

Extreme Precipitation Statistics Adjusted for a Changing Climate

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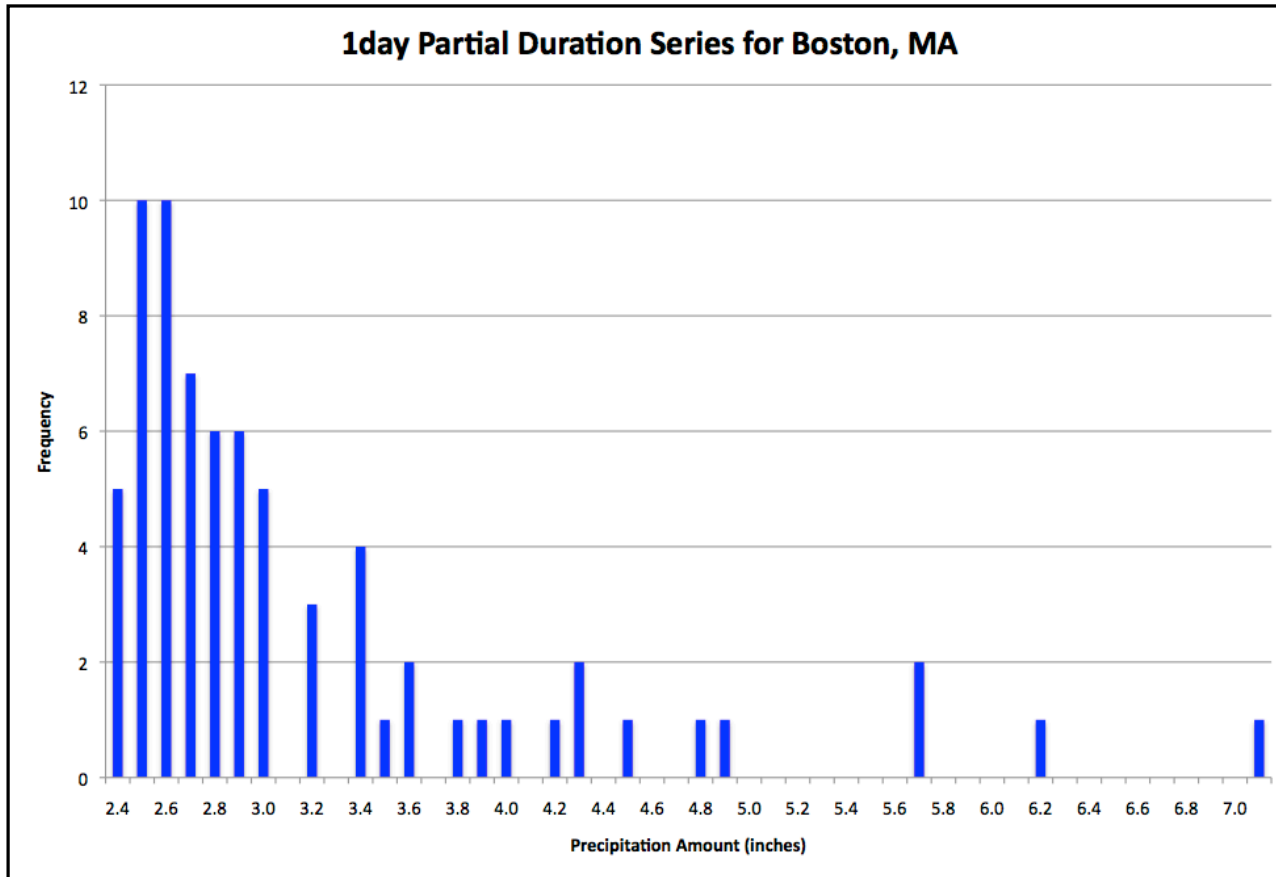
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Gather Observed Rainfall

