

## Catalog of Distant Tsunamis Reaching Japan from Chile and Peru

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### 1. Introduction

Japan has a big amount of old documents recording historical earthquakes and tsunamis covering more than 1,300 years from the middle age of 5th century to the end of 19th century. The work of compilation of historical records mentioning historical earthquakes from old documents was began to made before the second world war. Four volumes of collected materials of historical earthquakes were published by Musha(1946-1948, 1951). In the recent thirty years, 22 books of revised volumes were newly published by Earthquake Research Institute, University of Tokyo (1981-1993). In the present report, descriptions of tsunamis which are not accompanied with records of earthquakes or storms are introduced. Most of the events in the present report are considered to be distant tsunamis came

across the Pacific Ocean, and most of them are considered from the coasts of Peru and Chile or another South American Countries.

Distant tsunamis after the latter half of the 19th century are described by Watanabe (1998).

### 2. Catalog of Distant Tsunamis recorded in old documents in Japan

#### 2.1 AD799 September 18 (in Gregorian Calendar September 14 in Julian Calendar Enryaku 18 VIII 11)

[ Nihon Koki (Dynastic Chronology, Continued)- 8]

The Governor of Hitachi Province(Ibaraki Prefecture) reported to the Central Government of the Empire in Kyoto that on the 18th of this month, from the morning to the evening, the sea tide flooded and withdrew 15 times along the coasts of Kashima, Naka, Kuji and Taka counties. Sea wa-

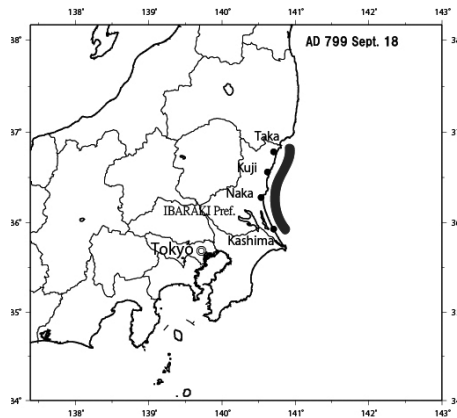


Fig 1 Distant tsunami of AD 799 September 18  
Fat line shows the tsunami hit coast

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ter came inland by about 100 m from the shoreline during the floods, and the sea floor was exposed up to 2 km from the shore line. Even elderly people living on the coasts had neither seen and nor heard of anything like this during their lives.

[Consideration]

The source is unknown, but it is possible this tsunami came from the Chilean Coast.

## 2.2 AD1420 September 7 (August 29 in Julian Calendar, Ouei 27, VII 20)

[Jinmei Kyo (Mirror of the God Jinmei) ]

On the 20th of the month, from 6 to 10 AM, the sea withdrew nine times at Kawarago Aise (Aise fishery port, Hitachi city, Ibaraki Prefecture), and many fishes were washed up on land.

[Consideration]

No earthquake was felt, and this tsunami is also considered to be a distant tsunami. It is possible the source was the Chilean coast.

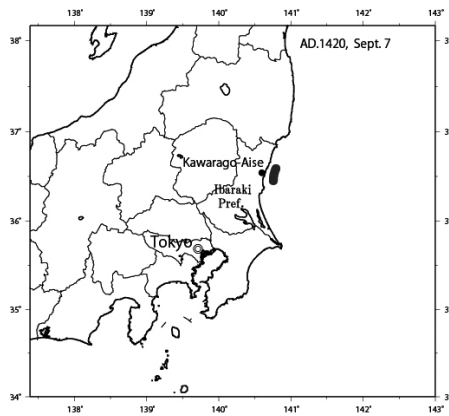


Fig. 2 Distant tsunami of AD 1420 September 7

## 2.3 AD 1586 July 10 (Tensho 14, V 24)

[Miyagiken Motoyoshi Gunshi (Chronicles of Motoyoshi County, Miyagi Prefecture)]

A legend in Tokura village in Minami Sanriku town, Motoyoshi County, Miyagi Prefecture says that a tsunami came to the coast of the village in

the 14th year of the Tensho Period.

