

## Geophysical and geological characterization of the 2007 Noto Hanto earthquake, central Japan

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### 1. INTRODUCTION

The Noto Hanto earthquake occurred at 9:42 am, local time on March 25, 2007, with a Japan Meteorological Agency (JMA) magnitude ( $M_j$ ) of 6.9. Focal depth of the main shock is about 11 km, the source fault, trending WNW-ESE for 20 km in length, dipping to the south at 60 degrees, shows reverse and right-lateral displacement (Earthquake Research Committee, 2007a). Constructing source fault model is crucial to estimate realistic strong ground motion. For this purpose, to correlate seismogenic source faults with geologic structure is important for the better estimation of devastating earthquake before rupturing. We conducted seismic profiling of focal areas, using controlled source. In this paper, we introduce the results of seismic survey and discuss the relationship between a seismogenic source fault and geologic structure.

### 2. OFFSHORE MULTI-CHANNEL SEISMIC REFLECTION PROFILING

To correlate the source fault with geologic structure, deep seismic reflection profiling was carried out across the estimated source faults in the offshore focal area. We used two vessels; a gun-ship with 1500 cu. inch air-gun and a cable-ship with a 1.2-km-long, streamer cable with 96 channels and 480 cu. inch air-gun. Common-mid point reflection data were acquired along the 150-km-long seismic line. The obtained seismic sections portray the faults, which displaced shallowest part of the reflectors. Deeper extension of the imaged fault accords well to the linear distribution of hypocenters of aftershocks. On the hanging wall of the fault, a 2-km-thick reflective unit (probable lower Miocene fluvial sediments) is distributed. It suggests that this fault originally formed as a normal fault, which bounded the early Miocene sedimentary basin. Along the seismic line across the mainshock area, a complicated fault system can be observed. A northward dipping normal fault system was displaced by a southward dipping reactivated reverse fault, which is a part of the source fault, marked by the planar distribution of aftershocks.

### 3. TECTONIC IMPLICATIONS OF THE 2007 NOTO HANTO EARTHQUAKE

According to the interpretation from the seismic sections, the source fault of the 2007 Noto Hanto earthquake was formed as a southward dipping normal fault, trending ENW-WSW, which is almost parallel to the trend of the Yamato basin. The 60 degrees dip is favorable as a normal fault. The age of the fluvial sediments is estimated as Early Miocene period (Fujii et al., 1992). Thus, the normal faulting is directly connected to the rifting of the Japan Sea. Around the Noto Peninsula, NS-trending normal fault systems are also observed (Katagawa, 2005), suggesting more complicated tectonic development during the rifting stage.

### 4. CONCLUSION

The 2007 Noto-hanto earthquake suggests that the geometry of source faults strongly controlled by the geologic structure. The normal fault systems formed in the back-arc basin development played a major role through fault reactivation processes. Therefore, to reveal the rifting and back-arc basin opening processes are crucial for better estimation of strong ground motions associated with large crustal earthquakes.