ALTOS

## CESBIO-IRD

Task 1.1

- Tree geometry: Taous rainfed Olive (Tunisia)
  - proxidetection (PRI, …) > maybe FLEX + LiDAR, TIR (within activities of TRISHNA TIR mission, with directional aspects)
  - DART 3D radiative transfer tool
  - ➢ PhD student + ALTOS Postdoc contract

- Spatial variability in soil infiltrability: Merguellil
  - Analysis of S1 time series
  - ➢ PhD student

- Climate variability: Merguellil
  - Downscaling of ERA5 using WRF and MODIS
  - ➢ PhD student

Task 1.2

- Land Use: Merguellil and Tensift
  - Developping and testing methods to derive seasonal (crop succession, min. twice a year) LU maps with S2 and minimum training data
  - ➢ 2 ALTOS funded traineeships
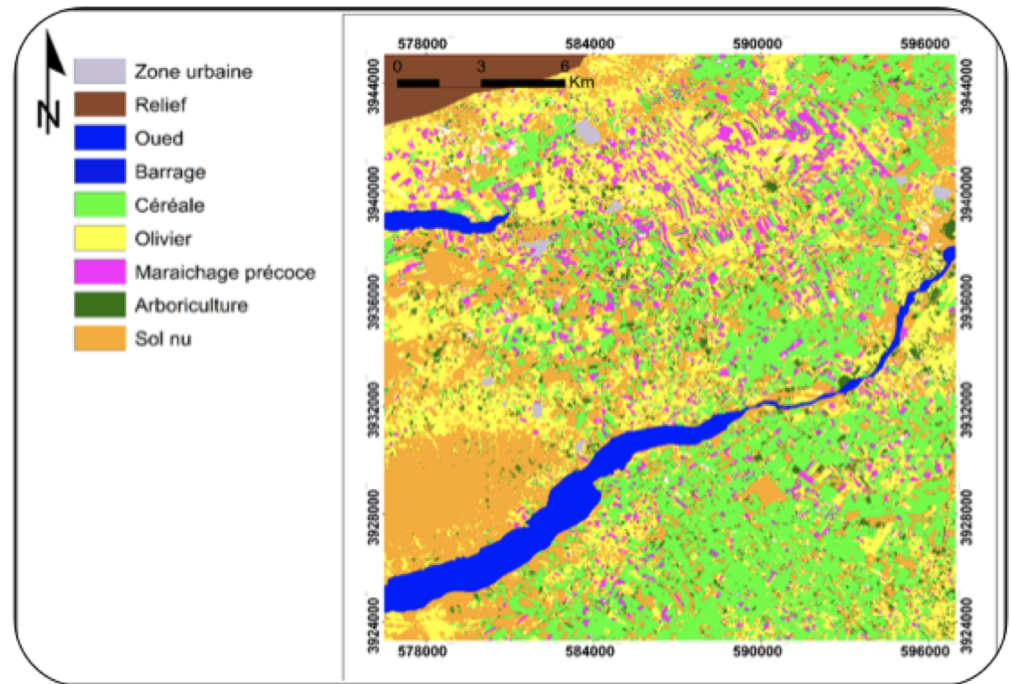
Task 2.1

- Evapotranspiration, soil moisture and crop growth
  - Irrigated (Tensift) and rainfed (Taous, Tunis) olive trees: joint use of eddy covariance / sap flow / isotopic measurements and optical / radar / thermal infrared remote sensing data, joint use of times series from insitu and remote sensing data.
  - ➢ CNES MOCTAR (Tensift) and TRISHNA (Taous) projects

- Dam - aquifer transfers and upstream - downstream surface / subsurface transfers.
  - Tensift: water budget calculation from hydrometric measurements (surface and subsurface inputs, water uses) and climate forcing data (rain, evaporation), piezometric network data
 - ➢ VI contract

Task 2.2

- Canopy scale heterogeneity induced by row and multi-strata structures and / or drip irrigation (Tunisia Taous site).
    - joint use of sap flow sensors (installed in both tree roots and trunks), eddy-covariance devices and in-situ remote-sensing to characterize the 3D functioning.
- Landscape scale heterogeneities induced by soil, topography and canopies (Tensift).
    - joint use of eddy covariance data at sub-catchment scales (few tenths of hectares), of scintillometry data across field transects, and of remote sensing data with embedded metric to kilometric resolutions à analysis of spatiotemporal dynamics.

Task 3.1

- Development of a Soil-Vegetation-Atmosphere Transfer model adapted to heterogeneous orchards (drip irrigation, intercrop…)
  - Test of MAESPA model over Tensift and Merguellil
  - Review of possible simplications (geometric features for 3D row/isolated tree; and esp. Radiation, multiple 1D approaches for soil moisture transfer…)

➢ ALTOS Postdoc Contract

Task 3.2

- 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.
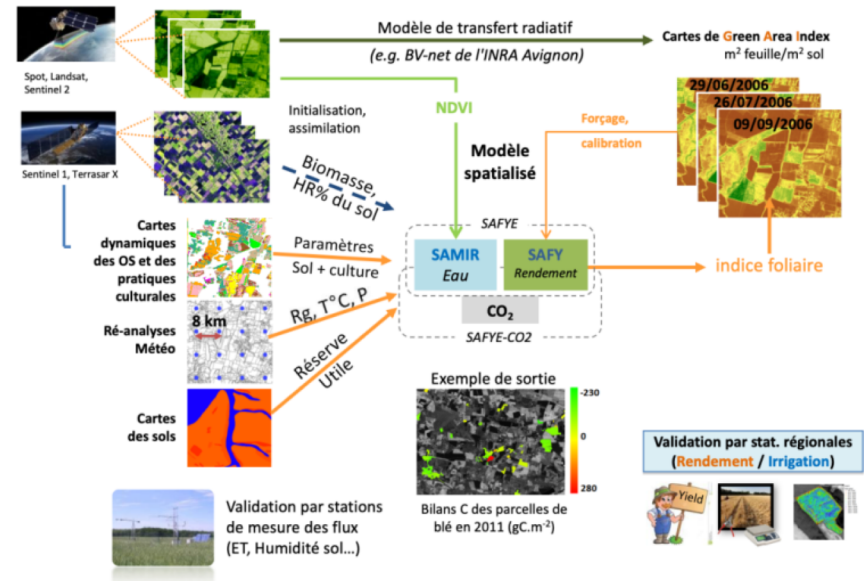
Link with other projects

- CHAAMS (ERANETMED 3, 2018-2021, FR*2, MA, TU, LI)
- ACCWA (H2020/RISE, 2019-2023, SP, FR, TU, MA +)
- FLUXMED (JPI WATER, 2020-2022, IT, FR, TU +)
- IDEWA (PRIMA, 2020-2023, FR, MA+)
- Hi-LIASE (ANR, 2021-, FR, SP +)
- CNES funded: TRISHNA (FR, TU, MA +), MOCTAR (FR, MA), …
- ESA funded: IRRIGATION+ (MA, SP, ?), SEN-ET (SP, TU test site)
- Many PRIMA submitted in 2020 (icl. DroughtTools PI IRTA)