

Delta progradation and variation in sediment and carbon storage of the Kiso River delta, central Japan

Kodai Hasada^{1*}, Kazuaki Hori¹

¹Graduate School of Environmental Studies, Nagoya University

Delta formation began in many places mainly between 8500 and 6500 yr BP when the Holocene sea-level rise has decelerated. However, the timing of delta initiation and the rate of delta progradation are controlled by not only the rate of sea-level change but also sediment supply. Deltas are important sinks of sediments and carbon in coastal and fluvial systems. We calculated sediment and carbon storage of the Kiso River delta (Nobi Plain) for successive 1000-year time slices by analyzing existing borehole columns and radiocarbon ages, reconstructing the three-dimensional stratigraphic architecture and measuring organic carbon content of borehole core sediments. The deltaic deposits were divided into three layers: middle mud (MM), upper sand (US), and top mud (TM) in ascending order. Total sediment and carbon storage in the delta area of only 822.8 km² was estimated at 22892 Tg and 190 Tg, respectively. The mass ratio of each layer to the total mass was calculated to be 36.5% for MM, 48.0% for US and 15.5% for TM. The stored carbon ratio of each layer to the total stored carbon was calculated to be 40.5%, 42.9% and 16.7%, respectively. The progradation rates of the delta during the last 6000 years were estimated at 5 m/yr (6000-5000 cal BP), 8 m/yr (5000-4000 cal BP), 4 m/yr (4000-3000 cal BP), 7 m/yr (3000-2000 cal BP), 6 m/yr (2000-1000 cal BP) and 9 m/yr (after 1000 cal BP). The rate of sediment and carbon storage during the last 6000 years has increased especially after 1000 cal BP. Additionally, the increase was found notably at TM. This is probably due to increase in sediment supply to the delta caused by human impact on the catchment area and expansion of delta plain accompanied with delta progradation.

Keywords: sediment storage, carbon storage, progradation, mass, GIS, Nobi Plain