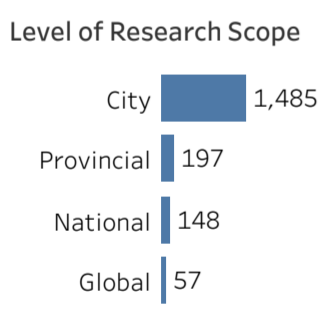
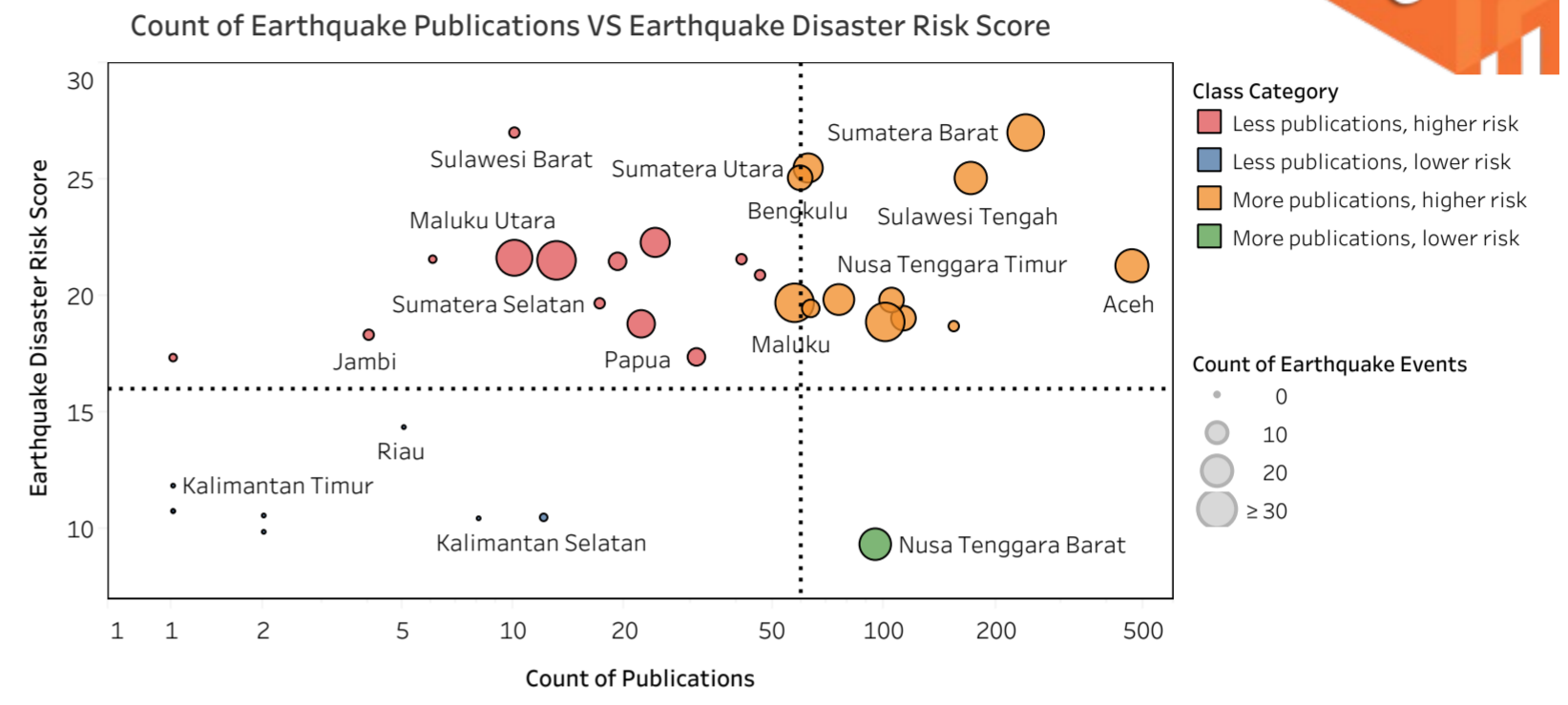
