NATIONAL & KAPODISTRIAN UNIVERSITY OF ATHENS

POST GRADUATE PROGRAM

ENVIRONMENTAL, DISASTER AND CRISES MANAGEMENT

2ο ΕΠΙΣΤΗΜΟΝΙΚΟ FORUM ΓΙΑ ΤΗ ΜΕΙΩΣΗ ΤΗΣ ΔΙΑΚΙΝΔΥΝΕΥΣΗΣ ΑΠΟ ΚΑΤΑΣΤΡΟΦΕΣ ΣΤΗΝ ΕΛΛΑΔΑ

2nd SCIENTIFIC FORUM FOR DISASTER RISK REDUCTION IN GREECE

Hellenic Disaster Risk Reduction Forum HDRRF

ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ
Εθνικόν και Καποδιστριακόν Πανεπιστήμιον Αθηνών
ΙΔΡΥΘΗΝ ΤΟ 1837

Η συμβολή των **Ερευνητικών Φορέων** της χώρας στη **Διαχείριση** των **Καταστροφών**

14 & 15 Μαρτίου 2019

Αμφιθέατρο
Άλκης Αργυριάδης

Κεντρικό Κτήριο
Εθνικού & Καποδιστριακού
Πανεπιστημίου Αθηνών

Προπύλαια
(Πανεπιστημίου 30)

Δηλώσεις συμμετοχής Φορέων & αποστολή τίτλων εισηγήσεων έως **18 Ιαν. 2019**

Πρόγραμμα Μεταπτυχιακών Σπουδών
Στρατηγικές Διαχείρισης Περιβάλλοντος, Καταστροφών & Κρίσεων

Πληροφορίες
WWW.EDCM.EDU.GR

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Πληροφορίες
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Η επιτυχής συνάντηση των Ερευνητικών Φορέων της χώρας το 2017 με θέμα τις εξελίξεις και τη συμβολή τους στο χώρο της διαχείρισης των καταστροφών αφενός, και αφετέρου η εκθετική αύξηση των καταστροφικών φαινομένων και των επιπτώσεων τους, σε εθνικό και διεθνές επίπεδο επιβάλλουν τη μετεξέλιξη της διοργάνωσης σε ένα Forum παρουσίασης νέων δεδομένων, ανταλλαγής απόψεων και αλληλοενημέρωσης.

Στόχος του 2nd HDRR Forum

Στο Forum επιδιώκεται να ***συντονιστούν τα Πανεπιστημιακά Ιδρύματα και οι Ερευνητικοί Φορείς της χώρας***, στο σύνολο τους, με σκοπό την ***κοινή και αποτελεσματική αντιμετώπιση των κινδύνων*** και με κοινό στόχο ***τη μείωση των επιπτώσεων*** σε εθνικό αλλά και παγκόσμιο επίπεδο.

Απώτερος σκοπός της συνάντησης είναι η διασύνδεση και η συνεργασία μεταξύ των τριών πυλώνων, της επιστημονικής κοινότητας, των επιχειρησιακών φορέων και της κοινωνίας, ως αναγκαία προϋπόθεση για μια επιτυχημένη και αποτελεσματική διαχείριση καταστροφικών φαινομένων.

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POST GRADUATE PROGRAM
ENVIRONMENTAL, DISASTER AND CRISES MANAGEMENT

Δρ. ΕΥΘΥΜΗΣ ΛΕΚΚΑΣ
ΚΑΘΗΓΗΤΗΣ
ΔΥΝΑΜΙΚΗΣ ΤΕΚΤΟΝΙΚΗΣ ΕΦΑΡΜΟΣΜΕΝΗΣ ΓΕΩΛΟΓΙΑΣ &
ΔΙΑΧΕΙΡΙΣΗΣ ΦΥΣΙΚΩΝ ΚΑΤΑΣΤΡΟΦΩΝ
ΠΡΟΕΔΡΟΣ
ΟΡΓΑΝΙΣΜΟΥ ΑΝΤΙΣΕΙΣΜΙΚΟΥ ΣΧΕΔΙΑΣΜΟΥ & ΠΡΟΣΤΑΣΙΑΣ
ΠΡΟΕΔΡΟΣ
ΤΜΗΜΑΤΟΣ ΓΕΩΛΟΓΙΑΣ ΚΑΙ ΓΕΩΠΕΡΙΒΑΛΛΟΝΤΟΣ
ΔΙΕΥΘΥΝΤΗΣ
ΠΜΣ ΣΤΡΑΤΙΓΙΚΕΣ ΔΙΑΧΕΙΡΙΣΗΣ ΠΕΡΙΒΑΛΛΟΝΤΟΣ ΚΑΤΑΣΤΡΟΦΩΝ & ΚΡΙΣΕΩΝ

ΝΕΑ ΕΠΙΣΤΗΜΟΝΙΚΑ ΤΕΧΝΙΚΑ ΚΑΙ ΕΠΙΧΕΙΡΗΣΙΑΚΑ ΔΕΔΟΜΕΝΑ ΑΠΟ ΠΡΟΣΦΑΤΕΣ ΚΑΤΑΣΤΡΟΦΕΣ ΣΕ ΔΙΕΘΝΕΣ ΕΠΙΠΕΔΟ

ΑΘΗΝΑ 2019

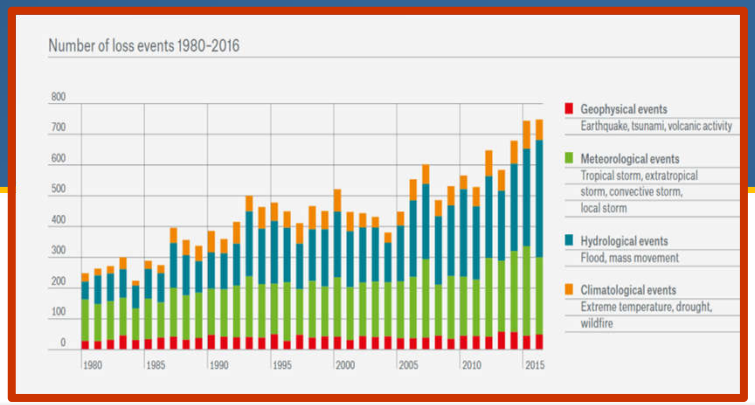
Ερευνητική & Υποστηρικτική Ομάδα του Π.Μ.Σ.
«Στρατηγικές Διαχείρισης Περιβάλλοντος, Καταστροφών και Κρίσεων»

Ευθύμης Λέκκας, Απόστολος Αλεξόπουλος, Μαρία Σταυροπούλου, Στυλιανός Λόζιος, Χαράλαμπος Κράνης, Εμμανουήλ Σκούρτσος

Βαρβάρα Αντωνίου, Γιώργος Δανάμος, Κωνσταντίνος Σούκης, Εμμανουήλ Ανδρεαδάκης, Δημήτρης Θεοχάρης, Ελένη Καπουράνη, Ευάγγελος Λόγος, Ιωάννης Μπαντέκας, Μιχάλης Διακάκης, Νικόλαος Καραλέμας, Σπυρίδων Μαυρούλης, Χρήστος Φίλης, Μαριλία Γώγου, Ναυσικά-Ιωάννα Σπύρου, Κατερίνα-Ναυσικά Κατσετσιάδου, Ευαγγελία Κώτση, Αλεξία Γραμπά, Βασιλική Αλεξούδη, Όθωνας Βλασσόπουλος, Μαρία Χρηστάκη, Μίλιος Δημήτρης, Χριστίνα Λέκκα, Σωτήρης Μαρσέλος, Παρασκευή Τσιούμα, Γωγώ Καραλή, Άρης Μαρσέλος

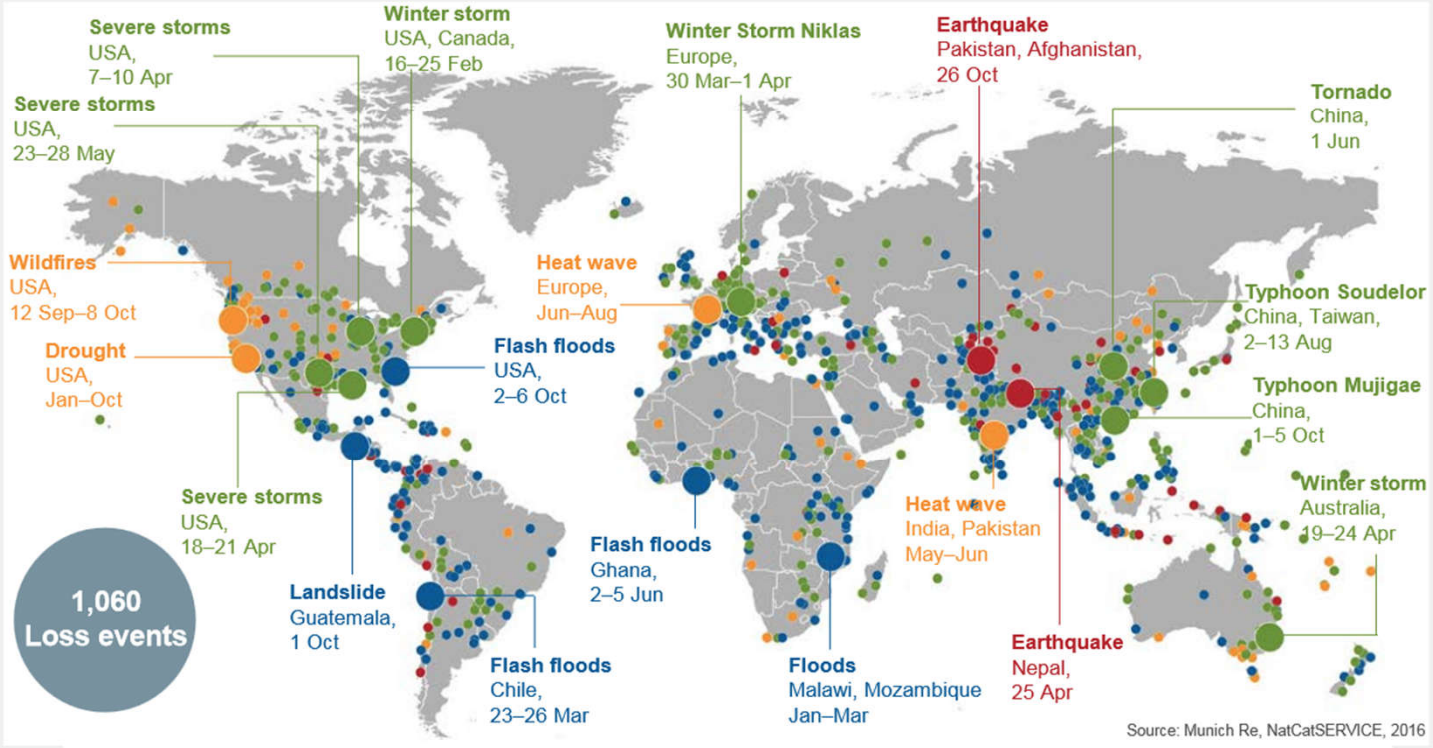

SABAH
ACI ALLAHIM
EL PAÍS
Newsweek
WHY HAITI MATTERS
BY BARACK OBAMA
star
KIYAMET KULELERİ
Público
CAOS, SAQUEOS Y RESCATES
TA NEA
Κατακραυγή
DER SPIEGEL
FUKUSHIMA
stern
Das unglaubliche Volk
ΕΛΕΥΘΕΡΟΤΥΠΙΑ
Τετέλεσται
BHMagazino
Le Point
La chute d'un géant
Quand le destin s'acharne sur les Japonais
PLUS: HOW IGNORANT IS AMERICA?
Newsweek
Apocalypse Now
Tsunamis. Earthquakes. Nuclear Meltdowns. Revolutions. What the @$%! Is Next?
TIME
Haiti's Tragedy
AKŞAM
Sanki kıyame
TA NEA
Βιβλική καταστροφή
TIME
The Agony of KASHMIR
BHMagazino

ΑΥΞΗΣΗ ΦΥΣΙΚΩΝ ΚΑΤΑΣΤΡΟΦΩΝ



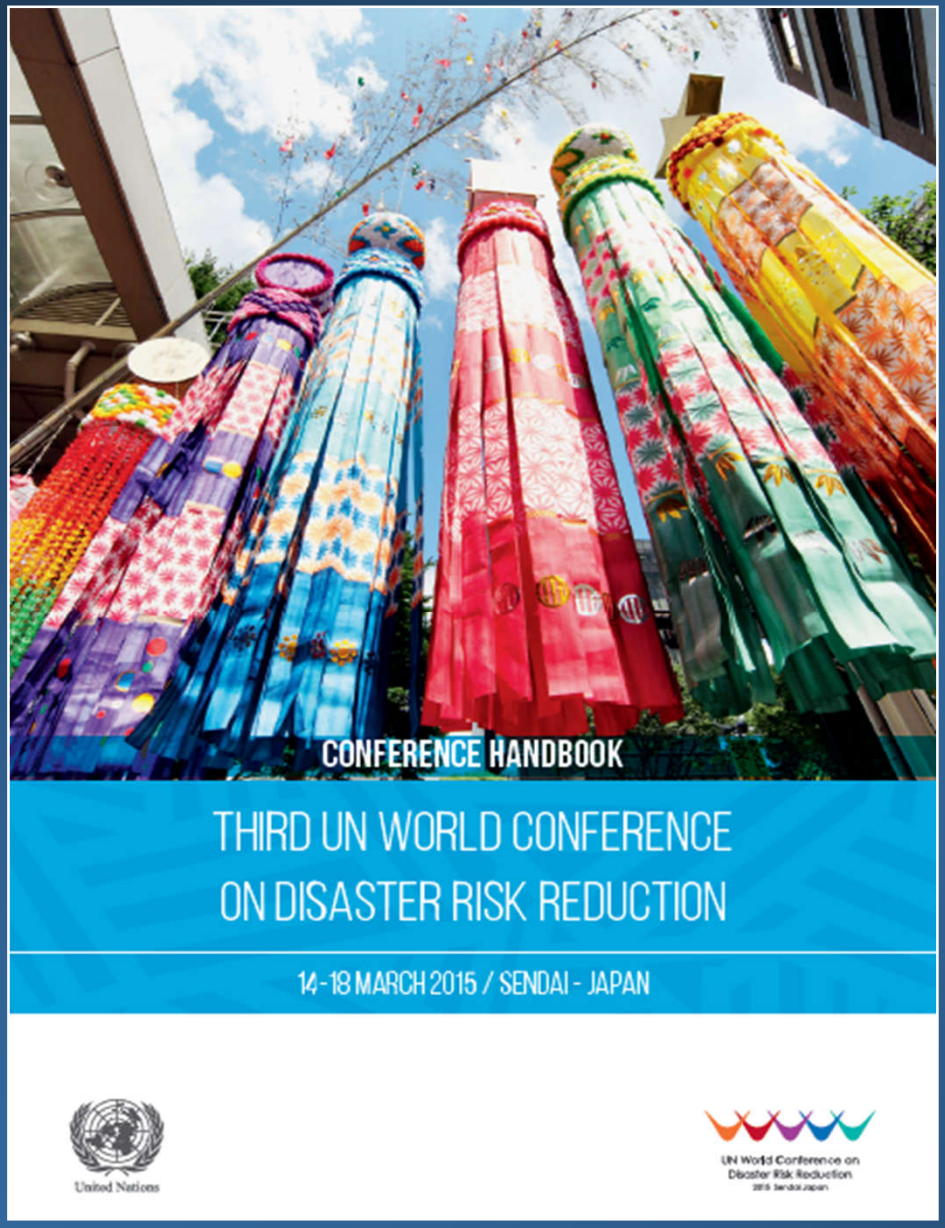
NatCatSERVICE

Natural loss events worldwide 2015
Geographical overview



- **Geophysical events** (Earthquake, tsunami, volcanic activity)
- **Meteorological events** (Tropical storm, extratropical storm, convective storm, local storm)
- **Hydrological events** (Flood, mass movement)
- **Climatological events** (Extreme temperature, drought, forest fire)

- ○ **Loss events**
- ◯ **Selection of catastrophes**



Το νέο Παγκόσμιο Πλαίσιο του ΟΗΕ για τη Μείωση Κινδύνου Καταστροφής 2015-2030 του Sendai (Japan 2015)

UN World Conference on
Disaster Risk Reduction
14-18 March 2015, Sendai, Japan

ΤΟ ΠΛΑΙΣΙΟ SENDAI

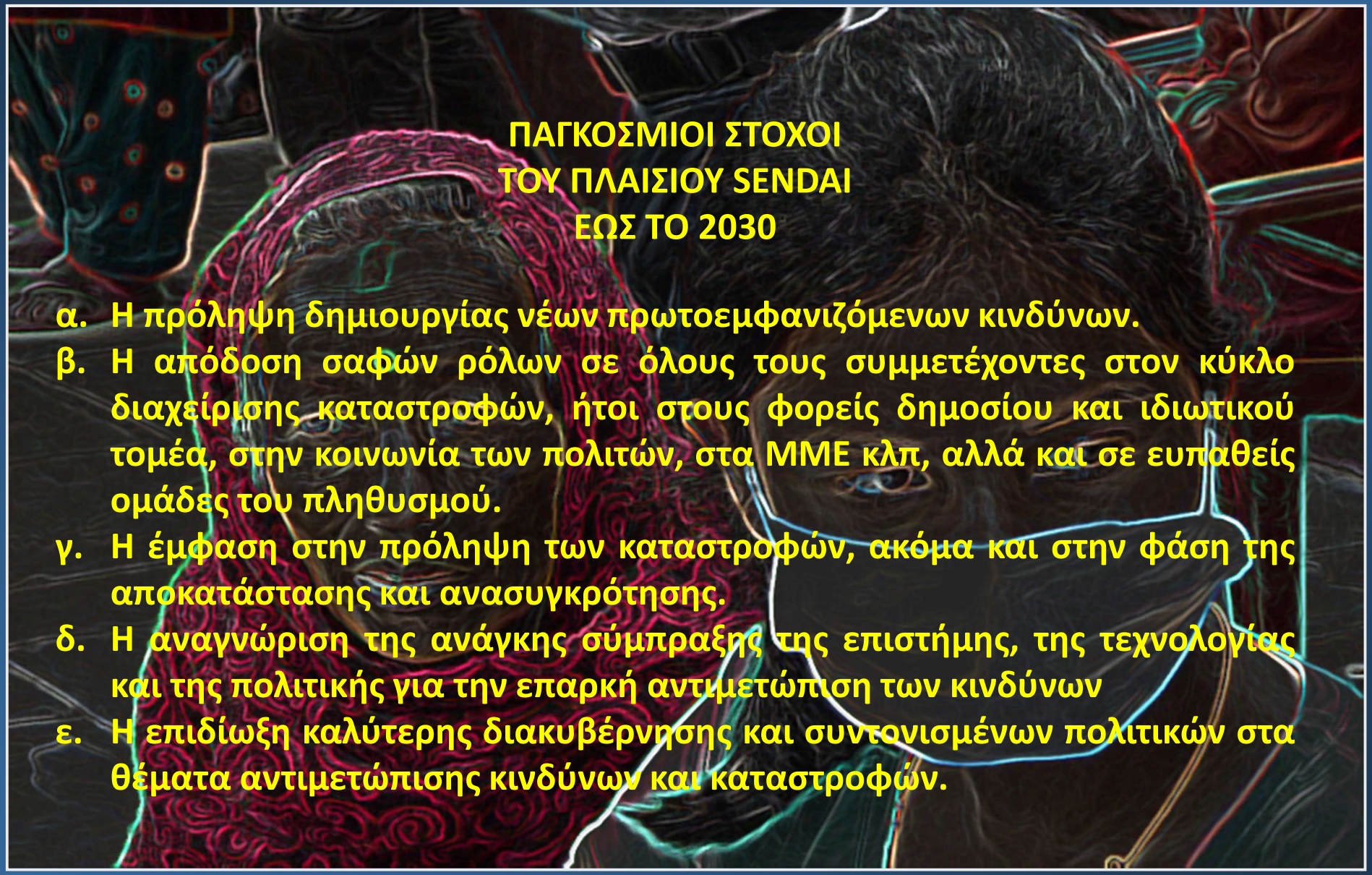
Προσαρμοστικότητα **είναι η ικανότητα ενός συστήματος που εκτίθεται σε κινδύνους, εγκαίρως και αποτελεσματικά να ανθίσταται, να απορροφά, να διαχειρίζεται και να ανακάμπτει από επιδράσεις ενός κινδύνου, μέσω της διατήρησης και αποκατάστασης των σημαντικών βασικών δομών και λειτουργιών .**

UN World Conference on Disaster Risk Reduction
14-18 March 2015, Sendai, Japan

ΠΡΟΤΕΡΑΙΟΤΗΤΕΣ ΓΙΑ ΔΡΑΣΗ

1. Γνώση του κινδύνου (risk) καταστροφής
2. Ενίσχυση της διακυβέρνησης του κινδύνου καταστροφής για τη διαχείριση του
3. Επένδυση στη μείωση του κινδύνου καταστροφής, στοχεύοντας στην προσαρμοστικότητα
4. Προαγωγή της ετοιμότητας για αποτελεσματική αντιμετώπιση των καταστροφών και της «καλύτερης ανοικοδόμησης» κατά την αποκατάσταση και ανασυγκρότηση.

