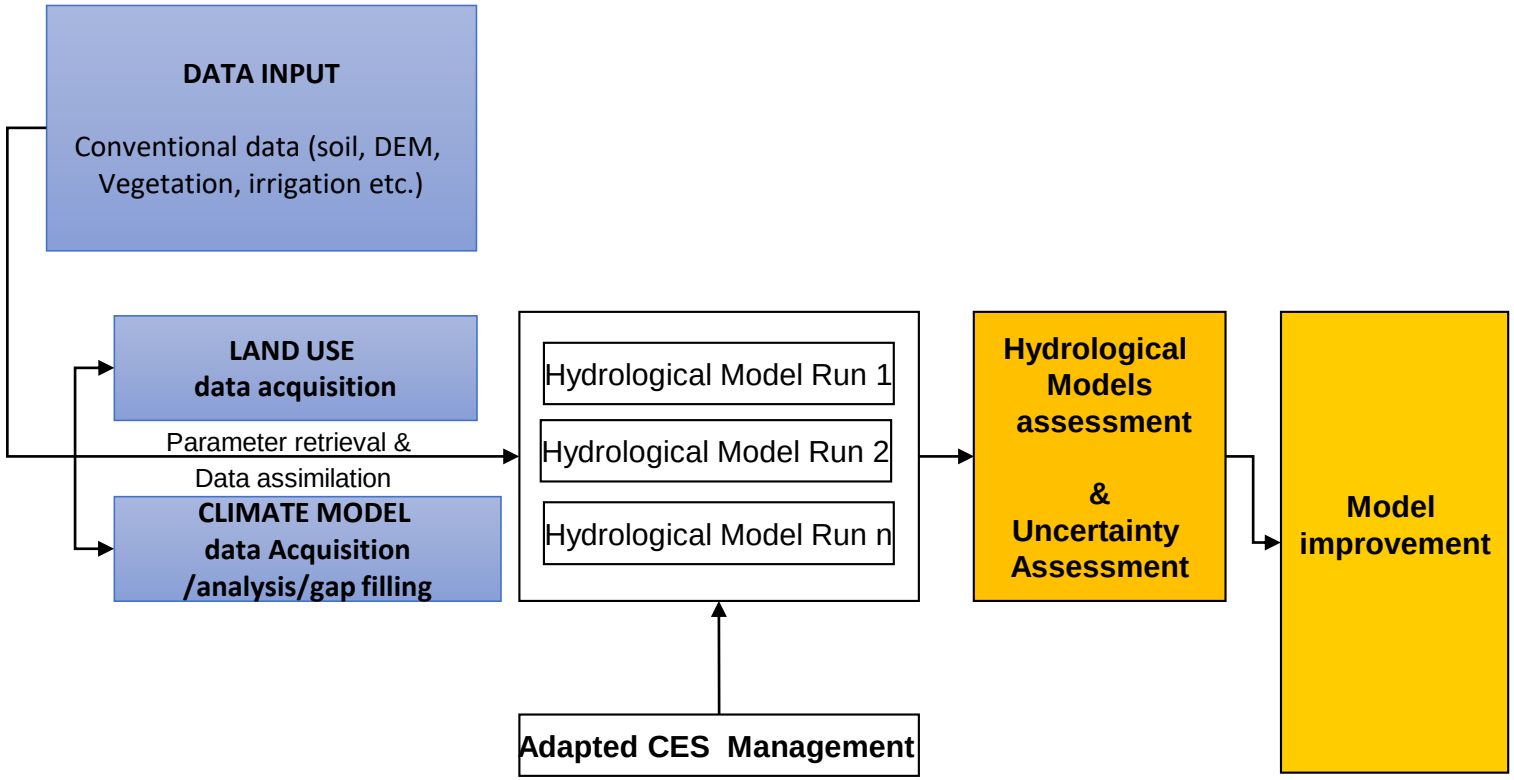
- **Objective** : improving subsurface hydraulic redistribution within the swat model
- **Method** :

1. Model Setup and runs using outputs from tasks 1.1 and 1.2 .
2. Calibration.
3. Improvement in the performance of SWAT model .

