

# RMC-BestFit Overview

## DLS-114, Module 1.3



**U.S. ARMY**



**US Army Corps  
of Engineers®**

**Dam and Levee  
Safety Programs**



March 2026 / Version 1

COUGAR DAM, OR (SOURCE: HDR)

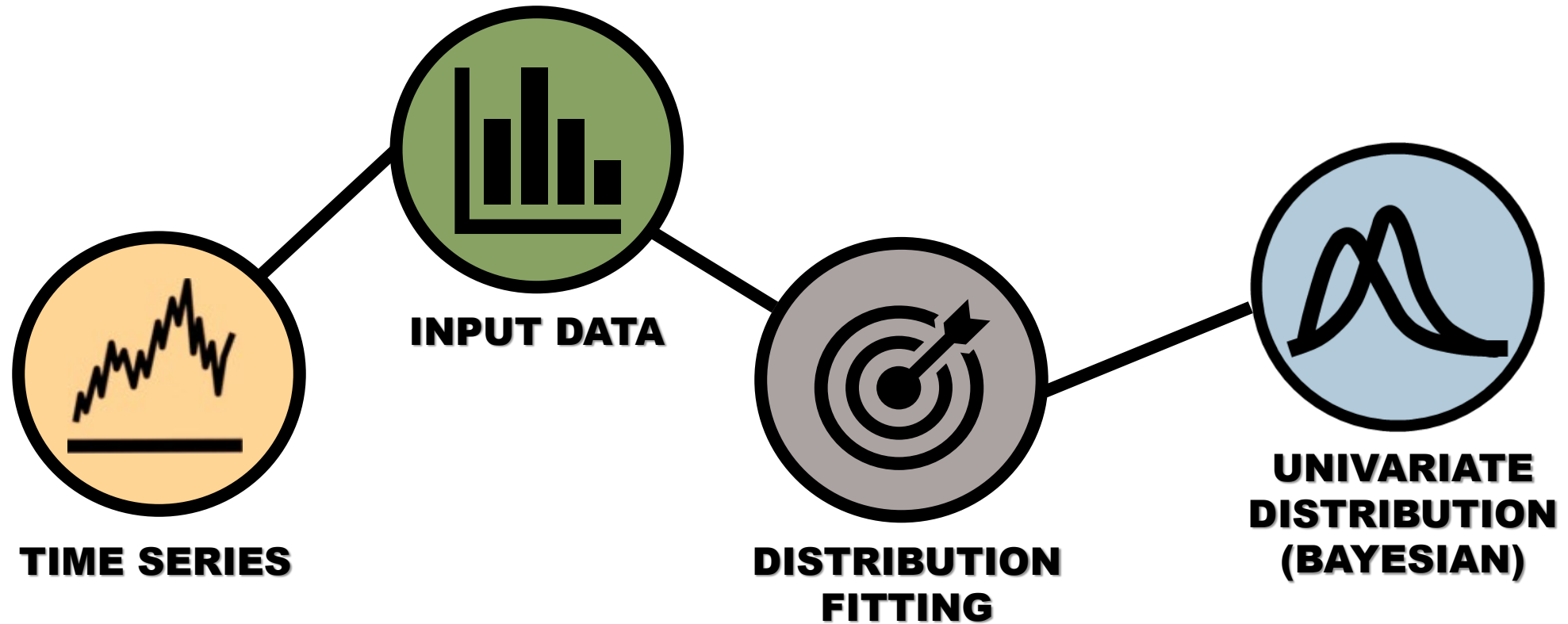
# Learning Objectives

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- Describe the why, what and when behind RMC-BestFit
- Explain Bayes' theorem
- Identify 4 project elements within RMC-BestFit

# RMC-BestFit

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# Why Use RMC-BestFit?

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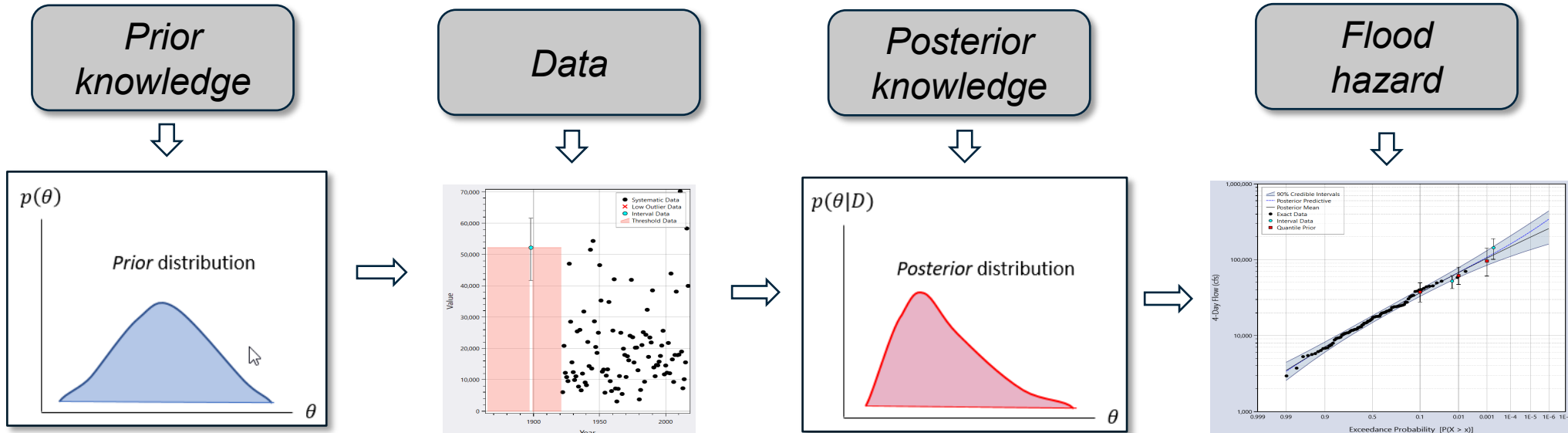
- To develop a flow or volume frequency curve
- The Bayesian method can incorporate a wide variety of information and data resulting in more confidence and less uncertainty
- Higher confidence in flow frequency curves
- Developed by the RMC, in collaboration with ERDC–CHL



# What is RMC-BestFit?

## Bayes Theorem

$$P(\theta|D) = \frac{P(D|\theta) \cdot P(\theta)}{\int P(D|\theta) \cdot P(\theta) \cdot d\theta}$$



# What is Bayesian Analysis?

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# When to Use RMC-BestFit?

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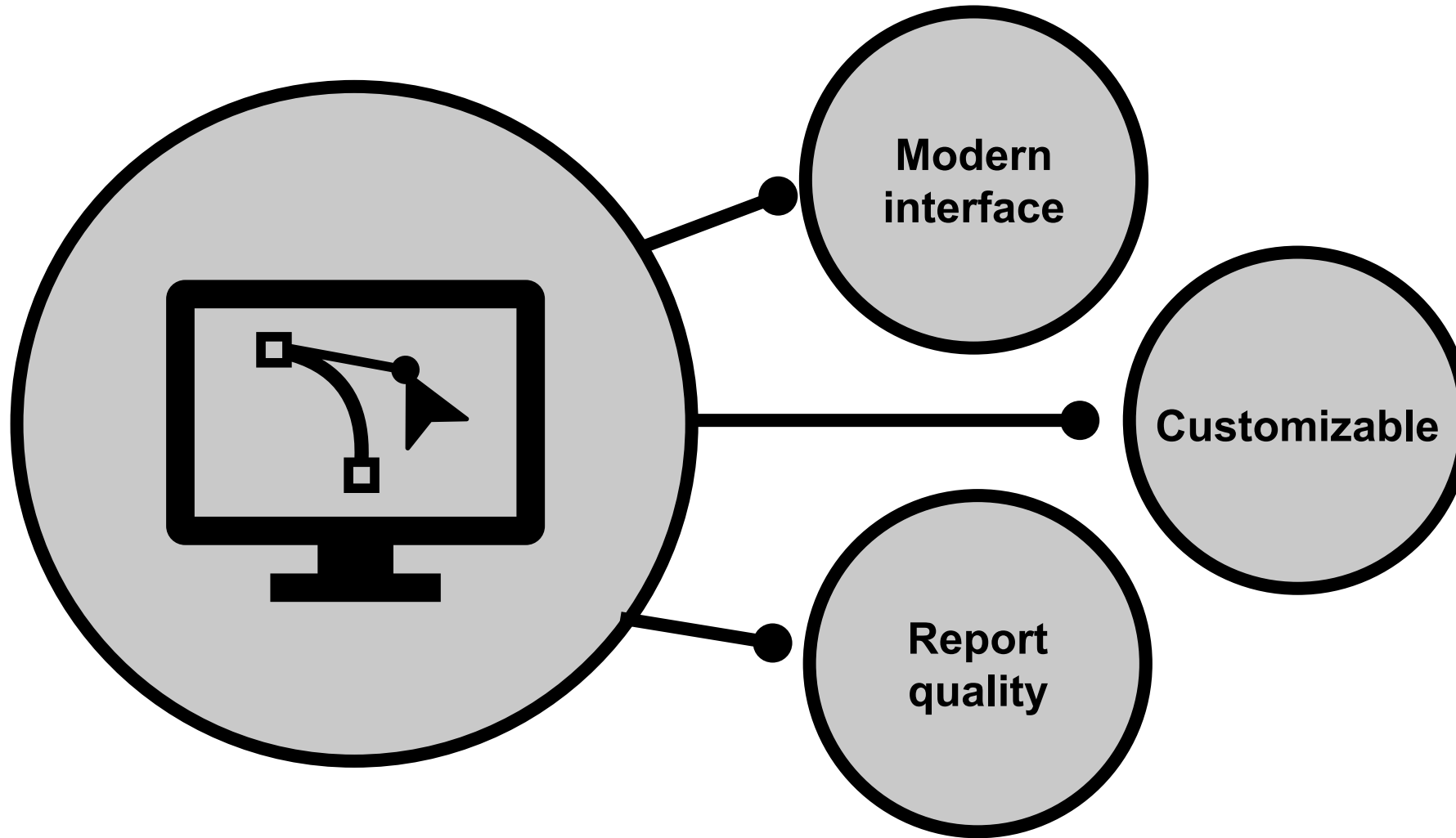
- Any level of study
- Any type of analysis
- Various sources of data





