



Joint Global Change Research Institute (JGCRI)
Pacific Northwest National Laboratory (PNNL)
5825 University Research Ct,
College Park, MD 20740

May 28, 2022

Dear Dr. Jones,

We wish to submit for publication in *Nature Scientific Data*, our paper titled “*Global monthly sectoral water use for 2010-2100 at 0.5° resolution across alternative futures*”. In this paper we generate a novel global gridded monthly sectoral water withdrawal and consumption dataset at 0.5° resolution for 2010-2100 for a diverse range of 75 scenarios. Our scenario repository is harmonized with the five Shared Socioeconomic Pathways (SSPs) and four Representative Concentration Pathways (RCPs) scenarios to support its usage in studies evaluating the implications of uncertain human and earth system change for future global and regional dynamics. To generate the data, we couple the Global Change Analysis Model (GCAM) with a land use spatial downscaling model (Demeter), a global hydrologic framework (Xanthos), and a water withdrawal downscaling model (Tethys).

This dataset is important because it quantifies the sources of demand-side pressures on scarce water resources globally under diverse future scenarios. It has been estimated that almost 70% of the world’s population is exposed to water scarcity at least one month in the year and projections show scarcity will increase with critical implications for sustainable development. Recent studies highlight that future water scarcity is primarily driven by human water demands rather than climate impacts on water availability. Additionally, irrigation water demands have been shown to have the largest relative impact on water scarcity. Furthermore, water access, availability and demands are highly localized, with large energy and economic costs associated with water transfers, and thus a regional understanding of water use is essential. This paper accounts for all of these key factors by providing a transparent and open-source dataset and accompanying methodology that captures the key drivers of future water scarcity (water use for human activities) at a fine spatio-temporal scale (0.5° resolution and monthly) and with added detail on irrigation water use by crop types.

We look forward to hearing from you soon.

Thank you for your time and consideration.

Best,

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