

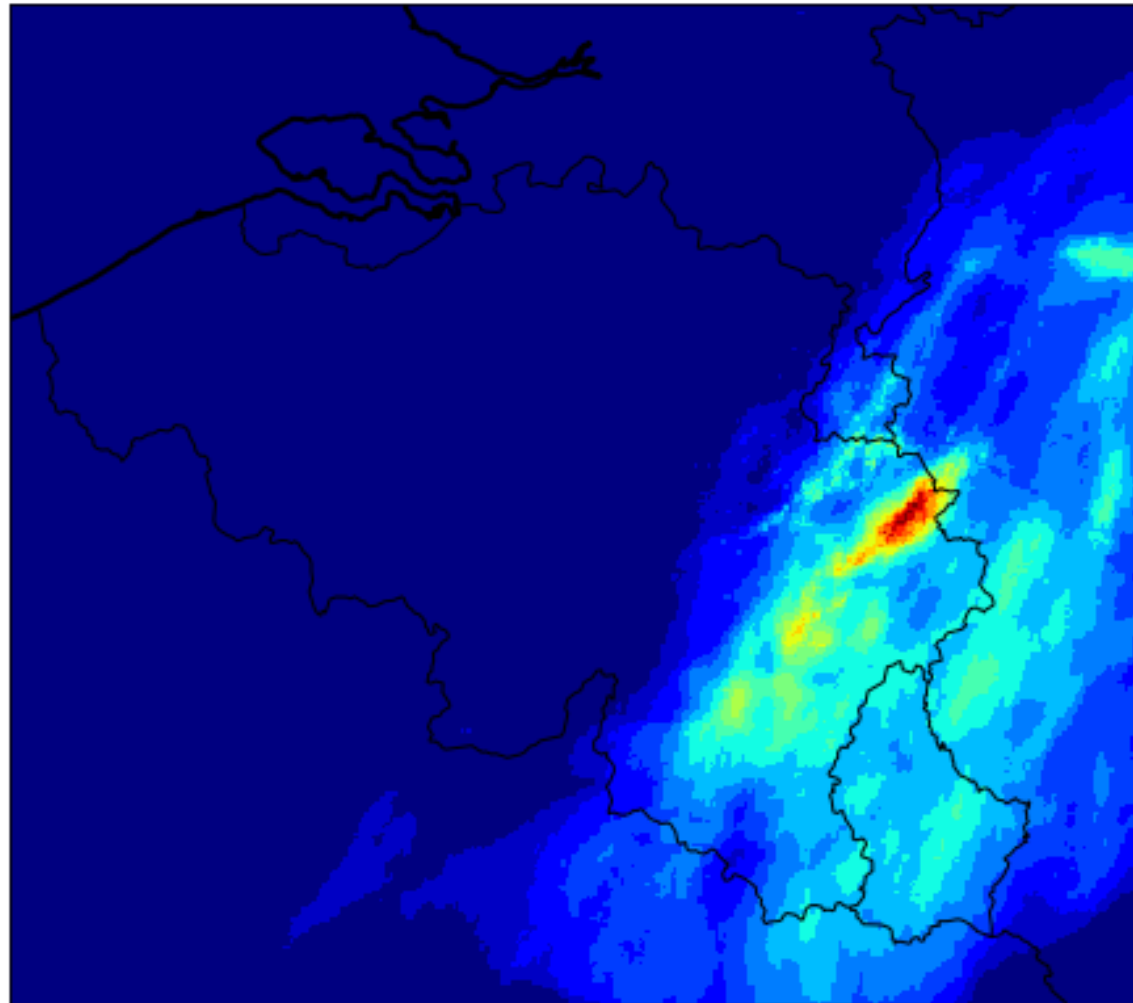
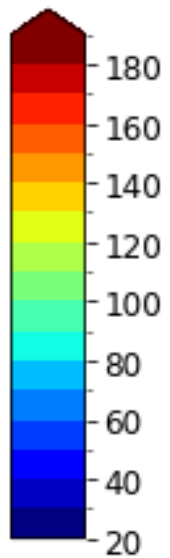
July 2021 event seen by MAR. Does it get more frequent in a warmer world ?

Belgian geographers day 2024

Josip BRAJKOVIC,
Hans Van De Vyver, Pierre ARCHAMBEAU,
Nicolas GHILAIN, Sébastien DOUTRELOUP &
Xavier FETTWEIS



Precip on
14/07/2021
(mm)



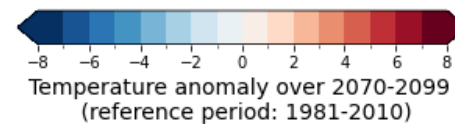
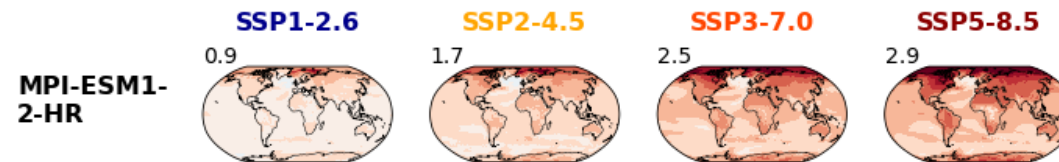
**300 mm over
3 days at
some
locations !!!**

