Groundwater resources assessment based on satellite GRACE and hydrogeology in Western Australia

Groundwater resources assessment in Western Australia (WA) has been made by using satellite GRACE (Gravity Recovery and Climate Experiment) and in situ hydrological, meteorological and hydrogeological data. Changes in land water storage analyzed by satellite GRACE showed the decreasing trends at both northern part of Western Australia (-17.9 mm/yr) and southern part of Western Australia (-11.7 mm/yr) during 2002 to 2008, even though the values of precipitation minus evaporation remain the same. This is attributed to the depletion of groundwater storage which is confirmed by in situ data with the decrease in groundwater level. Hydrogeology in northern part of WA is categorized as major groundwater basin with high recharge (100 – 300 mm/year) to medium recharge rate (20 - 100 mm/year). On the other hand, the hydrogeology of southern WA is categorized as local and shallow aquifer with medium to very low recharge (< 100 mm/year). Therefore the hydrogeology in northern WA and southern WA is very different in terms of recharge rate and the character (such as storage). The degree of depletion of groundwater storage depends on the hydrogeology, which have higher recharge rate with higher depletion in northern WA and lower recharge rate with lower depletion in southern WA. The satellite GRACE (Gravity Recovery and Climate Experiment) is useful tool for basin and continental scale groundwater assessment.