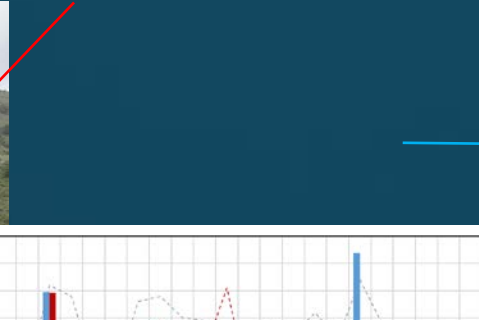


# Analysis of heavy rainfall in two contrasted Mediterranean watersheds from 1993 to 2017

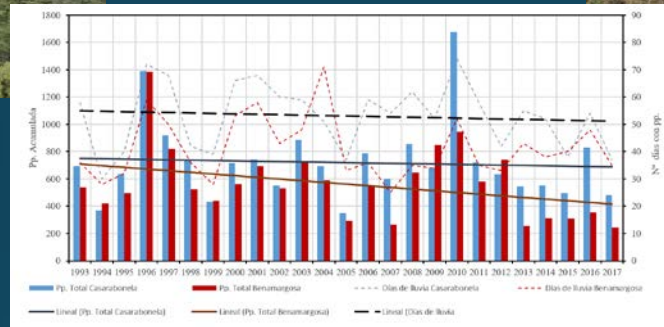
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RIO GRANDE BASIN (A)		
Climate	Type	Sub-humid Mediterranean
	Annual rainfall (mm)	720
Geology	Lithology	Phyllites
	Slope gradient (%)	41
Topography	Exposure (°)	150
	Biomass	VC (%)
Soils	Agreggate stability (%)	75
	OM(%)	6.52
	Soil erosivity (K-USLE)	0.38

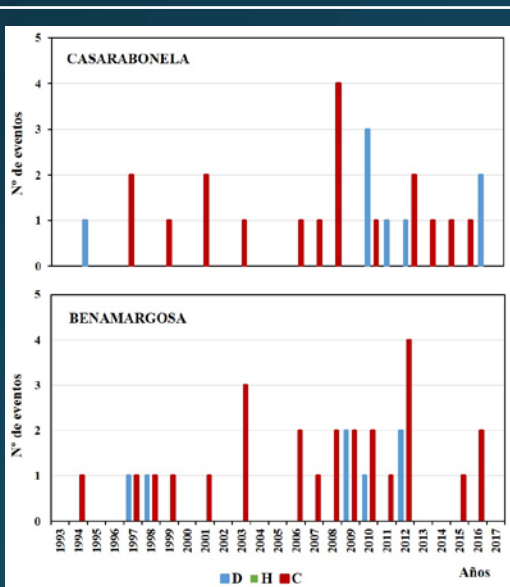


1. Evolution of annual rainfall and rainy days in Casarabonela (Rio Grande) and Benamargosa between 1993 and 2017 - Source: AEMET, SAIH.



The results indicated a high inter-annual variability and a tendency to more concentrated rainfalls in time in both study sites, but more significantly in the sub-humid Río Grande basin.

RIO BENAMARGOSA BASIN (B)		
Climate	Type	Dry – Semiarid Mediterranean
	Annual rainfall (mm)	560
Geology	Lithology	Phyllites
	Slope gradient (%)	35
Topography	Exposure (°)	165
	Biomass	VC (%)
Soils	Agreggate stability (%)	70
	OM(%)	5.32
	Soil erosivity (K-USLE)	0.51



2. Number of torrential events in Casarabonela (Rio Grande) and Benamargosa between 1993 and 2017 - Source: AEMET, SAIH.

This figure shows the limited frequency of the events considered as torrential rainfall according to the Agencia Estatal de Meteorología criteria ( $\geq 100\text{mm}/24\text{h}$ ;  $\geq 60\text{mm}/60'$ ) and a high occurrence of shorts heavy downpours ( $\geq 5\text{mm}/5'$ ), especially in recent years.

3. Examples of torrential rain in five minutes and their response in the media - Source: AEMET, SAIH, La Opinión de Málaga, Sur, 20 minutos.

Fecha y Hora	mm 5'	mm 60'
12/09/2006	9,6	27,4
17/11/2012	18,2	56,1
30/09/2015	11,8	49,5

**La lluvia deja carreteras cortadas y arroyos desbordados en la Axarquía** Cortada por las lluvias la antigua CN-340 entre Mezquitilla y Lagos

El acceso a Almáchar y El Borge desde la A-3112 sigue cerrado. El agua deja aislados los diseminados de Río Seco y Castillo de Zalla, en Alcaucin, donde hay vecinos que llevan todo el día sin luz.

La DGT informa de que el desbordamiento de un riachuelo ha inundado la nueva rotonda en este enclave.

**Las lluvias torrenciales provocan inundaciones en Almería, Málaga y Granada**

AGUSTÍN PELÁEZ  
Sevilla, 19 noviembre 2015. 14:15

4K 12/09/2015 - 14:15

## Conclusions

- Despite the proximity of the watersheds there are strong environmental contrasts between both.
- The current rainfall dynamics follows a trend towards concentration in fewer days.
- A rainfall cataloged as torrential by the AEMET ( $\geq 100 / 24\text{h}$ ,  $\geq 60 \text{mmh}^{-1}$ ) is not necessary to activate erosion and degradation processes, especially when the system conditions are vulnerable. There are downpours hidden in the hourly precipitation data that get at very high intensities.
- It is considered the need to analyze exhaustively the characteristics of a given system, in order to establish what capacity of response has a specific area in an event of extreme precipitation.