

# Water quality of shallow groundwater in the Yellow River Delta

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To clear that the interaction between river water, groundwater and seawater in the Yellow River Delta, we carried out groundwater and river water measurements about several water qualities and physical data as a general survey on August 9 – 11, 2002. In this survey, we measured water temperature, electric conductivity, pH, groundwater level in the field, and collected water samples of 150ml to analyze major ions and stable isotopes (oxygen-18 and deuterium). The analysis of major ion was carried out at Mie University, and that of stable isotopes was at Kyoto University.

The study area and measurement points were shown in Fig. 1. The study area is at the river mouth of Yellow River. The landform of this area is very flat, and formed delta. Geology is sand and silt, that is constructed by Yellow River flow. The speed of sediment is very quick, and the land area is expanding rapidly to the sea.

Yellow River is formed the raised bed river in this area, so it is considered that the river water recharges to the shallow groundwater. This is proved as follows: Major ion composition and values of stable isotopes ( $\delta^{18}\text{O}$  and  $\delta\text{D}$ ) of shallow groundwater that is distributed near yellow river were similar to those of yellow river water. Major ion compositions of shallow groundwater and river water were Na-Cl type at all measurement points.

The relationship between  $\delta^{18}\text{O}$  and  $\delta\text{D}$  is shown in Fig.2. The  $\delta^{18}\text{O}$  value of shallow groundwater and river water ranged from  $-7.2$  to  $-2.2$  per mil and the  $\delta\text{D}$  value from  $-53$  to  $-18$  per mil respectively. The regression line yielded from the data of groundwater and river water was shown by the following equation:  $\delta\text{D} = 7.14 \delta^{18}\text{O} - 1.78$ . The Local meteoric water line is unknown because of no rainwater data now. The values of  $\delta^{18}\text{O}$  and  $\delta\text{D}$  of the upward river water are low. Relatively, the values of these of downward (river mouth) river water are high. Almost all values of groundwater are shown between the lowest value of Yellow River water and the value of seawater on the mixing line. This is suggested that origin of groundwater is yellow river water and seawater in this area. In addition, the electric conductivity of groundwater near the coastline was higher than that of present seawater in Fig.3: values of groundwater ranged from 63 to 88mS/cm, value of present seawater ranged about 50mS/cm. It is suggested that origin of this groundwater isn't present seawater. A source of high electric conductivity in this area is unknown now.

In the future, it is necessary to carry out the measurement in wider area and deeper groundwater.

Fig.1