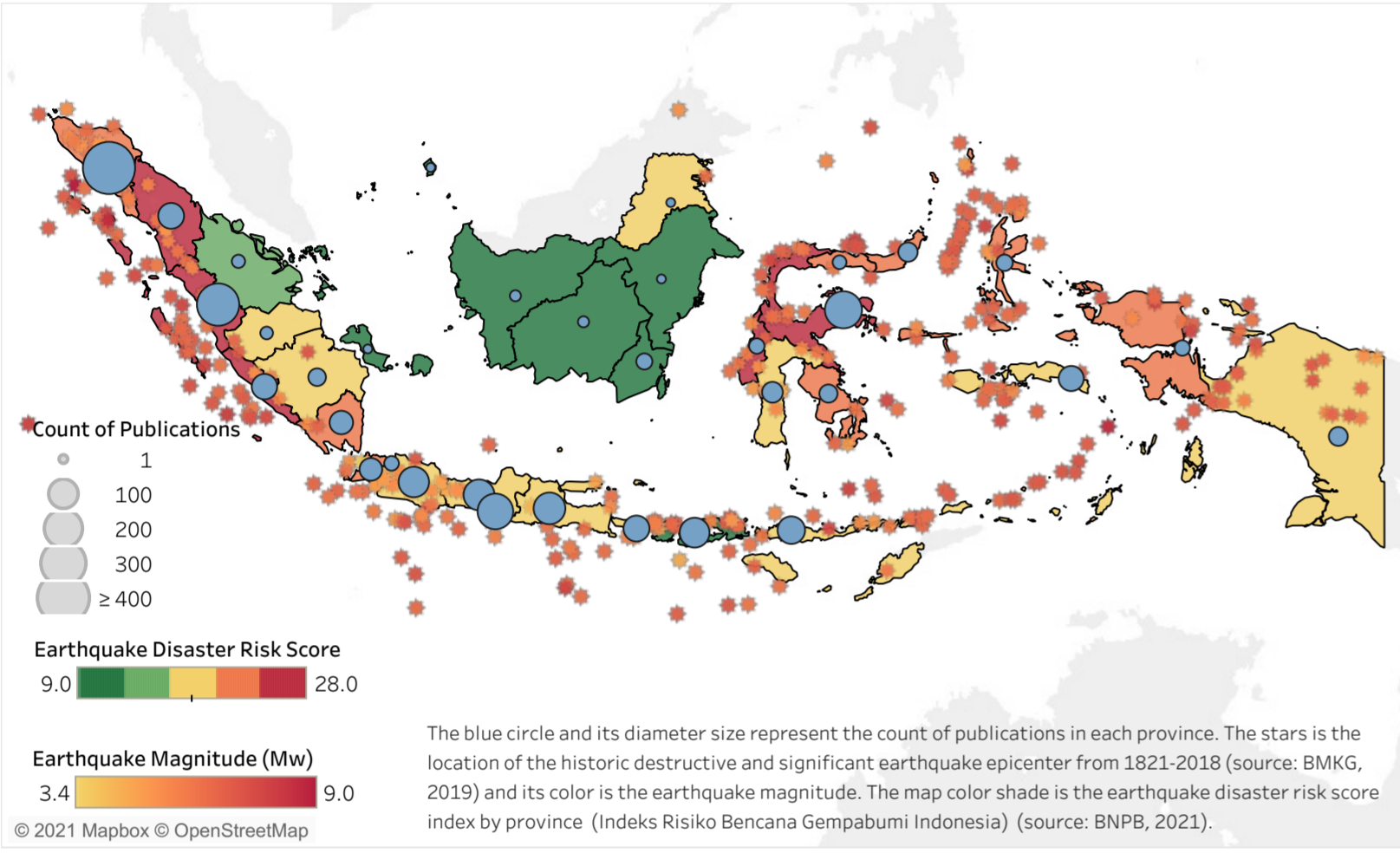