UN World Conference on Disaster Risk Reduction
14-18 March 2015, Sendai, Japan



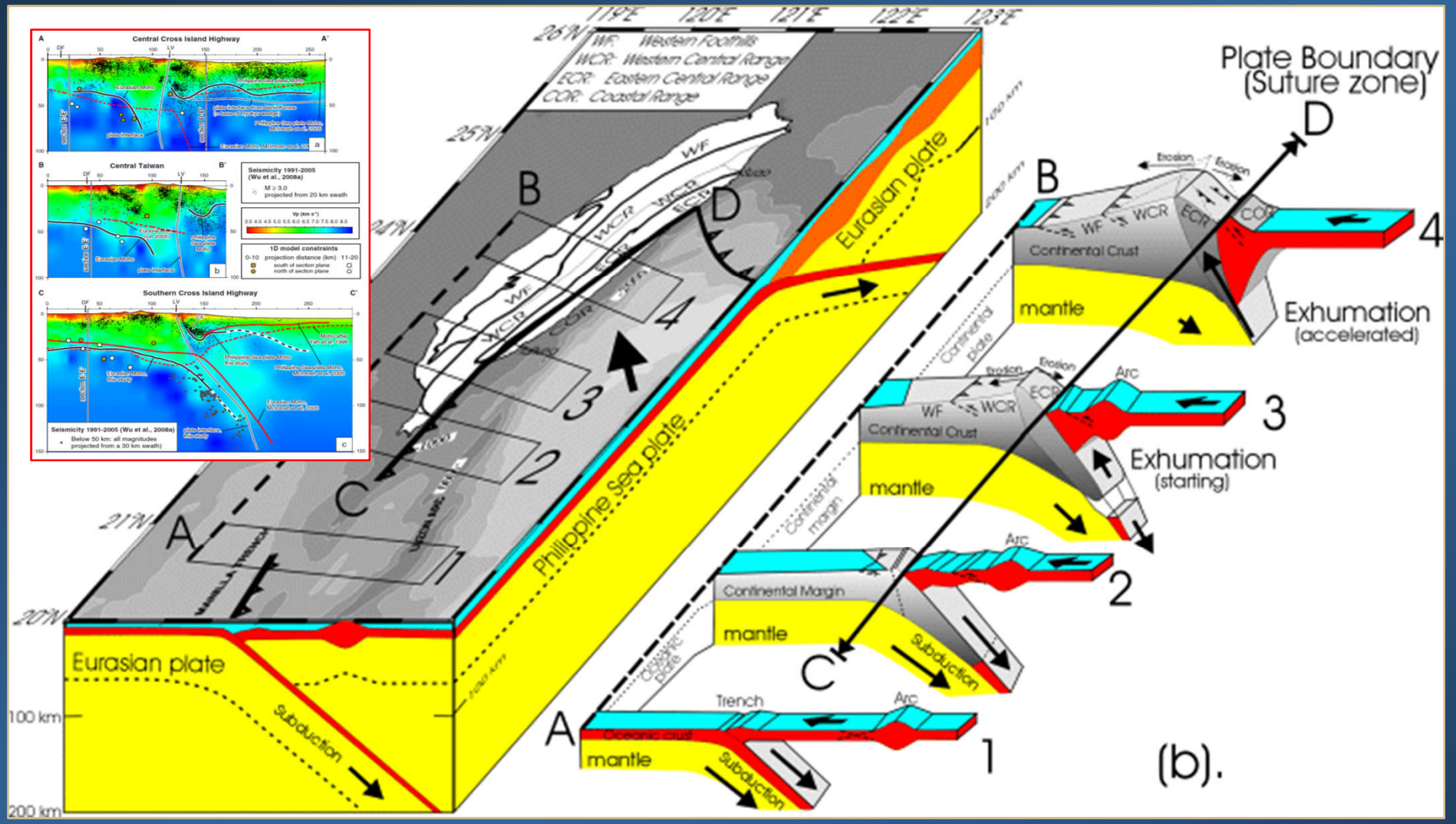
ΠΑΓΚΟΣΜΙΟΙ ΣΤΟΧΟΙ ΤΟΥ ΠΛΑΙΣΙΟΥ SENDAI ΕΩΣ ΤΟ 2030

α. Η πρόληψη δημιουργίας νέων πρωτοεμφανιζόμενων κινδύνων.
β. Η απόδοση σαφών ρόλων σε όλους τους συμμετέχοντες στον κύκλο διαχείρισης καταστροφών, ήτοι στους φορείς δημοσίου και ιδιωτικού τομέα, στην κοινωνία των πολιτών, στα ΜΜΕ κλπ, αλλά και σε ευπαθείς ομάδες του πληθυσμού.
γ. Η έμφαση στην πρόληψη των καταστροφών, ακόμα και στην φάση της αποκατάστασης και ανασυγκρότησης.
δ. Η αναγνώριση της ανάγκης σύμπραξης της επιστήμης, της τεχνολογίας και της πολιτικής για την επαρκή αντιμετώπιση των κινδύνων
ε. Η επιδίωξη καλύτερης διακυβέρνησης και συντονισμένων πολιτικών στα θέματα αντιμετώπισης κινδύνων και καταστροφών.

ΔΙΕΘΝΕΙΣ ΕΡΕΥΝΗΤΙΚΕΣ ΑΠΟΣΤΟΛΕΣ

1. The February 6, 2018 Mw 6.4 Hualien (eastern Taiwan) earthquake
2. The Mw 4.0, August 21, 2017 Ischia (Italy) Earthquake: A minor earthquake with high intensities
3. The September 2018 Sapporo Japan earthquake Mw 6.7
4. The May - June 2018 kilauea (Big Island, Hawaii) volcano activity
5. The September 2017 M 8.2 Chiapas and M 7.1 Puebla- Morelos earthquakes in Mexico
6. The September 2018 Mw 7.5 Palu (Sulawesi Island, Indonesia) earthquake and tsunami disaster
7. The December 2018 volcano-triggered tsunami in Krakatau complex (Sunda Strait, Indonesia)

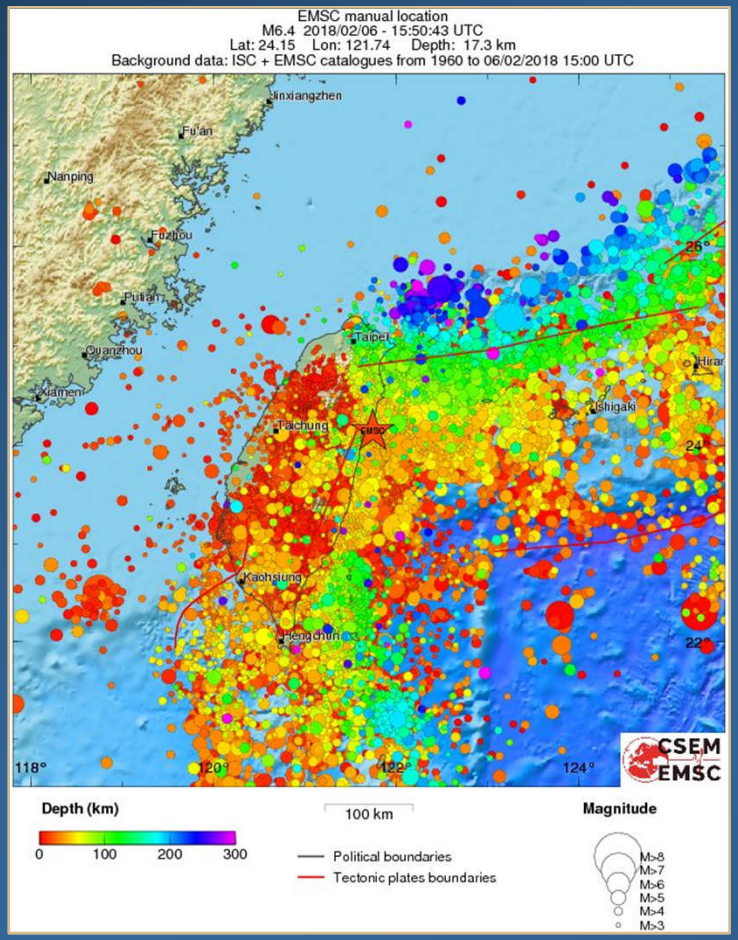
THE FEBRUARY 6, 2018 Mw 6.4 HUALIEN (EASTERN TAIWAN) EARTHQUAKE

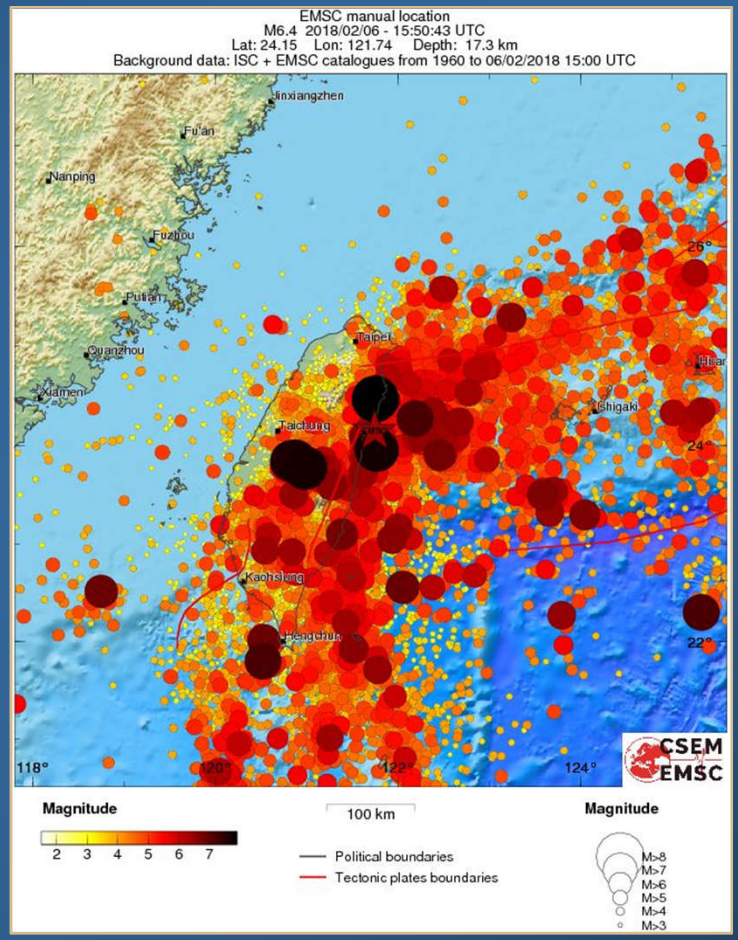


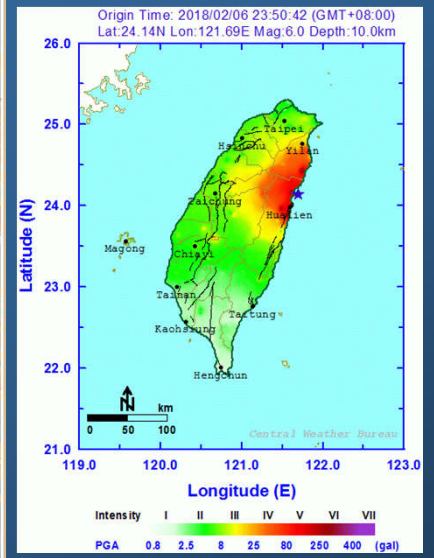
(a) A 3D tectonic model in the Taiwan area. East of Taiwan the Philippine Sea plate subducts northward beneath the Ryukyu arc, while south of the island Eurasian plate oceanic lithosphere beneath the south China Sea subducts to the east beneath the Philippine Sea plate (Tsai et al., 1977). General geological regions in Taiwan (after Ho, 1988) include: Coastal Plain (CP), Western Foothills (WF), western Central Range (WCR), eastern Central Range (ECR), Longitudinal Valley (LV) and Coastal Range (COR). The bathymetry is shown by contour on a grey scale.

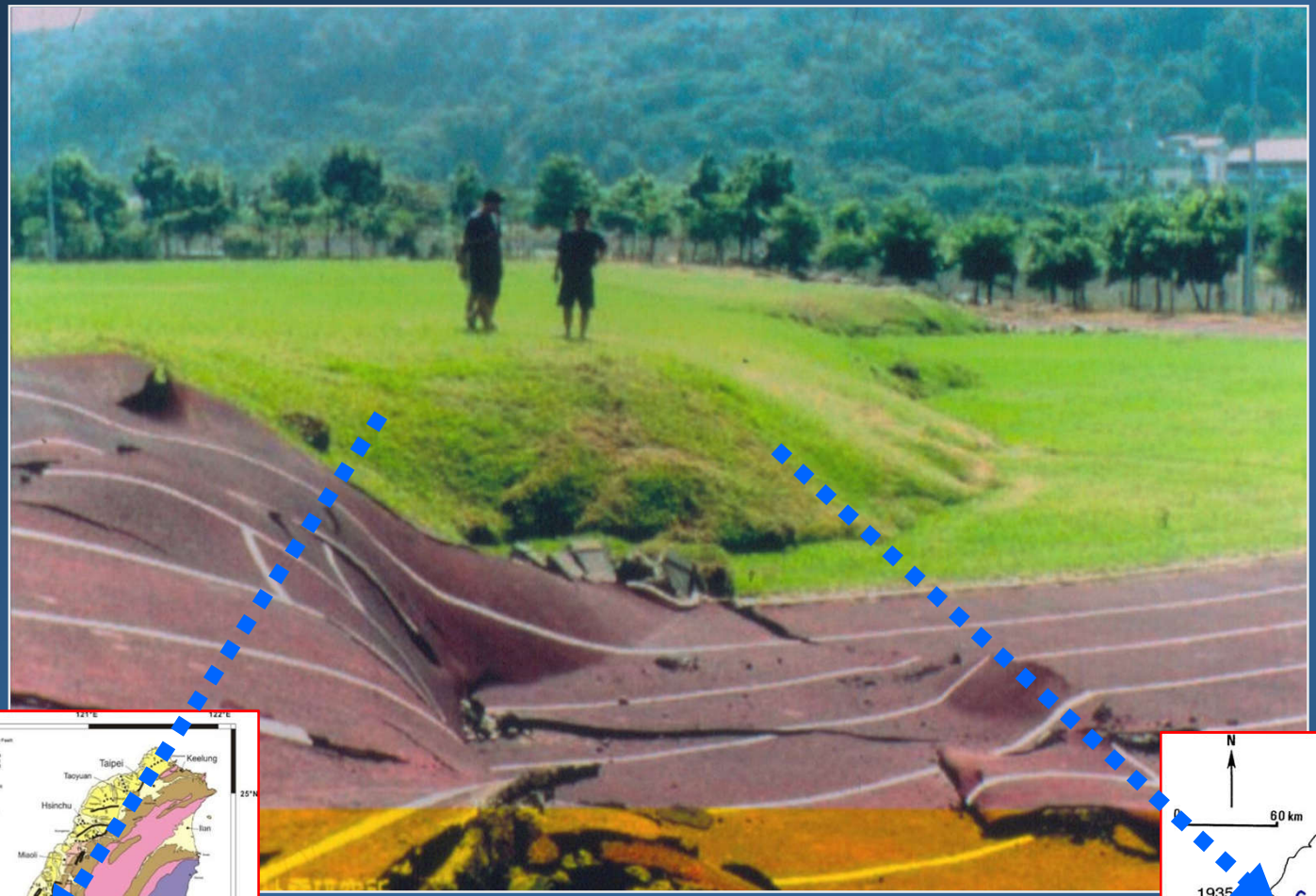
Lin (2002), Terra Nova, doi: 10.1046/j.1365-3121.2002.00421.x

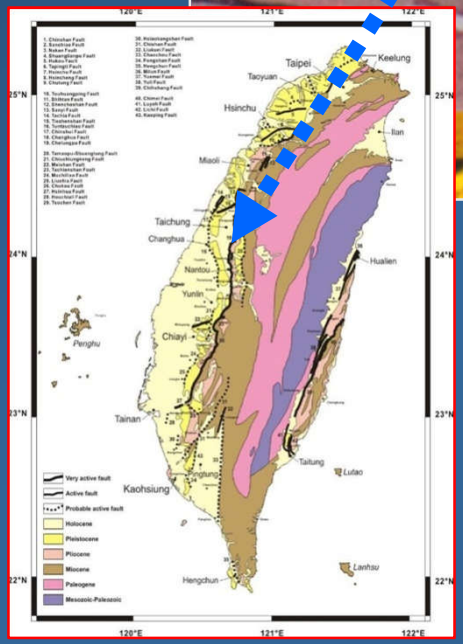
Regional instrumental seismicity based on ISC and EMSC catalogues from 1960 until the earthquake



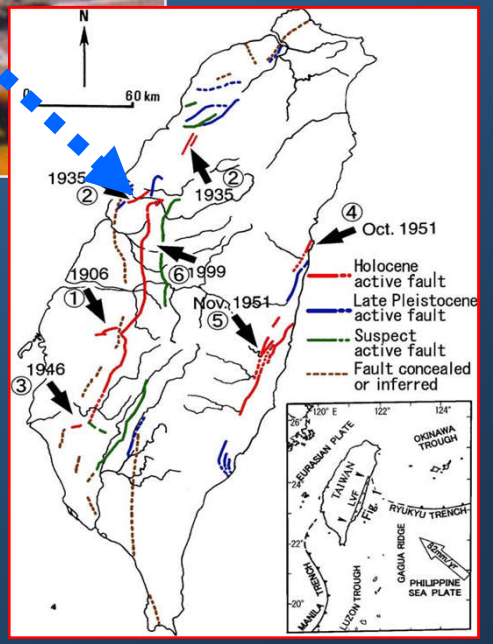








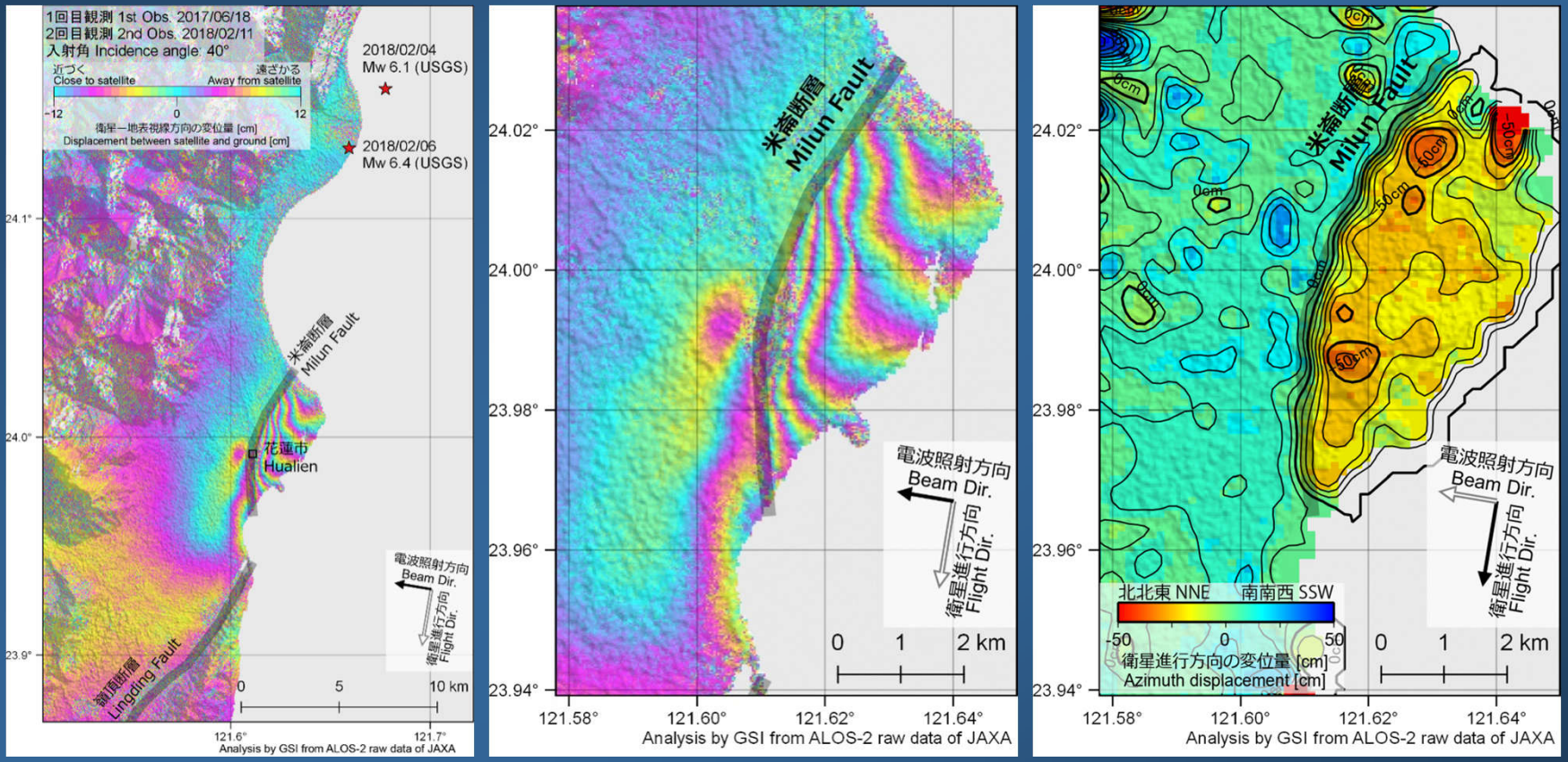
Ng et al. (2009), Geophys. J. Int.,
doi: 10.1111/j.1365-246X.2009.04164.x



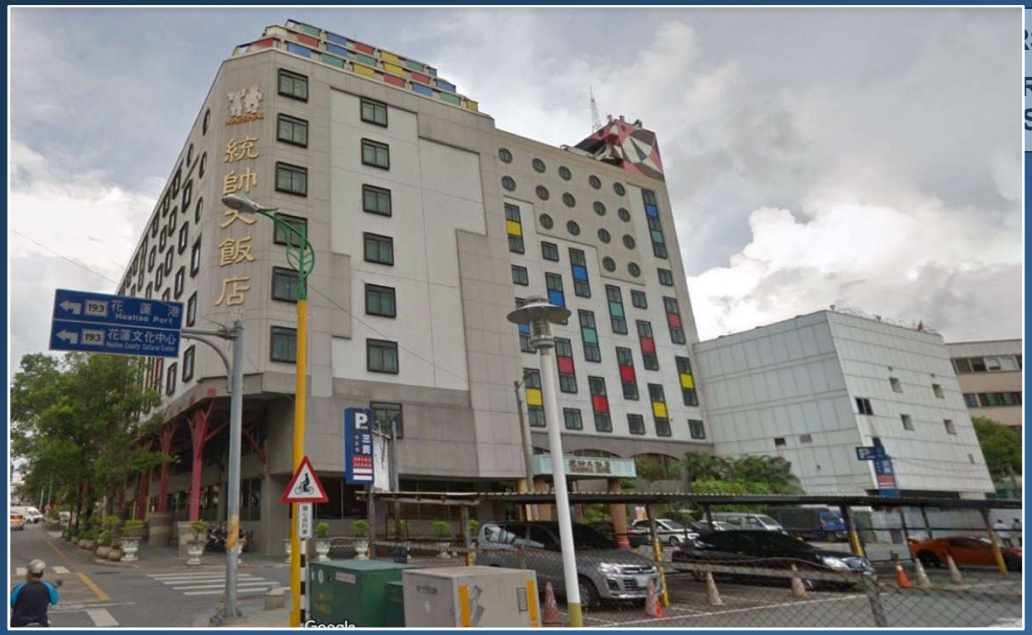
Ota et al. (2005), Tectonophysics,
doi:10.1016/j.tecto.2005.05.040


