

Spatial distribution of oxygen-18 in shallow groundwater and river water in Japan

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Environmental isotopes database for natural water in Asian-Pacific region has been constructed by Center for Remote Sensing in Chiba University and was utilized for following three purposes: (1)to determine common isotopic characteristics of natural water in Japan,(2)to construct the prediction equation for isotopic characteristics statistically by using meteorological and geographical parameters, (3)to clarify the main physical process for determining delta value of natural water.

For delta value of shallow groundwater and river water, the prediction equation could be constructed as functions of the latitude and the wind speed of sampling point by using correlation matrix and multiple regression analysis. The latitude, the influential explanatory variable, is an indicator of location, and seems to be a proxy for some physical parameter. Single regression analysis between delta value and geographical and meteorological parameters suggested that isotopic temperature effect was the most effective for determining delta value physically. The prediction equation for d value was constructed as a function of duration of sunshine. The GIS analysis suggested that its spatial change was similar to that of the amount of precipitation brought in winter season. In Japan, the d value of precipitation in winter is higher than in summer. Hence the duration of sunshine would include the property of precipitation brought.