Land-sea pathways between snowmelt and fishery production

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Cultured scallop (*Patinopecten yessoensis*) is a typical coastal fishery in Funka Bay. The annual spat density of scallop is highly correlated with the snowmelt runoff or accumulated snowfall. We investigated the land-sea pathways in Funka Bay, Japan, a typical semi-enclosed bay during snowmelt period to understand how the snowmelt runoff can improve the spat density or production of scallop larvae associated with ocean primary production, by analyzing hydrological and oceanographical data produced by a land-sea integrated model in conjunction with newly compiled datasets of riverine nutrient concentrations and of the particle tracking simulation. The model successfully estimated the riverine dissolved inorganic nitrogen (DIN) flux that is dominated by the temporal variation of the river runoff rather than that of the riverine DIN concentration. Ocean simulation indicated that the freshwater flux supplied by the snowmelt runoff enhances the clockwise circulation along the coast of the bay. The close relationship between the annual spat density of scallop and the snowmelt runoff associated with high DIN concentrations can be explained as follow; riverine nutrients can increase the biomass of phytoplankton in near-shore seas and improve food availability for scallop spawners, resulting in increased egg production in March to April. Therefore, the nutrient flux from agricultural source areas through the large snowmelt runoff has an important role in larvae production. Land-sea pathways need to be identified to design sustainable and synergetic systems of aquaculture and agriculture for the integrated management of coastal regions.

Keywords: Land-sea pathway, Snowmelt runoff, Nutrients, Coastal fishery prodcution

