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一般社団法人  
防災教育  
普及協会  
www.bunsei-edu.jp

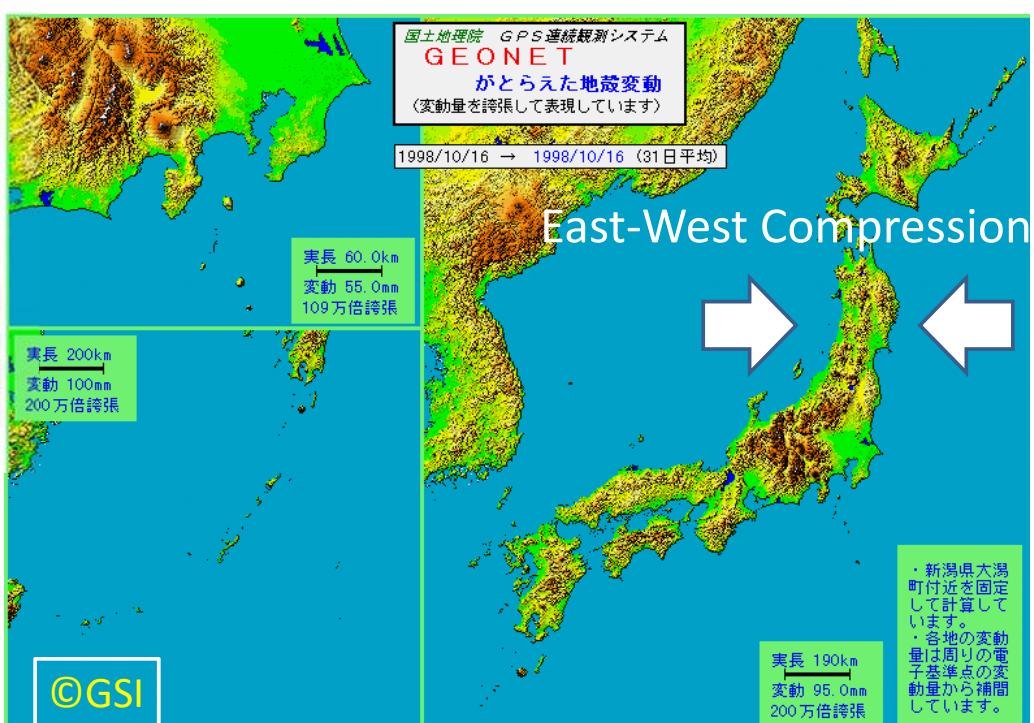
## Deformation of Japanese Islands



Geospatial Information Authority of Japan (GSI)      GEONET



GNSS(GPS)  
1300 stations  
in Japan

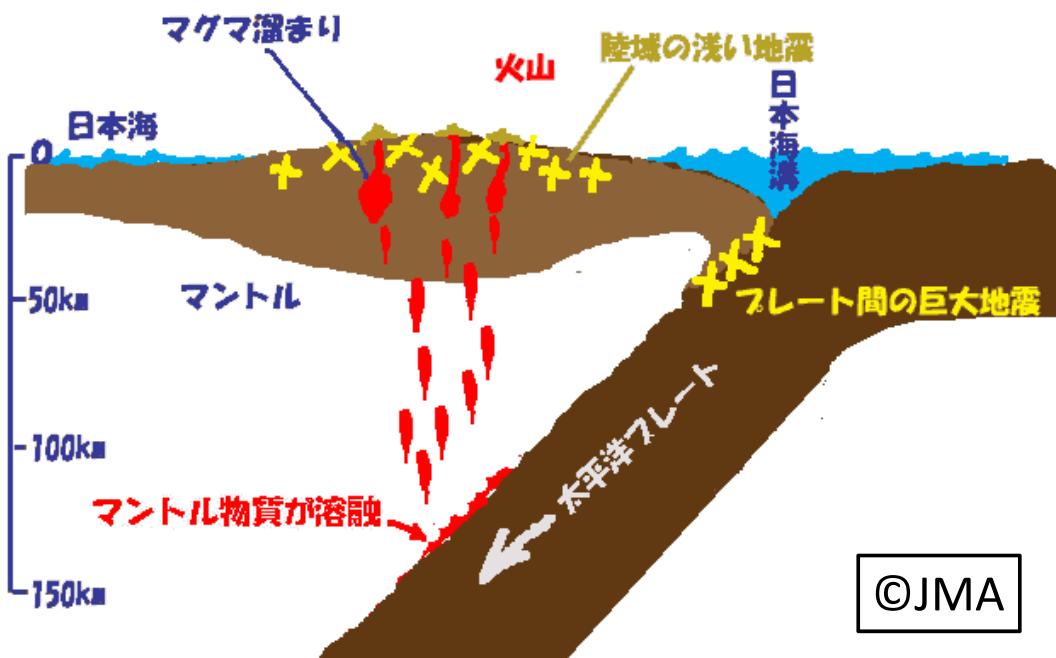


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# Mechanism of Volcanic Eruption



