Supplementary Materials for "InundatEd: A Large-scale Flood Risk Modeling System on a Big-data - Discrete Global Grid System Framework"

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Supplementary Tables

Table S1: Hurricane Hazel Regulatory Flood vs. 100-year Return Period – Grand River
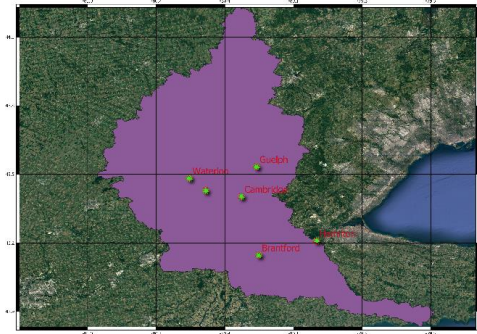Watershed

| Hydrometric Station	Upstream Area (km^2)	Regulatory Flood Discharge (m^{3}s^{-1})	100-Year Return Period Discharge (m^{3}s^{-1})
02GA003	2966.437	1140	1115.128
02GA010	857.8116	328	355.2413
02GA013	689.3451	592	751.7521
02GA015	477.7452	130	153.3091
02GA016	665.6931	168	286.5565
02GA017	278.3187	137	177.1731
02GA018	452.3958	232	381.725
02GA022	399.4326	235	300.6779
02GA033	54.4572	21.2	30.58763
02GB001	4372.953	1100	1495.431
02GB006	137.5461	50.4	67.71159

Table S2: Excluded Observed Flood Extent Polygon Areas

| Observed Flood Extent Polygon	Subcatchment Number	Intersection (% subcatchment area)	Excluded Observed Flood Extent Polygon Area (km^2)
FloodExtentPolygon_QC_CentralOttawa_20190503_113004.shp	5156	0.039	0.00992
FloodExtentPolygon_QC_CentralOttawa_20190503_113004.shp	4582	0.127	0.03154
FloodExtentPolygon_QC_CentralOttawa_20190503_113004.shp	12863	4.047	0.06318
FloodExtentPolygon_QC_LowerOttawa_20190429_230713.shp	1755	13.90	2.25351
FloodExtentPolygon_QC_LowerOttawa_20190429_230713.shp	10505	24.055	14.852
FloodExtentPolygon_QC_LowerOttawa_20190507_111329.shp	1755	18.599	3.01422
FloodExtentPolygon_QC_LowerOttawa_20190507_111329.shp	10505	24.100	14.8803
FloodExtentPolygon_QC_LowerOttawa_20190513_225800.shp	12115	14.262	3.18542
FloodExtentPolygon_QC_LowerOttawa_20190513_225800.shp	9504	6.8904	1.6800
FloodExtentPolygon_QC_LowerOttawa_20190513_225800.shp	1755	19.830	3.2136
FloodExtentPolygon_QC_LowerOttawa_20190513_225800.shp	10505	23.722	14.6467

Supplementary Figures

Figure S1: GIS Inputs for the Grand River Watershed and Ottawa River Watershed: study area (a-b), land use/ land cover (c-d), and flow lines (e-f). The maps are created in Qgis with the basemaps provided by © Google Satellite Maps and © Google Street Maps under OpenLayerPlugin.
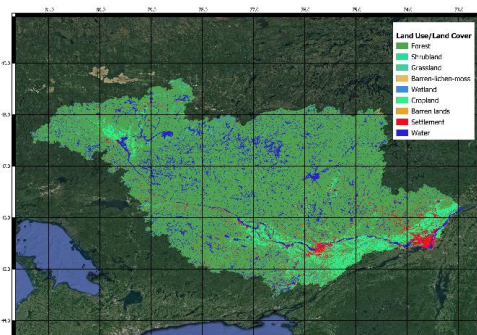