Extreme Rainfall 101



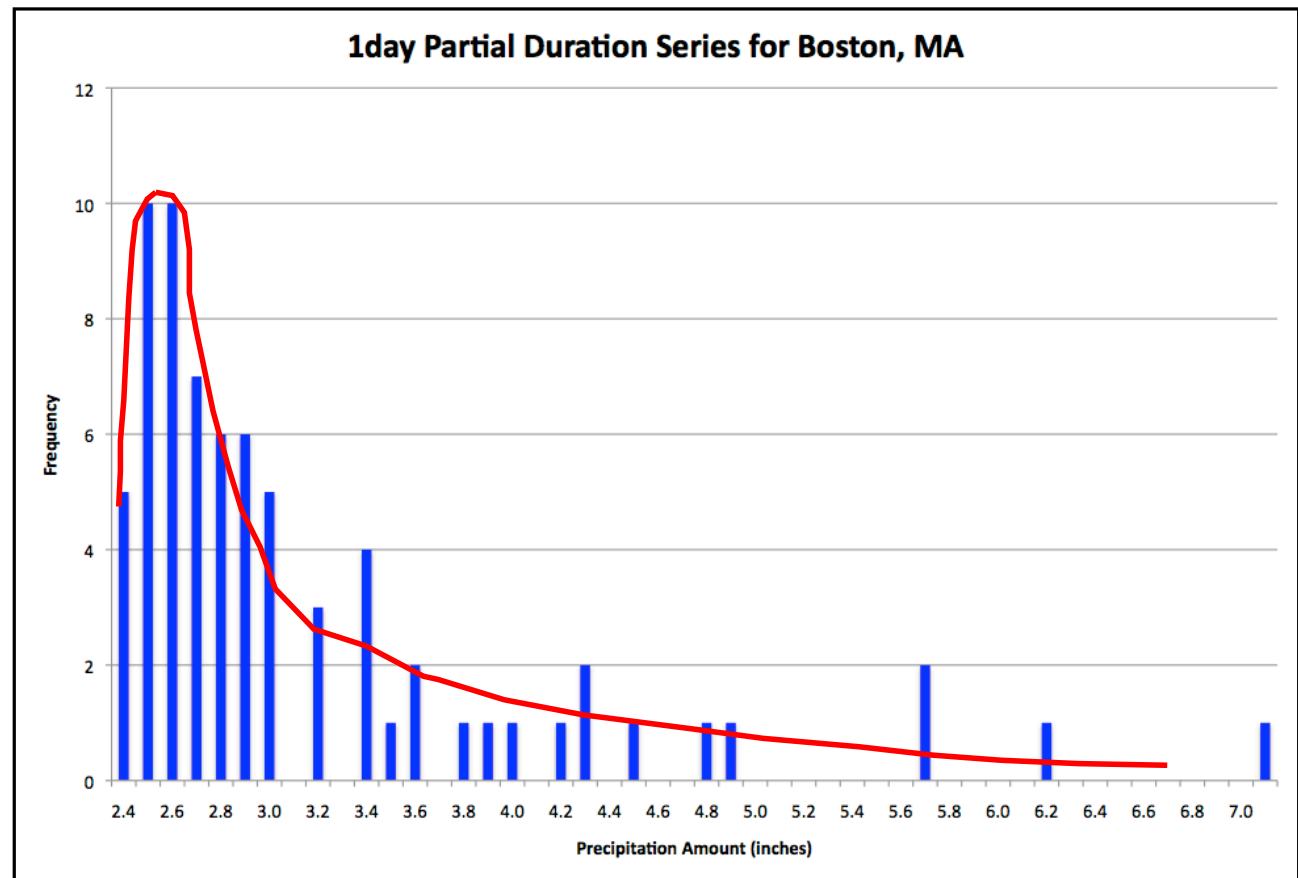
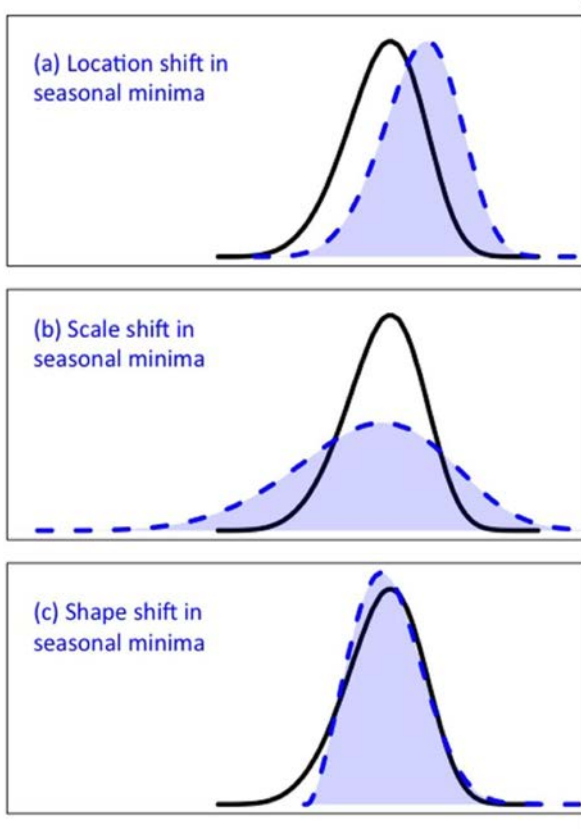
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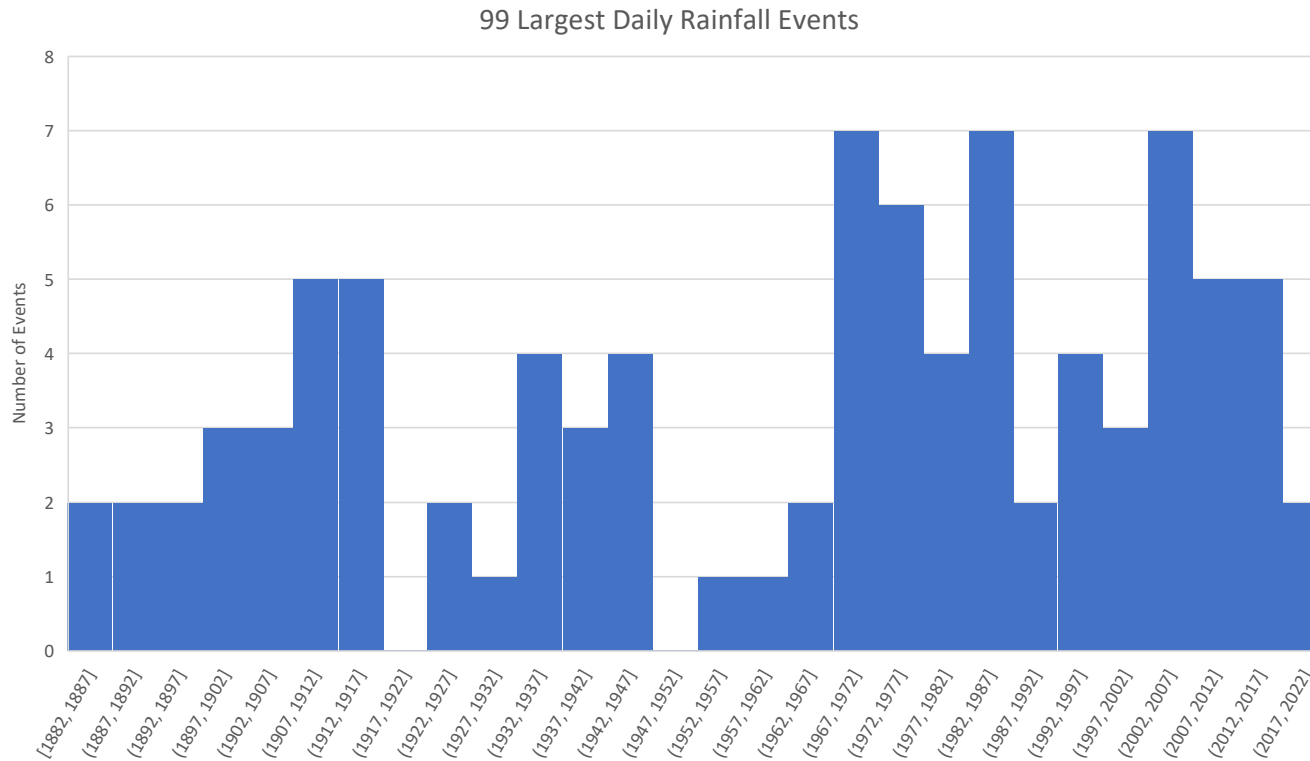
Choose and Fit a Distribution

