

Supplementary Materials

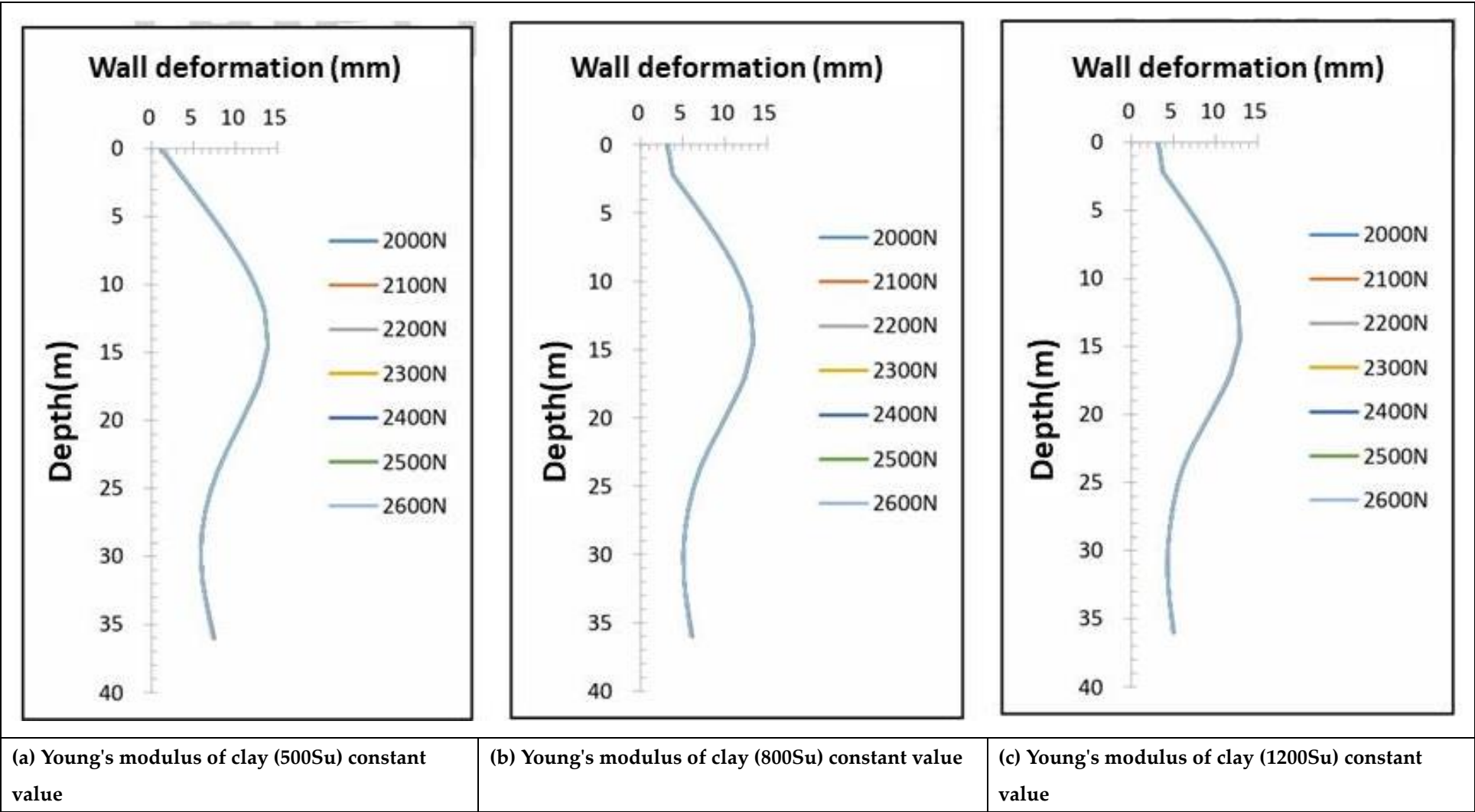