(Journée et al.,
2021)

**How do we answer
this question?**

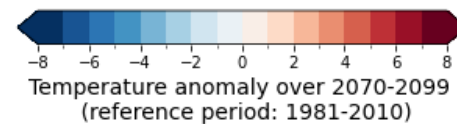
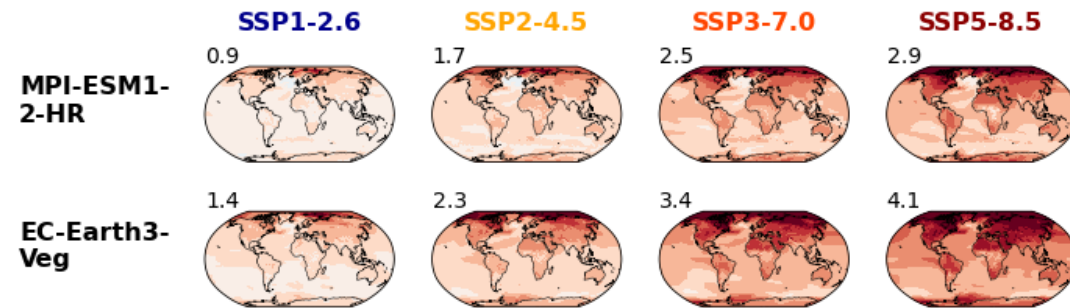
CMIP6 ESMs (Earth System Model)

IPCC scenarios



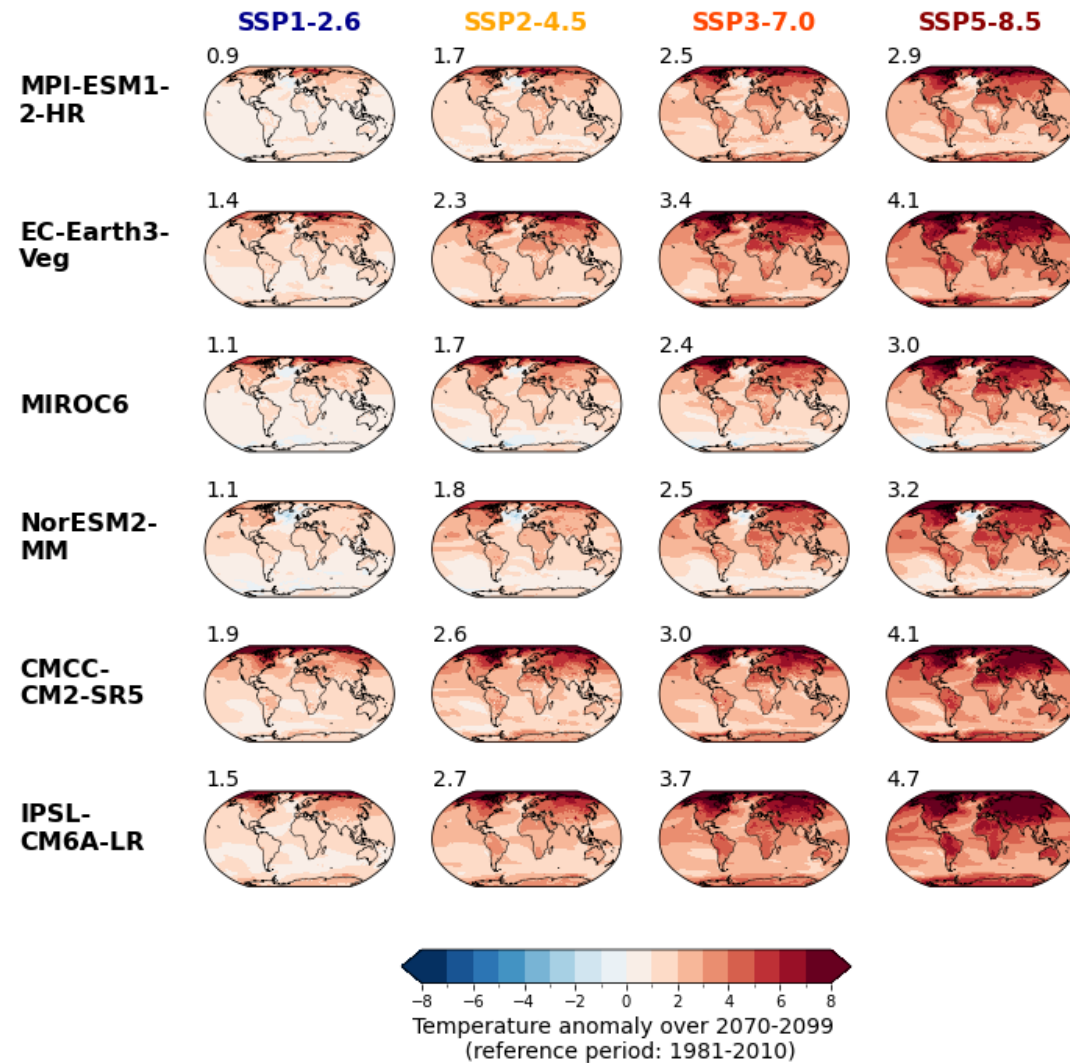
CMIP6 ESMs (Earth System Model)

