State estimation in water supply networks

Based on the node-edge joint GPs
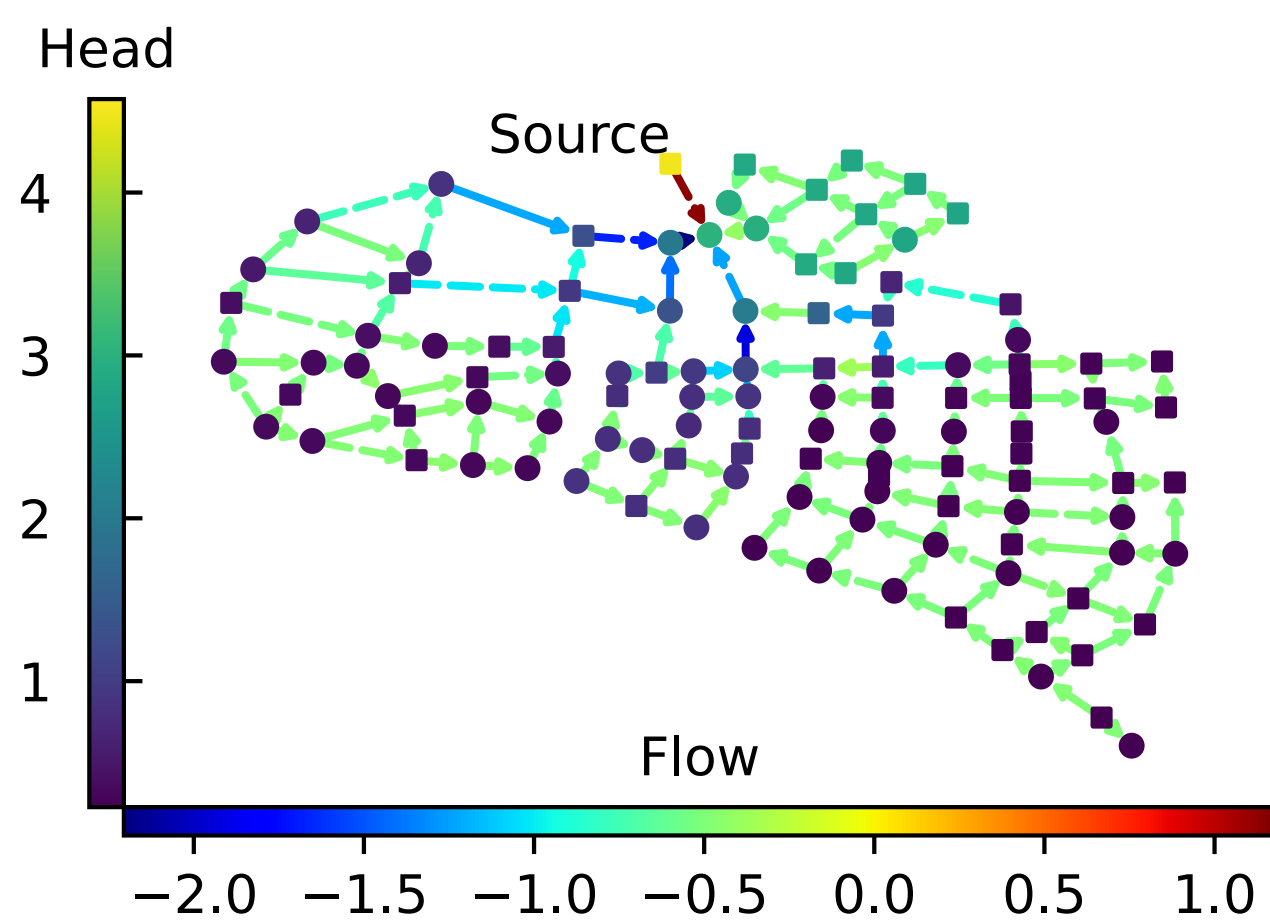

Original

non-Hodge edge GP

Hodge edge GP

non-Hodge edge GP, var

Hodge edge GP, var

$$\mathbf{B}_1^\top \mathbf{f}_0 = \bar{\mathbf{f}}_1 := \mathrm{diag}(\mathbf{r})\mathbf{f}_1^{1.852}$$

$$\begin{pmatrix} \mathbf{f}_0 \\ \bar{\mathbf{f}}_1 \end{pmatrix} \sim \mathrm{GP}\left(\mathbf{0}, \begin{pmatrix} \mathbf{K}_0 & \\ & \mathbf{K}_1 = \mathbf{B}_1^\top \mathbf{K}_0 \mathbf{B}_1 \end{pmatrix} \right)$$