<http://www.jma.go.jp/jma/kishou/know/whitep/2-4.html>

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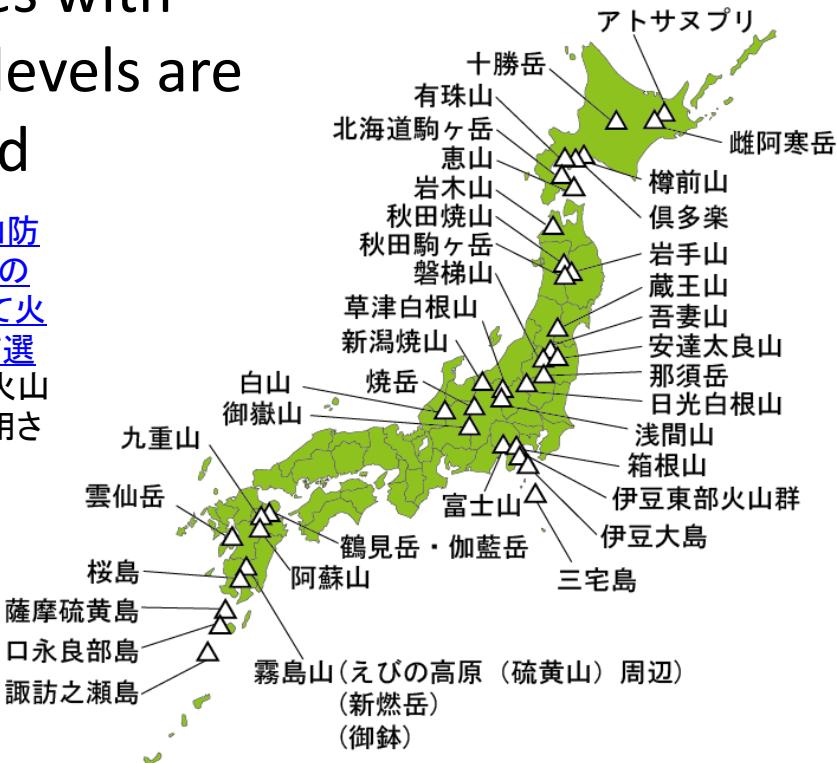
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# 38 volcanoes with volcanic alert levels are applied

噴火警戒レベルは、「火山防災のために監視・観測体制の充実等が必要な火山」として火山噴火予知連絡会によって選定された50火山のうち、38火山（平成28年12月現在）で運用されています。