松山
HOTEL

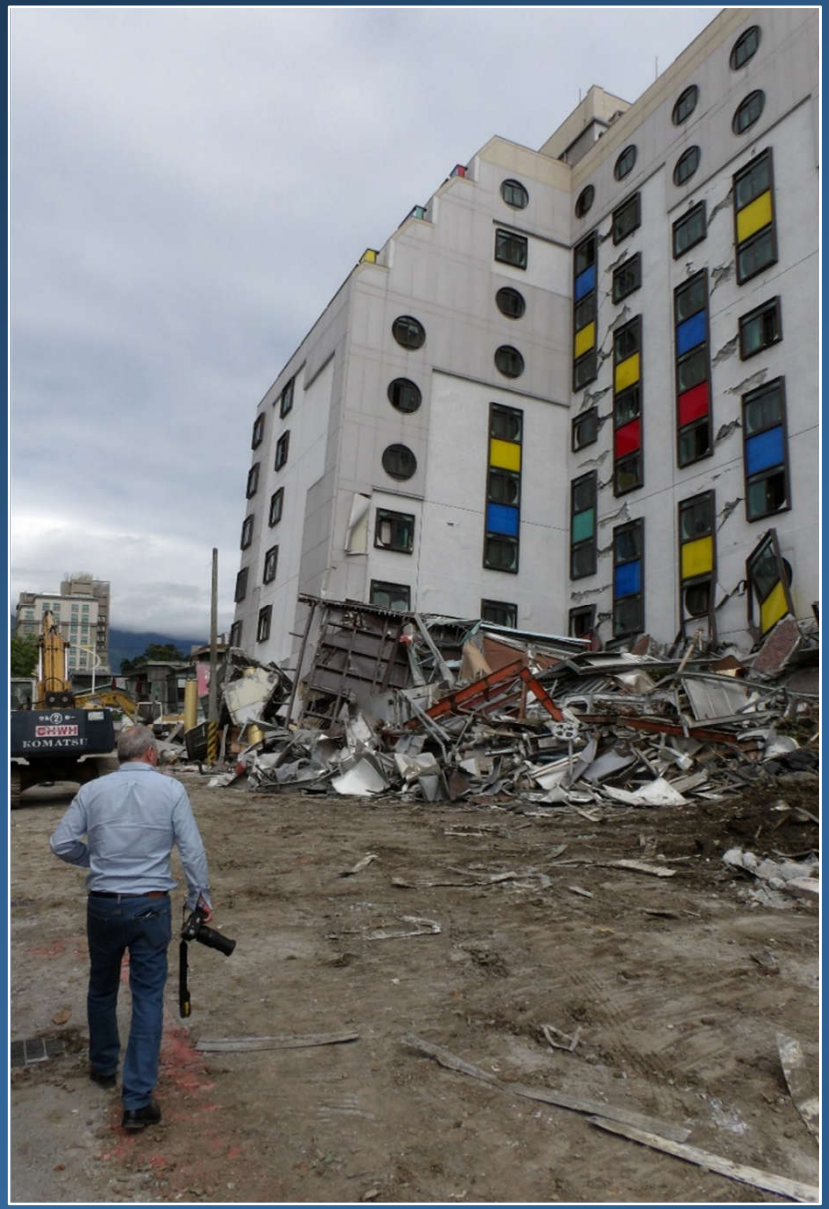
Crustal deformation associated with the February 6, 2018 Hualien (Taiwan) earthquake
Results of SAR analysis



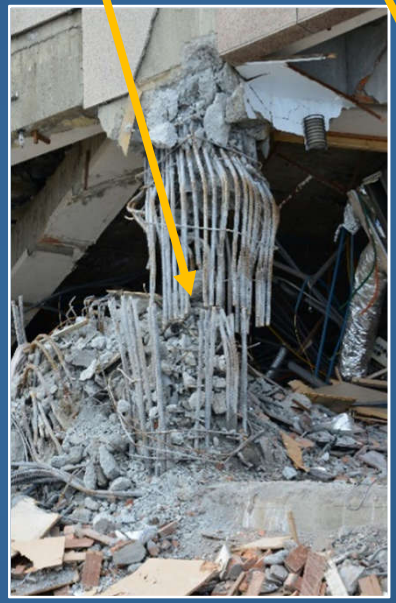
(a) Overall view of interference image, (b) enlarged view of interference image, (c) amount of displacement in the direction of satellite travel of the south right observation pair. In the figure (c), the cold color system indicates the south-southwest direction (satellite traveling direction), the warm color system indicates the displacement amount in the north-northeast direction (*http://www.gsi.go.jp/cais/topic180209-index-e.html*)

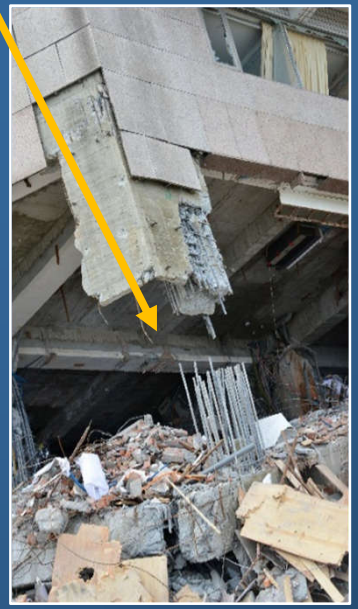

統帥大飯店
MARSHAL
花蓮港
Hualien Port
花蓮文化中心
Hualien County Cultural Center

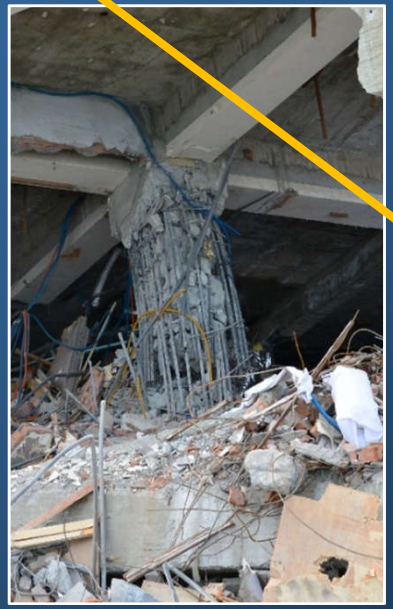

統帥大飯店
MARSHAL

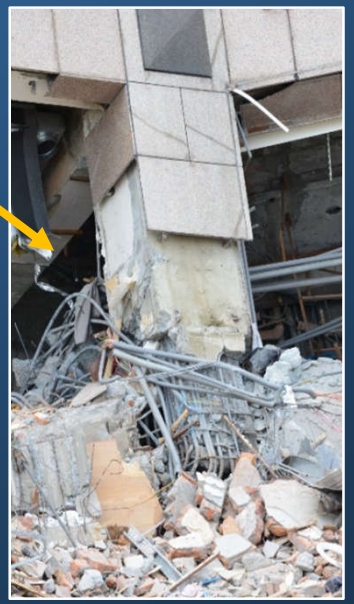

KOMATSU


OMATSU

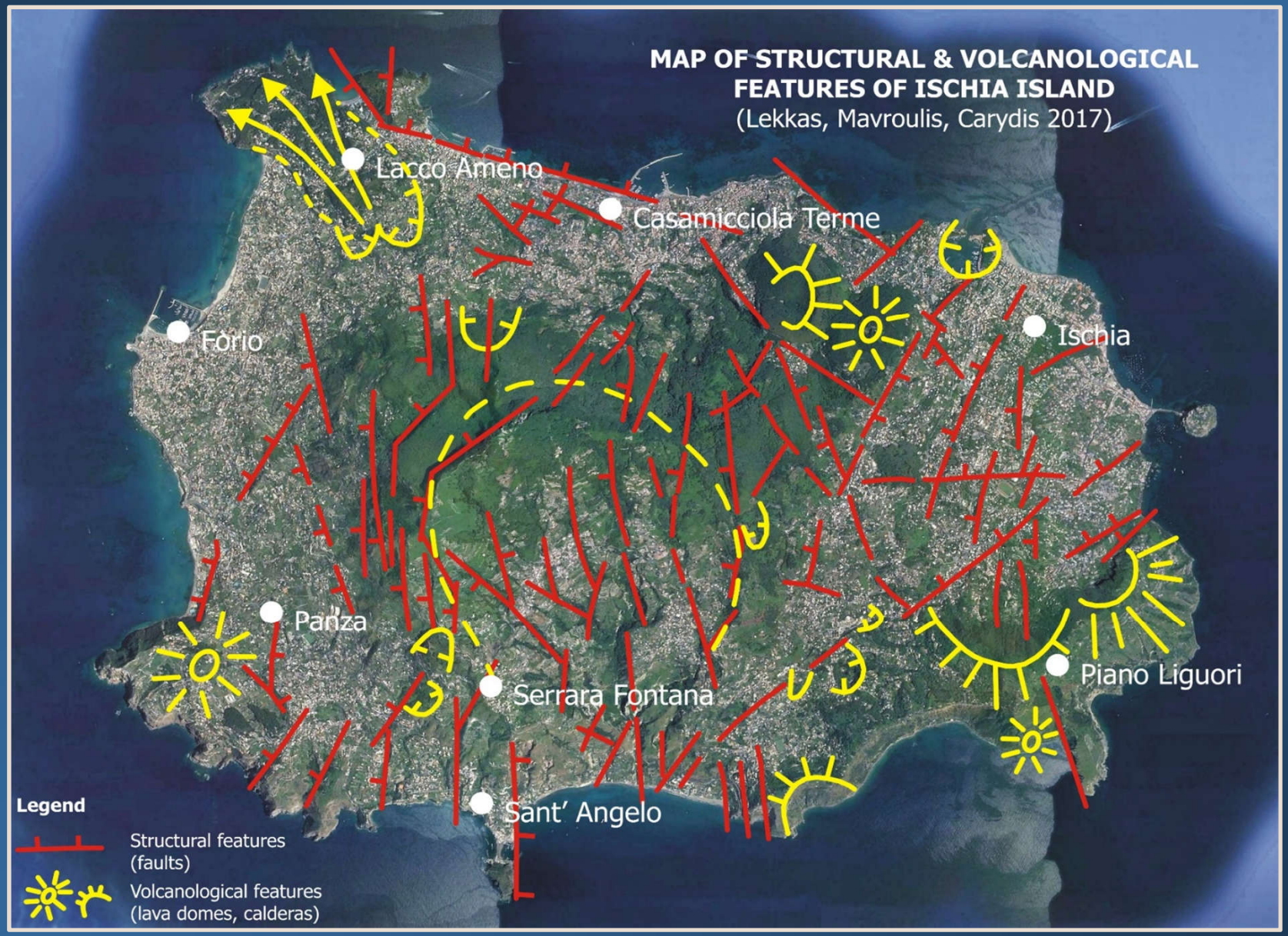








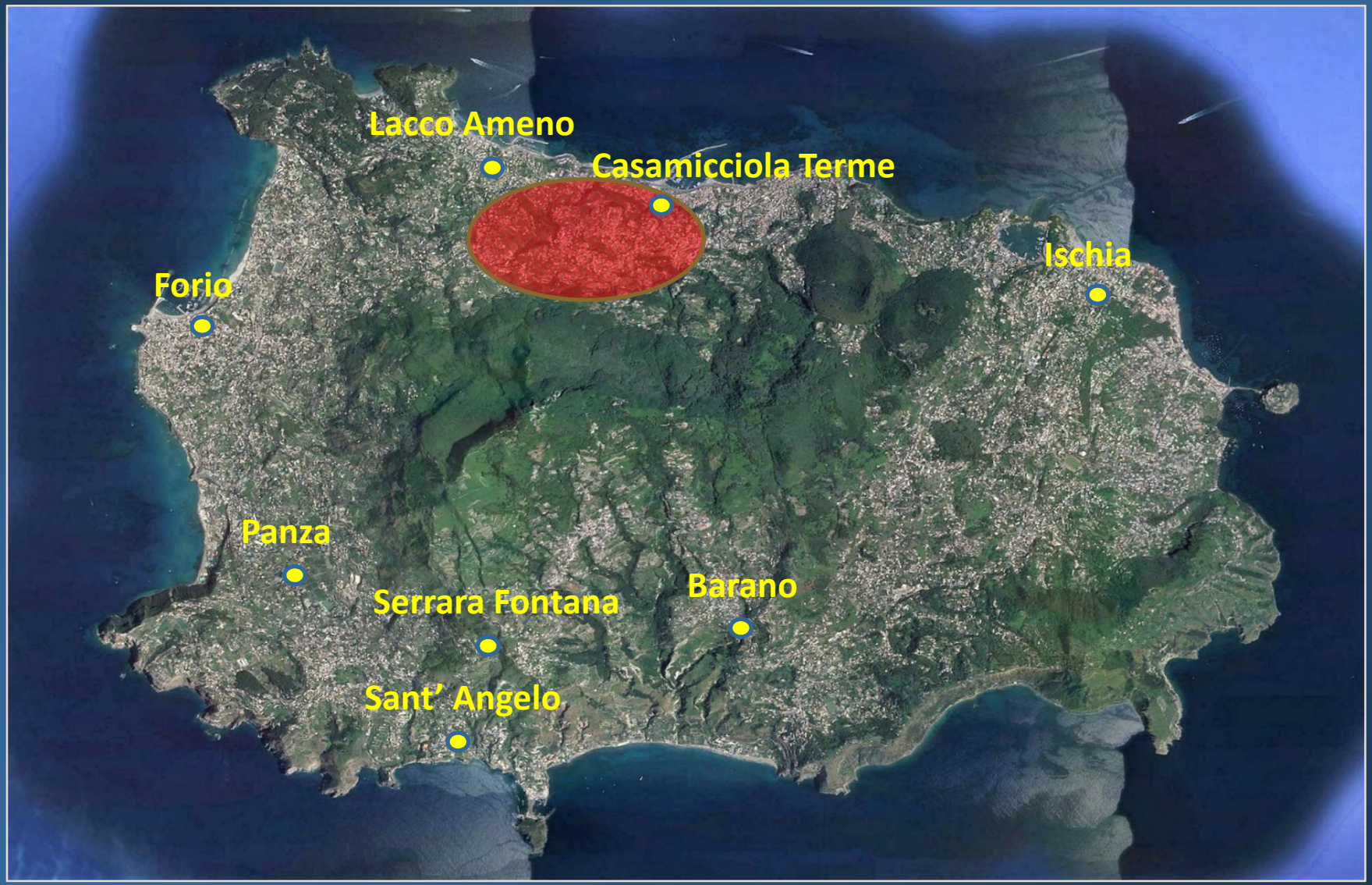
The Mw 4.0, August 21, 2017 Ischia (Italy) Earthquake: A minor earthquake with high intensities


MAP OF STRUCTURAL & VOLCANOLOGICAL FEATURES OF ISCHIA ISLAND
(Lekkas, Mavroulis, Carydis 2017)
Lacco Ameno
Casamicciola Terme
Forio
Ischia
Panza
Serrara Fontana
Piano Liguori
Sant' Angelo
Legend
Structural features (faults)
Volcanological features (lava domes, calderas)

Characteristic damage of historical earthquakes

The 1883 Casamicciola earthquake, Ischia, Bay of Pozzuoli. Xylography print from The Illustrated London News (1883). Courtesy of R. Musson, Edinburgh. Private collection, Prague

Distribution of heavy damage induced by the 2017 Ischia earthquake



Near total or total collapses of masonry buildings






The southern boundary of the area most affected by the 2017 Ischia earthquake

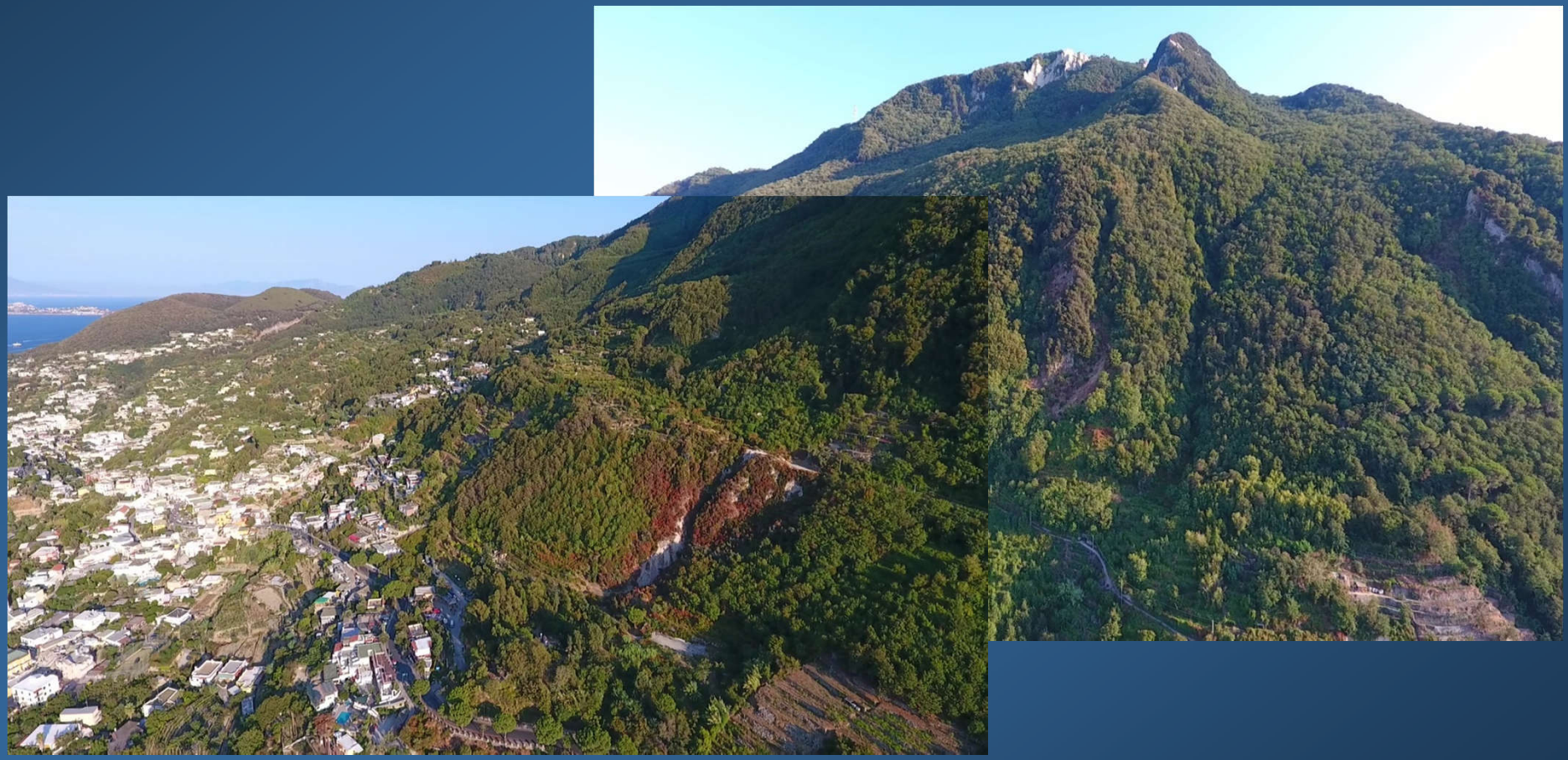


Photo taken on August 25, 2017

The eastern part of the area most affected by the 2017 Ischia earthquake

From the observation and the analysis of the induced damage, it is concluded that the earthquake ground motion is characterized by the prevalence of the vertical component and was generated by a minor earthquake. This can be deduced not only from the small extent of the earthquake-affected area but also from the assigned high intensities.

Photo taken on August 25, 2017

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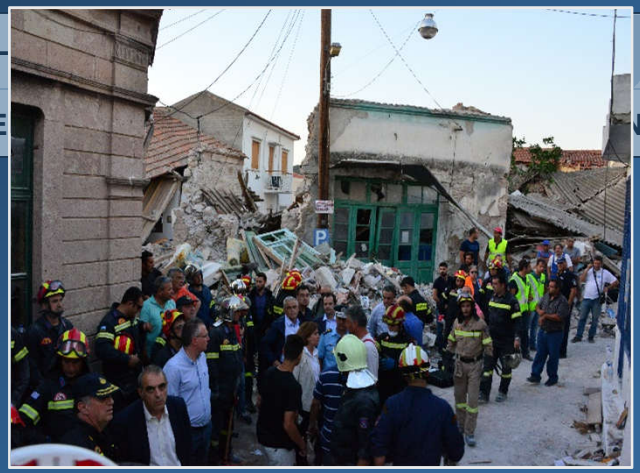
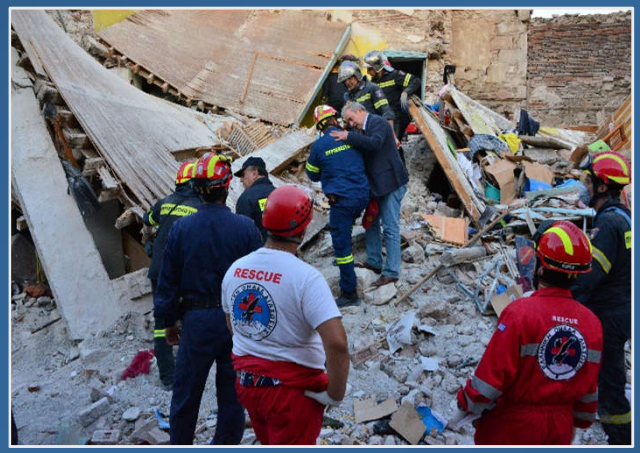
ENVIRONMENTAL, DISASTER AND CRISES MANAGEMENT

Ο ΣΕΙΣΜΟΣ ΤΗΣ ΛΕΣΒΟΥ
Mw 6.3, 12 ΙΟΥΝΙΟΥ 2017



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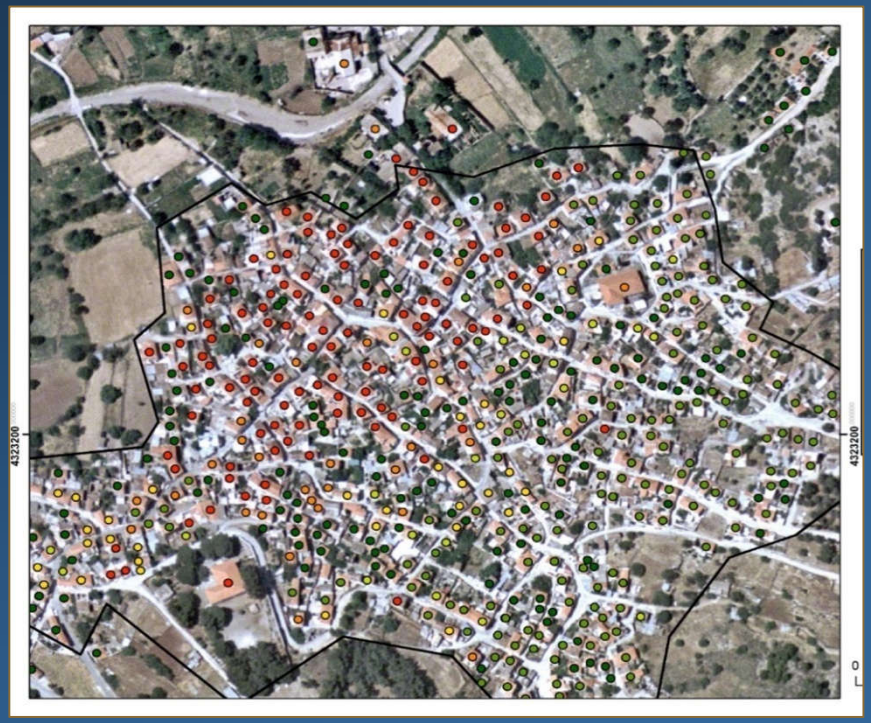
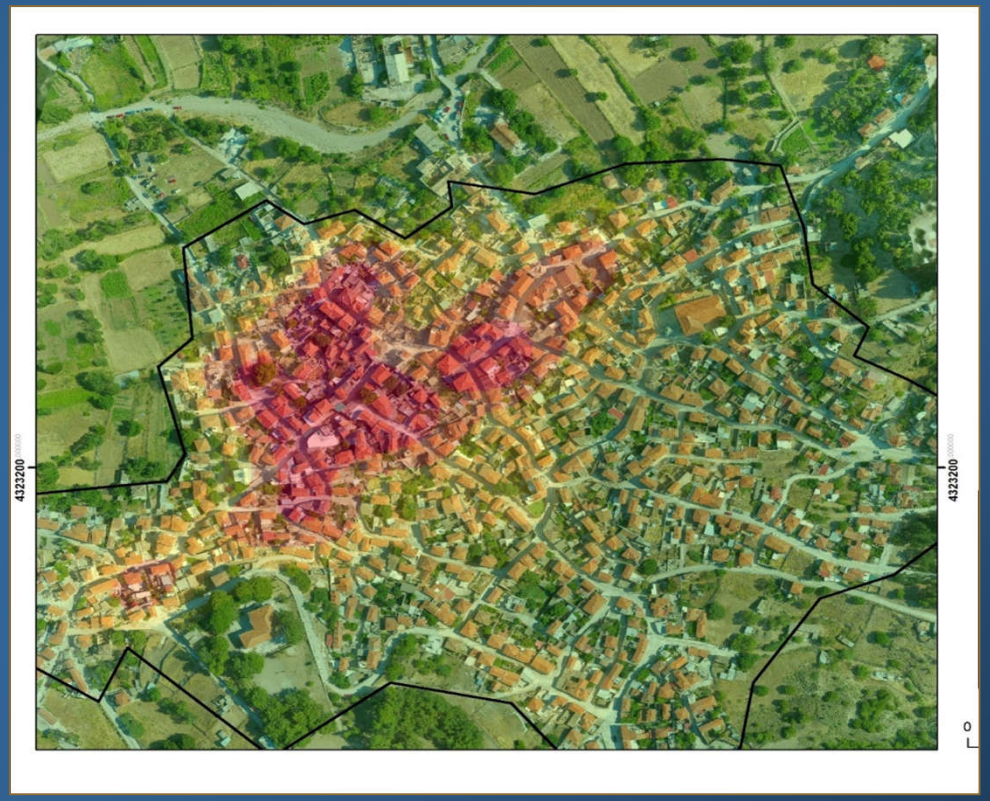
ENVIRONMENTAL, DISASTER AND CRISES MANAGEMENT





