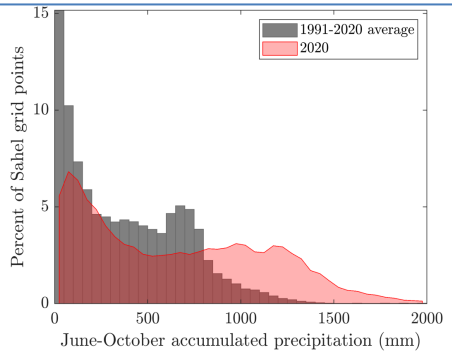
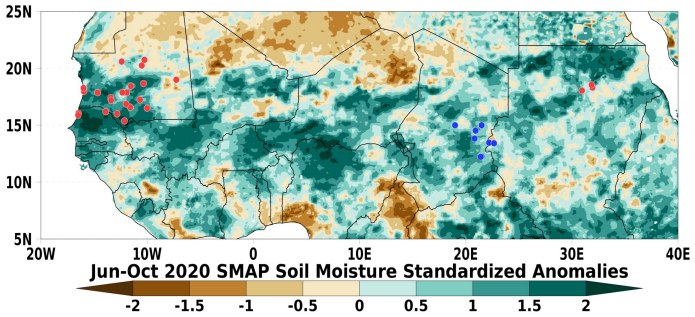
Evaluation of Extreme Soil Moisture Conditions During the 2020 Sahel Floods and Implications for Disease Outbreaks

Problem: Rainfall, temperature and vegetation index are commonly used in studies of vector-borne diseases; soil moisture is less well-studied in this context, even though it is an important determinant of environmental vector habitat suitability. There is a need to assess the impact of extreme soil moisture anomalies on disease outbreaks.



Distribution of accumulated precipitation from ARC2 during the June-October season over the Sahel for the 1991-2020 average and 2020.



June-October 2020 anomalies in SMAP surface soil moisture. The red (blue) dots correspond to locations of outbreaks of Rift Valley fever (Chikungunya) during this period.

Finding: Precipitation and surface soil moisture data indicate that flooding in the Sahel during the 2020 growing season ranked as the most extreme in recent decades. This event is linked with outbreaks of vector-borne diseases: Rift Valley fever and Chikungunya. For the outbreak of Rift Valley fever in Mauritania, soil moisture is shown to be a potentially better indicator of outbreak risk than precipitation alone.

Impact: It is important to establish spatial and temporal relationships between soil moisture anomalies and outbreaks of vector-borne diseases for different regions in order to use these relations in projections of outbreak risk.

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