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## Professor Jin-Ho Yoon's research team diagnoses the risk of extreme precipitation, such as drought and flooding in summer in East Asia

- GIST (Gwangju Institute of Science and Technology, President Kiseon Kim) School of Earth Sciences and Environmental Engineering Professor Jin-Ho Yoon confirmed that the risk of extreme precipitation\* such as drought and flooding during the summer in East Asia is increasing.

\* extreme precipitation: Heavy rains that occur in a short period of summer cause floods, landslides, and droughts that occur over a relatively long period of time, as well as enormous economic losses such as crop damage, as well as human deaths and ecosystem destruction.

- As global temperatures rise due to climate change, the amount of water vapor that the atmosphere can hold has increased, while at the same time, the surface of the earth is getting drier as it is deprived of moisture into the atmosphere. As a result, the risk of torrential rain and drought can increase at the same time, and in the worst case, it can lead to serious disasters. An extreme example of such damage is the recent case of Japan.
- In Japan, as much as 1000mm of rain fell from the end of June 2018 for about 10 days (6/28~7/8), causing heavy damage such as floods and landslides in the southeastern area. However, the severe high-temperature drying phenomenon over the whole month of East Asia was even more severe, and the damage was

further aggravated. More than 1,000 people died due to the continuous extreme precipitation.

- This study predicts that as the life cycle of the East Asian Summer Monsoon (EASM) becomes increasingly apparent, the likelihood of continuous occurrence of floods-Heat waves or droughts has increased.
  - Using observational data over the past 30 years and the latest climate models (Coupled Model Intercomparison Project Phase 6, CMIP 6), the research team confirmed that during the monsoon season in East Asia, which included Korea and Japan, more rain fell in a short period of time and the subsequent hot and dry periods were also strong and prolonged. As a result, even if the same amount of rain falls, more rain falls in a shorter period of time, so the damage is bound to become even greater.
  - In addition, the East Asian summer monsoon season lasts for several months and has various effects over a wide area, and it has been confirmed that the impact of global warming on this monsoon system varies from region to region. Overall, however, with the strengthening of the East Asian summer monsoon's life cycle, it is clear that the possibility of continuous extreme weather conditions like those in Japan in 2018 has increased.
- Professor Jin-Ho Yoon said, "It is very important to understand that global warming has strengthened the life cycle of the East Asian summer monsoon, thereby increasing the risk of a series of extreme weather changes."
- The research was led by GIST School of Earth Sciences and Environmental Engineering Professor Jin-Ho Yoon and conducted by Ph.D. student Jina Park in an international collaboration with Chonnam National University, Kyungpook National University, Tokyo University in Japan, and Utah State University in the United States with support from the Korean Meteorological Agency and the GIST Research Institute. The findings were published on June 10, 2020, in *Environmental Research Letters*, a top 10% internationally renowned journal in the field of meteorological and atmospheric science.

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