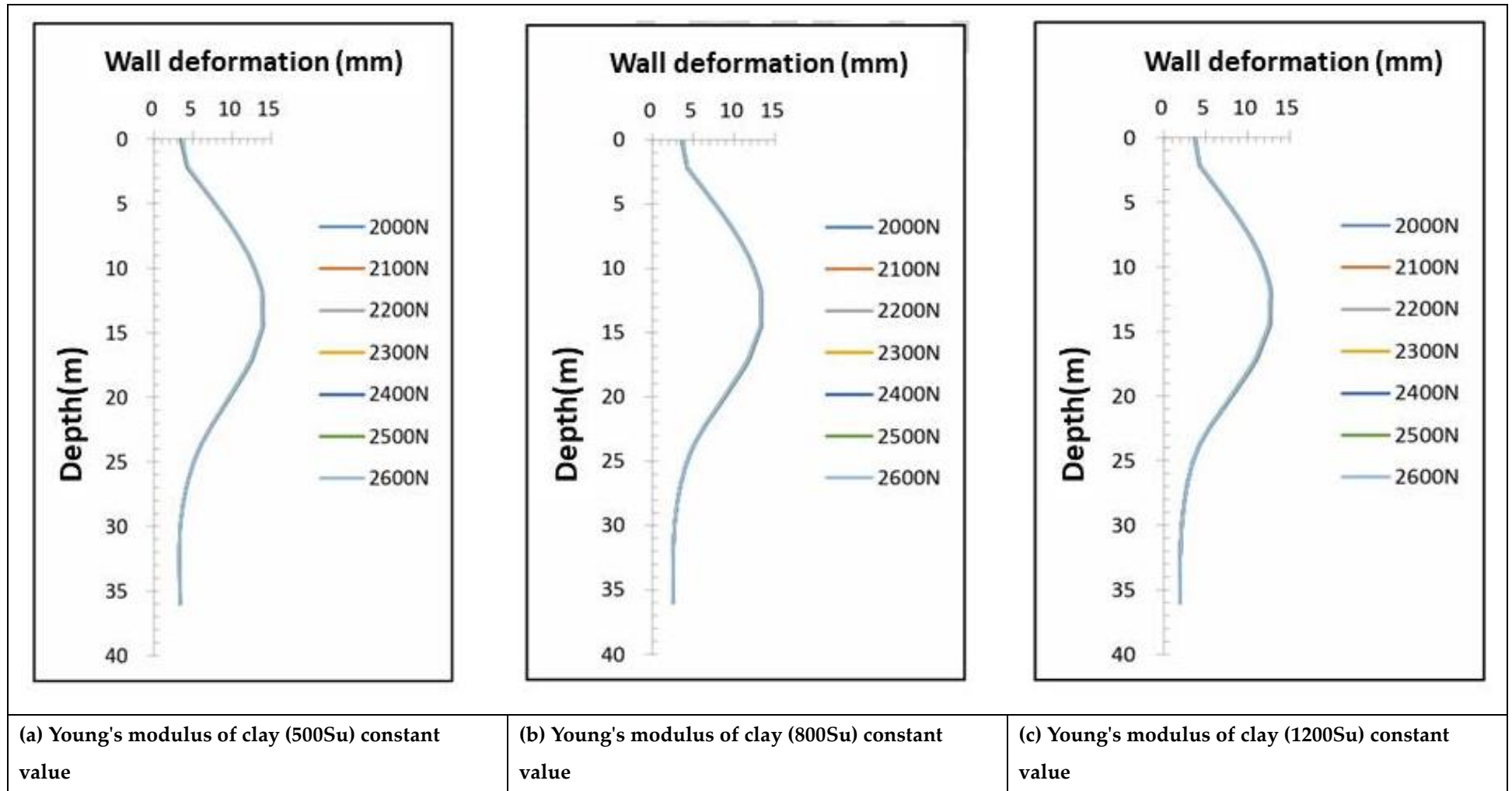
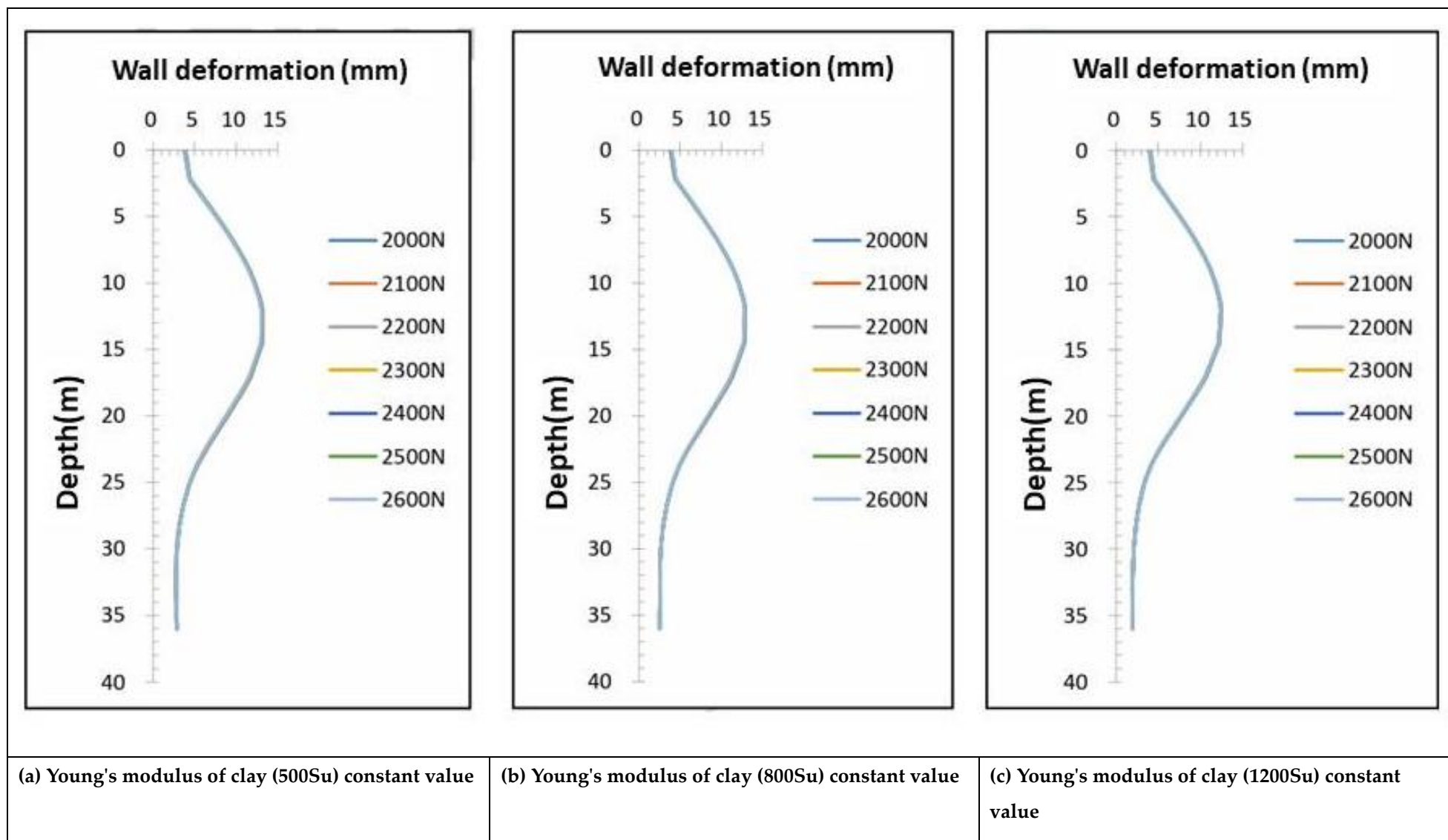


