Reference 2

National Active Fault Zone Information Development (production of "Active Fault Map in Urban Area")

1. Background and purpose

Development of "1:25,000 scale Active Fault Map in Urban Area"was launched in the wake of the Great Hanshin-Awaji Earthquake of January 1995, as part of the Japanese Government's measures for earthquake research promotion. This map shows detailed locations of active faults which are essential information for long-term assessment of inland earthquakes. The map is hoped to be utilized as basic materials for local disaster prevention planning and making various kinds of hazard maps. Major active faults and their vicinities in Japan are being surveyed based on this measure.

2. Basis of the measure

Active fault surveys for this measure are supported by "The Next Promotion of Earthquake Research" formulated in April 2009 (revised in September 2012) by the Headquarters for Earthquake Research Promotion in Government of Japan. They are also supported by "Promotion of Research and Observation on Earthquake and Volcanoes for Disaster Mitigation" proposed in November 2013 by Council for Science and Technology of MEXT (Ministry of Education, Culture, Sports, Science and Technology).

3. Definition of active faults and main contents of the map

"Active fault" of Active Fault Map in Urban Area is a fault that has distinct traces of repeated past activities on the landform during the recent hundreds of thousands of years, at intervals of roughly one thousand to tens of thousands of years, and that may repeat activities in the future as well.

Broken lines indicate sections where the locations of the active faults cannot be precisely determined due to erosion and sedimentation caused by wind and rain, influence of land developments and other factors.
Dotted lines are used to represent sections where traces of activities are presumed to have been concealed by overlaying deposits.

Besides the locations of active faults, the map also shows major topographic features formed from hundreds of thousands of years ago down to the present (the late Quaternary Period), such as terraces, alluvial lowlands and landslide forms, in relation to active fault assessment. The map can also provide information useful for disaster prevention, which includes ground conditions around active faults and estimation of areas where landslides can be reactivated by active fault movements.

4. Survey method and map format

This survey is conducted by the "National Active Fault Zone Information Development Investigative Commission" comprising active fault researchers from universities and other organizations. The commission identifies detailed locations of active faults by interpreting aerial photographs and referring to existing survey results. These results are depicted on Digital Topographic Map 25000 and converted into image data.

The area covered by a single sheet of Active fault Map depends on whether it is landscape- or portrait-format, and corresponds to the area of four sheets of Topographic Map 25000. Landscape-format map covers about 20-23 km East-West (varied depending on latitude) and about 18 km North-South, while portrait-format covers about 17-19 km East-West (varied depending on latitude) and about 26 km North-South.

Five colors are used in the map: topographic base map is monochrome (gray); active faults and the like are depicted onto the base map in two colors (red and black); and landform classifications, etc., are in two colors (orange and green.)

5. Limits of what can be ascertained from Active Fault Map in Urban Area

This survey has not covered the time when each active fault moved in the past. Also, we cannot tell when the active faults will move next from this map.

The green-colored areas in the Active Fault Map in Urban Area (alluvial lowlands, fans and alluvial cones, filled-up lands and reclaimed lands) are the land that has been formed in the past several thousands of years by sediment carried by rivers. In these areas, there remains the possibility of concealed, as-yet-unknown active faults that have not been identified in this survey.

Besides this survey, study of past movement of active faults (when and how large) has been conducted by the Headquarters for Earthquake Research Promotion, the National Institute of Advanced Industrial Science and Technology and universities, etc., employing boring and trenching survey method and others.

6. Present Coverage of Active Fault Map in Urban Area

As of November 2016, main active fault zones and the vicinity are compiled in 181 map sheets available at GSI website.

7. Release from GSI website

Active Fault Map in Urban Area is available online from GSI Map. Also, GSI has released supplemental information of the map, such as summary, covered areas, map browsing, detailed description of each fault zone, usage guidelines and Q&As.

Website for Active Fault Map in Urban Area

http://www.gsi.go.jp/ENGLISH/page_e30084.html

8. Glossary

- Strike-slip

  Relative directions of horizontal displacement of active faults: when looking across a fault, if the other side appears to have moved to the right, the fault is a right strike-slip fault. If the other side appears to have moved to the left, the fault is a left strike-slip fault. In this map, directions of displacement are shown with red arrows.

