

# ***Interactive comment on* “Space-time variability of soil moisture droughts in the Himalayan region” by Santosh Nepal et al.**

## **Anonymous Referee #1**

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The manuscript investigates the spatial and temporal variability of soil moisture droughts in the trans-Himalaya (Tibet), the high and middle mountains (Nepal), and the southern plains of the Koshi river basin (in Nepal and India). In particular, the basin’s soil moisture was simulated using the J2000 hydrological model, validated against observed discharge and evapotranspiration. Then the Soil Moisture Drought Index (SMDI) was calculated and compared with the SPI to identify the variation of the drought indication in space and time.

## General comments

The paper presents an interesting topic, although it is not totally novel from a methodological point of view. The grammar and language style are satisfactory. The following few points need clarification prior to publication.

Several indices have been developed so far to investigate agricultural droughts (see, for instance, <https://nhess.copernicus.org/articles/20/471/2020/nhess-20-471-2020.pdf> and references therein). In the introduction, the paper would benefit from a discussion on why SMDI has been preferred to other indices.

SMDI is calculated on a weekly basis in Equation (1). The authors should clarify how the SMDI values can be calculated on a seasonal basis.

According to LL 294-296, SPI values are computed on the same seasonal scale of SMDI (i.e. winter, DJF, pre-monsoon, MAM, monsoon, JJAS, and post-monsoon, ON). However, SPI affecting soil moisture can be related to different aggregation periods. A sensitivity analysis could help to identify the appropriate aggregation period for a better comparison with SMDI.

#### Technical comments

L18: something is missing after “actual”. L36: delete “and” after “hazards”. LL 114-115: “SPI is a widely used index . . .” moves this sentence before in the introduction. LL 351-352: There is a repetition in these lines. Figures 8 and 9: place the panels vertically rather than horizontally.

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Discussion paper