# RMC-BestFit User Interface

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# User Interface

Menu Bar  
Tool Bar

Project Explorer Window

Main Window

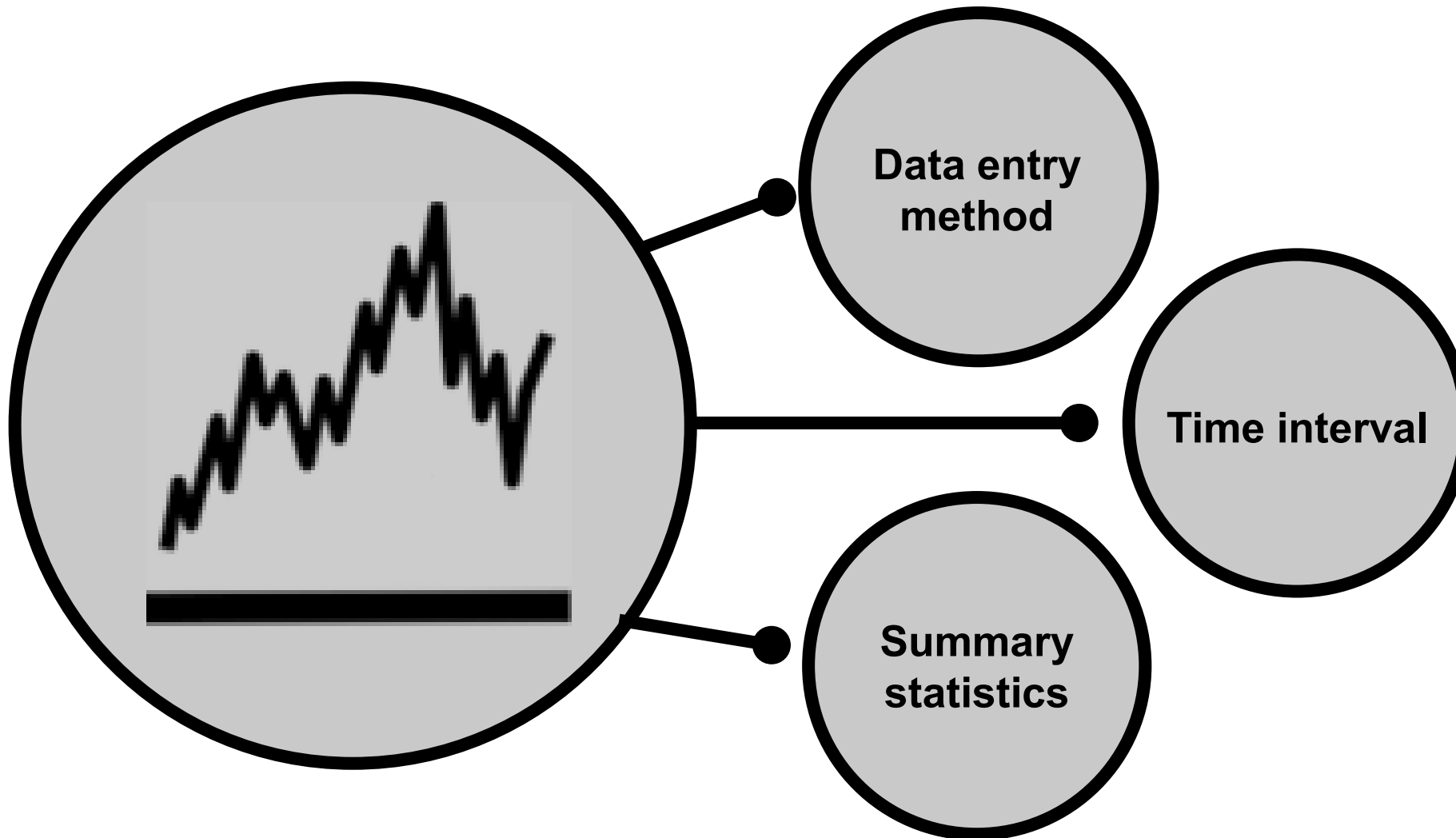
Properties Window

Message Window

The screenshot displays a software interface with several windows. The **Project Explorer** on the left shows a tree view with folders like 'Time Series Data', 'Input Data', 'Distribution Fitting Analysis', and 'Univariate Distribution Analysis'. The **Main Window** features a 'Data Frame' tab with 'Interval Data' and 'Threshold Data' sections. The 'Interval Data' section contains a table with columns 'Index', 'Value', 'Plotting Position', and 'Low Outlier'. The 'Threshold Data' section is currently empty. A plot of '4-Day Inflow (cfs)' vs 'Year' is shown, with data points and a shaded threshold area. The **Properties Window** on the right shows 'INPUT DATA PROPERTIES' for 'Paleoflood', including fields for Name, Description, Created On, Last Modified, Unit Label, and Index Label. It also has sections for 'EXACT DATA OPTIONS' and 'PLOTTING POSITIONS'. The **Message Window** at the bottom shows '0 Errors', '0 Warnings', and '0 of 13 Messages'.

Index	Value	Plotting Position	Low Outlier
1922	5,796	0.938148	
1923	20,016	0.381479	
1924	11,728.8	0.711357	
1924	10,425.6	0.783518	
1926	5,284.8	0.969074	
1927	45,192	0.051602	
1927	27,408	0.185615	
1929	14,952	0.556727	
1930	11,932.8	0.690740	
1931	9,535.2	0.804135	
1932	10,660.8	0.773209	
1933	24,434.4	0.237158	
1933	7,509.6	0.865987	
1935	24,912	0.216541	
1935	6,369.6	0.917531	
1937	11,498.4	0.721666	
1938	30,528	0.164997	
1939	8,779.2	0.845370	
1940	7,948.8	0.855679	
1941	21,199.2	0.329936	
1941	13,797.6	0.608270	
1943	49,488	0.041293	
1944	13,051.2	0.618579	
1945	52,176	0.030984	
1946	27,520.8	0.175306	

# RMC-BestFit Time Series Data



- Simple Example
  - Time Series Data ←
  - Example Time Series
  - Input Data
    - Example Input
  - Distribution Fitting Analysis
    - Example Distribution Fitting
  - Univariate Distribution Analysis
    - Example Bayesian Analysis
  - Bivariate Distribution Analysis
  - Rating Curve Analysis



# Time Series Data

## Properties

### TIME SERIES PROPERTIES

Name	Example Time Series
Description	
Created On	1/28/2026 3:30:03 PM
Last Modified	1/28/2026 3:30:03 PM
Unit Label	Value

### TIME SERIES OPTIONS

Data Entry Method	Manual Entry
Time Interval	1-Day
Start Date	01/01/2000 12:00 AM

### TIME SERIES OPTIONS

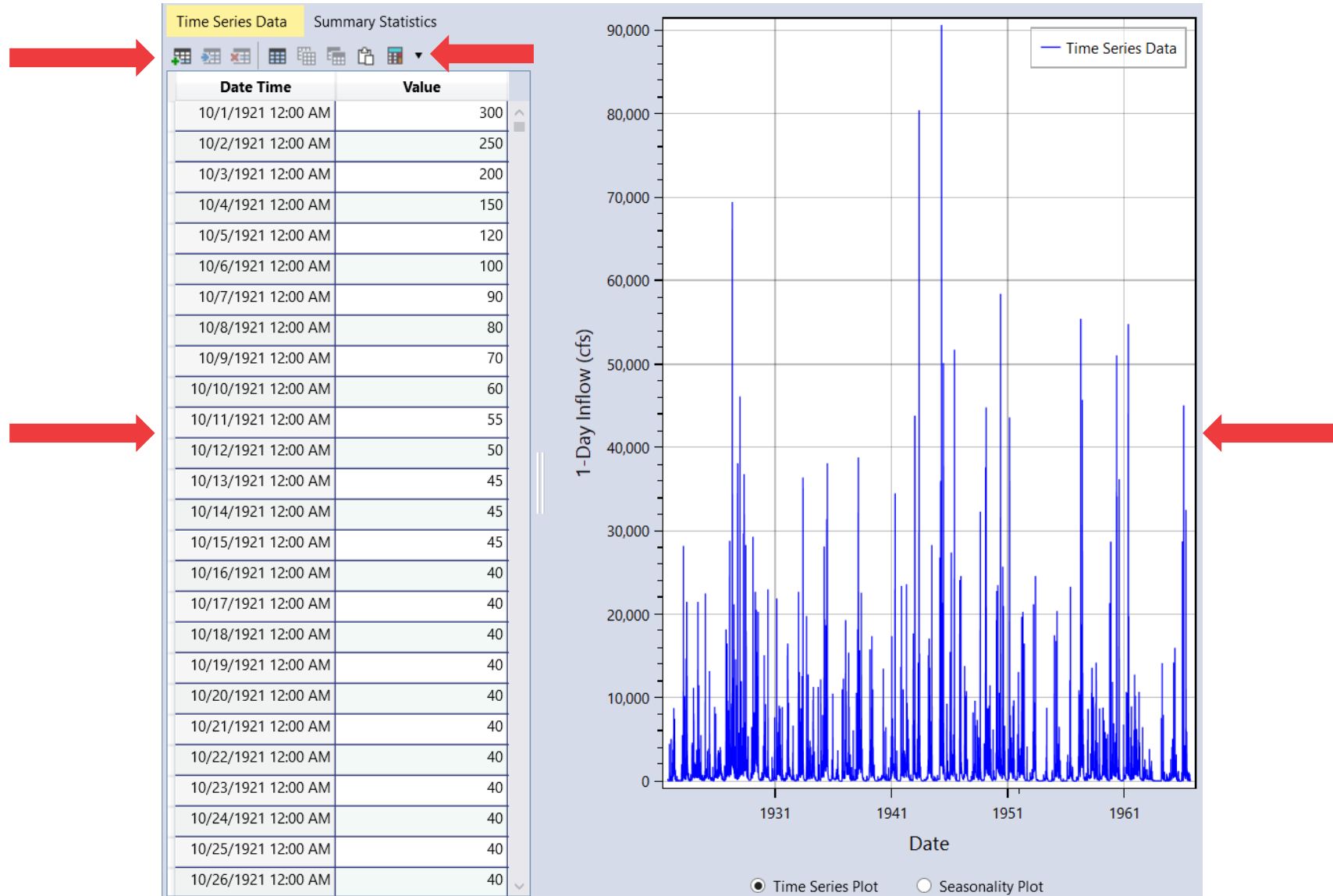
Data Entry Method	Manual Entry
Time Interval	
Start Date	

