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Percent of normal precipitation index

Deciles precipitation index

Palmer Drought Severity Index

Standardized Precipitation Index

McKee et al

Guttman

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$$g(x) = \frac{1}{\beta^\alpha \Gamma(\alpha)} x^{\alpha-1} e^{-x/\beta}$$

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$\beta > 0$

$\alpha$

$\Gamma(\alpha) \quad x > 0$

$x \quad \beta > 0$

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$$Z = SPI = + \left( t - \frac{c_0 + c_1 t + c_2 t^2}{1 + d_1 t + d_2 t^2 + d_3 t^3} \right) \quad ( )$$

for  $0.5 < H(X) < 1.0$

$$t = \sqrt{\ln\left(\frac{1}{(H(x))^2}\right)} \text{ for } 0 < H(X) < 0.5 \quad ( )$$

$$t = \sqrt{\ln\left(\frac{1}{(1.0 - H(x))^2}\right)} \text{ for } 0.5 < H(X) < 1.0$$

$c_0=2.515517, c_1=0.802853, c_2=0.010328,$   
 $d_1=1.432788, d_2=0.189269, d_3=0.001308$

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$$\Gamma(\alpha) = \int_0^\infty y^{\alpha-1} e^{-y} dy \quad ( )$$

$$H(x) = q + (1 - q)G(x) \quad ( )$$

G

H (X)

( ) (x)

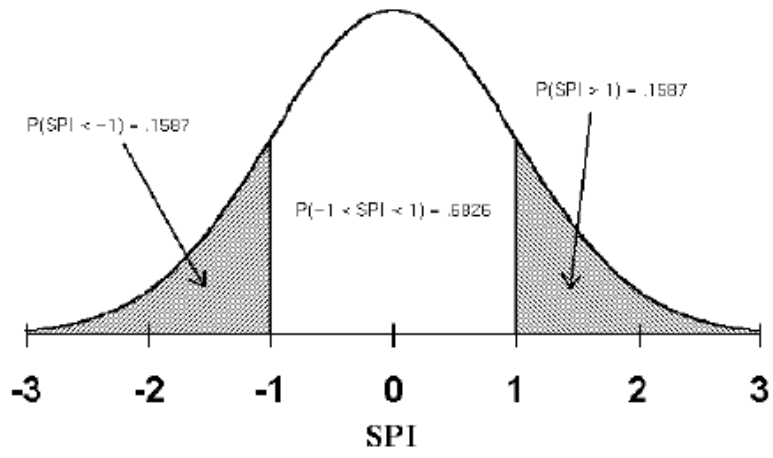
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SPI Z

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$$Z = SPI = - \left( t - \frac{c_0 + c_1 t + c_2 t^2}{1 + d_1 t + d_2 t^2 + d_3 t^3} \right) \quad ( )$$