[Consideration]

This event is based on a legend. The original document mentioning this tsunami has not yet been researched. This tsunami is considered as a distant tsunami sourced from the Lima, Peru

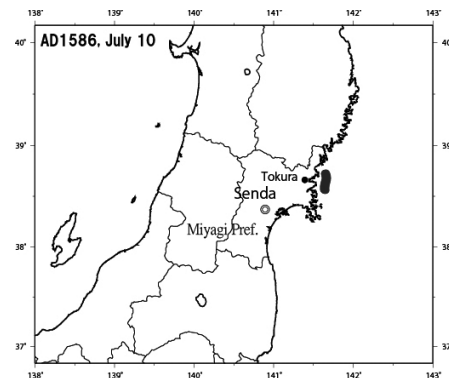


Fig. 3 Distant tsunami of AD 1586 July 10

Earthquake of AD 1586 which is mentioned in Soloviev and Go's (1976) catalog. The epicenter of the earthquake is estimated at lat. 12.3S, long. 77.7W and the tsunami magnitude is estimated at  $m = 4$ . The magnitude of the main shock is estimated at  $M = 7.7$  in Soloviev and Go's catalogue, but this value may be underestimated.

#### 2.4 The tsunami from the off Callao Earthquake of AD1687 October 20

(in the Japanese Calendar, Jokyo 4, IX 15, and in Calendar of the King Shotei, Ryukyu Dynasty, King Shotei 19, IX 15)

[Miyagiken Kaisho Shi (Chronology of Tsunamis in Miyagi Prefecture)]

Brine pans began to sound they were hit by waves on October 21. A tidal wave inundated streets of all coastal villages in Miyagi prefecture to a depth of 1.5 to 1.6 feet. The sea flooded the area 12 to 13 times. The Lord was immediately informed of the emergency.

[Kyuyo (Chronicles of the Ryukyu Dynasty)]

At 2 AM on October 16, the sea tide rose and withdrew four (or three) times on the coast of Yonagusuku County. The height of the waves was 80% of the regular flood of the astronomical tide.

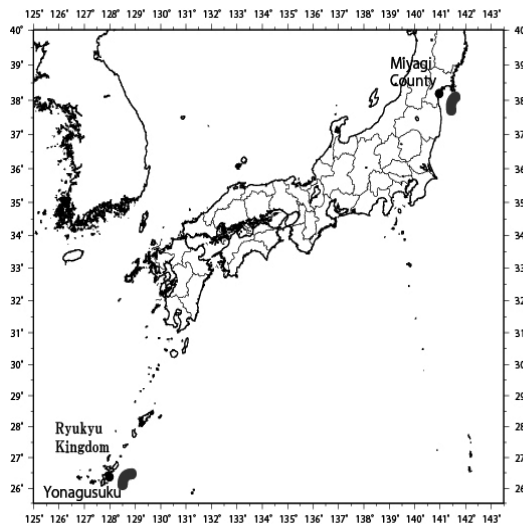


Fig. 4 The tsunami of the 1587 off Callao Earthquake, Peru

#### 2.5 The tsunami of the AD 1730 July 8 off Valparaiso Earthquake, Chile

(in Japanese Calendar: Kyoho 15, V 25)

[Tohan-Shiko (History of the East Clan)]

On May 25 (July 9 in the Western calendar) a tsunami struck the coasts of Miyagi, Ojika, Monou, and Motoyoshi counties, Miyagi prefecture. Barriers were broken, and rice fields were damaged.

[Shishiko Jike Kiroku (Official Diary of the Daté Clan)]

Sea water flooded the shore of Shiogama City and the ground around Monzen-bori channel. No

damage took place in the tax office or in the residential areas. No injuries or death were reported and no houses were damaged.

The Officer of Kesen county informed that sea water flooded at Oofunato and Akasaki villages and salt making fields. No injuries or deaths occurred.

Note: Monzen-bori channel is in the central part of Shiogama city. Kesen county covers the southern coastal part of Iwate prefecture including Oofunato and Akasaki villages. The tsunami height at all points in Figure 5 is estimated at 2 m.

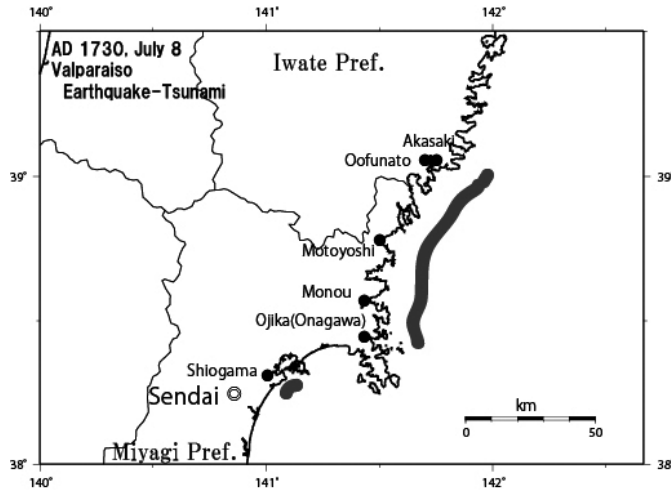


Fig. 5 The tsunami of the off Valparaiso Earthquake AD 1730 July 8

### 2.6 The tsunami of the off Concepcion earthquake AD 1751 May 25 (Horeki 1, V 2)

Two records of this tsunami are available: “Ootsuchi Kanshoku Ki (Diary of officers of Ootsuchi town) and “Tohan Shiko” .

