P46

Application of SEIB-DGVM in predicting CO_2 absorption and tsunami attenuation performances in coastal forests

○Rempei SUWA

Introduction: Coastal forests provide various ecosystem services including carbon sinks and disaster prevention. Black pine *Pinus Thunbergii* is one of the dominant species of the coastal forests in Japan. The present study attempted to evaluate the potentialities in carbon accumulation and tsunami attenuation functions of black pine forests, using the Spatially Explicit Individual-Based Dynamic Global Vegetation Model (SEIB-DGVM) (Fig. 1).

Material and methods: The simulation unit was a 30-m^2 virtual forest, which was divided into a grid of 1.00-m^2 meshes, with each mesh box accommodating only one individual. The simulation results were calibrated with field data sets obtained from the black pine forest at Enjyugahama beach in Kii peninsula, Japan. The carbon accumulation function was evaluated as tree biomass. The tsunami attenuation function was evaluated as the tsunami attenuation coefficient considering the tsunami-fallen trees.

Results and discussion: Maximum biomass was found after 90 yrs and did not vary regardless of the different initial density (Fig 2a). On the other hand, the tsunami attenuation coefficient against 2 m tsunami height showed its maximum peaks from 20 to 40 yrs (Fig. 2b). The maximum tsunami attenuation coefficient increased slightly with decreasing initial density from 1.0 to 0.6 m^{-2}, and decreased drastically. This indicates that there exists an optimum initial density to maximize its tsunami attenuation effect.

Acknowledgements: Presenter is grateful to Dr. H. Sekiguchi for his helpful suggestions. The present study was supported by the Exploratory Collaborative Research H20-02 from the Disaster Prevention Research Institute, Kyoto University.

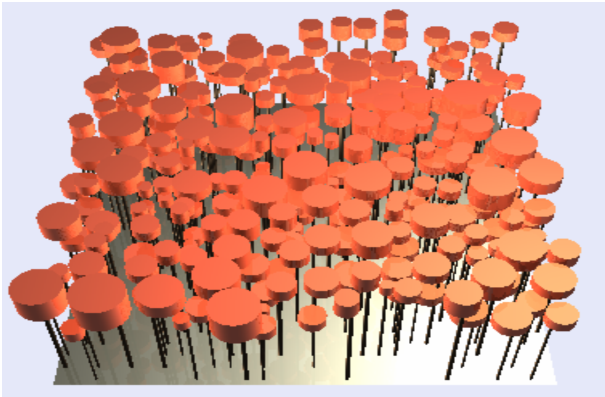

Fig. 1 Example of computationally-simulated black pine forest by SEIB-DGVM.

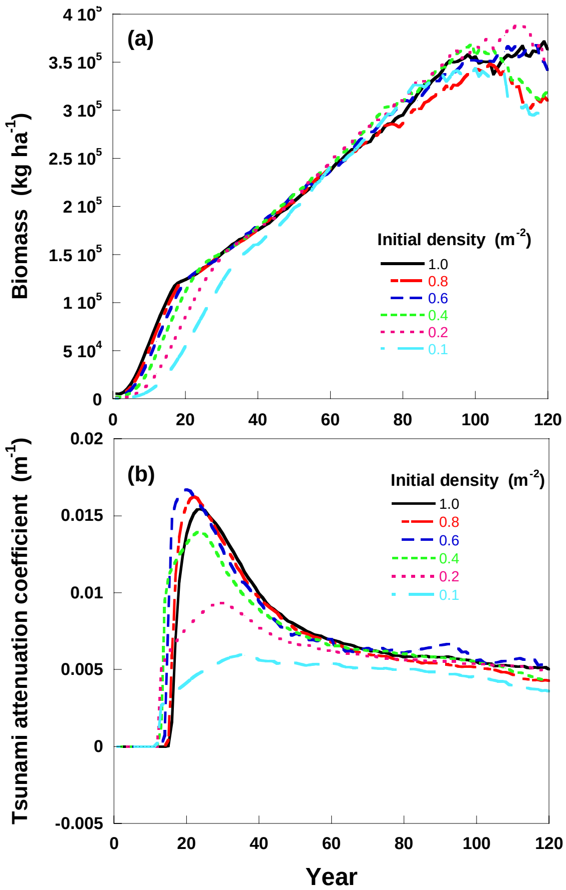

Fig. 1 Simulation results in (a) biomass and (b) tsunami attenuation coefficient at different initial density.