Quick report of preliminary reconnaissance of the 2024 Noto-hanto Earthquake in Japan

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Masaho Yoshida (Professor, National Institute of Technology, Fukui College)
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Outline of Reconnaissance Work

Team member (ICGdR team):

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Masaho Yoshida (Vice President of ICGdR)
Yuko Serikawa (Assistant of Director-General of ICGdR)

(ICGdR: NPO International Consortium on Geo-disaster Reduction)

Survey Period: 2024.1.4-1.5

Survey area: Wajima City and Anamizu Town
Outline of Earthquake

• Time of Main Shock: 2024.1.1 16:10 (Local time)
• Location of Epicenter: 137.2° E, 37.5° N
• Depth of Hypocenter: very shallow
• Magnitude of Main Shock: $M_{JMA}$ 7.6
• JMA Seismic Intensity of Main Shock:
  7: Shika-machi (Kanou)
  6+: Wajima (Fugeshi), Suzu (Misaki), Nanao (notojimamukoda)
  6-: Nanao (Honfuchumachi), Noto-machi (Ushutsu), Shika-machi (Togiryokenmachi)
  5+: Hakui (Yanaida), Kanazawa (Sainen), Komatsu (Komade)
After Shock Distribution
(2024 1.1 10:00AM – 1.2 8:00AM)

Cross-section diagram

by Japan Meteorological Agency

# K-NET Observatory Record

<table>
<thead>
<tr>
<th>Site name</th>
<th>Site code</th>
<th>Latitude</th>
<th>Longitude</th>
<th>PGA (NS)</th>
<th>PGA (EW)</th>
<th>PGA (UD)</th>
<th>PGV (NS)</th>
<th>PGV (EW)</th>
<th>PGV (UD)</th>
<th>JMA SI*</th>
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<tr>
<td>Ootani</td>
<td>ISK001</td>
<td>37.5</td>
<td>137.1767</td>
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<td>775</td>
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<td>117</td>
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<td>1120</td>
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<td>Anamizu</td>
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<td>136.9041</td>
<td>1023</td>
<td>1146</td>
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<td>1479</td>
<td>2678</td>
<td>1142</td>
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<td>359</td>
<td>283</td>
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<td>52</td>
<td>14</td>
<td>6- (5.82)</td>
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<td>163</td>
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<td>15</td>
<td>21</td>
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<td>5+ (5.04)</td>
</tr>
</tbody>
</table>

* : Calculated by Prof. Nishikawa (Professor of Fukui College of Technology)

by National Research Institute for Earth Science and Disaster Resilience

https://www.kyoshin.bosai.go.jp/kyoshin/quake/
https://www.google.com/maps/d/u/0/edit?mid=1GdLXhVGG0GaWYdqRLayXEZTFnsirv_0&usp=sharing
Time Histories and Acceleration Response Spectra (K-NET Wajima)

Time history of acceleration

Acceleration response spectra

Time history of velocity

by National Research Institute for Earth Science and Disaster Resilience

https://www.data.jma.go.jp/eew/data/ltpgm/event.php?eventId=20240101161010
Time Histories and Acceleration Response Spectra (K-NET Anamizu)

Time history of acceleration

Time history of velocity

Acceleration response spectra

by National Research Institute for Earth Science and Disaster Resilience

https://www.data.jma.go.jp/eew/data/ltpgm/event.php?eventId=20240101161010
Time Histories and Acceleration Response Spectra (K-NET Togi)

Time history of acceleration

Acceleration response spectra

Time history of velocity

by National Research Institute for Earth Science and Disaster Resilience

https://www.data.jma.go.jp/eew/data/ltpgm/event.php?eventId=20240101161010
Outline of Personal Damage  
(As of 17:00, 6\textsuperscript{th} of Jan. (5 days after the event))

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<th>Place</th>
<th>Dead</th>
<th>Missing</th>
<th>Injured</th>
<th>Refugee</th>
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<td>2,693</td>
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</table>
Damage Site Map of Anamizu Town
Damage Site Map of Wajima City

Damage to utility pole ⑨
Inclining of RC building ③
Floating of Manhole ④
Overturn of RC building ①
Floating of manhole ⑦
Floating of manhole ⑤
damage to utility pole ⑧
Liquefaction ⑩
Floating of manhole ⑥
Inclining of RC building ②
Japanese building code was upgraded in 1981. The many old wooden houses built before 1981 were collapsed. But some houses built after 1981 were also collapsed. Many persons died in a stampede of the old houses. Collapsed houses are blocking roads, causing traffic problems.
Damage to Wooden House

Wajima city

Wajima city
Damage to Wooden House

Wajima city

Wajima city
Damage to RC Building

Wajima city (Map ① )
Damage to RC Building
Damage to RC Building

Wajima city (Map ②)
Damage to RC Building

Wajima city (Map ③ )
Damage by Fire

Copy of the Hokkoku Newspaper Morning edition of 2024.1.3
A fire broke out immediately after the earthquake. The fire spread due to the fact that the road was blocked by collapsed houses and it was not possible to go to the waterproof sink, and the number of fire engines was small, and about 200 houses were burned down.
Floating of Manhole

In the center of the city, there were some manholes floating up, which was a traffic obstacle.
Floating of Manhole

Wajima city (Map ⑤ )

Wajima city (Map ⑥ )
Floating of Manhole
Damage to Utility Pole

Sloping utility poles block the road, causing traffic problems in the town.
Damage to Utility Pole

Wajima city (Map ⑨)
Landslide

Copy of the Hokuriku-chuunichi Newspaper
Morning edition of 2024.1.6.
Landslide

The affected area has many mountain areas and hilly areas, and many slope failures have occurred. It swept away houses, blocked roads, and had a major impact on the affected areas. It seems that many people were buried alive due to slope failure. Moreover, they have led to the creation of many isolated villages and loss of communication.
Landslide
Liquefaction occurred in the port area, but not on a large scale. It seems that the ground deformation due to liquefaction was not large.
Liquefaction

There were manhole floating in the city, thought to be due to liquefaction.
Concluding remarks

• The massive earthquake that struck a depopulated and aging area is revealing a variety of issues.

• Many slope failures have disrupted the road network, created many isolated villages. Due to the disruption of the road network, relief efforts have been delayed and relief supplies have also been delayed.

• Many casualties have occurred due to the collapse of the houses. Houses built before 1981, when the Japanese Building Code was revised, have been severely damaged. The relatively old houses built after that time were also damaged.

• Water and power outages are still on going in the affected areas, and relief efforts are expected as soon as possible.
Information related to earthquake ground motion was provided by Prof. Hayato Nishikawa of Fukui Institute of Technology. We express sincere appreciation.

We would like to express our deepest sympathies to those affected by the disaster and pray for the repose of the souls of those who lost their lives. We pray for the earliest possible recovery of the affected areas.