### TIME SERIES OPTIONS

Data Entry Method	Manual Entry
Time Interval	1-Day
Start Date	

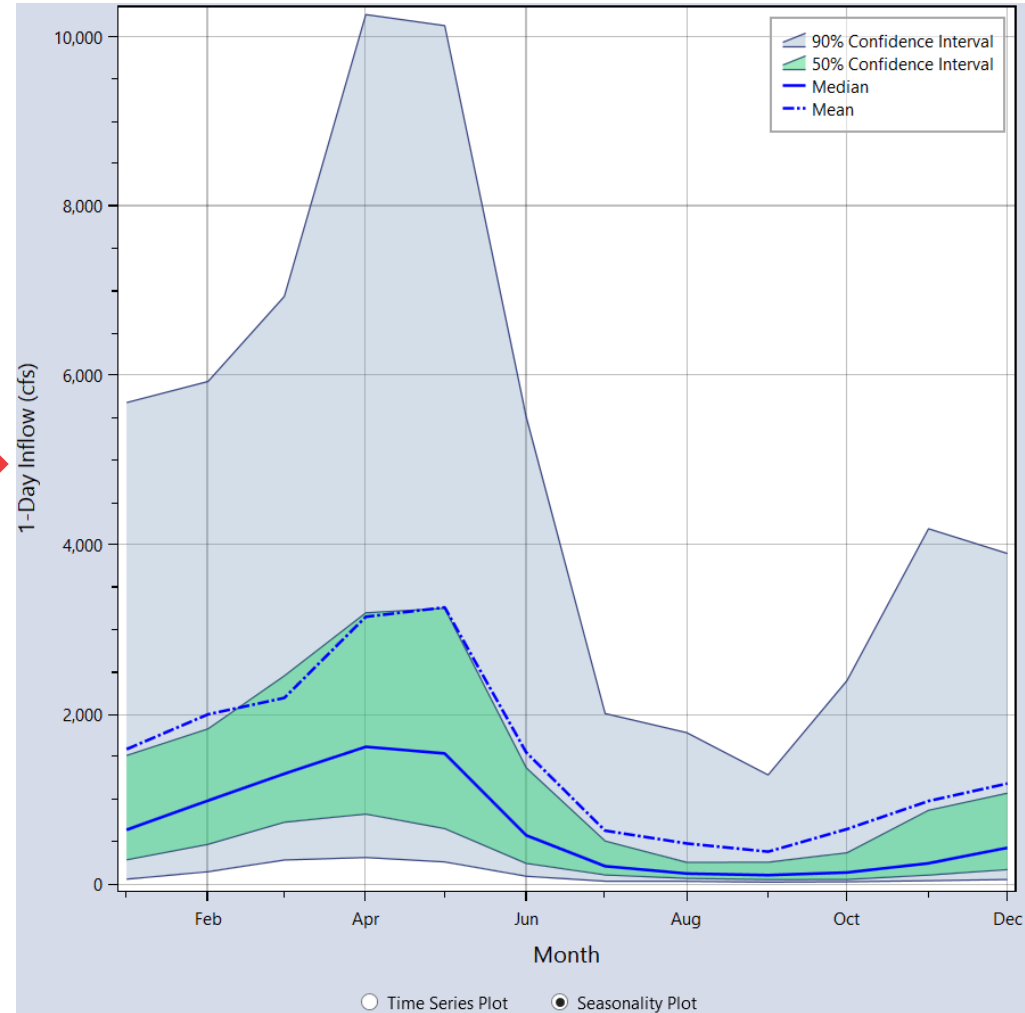


# Time Series Data



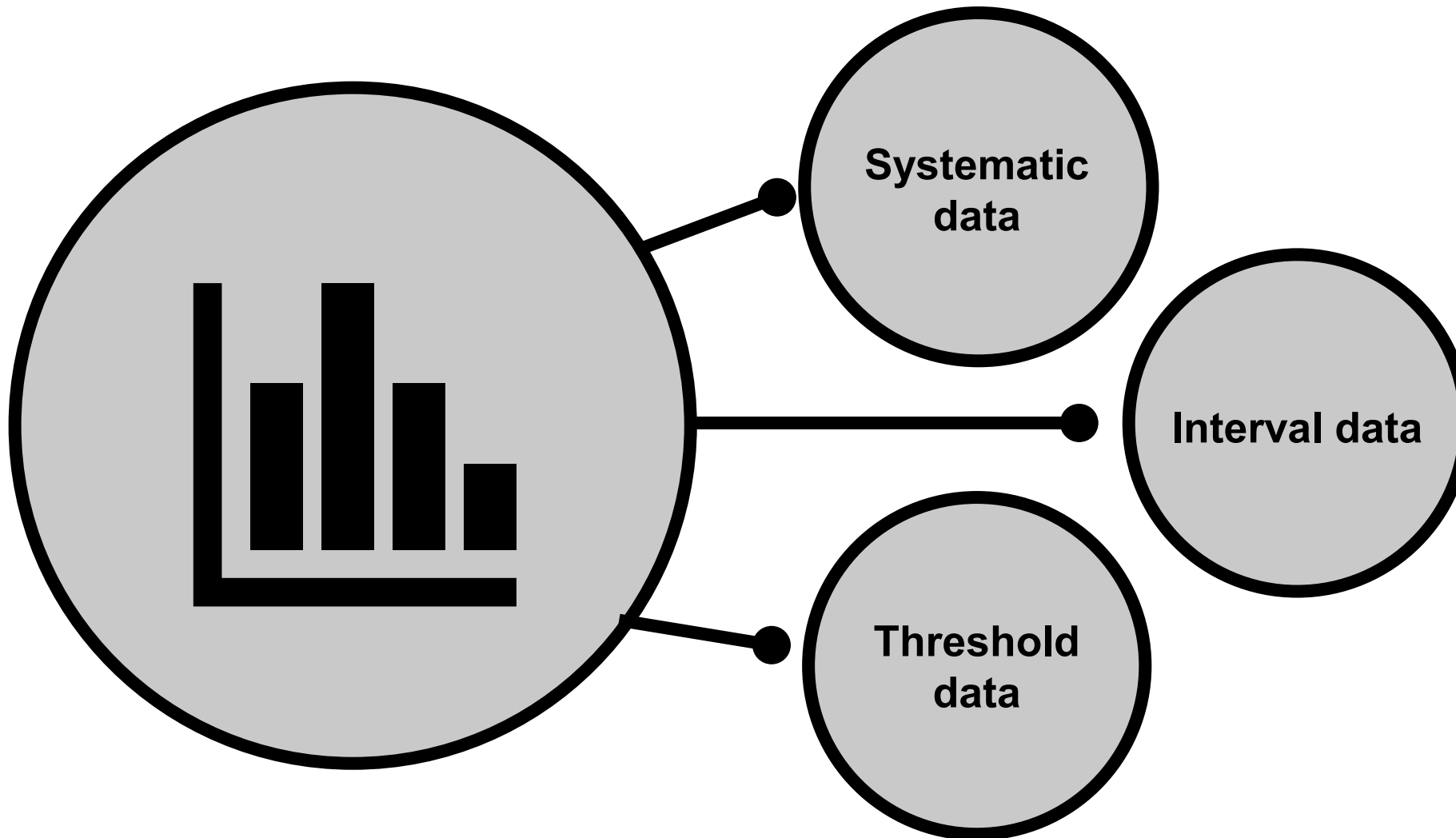
# Time Series Data


Time Series Data		Summary Statistics
Measure		Value
Record Length		16,436
Missing Values		0
Minimum		1
Maximum		90,600
Mean		1,501.0095
Std Dev		3,669.8736
Skewness		8.4782
Kurtosis		109.9365
1%		13.35
5%		41
25%		151
50%		482
75%		1,440
95%		5,644.5
99%		16,800



