



*European Geoscience Union 2020: Sharing Geoscience
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NH7.2

**Spatial and temporal patterns of wildfires:
models, theory, and reality**

Frequentist and Bayesian extreme value analysis on the wildfire events in Greece

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1. Motivation

- One of the measures of wildland fires is the total burned area per event provided in absolute terms in specific units (e.g. ha)
- However, what does it mean that a fire burned for example 5000 ha? How big is this in terms of the relative occurrence of the phenomenon?
- Towards this aim, the statistical assessment for the evaluation of the return period of a fire, can complement the absolute size of the fire event and express it in a relative way. In this case a fire can be expressed for example like “this fire occurs once per 50 years”

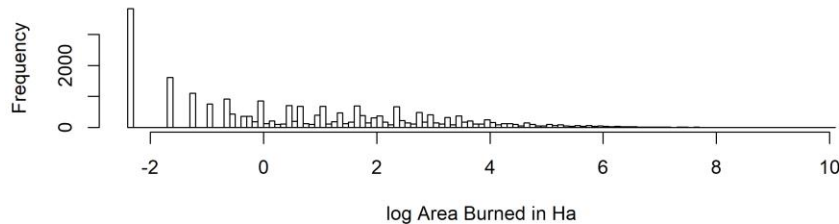
Data

- In this work, we used data of wildfires that have taken place in Greece from 1985 to 2004. In total we used 23257 observations.

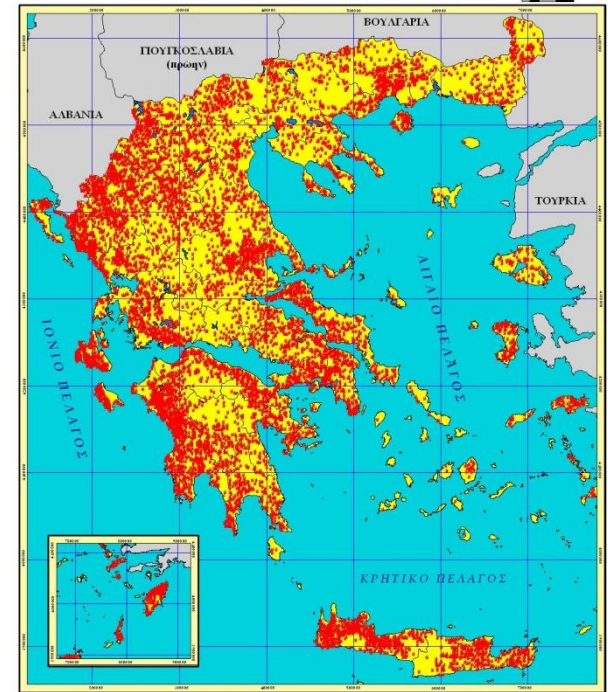
Histogram of Area Burned



Histogram of log(Area Burned)



ΣΗΜΕΙΑ ΕΝΑΡΞΗΣ ΔΑΣΙΚΩΝ ΠΥΡΚΑΓΙΩΝ



ΥΠΟΜΝΗΜΑ ΧΑΡΤΗ

- Περιοχή έρευνας
- Σημεία έναρξης δασικών πυρκαγιών

Υπόμνημα Βασικών Χαρακτηριστικών

- Γεωγραφική κλίμακα
- Θέλιση
- Αίλιες
- Όρια Κρήτης
- Όρια Ελλάδας
- Όρια Νοτίου

Επιμέλεια: Νίκος Κούτσιος

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Συντάκτης: Γεωργία Σ. Κούτσιου
Επιμέλεια: Νικόλαος Κούτσιος
Μέλη: Μπέλα