IPCC scenarios



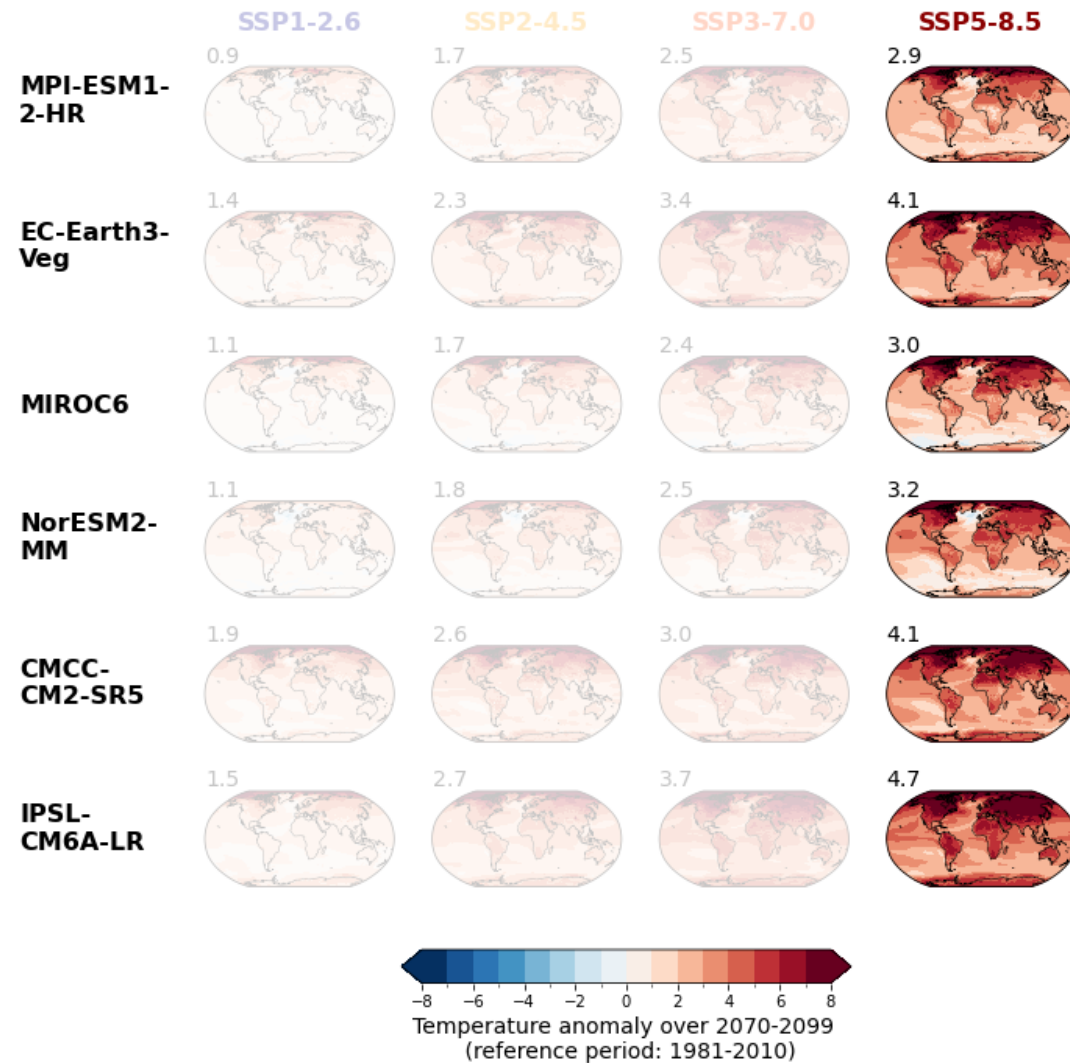
CMIP6 ESMs (Earth System Model)