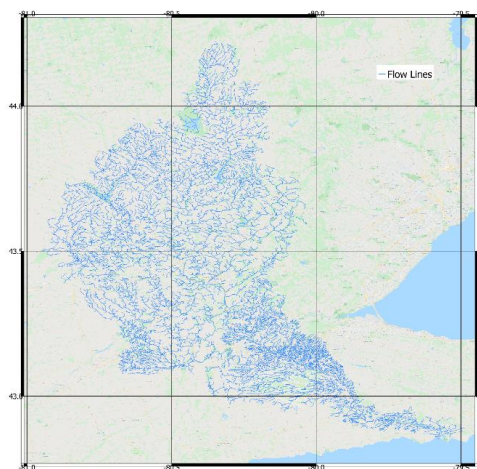a) Grand River Watershed Study Area
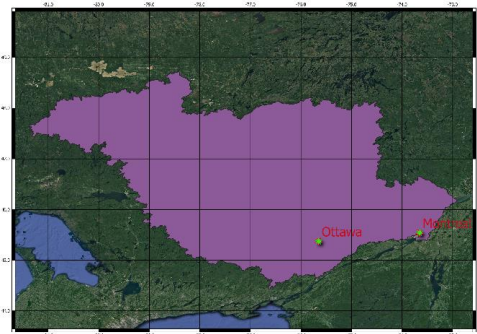
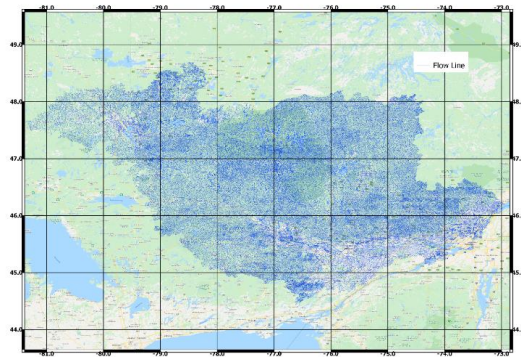b) Ottawa River Watershed Study Area
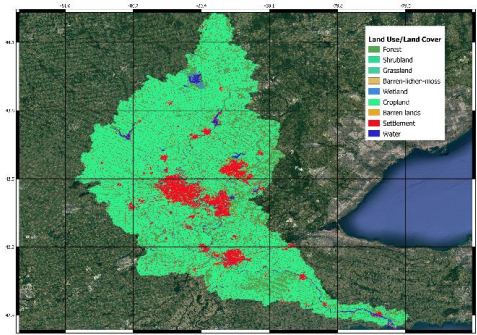
c) Grand River Watershed Land Use/Cover