Δημιουργήθηκε στο ArcView 3.2
Επιμέλεια: Νίκος Κούτσιος

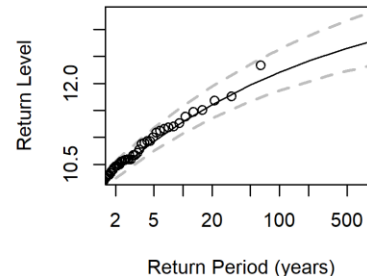
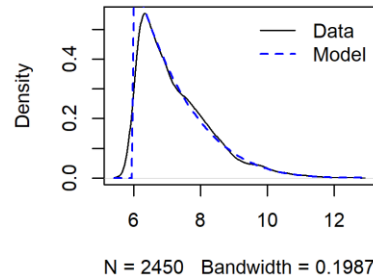
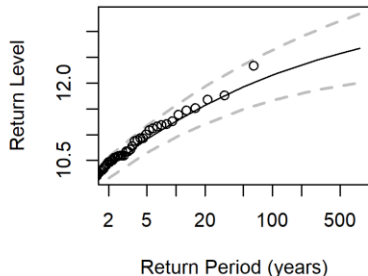
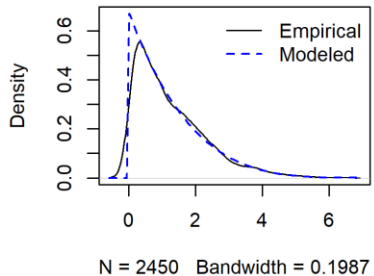
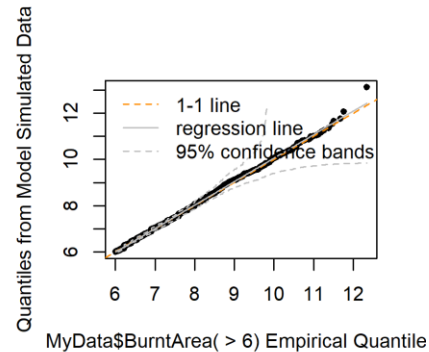
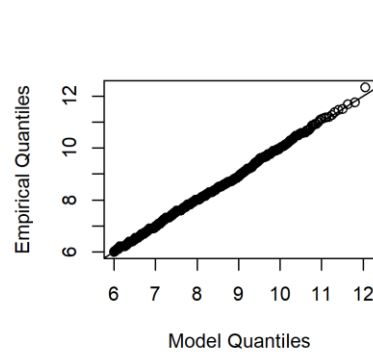
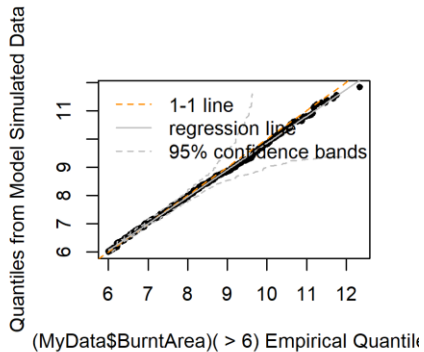
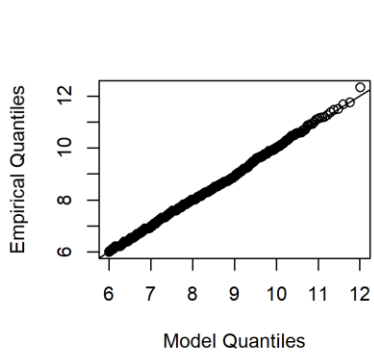
Methods

- For the estimation of the return period, the extreme value analysis has been adopted, where the burned area is considered as the index for a given event to appropriately represent its significance.
- For the sake of comparison, we made use of both **frequentist** and **Bayesian** approaches, where the Generalized Extreme Value (GEV) distribution along with Peaks over Threshold (POT) have been compared with the Bayesian Extreme Value analysis.

Results

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fevd(x = MyData\$BurntArea, threshold = 6, type = "GP", method = "Bayesian",



Results

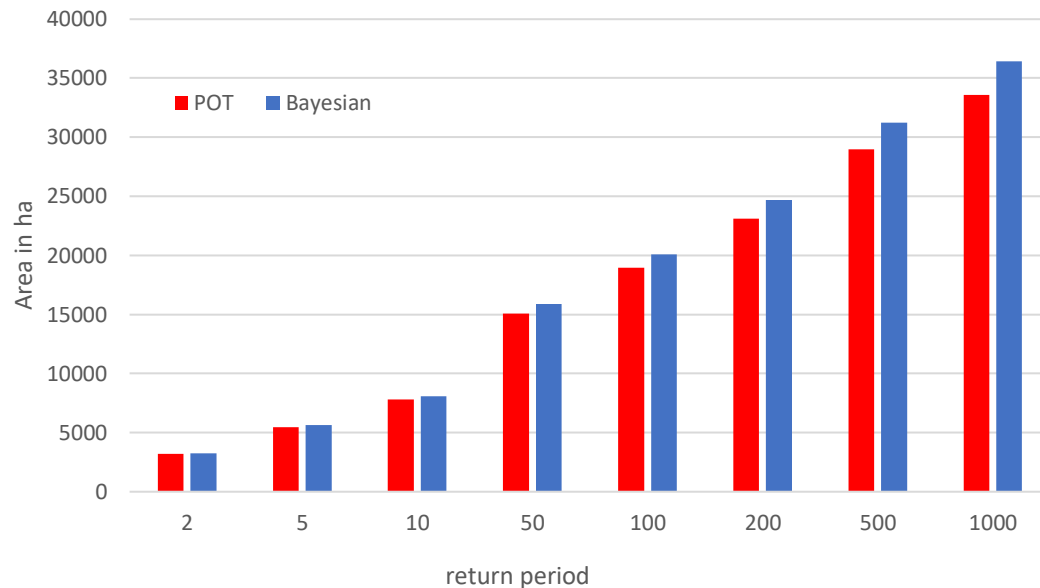
POT

Return period	Area Burned
2	3181.52
5	5479.53
10	7796.56
50	15081.74
100	18934.74
200	23112.86
500	28981.49
1000	33563.30

Bayesian

Return period	area
2	3235.32
5	5622.35
10	8057.85
50	15861.51
100	20064.21
200	24673.95
500	31235.46
1000	36426.01

POT vs Bayesian



Both approaches in this example show similar results, e.g. a fire of 15081 ha has a return period of 50 years with the POT approach, and a fire of 15861 ha has a return period of 50 years with the Bayesian approach.

Thank you for your attention