[Ootsuchi Kanshoku Ki]

On May 2 (May 25 in the Western calendar), from 2 to 6 PM large tides came up seven times and smaller tides came five times. Sea water rose to the floor levels of residential houses, and rice and vegetable fields were fully inundated by the sea water. Fields behind the houses of Yoka-

machi, Hatsukamachi, and Mukogawara squares in Ootsuchi town were completely submerged. However there were neither injured nor dead, and no houses were damaged.

[Tohan Shiko]

The tsunami hit the coasts of Ojika, Monou Motoyoshi, and Kesen counties.

Note: In the tsunami catalog edited by Watanabe(1998), the author explains that sea water rose to floor-level height in houses both at Ojika (Onagawa) and Kesen, but there is no such description in any historical documents.

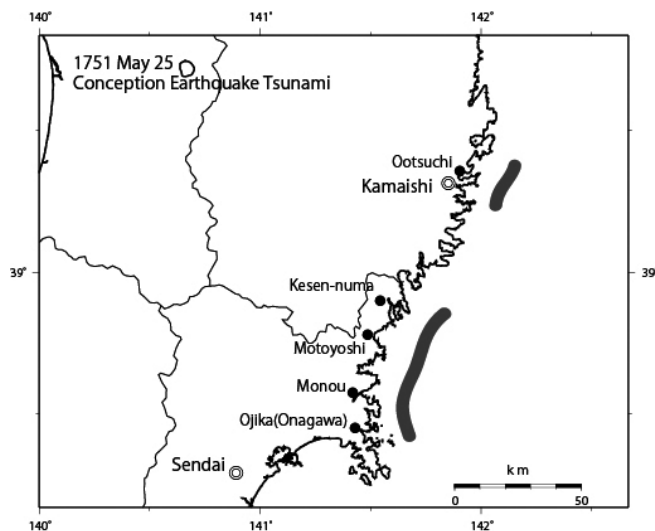


Fig. 6 The tsunami of the Concepcion Earthquake of AD 1751 May 25

### 2.7 The tsunami of the Valdivia Earthquake of AD 1837 December 7 (Tenpo 8, X 10)

[Tohan Shiko(History of the East Clan)]

On 11 October (8 December in the Western calendar) 1837, sea water flooded the coastal areas of Kesen, Motoyoshi, Ojika, and Miyagi(Shiogama City at present) counties. Rice fields were damaged.

[Kojima Family's Documents, Imaizumi street, Kesen town, Rikuzen Takata City]

At 1 PM, October 11, a tsunami wave arrived and salmon barrier fences in Kesen river were broken. The banks surrounding the salt market at Akasaki, Oofunato City were broken, and two thousands straw bags of salt were lost there.

There was slight damage to the residential areas of Otomo and Hase villages. This tsunami appeared to be generated without any corresponding earthquake.

Sea water flooded the fields between Oohashi

and Kobashi Bridges, but did not invade houses in Hashimoto village.

[Yuzo's Memo, Onagawa Town]

From 12PM on October 11, large waves of a tsunami struck the residential area without any shaking of an earthquake; people were excited. Forty-five years prior, a tsunami had also come.

[Chronicle of Noda village]

In the night of October 11, tsunami waves flooded onto residential area of Kamaishi City, and people were excited and kept watch.

Watanabe(1998) mentions that the Hawaiian Islands were severely affected by this tsunami; at Hilo on the main island of Hawaii, the tsunami height was 6 m, 66 houses were entirely destroyed, and 14 people were killed. On Maui island, the tsunami height was 2.5 m and 2 people were killed. At Honolulu, Oahu Island, the tsunami height was 2.4 m. This tsunami was also recorded in the Samoan Islands.

