Facies analysis of Miocene subaerial volcaniclastics in Motegi area, Tochigi Prefecture.

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A thick sedimentary sequence of Lower Miocene deposit is well developed in Motegi area. Yamanouchi Formation contains voluminous volcaniclastics, with intercalated lavas. They have many volcanic debris flow deposits. Clast-supported debris flow deposits are well recognized. This indicates that these deposits are supplied from intercalated massive lavas. A variety of facies in these deposits might have been generated by modification of flow characteristics. According to analysis of paleocurrent direction determination, these deposits were originated from at least two different ancient stratovolcanos. Early Miocene volcanic activity had suddenly ceased. Regional and rapid extentional deformation around 15Ma might have suppressed these active volcanism.

A thick sedimentary sequence of Lower Miocene subaerial volcaniclastic deposit is well developed in Motegi area, eastern Tochigi Prefecture. This sequence, Nakagawa Group, consists of four formations as follows in ascending order: Ichiba Formation (fluvial conglomerate),Motokozawa Formation (lacustrine deposits),Yamanouchi Formation (basaltic to andesitic volcaniclastic rocks and intercalated lavas),Motegi Formation (andesitic to dacitic volcaniclastic rocks).Many published K-Ar ages indicate that these volcanism occurred during 18-16Ma.

Lower Miocene Yamanouchi Formation contains voluminous subaerial volcaniclastics, with intercalated lavas. Based on the lithofacies, these clastic rocks are supplied from the ancient stratovolcano that are missing now. And they should represent parts of the basaltic volcanic edifice and accordingly internal structure looks like the proximal facies. On the other hand, volcanic fan deposits sequence represent the distal facies. They consists of many volcanic debris flow (Lahar) inducing deposits. Clast-supported debris flow deposits with rare fine materials are well recognized in the Yamanouchi Formation. This indicates strongly that these debris flow deposits constituents are supplied mainly from the intercalated massive lavas. A variety of facies in volcanic debris flow deposits might have been generated by modification of flow characteristics. Flow mechanism evolution would be enhanced by ingestion of water, settling of coarser particles.

According to the analysis of the paleocurrent direction and constituent rock fragments determination for some debris flow deposits, abundant these deposits were originated from at least two different ancient stratovolcanos named volcano-A and B, respectively. Analytical results also show that volcano-A was already active before volcano-B eruption started. While volcano-B was more and more active, volcano-A activity gradually became inactive. Volume estimation of each stratocone has been carried out from the volcanological point of view. Volcano-A and B have the inferred volume of 260km3, 120km3, respectively. Early Miocene voluminous volcanic activity, 100-200km3 order, had suddenly ceased after the Motegi Formation sedimentation. Regional and rapid extentional deformation around 15Ma might have suppressed these active volcanism in Motegi area.

Facies analysis, including paleocurrent direction and constituent rock fragment determination for volcaniclastic sediments, gives us great opportunity and significant information to understand the sediment gravity flow evolution and the history of the volcanism.