for  $0 < H(X) < 0.5$



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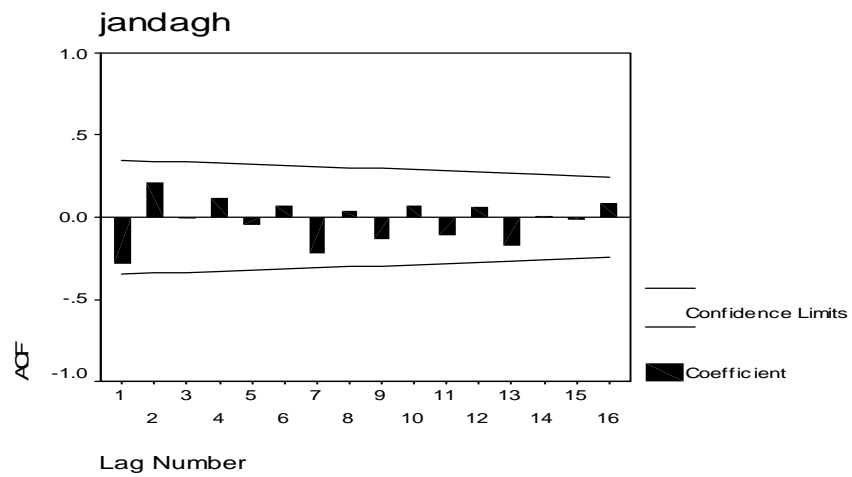
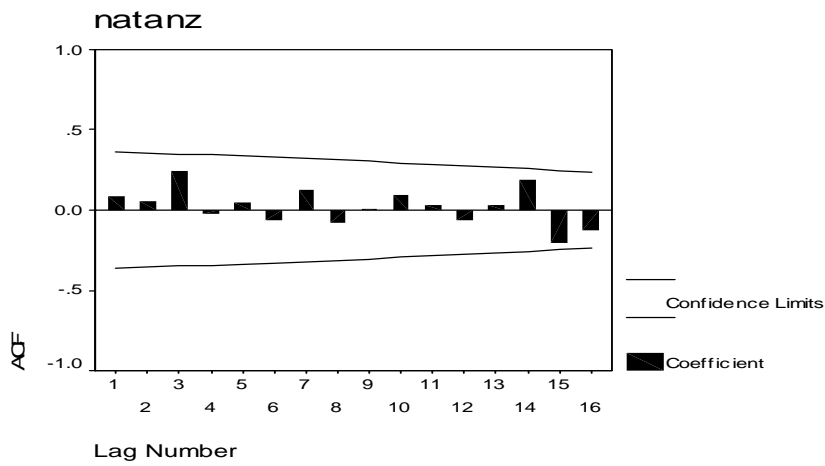
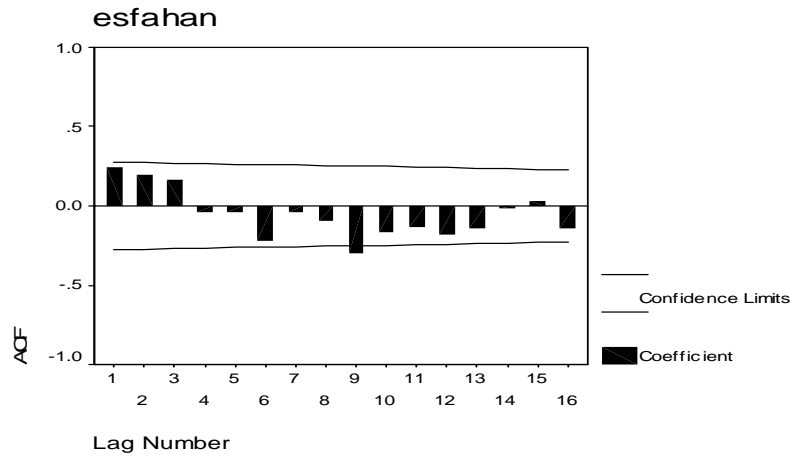
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Flood frequency analysis