Extreme Rainfall 101



Choose a Period of Record

Extreme Rainfall 101



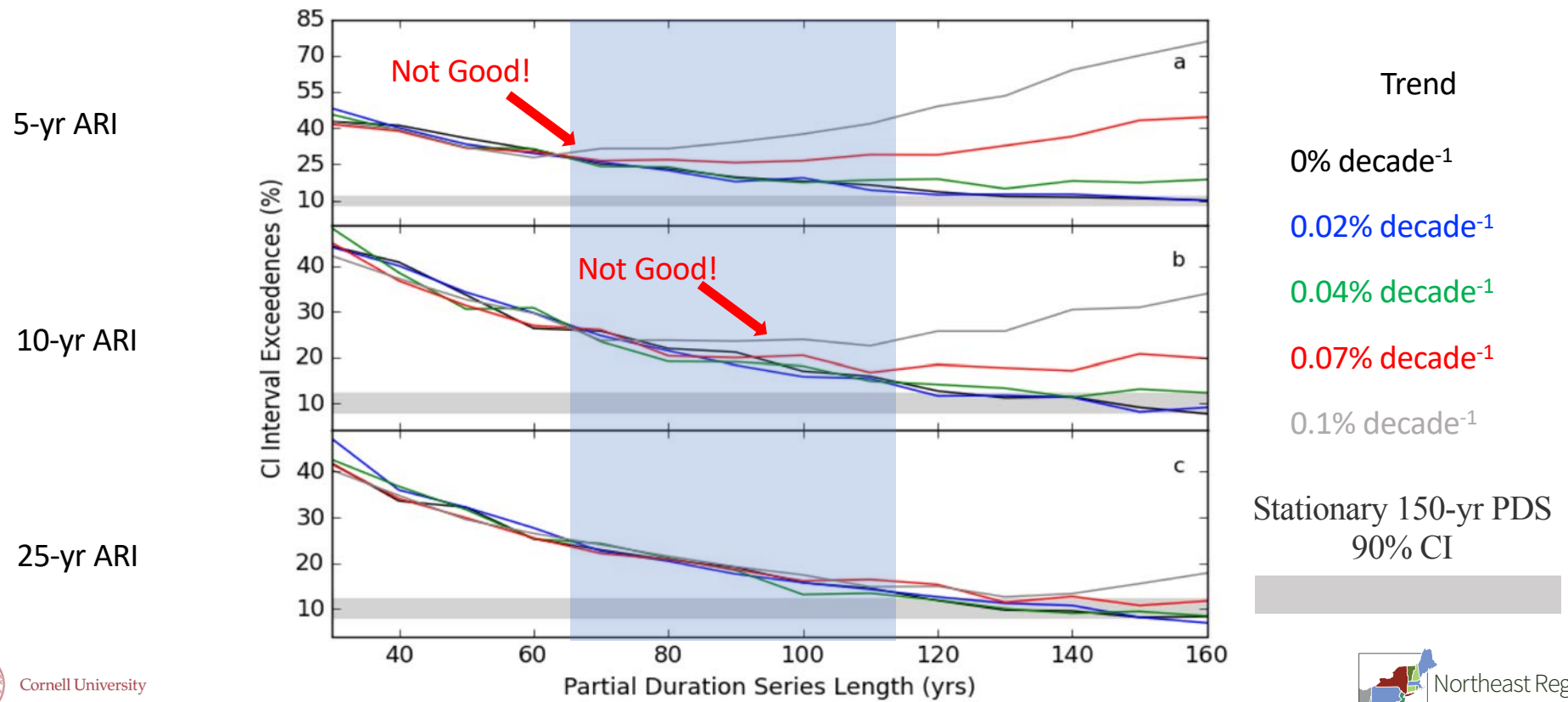
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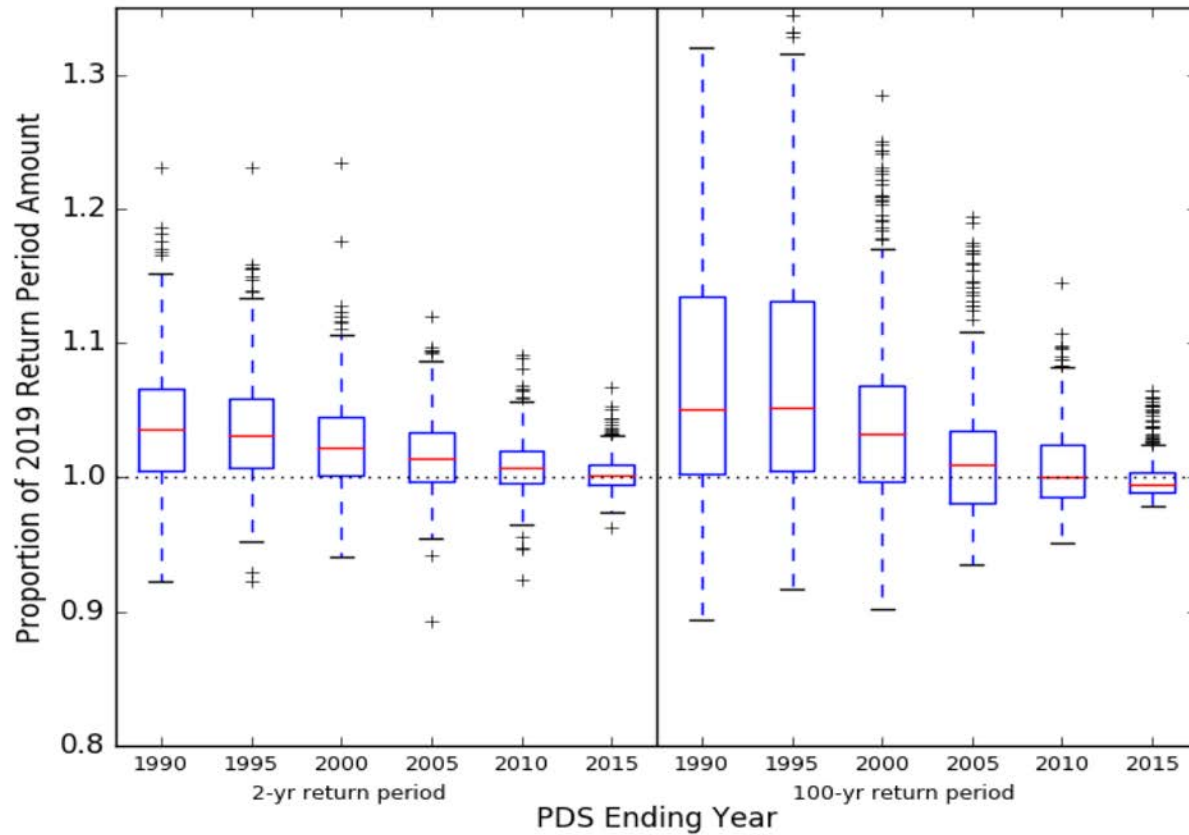
Chose a Period of Record