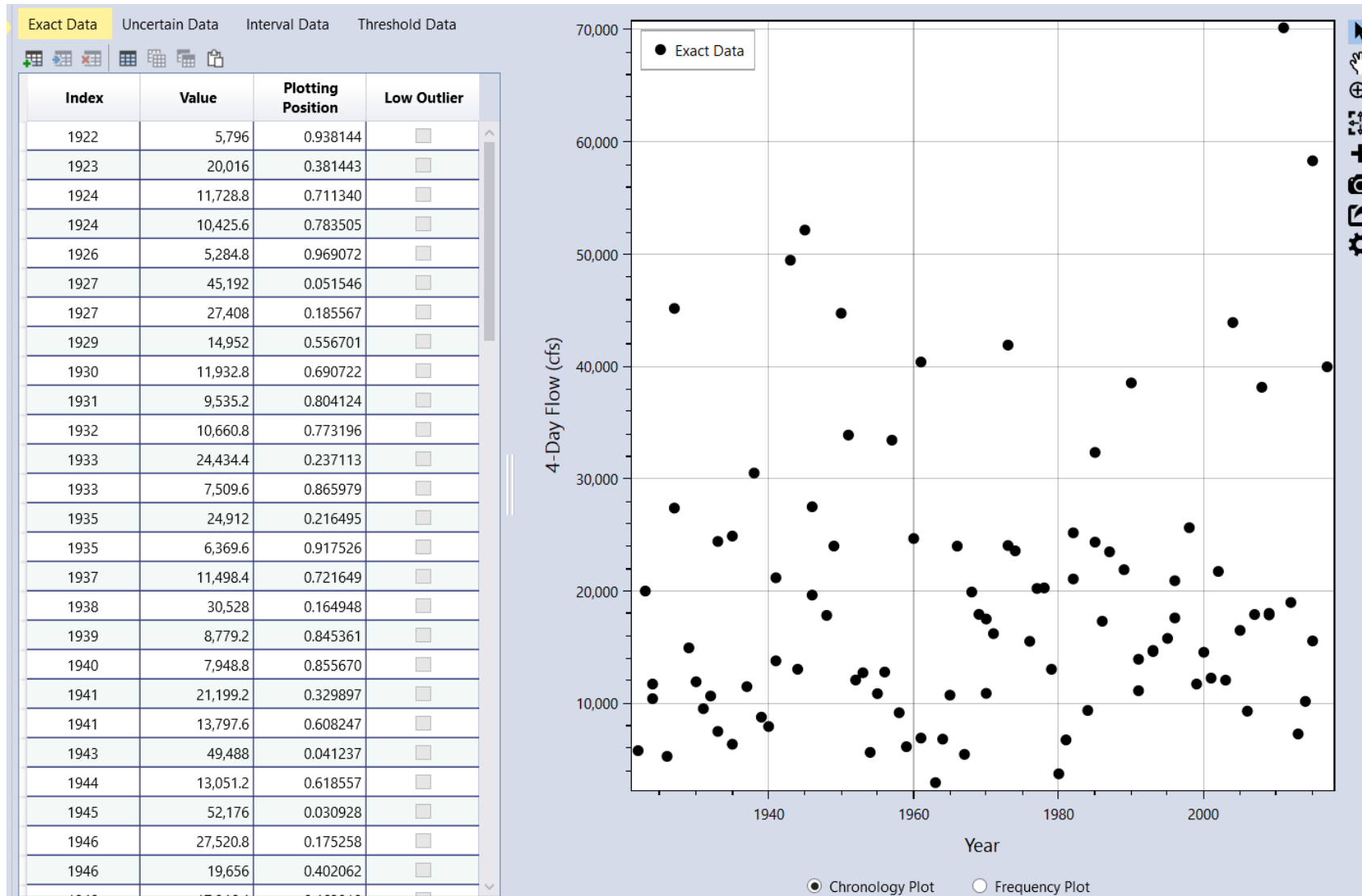


# RMC-BestFit Input Data

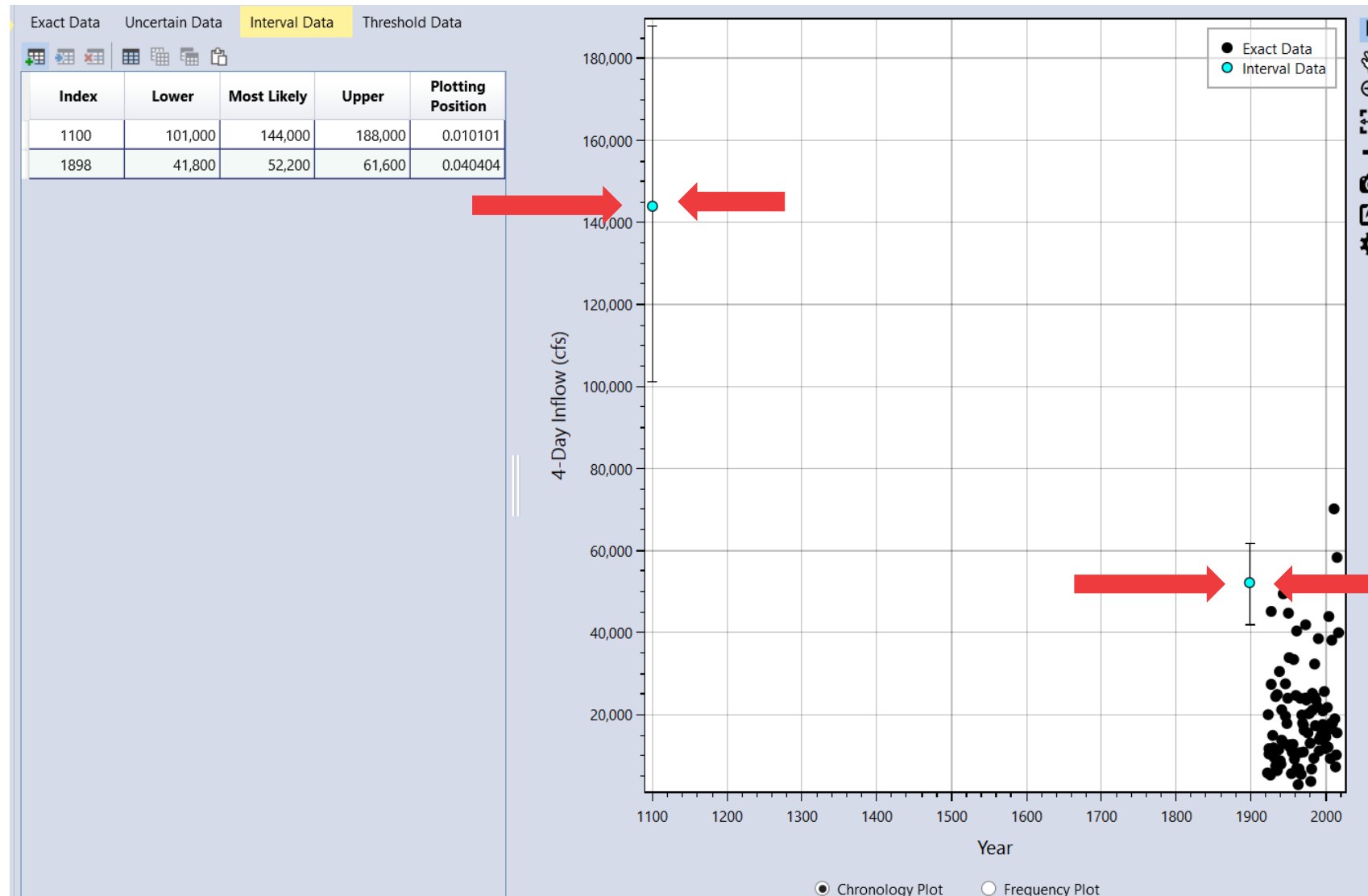


- Simple Example
  - Time Series Data
    - Example Time Series
  - Input Data 
    - Example Input
  - Distribution Fitting Analysis
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# Systematic Data

