The recommended location of rain gauge stations based on radar

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Motivation

The number of hydrology-related damage cases is increasing worldwide due to climate change. The Korean Peninsula is suffering from more natural disasters related to rainfall such as floods, flooding of dams, and torrential rains. The hydrologic analysis is necessary for the efficient management of water resources. Water resources can be efficiently managed by analyzing **the spatial characteristics of rainfall and the rainfall characteristics in the basin** through hydrologic analysis by basin. **To this end, it is necessary to organize a rain gauge network that can accurately identify rainfall information in the basin.**

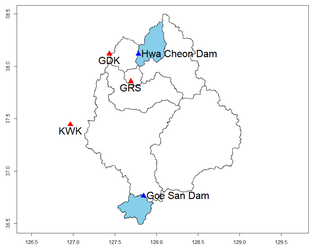
Radar data can be used to observe a wide range of weather information, even if no weather station is installed. Therefore, radar data can be used to determine the characteristics of the river in the entire basin.

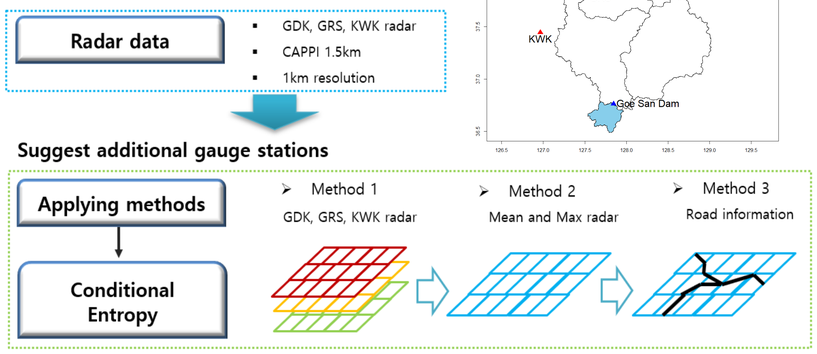
In this study, radar data were used to select a major location for identifying the characteristics of rainfall in the basin, and if a rain gauge station was installed, we looked for an appropriate location.

Methodology

❖ Research flow

- **The Goesan Dam and Hwacheon Dam basin are the most difficult points to identify the characteristics of rainfall only by the rain gauge stations currently in operation.**





❖ Entropy

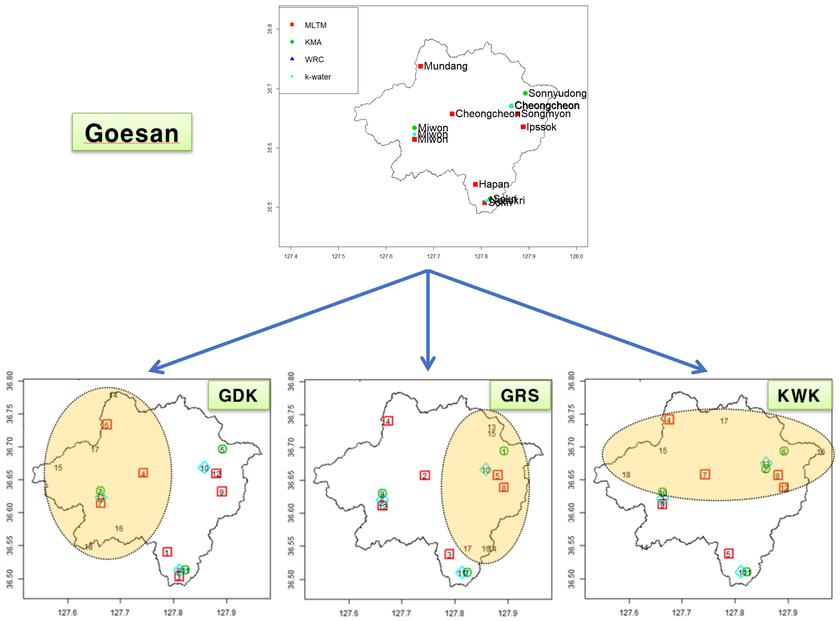
- Entropy is an information theoretical approach that quantitatively evaluates the degree of randomness from the probability distribution of data (Shannon, 1948).

