

# World Climate Research Programme

## JOINT SCIENTIFIC COMMITTEE (JSC)

### 41st online session

## Water for the Food Baskets of the World GC Report (draft 1)

### 1. Highlights for JSC

#### a. Scientific Highlights

- Convection permitting modeling (CP) performed over S. America, Europe, China and N. America with new updated and expanded experiments planned
- Water for Food Baskets as a theme is part of several regional hydroclimate projects (RHPs): PANNEX, ANDEX, HYMEX and the to be -further- developed RHPs in Central Asia, Eastern Africa and AsiaPEX (SE Asia)
- LIAISE field campaign is fully funded and was in full preparation when the COVID-19 crisis occurred. It has now been postponed to spring and summer 2021. All funding agencies and participants maintain their commitment.
- LS4P: land surface initializing important for forecasting at S2S time scales important for agriculture
- US/CONUS RHP development underway with the support of the newly established US-GEWEX coordination office.
- Sonali P. McDermid has initiated a coordination effort for the development of irrigation and water management parameterizations in Earth System models (ESMs). It includes hydrology, agronomy and land surface modelers (Town Hall meeting organized at AGU and a review paper under preparation).
- Development of agriculture management models for ESMs continue for WRF and CESM.
  - A tile-drainage model was recently implemented in WRF-Hydro along with a 30-m CONUS tile-drainage dataset (AgTile-US, see slides 1&2 in the attached ppt), and the latter represents the first attempt to map high-resolution agriculture tile-drainage installations at continental scales (Valayamkunnath et al. 2020).
  - To improve the representation of climate-crop-hydrology interactions, we applied the community Noah-MP LSM with dynamic crop-growth and irrigation schemes to jointly simulate the crop yield and irrigation amount for corn and soybean in the central U.S. Several common uncertainties in modeling crop growth were identified, including yield-gap estimation, planting date, photosynthetic rubisco capacity, irrigation processes, which point to future efforts to incorporating spatially-varying crop parameters (see slide#3).

#### b. Programmatic Highlights

- Well established link with AgMIP community
- Convection permitting modeling (CP) community well established and growing fast
- USGCRP Support for US GEWEX related activities in development of which CP modelling is important part
- Research programs funded in a number of European countries to understand the role of water usage on recent trends in water resources.

- ESA has funded two research projects on quantifying irrigation using remote sensed information.
- US agencies (NOAA, NSF, USDA) funded research projects to enhance the representation of agriculture management modelling for ESMs.

## **2. Primary science issues** (looking ahead, 3 to 5 years)

- Water for the Food Baskets to become a GEWEX theme/focal point (as the GC disappears)
- This is a very broad grand challenge and can only tackled piecemeal wise

## **3. Issues and challenges**, for example:

- Better linkage needed with the S2S community (when both communities are primed)
- Uncertainty in future structure can have a paralyzing effect on activities
- As a theme/focal point and with sponsors this GC is very attractive but for the scientific community it is very broad in scope, and researchers tend to focus on one or a few aspects. Will take time to connect all the “dots” and have the right people in place.
- One possible pathway forward is to unify these efforts in the context of CP modelling and improve ESMs (already happening).
- Developing joint activities with the AgMIP community/vegetation/crop modelling needs to be prioritized.
- A WCRP conference on this Grand Challenge has been requested but no news for the moment.
- A stronger integration with GEWEX panels would be helpful in order to involve more experts in either observations, land surface or atmospheric modelling.

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