Improving drought prediction by coupling local and remote drivers

Background
This poster presents plans and some initial results of my NWO funded Veni-project that will start in January 2017 at the Copernicus Institute of Utrecht University. The aim of the project is to analyse the atmospheric part of the water cycle, and to assess its anomalies during drought periods of several months. The output of this knowledge could be a better understanding of the seasonal predictability of droughts.

Drought processes
Are droughts caused and/or prolonged due to local or remote processes?

The atmospheric moisture cycle
By analysing the total atmospheric water cycle, we aim to get a more complete view of droughts

Assessing the water cycle: moisture tracking
To diagnose what the atmospheric anomalies are during droughts, precipitation, evaporation and atmospheric humidity flows will be analysed. Moreover, an atmospheric moisture tracking model is used to determine the previous evaporation location of the precipitation in a given location. During droughts, this upstream evaporation may be located differently than during months with normal precipitation.

Classification of moisture cycle during droughts
Local, moisture transport and upstream evaporation dominated droughts

Seasonal prediction of droughts
Seasonal predictions (S2S) for August precipitation in France

Objective: improve understanding of seasonal predictability
Why do some (sets of) ensemble members produce better forecasts?
Is that due to the initial conditions? If so, upstream, or locally?
Does this vary for different drought types?

Typical Research Questions

Droughts:
- What is the typical drought type in this location?
- How well are droughts predicted here? What lead-time?
- What processes influence this predictability?
- Where are observations (soil moisture, sst, ice) needed to constrain model ensemble?

Models:
- How many ensemble members do we need per model?
- How many different models do we need?
- What forecast frequency?
- High or low resolution? Ocean coupling

References:
2. Tuinenburg et al. (2012). The fate of evaporated water from the Ganges basin. JGR, 117.