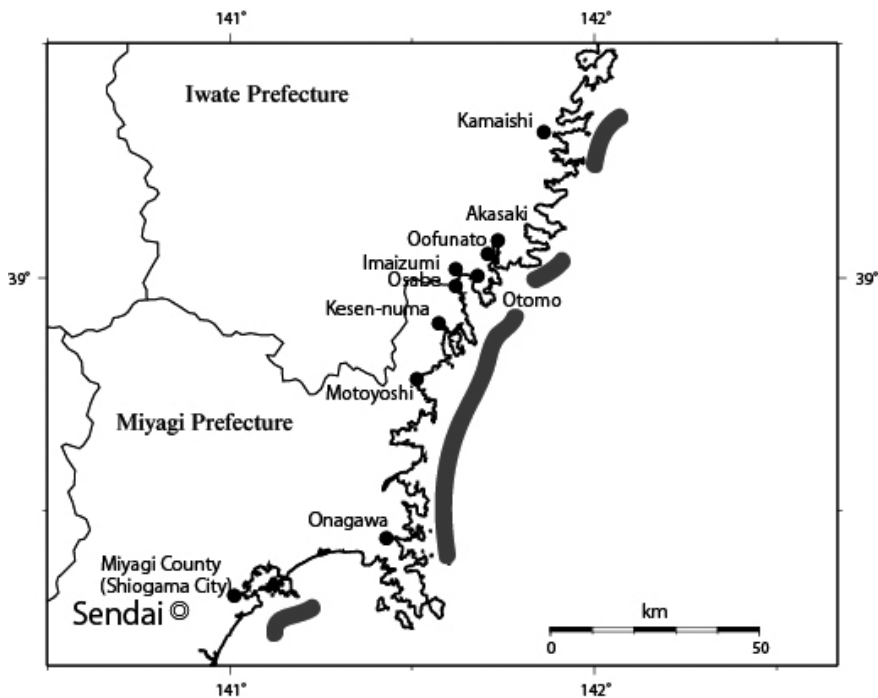


Fig. 7 The tsunami of the AD 1837 Valdivia Earthquake

## 2.8 The tsunami of the AD 1868 Arica Earthquake

In Japan, this tsunami was recorded at Hakodate

(height 2m), Motoyoshi coutu, Miyagi Prefecture, Shimoda in Shizuoka Prefecture, and at Naha Port, Ryukyu (Watanabe, 1998).

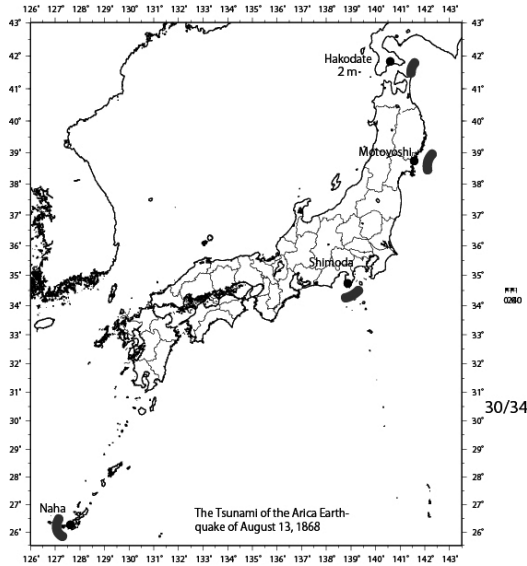


Fig. 8 The tsunami of the AD 1868 August 13 Arica Earthquake

## 2.9 The tsunami of the AD 1877 May 10 Iquique Earthquake

Tsunami heights at Hokodate, Kamaishi, and Tokyo Ports were 2.4 m, 3 m, and 0.7 m, respec-

tively. This tsunami caused damage along the coast at Hakodate and Sanriku. Fatalities were reported on the coast of Boso Peninsula (Watanabe, 1998).

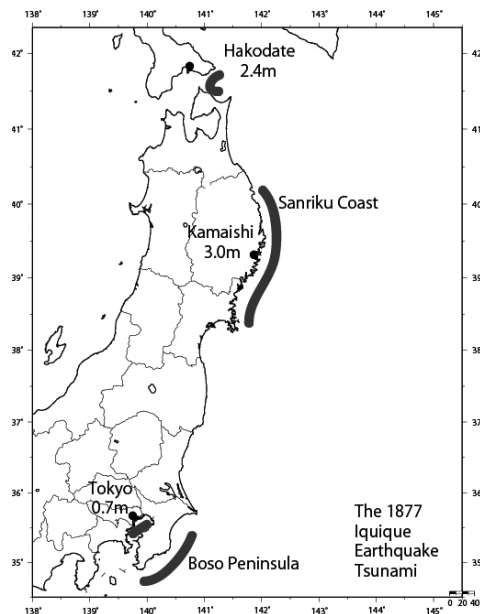


Fig. 9 The tsunami of the AD 1877 May 10 Iquique Earthquake

**2.10 The Tsunami of the Valparaiso Earthquake of August 17, 1906**

Double amplitudes at Hakodate, Ayukawa, and

Kushimoto were 24cm, 18cm, and 35cm respectively. No damage occurred place on the Japanese islands.