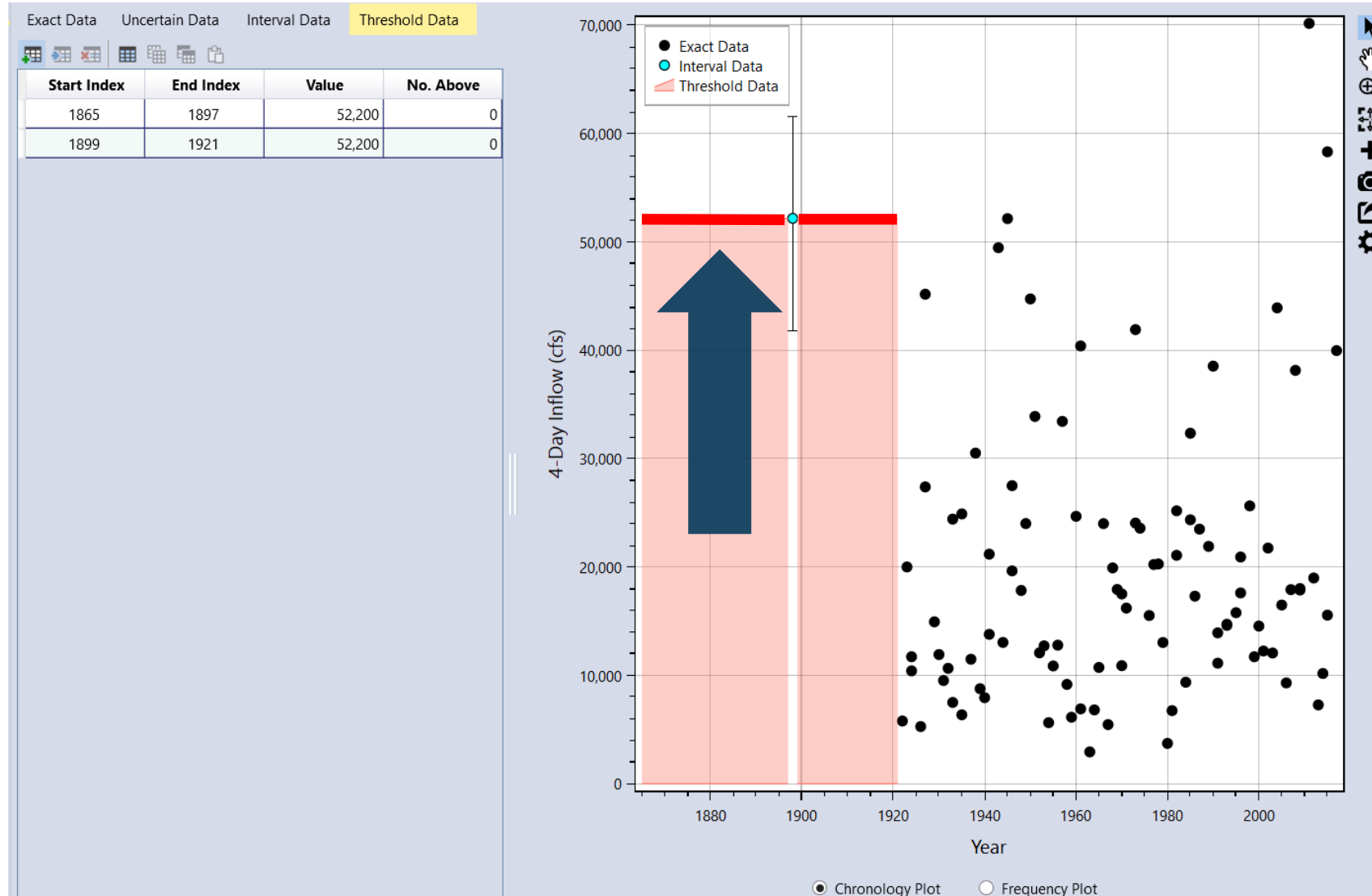


# Interval Data

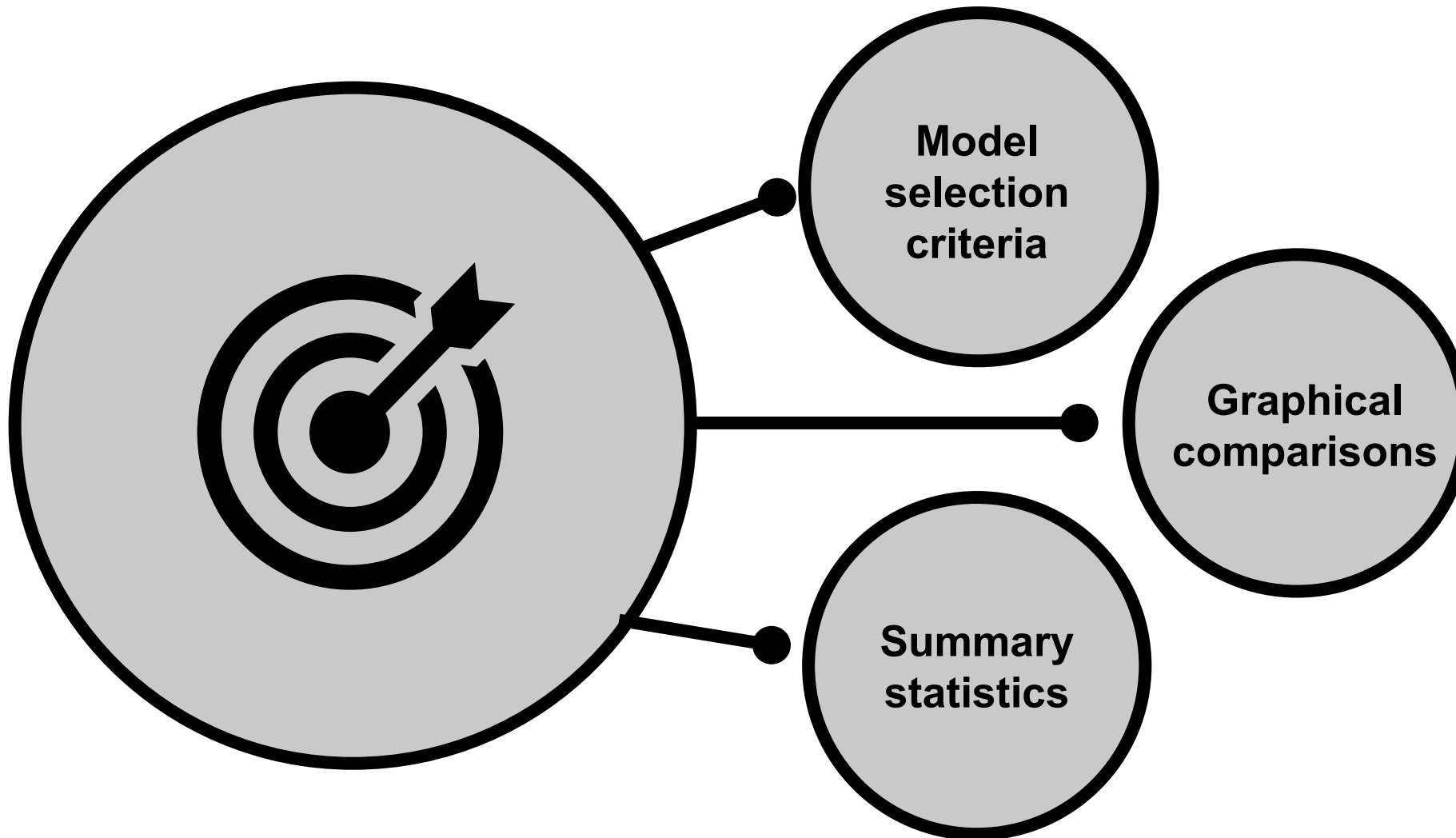





# Threshold Data



# RMC-BestFit Distribution Fitting Analysis



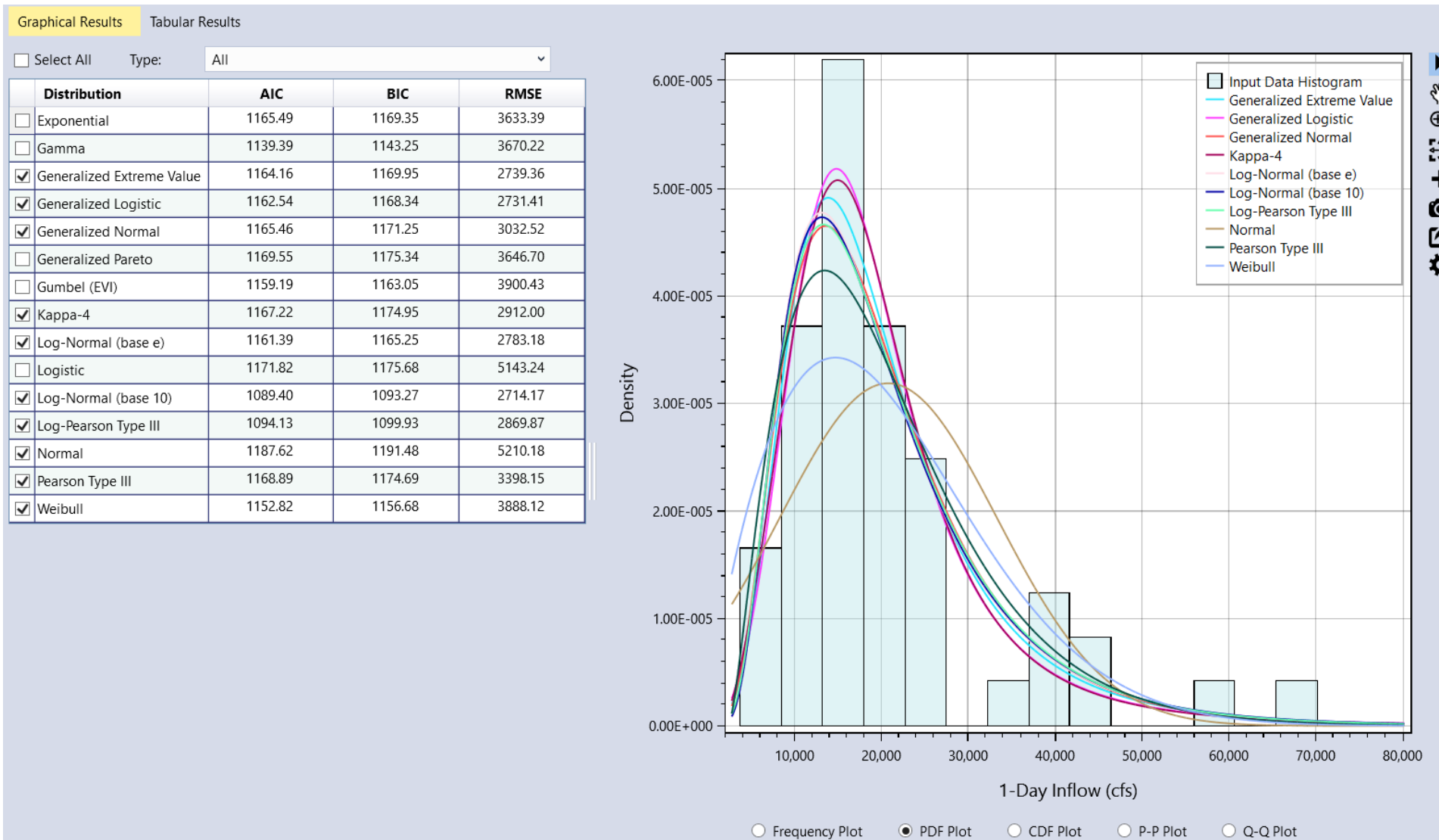
- Simple Example
  - Time Series Data
    - Example Time Series
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    - Example Input
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# Model Selection Criteria

Graphical Results		Tabular Results		
<input checked="" type="checkbox"/> Select All	Type:	3-Parameter		
	Distribution	AIC <sup>1</sup> ▲	BIC <sup>2</sup>	RMSE <sup>3</sup>
<input checked="" type="checkbox"/>	Log-Pearson Type III	1094.13	1099.93	2869.87
<input checked="" type="checkbox"/>	Generalized Logistic	1162.54	1168.34	2731.41
<input checked="" type="checkbox"/>	Generalized Extreme Value	1164.16	1169.95	2739.36
<input checked="" type="checkbox"/>	Generalized Logistic	1165.46	1171.25	3032.52
<input checked="" type="checkbox"/>	Pea	1168.89	1174.69	3398.15
<input checked="" type="checkbox"/>	Ger	1169.55	1175.34	3646.70

Generalized Logistic  
Location ( $\xi$ ) = 17,718.7999  
Scale ( $\alpha$ ) = 5,262.4996  
Shape ( $\kappa$ ) = -0.2924

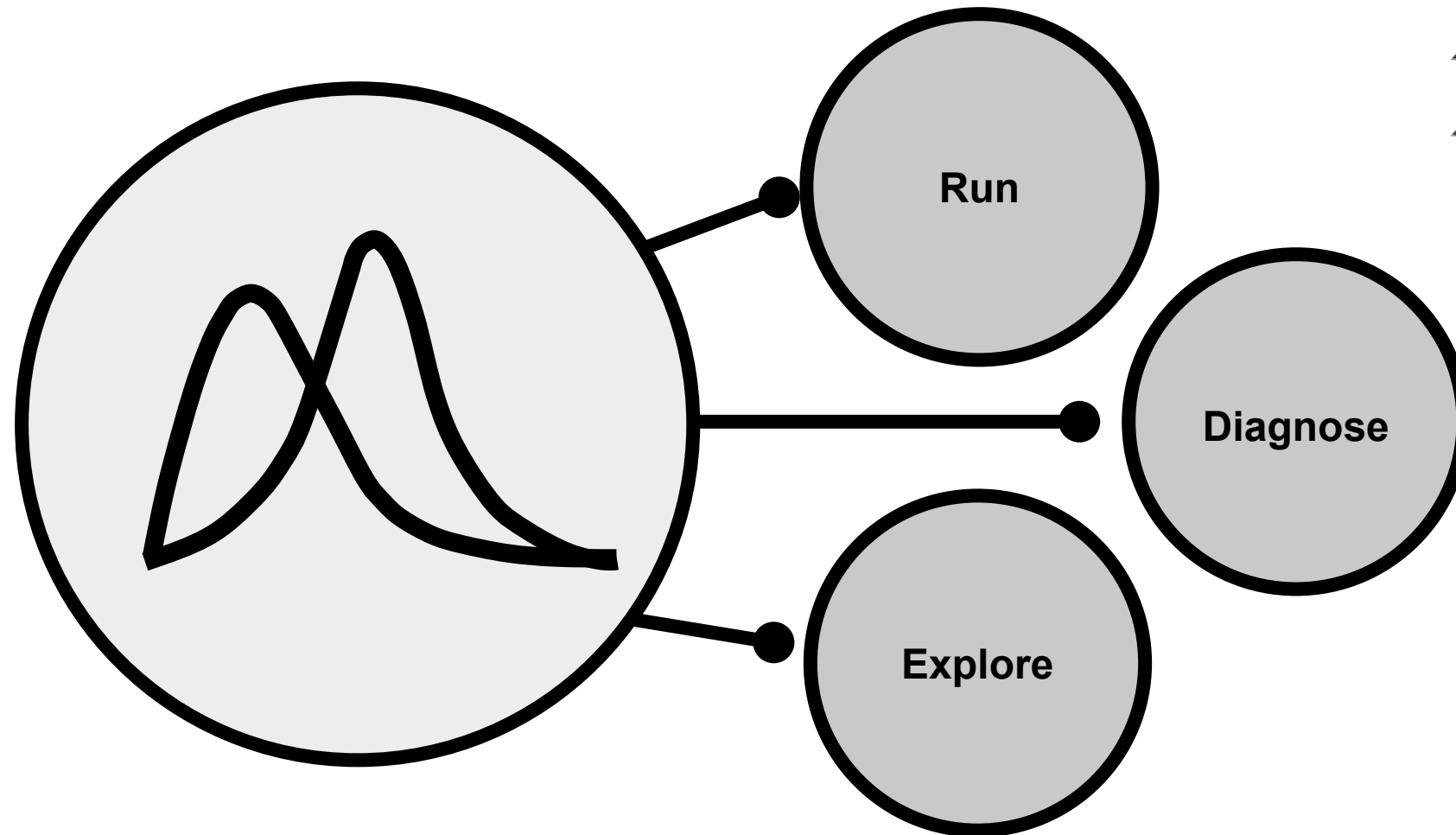
# Graphical Comparisons



# Summary Statistics

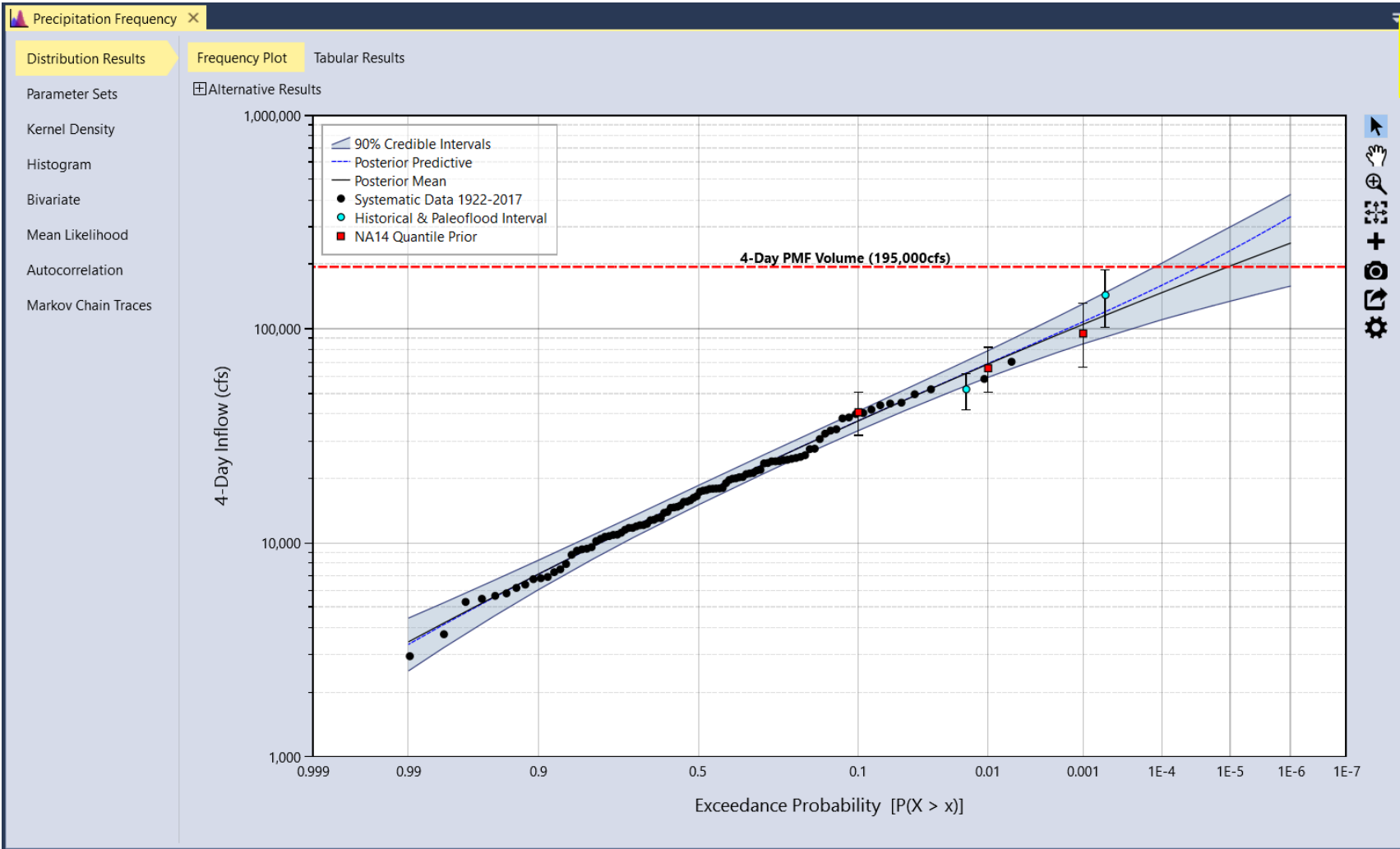
Graphical Results    Tabular Results							
Measure	Exponential	Gamma	Generalized Extreme Value	Generalized Logistic	Generalized Pareto	Gumbel (EVI)	Ln-Normal
Location	7,360.0000	N/A	22,480.5111	26,775.5897	7,360.0000	22,627.4795	28,515.715
Scale	17,851.5087	7,502.82	25,649.6401	25,649.6401	25,649.6401	11,370.2977	14,859.897
Shape	N/A	3.9411	-0.0131	-0.1516	0.2155	N/A	N/A
Minimum	7,360	0	-832,814	-22,558	7,360	-∞	
Maximum	∞	∞	∞	∞	126,364	∞	∞
Mean	25,212	29,569	28,692	28,692	28,462	29,191	28,515
Std Dev	17,852	14,895	14,614	14,783	17,639	14,583	14,860
Skewness	2.0000	1.0074	1.2199	1.5833	1.1398	1.1396	1.704
Kurtosis	3.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
1E-06	253,988	159,240	192,055	378,263	120,306	179,714	259,87
2E-06	241,614	153,233	182,796	338,273	119,329	171,833	242,39
5E-06	225,257	145,238	170,686	291,466	117,794	161,414	220,38
1E-05	212,883	139,143	161,620	260,135	116,413	153,533	204,53
2E-05	200,509	133,004	152,637	231,930	114,809	145,651	189,35
5E-05	184,152	124,812	140,886	198,917	112,286	135,233	170,25
0.0001	171,778	118,549	132,089	176,819	110,018	127,351	156,52
0.0002	159,405	112,220	123,372	156,924	107,384	119,469	143,37
0.0005	143,048	103,738	111,669	133,635	103,240	109,049	126,87
0.001	130,674	97,217	103,430	118,041	99,513	101,165	115,00
0.002	118,300	90,590	94,966	103,994	95,187	93,278	103,65
0.005	101,943	81,630	83,885	87,527	88,379	82,842	89,37
0.01	89,569	74,661	75,574	76,468	82,259	74,933	79,09
0.02	77,196	67,481	67,308	66,451	75,152	66,994	69,19
0.05	60,838	57,544	56,395	54,541	63,970	56,399	56,63
0.1	48,465	49,535	48,054	46,282	53,916	48,215	47,39
0.2	36,091	40,839	39,442	38,317	42,242	39,682	38,20
0.3	28,853	35,228	34,103	33,530	34,560	34,340	32,70

