

# An interpretation of multi events from a backthrust outcrop trial at Hakodate-heiya-seien Fault Systems

# Nobuhiro Demboya[1]; Toshihiro Kakimi[2]; Yasuo Ichikawa[3]

[1] EPDC; [2] Ex.GSJ; [3] OYO co.

In case of segmentation of long active fault, it needs that to identify the history of earthquake in detail, so it is expected that it needs that to identify many earthquake events at somewhat old surface or geological index.

The authors investigated at an outcrop crops out on the M2 Terrace at which located on a lineament of a backthrust of Hakodate-heiya-seien Fault System.

The geological units distribute on the outcrop are the Tomikawa Formation, the M2 Terrace Conglomerate, the Old Talus Deposits, the Loams and so on. The authors divide Loam into five layers, and confirm the Toya(ca 100-90ka) just under the Loam1, the ZM(ca 50ka) in the upper most part of the Loam3, the Ko-h(ca 17ka) in the upper part of the Loam4 and the Ng(ca 12ka) in the Loam5.

There is only one fault at the lower part of the outcrop, and it is divided into two faults at the upper part of the outcrop, the one is with low dip and thin out in loam, the other is with high dip.

The former is divided two faults, the upper one achieved to the bottom of the Loam4, but does not achieve to the upper most part of the Loam4. There are two faults which disturb the Loam2, but they are not continued to the fault on the lower part of the outcrop, which are doubted made by cryoturbation.

The high dip fault are divided some faults, and squeeze out M2 Terrace Conglomerates and are achieved to the surface.

The authors interpret earthquake events as below, from the geological structure on outcrop.

1)The Old Talus Deposits which distributed only at the foot wall, and is constituted only by gravels of the M2 Terrace Conglomerates are thought as an earthquake event deposits. This deposits are located upper of the M2 Terrace Conglomerates and lower of Toya, so it is thought that the earthquake occurred in ca 100-90ka.

2)The age of the event of the lower dip fault is the early era of the Loam4 deposition, it is thought that after the deposition of ZM, and prior to those of Ko-h.

3)The high dip fault achieves to the surface which is artificially affected, so the event age is thought after Ng deposition, but the upper limitation age is unknown.

In addition with the upper interpretation of events, it is possible to interpret the events discussed below although with low possibility.

a)The lower part of the Old Talus Deposits is constituted only by gravels, and the upper part of the deposits is constituted by gravels with loam. So the event was two earthquakes, at least.

b)The Loam2 and 3 are contemporaneous, but with different lithofacies, the former one distributes only near the faults, and contains gravels. So it is event deposits.

c)The Loam2 is disturbed by faults in the foot wall. But it is possible that this event is a same one of event 2).

The authors could identify the only one fault in a lower part of the outcrop, so it is thought that this fault displaced at each earthquake. Three events are identified with high accuracy and several events with low accuracy. There are not so serious inconsistency with this interpretation of events and the recurrence intervals as 10,000yrs.

The average of displacement is 0.04-0.05m/kyr at this backthrust, from the displacement of the basement of M2 Terrace Conglomerates. The value is about one-tenth of those of the main part of the fault systems as 0.3-0.4m/kyr.

The above mentioned that backthrust of this outcrop had deformed at almost every events with the earthquake of the main part of the active fault systems as flexure. The reason of average of displacement of this backthrust is as one-order smaller than those of the main flexure is not limited events of the backthrust but is a small of unit displacement.

It is difficult to investigate long and large thrust active fault which main part is large flexure for identify events in detail because of investigation with large scale. It had better to investigate at backthrust on a somewhat old surface, for identify the detail history of events for segmentation.