- Dip-slip

  Direction of vertical displacement of active faults: in this map, short lines (or thorns) indicate the side that is relatively falling.

- Active fold

  Wave-like topography resulting from the continuing tectonic activity: this topography is shown with continuing lines of concave or convex.

- Tilting

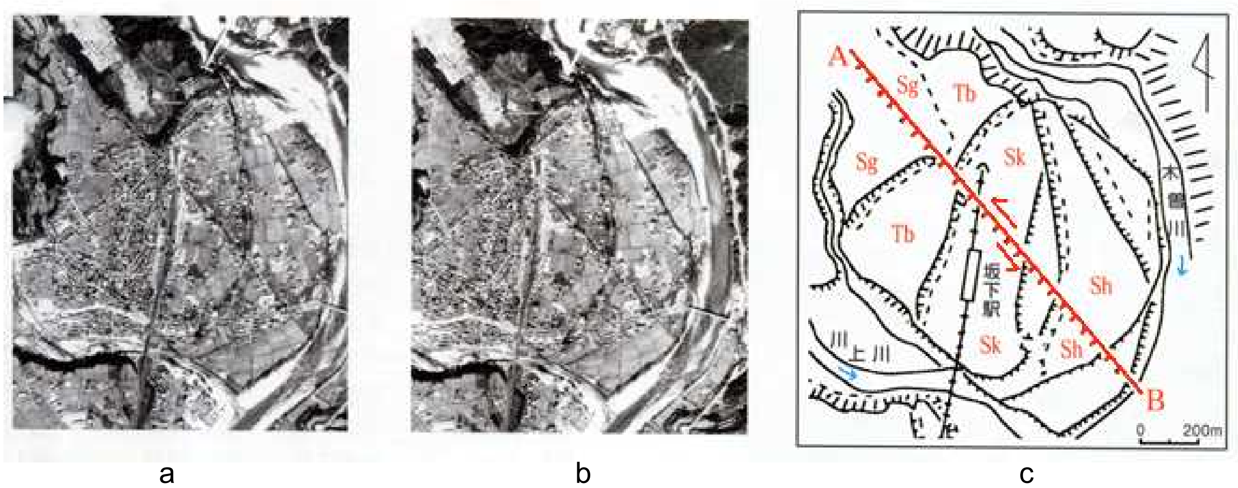
  This is a place where the surface is inclining due to continuing tectonic activity. An arrow indicates most heavily inclined direction.

- En echelon

  When multiple faults are arranged in a pattern similar to the shape of the Japanese katakana character “ミ” or the right side of kanji character “杉”, the former group is called right en echelon, while the latter is left en echelon.

- Active flexure

  These are active faults that are diffused in soft layers and appear on the surface not as unevenness but as flexures. On this map the range and the dip direction of flexures are shown.



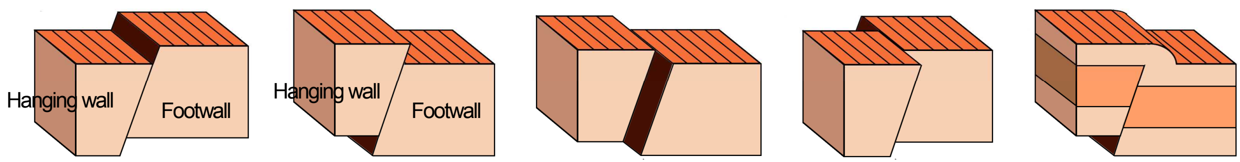
a b c

Fig. 1 Aerial photo-interpretation
a and b: stereographs, c: landform interpretation

By using a stereoscope, we obtain a 3D view of two aerial photographs which were taken for mapping, and examine the photographs to find terrain displacements. Among these terrain displacements, we identify the terrains caused by faults, evaluate possibilities that fault activities will repeat in the future, and determine whether the faults are active.

In fig. 1, the cliff running NW-SE through the town in the center of the aerial photographs (a and b) is an active fault (line AB on the map c,) where differences in ground level have been formed. This is an example determined as an active fault, because the fault cuts through the multiple river terraces of different ages of formation (Sg, Tb, Sk, Sh) and vertical and left strike-slip displacement can be seen along the fault.

Types of active fault



Dip-slip fault (normal fault) Dip-slip fault (reverse fault) Right strike-slip fault Left strike-slip fault Active flexure