- **Study area** : Merguellil
- Partner: INAT, UNICA

- PhD student : Ines Gharnouki

Proposal for Merguellil Ph.D Thesis



Task 3.2. modeling combined processes (leader: INAT)

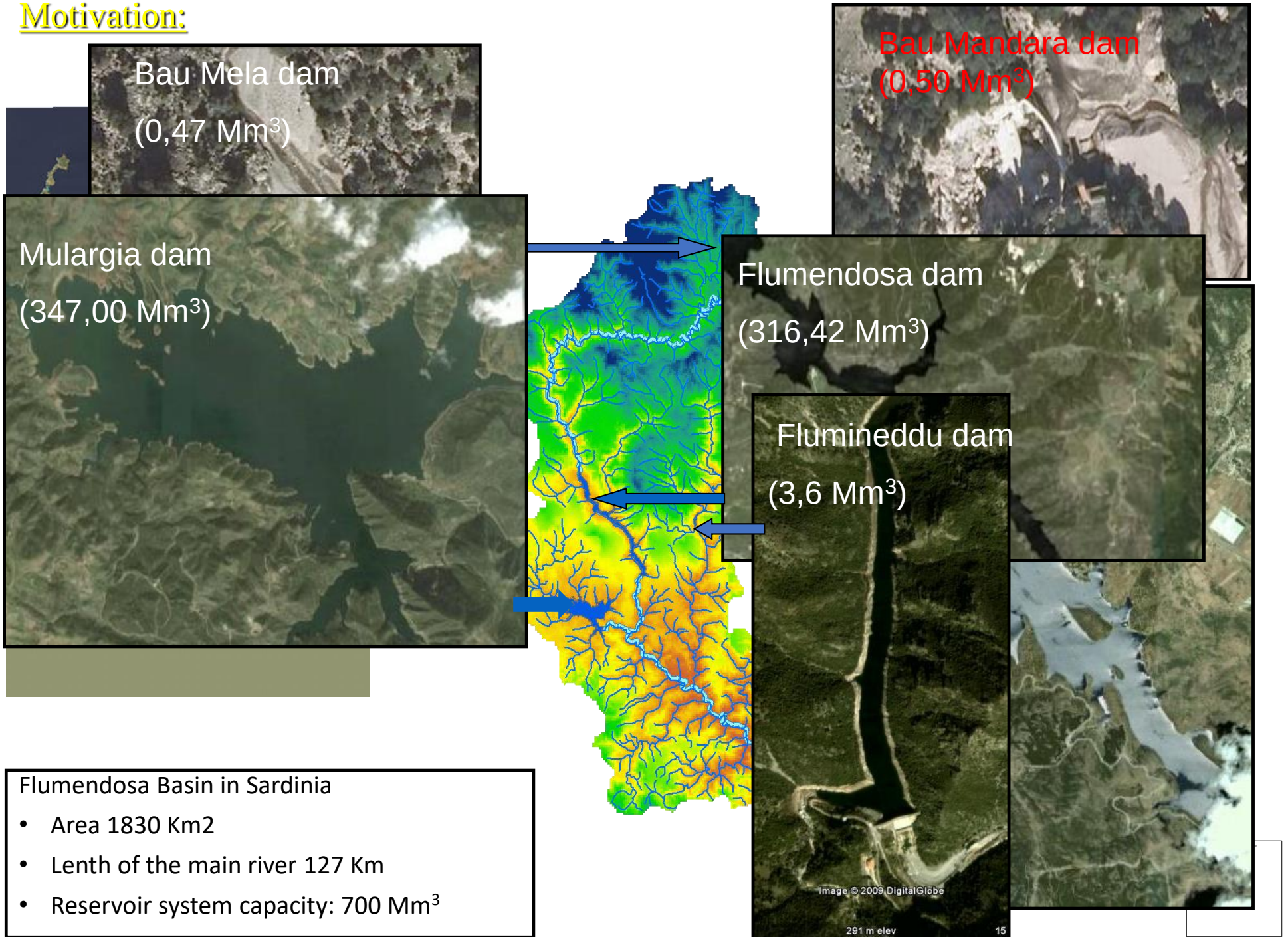
UNICA

Dipartimento di Ingegneria Civile , Ambientale e Architettura

Università di Cagliari, Italy

PI: ***Nicola Montaldo***
Giulio Vignoli, Roberto Corona, Serena Sirigu, Alessandro Seoni, Antonio Mascia, Andrea Saba