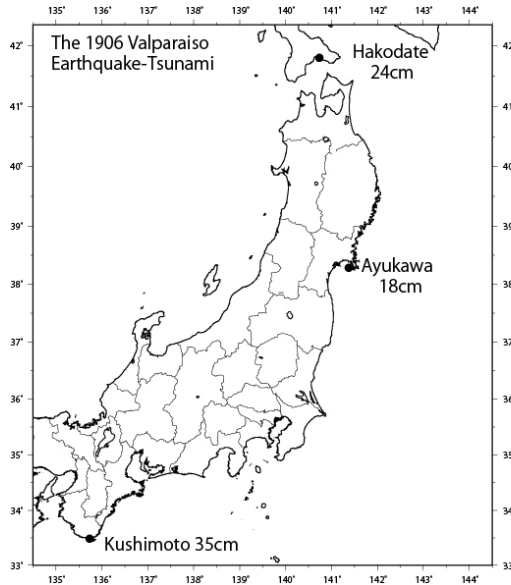


Fig. 10 The tsunami of the AD 1906 August 17 Valparaiso Earthquake

**2.11. The tsunami of the AD 1922 November 11 Atacama Earthquake**

The maximum double amplitudes at tidal stations were 60 cm at Hanasaki, 65 cm at Ayukawa, 70 cm at Kushimoto, and 39 cm at Hosojima.

Thirty houses were washed away by waves in Oofunato city, which suggests that the tsunami height was 1 to 2 m there.

Slight damage was recorded on the Samoan and Hawaiian islands.

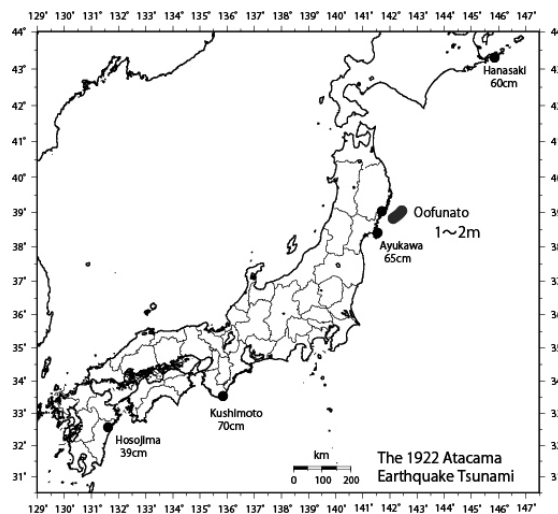


Fig. 11 The tsunami of the AD 1922 Atacama Earthquake

### 2.12 The tsunami of the AD 1943 April 6 Off Coquimbo Earthquake

No damage was recorded on the Japanese

islands. Double amplitudes at tidal stations of Hanasaki and Kushimoto were 10cm and 25 cm, respectively.

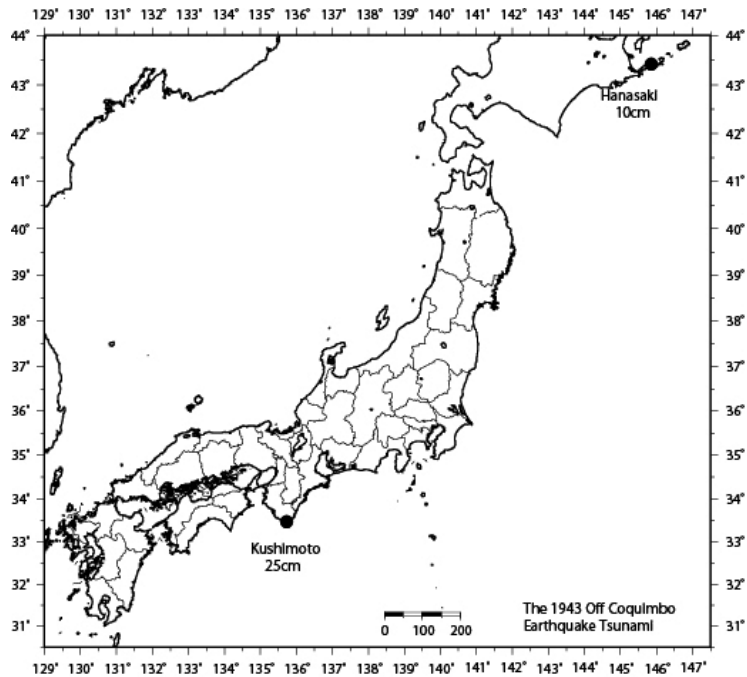


Fig. 12 The tsunami of the AD 1943 off Coquimbo Earthquake

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