A graph neural network approach to basin-scale river network learning: The role of physics-based connectivity

March 20, 2022

1 Fig S1. PRISM annual data

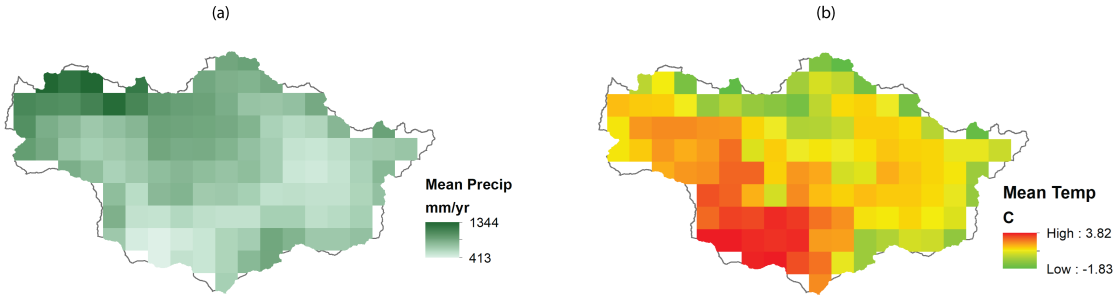

Figure 1: PRISM 30-year mean (a) precipitation and (b) air temperature for the East Taylor Watershed.

2 Fig S2. GraphWaveNet (GWN-O) trained without using antecedent NWM outputs as predictors

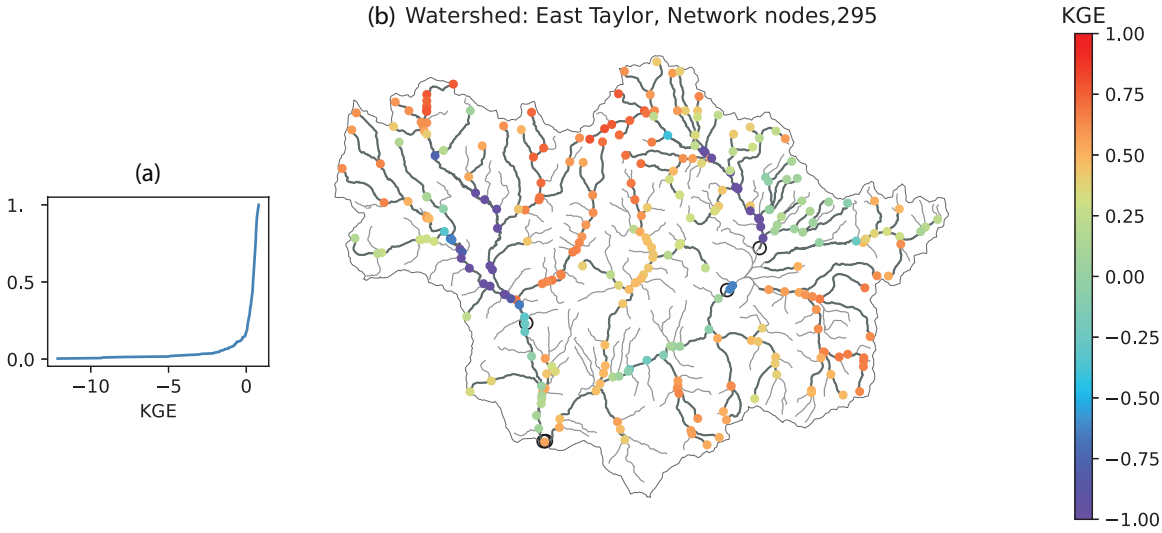

Figure 2: KGE of the GWN-O model trained using only Daymet meteorological forcing. Median KGE=0.433, mean KGE=0.065

3 Fig S3. Sensitivity study using NWM2.1 data

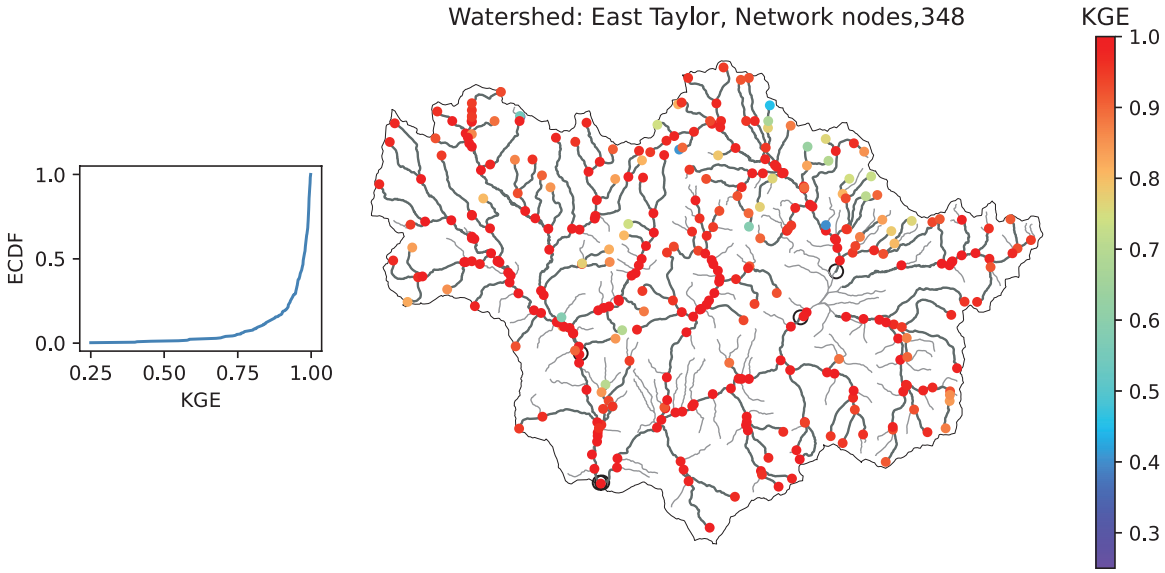

Figure 3: KGE of the GWN-O model trained using NWM2.1 data. Median of KGE = 0.974, mean of KGE=0.937.

4 Data fusion on the GWN-Impute model

Table 1: Results of leave-one-out cross validation using the five USGS gages (boldface numbers indicate better performance).

USGS Gage	NWM COMID	KGE		
		NWM	GWN-Impute	Data Fusion
09107000	1333022	0.563	0.567	0.567
09112200	1333198	0.332	0.330	**0.695**
09112500	1333418	0.355	0.353	**0.666**
09109000	1333490	0.425	0.425	**0.879**
09110000	1333564	**0.616**	0.613	0.508

5 Data fusion on the GWN-O model without using NWM

Table 2: Results of leave-one-out cross validation using the five USGS gages (boldface numbers indicate better performance).

USGS Gage	NWM COMID	KGE		
		NWM	GWN-O	Data Fusion
09107000	1333022	0.563	-2.465	-2.465
09112200	1333198	0.332	0.667	**0.860**
09112500	1333418	0.355	0.611	**0.707**
09109000	1333490	**0.425**	-0.042	0.334
09110000	1333564	0.616	0.426	**0.690**