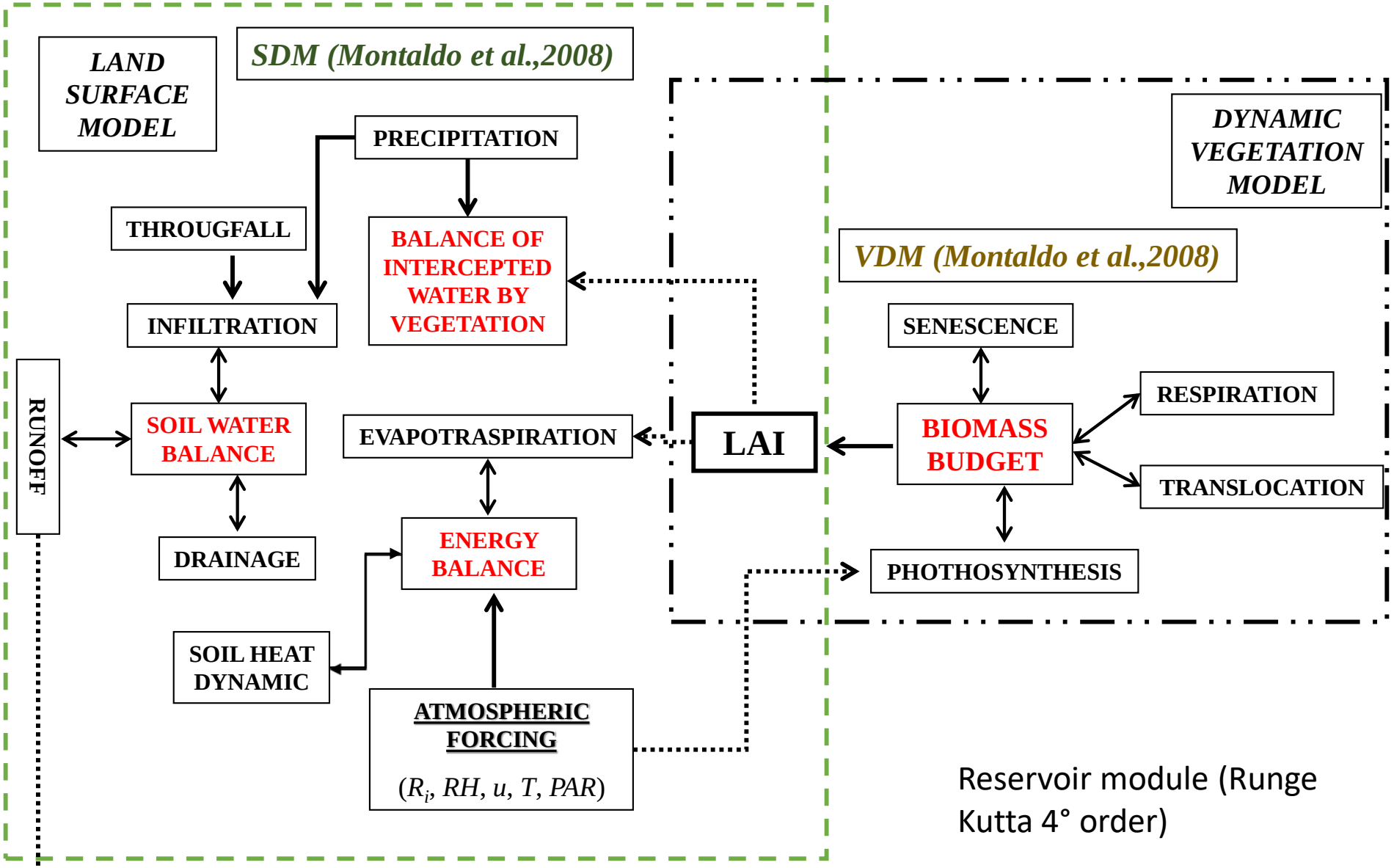
Motivation:



Flumendosa Basin in Sardinia

- Area 1830 Km2
- Lenth of the main river 127 Km
- Reservoir system capacity: 700 Mm^3

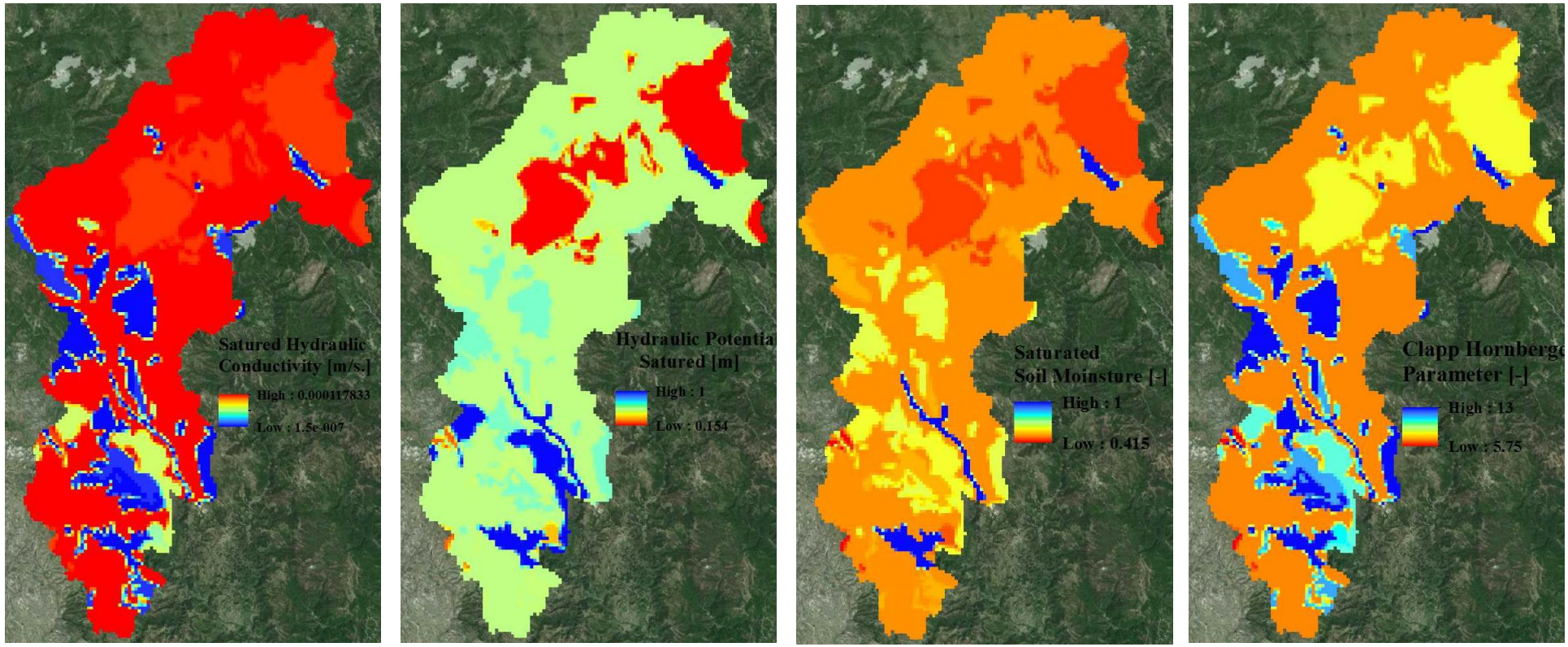
ECO-HYDROLOGICAL MODEL: ***STRUCTURE***