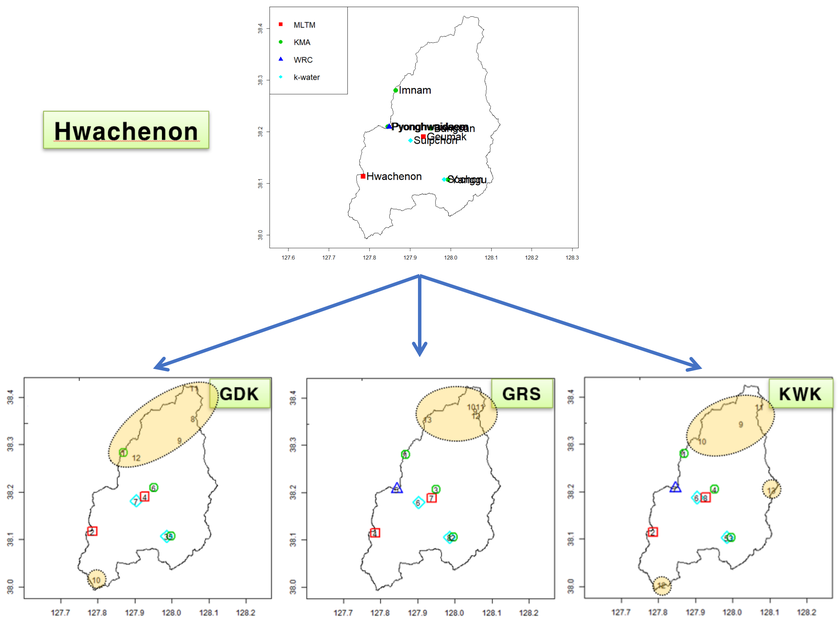
$$H(X) = -\sum_{n=1}^{N} p(x_n) ln p(x_n) \qquad H(X|Y) = -\sum_{n=1}^{N}\sum_{m=1}^{M} p(x_n, y_m) ln p(x_n|y_m)$$

Results

Method 1:

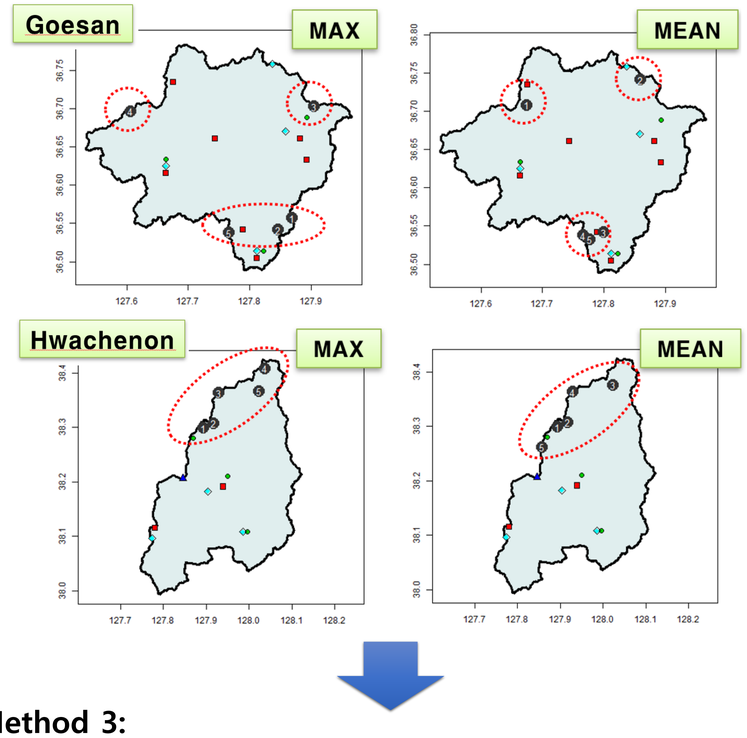
To assess exitance gauged sites based on individual radar data





Method 2:

The suggested location of gauge sites using **composite radar data**



Method 3:

The suggested location of gauge sites using **composite radar data & road network**