d) Ottawa River Watershed Land Use/Cover

d) Grand River Watershed Flow Lines

e) Ottawa River Watershed Flow Lines

Figure S2: DGGS conversion flowcharts for raster input data (a), polygon vector input data (b), and network (directional) input data (c). The maps are created in ArcGIS with the basemaps provided by © ESRI.
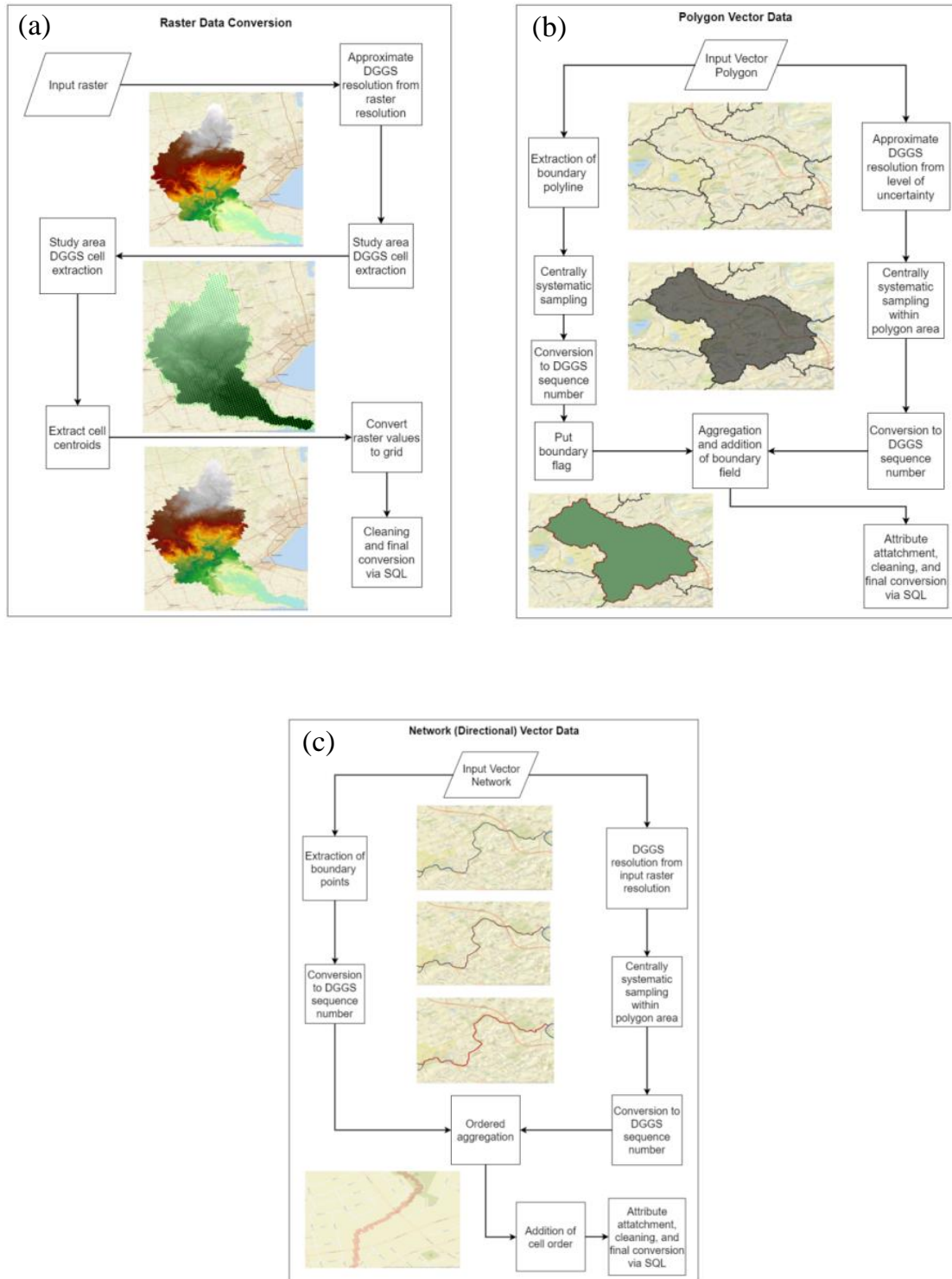
Figure S3: GEV Distribution Regional Growth Curves – Grand River Watershed and Ottawa
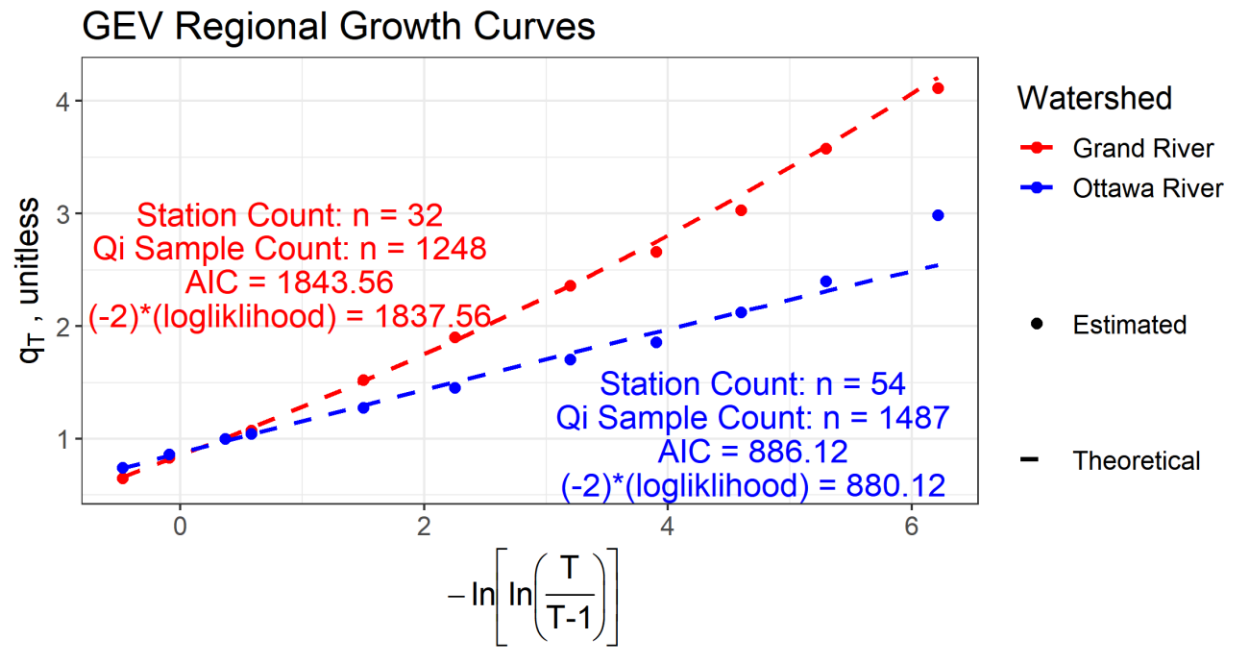River Watershed

GEV Regional Growth Curves

Station Count: n = 32
Qi Sample Count: n = 1248
AIC = 1843.56
(-2)*(logliklihood) = 1837.56

Station Count: n = 54
Qi Sample Count: n = 1487
AIC = 886.12
(-2)*(logliklihood) = 880.12