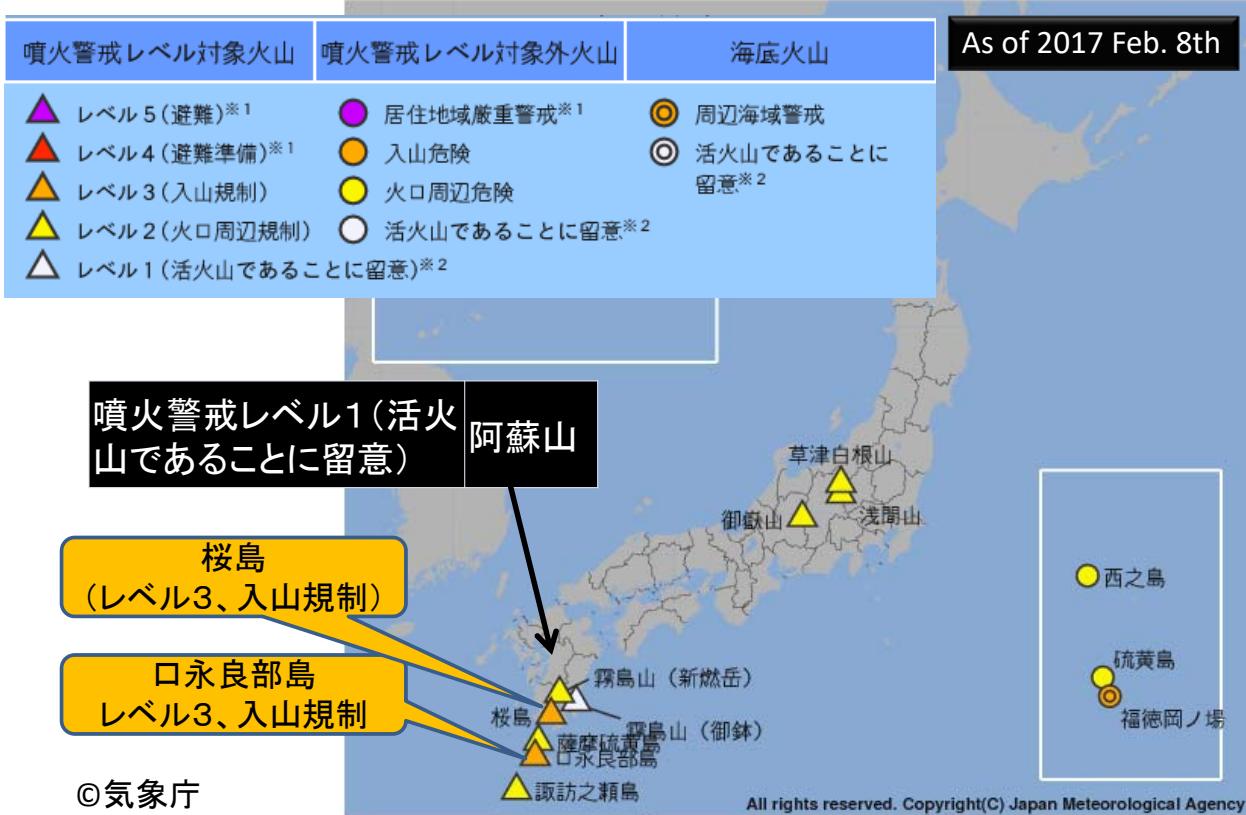
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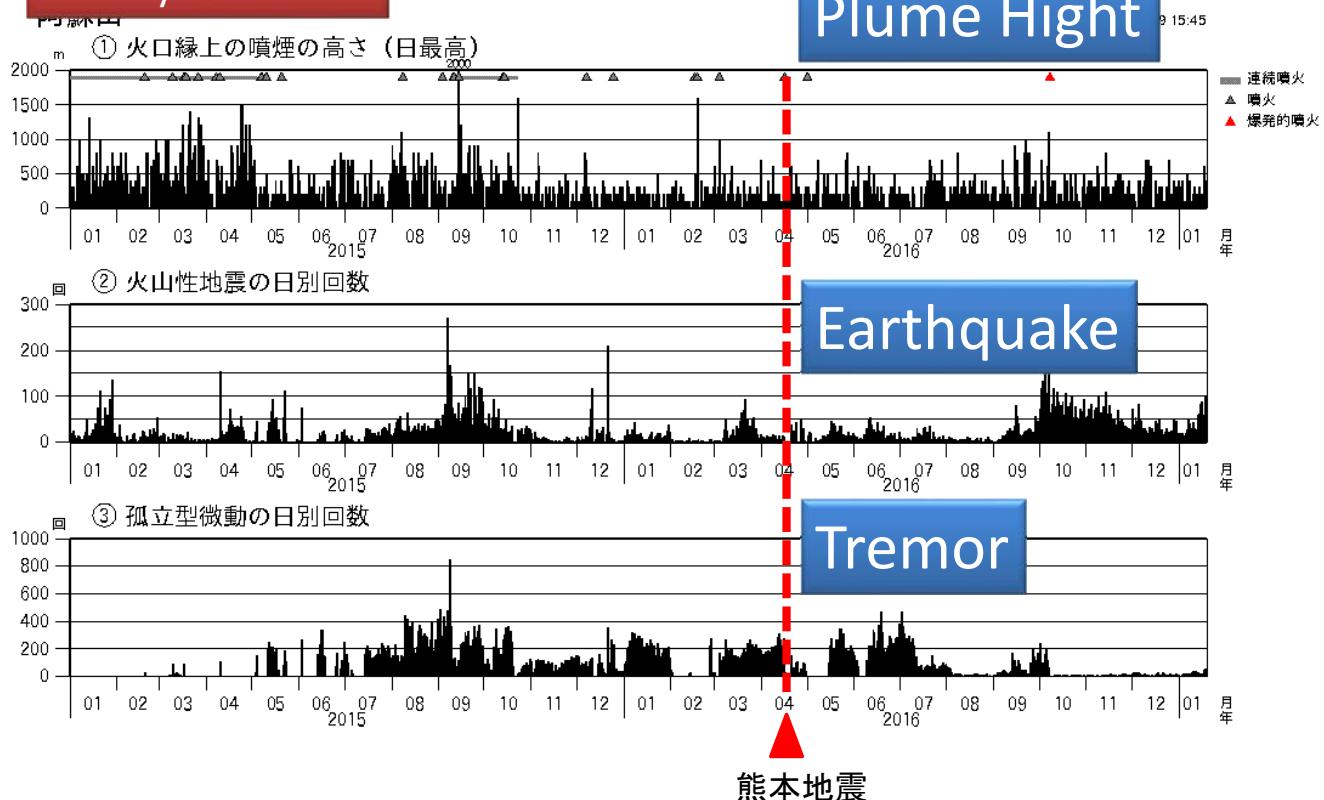