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Research publications about Earthquake Hazards in Indonesia

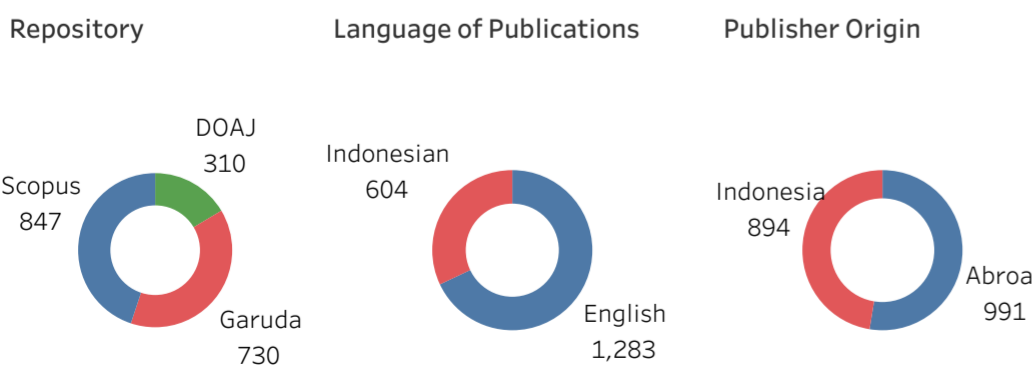


The map shows the distribution of research publications on earthquake hazards in Indonesia by province (source: CARI! repository-of-repositories, 2021). From 1.887 collected articles about the topic & with relevance to Indonesia, 1.485 researched at the city/district level, 197 at the provincial level, 148 at the national level, and 57 articles at the global level with implications to Indonesia. The previous significant earthquake occurrences are indicated by its epicenter across the Indonesian archipelago mostly on the Sumatera, Java, Nusa Tenggara, Sulawesi, Maluku, and Papua Island. The relatively sparse earthquake epicenter was found on Kalimantan island. As the map indicates, most destructive earthquakes were along the major fault lines within Indonesia.

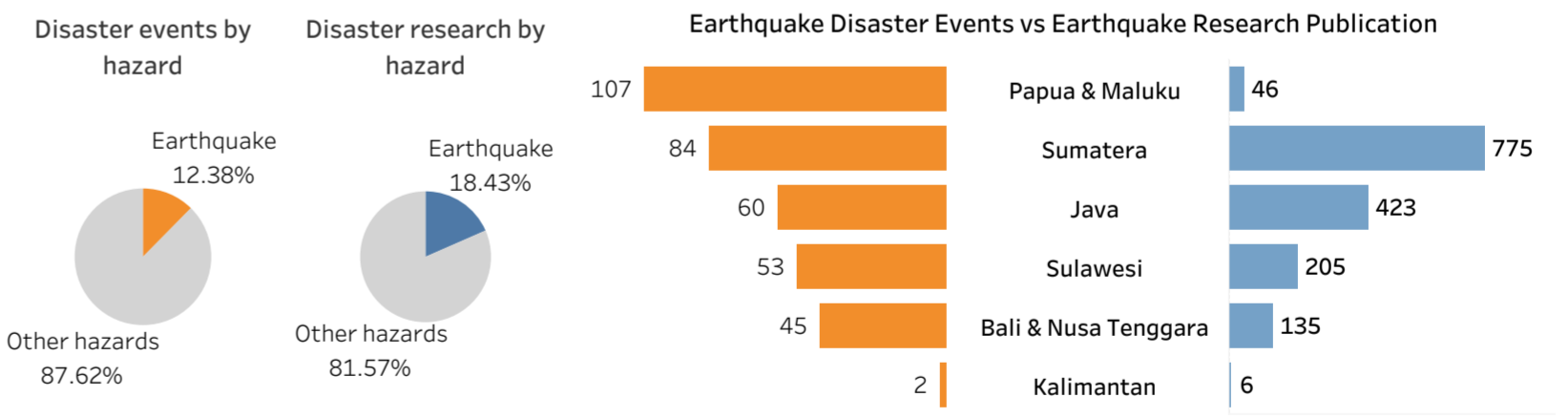
The quadrant plot shows the provinces class category based on the Count of Earthquake Research Publications (CERI) and earthquake disaster risk score (source: BNPB, 2021). 25 provinces have a higher earthquake disaster risk score, whereas 13 of these provinces have lower than the average number of earthquake-related research (<49 publications), classified in the red category. West Sulawesi Province has the highest risk of earthquake disaster but only has 7 identified research publications. The 12 provinces in the orange category are dominated by provinces in Java Island and provinces that experienced significant earthquake disasters such as Central Sulawesi, Aceh, and West Sumatra. West Nusa Tenggara has 89 research articles, classified in the green category with an above-average number of research articles & low earthquake risk. 7 Provinces in the blue category with relatively low risk of earthquake disaster mainly from Kalimantan Island, the eastern part of Sumatera, and DKI Jakarta. The provinces with higher risk scores tend to have higher number of publications.