# Univariate Distribution Analysis



- Simple Example
  - Time Series Data
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  - Example Bayesian Analysis
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# Run



## Output options

Name: Precipitation Frequency

Description:

Created On: 1/28/2026 2:00:58 PM

Last Modified: 1/31/2026 9:29:47 AM

## Input data Distribution

PARAMETER PRIORS

Parameter	Distribution
Mean (of log) ( $\mu$ )	U (0, 6)
Std Dev (of log) ( $\sigma$ )	U (0, 2)
Skew (of log) ( $\gamma$ )	N (-0.17, 0.346)

Prior distributions

Use Default Flat Prior ☐

Use Jeffreys' Rule for Scale ☒

QUANTILE PRIORS

Ex. Probability	Distribution
0.1	LN (40500, 5800)
0.01	LN (65100, 9700)
0.001	LN (95500, 20100)

Enable Priors on Quantiles ☒

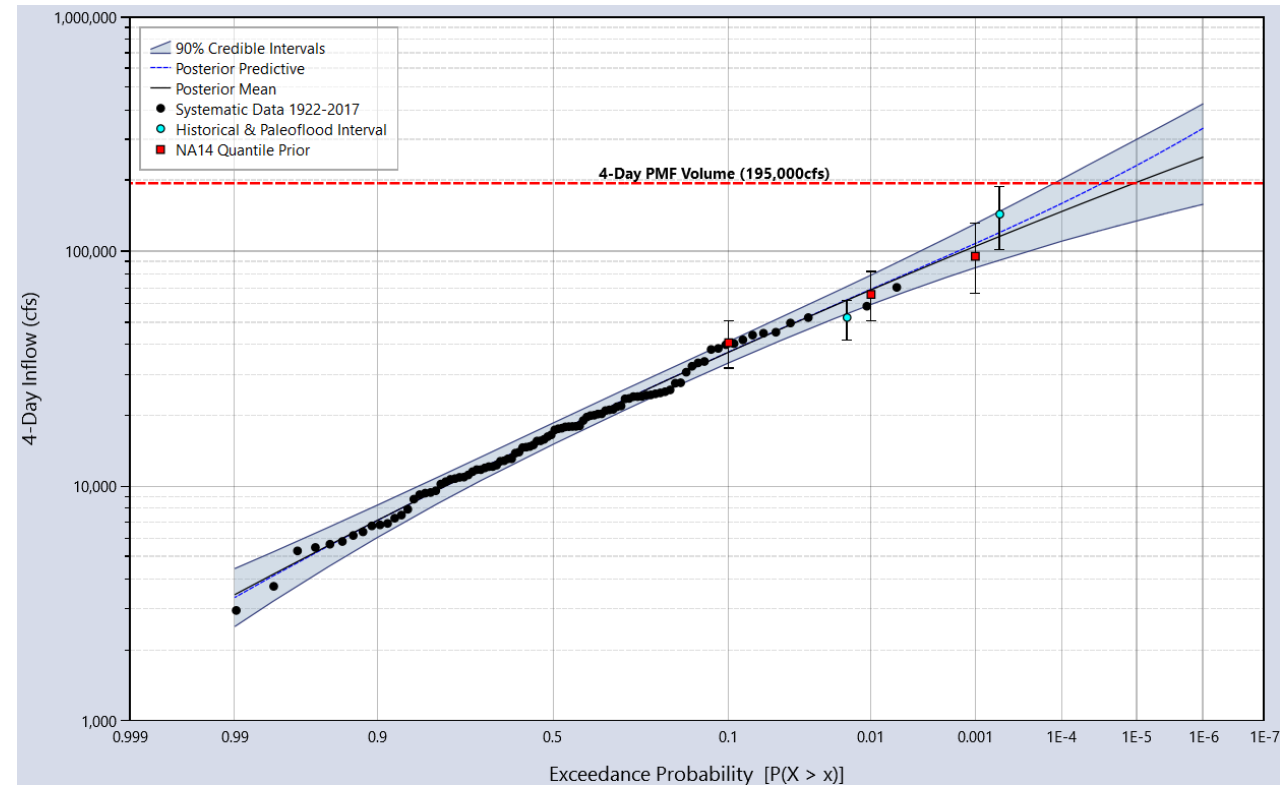
Use Single Quantile ☐

## Estimate



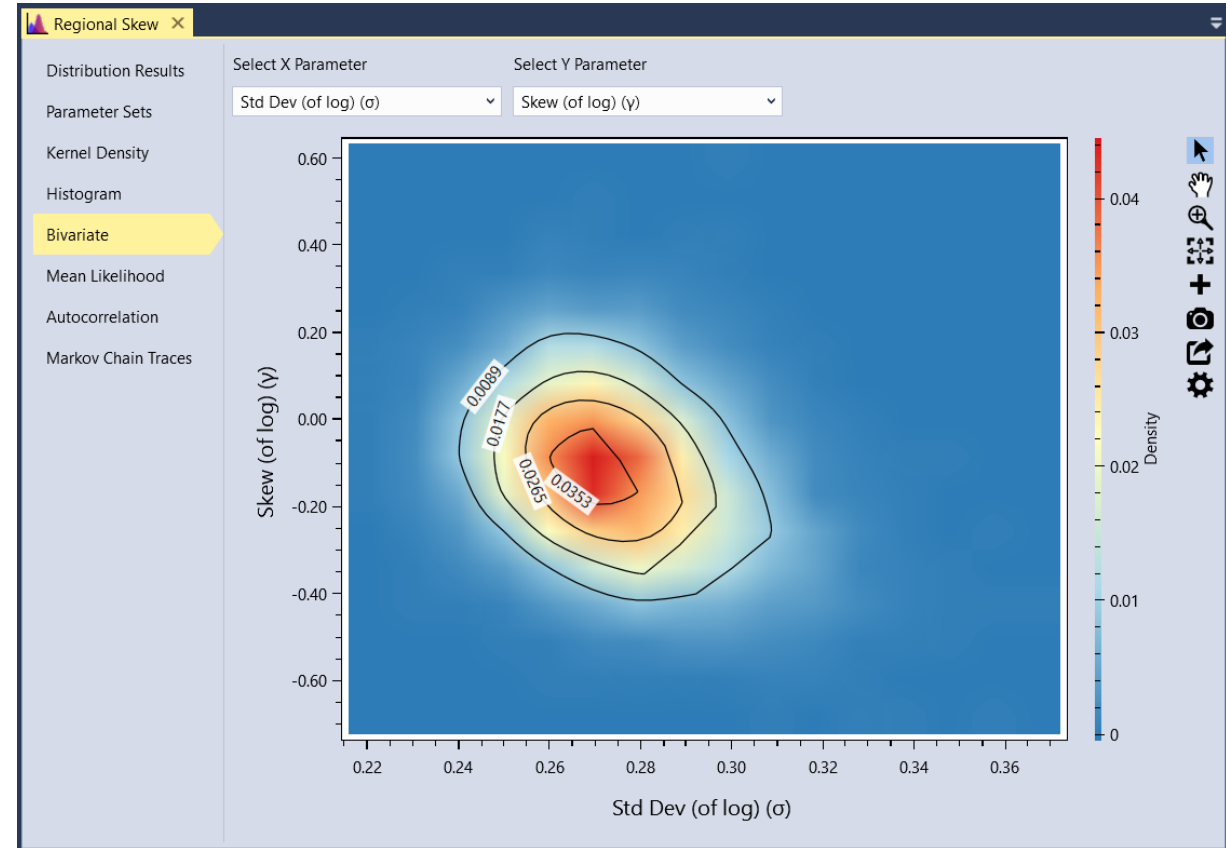
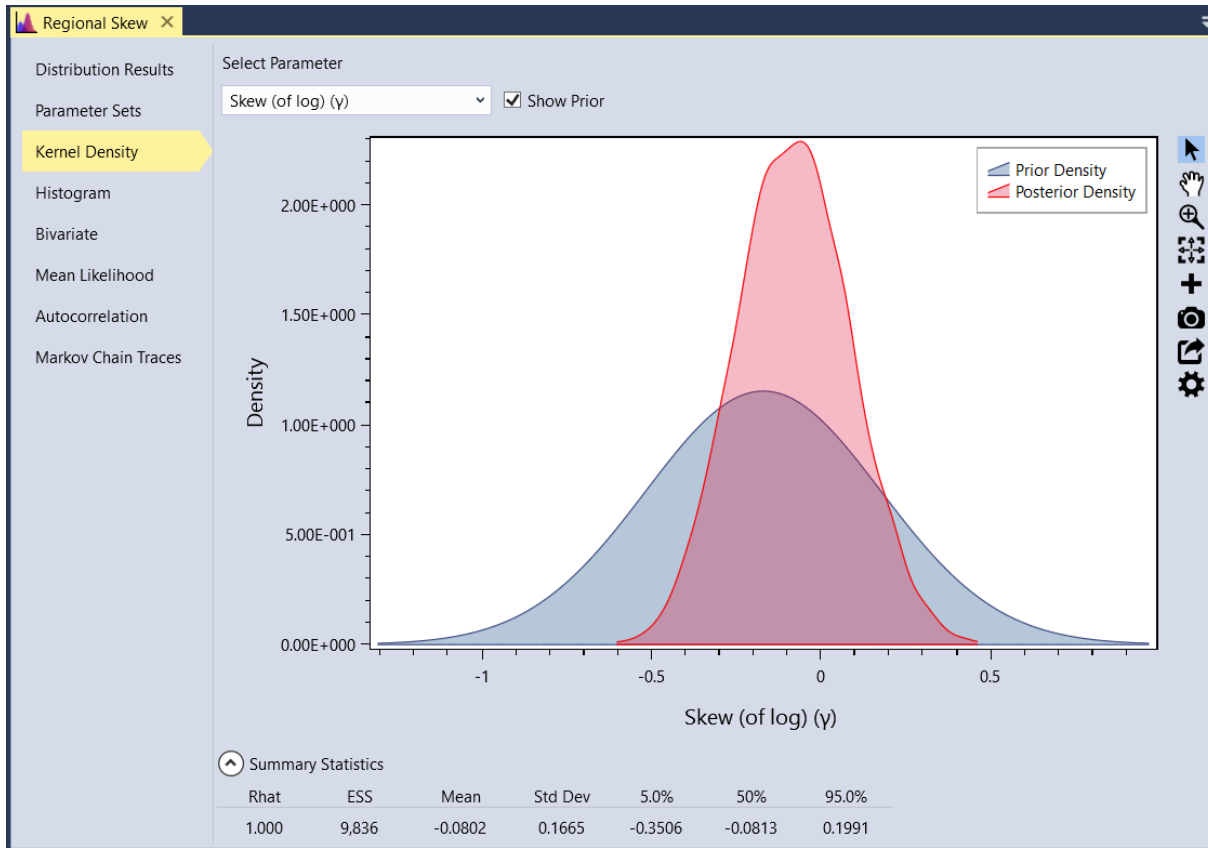


