Forecast summary for 2023-03-15 – Pueblo Reservoir Inflow

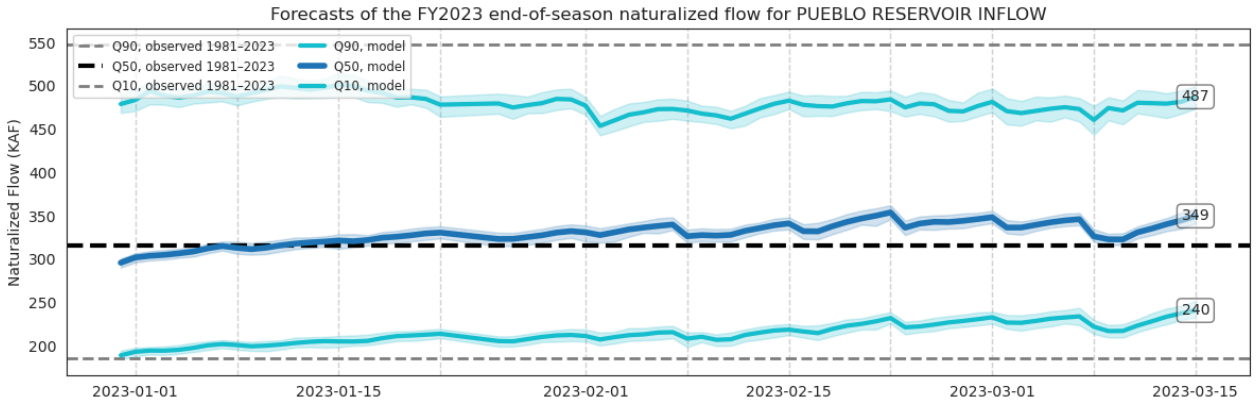

Figure 1. Model forecasts and observed quantiles. Shading indicates the ensemble range.

The forecast year 2023 at Pueblo Reservoir Inflow is predicted to be normal or slightly wetter than normal (Fig 1). The median (Q50) forecasts have been predicting slightly below normal conditions in the beginning of January but the latest Q50 indicates above-normal 350 KAF for the end-of-season accumulated normalized flow. The 80% prediction uncertainty range is relatively narrow compared to the climatological 80% range, indicating that the model's expectation of a normal water year is quite certain.

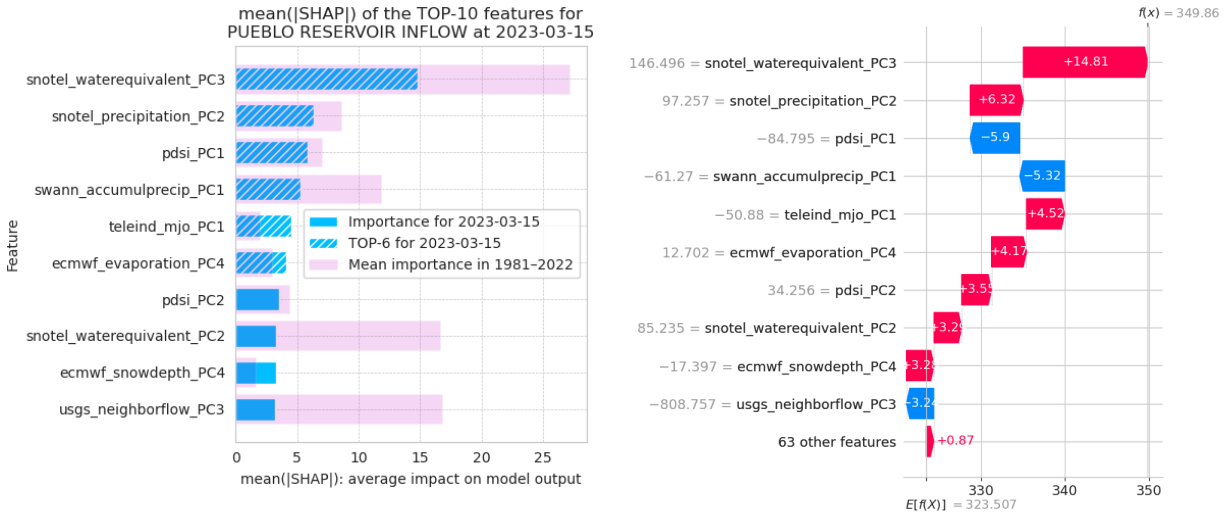

Figure 2. Left: the mean(|SHAP|) feature analysis. Right: the contribution of features to the issue date forecast relative to the long term mean.

Out of the ten most important features the ones related to current and antecedent snow water equivalent indicate the most positive contribution to the forecast (Fig 2). On the other hand, the features related to accumulated precipitation amounts from different sources – SNOTEL and SWANN – show opposite signs, which largely cancel each other. This contradiction can be explained by the majority of SNOTEL stations locating outside and to the west from the catchment (Fig 4). That region is wetter than the actual catchment. The data from both SWANN and PDSI datasets, which show drier than normal conditions, are extracted from the inside of the catchment, and they contribute negatively to the forecasted flow – in other words, the eastern parts of the catchment suffer from moisture deficit.

