

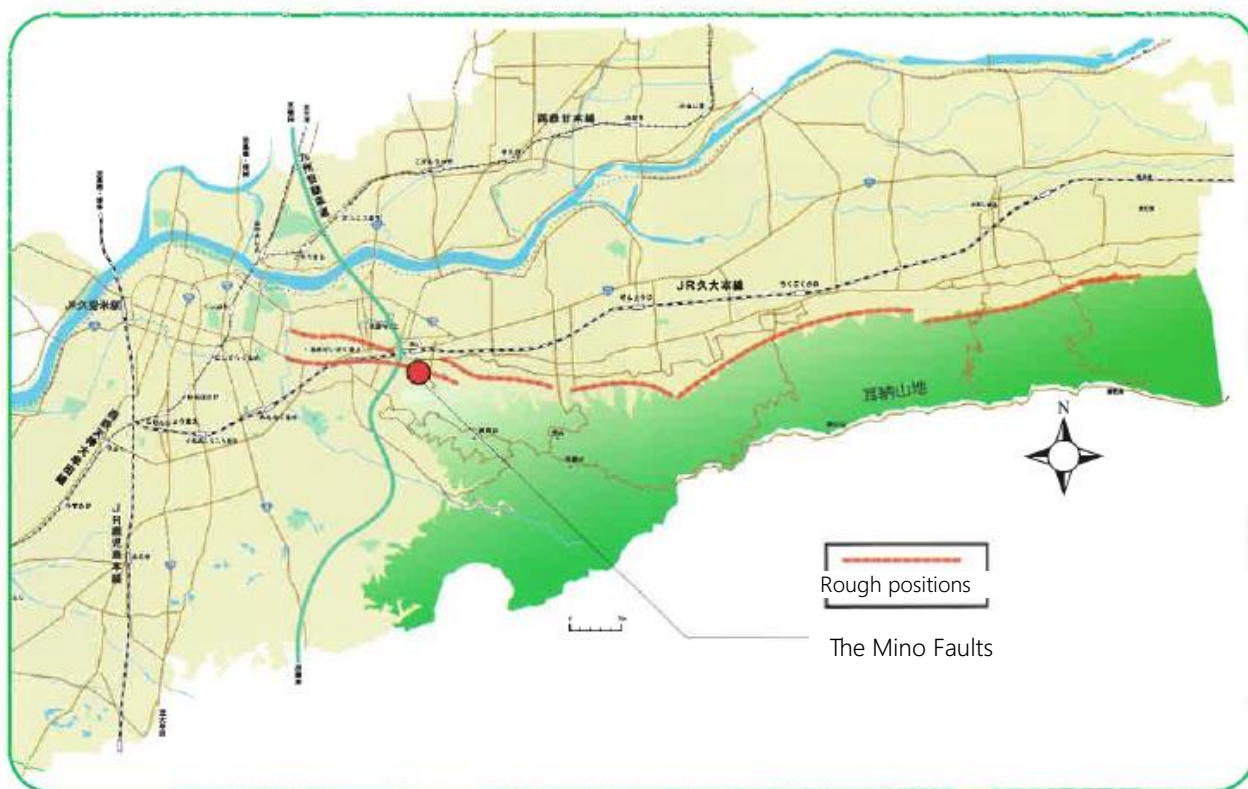
Kurume History Walks

No.1 The Mino Faults Mino danso 水縄断層

The Mino Faults (*Mino danso*) mark the northern border of the Mino Mountains with cliffs and pass through the cities of Kurume and Ukiha. It is about 20 kilometers long and is composed of ten minor faults that run diagonally or parallelly.

These dextral normal faults with the north-dipping side are estimated to move averagely 10 centimeters to 1 meter per a thousand years. These fault scarps show the continuous dissection induced by a steep-sided valley.

The Mino Faults were designated a National Natural Monument on July 28th, 1997.



Location of the Mino Faults

Fault-drilling research on the Yamakawa-Yamada Remains

In October 1993, we found several outcrops, many cracks, the lithospheric flexures and the traces of the liquefaction phenomenon and the sand boil phenomenon, as a result of the drilling research under the direction of Professor Matsuda Tokihiko (faculty of Science, Kyushu University; professor emeritus of Tokyo University), Dr. Sangawa Akira (senior researcher in Agency of Industrial Science and Technology of the Ministry of International Trade and Industry), Prof. Chida Noboru (faculty of Education, Oita University).

We also verified the four events: the first happened about twenty-five thousand years ago, before the accumulation of the AT volcanic ash layer by an eruption of the Aira caldera of Kagoshima, and the other three times after that.