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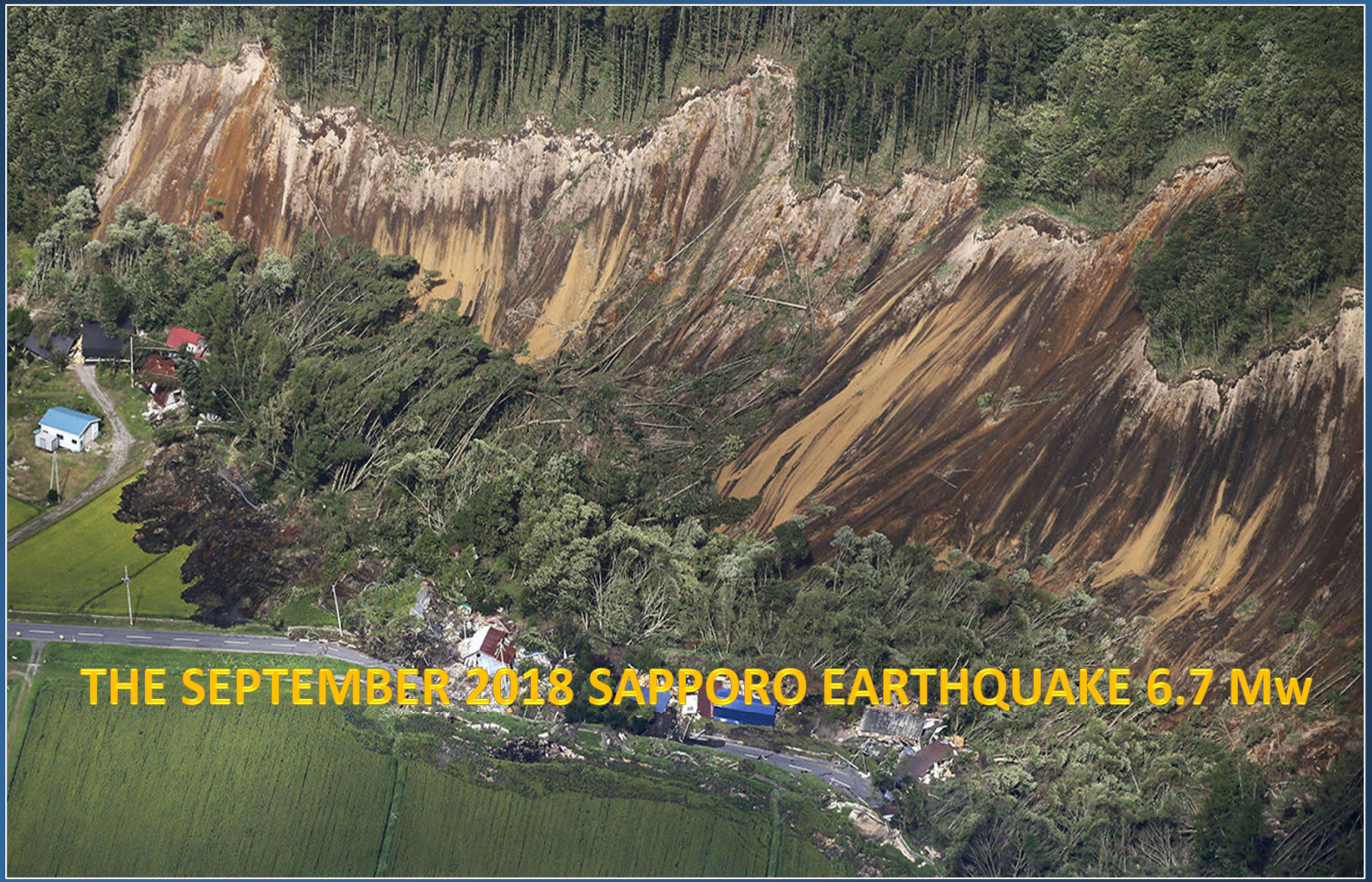
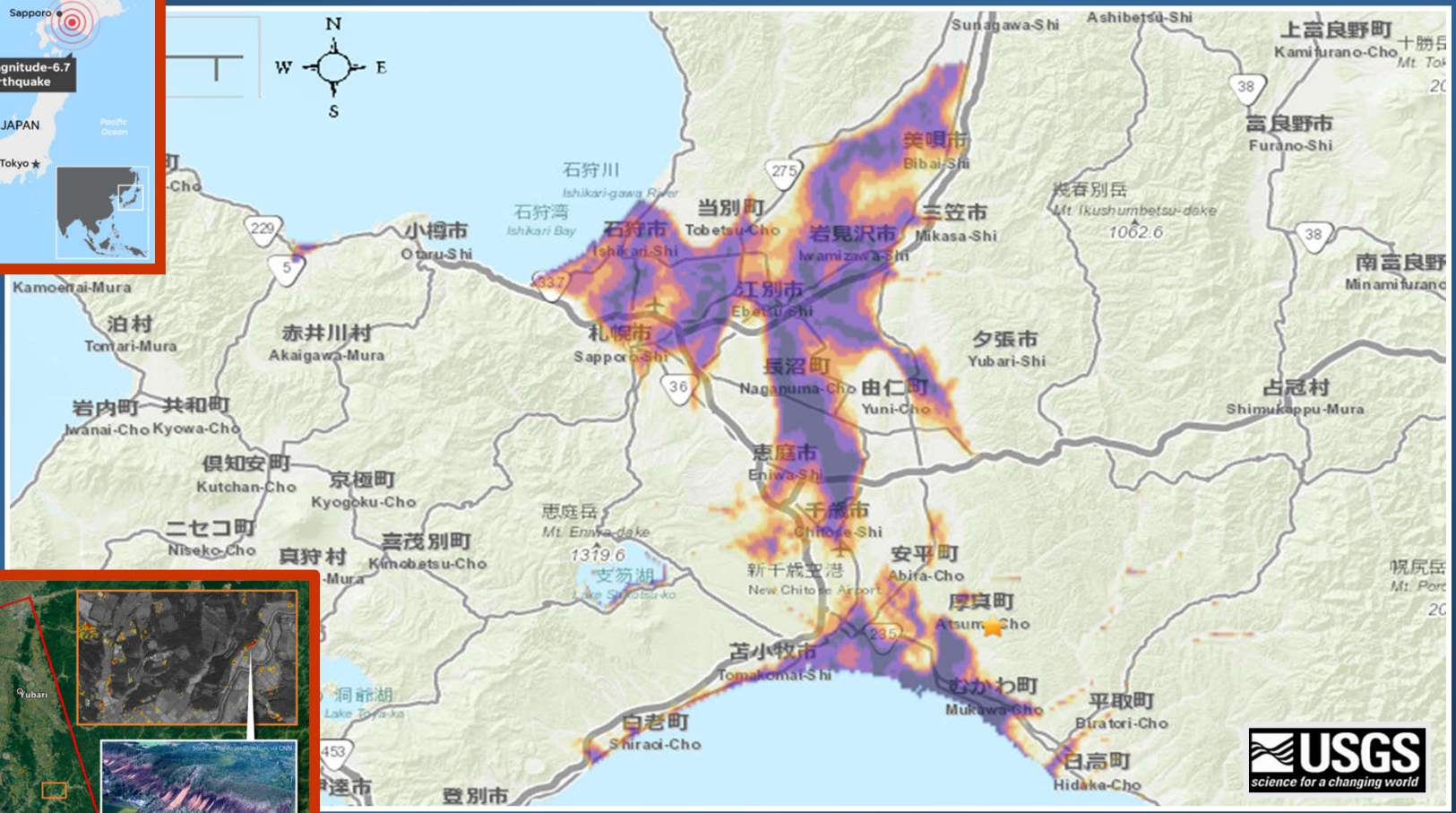


Χάρτης Περιοχών Ρευστοποιήσεων



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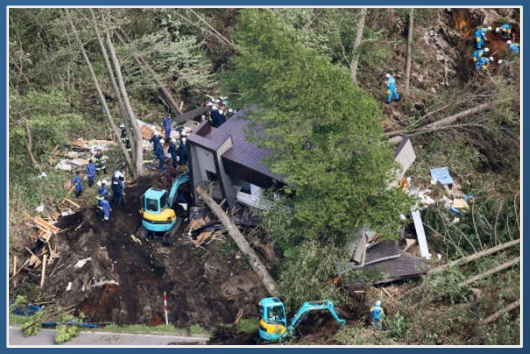
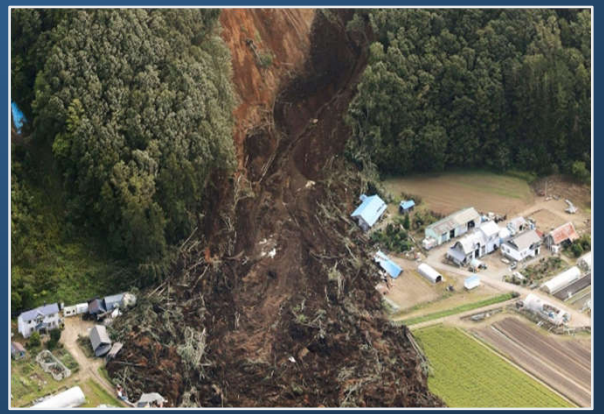
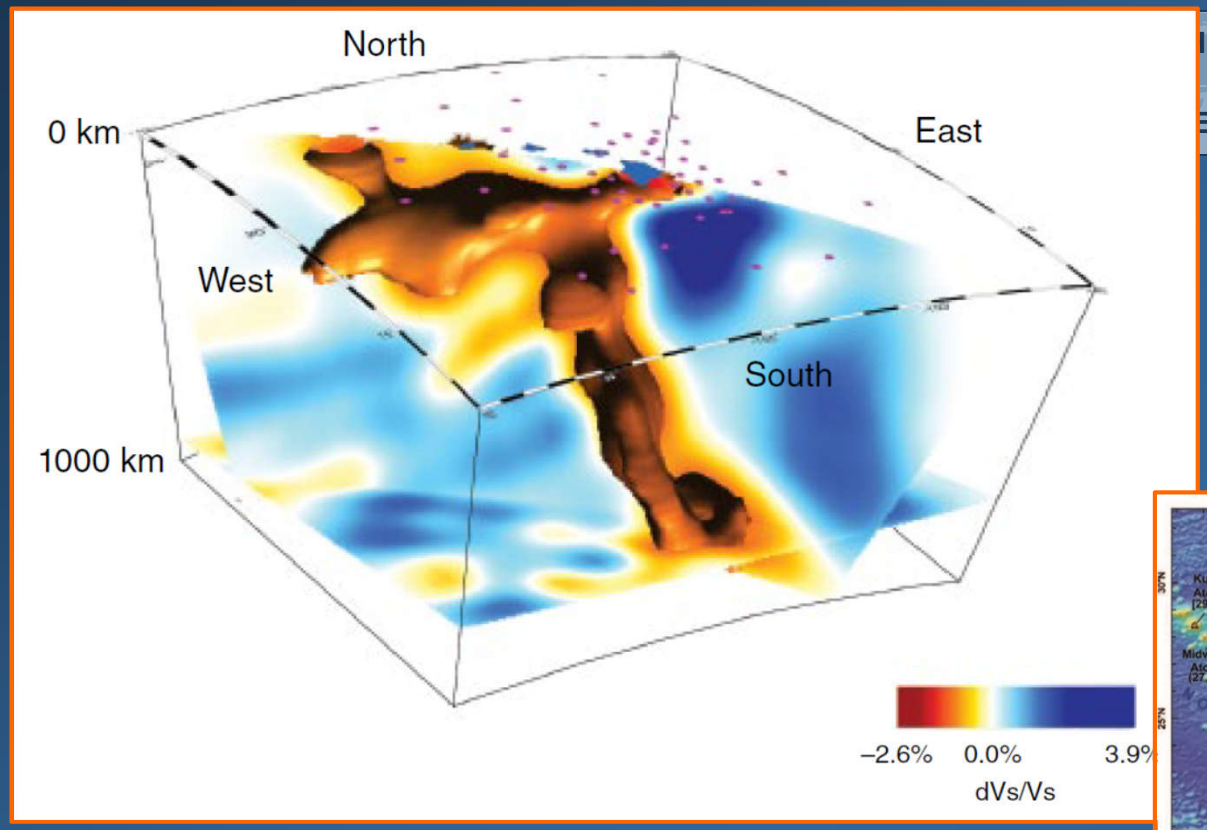
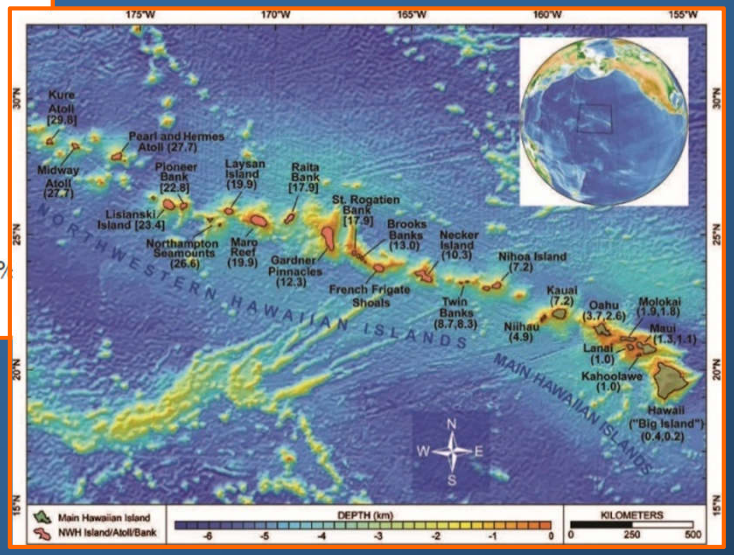


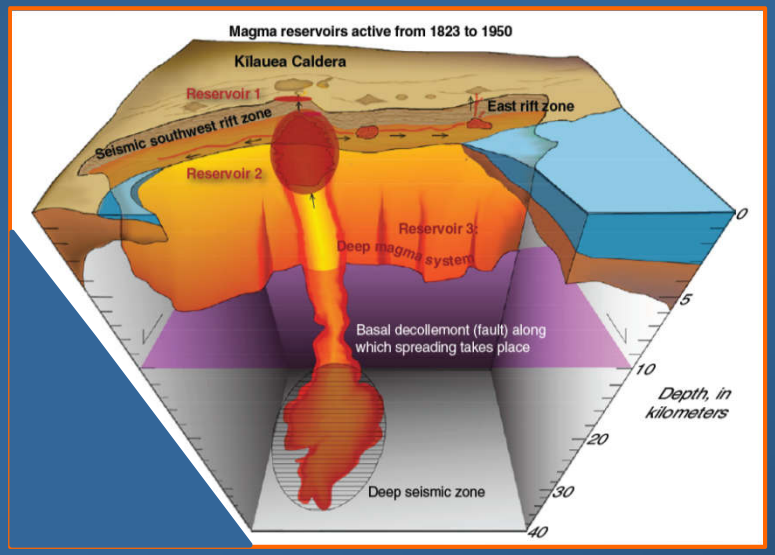

東真消防団



THE MAY - JUNE 2018 KILAUEA (BIG ISLAND, HAWAII) VOLCANO ACTIVITY

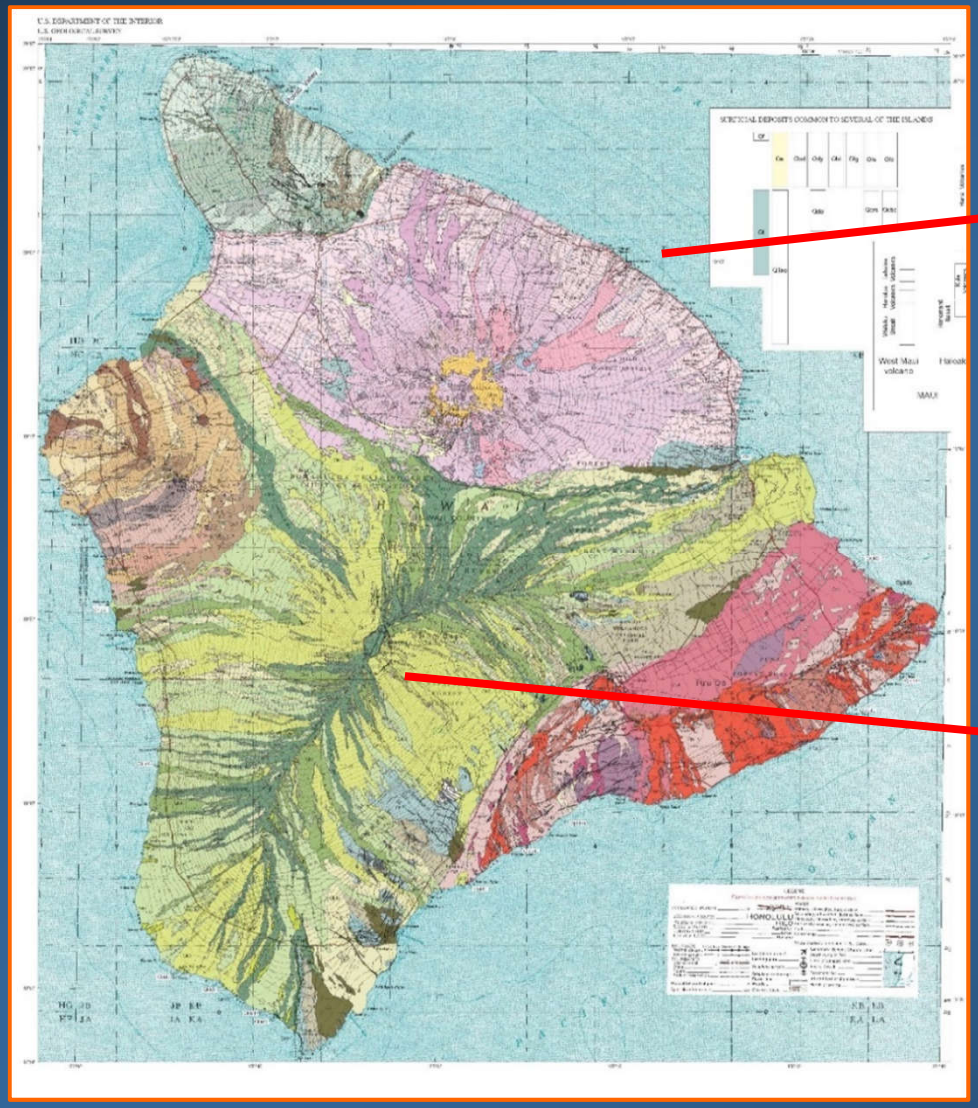


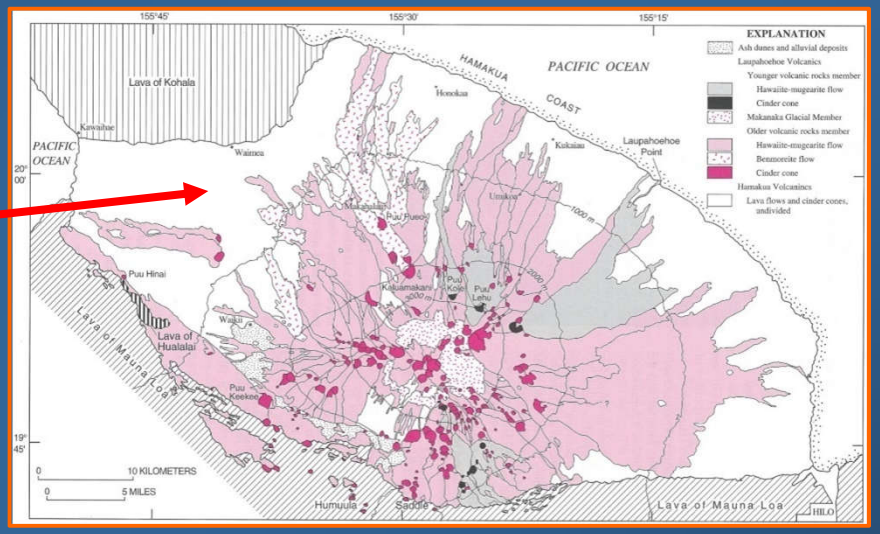


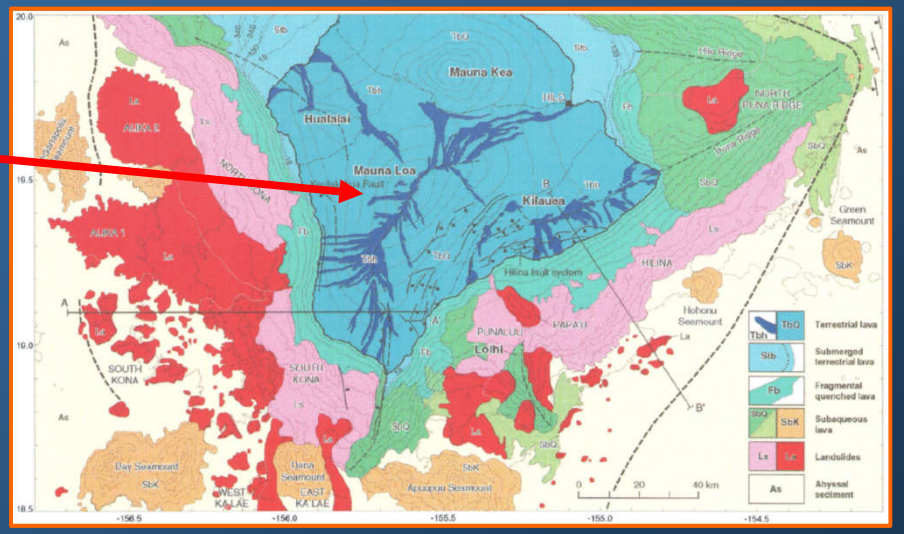


Cheng et al. (2015),
AGU Geophysical Monograph 208, John Wiley & Sons, Inc.

