Changes in the Winter-Spring Center Timing over Upper Indus River Basin in Pakistan

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요 지

The agriculture sector plays a vital role in the economy of Pakistan by contributing about 20% of the GDP and 42% of the labor force. Rivers from the top of Himalayas are the major water resources for this agriculture sector. Recent reports have found that Pakistan is one of the most vulnerable country to climate change that can cause water scarcity which is a big challenge to the communities. Previous studies have investigated the impact of climate change on the trend of streamflow, but the understanding of seasonal change in the regional hydrologic regimes remained limited. Therefore, a better understanding of the seasonal hydrologic change will help cope with the future water scarcity issue.

In this study, we used the daily stream flow data for four major river basins of Pakistan (Chenab, Indus, Jhelum and Kabul) over 1962 - 2019. Utilizing these daily river discharge data, we calculated the winter-spring center time and the summer-autumn center times. In this study Winter-spring center time (WSCT) is defined as the day of the calendar year during which half of the total six months (Jan-Jun) discharge volume was exceeded. Results show that the four river basins experienced a statistically significant decreasing trend of WSCT, that is the center time keeps coming earlier compared to the past. We further used the Climate Research Unit (CRU) climate data comprising of the average temperature and precipitation for the four basins and found that the increasing average temperature value causes the early melting of the snow covers and glaciers that resulted in the decreasing of 1st center time value by 4 to 8 days. The findings of this study informs an alarming situation for the agriculture sector specifically.

Key word : winter-spring center timing, climate change, Upper Indus River

감사의 글

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