Publication Statistics

1.887 Publications | 854 Publishers | 1.750 Authors



The charts show the number of research publications about earthquake hazards in Indonesia published between 1995 and October 2021. These publications are compiled in CARI! repository-of-repositories. 847 publications are sourced from Scopus, 310 publications from the DOAJ directory, and 730 from Portal Garuda. A total of 894 publication titles are published by Indonesian publishers and 991 from abroad. 1.283 publications were written in English and 604 publications were written in Bahasa Indonesia.

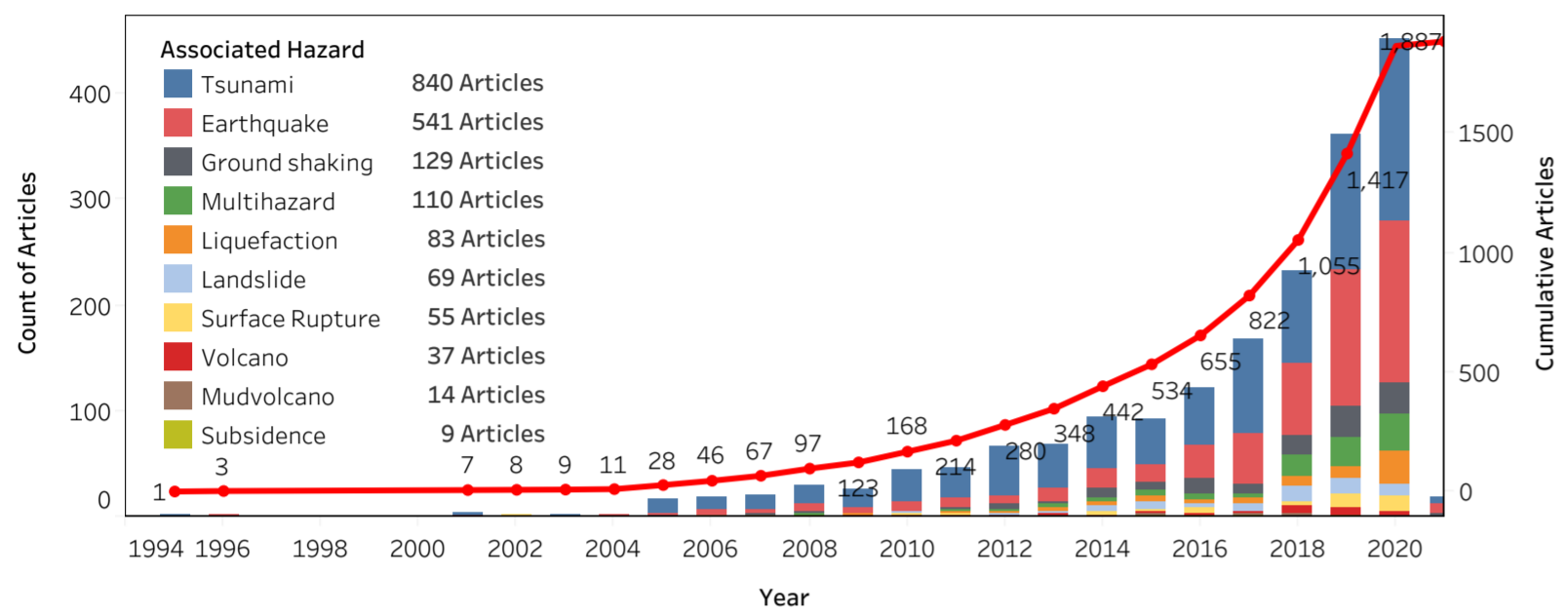


Earthquake disaster is the 2nd most studied after floods disaster in Indonesia, making about 18.43% of the total of disaster research (source: CARI!). By the count of event, earthquake disaster is less frequent but often have a major impact, greater mortality rate than other disasters, and significant economic impact (source: DIBI BNPB). Generally, provinces with a higher risk of earthquakes tend to have more research publications. This is true except for Papua & Maluku, which experiencing frequent earthquake events, yet the count of research articles is relatively few. Few research articles in Kalimantan are understandable due to lesser-known risks. Sumatera Island has the most studies due to the highly active seismic activities in the south and west side, indicating known hazard sources and major earthquake and tsunami disasters events attract researchers from around the world to further investigate earthquake-related risks in the island.