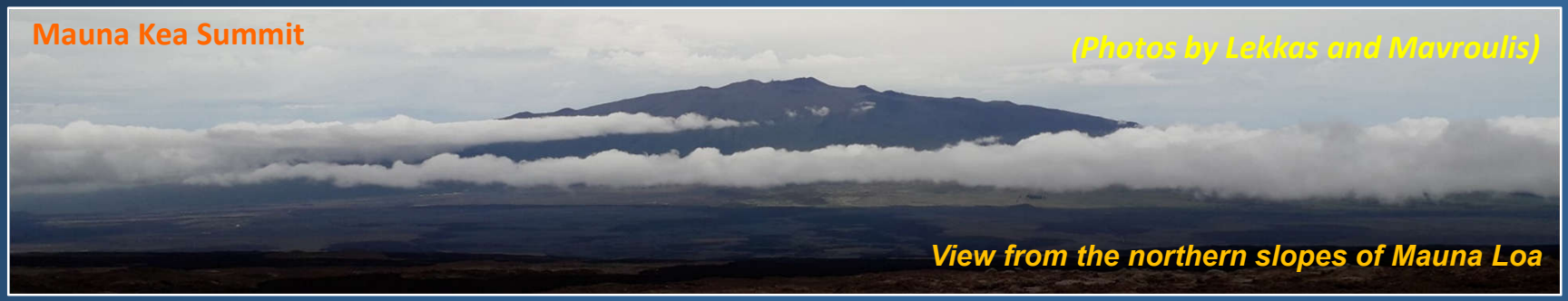
Geological map of Hawaii Island

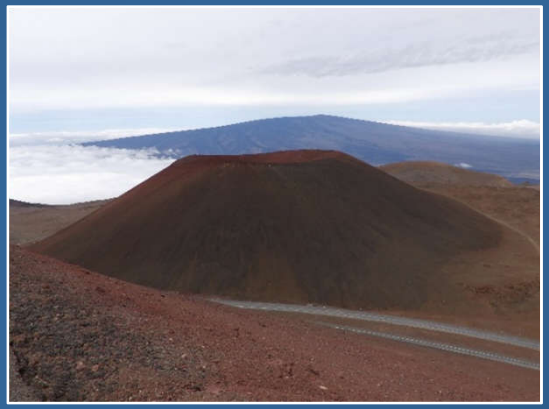




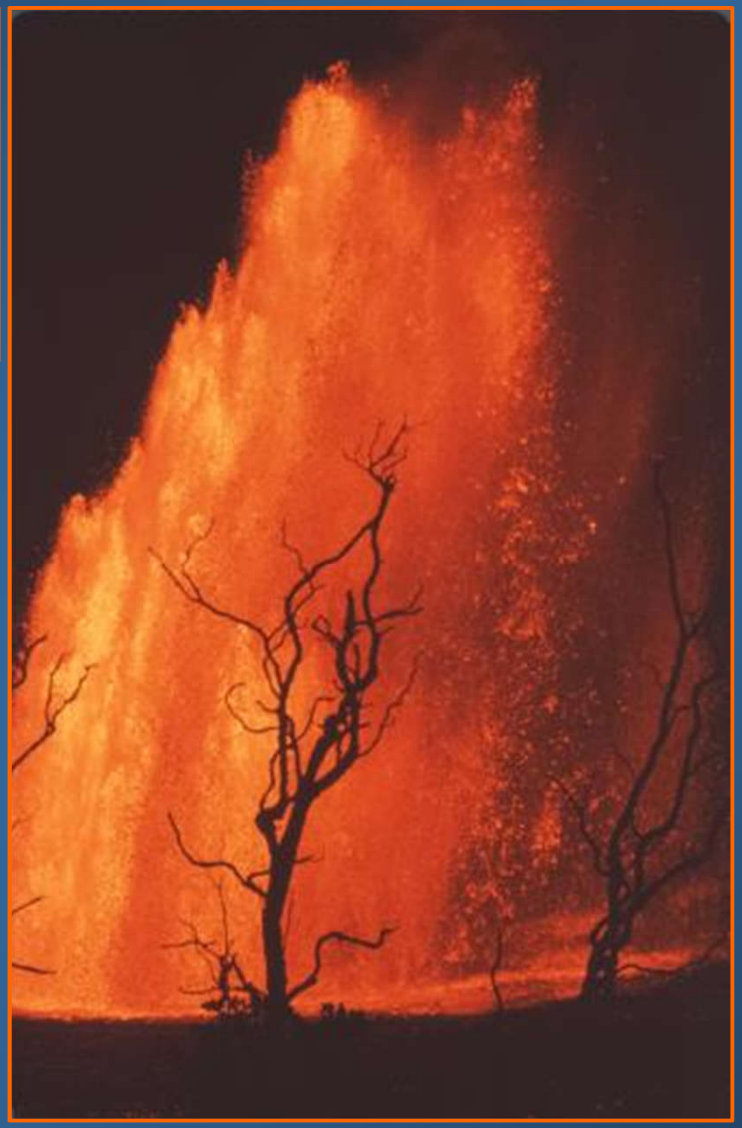


Current condition of Mauna Kea volcano

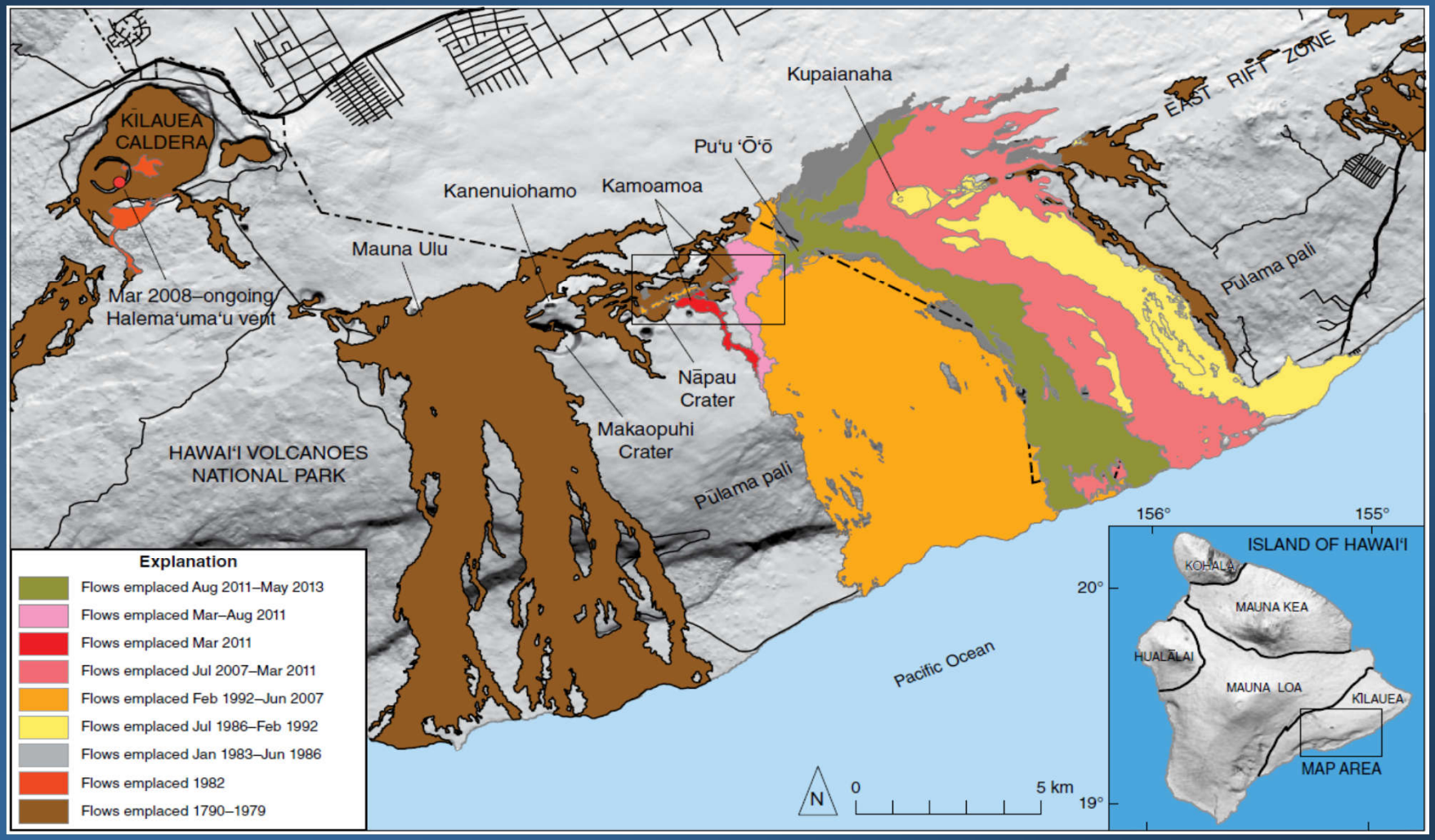




1969 Mauna Ulu Eruption

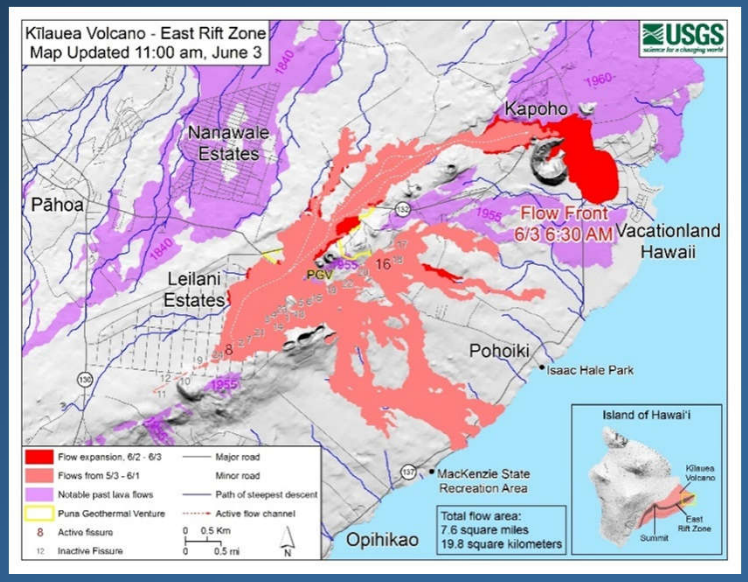


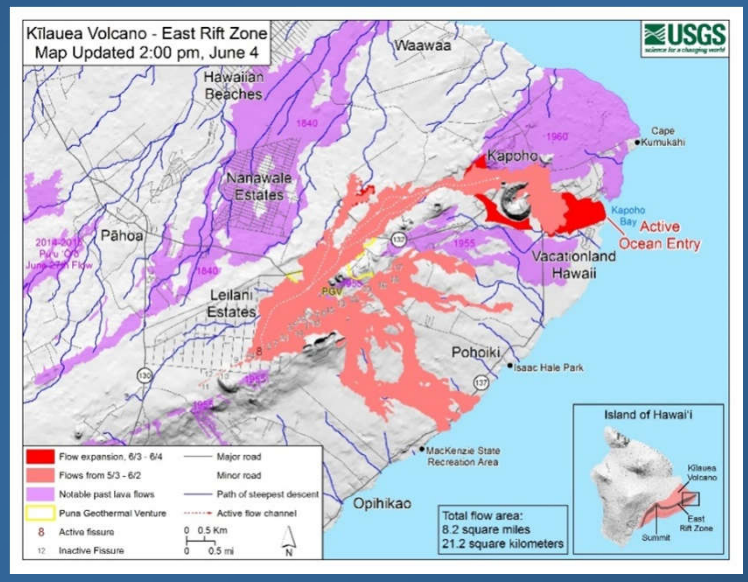
Lava flows emplaced from 1790 to 2013

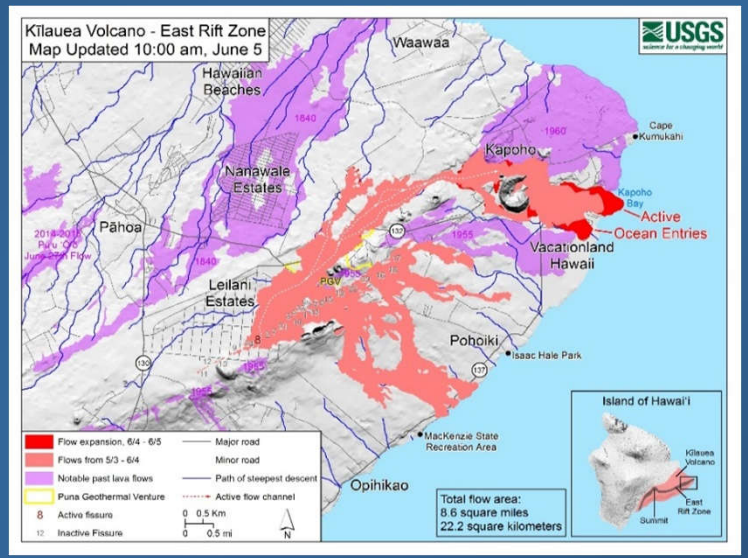


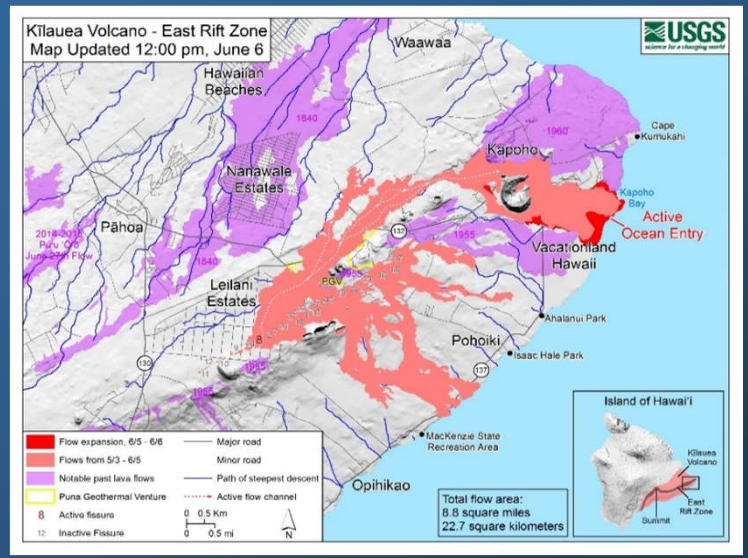
Map of summit and upper-middle East Rift Zone of Kilauea Volcano. Recent and historic lava flows at the summit, along the upper Southwest Rift Zone, and along the upper to middle East Rift Zone.

3-6 June 2018 Kilauea lower East Rift Zone lava flows and fissures

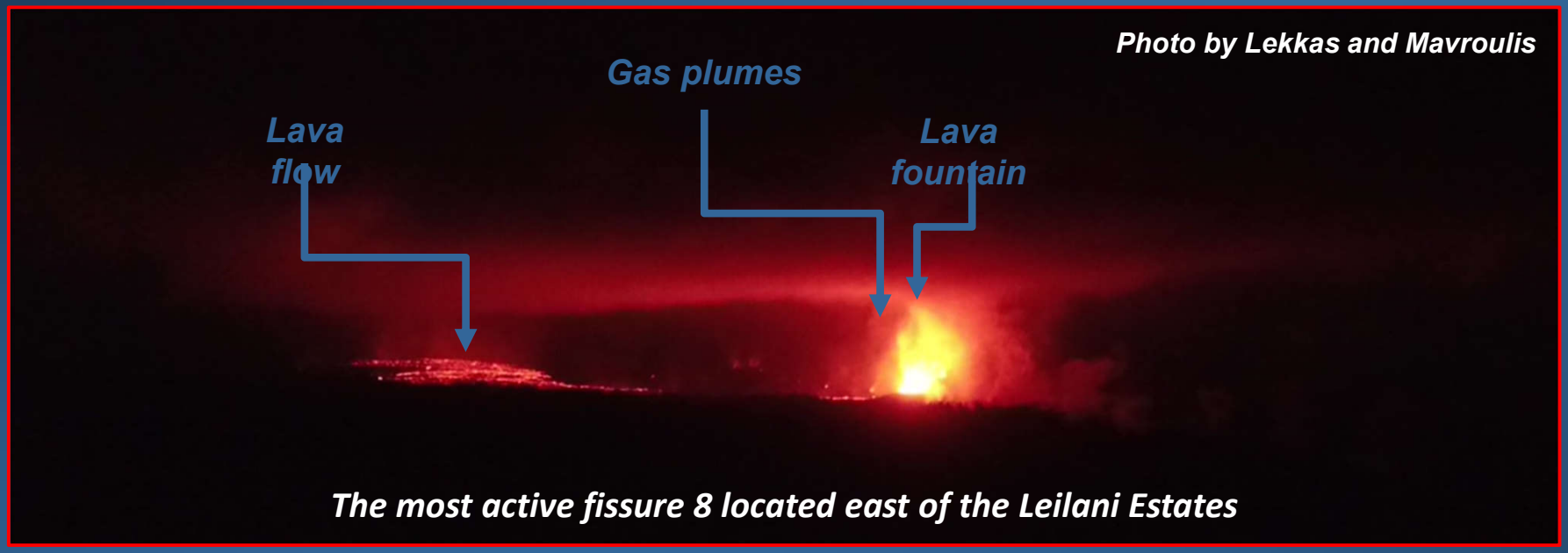






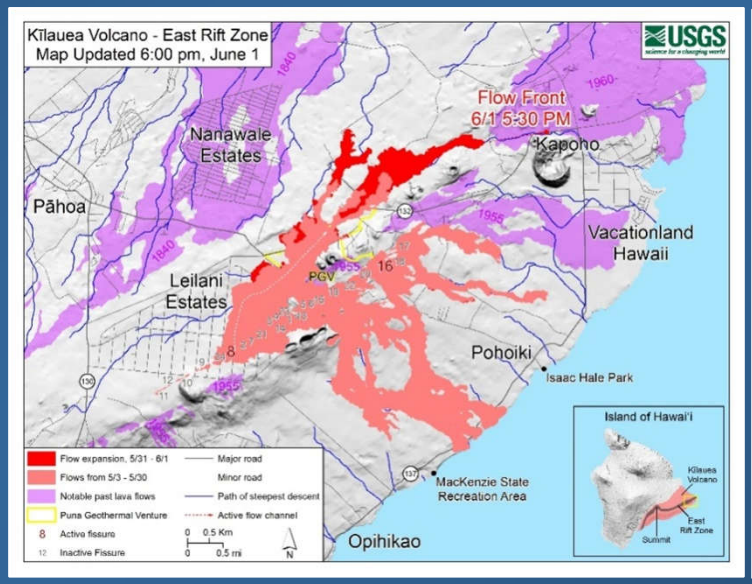


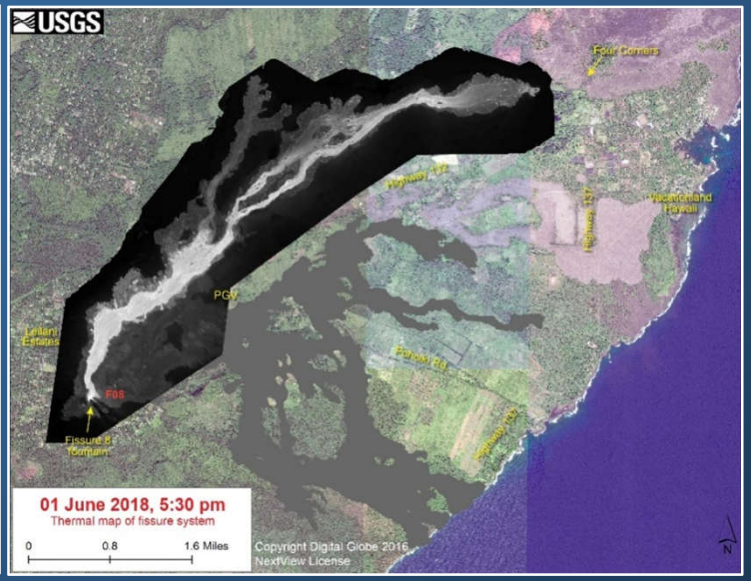
Active fissures, fountains and lava flows in Kilauea Volcano



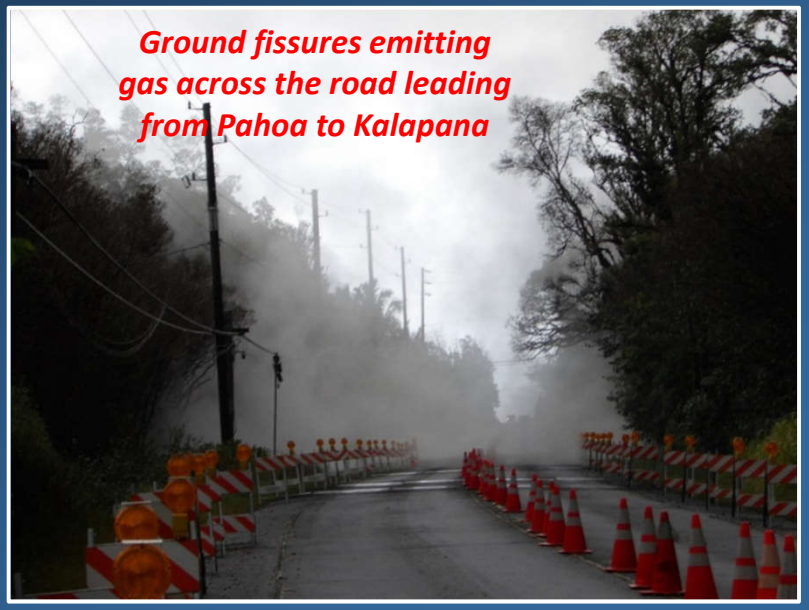
Lava fountain and white plumes of gas recorded on June 1st, 2018 along the most active fissure 8 located east of the Leilani Estates as seen from a helicopter

Photo by Lekkas and Mavroulis





Ground fissures from Pahoa to Kalapana



Damage to buildings and infrastructures

Lava Viewing Area
Kalapana
(Puna District, eastern Hawaii)

