

Changes in groundwater level after the 2005 Fukuoka Earthquake and characteristic patterns in aftershock sequences

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We detected the characteristic pattern of groundwater level change before the earthquake in the off-shore area west of Fukuoka Prefecture(M7.0) occurred on 20 March 2005 . After that, we detected repeatedly the similar pattern of groundwater level change in aftershock sequences. The active fault called Kego fault which runs through the central part of Fukuoka city is located to the southeastern direction of the fault which generated the above M7.0 earthquake. It is said that the M7.0 earthquake increased the possibility of movement of the Kego fault. The recurrent period shows that the Kego fault may move in the geologically near future. Therefore we have been monitoring the changes in groundwater level at fourteen groundwater level observation stations surrounding the Kego fault. The main observational results are as follows;

1)The three-stage(increase, decrease and increase) characteristic changes in groundwater level were detected repeatedly before the main shock and the large aftershocks.

2)Duration of anomalous groundwater level correlates very well with the earthquake magnitude. From the above correlation between duration and magnitude, we can predict the date of earthquake occurrence and the earthquake magnitude. it is also clarified that the above correlation shifts with time.

3)The observed change in groundwater level correlates well with the elasticity around the observational well.

4)The above clear change in groundwater level may originate from the uniform underground structure and the simple stress field in the area concerned.

We detected also the following interesting phenomena in recent observations;

1)Two different precursor patterns of groundwater level change were observed before the occurrence of aftershocks.

2)Stress accumulation of different earthquakes in the aftershock area may proceed simultaneously.

3)The earthquake occurrence mechanism of some aftershocks may be interpreted in terms of stress corrosion.

The above observational results would show the importance in clarifying the earthquake mechanism and also in predicting earthquakes.