

The Iyo-Bungo, southwest Japan, earthquake on September 1st, 1596 as deduced from contemporary historical records

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In leap July of the 5th year of the Bunroku era (in the old Japanese lunar calendar; September, 1596 in the Gregorian calendar) Bungo province (present-day Oita Prefecture) in Kyushu, southwest Japan, suffered from severe earthquake and tsunami disasters. Concerning the occurrence date of the causative earthquake, currently prevailing idea is that a large earthquake took place on leap July 9 in Iyo province (present-day Ehime Prefecture) in Shikoku, on the eastward opposite shore of Bungo, and another large earthquake occurred on leap July 12 around Bungo. Against this idea I claim that a single event which could be called "the Iyo-Bungo earthquake" occurred around seven p.m. on leap July 9 in the Iyo-Bungo region based on reliable contemporary historical records.

There are more than 70 documents on this (these) earthquake(s) printed in the existing collections of historical earthquake materials, but their values as historical records vary considerably. Since the essential principle of historiographical seismology is to utilize only reliable first-grade documents, I performed historical source criticism to select 16 contemporary materials. I referred to their original or best texts, not using texts printed in the collections.

According to the contemporary records, in Bungo, violent earthquake ground motion collapsed shrines around seven to nine p.m. on leap July 9 and a large tsunami hit Fuchu (Oita) in the twilight (*"Yusuhara-no-miya Nendai Ryakki"*). *"Kodo-ji Daihan'nyakyo Okugaki"* and *"Shibayama Kanbei Ki"* also describe strong earthquake shaking and large tsunami around Fuchu on that day. In Kyoto, roughly 430 km east-northeast of Bungo, earthquake ground motion was felt around seven to nine p.m. on leap July 9 (*"Kotokuni-kyo Ki"*), or around seven p.m. on the same day rather strongly (*"Ozuki-Takasuke-Sukune Ki"*). In Hiroshima Prefecture, at Hatsuka-ichi and Itsukushima strong ground motions were felt at night on leap July 9 without damages (*"Hoida Motokiyo's letter"*), and at Mihara strong earthquake tremors continued from leap July 9 till 12 (*"Buttsu-zenji Juji Ki"*). In Iyo, *"Yakushi-ji Daihan'nyakyo Okugaki"* says a severe earthquake tremor occurred on leap July 9 and the whole Iyo province had trouble, suggesting earthquake disaster in a wide area. In Satsuma and Osumi provinces (present-day Kagoshima Prefecture), *"Kabayama Shoken Jiki"* writes a strong earthquake on leap July 9, and *"Nanko Nikki Zankan"* also writes an earthquake on the same day. *"Chosa Yachi's letter"* written on leap July 29 describes that since leap July 8 earthquake tremors had continued.

As a fundamental methodology of historiographical seismology, these tremors and tsunami in Bungo, Iyo, Kyoto, Hiroshima and Kagoshima on leap July 9 are considered to have been produced by an identical earthquake unless there is any counter-evidence. Leap July 12, the other proposed date of the Bungo earthquake, comes from historical materials written after 1698, which probably mistook the great Kyoto earthquake in the midnight of leap July 12 for the Bungo event. The seismic intensities are evaluated to be stronger 6 in some places in Bungo and Iyo, 4 in Hiroshima, stronger 3 in Kyoto, and about 3 in Kagoshima on the JMA scale. The most simple and reasonable interpretation is that a large earthquake with the source region from around Oita to the midst of Iyo took place around seven p.m. on leap July 9, whose magnitude being around 7.5, and the tsunami on the Bungo coast followed. The rupture of the Kawakami fault in the MTL fault zone during this earthquake suggested by Tsutsumi *et al.* (2000) may have

occurred.

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