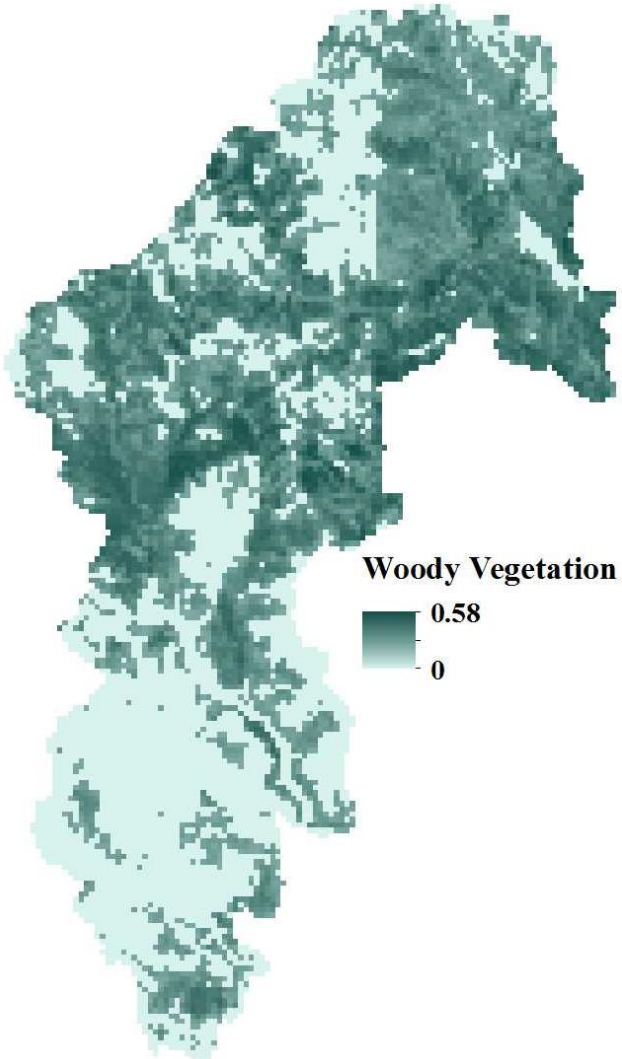
Reservoir module (Runge Kutta 4° order)

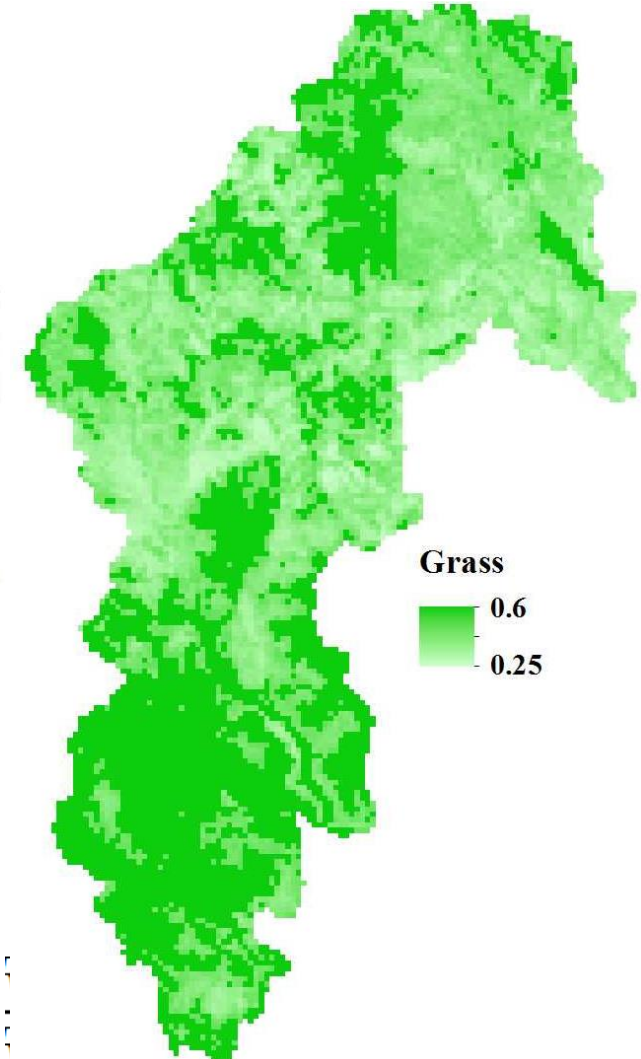
Montaldo et al. (Hydrol. Process. 2007)