Pahoehoe lava hardens into interesting textures

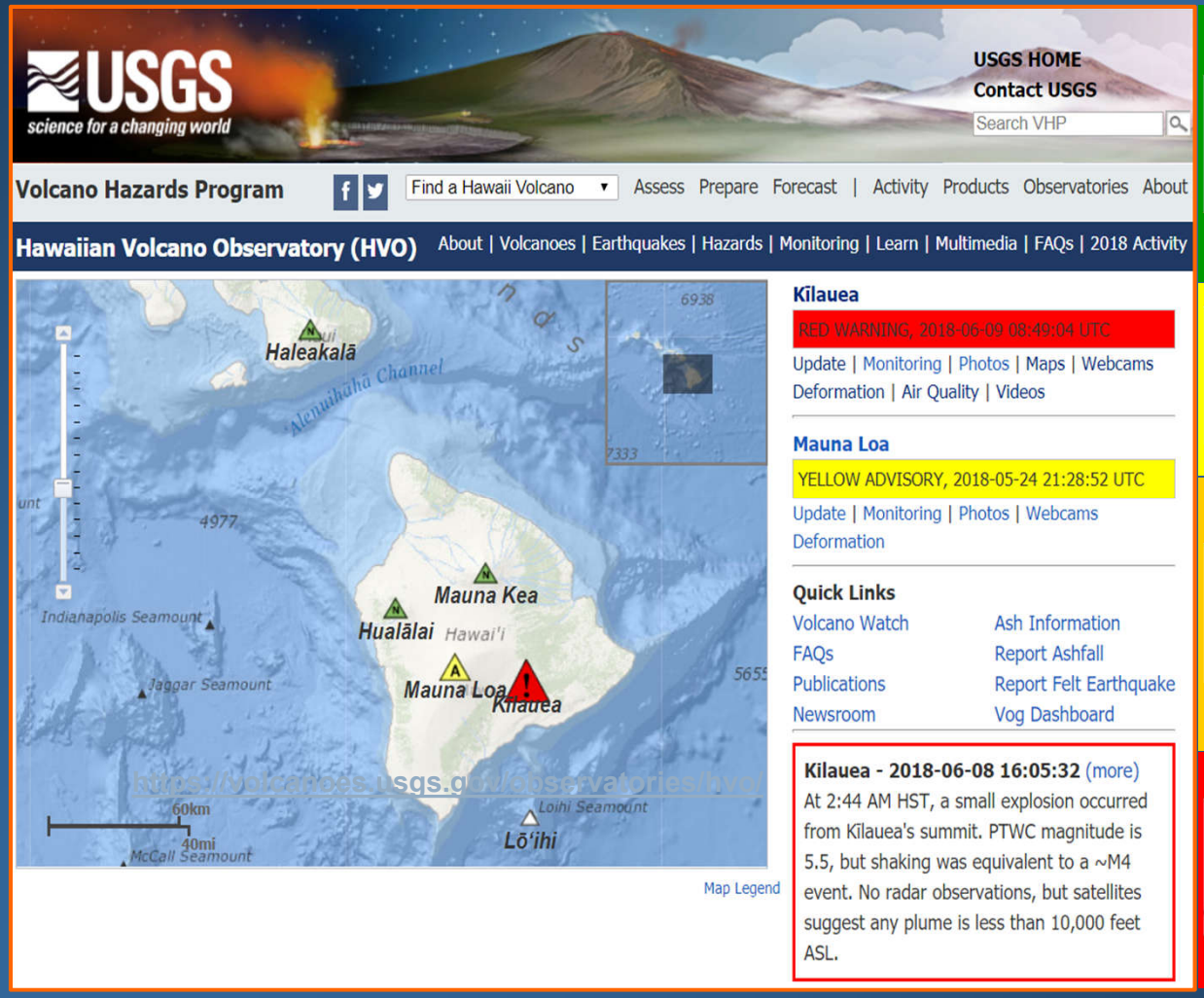
(Photos by Lekkas and Mavroulis)








Monitoring of the Hawaiian Volcanoes
2018 Kilauea volcanic activity



Non-erupting volcano is exhibiting typical background activity (including steaming, seismic events, thermal feature, or degassing), as long as such activity is within the range of typical non-eruptive phenomena seen at the volcano.

Volcano is exhibiting signs of elevated unrest above known background activity.

Major volcanic eruption is imminent, underway, or suspected but it poses limited hazards to aviation because of no or minor volcanic-ash emissions (e.g., an eruption with only substantial lava flows and no risk of ash production).

Major volcanic eruption is imminent, underway, or suspected with hazardous activity both on the ground and in the air.

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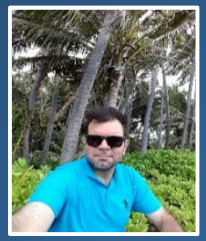

The September 2017 M 8.2 Chiapas and M 7.1 Puebla-Morelos earthquakes in Mexico

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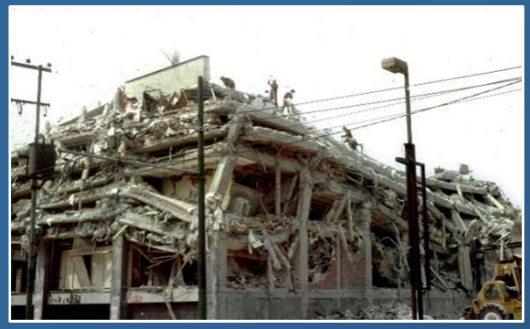
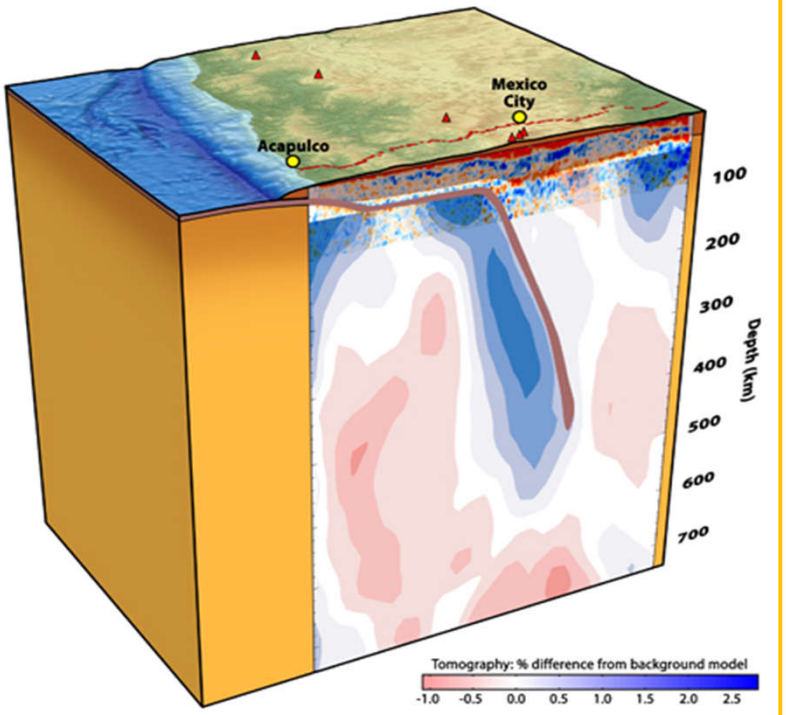
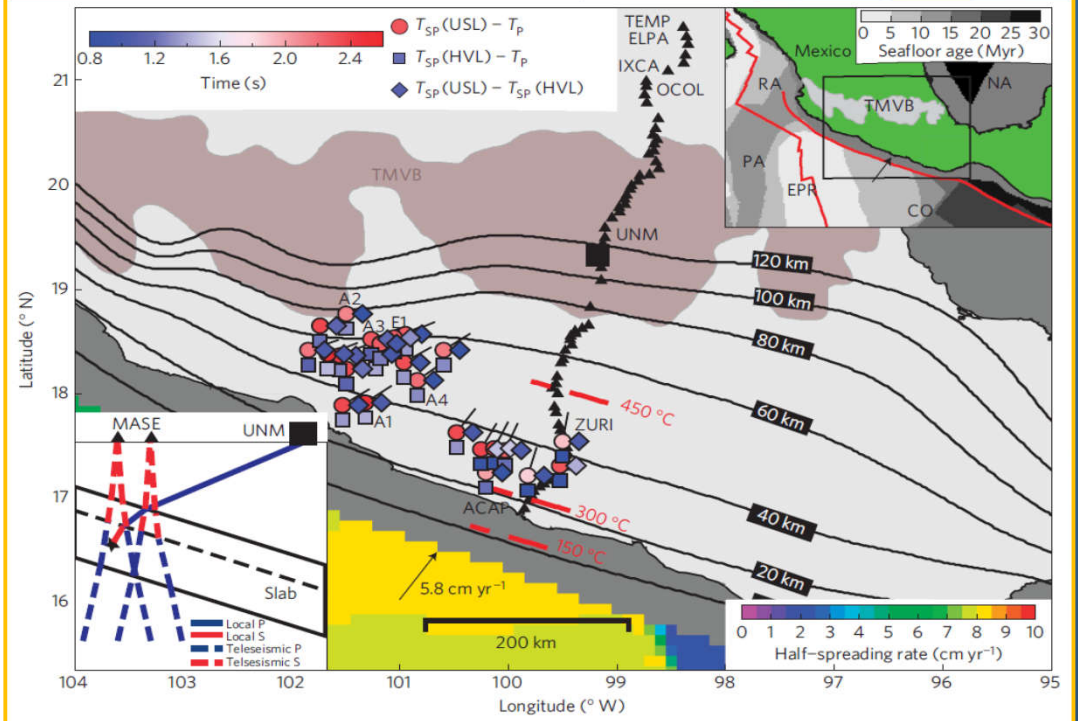
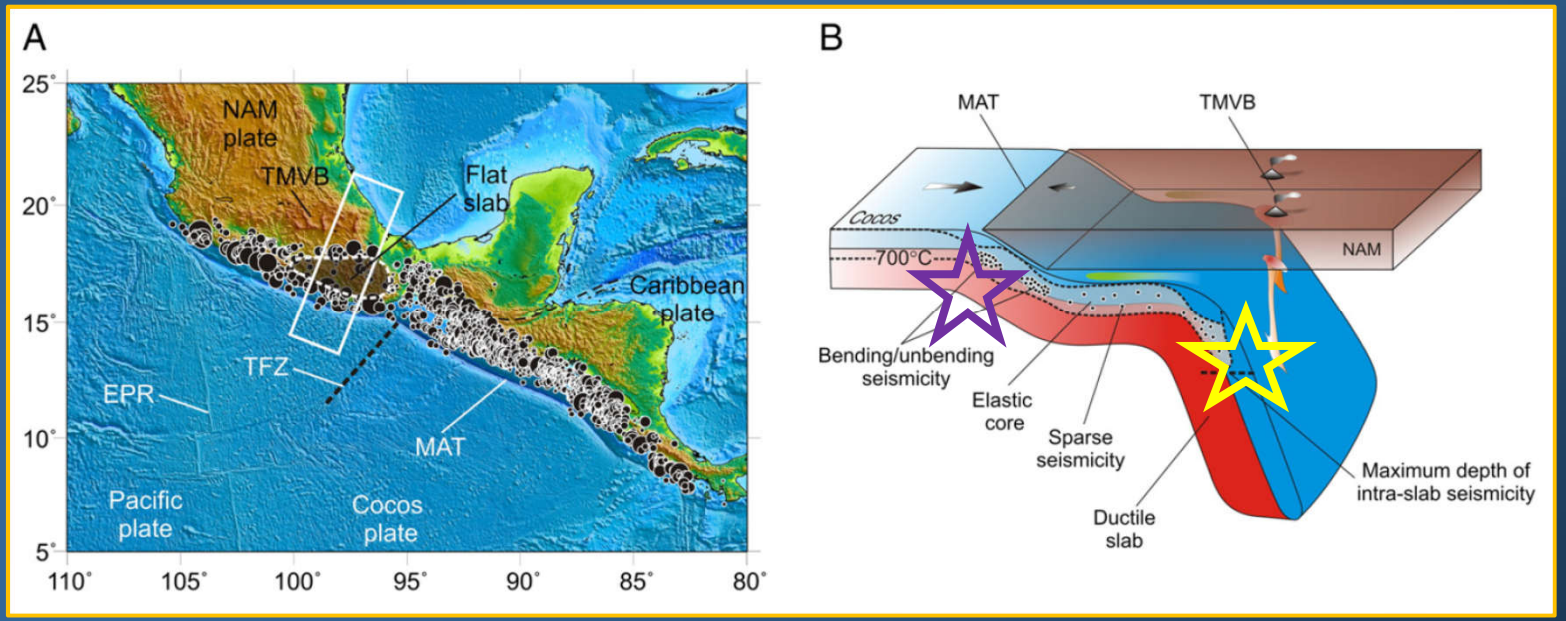
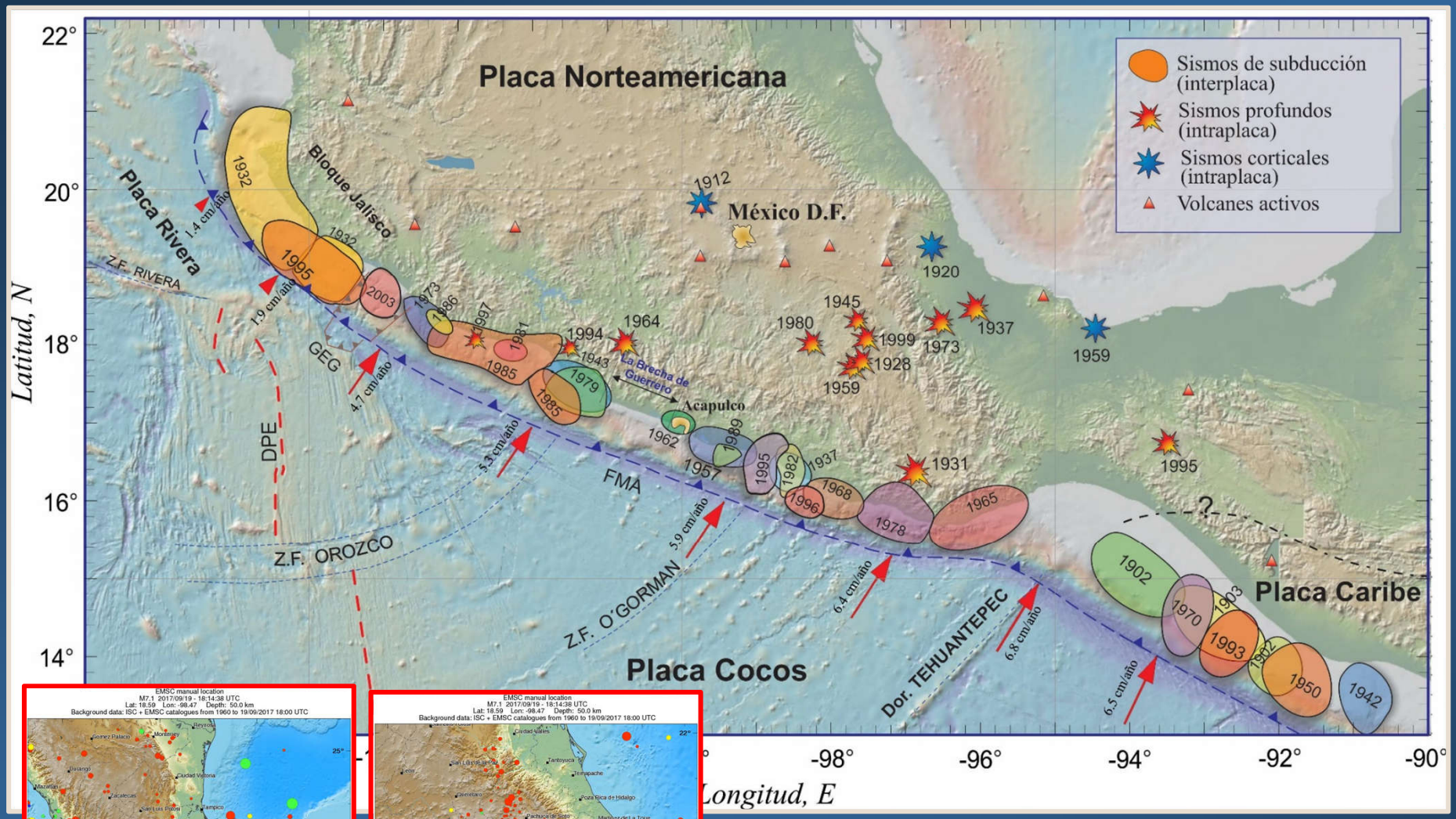
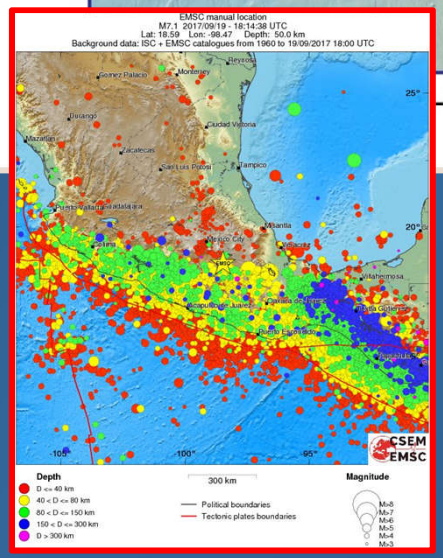


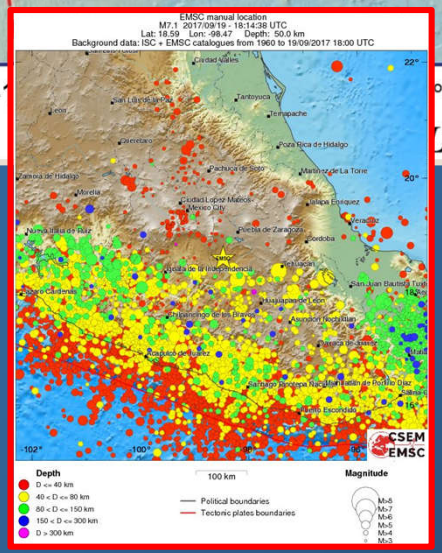

Mexico City
Acapulco
100
200
300
400
500
600
700
Depth (km)
Tomography: % difference from background model
-1.0 -0.5 0.0 0.5 1.0 1.5 2.0 2.5


0.8 1.2 1.6 2.0 2.4
Time (s)
T_{SP} (USL) – T_P
T_{SP} (HVL) – T_P
T_{SP} (USL) – T_{SP} (HVL)
TEMP
ELPA
IXCA
OCOL
0 5 10 15 20 25 30
Seafloor age (Myr)
Mexico
RA
NA
TMVB
PA
EPR
CO
TMVB
UNM
A2
A3
E1
A4
A1
ZURI
ACAP
120 km
100 km
80 km
60 km
40 km
20 km
450 °C
300 °C
150 °C
MASE
UNM
Slab
Local P
Local S
Teleseismic P
Telseismic S
5.8 cm yr⁻¹
200 km
0 1 2 3 4 5 6 7 8 9 10
Half-spreading rate (cm yr⁻¹)
Latitude (° N)
Longitude (° W)
21
20
19
18
17
16
104
103
102
101
100
99
98
97
96
95

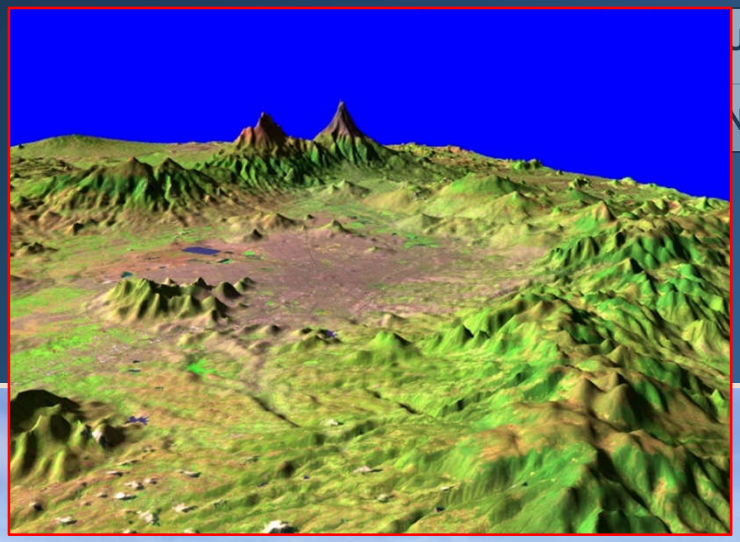

A
25°
20°
15°
10°
5°
NAM plate
TMVB
Flat slab
Caribbean plate
TFZ
EPR
MAT
Pacific plate
Cocos plate
110°
105°
100°
95°
90°
85°
80°
B
MAT
TMVB
Cocos
NAM
700°C
Bending/unbending seismicity
Elastic core
Sparse seismicity
Ductile slab
Maximum depth of intra-slab seismicity

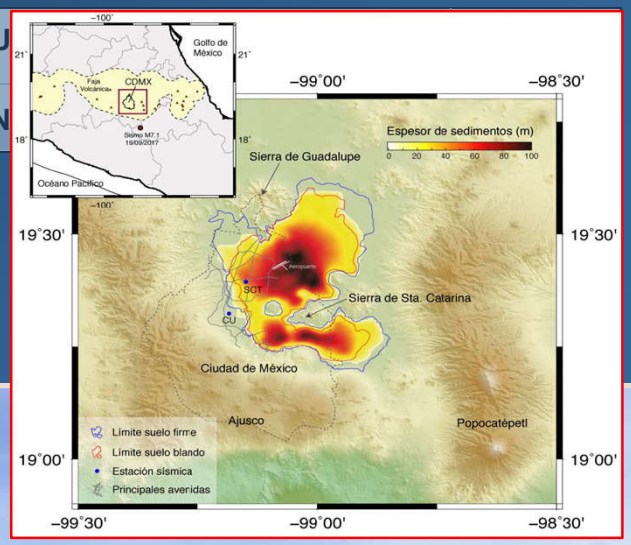

Placa Norteamericana
Placa Rivera
Placa Cocos
Placa Caribe
Bloque Jalisco
Z.F. RIVERA
Z.F. OROZCO
Z.F. O'GORMAN
DPE
GEG
FMA
Dor. TEHUANTEPEC
La Brecha de Guerrero
México D.F.
Acapulco
1.4 cm/año
1.9 cm/año
4.7 cm/año
5.3 cm/año
5.9 cm/año
6.4 cm/año
6.8 cm/año
6.5 cm/año
Sismos de subducción (interplaca)
Sismos profundos (intraplaca)
Sismos corticales (intraplaca)
Volcanes activos
Latitud, N
Longitud, E
22°
20°
18°
16°
14°
-98°
-96°
-94°
-92°
-90°


EMSC manual location
M7.1 2017/09/19 - 18:14:38 UTC
Lat: 18.59 Lon: -98.47 Depth: 50.0 km
Background data: ISC + EMSC catalogues from 1960 to 19/09/2017 18:00 UTC
CSEM EMSC
Depth
Magnitude
Political boundaries
Tectonic plates boundaries


EMSC manual location
M7.1 2017/09/19 - 18:14:38 UTC
Lat: 18.59 Lon: -98.47 Depth: 50.0 km
Background data: ISC + EMSC catalogues from 1960 to 19/09/2017 18:00 UTC
CSEM EMSC
Depth
Magnitude
Political boundaries
Tectonic plates boundaries


Zonas Sísmicas en México
Zona A. Escasa actividad sísmica y de baja magnitud.
Zona B y C. Zonas de intensidad intermedia con sismos poco frecuentes.
Zona D. Sismos muy frecuentes donde han ocurrido los de mayor magnitud y generado daños.