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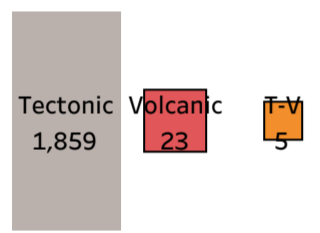


Research Publication Trends of Earthquakes and Its Associated Hazards



The earthquake-associated hazards category is adapted from the UNDRR hazards cluster list with some modifications (source: UNDRR, 2020).

Publications by Earthquake source



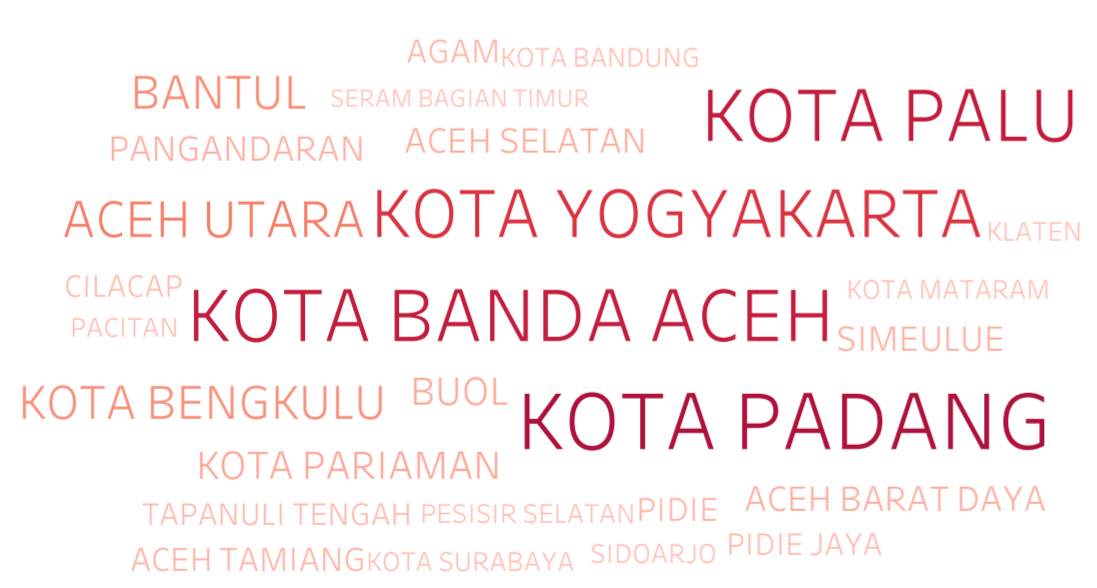
From 1994 to 2004, the number of published research articles about earthquake hazards in Indonesia was relatively low. Since 2005, after the 2004 Indian Ocean Tsunami, the earthquake research publications have increased exponentially until present days with current total publications having reached 1.887 articles. The number of research of earthquake-associated hazards, dominated by tsunami (840 articles) and followed by ground shaking hazard with 129 articles, multi-hazards, liquefaction, landslide, surface rupture, volcano, mud volcano, and subsidence. Based on the earthquake source, researchers dominantly studied the tectonic-source earthquake, which has 1.859 articles, followed by volcanic type by 23 articles, and few combined tectonic-volcanic mechanisms by 5 articles.