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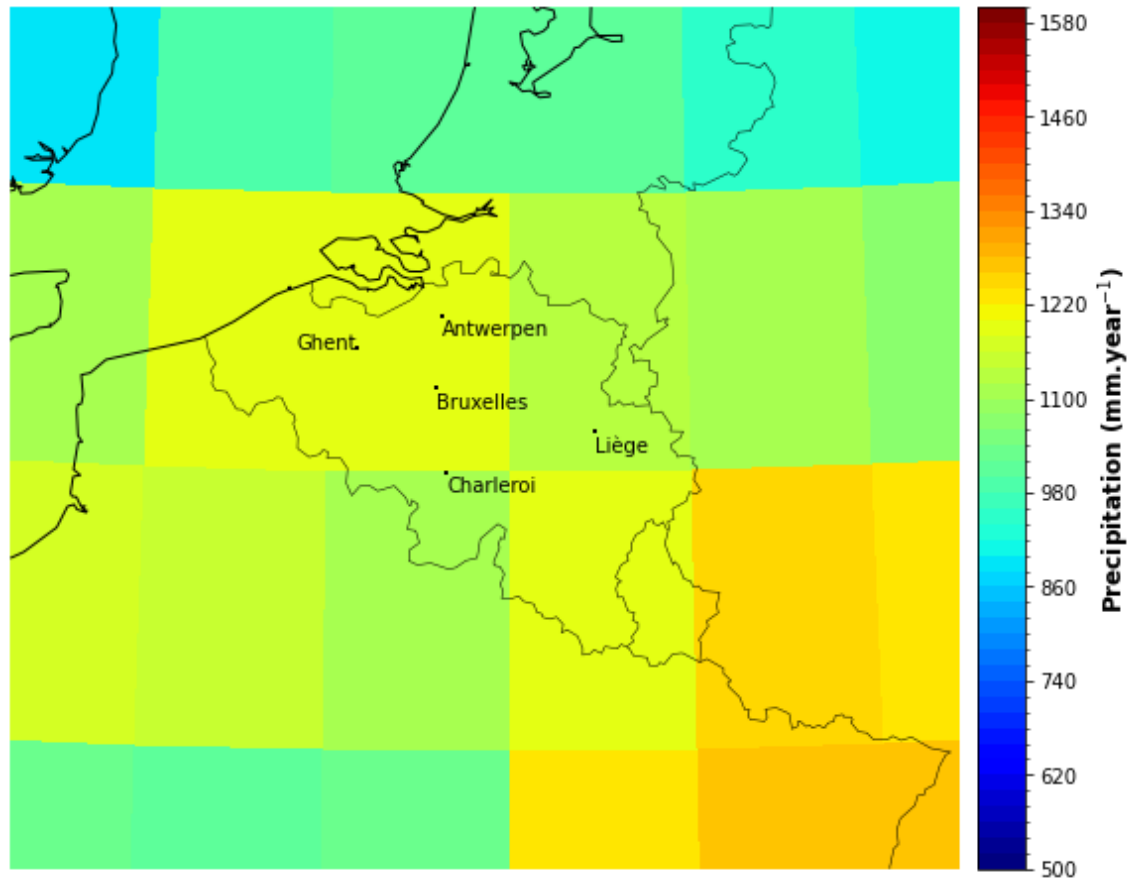


CMIP6 ESMs (Earth System Model)