Learned kernel
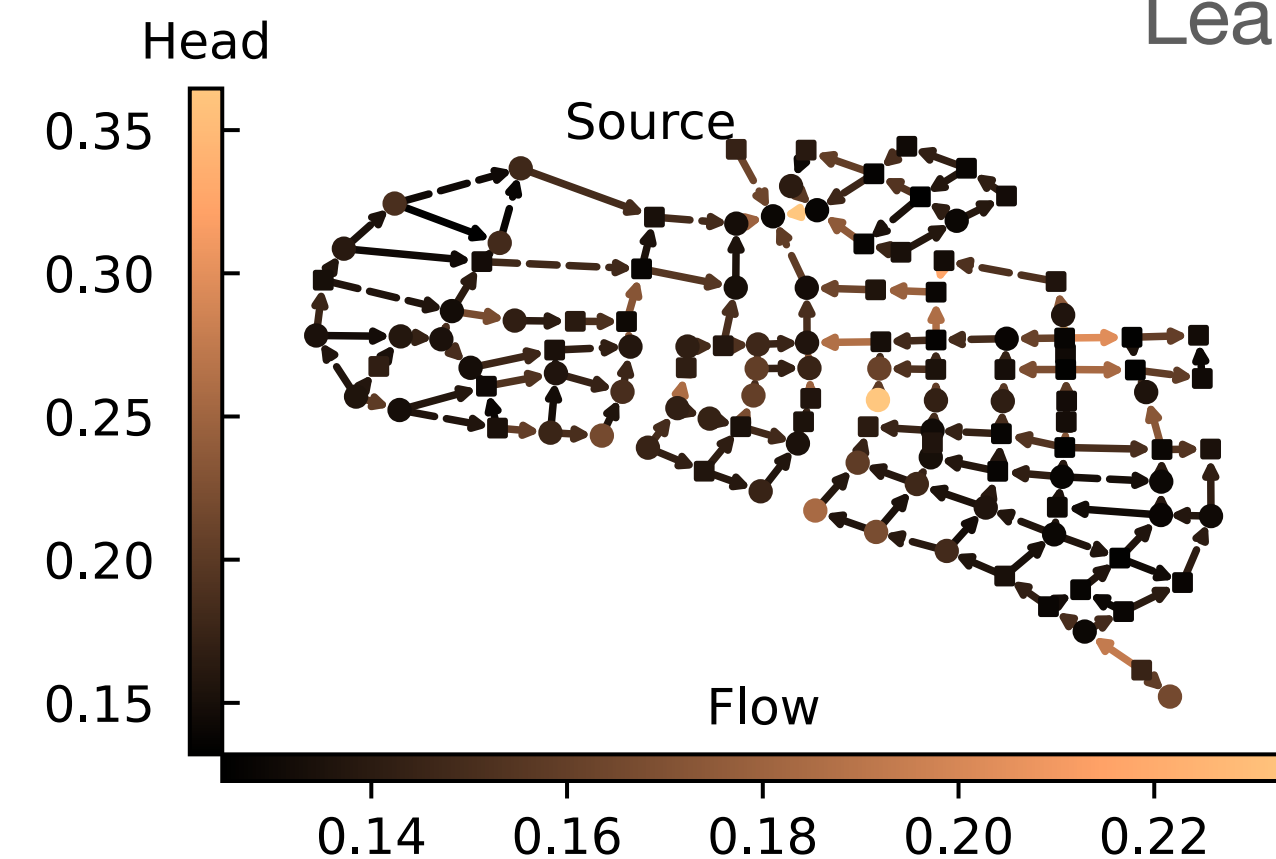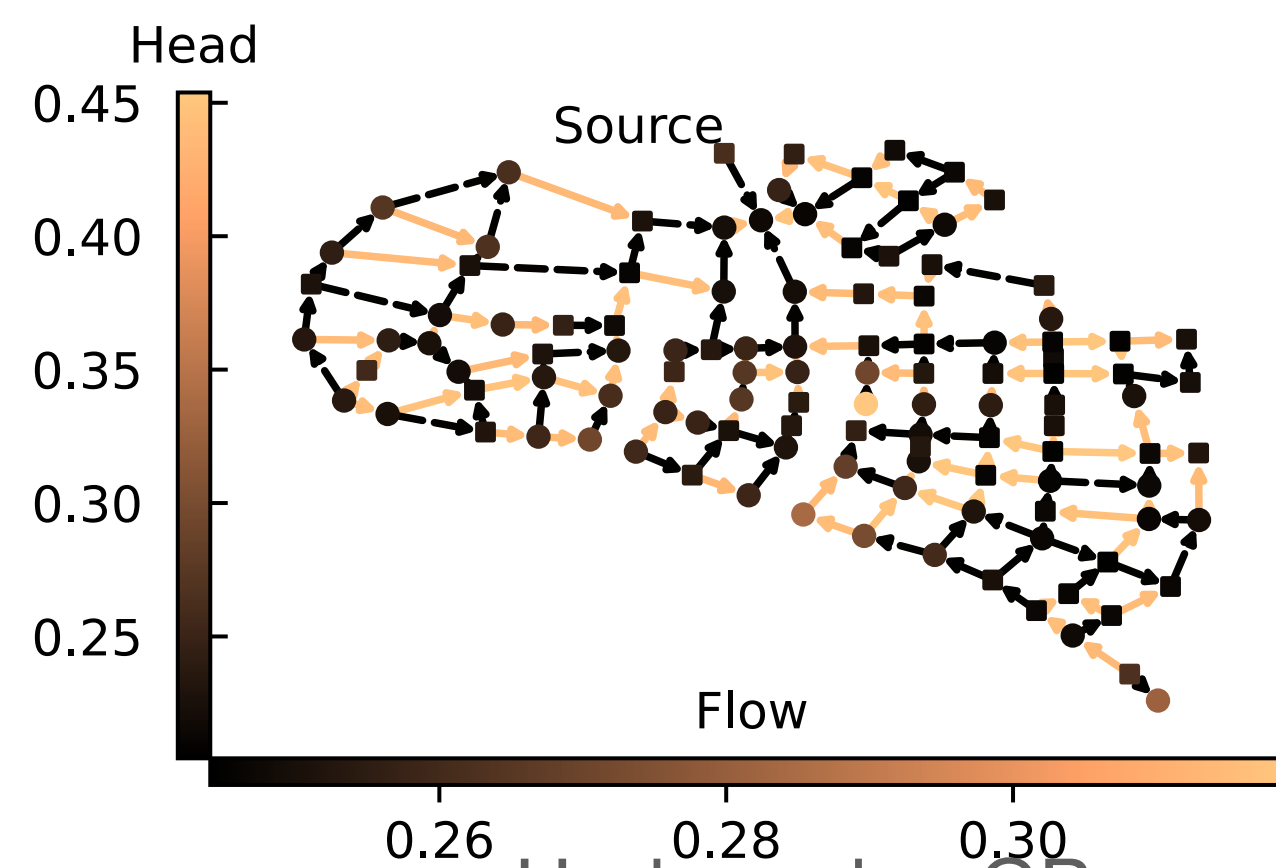