

Sentinels for Cape Verde Water & Food Security Monitoring



Dr.eng.Jacques de Pina Tavares, INIDA, Cabo Verde

Dr.ir.Chris Mannaerts, ITC-Utwente, NL

Dr.Angela Moreno, INIDA, Cabo Verde

Ms.Julcilina Bassanguê (MSc), INIDA, Cabo Verde

Ms.Keila Monteiro (MSc), INIDA, Cabo Verde

Vasilios (Bas) Retsios (MSc), ITC-UTwente., NL

Cape Verde islands (country Cabo Verde):

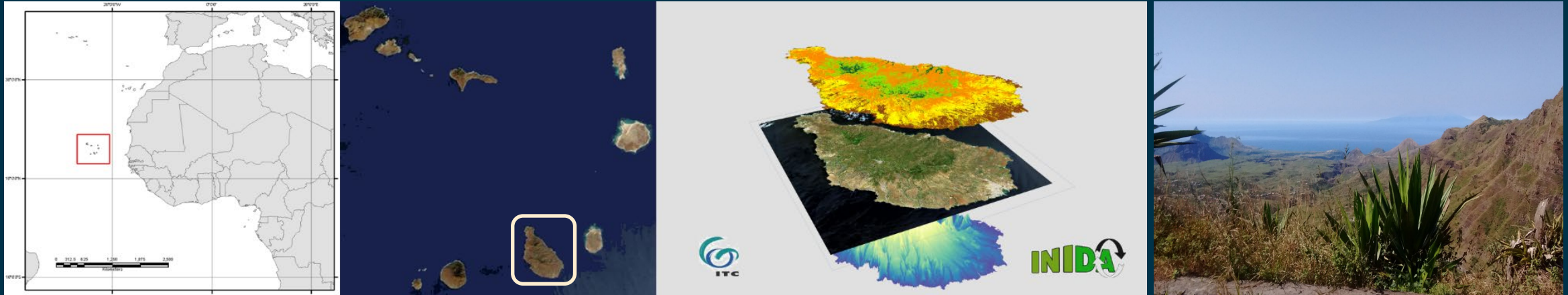
- Most Western part of the Sahel region, highly vulnerable to weather and climate,
- Recurring droughts are an entire part of its climate and socio-economic history,
- Rural populations remain dependent on rain-fed & irrigated agriculture for sustaining their livelihood



- Medium to high resolution vegetation-index based agricultural monitoring coupled to near real time rainfall observations can provide adequate information for water resources and agricultural forecasting.
- *SENCAPE: will design and implement Sentinel & EU-Copernicus data derived cloud-computing solutions for rainfall and agricultural monitoring, optimized for Cape Verdean conditions (small-scale dryland and irrigated agriculture, steep topographies)*
- Photo inset: Rural farmstead, local population, drip irrigation on slope land on Santiago - Photo credits: C. Mannaerts, Creative Commons CC-BY-NC-ND 2.0

Study Area

Map and some views of the pilot study area (rural areas in Santiago island)



Views of Santiago: Ribeira Grande, Rib.das Naus, São Jorge, Boa Entrada (2015-2022) – Photo credits : C.Mannaerts, Creative Commons CC-BY-NC-ND 2.0

- Build the three cornerstones (datasets) of the Water & Food Security Monitoring System (under development by INIDA) using cloud-based computing techniques with Sentinel & other data repositories:
 - 10-m LULC classification: use case Santiago island
 - Data: S2A/B and 10-m DEM for topographic & hydrographic variables, ancillary vector features
 - Apply new approach using multi-temporal NDVI thresholding with decision / regression tree (own original workflow) on S2A/B 10-m
 - Long-term Vegetation Climatology and statistical parameterisation (1990-2021)
 - Generate long-term NDVI time series (10-30m), using Landsat archive (pre-S2A/B) and S2A/B
 - Apply outlier detect, filtering, phenology, statistics for further use in WFS system (forecasting)
 - Long-term Precipitation Climatology (and statistical parameterisation)
 - Screen, and test multiple rainfall data sources using ground validation with local station data
 - Apply downscaling and spatial interpolation techniques to obtain (~1km gridded fields)
- Next research to operations faze: further develop the WFS monitoring system of CV, focusing on near-real time drought (crop failure) detection & monitoring and agricultural water and crop productivity using modelling approaches e.g. FAO Wapor methodology high resolution, Scope model (ITC), etc.

Joint Research Team: INIDA (Cabo Verde) and Department of Water Resources, ITC, UTwente (NL)

- Africa partner: INIDA - Instituto Nacional de Investigações & Desenvolvimento Agrária - National Institute of Agricultural Research & Rural Development (Cape Verde)*

Co-PI: Dr.Eng.Jacques de Pina Tavares. Sr researcher, head Geospatial Lab. Jacques.tavares@gmail.com

Dr. Angela Moreno. Director, Senior researcher INIDA. Angela.Moreno@inida.gov.cv

Ms. Julcilina Bassanguê (MSc). RS/GIS researcher, INIDA julcilinabass12@gmail.com

Ms. Keila Monteiro (MSc). Junior researcher RS/GIS, INIDA kpmonteiro9616@gmail.com



- EU partner: Department of Water Resources, ITC, UTwente (NL)*

Co-PI: Dr.ir.Chris Mannaerts. Assoc. Professor Environmental Satellite Hydrology. c.m.m.mannaerts@utwente.nl

Vasilios (Bas) Retsios (MSc). Geospatial software development engineer. v.retsios@utwente.nl