

Can future climate changes impact seasonal variations in terrestrial loads into the Seto Inland Sea?

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This study assessed impacts of climate change in future on the seasonal variations in the precipitation, runoff loads of suspended solids (SS), and nutrients such as total nitrogen (TN) and total phosphorus (TP) discharged from all river-basins facing to the Seto Inland Sea. After the enforcement of the Climate Change Adaptation Act in December 2018, the assessment for environmental impact on climate change is urgently needed to create adaptive strategies in local and prefectural governments. From a coastal management, the assessment of the climate change impacts on semi-enclosed seas such as the Seto Inland Sea is also essential to decision making of adaptation measures in each municipality. Then, we performed a distributed, multi-river runoff simulation in the Seto Inland Sea basin to predict the freshwater, SS, TN and TP discharges during about 20 years using the present (HPA_m02) and future climate scenarios of the climate change (HFA_rcp85_c3) produced by the NHRCM20 (Non-hydrostatic Regional Climate Model 20) based on RCP (Representative Concentration Pathways) scenarios. Our prediction suggested that the frequency of the flood discharge induced by the heavy rain will decrease in the future climate compared to that in the present climate. However, the rate of the flood discharges in the future climate will extremely increase. The whole runoff from the Seto Inland Sea basin will decrease about 3% in the future climate. The seasonal peaks of the precipitation in the present climate shows in June or July, on the other hand, the peaks in the future climate will shift in August or September. As a result of those peak shifts, the seasonal peak of the river runoff in the future climate will also shift in August or September. As for the terrestrial loads, the SS will be increase about 1.5 times in the future climate, but the increase of the TN and TP loads will be hardly visible. Focusing on the seasonal variation in the terrestrial loads, the seasonal peaks of all terrestrial loads will shift in August and September in phase with those of the river runoff.

Keywords: Seto Inland Sea, climate change, NHRCM, RCP scenarios