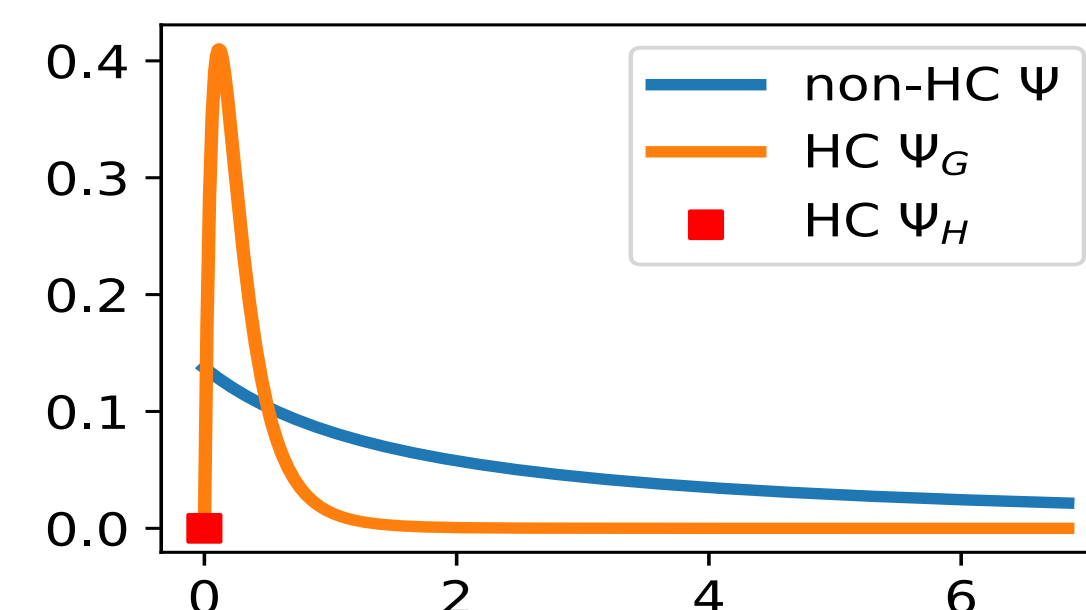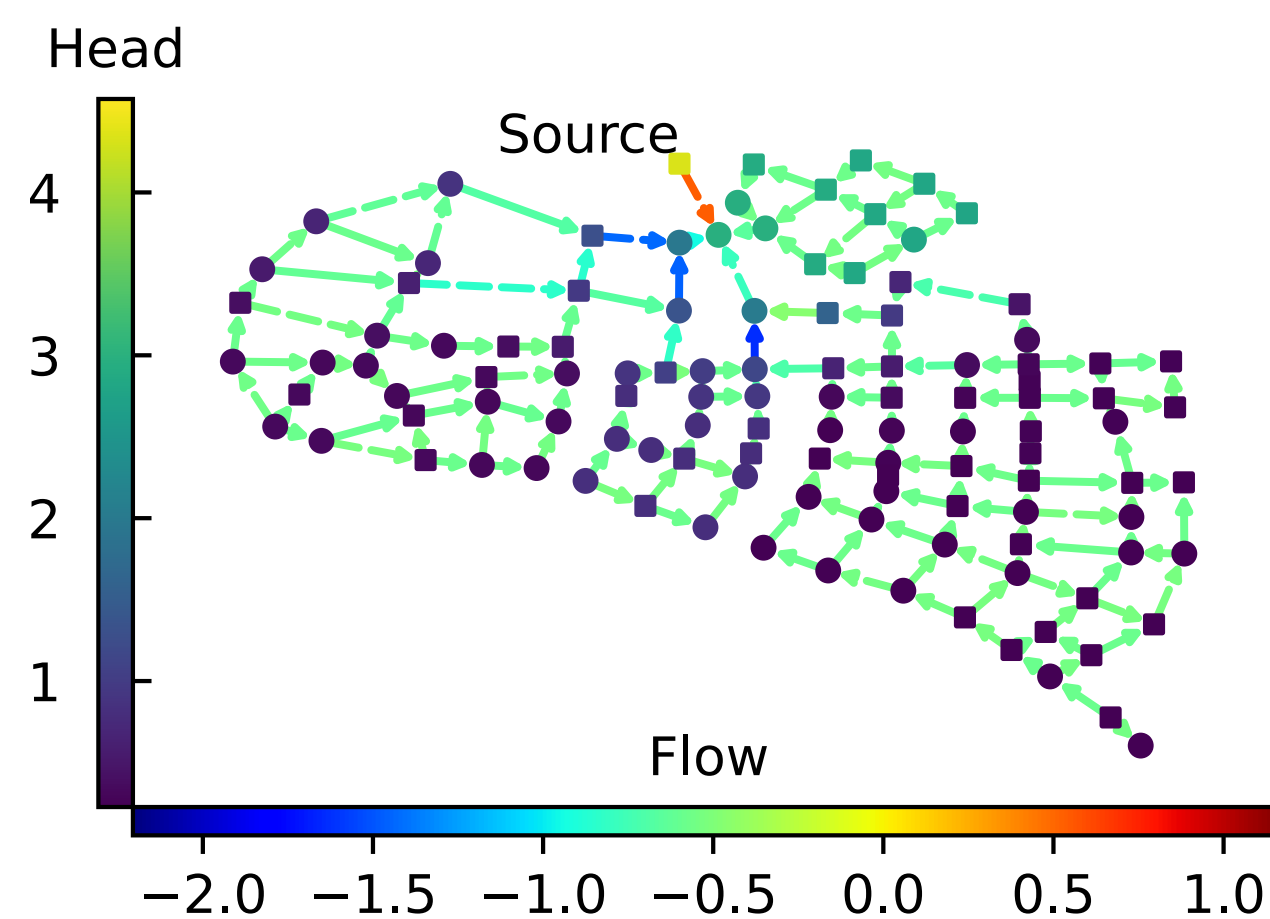