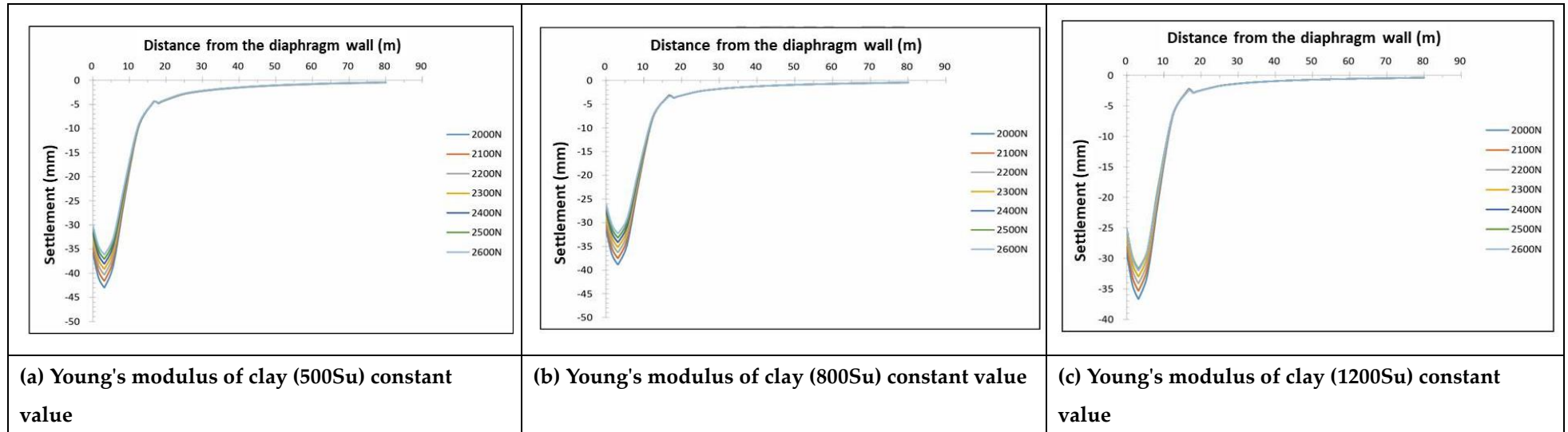
Figure S1 MC model, comparison of results with changes in sand's Young's modulus