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## Activity of Aso Mt.



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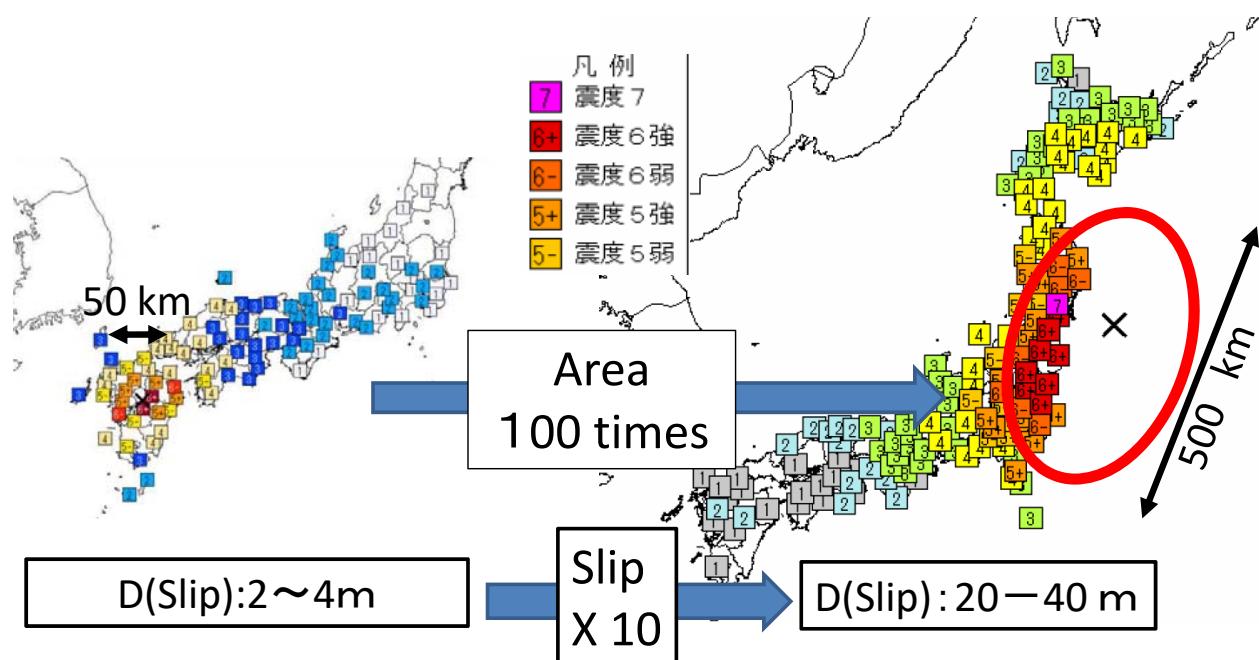
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## 東北地方太平洋沖地震の大きさ

