D008-P004 Time: May 29 17:15-18:45

Numerical Simulation for the Improvement of the Resolution on the Offshore Faults by Using Ocean-Bottom Crustal Deformation Data

Sou Nishimura[1], Masataka Ando[2], Keiichi Tadokoro[3]

[1] RCEP, DPRI, Kyoto Univ., [2] RCSV, Science, Nagoya Univ., [3] RCSV, Nagoya Univ.

Interplate coupling on the plate interface along the Nankai trough has been revealed by the geodetic observation data. Especially, precise distribution of slip deficits also has been revealed by using the GPS data from the GEONET (GPS Earth Observation NETwork) GPS sites, which is established by the GSI (Geographical Survey Institute, Japan). Aseismic slow slip events beneath Bungo channel and Tokai district are found by the GPS data from GEONET.

However, because of the limited observation on land, the resolution of the slip deficits is very bad on the offshore fault segments, while it is good on the landward fault segments. Due to bad resolution in the offshore area, the actual tectonic motion near the trench axis has not been revealed. Ocean-bottom crustal observation is thought to provide us with important information to know the offshore tectonics. If the resolution in the offshore area is improved, we can discuss on the actual distribution of the slip deficit rates near the trench axis, the possibility of episodic slip events near the trench axis, and the strain accumulation on the splay fault.

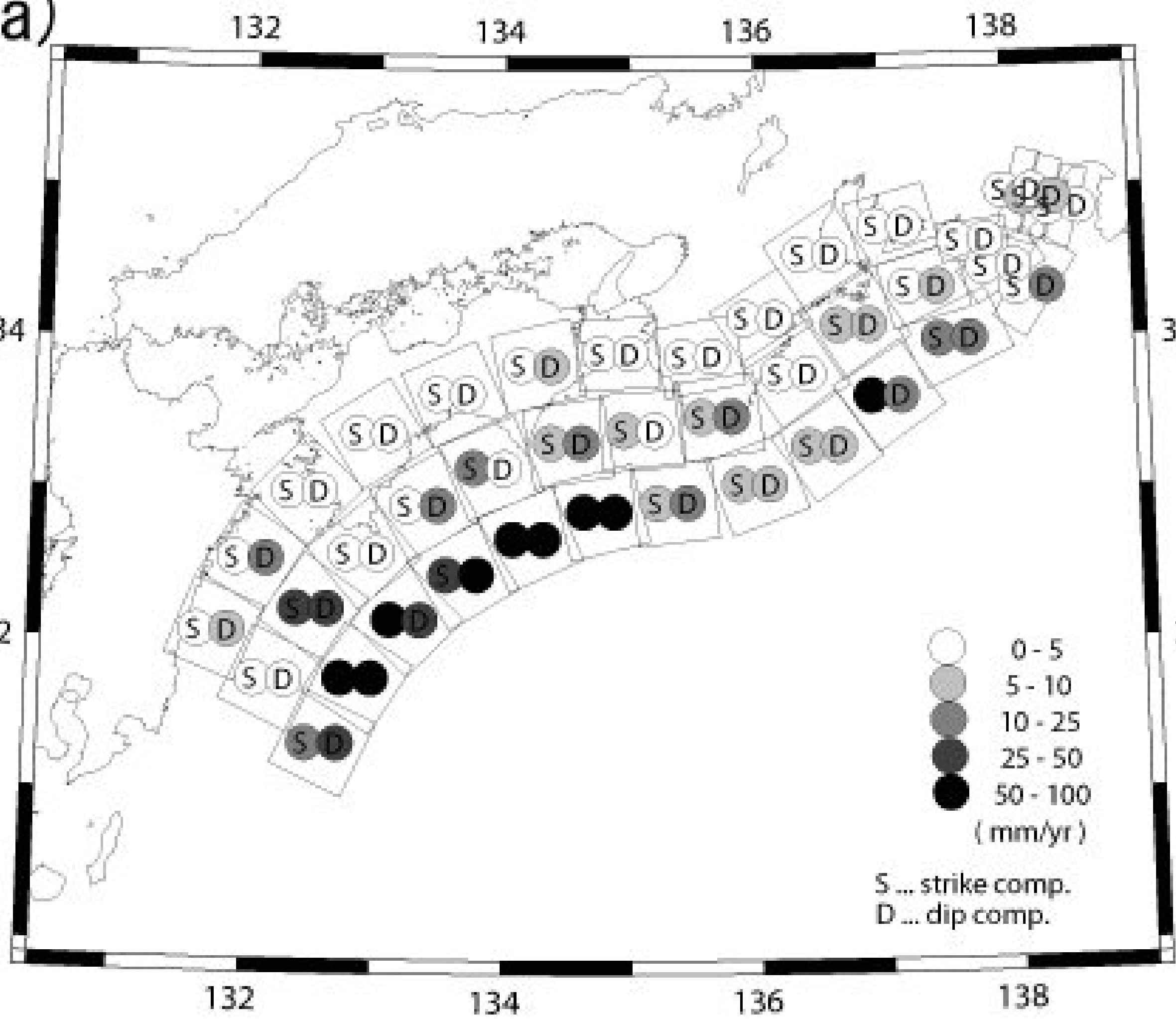
In this study, we discuss on the improvement of the resolution of the slip deficits on the offshore faults by ocean bottom crustal deformation observation
through the numerical simulation. The plate interface along the Nankai trough is modeled by 39 planar fault segments,
whose length and width are set to be 60 km and 60 km, respectively. 477 GPS observation sites are used as data points in our calculation. 12 offshore observation sites are assumed to be aligned along 60 km distance from the coastal line in southwest Japan. The site interval is set to be 60 km.