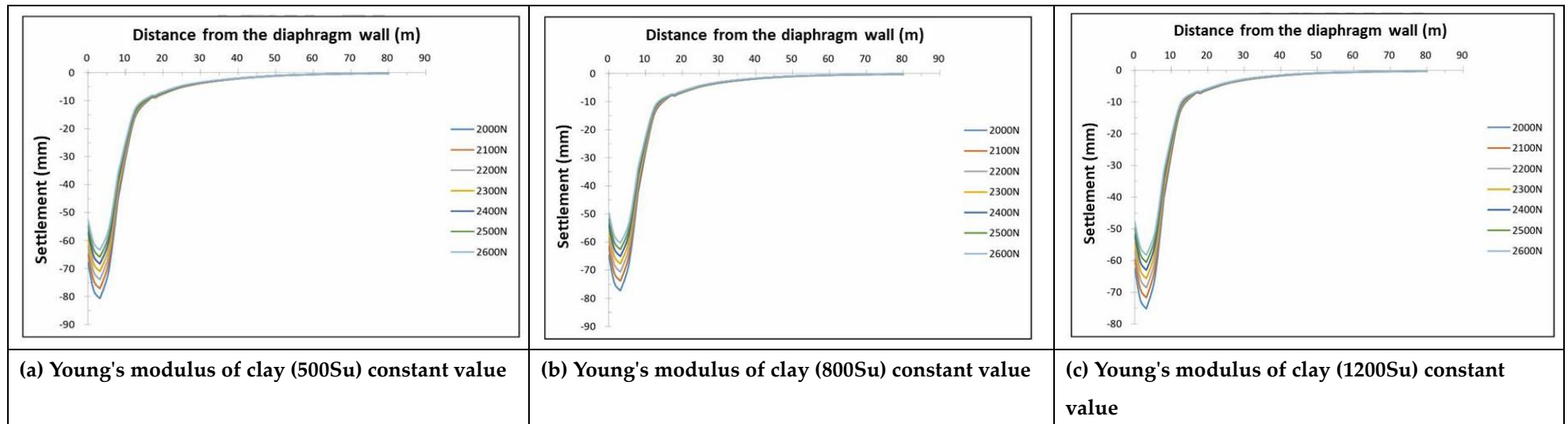
**Figure S2** HS model, comparison of results with changes in sand's Young's modulus



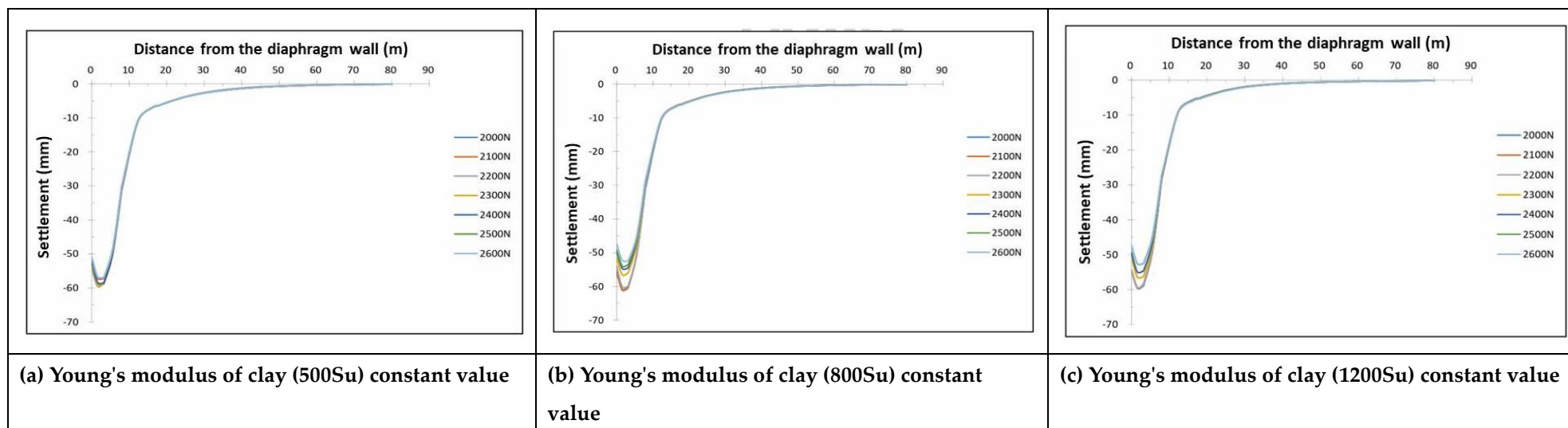
**Figure S3** HSS model, comparison of results with changes in sand's Young's modulus



**Figure S4** MC model, comparison of results with changes in sand's Young's modulus



**Figure S5** HS model, comparison of results with changes in sand's Young's modulus



**Figure S6** HSS model, comparison of results with changes in sand's Young's modulus