2016 Kumamoto (M7.3)

2011 Tohoku-oki(M9.0)



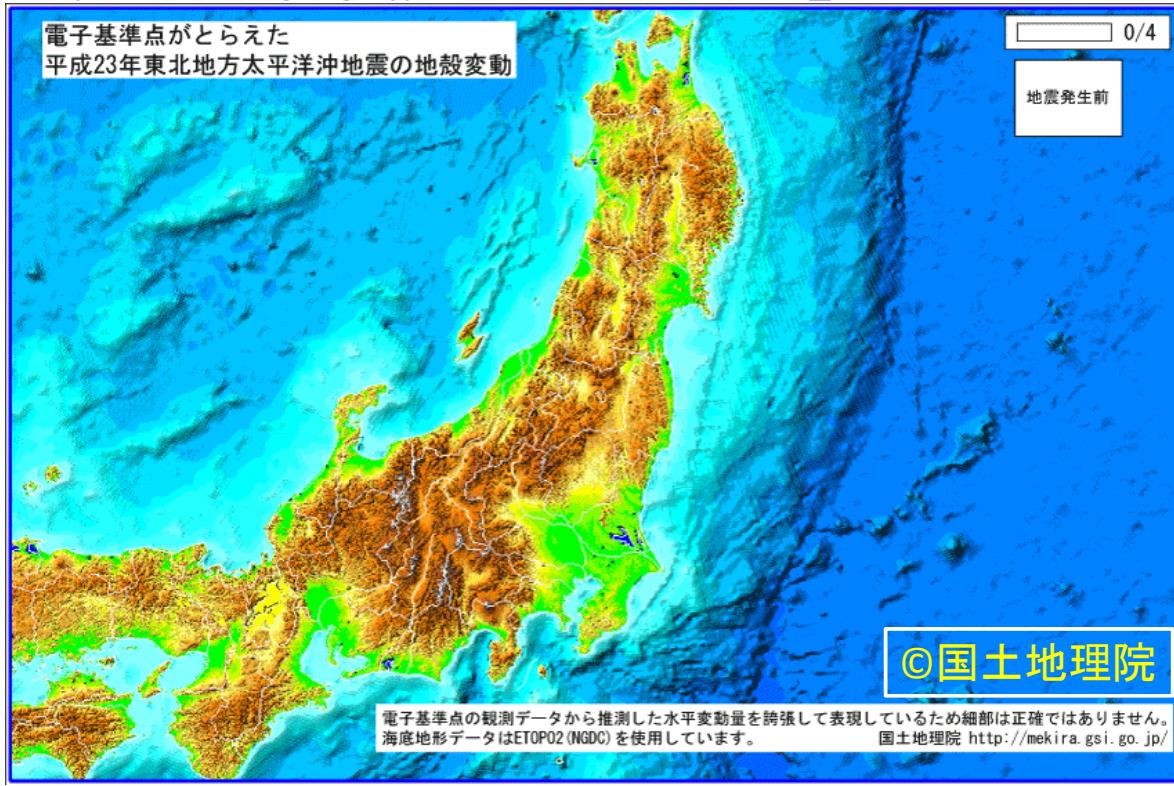
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# Co-seismic deformation in 3 minutes

[http://mekira.gsi.go.jp/JAPANESE/crstanime\\_tohoku110311.html](http://mekira.gsi.go.jp/JAPANESE/crstanime_tohoku110311.html)



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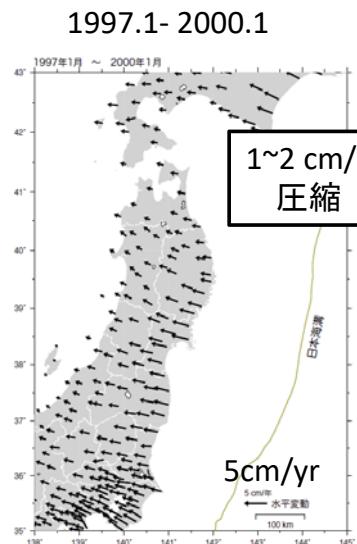
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[www.bunsaishi-edn.jp](http://www.bunsaishi-edn.jp)

