

## Review of the manuscript:

### ***Technical note: A stochastic framework for identification and evaluation of flash drought***

Anonymous Reviewer #1

Li, Chen, Yin and Yuan(2022) propose a new approach for flash drought identification and characterization based on a simple water balance model for tracking soil moisture changes. The mathematical and probabilistic framework is sound and the results derived from it provide robust mathematical evidence to current understanding of flash drought development. The method, despite the limitation of parameterization, allows the simulation of multiple scenarios to assess different types of flash droughts.

### **General comments**

The manuscript is written in good English and overall is well structured. The authors provide extensive literature review and good methodological description

- Please improve your code documentation and comment.

It is my opinion that the manuscript has no major technical flaws. Nevertheless, our recommendation is for *Minor Reviews*.

### **Specific comments**

#### 1. Results

- Fig 4:
  - Please improve the colour scheme, as the points in New York and Heyuan are barely visible.
  - Why did you use a limit of 100 days in the scale? Normally flash droughts intensification period is limited to up to 30 days (Osman et al, 2021; Ford and Laosier, 2015, Lisonbee et al, 2021).
  - By using the metric of Mean First Passage Time (MFPT), some areas end up showing no actual flash droughts. Please consider showing the 10<sup>th</sup> percentile of first passage time, that would show the expected occurrence in more areas.
  - Please justify the very low MFPT in semi-arid regions, such as southern India, northern Namibia/Botswana and northeast Brazil