Extreme Rainfall 101



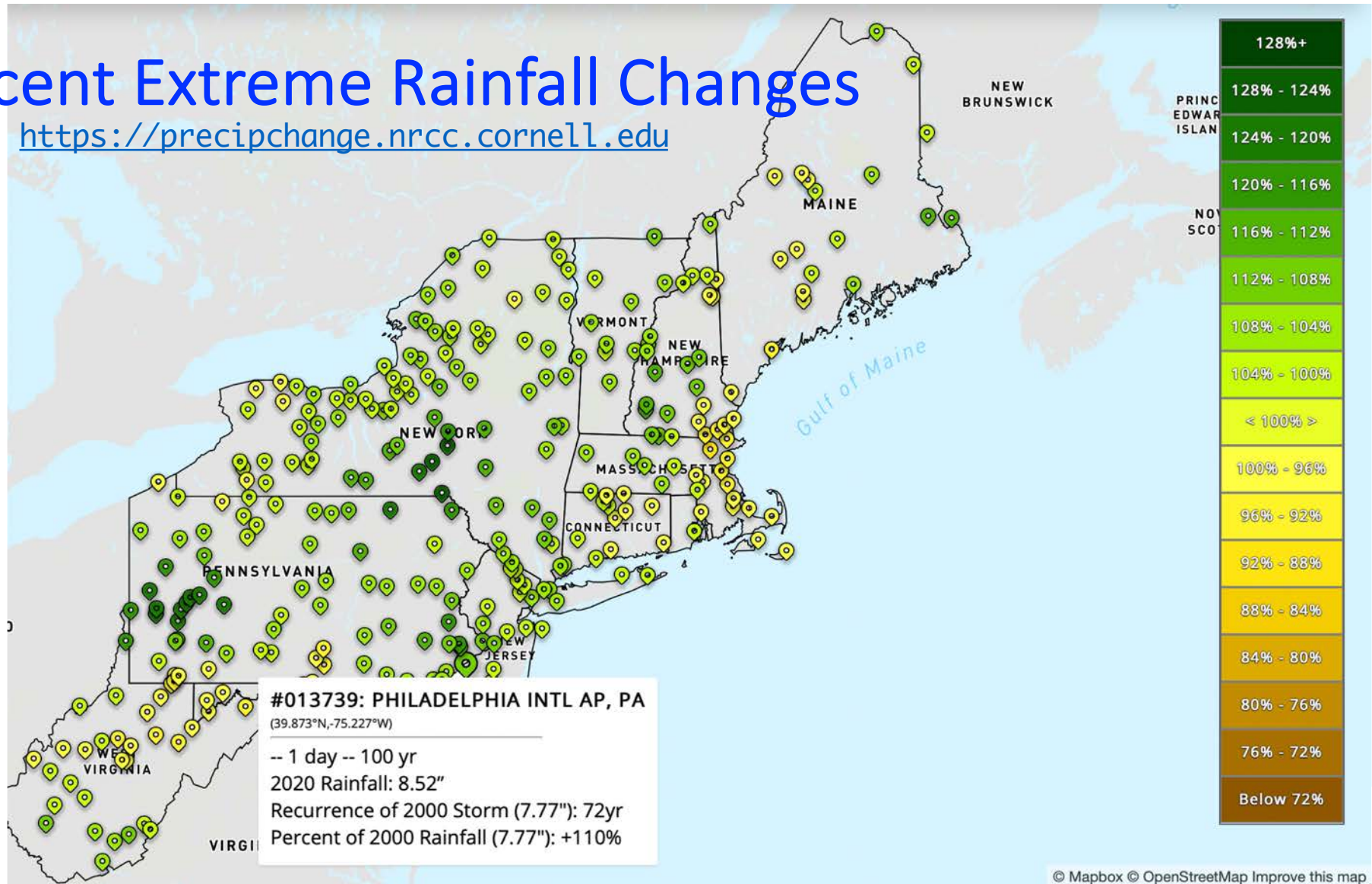
Recent Extreme Rainfall Changes

For PDS starting in 1950



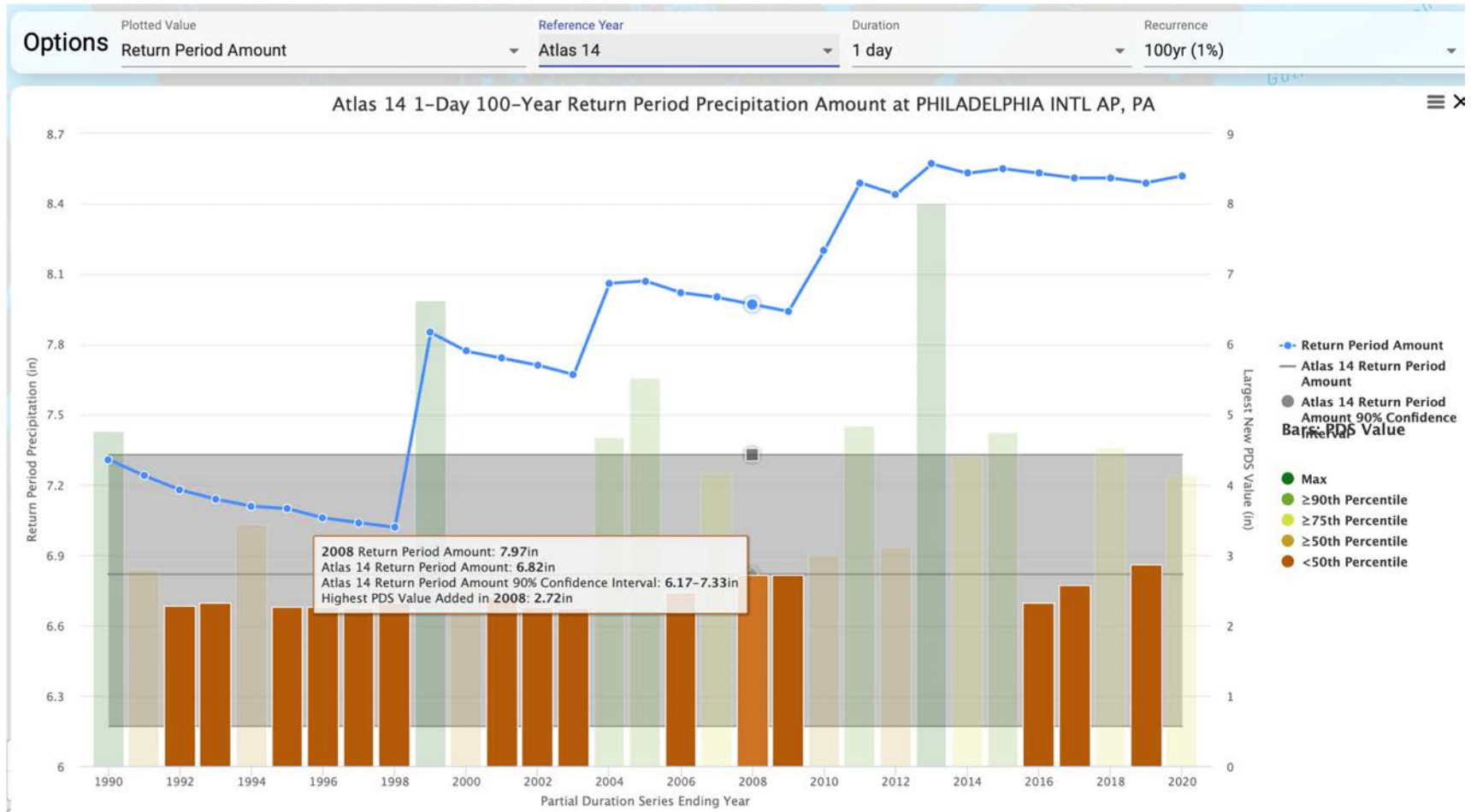
Recent Extreme Rainfall Changes

<https://precipchange.nrcc.cornell.edu>



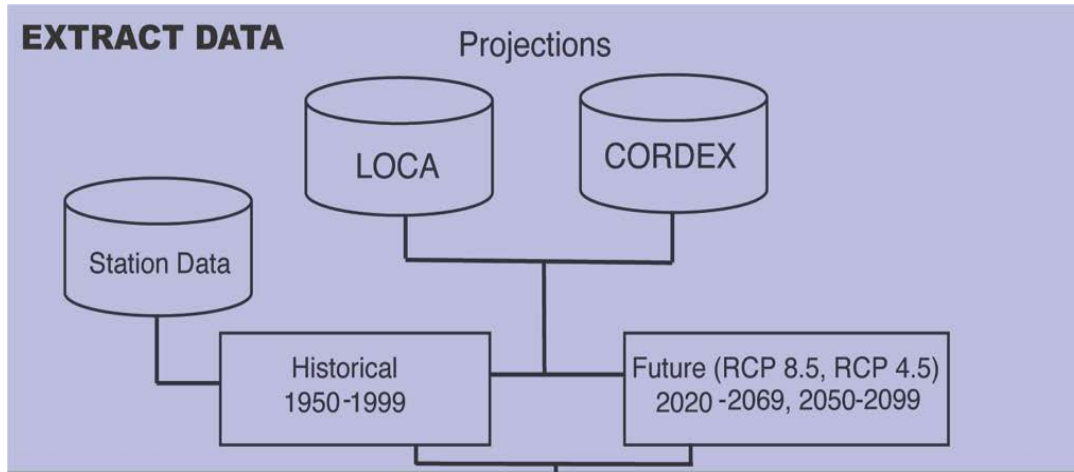
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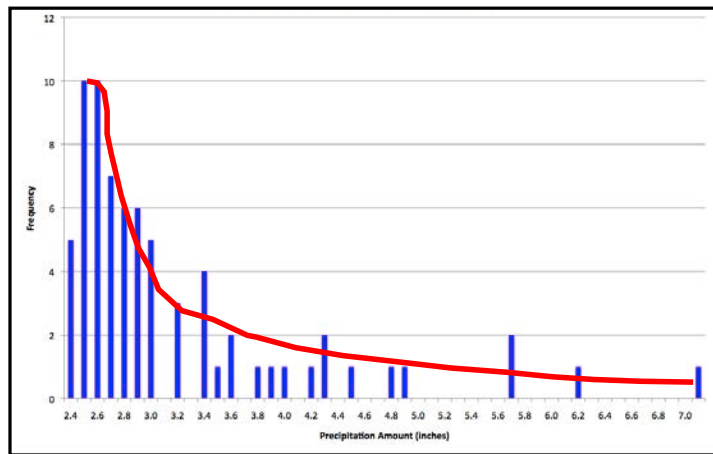
Future Extreme Rainfall:

Data