Golfo de México
CDMX
Faja Volcánica
Sismo M7.1 19/09/2017
Océano Pacífico
−100°
21°
18°
−99°00'
−98°30'
19°30'
19°00'
Espesor de sedimentos (m)
0 20 40 60 80 100
Sierra de Guadalupe
Aeropuerto
SCT
CU
Sierra de Sta. Catarina
Ciudad de México
Ajusco
Popocatépetl
Límite suelo firme
Límite suelo blando
Estación sísmica
Principales avenidas

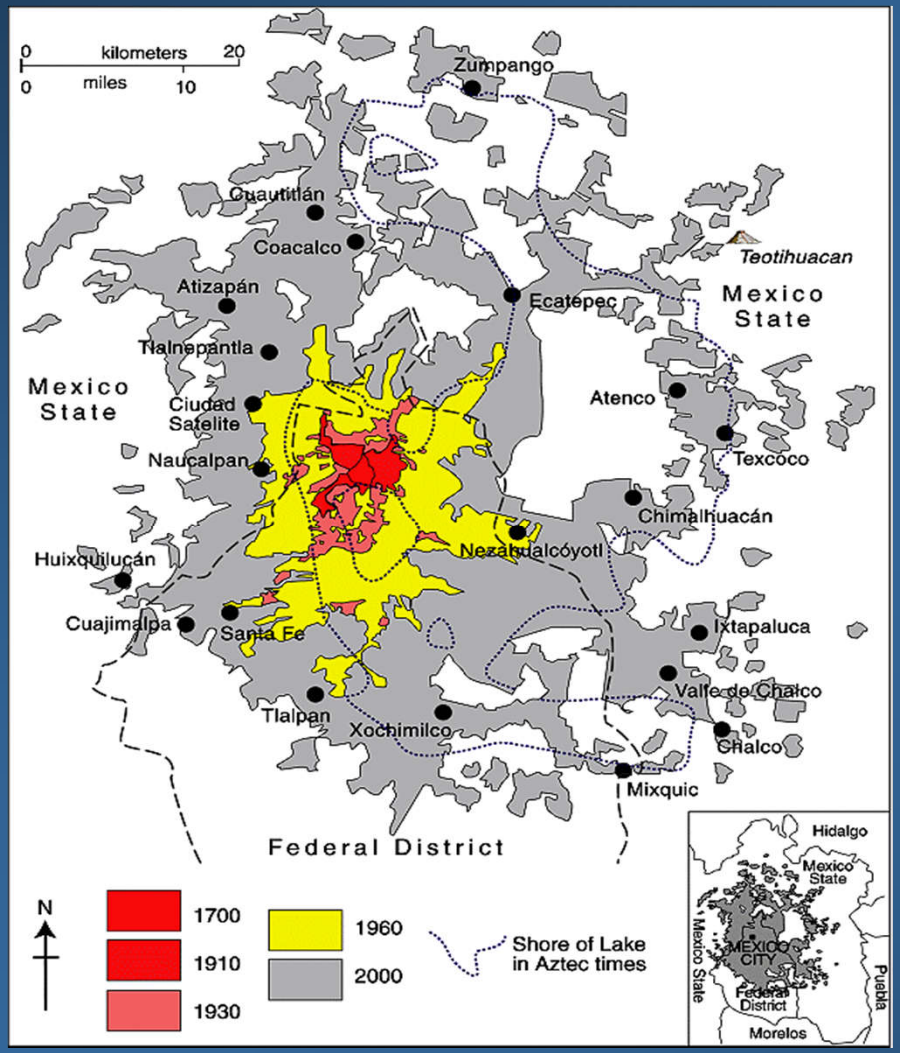

Sierra de Las Cruces
Volcán de Guadalupe
Sierra de Santa Catarina
Cerro del Elefante
La Caldera
Mexico Basin
MEXICO 150 D

Tenochtitlan, the Capital of the Aztec Empire

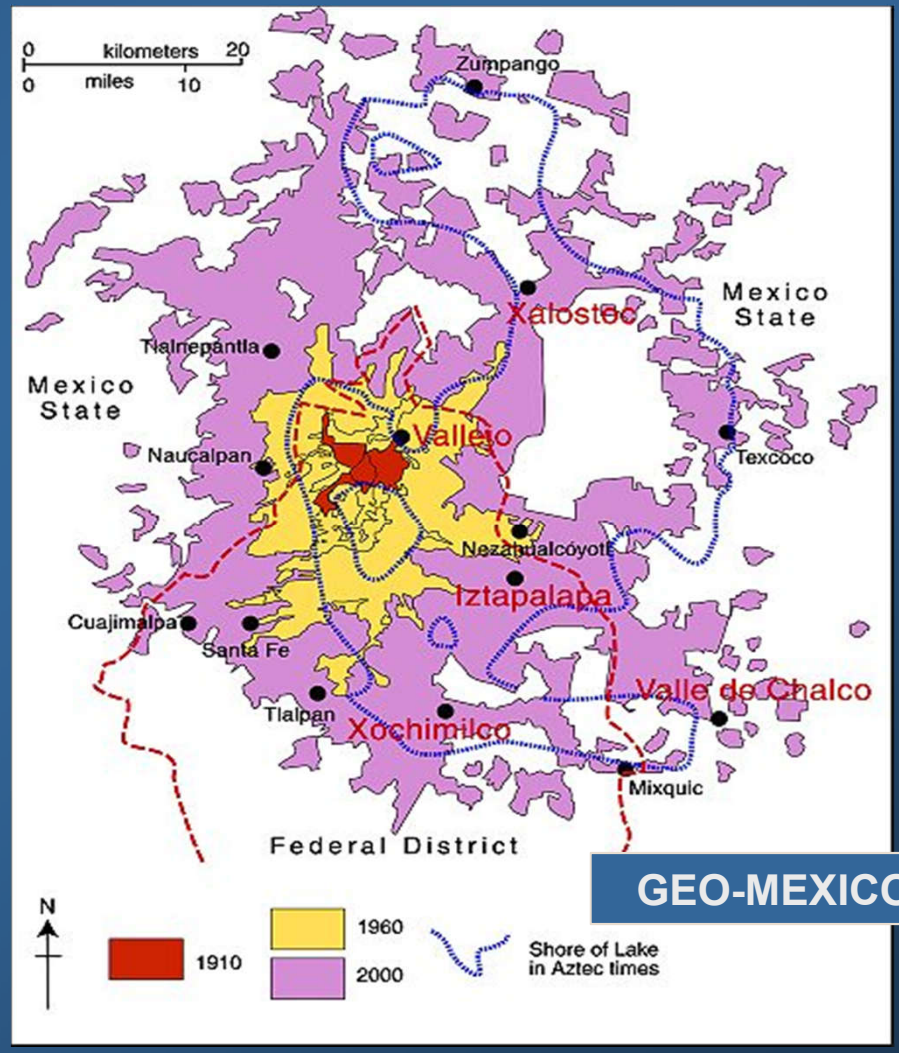
Unknown creator, the foundation of Tenochtitlan, Codex Mendoza, 1542. © Bodleian Libraries, University of Oxford

Unknown creator, map of Tenochtitlan (at right) and schema of the Gulf Coast (at left), from Hernando Cortés's Second Letter, Praeclara Fernandi Cortesii de Noua Maris Oceani Hyspania Narratio . . . (Nuremberg, 1524). Courtesy of the Newberry Library, Chicago, Ayer 655.51.C8 1524d.

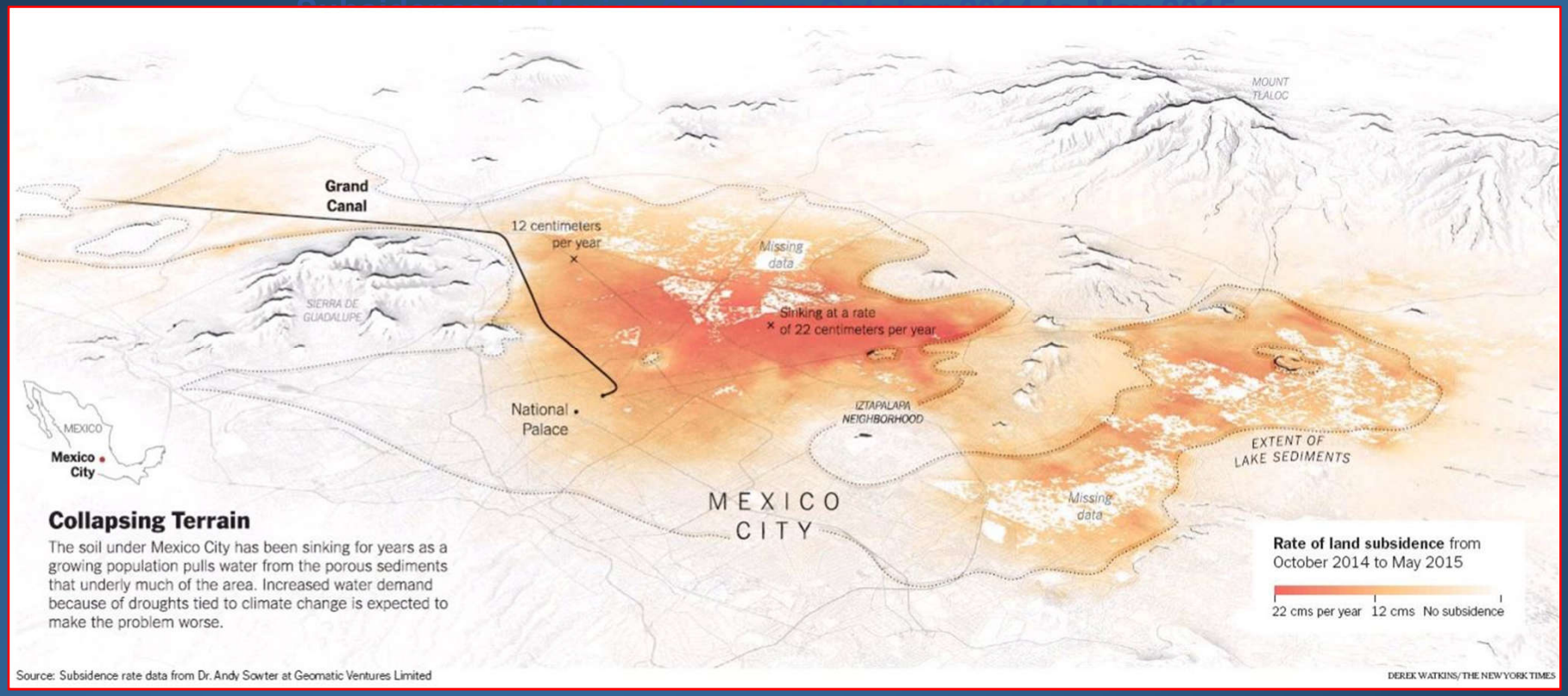
Spatial growth of Mexico City Metropolitan Area

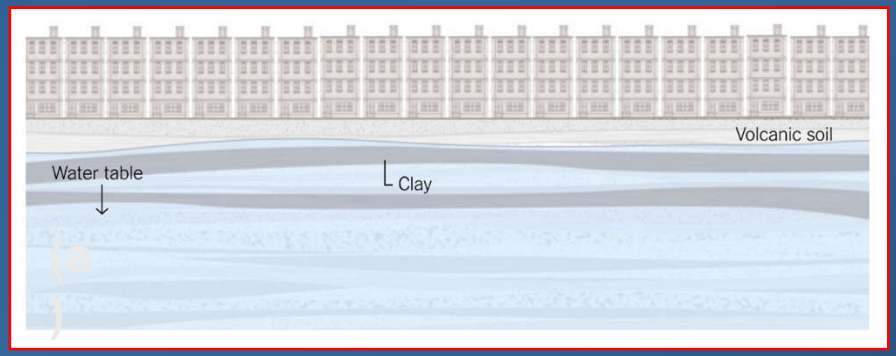


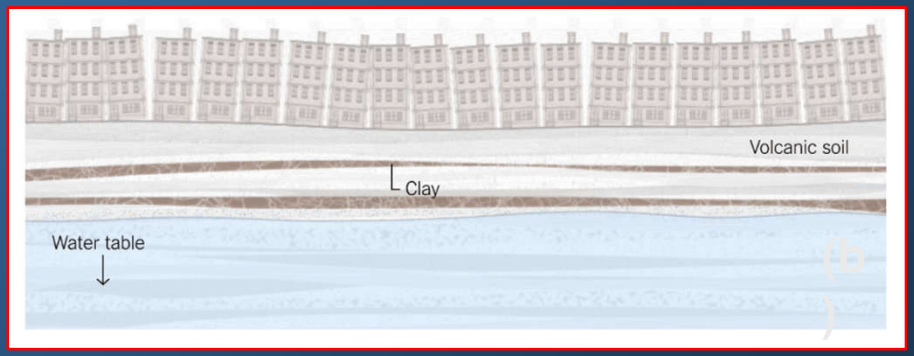
Sites in Mexico Valley with high incidence of ground cracks



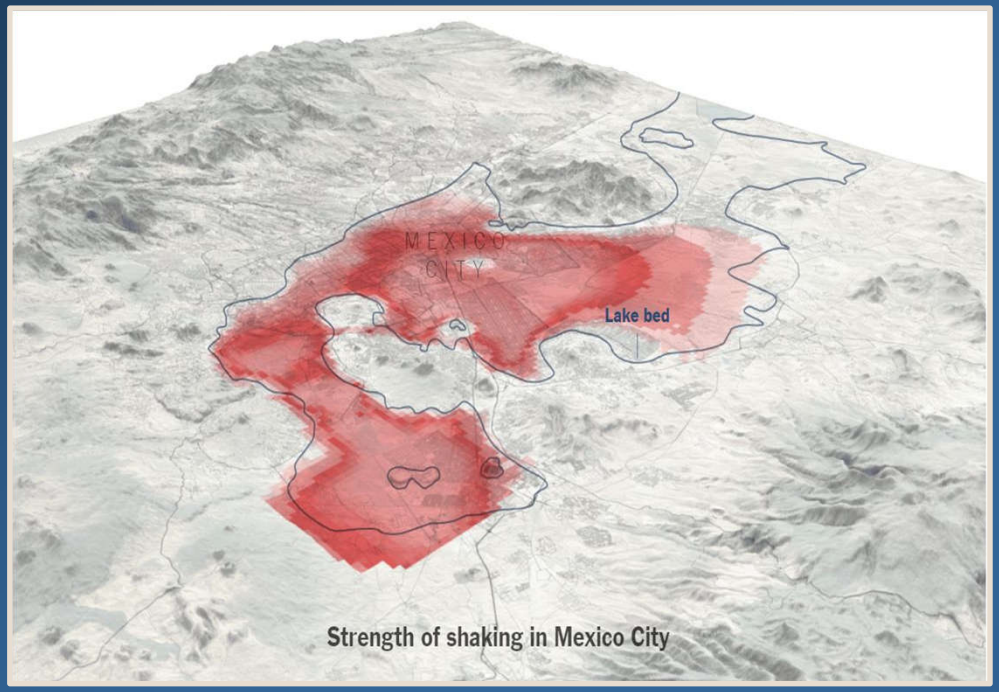
GEO-MEXICO


MOUNT TLALOC
Grand Canal
12 centimeters per year
Missing data
SIERRA DE GUADALUPE
Sinking at a rate of 22 centimeters per year
National Palace
IZTAPALAPA NEIGHBORHOOD
EXTENT OF LAKE SEDIMENTS
MEXICO
Mexico City
MEXICO CITY
Missing data
Collapsing Terrain
The soil under Mexico City has been sinking for years as a growing population pulls water from the porous sediments that underly much of the area. Increased water demand because of droughts tied to climate change is expected to make the problem worse.
Rate of land subsidence from October 2014 to May 2015
22 cms per year
12 cms
No subsidence
Source: Subsidence rate data from Dr. Andy Sowter at Geomatic Ventures Limited
DEREK WATKINS/THE NEW YORK TIMES


Volcanic soil
Water table
Clay
(a)


Volcanic soil
Clay
Water table
(b)

Long Duration of Ground Motion in the Valley of Mexico



Built-up on top of ancient lake deposits, Mexico City experiences some of the largest seismic site effects worldwide. Besides the extreme amplification of seismic waves, duration of intense ground motion from large subduction earthquakes exceeds three minutes in the lake-bed zone of the basin, where hundreds of buildings collapsed or were seriously damaged during the M 8.0 Michoacán earthquake in 1985, the M 8.2 Chiapas and the M 7.1 Puebla-Morelos earthquakes during September 2017. Different mechanisms contribute to the long lasting motions, such as the regional dispersion and multiple-scattering of the incoming wavefield from the coast, more than 300 km away from the city.

By means of high performance computational modeling Cruz-Atienza et al. (2016) showed that, despite the highly dissipative basin deposits, seismic energy can propagate long distances in the deep structure of the valley, promoting also a large elongation of motion. Their simulations revealed that the seismic response of the basin is dominated by surface-waves overtones, and that this mechanism increases the duration of ground motion by more than 170% and 290% of the incoming wavefield duration at 0.5 and 0.3Hz, respectively, which are two frequencies with the largest observed amplification. This conclusion contradicts what has been previously stated from observational and modeling investigations, where the basin itself has been discarded as a preponderant factor promoting long and devastating shaking in Mexico City.

Cruz-Atienza et al. 2016, Scientific Reports 6, 38807; doi: 10.1038/srep38807

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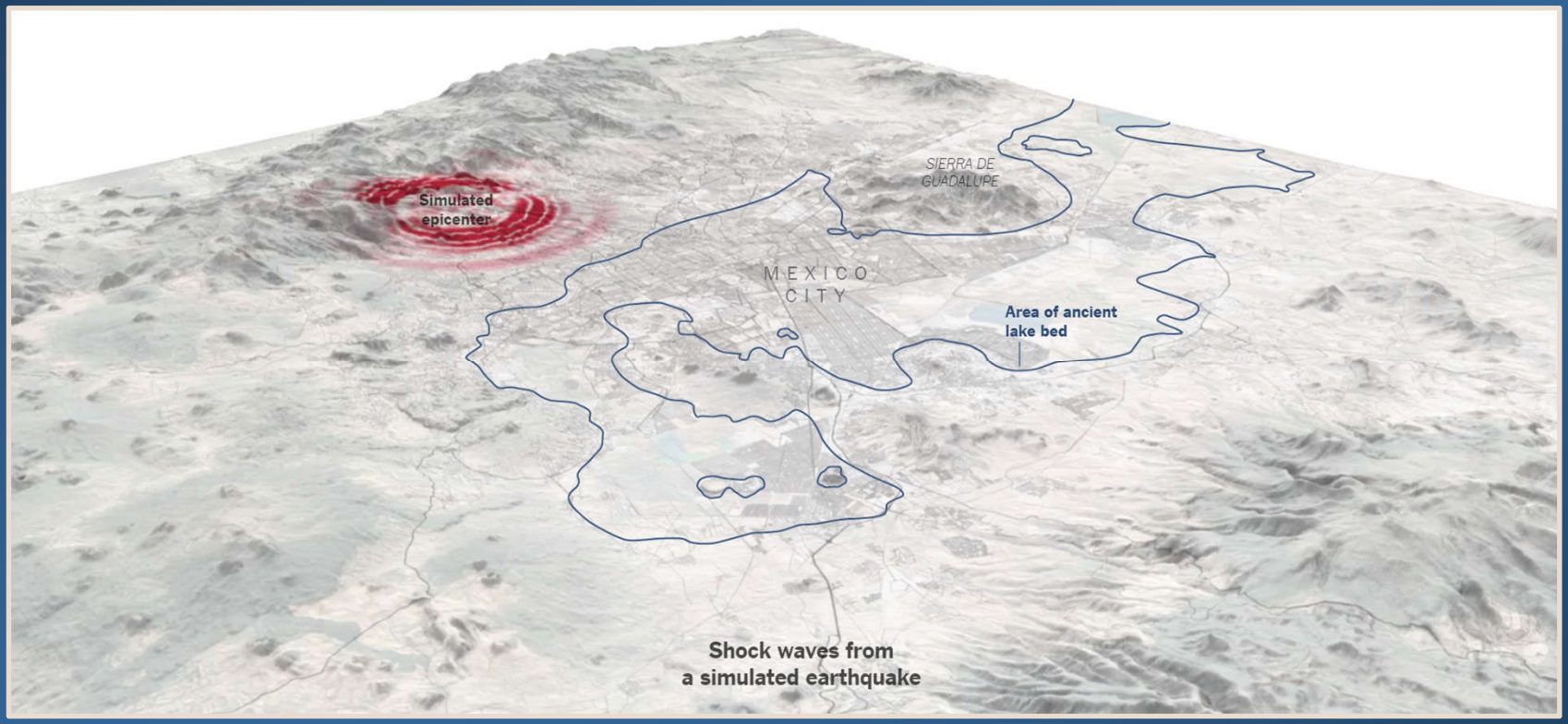
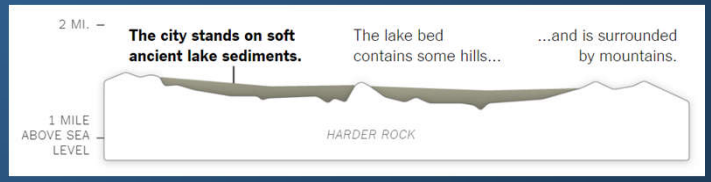
Shock waves of a hypothetical earthquake generated near Mexico City and amplification in the area of the ancient lake bed



Darker red areas indicate the strongest ground movement (based on *Cruz-Atienza et al. 2016, Scientific Reports 6, 38807; doi: 10.1038/srep38807*)



