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Hydro-meteorological and Agricultural drought assessment under Solar Radiation Modification over the Niger river basin in West Africa

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West African countries are vulnerable to the adverse impacts of climate extremes such as drought which are becoming more frequent and more intense over the past decades. However, drought characterization and its associated drivers are not well understood in the region. In this study, we will investigate the implication of Solar Radiation Modification (SRM) in Hydro-meteorological and Agricultural drought over the Niger River Basin, as well as their larger-scale atmospheric and ocean-atmosphere drivers. The impacts of SRM on these aspects of drought will be assessed using ARISE/GeoMIP Global Climate Model (GCM) data. The study will use three drought indices: Standardized Precipitation Evapotranspiration Index (SPEI) over each grid point for each dataset for 1 month, 3 months, 6 months and 12 months. Precipitation Concentration Index (PCI) employed as an indicator of rainfall concentration for annual and seasonal scales (wet and dry seasons). Precipitation Concentration Degree (PCD) and Precipitation Concentration Period (PCP) to measure the rainfall distribution and the peak rainfall date, based on the daily or monthly total precipitation. Standardized runoff index (SRI) and standardized soil moisture index (SSWI). The Soil and Water Assessment Tool (SWAT) will be used to assess the current and future water balance in the basin and to estimate the features of meteorological, hydrological and agricultural droughts. The model will be driven by a statistically downscaled of the SRM climate model data. In the Preliminary results, models reproduce the near normal drought for each type of drought over the basin. The ssp585 shows less dry condition in the far future over the basin. The model intervention reduces the gap and has serious implications for future management of droughts over the basins. This is an ongoing study. The results of this research will provide valuable insights to stakeholders in the region on the regional impacts of a global climate mitigation solution such as SRM on key socio-economic climate hazards. Details results from the study will be presented in oral at the workshop. The results will enable much better-informed contributions from African policymakers in the UNFCCC and other fora where the pros and cons of geoengineering of climate

in general, and SRM in particular, are being debated.

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