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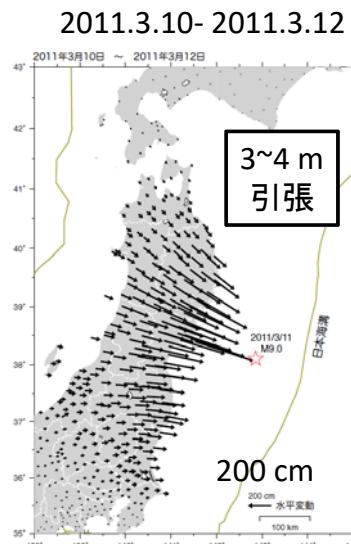


## Crustal deformation in Tohoku

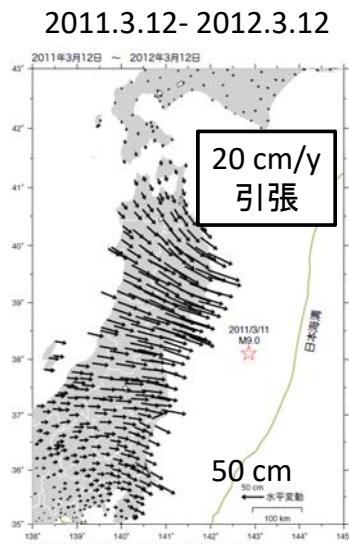
3 yrs before



Co-seismici



1 yr after



©GSI

<http://www.gsi.go.jp/cais/chikakuhendo40012.html>

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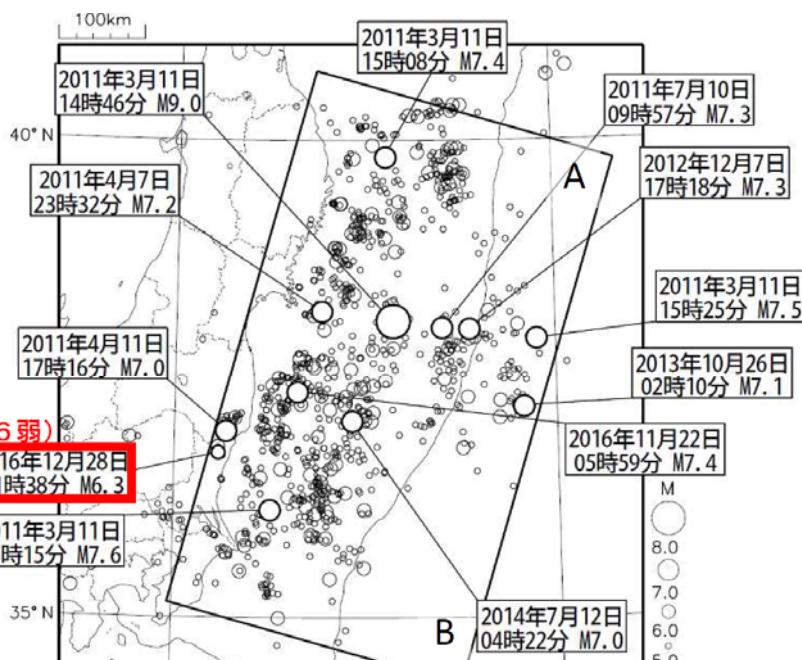
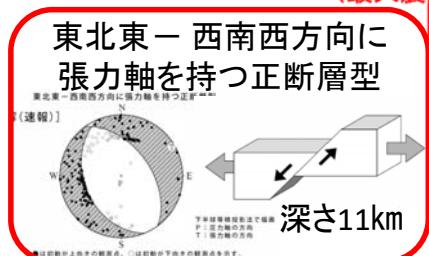
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# Aftershocks of the 2011 Tohoku-oki earthquake

## Epicenters

2011年3月11日12時00分～2016年12月28日21時40分、深さ0～90km、M 5.0

2016年末の地震  
(最大震度6弱)