In conclusion, we defined the Mino Faults to be the source of the Tsukushi no Kuni Earthquake mentioned in the article Dec. 678 CE of “The Chronicles of Japan (*Nihon Shoki*)”, comparing other following facts that we found, and the materials and the traces of remains in Chikugo province.

- In the deposit that filled the cracks caused by the last event, a Haji pottery (unglazed earthenware of the 3rd to the 12th century) was discovered.
- The upper layer that covers the above-mentioned included the artifacts of the Kamakura period (1185-1333).



Yamakawa-Maeda Remains
(The faults run along the edge of a mountain)



Slippage of the black humus layer and the orange AT volcanic ash layer.



This crack in which a Haji pottery was unearthed is the conclusive evidence that was the source of the Tsukushi no Kuni Earthquake.



A humus layer that normally accumulates horizontally was greatly deflected.

The Tsukushi no Kuni Earthquake in 678

“This month, in Tsukushi Province, the earth moved exceedingly. The earth fissured two jō (an old Japanese unit: one jō is equal to three meters) in width, more than three thousand jō (nine thousand meters) in length. Many farmhouses in each village collapsed and broke down. At that time, a peasant house had been upon a hill. In the evening when the earth moved, the hill crumbled down and the house moved away. However, the house did not get damaged at all. The inhabitants did not know that the hill fell and their house moved. Then only after the dawn, they got hugely surprised.”

This article is from “The Chronicles of Japan” which tells that in December 678 in Tsukushi Province (*Tsukushi no Kuni*, today’s Chikuzen and Chikugo Province), there was a huge earthquake that caused heavy damage. The fault-drilling investigation, mentioned in the previous page, revealed that the seismic center was the Mino Faults and that it was the latest activity — it occurs in about 8000-12000 years intervals.

At the ruins of Chikugo Province of which Kurume takes part, the cracks and the traces of the liquefaction phenomenon and the sand boil phenomenon were found in great numbers. They proved that it was as large as the Kobe Earthquake in 1995. Moreover, this earthquake is the oldest that is mentioned in a written record, and of which the occurrence year is known.

Traces in the city



The trace of the liquefaction phenomenon and the sand boil phenomenon at the remains of ancient facilities of the national administration and the military (*Chikugo Kokufu* in Aikawa)



The clay wall was re-rammed after the collapse due to the liquefaction (*Kamitsu Dorui Ato* in Kamitu)



The sinking due to the crack (Shindo Remains in Mii-Hatazaki)

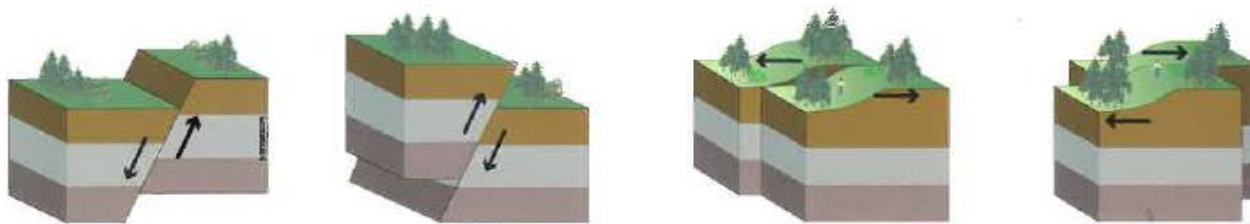


The cracks (black lines) tear a pit dwelling house and a bowl turned down on the floor in the Yayoi period (1000 BCE-300) (Higashigarasu remains in Yasutake)

【Descriptions of terms】

Active fault: The fault is considered to be repeating the movement through the late Quaternary Period from the last hundreds of thousands of years to the present time, and to become again active in the future.

Fault types:



Normal fault (inclined fault) Reversed fault (inclined fault) Left-lateral fault Right-lateral fault

Seismic Intensity Scale (*Shindo*): The scale used in Japan to categorize the intensity of local ground shaking caused by earthquakes. Each observation site judges it by bodily sensation, state of shaking objects and damage, and so on. The scale is divided into ten classes from 0–4, lower/upper 5, lower/upper 6, and 7.

Seismic magnitude scale: It describes the overall size of an earthquake evaluated according to the record of the seismometer. It is indicated by M, in general. Each unit of magnitude represents a nearly 30-fold increase in the seismic energy of an earthquake so that an earthquake of M7 is equivalent to one thousand earthquakes of M5.

Liquefaction phenomenon and sand boil phenomenon: When a sand layer with high water content is hit by a large earthquake, it becomes squishy (Liquefaction). Furthermore, if upon the sand layer there is a clayey layer that functions as the lid, the water, and the sand tear the clayey layer, and these spurt out to the surface (Sand boil). When the Niigata Earthquake occurred in 1964, some high-rising buildings broke down or leaned.



Main active faults in Fukuoka (Red lines)

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