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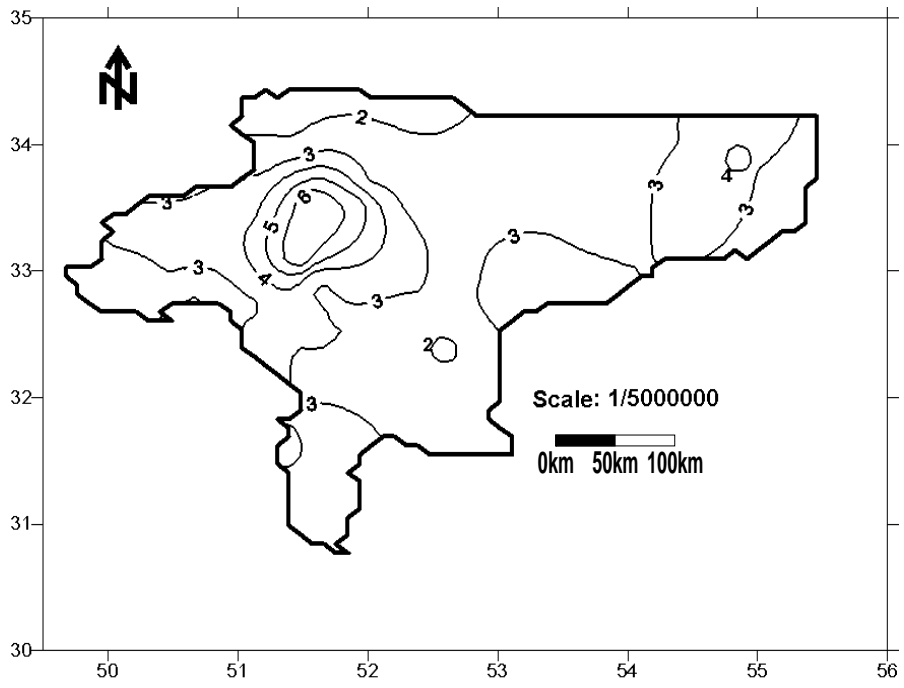
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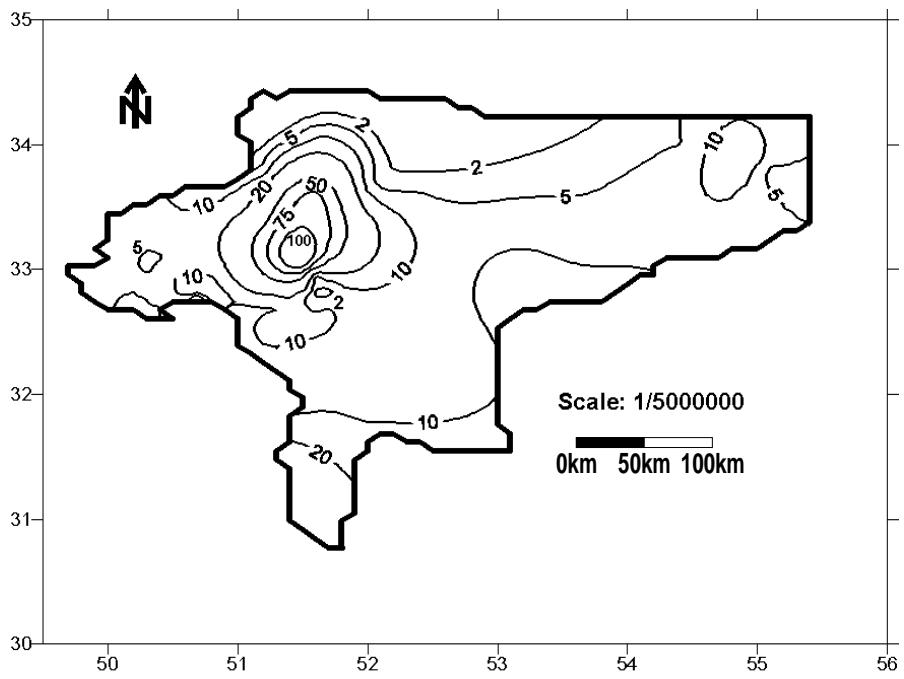
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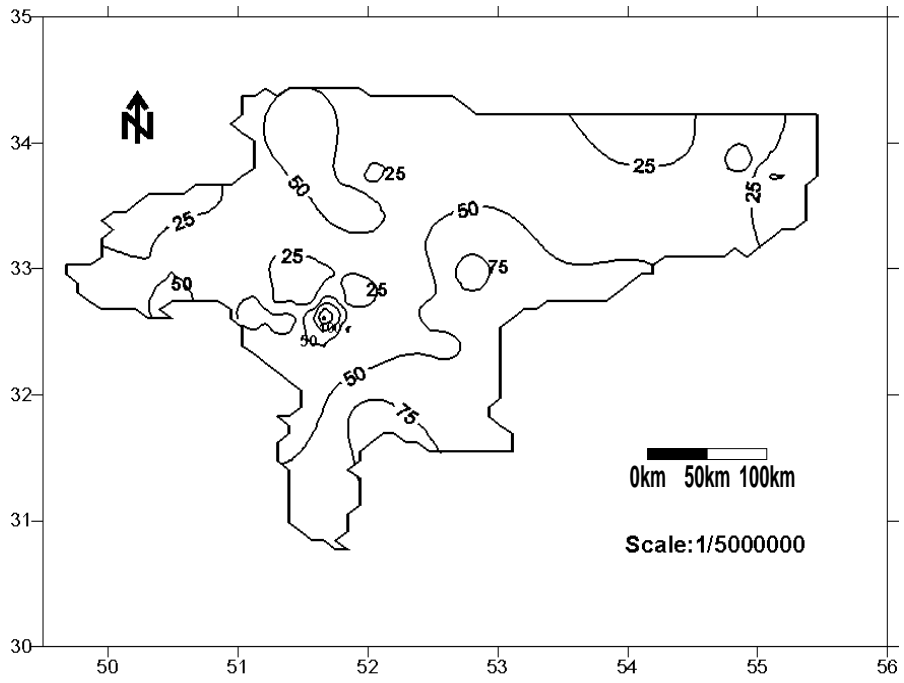




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## **Statistical analysis of return period of drought conditions in Isfahan province using the Standardized Precipitation Index**

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### **Abstract**

Drought is universal phenomenon that can occur everywhere and can cause harmful impacts on human beings and natural ecosystems. Thus, it is very important to study drought characteristics part of for water resources management. In this study, the Standardized Precipitation Index (SPI) is used for drought frequency analysis in Isfahan province. After collecting the precipitation data in the province stations and removing those stations with incomplete data, frequency analysis of drought was carried out by 12-month SPI time series scale end of March. Then, the maps of drought return periods were prepared and analyzed by SURFER software. These maps show that moderate and severe drought with long return period mainly in the west the province and extreme drought events in the east and north east of the province with short return periods which indicate high sensitivity and the necessity for suitable managing programs to deal with the problem of drought.

**Keywords:** Standardized Precipitation Index, Frequency analysis, Drought, Isfahan province