Effects of physical parameters on behavior of pyroclastic flow entering sea and generating a tsunami

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Volcanogenic tsunamis can provide with useful information to examine the relationship between its waveform and the source parameters of eruptions. Resultant evidence of them arriving on coastal areas and related eruptive deposits, such as subaerial / submarine debris avalanche or pyroclastic flow deposits, can also be important clues for revealing behaviors of tsunamis and their source conditions. However, these characteristics are rarely linked with eruption parameters, and the nature of tsunami generation processes has remained controversial. In this study, we focus on the subject of much speculation 'What happens when a pyroclastic flow encounters the sea?'

Important parameters controlling the interactions should to be the bulk density of the flow, the velocity and discharge rate of the flow, and the angle of incidence between the flow and the water surface (Cas and Wright, 1991). On the basis of previous considerations, we numerically investigated the interaction between gravity currents (pyroclastic flows) and stratified layers (upper air and lower water) in a simple rectangular channel using shallow-water theory, and the effects of physical parameters on behavior of currents and generating tsunamis. Representative physical parameters are as follows; (1) the *density* of subaerial pyroclastic flows, which was set to be 800 to 1200 kg/m^3, (2) *interfacial drag coefficient* between pyroclastic flow and water, which may strongly effects on the amplitude of tsunami, and (3) the *angle of incidence* between the flow and the water surface.

The shape and motion of descending currents were compared with those of particle driven gravity currents and interfacial intrusions in previous studies (e.g. McLeod et al., 1999; Monaghan et al., 1999). Appropriate values for physical parameters are also investigated by comparing between numerical results of this study and data from previous numerical and laboratory experiments, with respect to time and distance plots for a given volume flux of subaerial density currents.

We will also talk about recent experimental results that gravity currents descend through a tank stratified with fresh water above and salty water below.