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Spatial variability of the seasonal sea level variation component and its mechanism in the adjacent seas to korean peninsula

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The analysis of seasonal sea level variation in surrounding seas to Korean peninsula revealed that there exist some systematic pattern for the Sa amplitude varying from 20 to 10cm, depending upon the regions such as the Yellow Sea, South Sea and East/Japan Sea (EJS). Results from the analysis of coastal tidal data are presented as well as the analysis result from the satellite altimetry data of Topex/Poseidon. The physical factors, such as atmospheric force and thermosteric force, to influence the seasonal variation of sea level are examined in order to understand the mechanism of spatially systematic variation of the seasonal sea level variation component Sa. The spatial distribution of Sa amplitude by inverse barometric effect varies 10cm to 8cm from the Yellow Sea, through South Sea, to the EJS, respectively. This inverse barometric force alone does not explain the amplitude variation over the surrounding seas to Korean peninsula. Additional contribution is from the origin of sea level change by the thermosteric effect. Naturally we focus upon the contribution of thermosteric sea level to the observed Sa variability in the Yellow and East/Japan Seas. In the Yellow Sea the Sa amplitudes by the thermosteric effect are about 5 to 7cm from 10 to 20 year data analysis, and the phase of peak amplitude occurs in August by seasonal solar radiation, similarly to the phase lag of early July by inverse barometric effect. Meanwhile, the amplitude contribution by the thermosteric sea level in the EJS is 3 to 4cm, and Sa peak lags by about 50ąÆthan in the Yellow Sea, due to possibly different physical phenomenon from the Yellow Sea in summer season. It is known that the cold water mass from the northern EJS flows toward the southern and southwestern direction, which may drive a different TSL contribution from the Yellow Sea where solar

radiation is the main forcing to water column. Summation of two component with representative phase lag explains reasonably better the observed Sa results in the Yellow and East/Japan Seas than inverse barometric effect. Therefore, it is likely that the main driving force to the spatial amplitude variability of the Sa component is the differently lagged contribution from the shallow Yellow Sea and deep EJS where North Korea Cold water and/or EJS Intermediate Water keeps flowing southwestward, toward the Korean coasts of the EJS. Analysis result of the Sa amplitude from Topex/Poseidon data also shows such a pattern in the surrounding seas to Korean peninsula. Acknowledgement: This work was partially supported by KORDI basic research program entitled A Study on the Response of the East Sea Circulation and Medium to Long Period Oscillation by the Climate Change.