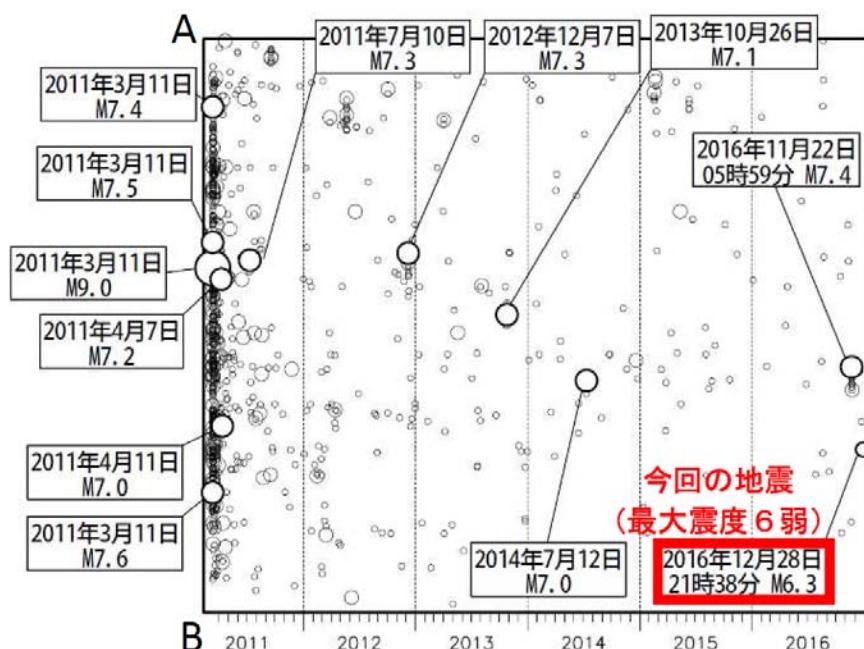


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## Space-Time Distribution (projection on A-B)



横軸は時間、縦軸は前頁図のA-Bの範囲を示す。発生した時刻にマグニチュードの大きさに対応した丸を示した

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# Monthly number of aftershocks

(M $\geq$ 4.0)

Average in 2001 – 2010:  
11.5 in a month for  
M $>=$ 4.0

2001 年～2010 年の M $\geq$ 4.0 の地震発生回数  
月平均値：11.5 回  
月中央値： 9 回



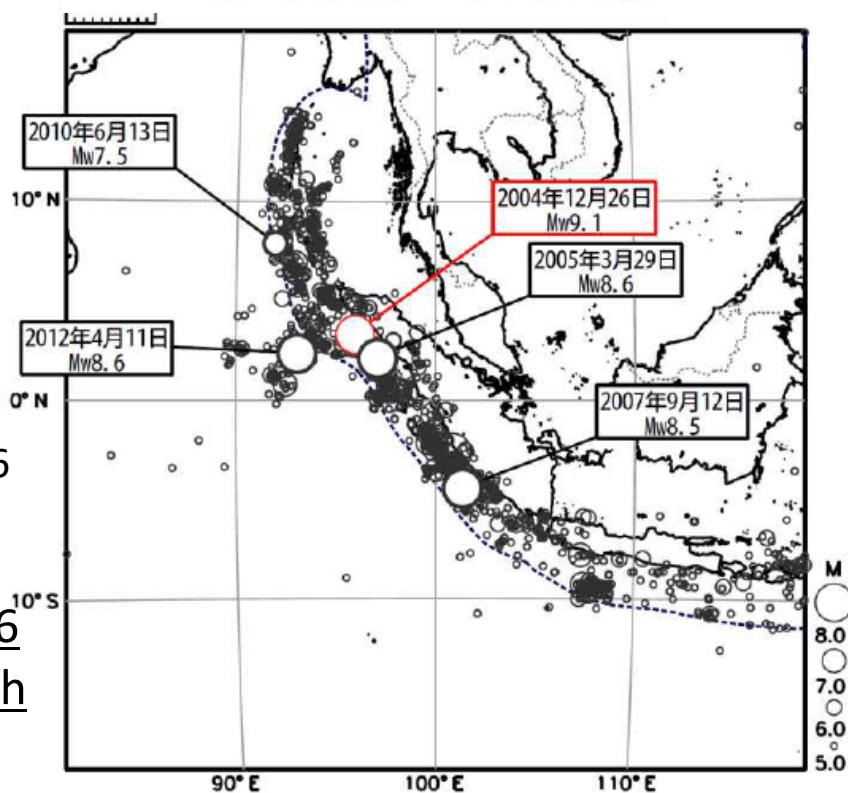
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# The 2004 Sumatera-Andaman earthquake (M9.1)

