Model documentation and write-up

1. **Who are you (mini-bio) and what do you do professionally? If you are on a team, please complete this block for each member of the team.**

   Atabek Umirbekov is a doctoral researcher at the Leibniz Institute of Agricultural Development in Transition Economies (IAMO). His research primarily deals with the impacts of climate variability and change on water resources and agricultural production in Central Asia.

   Dr. Changxing Dong is a researcher in the Department Structural Change of IAMO. His research interests are Agent-Base modelling and application of Machine Learning in the domain of structural development of agricultural regions.

2. **What motivated you to compete in this challenge?**

   Atabek's recent research focuses on improving seasonal water supply forecasting in Central Asia, a region geographically distant from the western US but sharing similar climate and hydrological dynamics: accumulated snowpack is the primary determinant of seasonal river flow.

3. **If there are any particularly useful snippets of code when producing your communication outputs (calculations, visualizations, etc.) that would be useful to highlight, please copy-paste them here.**

   N/A

4. **Please provide the machine specs and time you used to train your model and to produce the communication outputs.**

   - CPU (model):
   - GPU (model or N/A):
   - Memory (GB):
   - OS:
   - Train duration:
   - Inference duration:
   - Software used to prepare the forecast summary:

5. **Anything we should watch out for or be aware of in using your model (e.g. code quirks, memory requirements, numerical stability issues, etc.)?**

   N/A

6. **Did you use any tools for data preparation or exploratory data analysis that aren't listed in your code submission?**

   No

7. **What are some other things you tried that didn't necessarily make it into the final workflow (quick overview)?**

   The submitted code generates forecast details and associated plots as lists, which can be saved then for example as CSV and JPEG files. These can then be organized manually into forecast summaries for each basin and forecast issue date. However, we were unable to automate the process of arranging these files into knit finalized single summaries.

8. **If you were to continue working on your explainability/communication solution for the next year, what methods or techniques might you try in order to build on your work so far? Are there other metrics or visualizations you felt would have been very helpful to have?**

   Communicating retrospective performance of forecasts visually: Adding a graph that shows actual observations vs. forecasts, along with uncertainty bounds for the most recent 10 years.

   Communicating evolution of the forecast along issue dates for the same basin: Analyzing how forecast predictions evolve across different issue dates for the same basin can provide valuable insights.

   Presenting forecast via an interactive dashboard: Implementing tools like Shiny apps or Plotly could allow stakeholders to interact with forecast data dynamically.

   Incorporating other official forecasts: Similar to how organizers presented multiple forecasts in the "Forecast predictions" interactive plot during the competition.