T145-005 **Room: 202** **Time: May 15 10:00-10:15**

Heat flow measurement in shallow seas through long-term water temperature monitoring

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Heat flow data at the surface gives important constraint on estimation of the subsurface thermal structure. Heat flow measurements have been extensively conducted on land and in deep seas. In shallow seas, however, reliable heat flow values have not been obtained because the bottom water temperature variation (BTV) is large, which disturbs the temperature distribution in surface sediment.

We proposed two new methods for measurement of temperature gradient and heat flow in shallow seas. In the first method, temperatures in surface sediments are measured for several months to one year using a pop-up type instrument with a 2 m long probe. Then the influence of BTV is analytically removed from the temperature records to determine the temperature gradient. In the second method, long-term BTV data are analyzed with the temperature profile in sediment measured at the end of BTV monitoring.

We have already showed that the first method is useful for determination of the temperature gradient and heat flow in shallow seas (Hamamoto et al., 2005). It is, however, difficult to apply this method to many stations since the monitoring device is rather complex and it takes relatively much time and cost to deploy it. As the second method requires long-term records of BTV only and thus the monitoring instrument can be much simpler, we attempted to determine the temperature gradient and heat flow by the second method as well.

We conducted long-term monitoring of BTV with pop-up type instruments in shallow seas landward of the Nankai Trough. Temperature records from 444 to 1083 days were obtained at three stations off Shikoku Island and off Kumano (water depths range from 1329 m to 2164 m). We then measured the temperature profile in sediment with an ordinary deep-sea heat-flow probe at the end of BTV monitoring, which can be compared with the profile calculated based on the BTV record. The undisturbed temperature gradient is an unknown parameter in this calculation and can be estimated through inversion analyses by fitting the calculated profile to the observed one. We could successfully obtain the temperature gradient and heat flow values at all the three stations.

We also estimated the length of BTV monitoring necessary for reliable heat flow determination by this method. With a 2 m long probe, the temperature gradient can be determined with about 20 % errors from BTV records for 300 days and with about 10 % errors from 400 day records.

This method requires that the thermal diffusivity of sediment is known and show no significant variation with depth. We should therefore use both methods in parallel for efficient measurements. In an area where long-period components of BTV are approximately uniform, we may be able to obtain heat flow data by measuring temperature profiles at multiple stations around one BTV monitoring site.