Top Articles based on Scopus directory

- Frictional afterslip following the 2005 Nias-Simeulue earthquake, Sumatra**
Hsu Y.J. | Science
Published on 2006-06-30 | Cited by 341 articles
- Plate-boundary deformation associated with the great Sumatra-Andaman earthquake**
Subarya C. | Nature
Published on 2006-03-02 | Cited by 298 articles
- Earthquake induced landslide susceptibility mapping using an integrated ensemble frequency ratio and logistic regression models in West Sumatera Province, Indonesia**
Umar Z. | Catena
Published on 2014-01-01 | Cited by 156 articles
- The tectonic framework of the sumatran subduction zone**
McCaffrey R. | Annual Review of Earth and Planetary Sciences
Published on 2009-05-01 | Cited by 141 articles
- The 2010 Mw 7.8 Mentawai earthquake: Very shallow source of a rare tsunami earthquake determined from tsunami field survey and near-field GPS data**
Hill E.M. | Journal of Geophysical Research: Solid Earth
Published on 2012-06-01 | Cited by 118 articles

The top-five publications on earthquake hazards in Indonesia are shown. The selection criteria are based on the number of citations from 1995 to 2021, from the Scopus directory. The top-cited research articles of earthquakes mainly studied recent earthquake events and about Sumatera's tectonic setting, especially on the western coast and offshore. All of these top-cited articles are that of hazard assessment.

