Integrated observation well network of Geological Survey of Japan, AIST for study of Nankai and Tonankai earthquakes

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Geological Survey of Japan (GSJ),AIST has a network composed of about 40 groundwater observation stations in and around the Tokai and Kinki areas, Japan. This is one of the most well-equipped groundwater observation networks for earthquake prediction research in the world. Based on the pre-slip model of the impending Tokai Earthquake in the Suruga Trough and the assumption that groundwater level changes is proportional to volumetric strain changes, it is found that our network has a capability of detecting pre-seismic groundwater level changes. This pre-slip is an aseismic slow slip in and around the focal region expected to start a few days before the main shock. These groundwater data can be accessed from http://www.aist.go.jp/RIODB/gxwell/GSJ_E/index.shtml

We have been monitoring groundwater in the Tokai area for earthquake prediction since 1976. However, the possibility of occurrence of the Tonankai and Nankai earthquakes, which have occurred in the Nankai Trough next to the Suruga Trough with an interval of 100-200 years since A.D.684, has also been increasing recently. In addition, hydrological anomalies related to the past Nankai and Tonankai earthquakes were often reported in Shikoku and Kii Peninsula by historical documents. Therefore we have started constructing a new observation network in and around the Shikoku and Kii Peninsula since 2006. In 2007 we have constructed two new stations and started monitoring groundwater and borehole strain at Hongu and Kumano in the southern part of the Kii Peninsula, which is near the epicenters of the 1944 Tonankai and 1946 Nankai earthquakes (Fig. 1), which are the most recent events of the Tonankai and Nankai earthquakes. The 30, 200 and 600 m-depth wells were constructed in one observation station.

Figure 1 Location and structure of the new observation station.

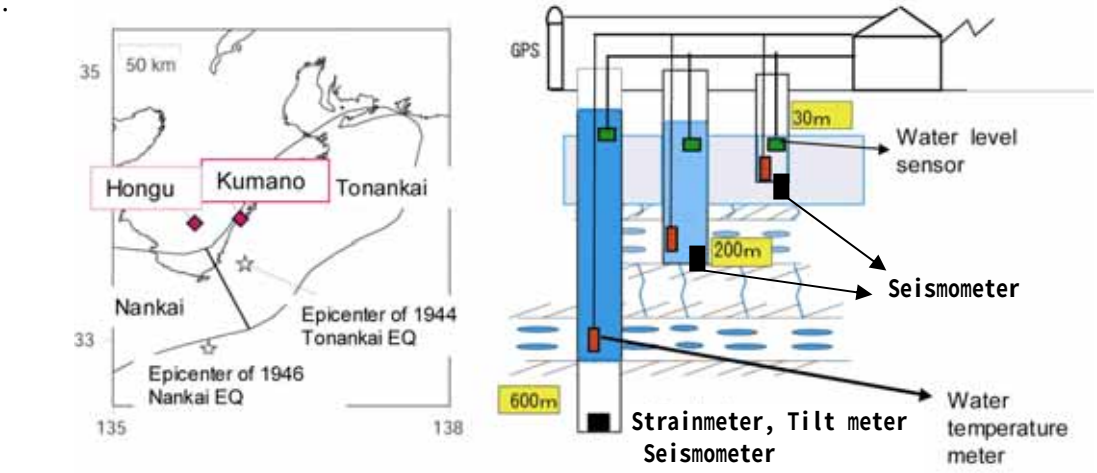
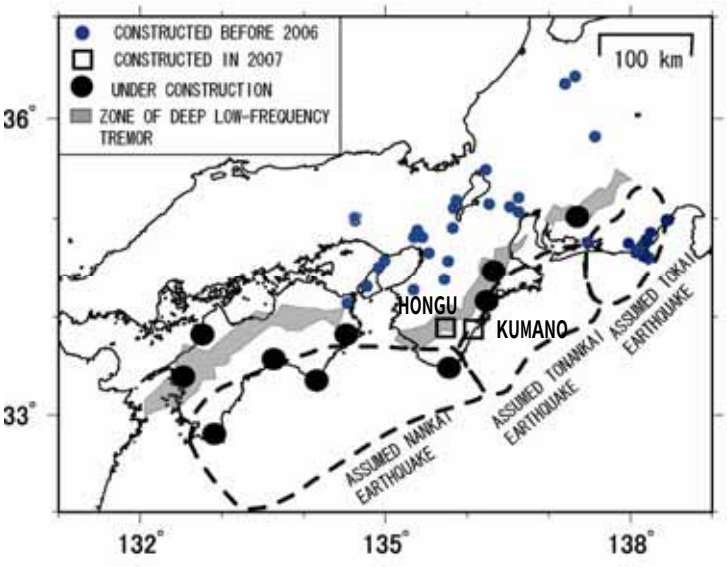


Fig.2 Groundwater observation network of GSJ.



Groundwater level and temperature are observed at each well. Crustal strain、tilt and seismic ground motion are also observed by a multi-component borehole strain-meter , tilt-meter and seismometers (Fig.1). We expect to observe groundwater changes related to crustal deformation caused by transient slow slips with deep low-frequency tremors, preslips and main shocks for Tonankai and Nankai earthquakes. These data will enable us to clarify the mechanism of the earthquake-related groundwater changes and help reducing hazards of Tonankai and Nankai earthquakes. During the period from 2007 to 2008, we will construct other ten stations like this (Fig.2).