

How did a typhoon affect the disaster of 1923 Great Kanto Earthquake?

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The Great Kanto Earthquake of 1923, which occurred 100 years ago, caused the largest amount of damage in Japan since the Meiji era, and was characterized by the fire damage that caused a large number of deaths and missing persons in Tokyo. It is reported that on September 1, when this earthquake occurred, a typhoon or a low-pressure system that changed from a typhoon (referred to as a typhoon in this study) crossed Honshu and caused strong winds and other effects to the fires that caused devastating damage to Tokyo.

The weather conditions can be grasped from previous report, such as survey reports containing meteorological observations and weather charts. However, the actual image of the typhoon at that time and how the typhoon affected the wind and earthquake disaster in Tokyo are not clarified. Therefore, in this study, numerical simulation was performed using the data that can be used now, and the movement of the typhoon at that time was reproduced. Then, we verified how much the weather conditions were affected by the typhoon.

The weather field on September 1, 1923 was simulated using the numerical forecast model WRF-4.3. Domain 1 (250, 250, 50) with a horizontal grid spacing of 15 km and domain 2 (same number) with a horizontal grid spacing of 5 km were set. Initial values and boundary values were calculated from 18 JST on August 30 to 18 JST on September 2, using reanalysis ERA20C using surface pressure and sea breeze by ECMWF. At the initial time, a 985hPa typhoon Bogas was created over the sea west of Kyush. Domain 2 was calculated by 1-way nesting from 06 JST on a day to see the area around Tokyo in detail.

A typhoon of 990hPa is present, passing through the Kyushu and Chugoku regions and into the Sea of Japan, although it is slightly westward compared to the analytical weather charts. After that, while weakening, it advanced to Sanriku offshore on 06 JST on the 2nd. It can be confirmed that there is a low pressure off Sanriku in the weather chart.

This time, as the first trial, we reproduced the movement of the typhoon at the time of the Great Kanto Earthquake in 1923 and the trend of wind speed change in Tokyo without considering the fire. The fact that the reproduced typhoon position and wind changes are delayed by several hours compared to the weather charts and observed values at that time may also reflect the characteristics of the reanalysis data ERA20C. be. Bearing this in mind, when comparing the reproduction results and observations that do not consider the occurrence of fires, in Tokyo (Central Meteorological Observatory, Shinagawa), immediately after the earthquake (12:00 on the 1st), the observation at that time was The wind was strong due to the influence of the typhoon, but the strong winds from around 17:00 according to the Central Meteorological Observatory are believed to have been greatly affected by the fires that broke out in the surrounding area, and the strong winds due to the fires occurred even earlier. It is also possible that it was from In the future, it will be important to investigate the interaction between the wind and large-scale fires, as well as the time lag in the reproduction of typhoon motion.

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