Dataset	RCPs	Approximate gridded spatial resolution*	Temporal resolution	Downscaling approach
BCCAv2	4.5,8.5	12 km (7.5 miles)	Daily	Statistical
MACA	4.5, 8.5	4 km (2.5 miles)	Daily	Statistical
LOCA	4.5, 8.5	6 km (3.7 miles)	Daily	Statistical
NA CORDEX	8.5	25 km (15.5 miles)	Daily and Sub-daily	Dynamical
NA CORDEX	4.5	25 km (15.5 miles)	Daily	Dynamical
NA CORDEX	4.5	50 km (31 miles)	Daily	Dynamical

Future Extreme Rainfall: Extreme Value Analysis



EXTREME VALUE ANALYSIS

Extract PDS

Fit GEV

Extract precipitation amounts (q_i) for 0.50, 0.80, 0.90, 0.96, 0.98 and 0.99 percentiles

Select 1000 Random PDS



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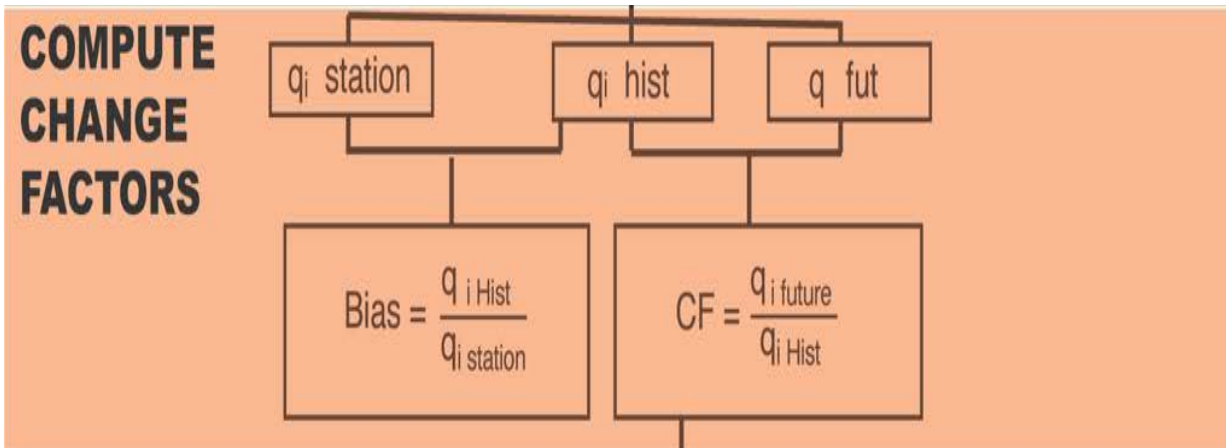


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Future Extreme Rainfall:

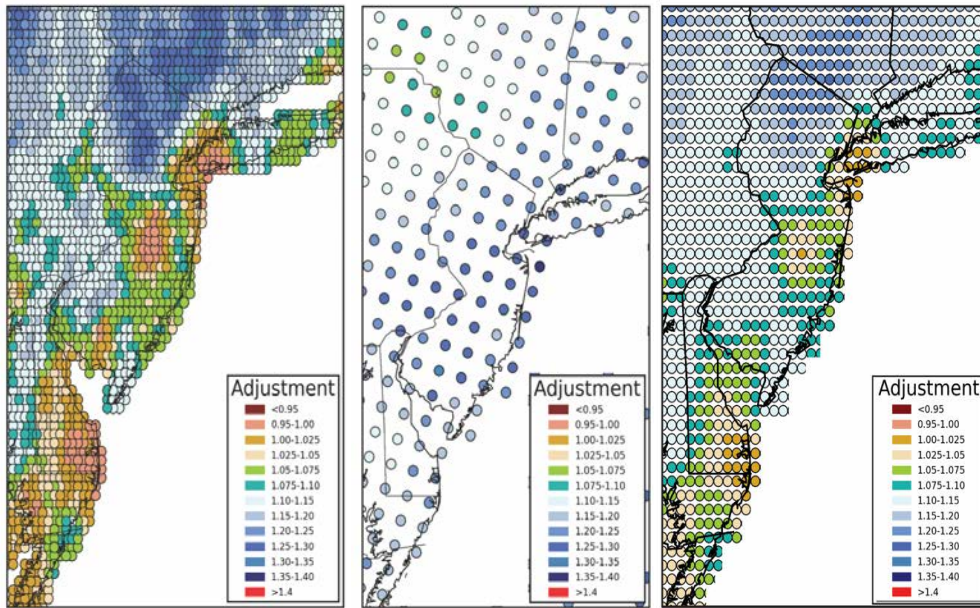
Compute Change Factor

$$CF_i = \frac{P_{i,r,future}}{P_{r,historical}}$$



Future Extreme Rainfall:

Interpolate and Smooth

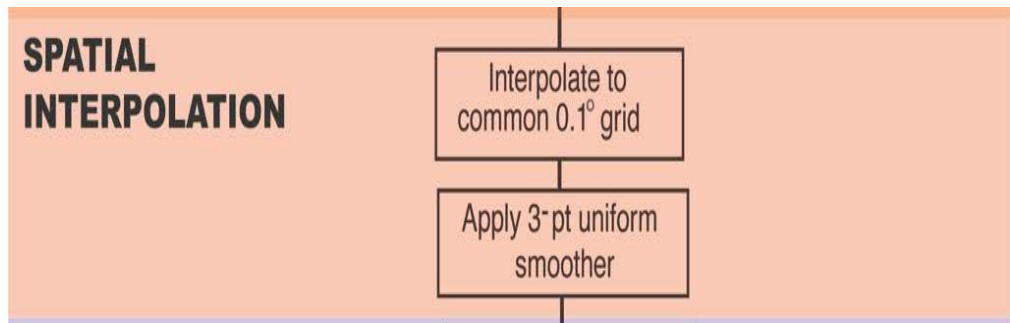


LOCA

CORDEX

COMMON 0.1°

Low (RCP4.5) Emissions 2050-2099 100-yr Storm

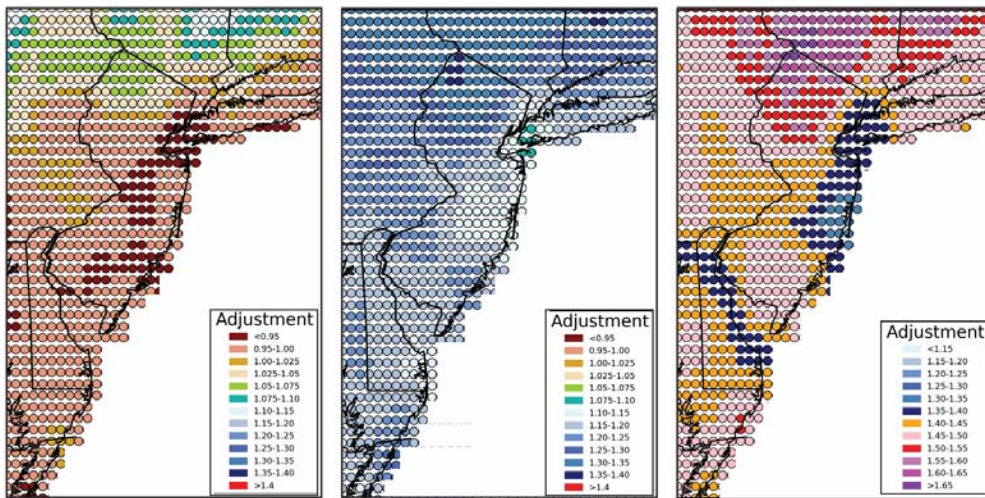


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Future Extreme Rainfall: Extract Ensemble Statistics



High Emissions 2050-2099 100-yr Storm

EXTRACT MODEL ENSEMBLE STATISTICS

1000 x number of models CF per grid

Retain 10th, 17th, 25th, 50th, 75th, 83rd and 90th percentile

Extract values for grid closest to county centroid



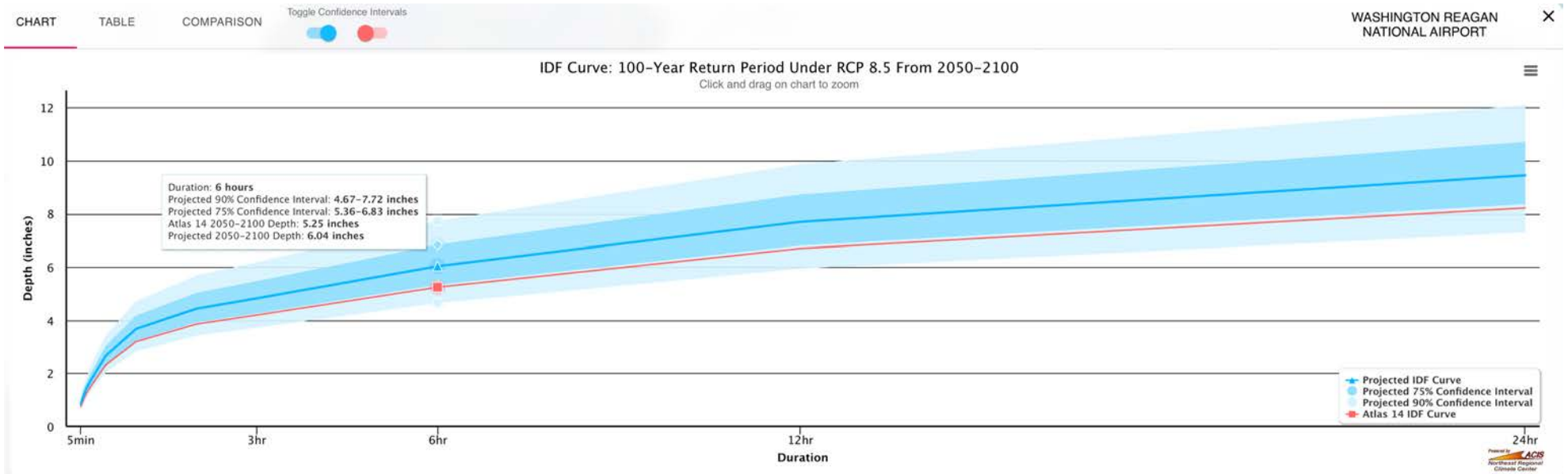
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Future Extreme Rainfall