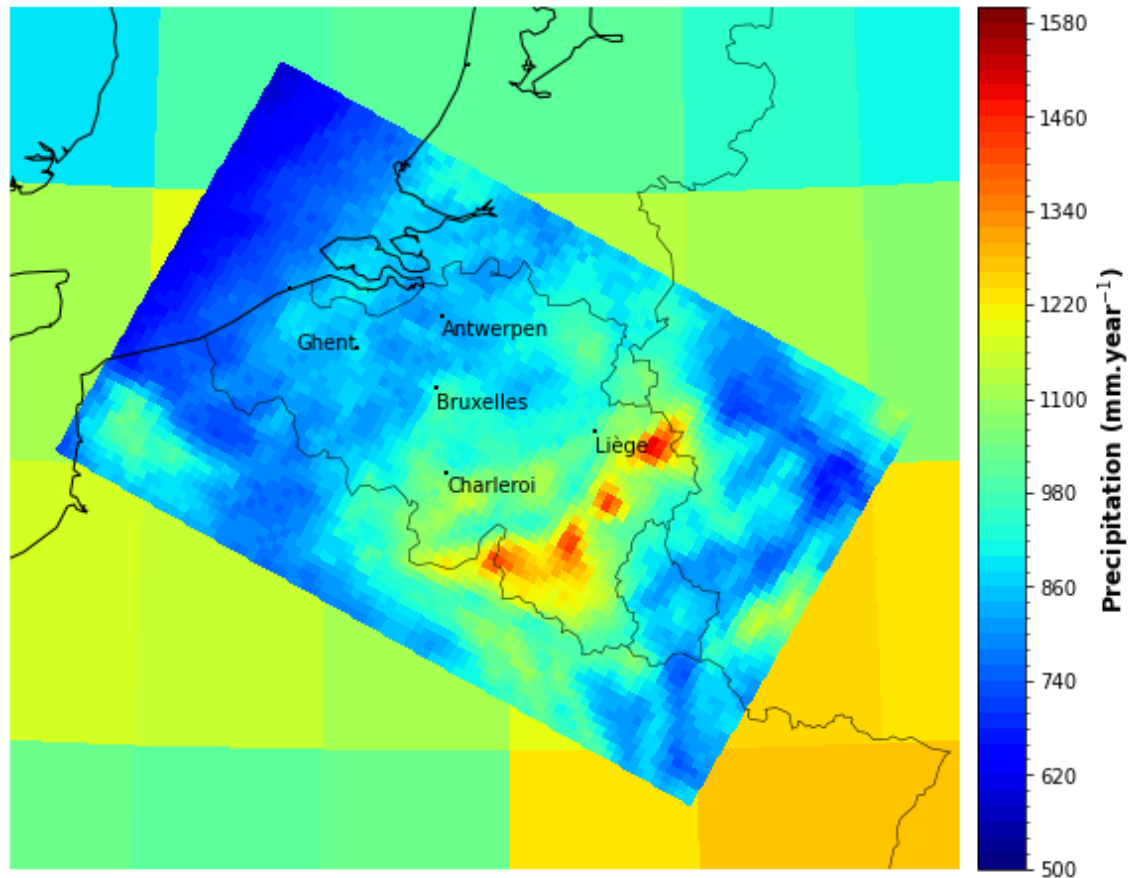
IPCC scenarios



MAR Model (Modèle atmosphérique régional)



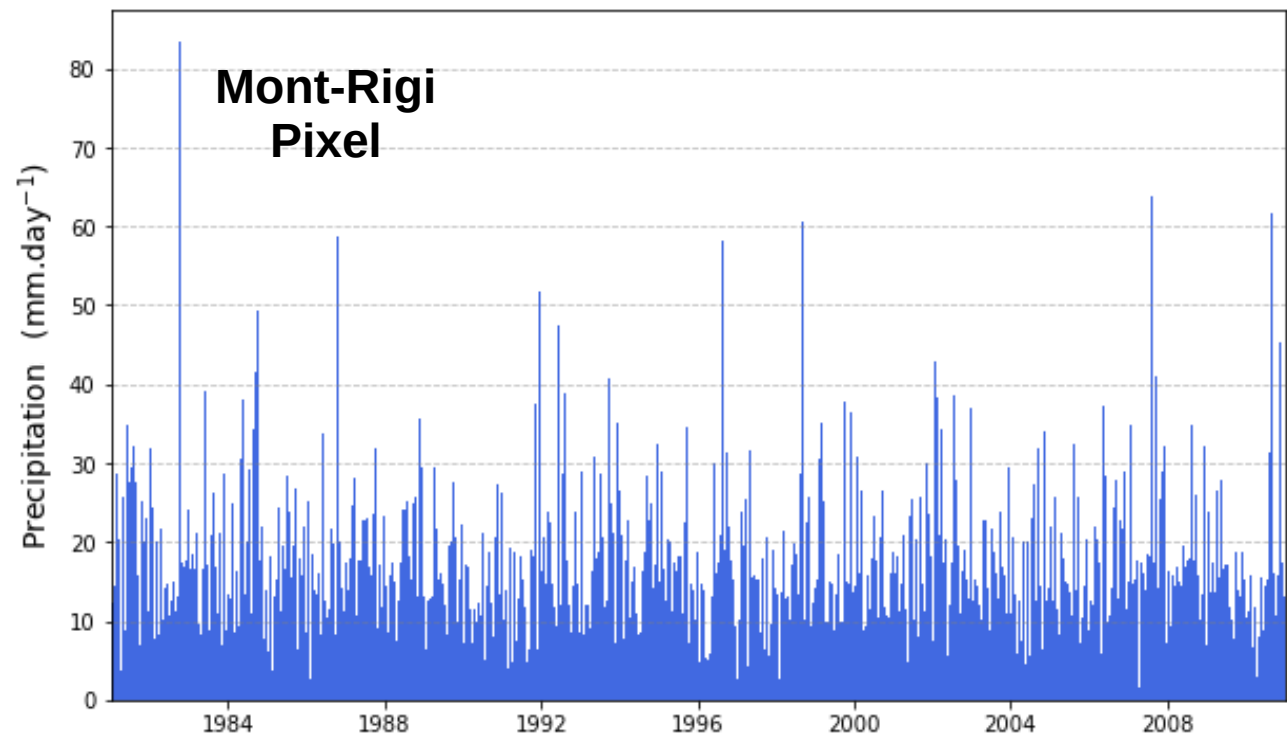
MAR Model (Modèle atmosphérique régional)



How do we use the outputs ?