Watershed
- Grand River
- Ottawa River

- Estimated

- Theoretical

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Figure S4: Additional Binary Classification Results – Ottawa River Watershed

a) RP 26.5 True Positive Rate

b) RP 26.5 True Negative Rate

c) RP 16.52 True Positive Rate

d) RP 16.52 True Negative Rate

e) RP 25.96 True Positive Rate

f) RP 25.96 True Negative Rate

g) RP 42.69 True Positive Rate

h) RP 42.69 True Negative Rate

0.0   0.2   0.4   0.6   0.8   1.0
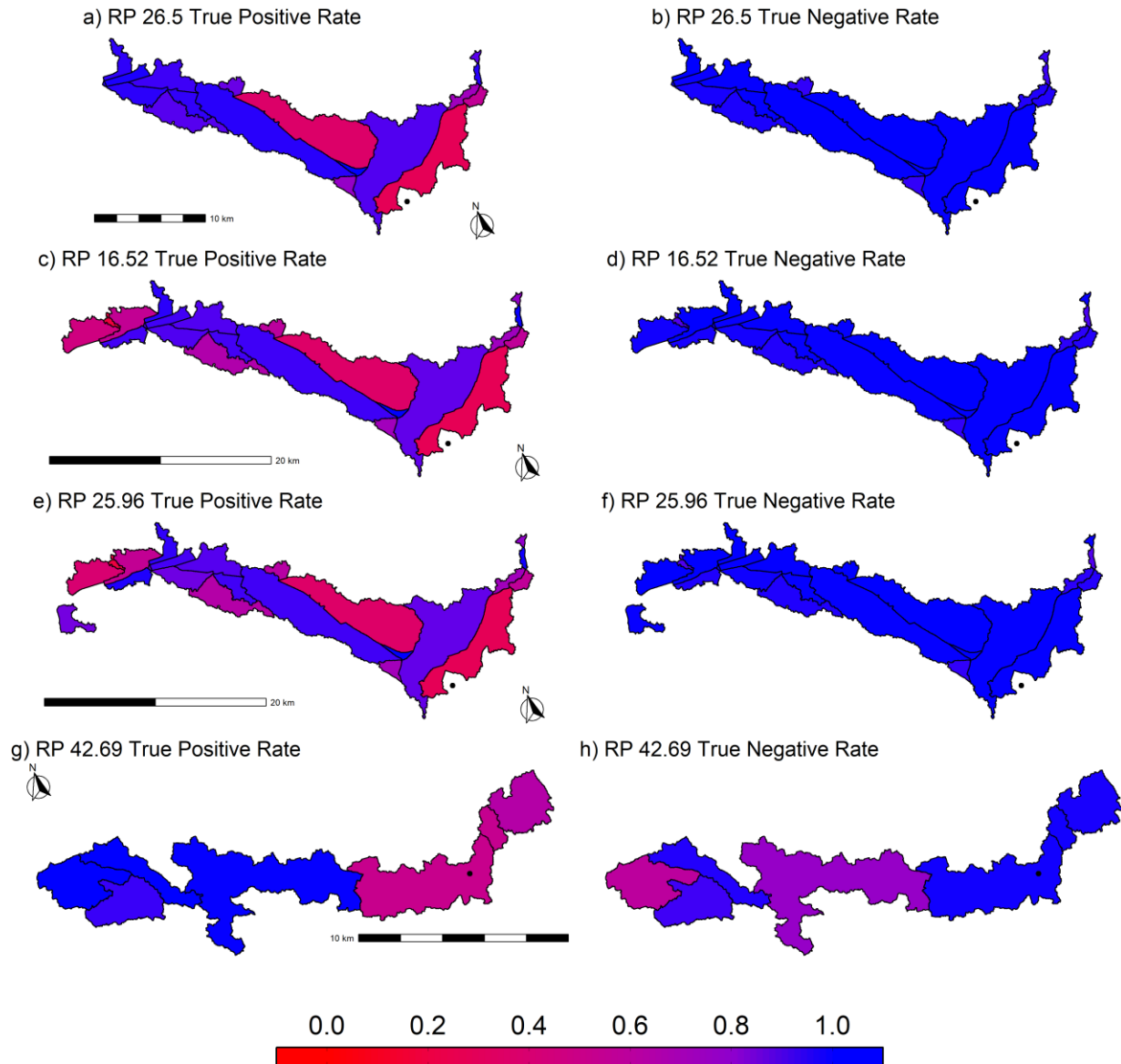
Figure S5: Grand River Watershed Dams

Runtime Comparison - Grand River Watershed