# Explore (1 of 2)

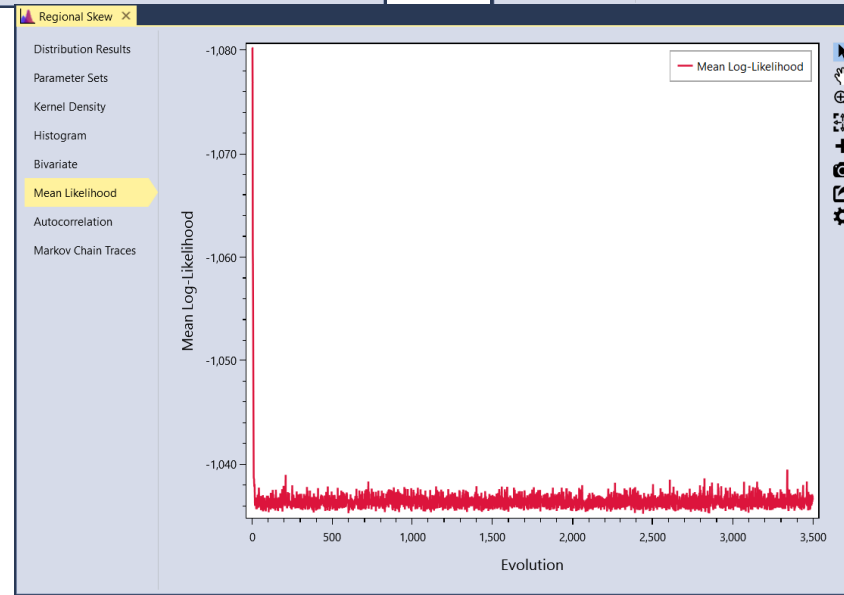
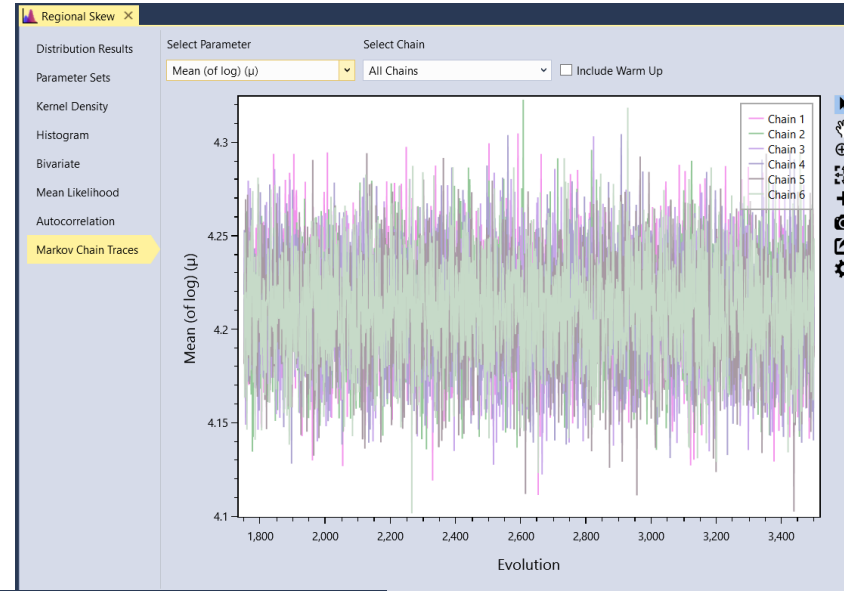
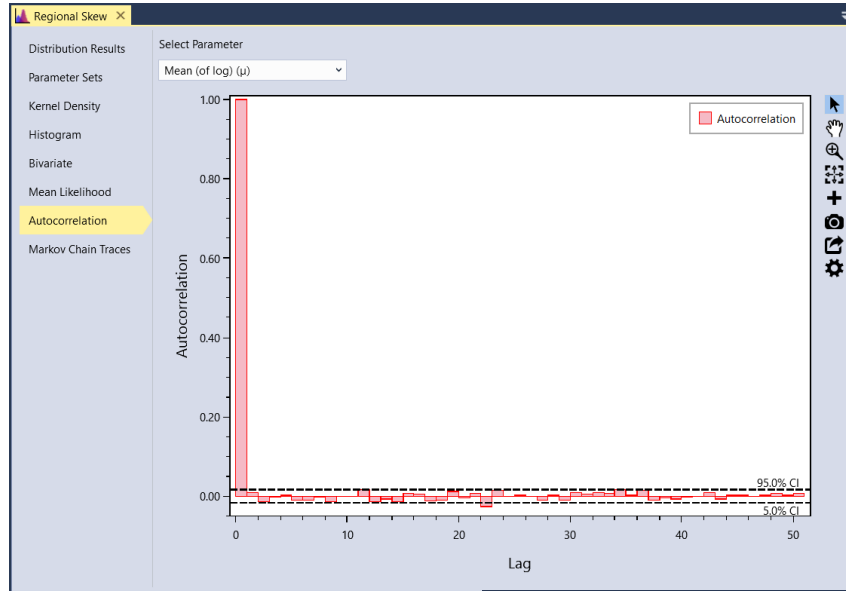


Frequency Plot		Tabular Results					
Frequency Curve Results						Summary Statistics	
Probability		95.0% CI	5.0% CI	Posterior Predictive	Posterior Mean	Measure	Posterior Mean
1E-06		425,741.1	158,727.61	335,014.62	252,311.95	Mean (of log) ( $\mu$ )	4.2159
2E-06		383,848.33	151,509.94	299,916.4	234,876.53	Std Dev (of log) ( $\sigma$ )	0.2794
5E-06		333,682.85	141,979.88	259,155.06	212,774.93	Skew (of log) ( $\gamma$ )	-0.1445
1E-05		299,645.16	134,697.49	232,033.5	196,762.63	Minimum	0.0000
2E-05		267,943.78	127,454.12	207,683.33	181,350.95	Maximum	120765462.8522
5E-05		229,743.28	117,728.72	179,188.2	161,886.3	Mean	20094.5217
0.0001		202,943.29	110,511.14	160,054.63	147,838.56	Std Dev	13627.2478
0.0002		179,026.04	102,654	142,723.4	134,364.1	Skewness	2.0363
0.0005		150,567.29	92,629.85	122,195.16	117,415.73	Kurtosis	10.7100
0.001		131,293.09	85,267.62	108,208.59	105,235.11	AIC	2073.0631
0.002		113,858.6	77,514.75	95,352.24	93,593.29	BIC	2080.8180
0.005		93,230.56	67,200.92	79,817.28	79,007.46	DIC	2072.5320
0.01		79,229.71	59,415.09	68,990.14	68,560.27	RMSE	1515.8712
0.02		66,679.35	51,593.35	58,824.32	58,594.05		
0.05		51,629.88	41,205.34	46,218.61	46,102.14		
0.1		41,151.35	33,418.83	37,178.28	37,099.67		
0.2		31,329.46	25,664.63	28,416.67	28,365.83		
0.3		25,749.43	21,058.62	23,323.69	23,288.77		
0.5		18,523.87	15,032.9	16,713.29	16,696.05		
0.7		13,293.88	10,558.05	11,876.18	11,868.05		
0.8		10,894.24	8,413.74	9,616.83	9,613.85		
0.9		8,286.66	6,036.53	7,130.87	7,140.87		
0.95		6,641.91	4,512.25	5,530.4	5,560.22		
0.98		5,201.55	3,200.24	4,110.02	4,174.55		
0.99		4,437.59	2,513.32	3,343.76	3,438.16		