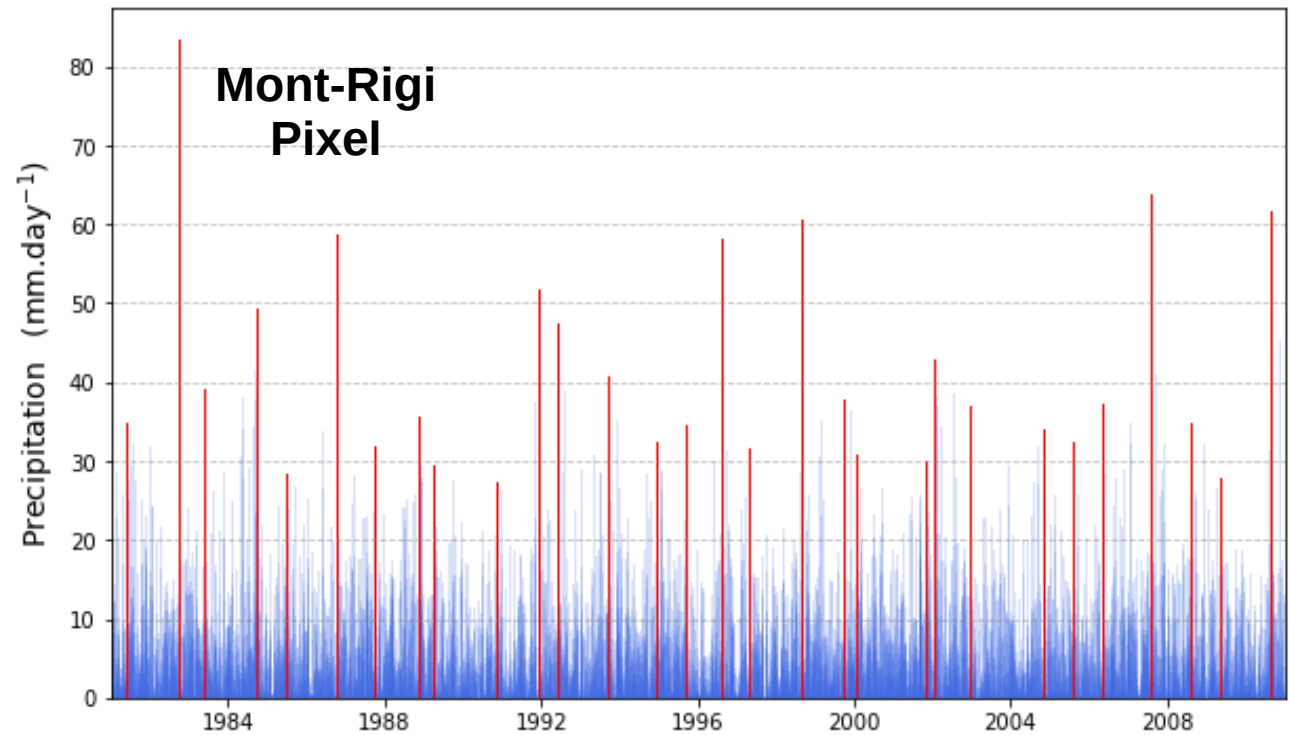
Extreme value analysis (EVA)

2 ways



2 ways

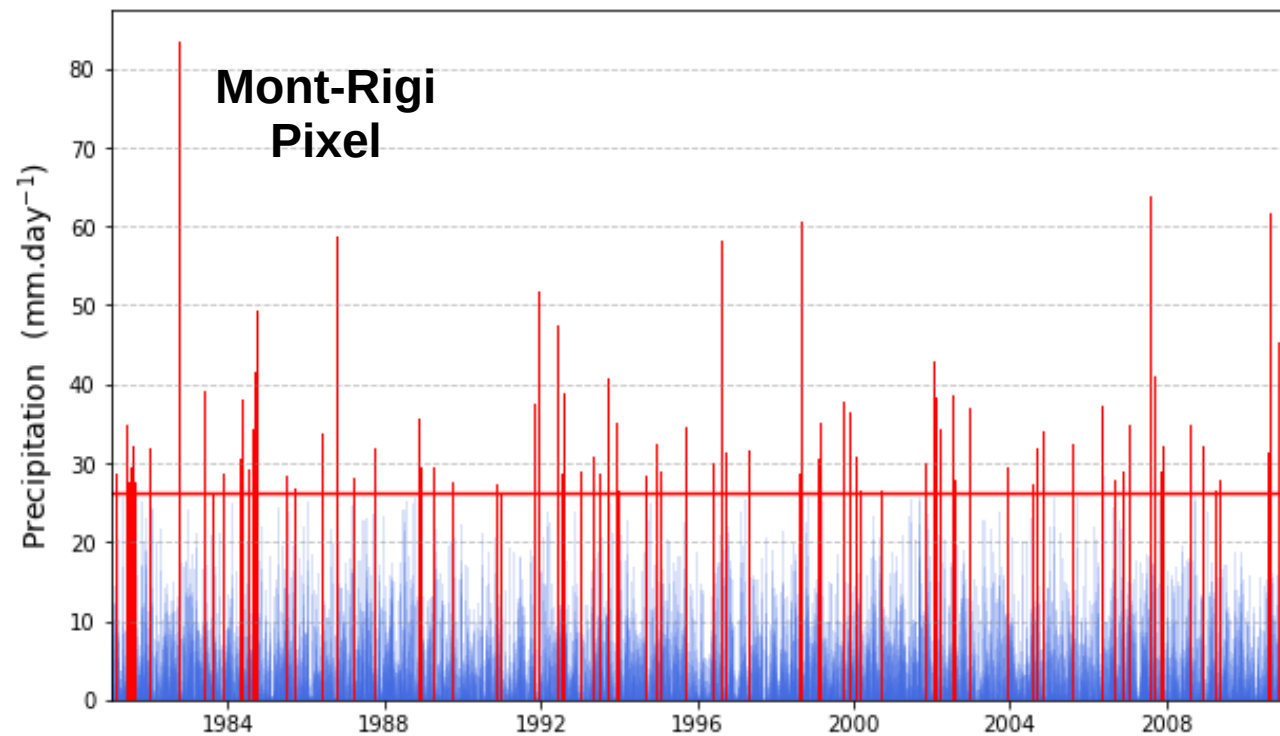
**Annual
Maxima
(AM)**



2 ways

**Annual
Maxima
(AM)**

**Peaks over
Threshold
(POT)**



2 laws were fitted

R_T = precipitation with return period T (probability $p=1/T$)

