

Sediments in a Small Dam - After- failure Observation, Fudo Stream, Kyoto Prefecture

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The Hontani Dam was constructed in 1875 at the upper stream in Kyoto Prefecture, West Japan. It was destructed by heavy flood in 1953, and the dam deposits were exposed by stream erosion. The dam was 55m long and 6m high and the dam-pond was 170m long. The sedimentary body can be divided into five units corresponding to five stages which reflect the change of sedimentary environment.

(1) Unit 1 is a small valley floor deposits transported before the construction of the dam. It consists of ill-sorted subangular gravels of various sized horunfels and granite transported by debris flows from landslide sites. The thickness is thin, around 50cm thick, suggesting repeated transportation by secondary flood streams.

(2) Unit II is the first stage product after the construction of the dam. It consists mainly of arkose sands. Their depositional front is situated at about 80m from the mouth of the stream.

(3) Unit III occupies a main part of the pond sediments. The thickness attains up to 3m in the middle part of the basin and 1.5 m near the dam, but less than several tens of cm on the surface of Unit II. It is considered that the load of flow was mostly transported through trough-like channel on the subaqueous terrace of Unit II. The sediments of this unit consist mainly of fine materials, such as clay, silt, fine-grained sand suggesting a deposition under stagnant water or very weak current. Coarse-grained and pebble-bearing sand layers, however, are found at two horizons. These sand layers are considered to be transported by a tractive flood stream and deposited on the non-aqueous surface because of their reversely graded sedimentary structure. A stratified, fine- to medium-grained sand layer in the upper part of the unit is also considered to be of same origin. Therefore, the pond was dried up or had only limited water pool by drainage of water or dry climate, several times. At the final stage of this unit the pond was reduced in extent to about 70m in length. This size is similar to that of the pond of old map written in 1887. This fact indicates that nearly 60 percent of the pond area was buried up during only 13 years or so.

(4) Unit IV is widely distributed. Two sets of reversely graded, granule- or pebble-bearing sand layers with variable sedimentary structures are formed in the middle and upper part of the sedimentary basin. They are undoubtedly heavy-flood deposits, which change to deltaic deposits consisting of concavely laminated, sandy foreset beds and parallel laminated thin muddy bottomset beds. The flood of this unit are indicated as those happened in 1906 and 1907. The extent of the pond reduced to about 50m in length.

(5) After the deposition of Unit IV the level of the water surface was lower about 1.7m probably due to the drainage of the dam because of heavy storms in Stage IV. Unit V deposited in the last stage is poor in sediment partly because of poor sediment supply due to the progress or sand-arresting work, and partly because of erosion by 1958 flood. The unit is represented by a thin, ten and several centimeters thick, very fine grained sand layer near the bank, and a medium-grained sand layer, about 59cm thick, in the upper reaches. The former deposited on the margin of the pond by raised water surface by flood, and the later is a fan deposit made by the same flood. The areal extent of the pond was reduced to 30-35m when the dam is destructed.

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