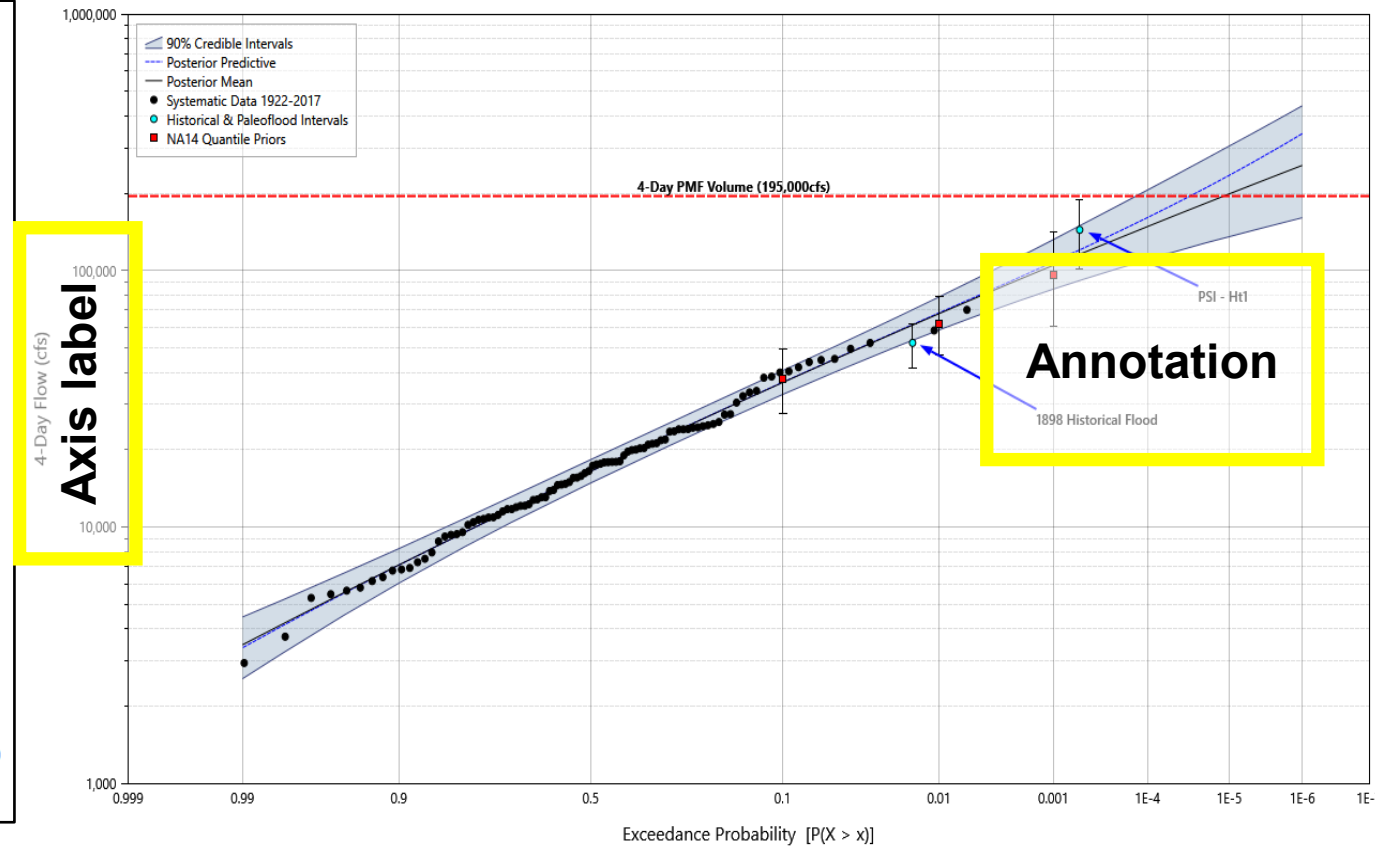
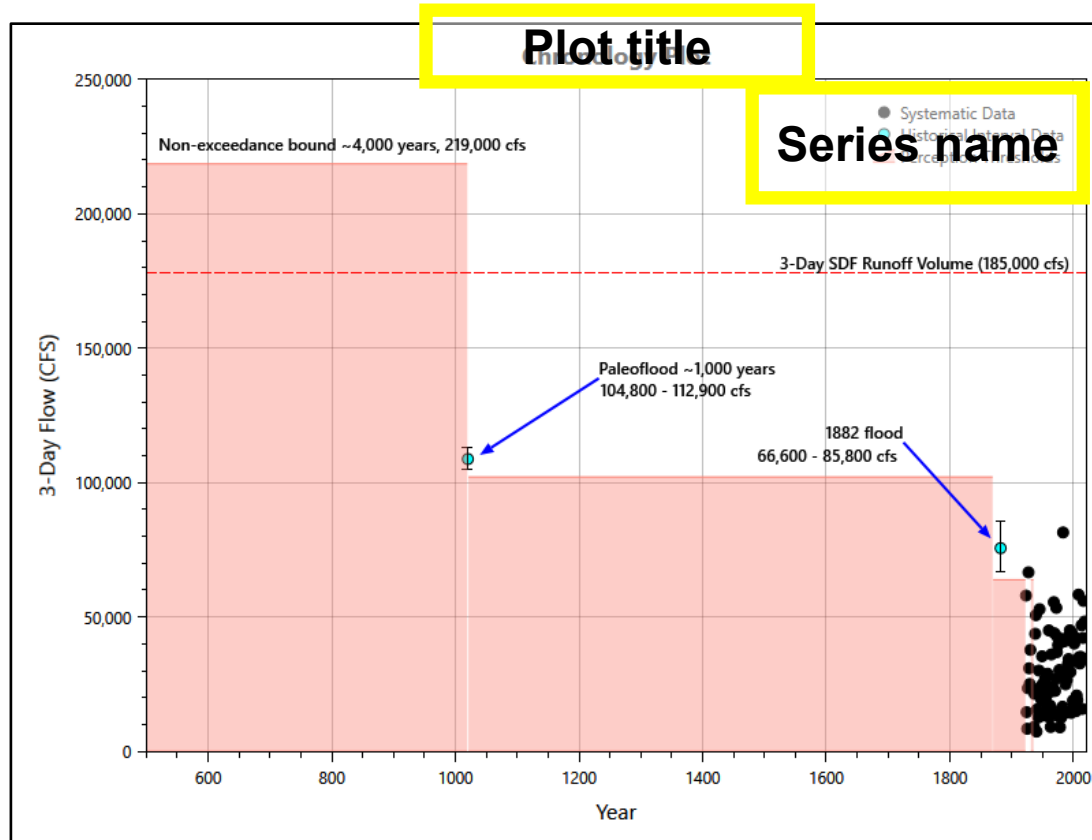
# Explore (2 of 2)



# Diagnose



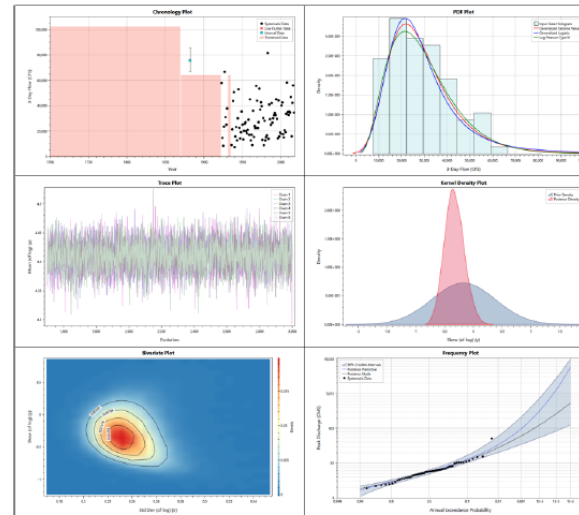
# Report Quality Plots



# RMC-BestFit Resources

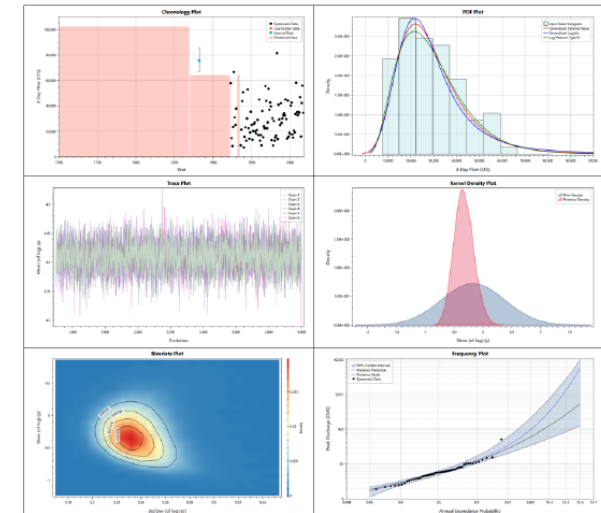
## RMC-BestFit Quick Start Guide

### RMC-TR-2020-03

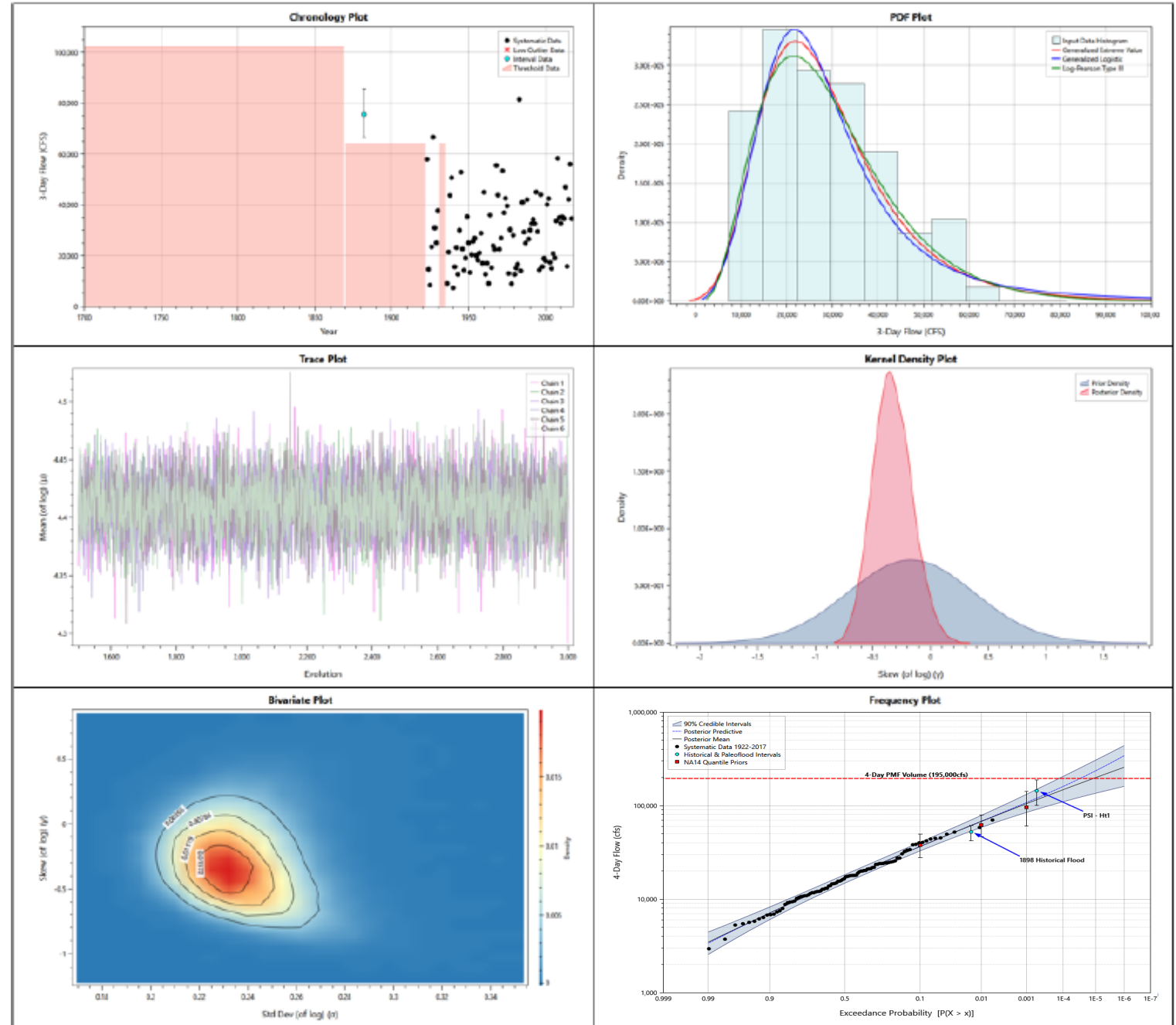


## Verification of the Bayesian Estimation and Fitting Software (RMC-BestFit)

### RMC-TR-2020-02



# Start Using RMC-BestFit



U.S. ARMY



US Army Corps  
of Engineers®  
Dam and Levee  
Safety Programs

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# ? Questions