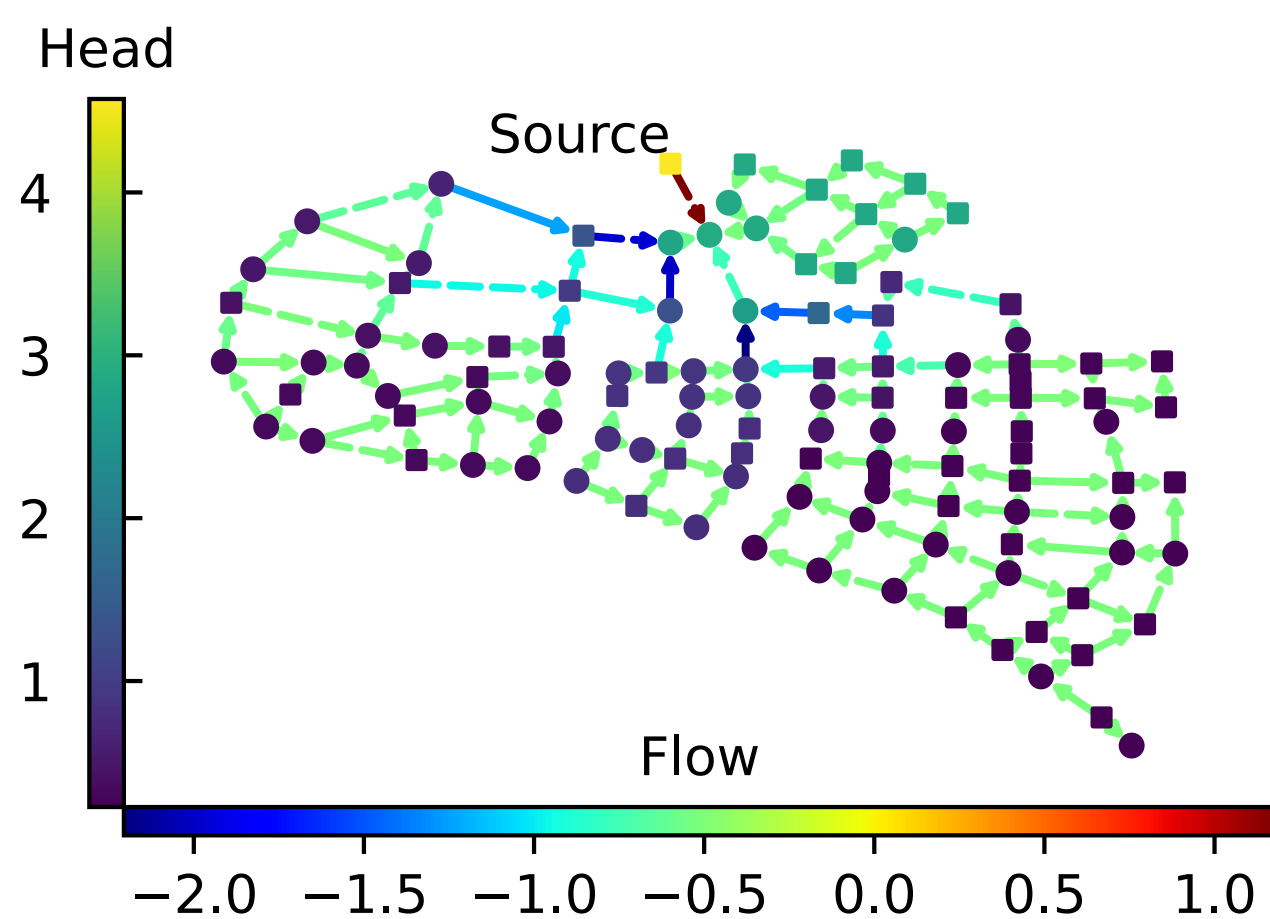
4. Topological Schrödinger Bridge Matching

- matching topological signal distributions
- generative learning of topological signals