Top Investigated Cities



Top Investigated Provinces



Top Investigated by Disaster Management Topics

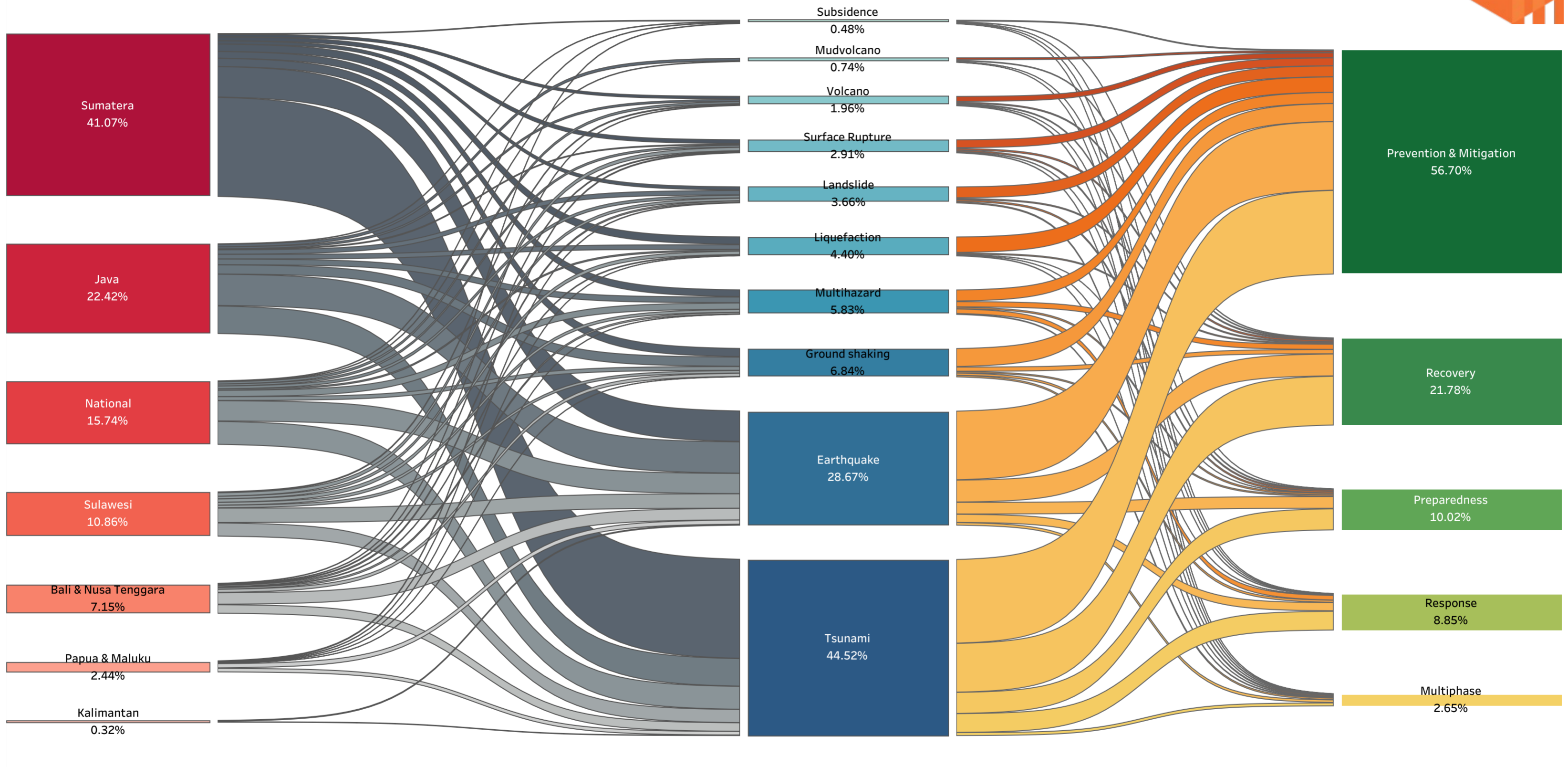


Top Investigated Cities only shows cities with greater than 14 research publications. The top cities are mainly located in Sumatra, Java, and Sulawesi Island. Cities which recently hit by major earthquake disasters were investigated more frequently by researchers, including Kota Banda Aceh, Kota Padang, Kota Palu, and Kota Yogyakarta. This trend also applies at provincial level, where Aceh, Sumatera Barat, Sulawesi Tengah, and DI Yogyakarta are among the top investigated location. With respect to Disaster Management Phase Topics, the hazard assessment topics are frequently studied by researchers and often have direct implications to prevention and mitigation, followed by recovery-related studies every after major earthquake disaster events in Indonesia.

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This Month's Sankey Diagram of Earthquake hazards publications: Location to Earthquake-associated hazards type to DRM Phase



This Sankey diagram was calculated based on the number of articles. One article only represents one value of the Sankey flow. Research about Sumatera has the largest portion of earthquake articles with 41.07% of total publications, followed by Java, national-level research, Sulawesi, Bali & Nusa Tenggara, Papua & Maluku, and Kalimantan which have less than 1%. Earthquake research on Sumatera mainly examined the inter-relationship with tsunami hazards, due to tsunami events in the last decade. Research about Java tends to study earthquake hazard as a singular event and hazard factor, followed by earthquake-tsunami research. National-level research has an equal proportion of research investigating earthquake and tsunami hazards. From hazard with earthquake, tsunami-related research is the most frequently studied with 44.52% of total publications. Ground shaking hazard makes to the third position followed by multihazard, liquefaction, landslide, surface rupture, volcano, mud volcano, and lastly on subsidence. More than half of all publications (56.7%) is consist of the prevention & mitigation management phase, which have an equal distribution from all associated hazards types. The recovery phase is also highly investigated with 21,78% from all publications, mainly damage-loss-impact assessment, and reconstruction research themes. Research on preparedness-related publication only accounted for 10,02% of the publication and, surprisingly only 8,85% of research is about Emergency Response.