We carry out the following procedure in the numerical simulation,
1, Give the initial values of slips (X0),
2, Calculate the surface displacements from the initial slips,
3, Add the random errors to the calculated displacements,
4, Estimate the slip distribution (X) from the synthesized displacements,
5, Compare the initial slips (X0) and the estimated slips (X).
If the resolution is good, The estimated slips are to be same as the initial values. On the other hand, if the resolution is bad, the estimated slips become different from the initial values. In order to express the resolution, we use the absolute value for the difference between the initial slips and the estimated slips ($dX = | X - X0 |$).

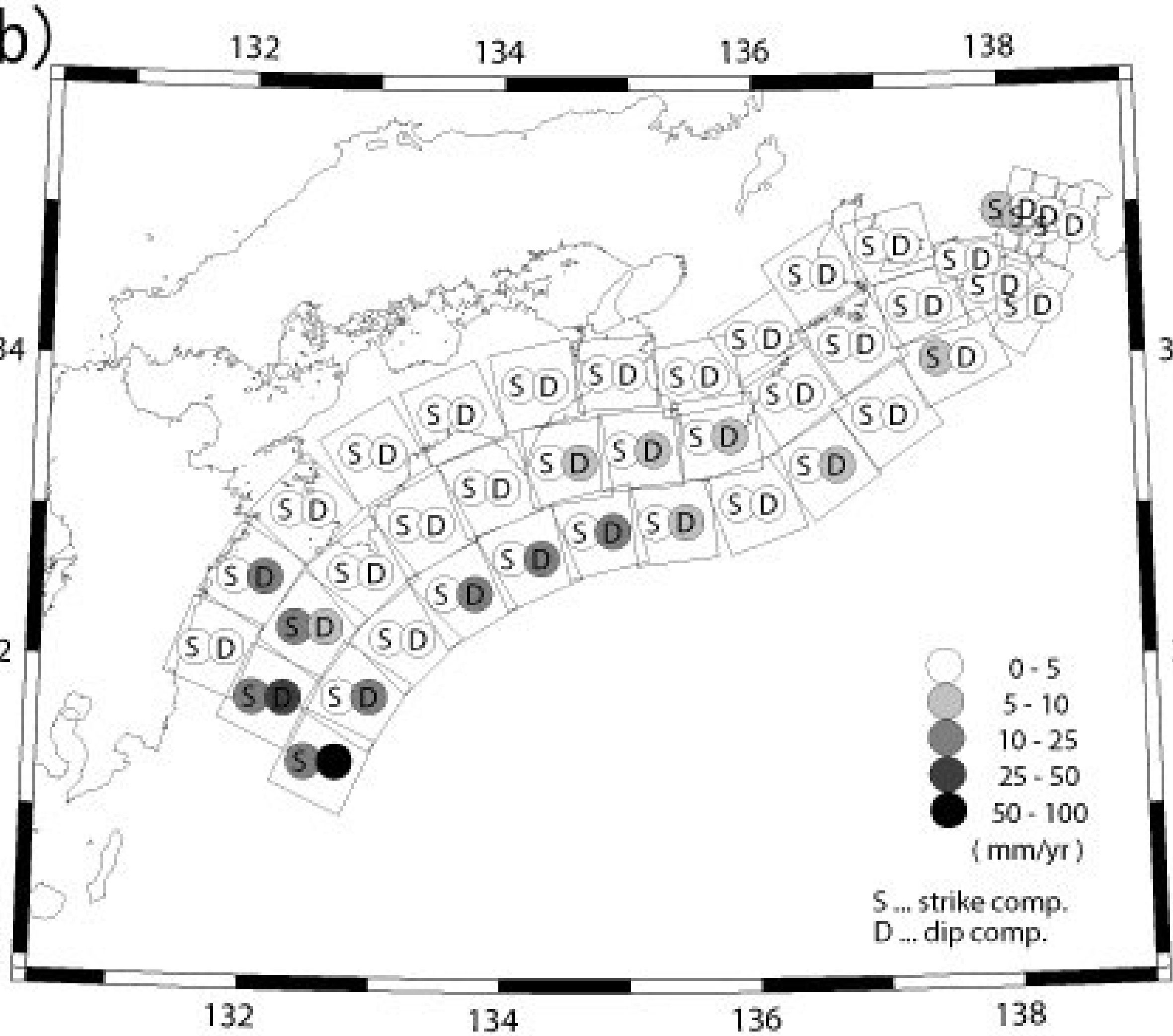
We have two calculations;
A, without offshore sites (477 sites),
B, including offshore sites (489 sites).
By the comparison between these two cases we can suggest the improvement of the slip solution in the offshore area by using the ocean-bottom observation data.

We show the results in the case that positive (+50 mm) and negative (-50 mm) values of slips are given to the neighboring segments (Checker Board Test). Segments beneath or near the observation network on land have a good resolution (dX is less than 10 mm). On the other hand, bad resolution (dX = 50 - 100 mm) are obtained for the segments far from the coastal lines (case A). In the case B (including offshore sites), resolution in the offshore area is remarkably improved (dX = 10 - 25 mm) by 12 ocean-bottom observation sites.

(a)


132
134
136
138
34
32
30
0 - 5
5 - 10
10 - 25
25 - 50
50 - 100
(mm/yr)
S ... strike comp.
D ... dip comp.

(b)


132
134
136
138
34
32
30
0 - 5
5 - 10
10 - 25
25 - 50
50 - 100
(mm/yr)
S ... strike comp.
D ... dip comp.