

Important Rainfall-Runoff Correlation and Strange's Tables Formulas PDF



Formulas Examples with Units

List of 15 Important Rainfall-Runoff Correlation and Strange's Tables Formulas

1) Rainfall-Runoff Correlation Formulas ↻

1.1) Annual Precipitation in (i-1)th year given Antecedent Precipitation Formula ↻

Formula

$$P_{(i-1)} = \frac{P_a - a \cdot P_i - c \cdot P_{(i-2)}}{b}$$

Example with Units

$$121_{\text{cm}} = \frac{96.39_{\text{cm}} - 0.79 \cdot 95_{\text{cm}} - 0.11 \cdot 84_{\text{cm}}}{0.1}$$

Evaluate Formula ↻

1.2) Annual Precipitation in (i-2)th year given Antecedent Precipitation Formula ↻

Formula

$$P_{(i-2)} = \frac{P_a - a \cdot P_i - b \cdot P_{(i-1)}}{c}$$

Example with Units

$$84_{\text{cm}} = \frac{96.39_{\text{cm}} - 0.79 \cdot 95_{\text{cm}} - 0.1 \cdot 121_{\text{cm}}}{0.11}$$

Evaluate Formula ↻

1.3) Annual Precipitation in i-th year given Antecedent Precipitation Formula ↻

Formula

$$P_i = \frac{P_a - b \cdot P_{(i-1)} - c \cdot P_{(i-2)}}{a}$$

Example with Units

$$95_{\text{cm}} = \frac{96.39_{\text{cm}} - 0.1 \cdot 121_{\text{cm}} - 0.11 \cdot 84_{\text{cm}}}{0.79}$$

Evaluate Formula ↻

1.4) Antecedent Precipitation Index Formula ↻

Formula

$$P_a = a \cdot P_i + b \cdot P_{(i-1)} + c \cdot P_{(i-2)}$$

Example with Units

$$96.39_{\text{cm}} = 0.79 \cdot 95_{\text{cm}} + 0.1 \cdot 121_{\text{cm}} + 0.11 \cdot 84_{\text{cm}}$$

Evaluate Formula ↻

1.5) Equation of Straight-line Regression between Runoff and Rainfall Formula ↻

Formula

$$R = a \cdot P + (B)$$

Example with Units

$$14.75_{\text{cm}} = 0.79 \cdot 75_{\text{cm}} + (-44.5)$$

Evaluate Formula ↻



1.6) Exponential Relationship for Larger Catchments Formula

Formula

$$R = \beta \cdot P^m$$

Example with Units

$$14.6076_{\text{cm}} = 4 \cdot 75_{\text{cm}}^{0.3}$$

Evaluate Formula 

1.7) Precipitation using Runoff from Exponential Relationship Formula

Formula

$$P = \left(\frac{R}{\beta} \right)^{\frac{1}{m}}$$

Example with Units

$$81.929_{\text{cm}} = \left(\frac{15_{\text{cm}}}{4} \right)^{\frac{1}{0.3}}$$

Evaluate Formula 

1.8) Precipitation using Runoff in Straight Line Regression between Runoff and Rainfall Formula

Formula

$$P = \frac{R - (B)}{a}$$

Example with Units

$$75.3165_{\text{cm}} = \frac{15_{\text{cm}} - (-44.5)}{0.79}$$

Evaluate Formula 

1.9) Runoff Rainfall Regression by Logarithmic Transformation Formula

Formula

$$R = m \cdot \exp(\ln(P)) + \exp(\ln(\beta))$$

Example with Units

$$26.5_{\text{cm}} = 0.3 \cdot \exp(\ln(75_{\text{cm}})) + \exp(\ln(4))$$

Evaluate Formula 

2) Strange's Runoff Volume Percentage Formulas

2.1) Precipitation given Runoff Volume Percentage for Damp AMC Formula

Formula

$$p = \frac{K_s + 5.1079}{0.3259}$$

Example with Units

$$3.1015_{\text{cm}} = \frac{5.0 + 5.1079}{0.3259}$$

Evaluate Formula 

2.2) Precipitation given Runoff Volume Percentage for Dry AMC Formula

Formula

$$p = \frac{K_s + 2.3716}{0.5065}$$

Example with Units

$$1.4554_{\text{cm}} = \frac{5.0 + 2.3716}{0.5065}$$

Evaluate Formula 

2.3) Precipitation given Runoff Volume Percentage for Wet AMC Formula

Formula

$$p = \frac{K_s - 2.0643}{0.6601}$$

Example with Units

$$0.4447_{\text{cm}} = \frac{5.0 - 2.0643}{0.6601}$$

Evaluate Formula 



2.4) Runoff Volume Percentage for Damp AMC Formula

Formula

$$K_s = 0.3259 \cdot p - 5.1079$$

Example with Units

$$0.1065 = 0.3259 \cdot 1.6 \text{ cm} - 5.1079$$

Evaluate Formula 

2.5) Runoff Volume Percentage for Dry AMC Formula

Formula

$$K_s = 0.5065 \cdot p - 2.3716$$

Example with Units

$$5.7324 = 0.5065 \cdot 1.6 \text{ cm} - 2.3716$$

Evaluate Formula 

2.6) Runoff Volume Percentage for Wet AMC or Antecedent Moisture Condition Formula

Formula

$$K_s = 0.6601 \cdot p + 2.0643$$

Example with Units

$$12.6259 = 0.6601 \cdot 1.6 \text{ cm} + 2.0643$$

Evaluate Formula 



Variables used in list of Rainfall-Runoff Correlation and Strange's Tables Formulas above

- **a** Coefficient 'a'
- **b** Coefficient 'b'
- **B** Coefficient 'B' in Straight-line Regression
- **c** Coefficient 'c'
- **K_s** Runoff Volume Percentage
- **m** Coefficient m
- **p** Daily Rainfall (Centimeter)
- **P** Rainfall (Centimeter)
- **P_(i-1)** Precipitation in (i-1)th Year (Centimeter)
- **P_(i-2)** Precipitation in (i-2)th Year (Centimeter)
- **P_a** Antecedent Precipitation Index (Centimeter)
- **P_i** Precipitation in (i)th Year (Centimeter)
- **R** Runoff (Centimeter)
- **β** Coefficient β

Constants, Functions, Measurements used in list of Rainfall-Runoff Correlation and Strange's Tables Formulas above

- **Functions:** **exp**, exp(Number)
n an exponential function, the value of the function changes by a constant factor for every unit change in the independent variable.
- **Functions:** **ln**, ln(Number)
The natural logarithm, also known as the logarithm to the base e, is the inverse function of the natural exponential function.
- **Measurement:** **Length** in Centimeter (cm)
Length Unit Conversion 



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- [Important SCS-CN Method of Runoff Volume Formulas](#) 
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