<https://midatlantic-idf.rcc-acis.org>



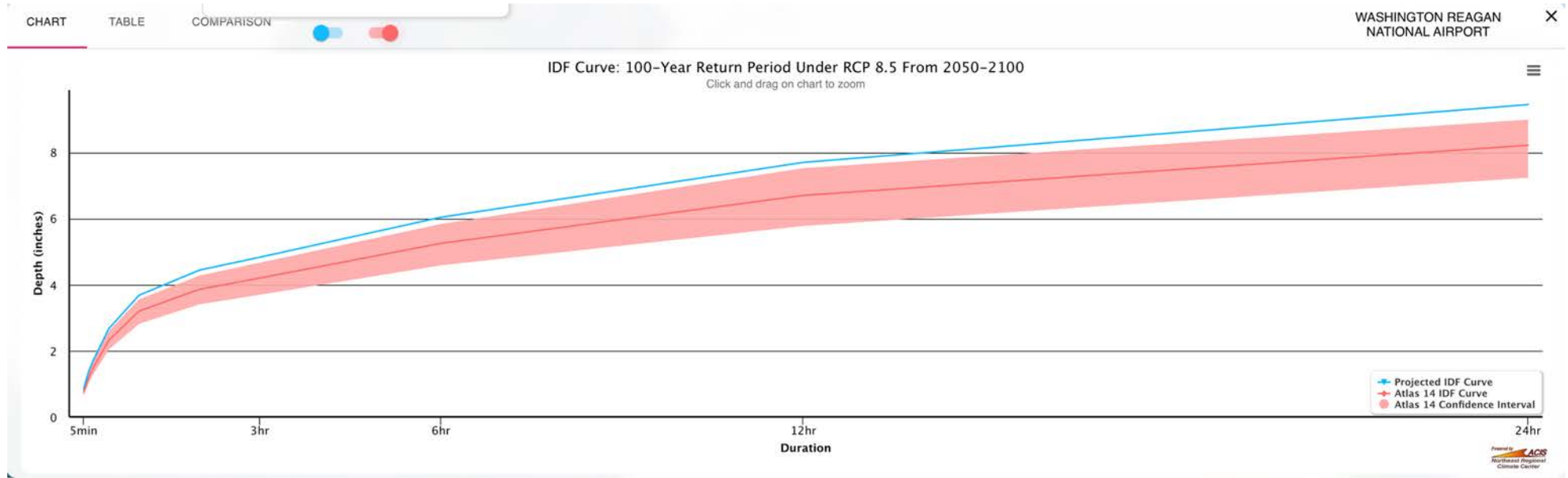
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Future Extreme Rainfall

County Values

CHART **TABLE** COMPARISON [DOWNLOAD CSV](#) PURCELLVILLE ✕

Percentile	10th	25th	Median	75th	90th	
County Change Factors:	0.98	1.05	1.14	1.26	1.481	Atlas 14 Depth (inches)
Duration	Projected 2050-2100 Depth (inches)					
5 min	0.76	0.82	0.89	0.98	1.16	0.78
10 min	1.19	1.27	1.38	1.52	1.79	1.21
15 min	1.49	1.60	1.73	1.92	2.25	1.52
30 min	2.22	2.38	2.59	2.86	3.36	2.27
60 min	3.03	3.24	3.52	3.89	4.58	3.09
2 hr	3.80	4.07	4.42	4.89	5.75	3.88
3 hr	4.10	4.39	4.77	5.27	6.19	4.18



Future Extreme Rainfall

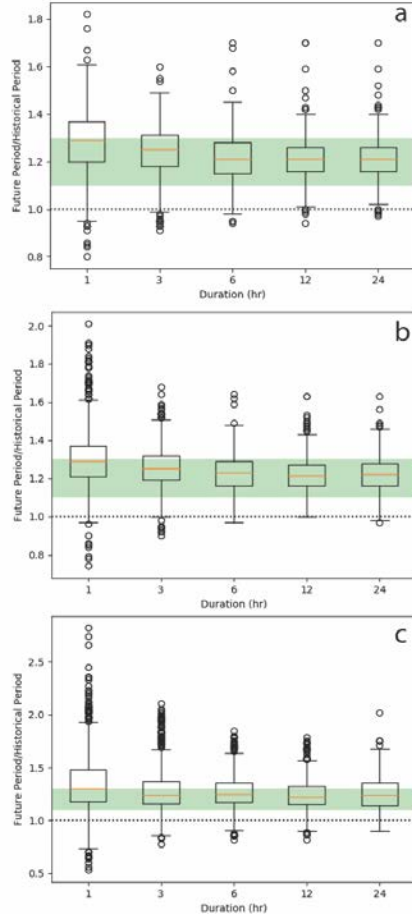
County Values

CHART	TABLE	COMPARISON	PURCELLVILLE		X
Duration	Atlas 14 Depth (inches)	Projected 2050-2100 Depth (inches)	Change (inches)		
5 min	0.78	0.89	+0.11		
10 min	1.21	1.38	+0.17		
15 min	1.52	1.73	+0.21		
30 min	2.27	2.59	+0.32		
60 min	3.09	3.52	+0.43		
2 hr	3.88	4.42	+0.54		
3 hr	4.18	4.77	+0.59		
6 hr	5.16	5.88	+0.72		



Future Extreme Rainfall

Hourly CF





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