(a) Input data

1. Streamflow
   - Natural
   - Regulated

2. Precipitation

3. Temperature

4. Glacier mass balance change

(b) Reservoir signal reconstruction
- Generalized additive model:
  1. Trained on the natural period
  2. Applied to the regulated period
- Observed regulated time series - Simulated natural time series

(c) Signal clustering

1. FDA representation
   - Discrete observations
   - Representation by basis functions
   - Functional representation

\[
\begin{align*}
  c_1 & \rightarrow \quad Q(t) = a_{11} + a_{21} + a_{31} + a_{41} + a_{51} \\
  \vdots \\
  c_n & \rightarrow \quad Q(t) = a_{1n} + a_{2n} + a_{3n} + a_{4n} + a_{5n}
\end{align*}
\]