Change in components of lahar deposits from Chokai volcano

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Chokai volcano, located in the northern Honshu arc, is an andesitic stratovolcano that collapsed the edifice partly at ca.2500 years ago. The post-collapse lahar deposits (Shirayukigawa lahar deposit) are distributed in the northern foot of Chokai volcano. These deposits form a volcanic fan and consist of 16 units of debris flow and hyperconcentrated flow deposits. The Shirayukigawa lahar deposits 30 m thick, overly the 2.5 ka Kisakata debris avalanche deposit.

On the basis of sedimentary facies and structures, units of the Shirayukigawa lahar deposits are classified into three types: clast-supported debris flow deposit (Cc), matrix-supported debris flow deposit (Cm1), and hyperconcentrated flow deposit (Cm2). Each type has the following lithological characteristics.

Debris flow deposit (Cc) is massive, very poorly sorted, partly graded, and clast-supported with polymictic clasts dominated by subrounded to rounded volcanic clasts. Matrix is sandy to muddy. Preferred clast orientation are present.

Debris flow deposit (Cm1) is massive, very poorly sorted, and matrix-supported with polymictic clasts dominated by subrounded to rounded volcanic clasts. Matrix is sandy to muddy. Some layers exhibit coarse-tail normal/inverse grading. Most clasts are oriented.

Hyperconcentrated flow deposit (Cm2) is massive to diffusely laminated, very poorly sorted and matrix-supported with polymictic clasts dominated by subrounded to rounded volcanic rocks. Matrix is sandy. The clasts are randomly distributed in the sandy matrix except for some clast-concentrated lenticular layers. Clasts smaller than 1cm account for about 10 percent of the deposits. Maximum clast size is about 30 cm.

The clasts of these deposits consist of altered andesite, fresh andesite, mudstone and sandstone. The sedimentary clasts were derived from the substrate. The proportion of altered andesite clasts decreases upwards.

Matrix components in the lower 8 units (C-LHR) are different from those of the upper 8 units (S-LHR). In C-LHR units, grayish blue clay is dominant in matrix, whereas in S-LHR units, brownish yellow volcanic sand is dominant in matrix. The change in matrix component reflects the source material and is consistent with the change in clay mineral assemblage determined by X-ray diffractometry. Clay minerals such as smectite, chlorite, pyrophyllite and kaoline group mineral, are rich in C-LHR units whereas they are poor in S-LHR units. Presence of these clay minerals in the C-LHR units indicates that hydrothermal activity was dominant near the summit of Chokai volcano when the early lahars occurred. These deposits imply repetitive lahar events after sector collapse of Chokai volcano.