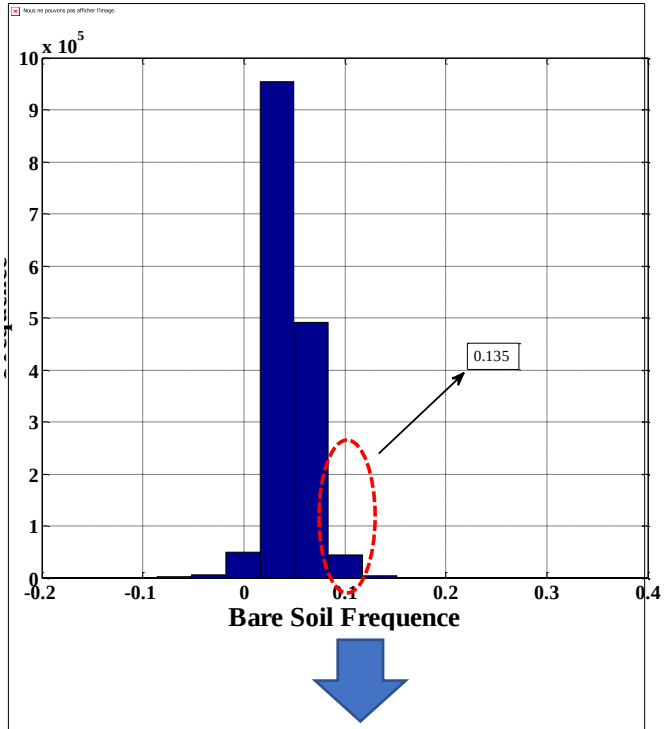
Soil parameters



Vegetation parameters



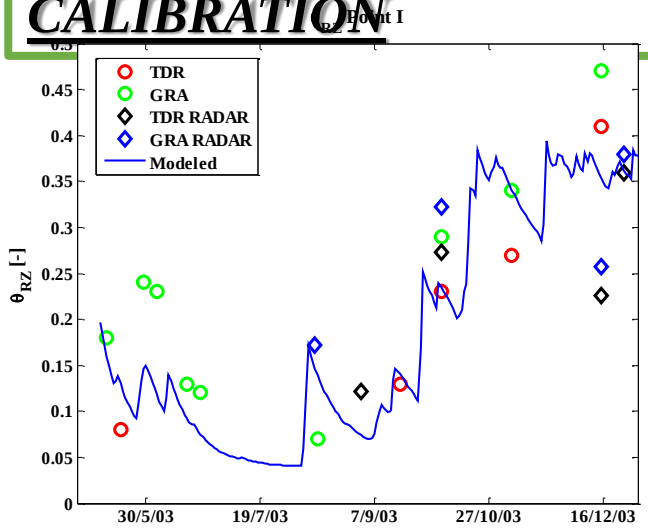


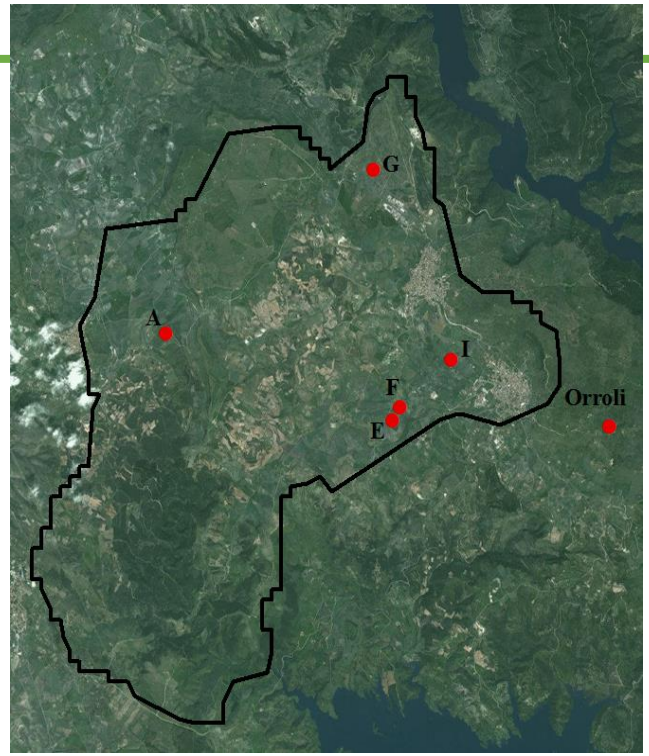


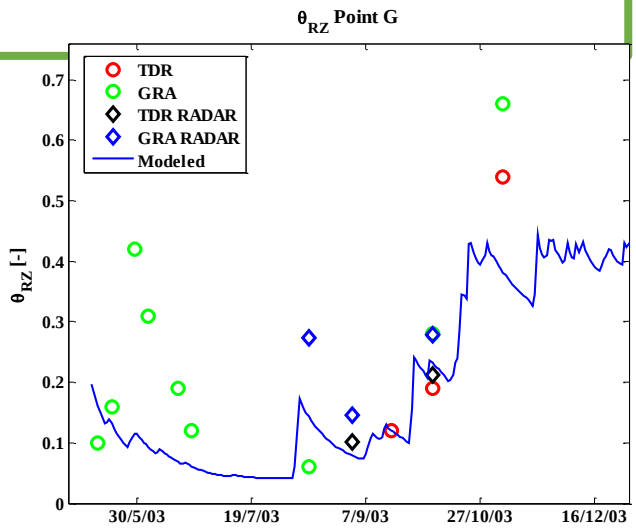
