

WP2- Predictability and Prediction tools

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second project objective is *“to assess the predictability levels associated with the climate features identified in the first objective from sub-seasonal to decadal timescales”*.

third project objective is *“to develop innovative regional prediction tools not only of climate variability but also of climate impact on agriculture and hydrology in SSA on subseasonal and seasonal time scales”*.

General objectives

- development of predictability assessments and climate prediction tools
- Co-production with the stakeholders
- **What are the needs from agriculture and water resources?**
- Timescales: applications to both sectors
- Subseasonal, seasonal, decadal
- What are the important seasons ?
- What are the regions?

WP2 – Objectives and Tasks

WP2.01. To assess **predictability and prediction** skill for **subseasonal, seasonal and decadal** timescales from multi-model and multi-member prediction datasets.

WP2.T1. To **apply relevant metrics** (error quantifications, anomaly correlations and probabilistic verification scores) as well as traditional potential predictability definitions on existing hindcasts from **S2S, CHFP projects, and other global centres (ECMWF-S4)**, and the hindcasts of global and regional models available at **CPTEC/INPE**.

The assessment will focus **on precipitation and temperature**, and later extended to other variables.

****Identify other sources of predictability**

- **(CPTEC/INPE, CNRS/UMI3351)**

WP2 – Objectives and Tasks

WP2.02. To apply the **moisture recycling network model**, improved in WP1, and **evaluate how the model performance improved climate predictability** of historical and near-future (i.e. until 2030) continental **moisture transport**.

WP2.T2. Analysis of **land cover change impacts** on the regional climate, especially on the occurrence and intensity of extreme events in the near-future and their effects on the hydrology and carbon cycles.

Conduct offline simulations with **the land surface model ORCHIDEE and the dynamic vegetation model LPJmL** forced by historical reanalysis and near-future multi-model climate projections (e.g. CMIP5).

Changes in moisture transport from the tropics to SSA will be assessed under historic and future climate to attribute changes to **deforestation and degradation. (LSCE, PIK, TUM, CCST/INPE)**

WP2 – Objectives and Tasks

WP2.03. To perform **hindcast experiments** with **hydrological and agricultural models** forced by **subseasonal and seasonal hindcasts**, analyzing the propagation of predictive skill and uncertainties throughout the model chain.

WP2.T3. **Development of products** based on seasonal ensemble **streamflow and crop yield forecasts** in basins and regions of SSA (**Paraíba do Sul and Iguazú Basins, the Argentinean Pampas and other areas to be selected with WPO**).

Assessment of seasonal ensemble **streamflow forecast** for **drought and flood** made by **different hydrological models (MHD-INPE, ORCHIDEE, VIC)**.

WP2 – Objectives and Tasks- *WP2.T3*

- The **ORCHIDEE model** will also be used to predict **forests, agricultural and pastures productivity** in selected regions of SSA.
- The **CASANDRA platform** [based on the DSSAT crop model] will forecast crop yield in the Pampas of Argentina.
- Both **potential skill** (compared to reanalysis with same impact model) and **actual skill** (compared to observed values of discharge or crop yields) will be assessed.

(CPTEC/INPE, CCST/INPE, LSCE, PIK, WUR, CNRS UMI3351).

WP2 – Objectives and Tasks *WP2.T3*

- The relative **contribution to the total skill** originating from **correct specification of initial conditions (e.g. soil moisture, vegetation status, snow, etc.)** versus climate forcing quality respectively will be assessed.
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- The **sensitivity of crop yields** to the activity of the **leading patterns of climate variability on subseasonal (e.g. MJO) and seasonal (e.g. ENSO, SAM, IOD)** timescales will be assessed.
- **Techniques for bias correction and calibration-**downscaling of the information provided by climate prediction for **its incorporation in impact models** will be analyzed.
- **(CPTEC/INPE, CCST/INPE, LSCE, PIK, WUR, CNRS/UMI3351).**

WP2 – Objectives and Tasks

WP2.O4. To co-design a **regional prediction framework** for the **two WP0 case studies** based on the outcomes of the previous WP2 objectives and on WP0 co-design workshops.

WP2.T4. **Co-development** of a **regional prediction framework** for the **two WP0 case studies** based on the outcomes of **the WP2 objectives and on WP0 co-design workshop discussions**.

(CNRS/UMI3351, CPTec/INPE and WP0 participants).