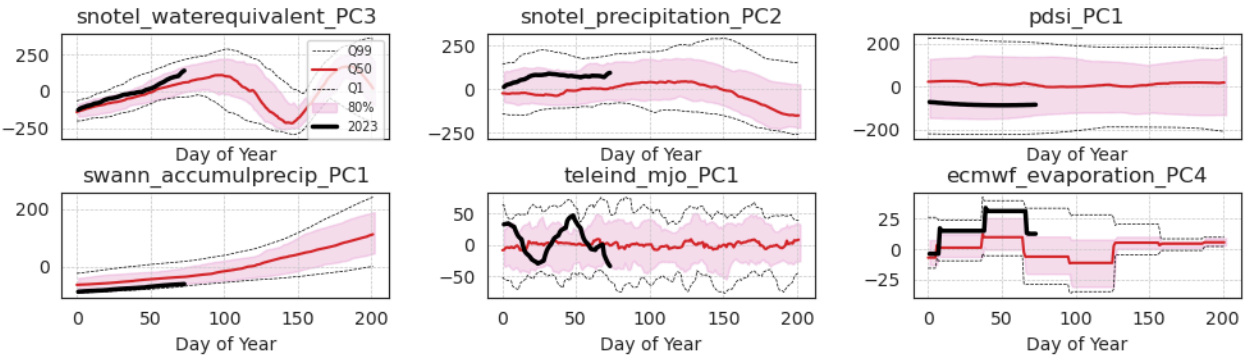

Figure 3. The forecast year time series and the climatological distributions of the TOP-6 most important features contributing to the forecasts of the current issue date.

The drier than normal conditions in the east and the wetter conditions of the west most likely also cause the resulting normalized flow to be near normal or slightly below. The near-normal flow conditions in the catchment have been prevailing throughout the water year, which is the reason why the flow-related features do not stand out in the SHAP analysis (Fig 2).

The features that intend forecasting the future, namely the forecasted evaporation and snow depth from the ECMWF seasonal dataset as well as the MJO based teleconnection indices, contribute positively to the predicted flow amounts.

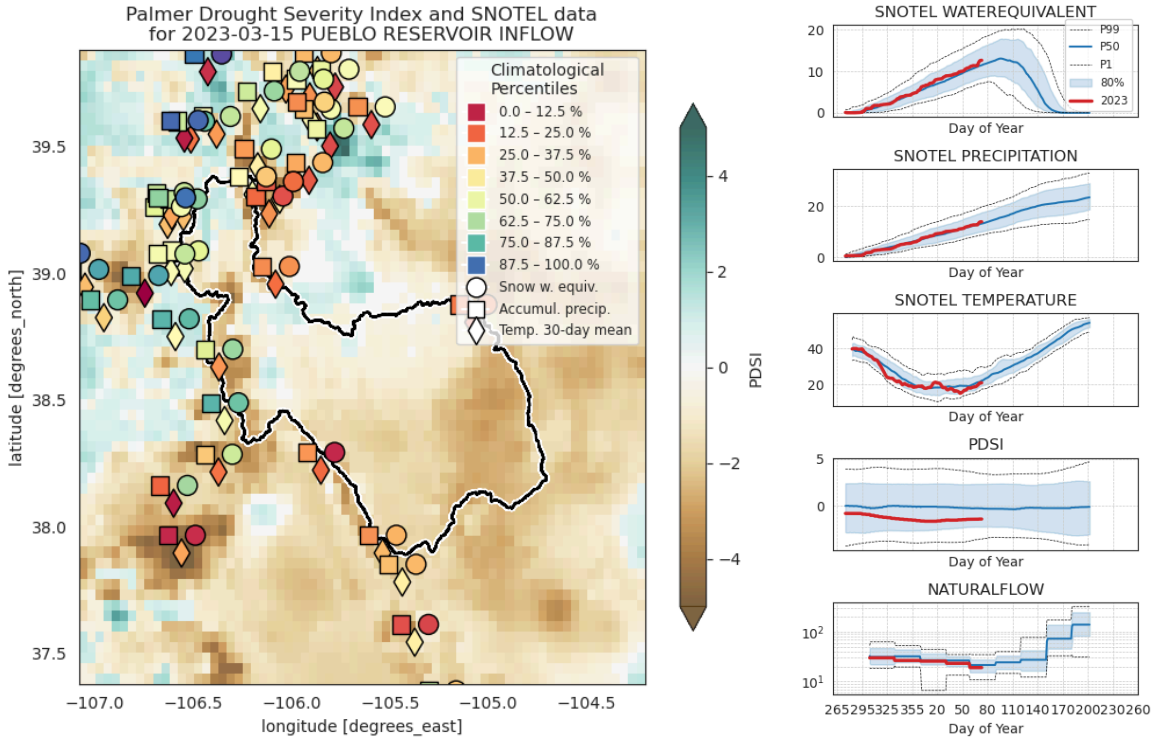

Figure 4. Left: the PDSI and SNOTEL data for the current issue date. Right: climatological quantiles and data for the current forecast year for the key data sets.