- 4 month later, M8.6
- 2.5 yrs later, M8.5
- 5.5 yrs later M7.5
- 7.5 yrs later, M8.6  
west of the trench axis



<http://www.jishin.go.jp/main/chousa/14tohoku/p2.pdf>

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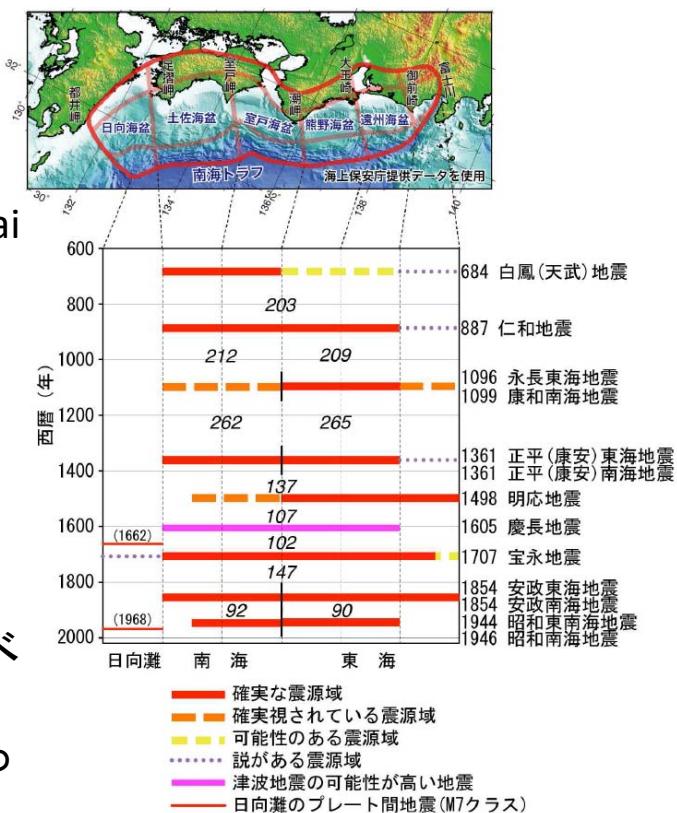
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## Variety of Nankai Trough earthquakes

- Events in Tokai area and Tonankai area
  - ① Simultaneous (1498, 1707)
  - ② Short time difference (1854, 1944·1946)
- Tokai earthquake
  - ① 御前崎より西側で断層のすべりが止まった場合(1944年)
  - ② 駿河湾奥まですべりが広がった場合(1854年)

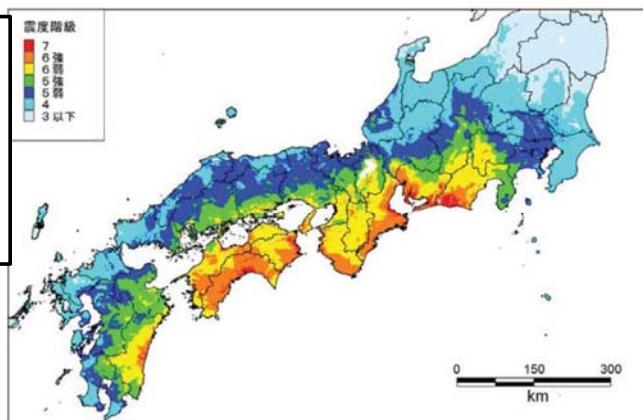


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Intensities by the  
Gigantic Earthquake in  
Nankai Trough  
(Landward case)



◆Loss and damages at the worst case

M	Inundated area	Population in inundated areas	Death or lost	Totally Collapsed houses
9.0(9.1)	1,015 km <sup>2</sup>	1,630K	323K	2,386K

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南海トラフ巨大地震の被害想定について(第一次報告) 平成24年8月29日 中央防災会議

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## Summary

1. The 2016 Kumamoto Earthquake Sequence brought Seismic Intensity 7 in JMA scale at Mashiki town with an interval of 28 hrs.
2. If the M7 event occur in Tokyo Metropolitan, a loss and damage is tremendous.
3. The effect of the 2011 Tohoku-oki event is still continuing.
4. The Nankai Trough Gigant earthquake is likely to occur and cause a very large loss and damages.