0.135 is the NDVI threshold below which, we have bare soil.

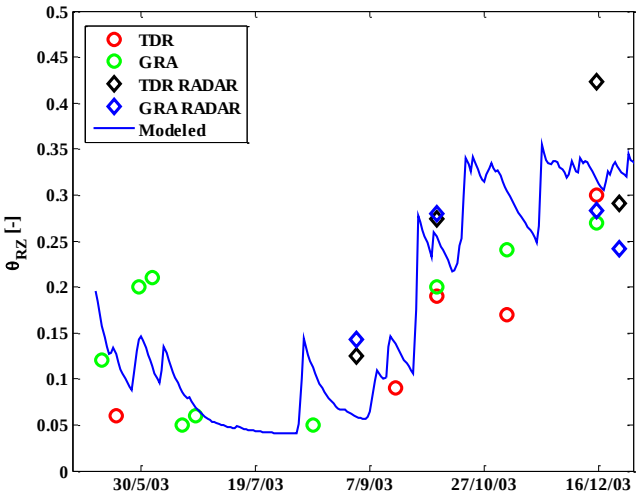
ECO-HYDROLOGICAL MODEL: soil moisture

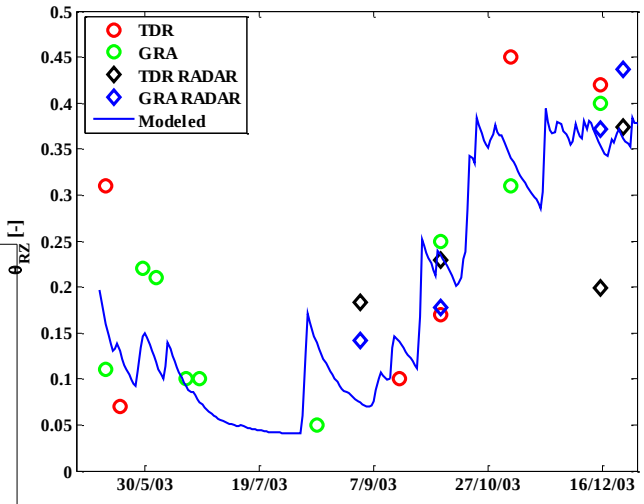
CALIBRATION











ECO-HYDROLOGICAL MODEL: ***discharge***