Crustal deformation due to short-period sea level fluctuations

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We detected periodic flucuations in the extensometer records at the Nokogiriyama observatory in Chiba Prefecture. One can conclude that they were excited by periodic sea level fluctuations, because components with the same periods of 2200s and 900s are observed in mareograms. Most researchers calculate theoretical crustal deformation caused by sea level fluctuation on the basis of global Earth models. In our present case, however, global Earth models could not explain the observed records, presumably because such models do not include any surface layers which play an important role when the observatory is close to the coastline. In this study we employed Earth models containing surface layers. We found, by trial and error search, the optimal surface layer parameters as thickness 1km, Vp 3.1km/s, Vs 1.6km/s, density 2.2g/**cm. Tada (1981) obtained the Young's modulus of the crust from the anomolous changes in leveling records associated with the removal of a large amount of sand in Futtsu, not far from Nokogiriyama. His result of 10-20 GPa is consistent with the value of 5-40 GPa we obtained, in support of the adequacy of the method and assumptions we used in our analysis.