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GEV

Annual
Maxima
(AM)

$$R_T = \begin{cases} \mu - \frac{\sigma}{\xi} [1 - \{-\log(1 - p)\}^{-\xi}] & , \text{ for } \xi \neq 0 \\ \mu - \sigma \log\{-\log(1 - p)\} & , \text{ for } \xi = 0 \end{cases}$$

(Coles, 2001)

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GEV

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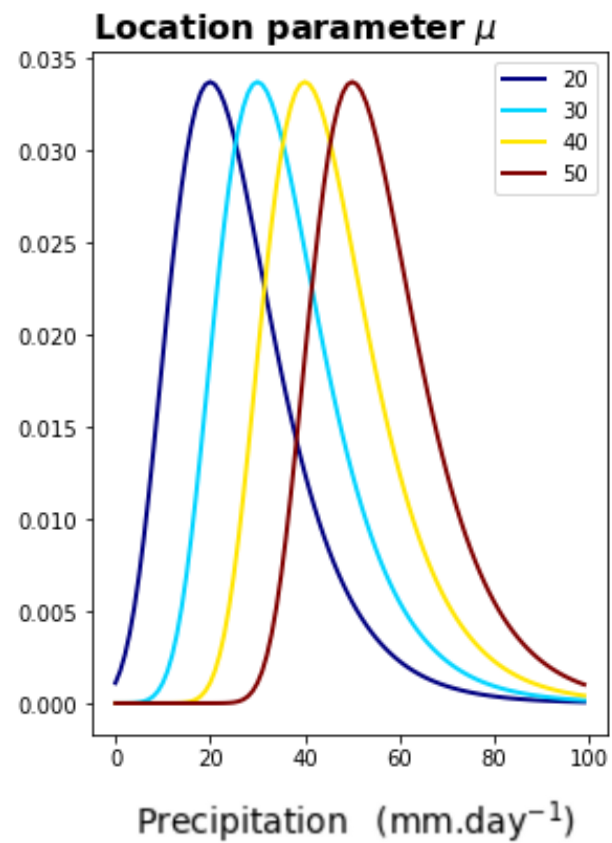
GPD

**Peaks over
Threshold u
(POT)**

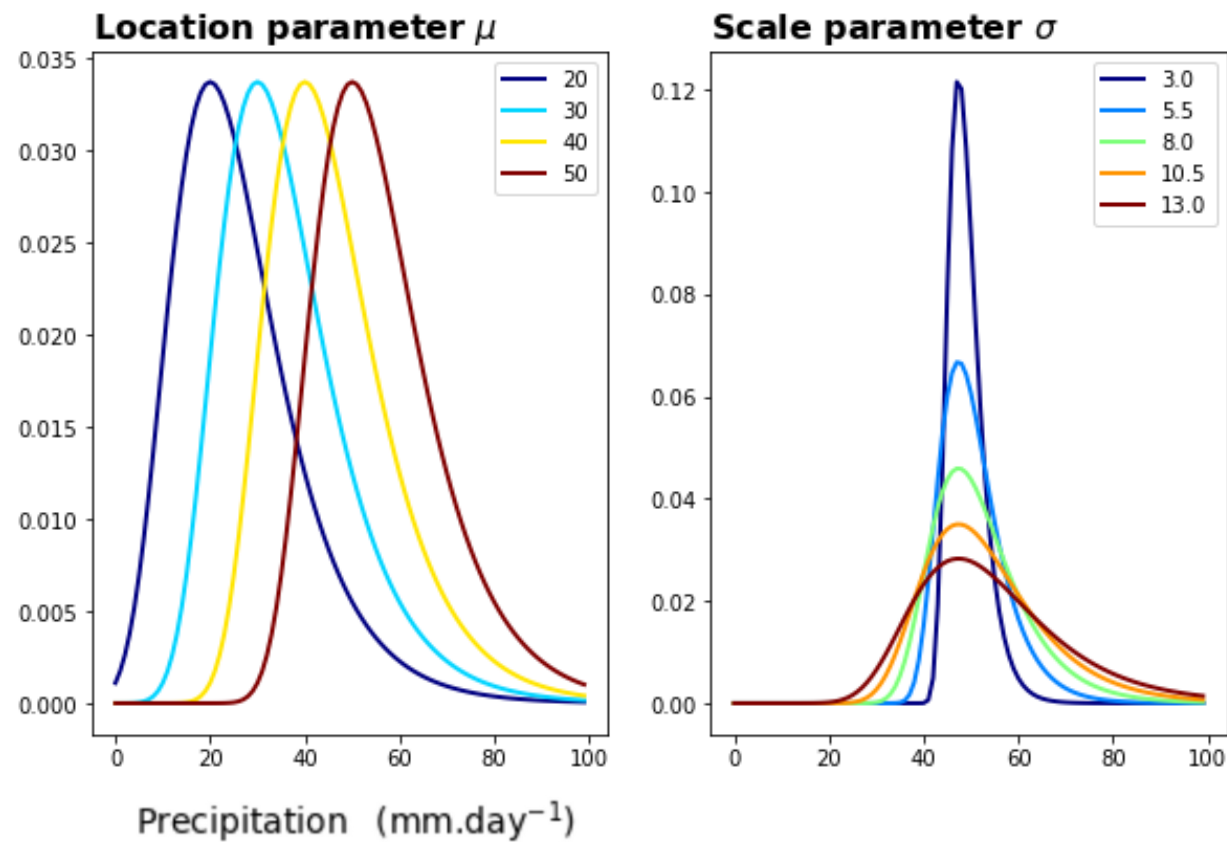
$$R_T = \begin{cases} u + \frac{\sigma}{\xi} (\lambda T)^{\xi-1} & , \text{ for } \xi \neq 0 \\ u + \sigma \log(\lambda T) & , \text{ for } \xi = 0 \end{cases}$$

(Coles, 2001)

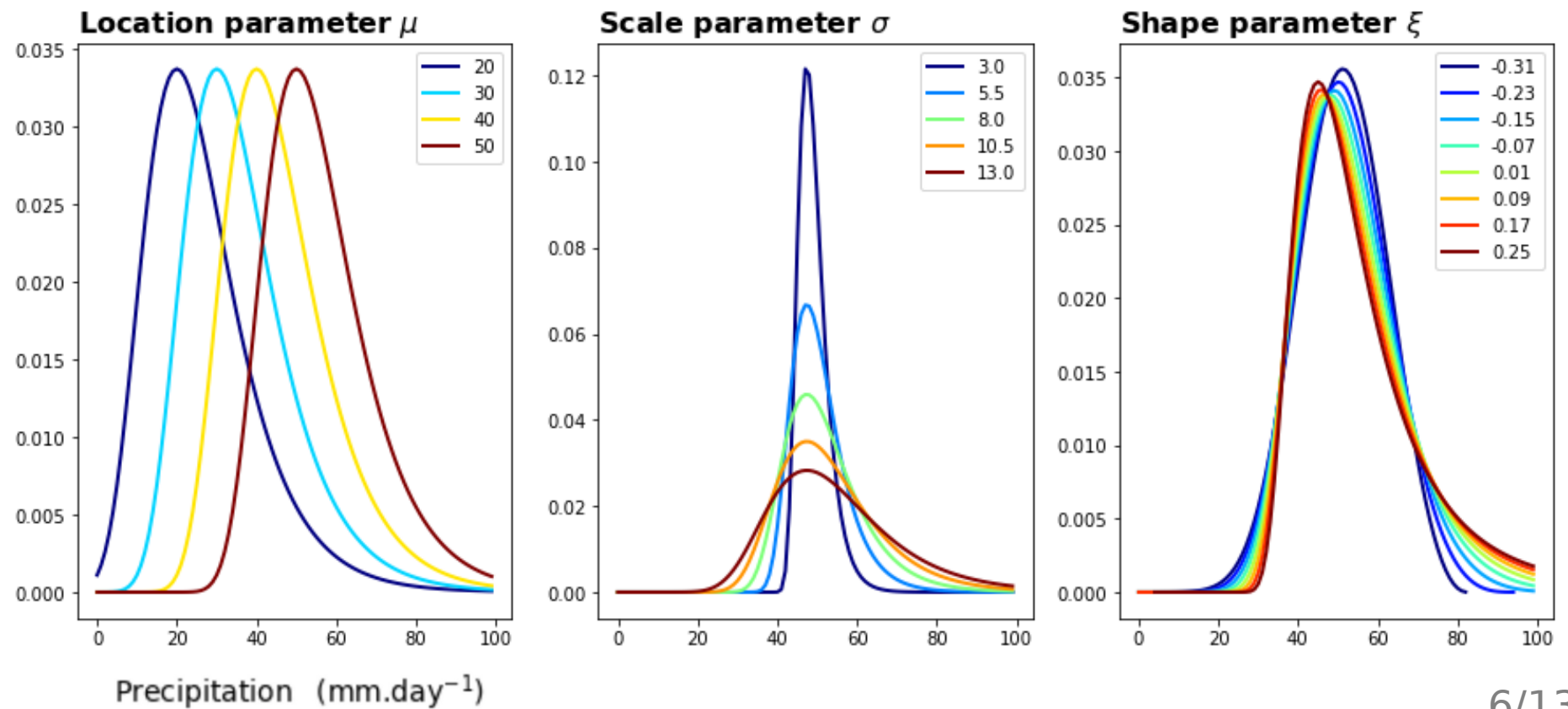
What do the fitted parameters tell us about the distributions ?



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Evolution of extremes...