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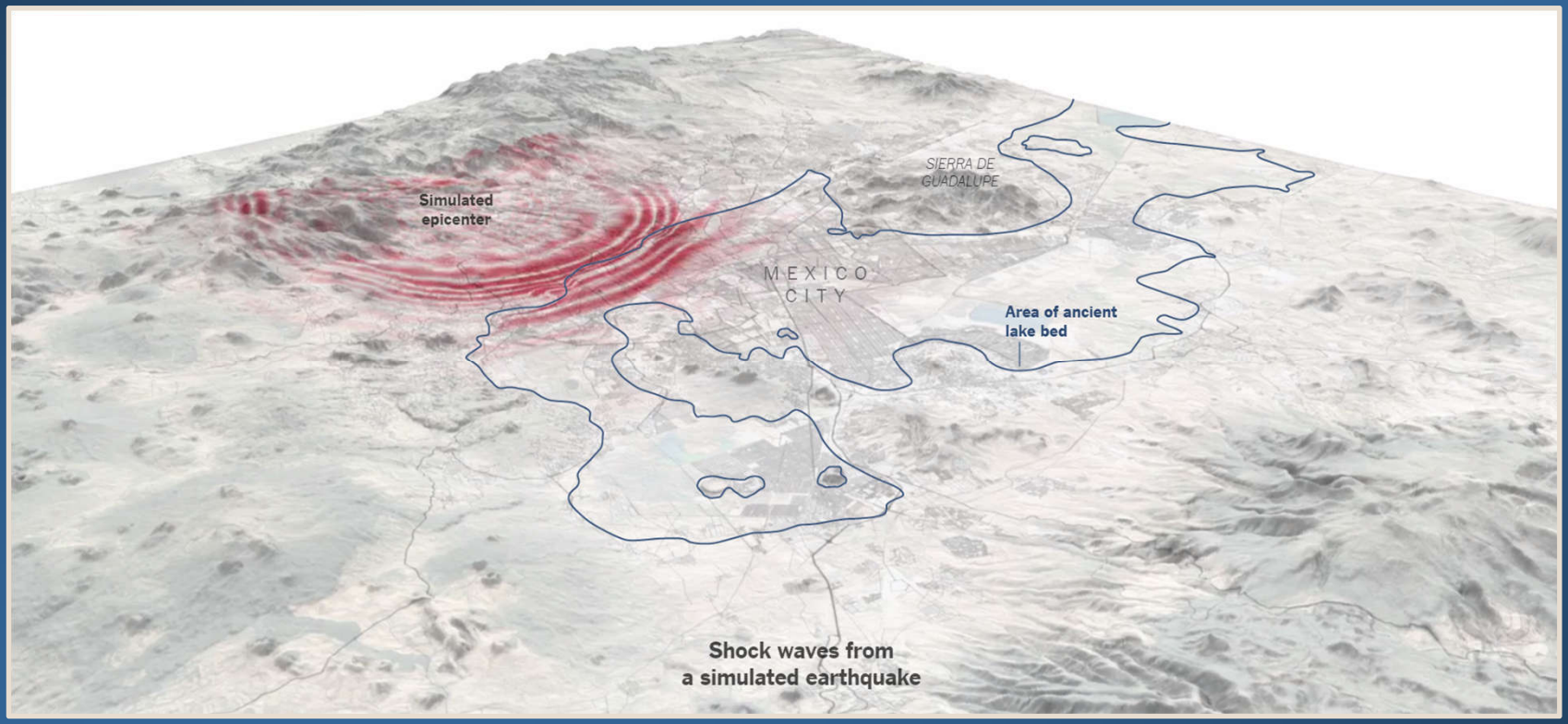

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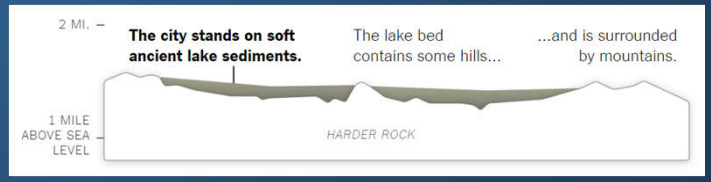

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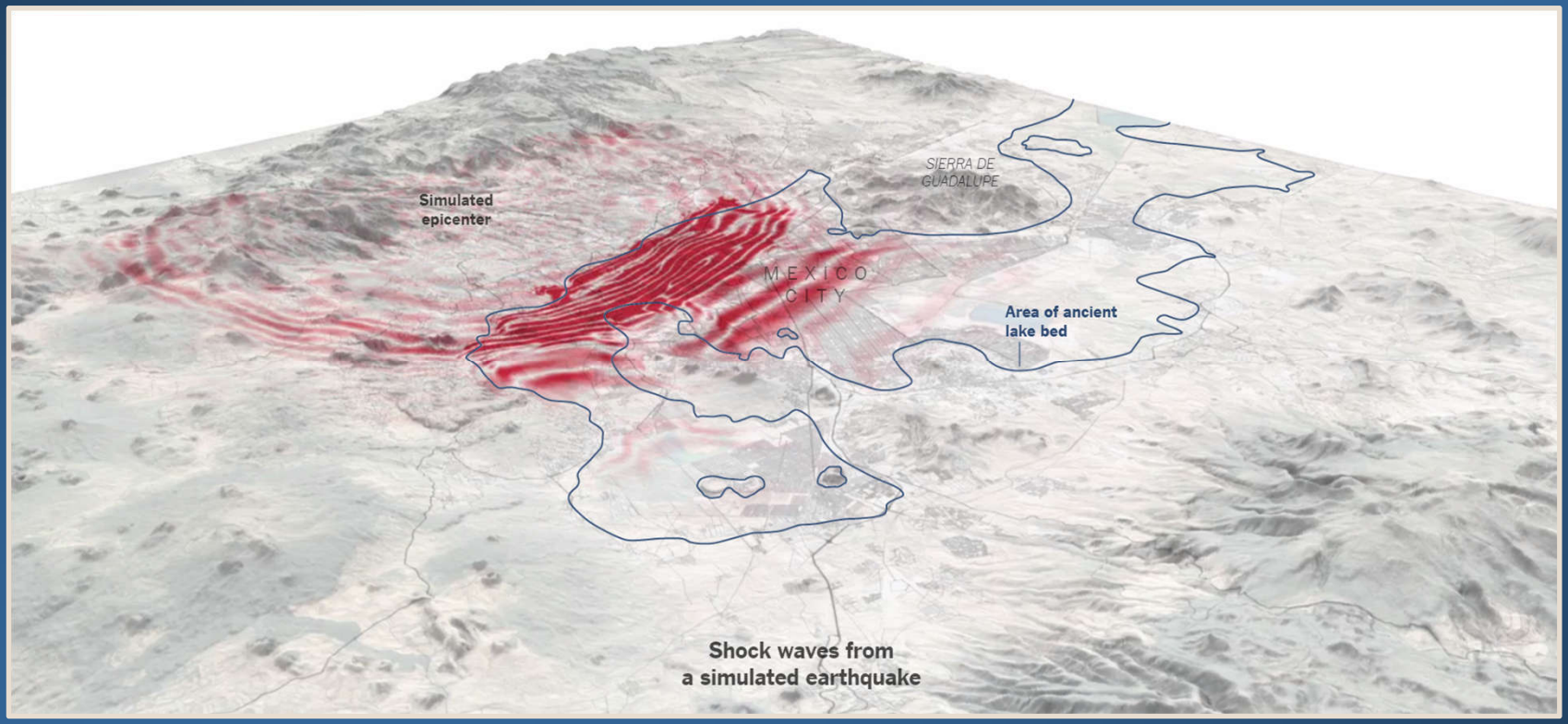

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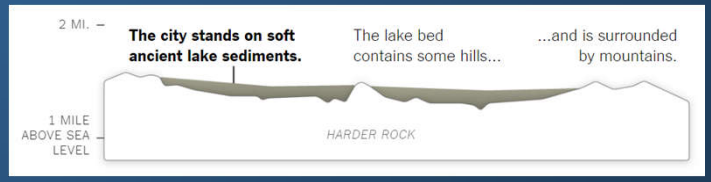

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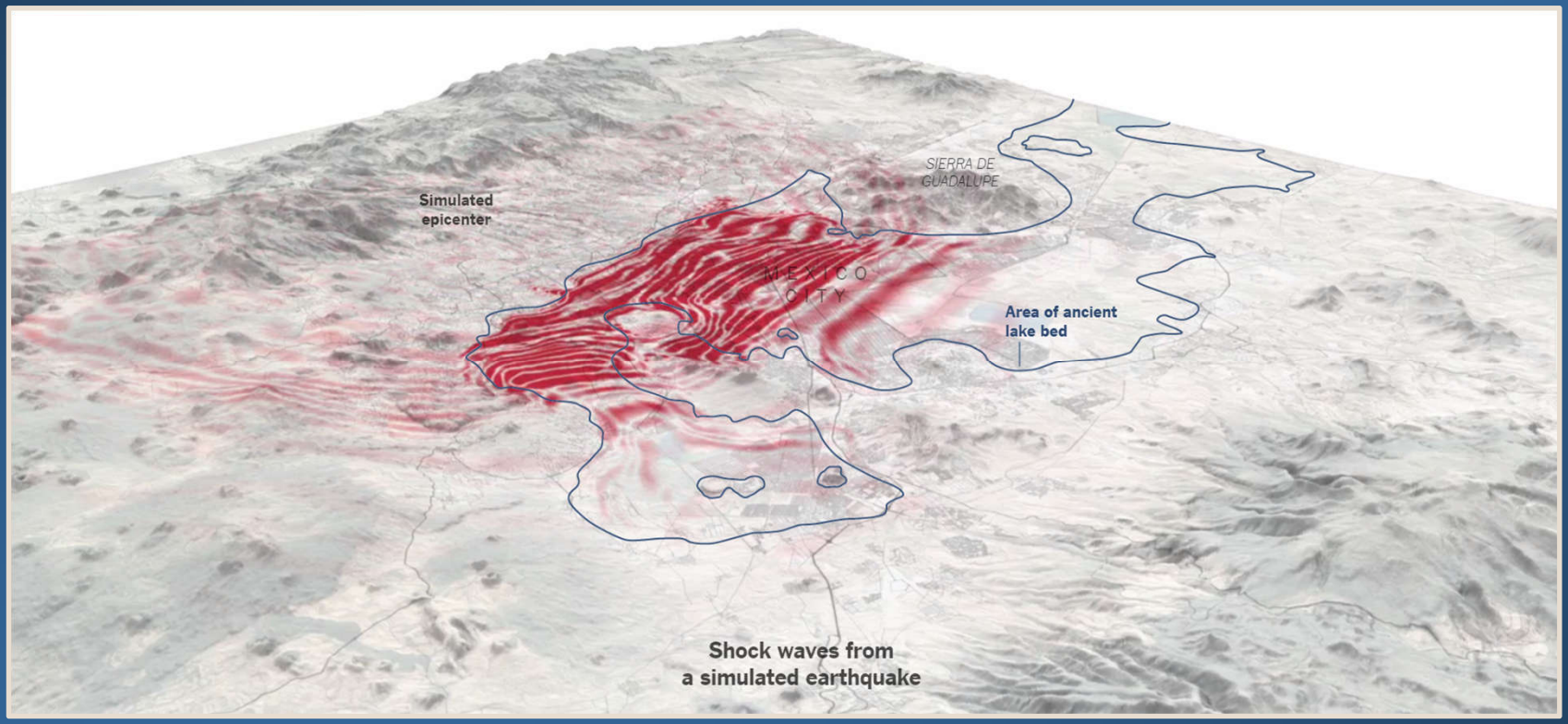

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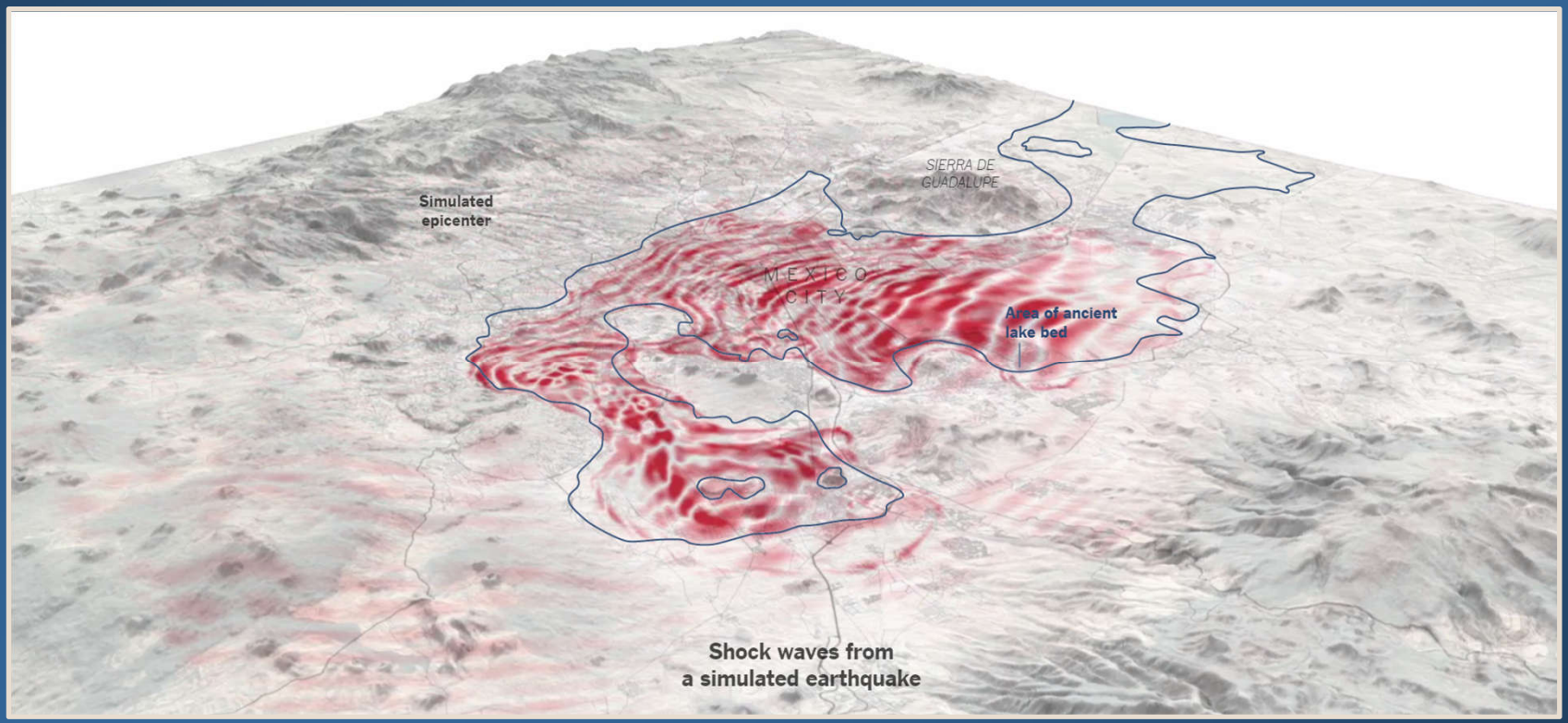

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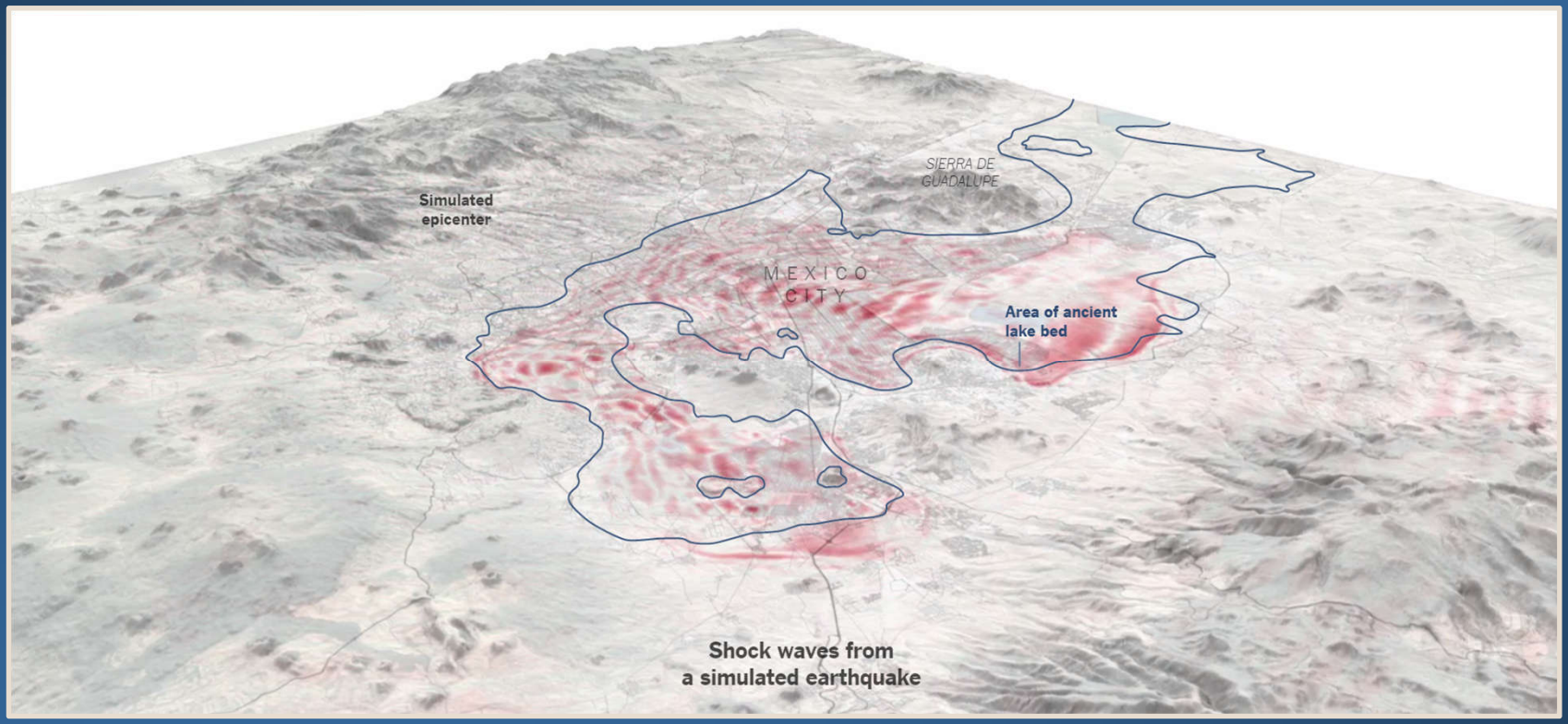

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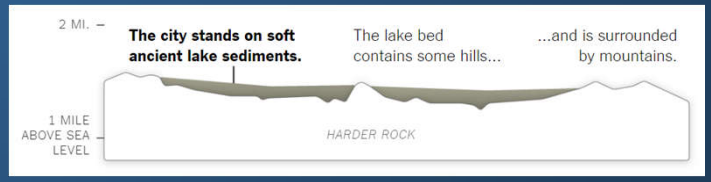
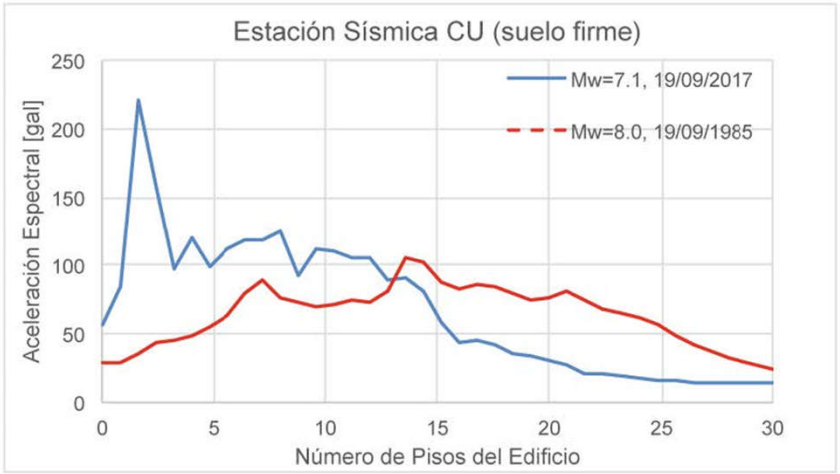
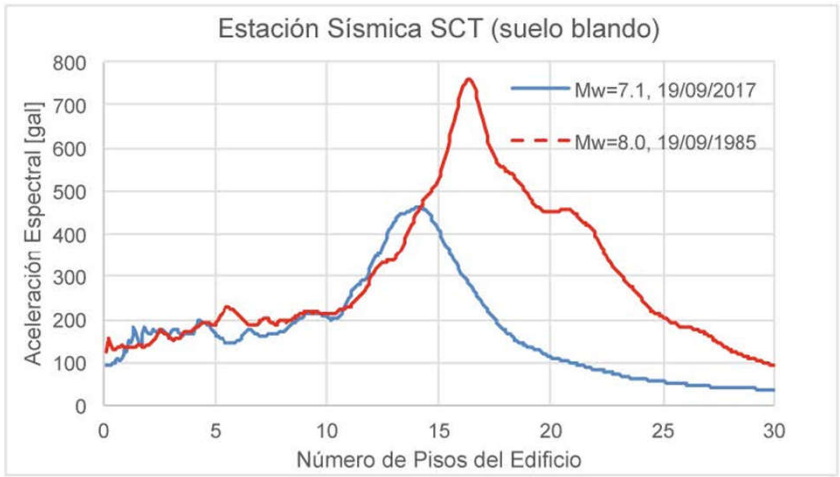
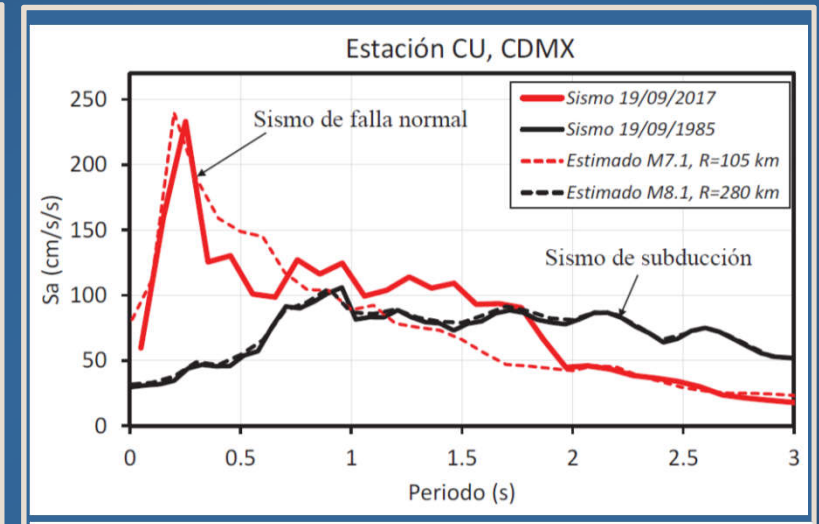
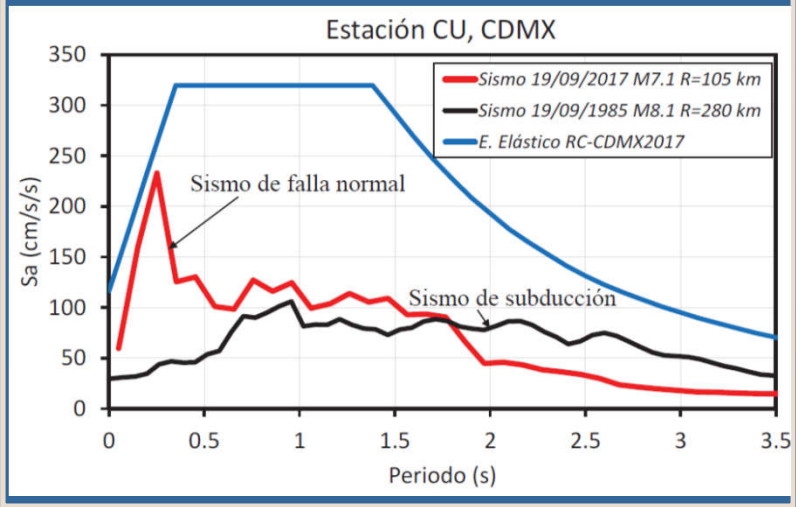


Spectral accelerations recorded during the September 19, 2017 M 7.1 Puebla-Morelos earthquake in comparison to the respective accelerations of the September 19, 1985 M 8.1 Michoacán earthquake

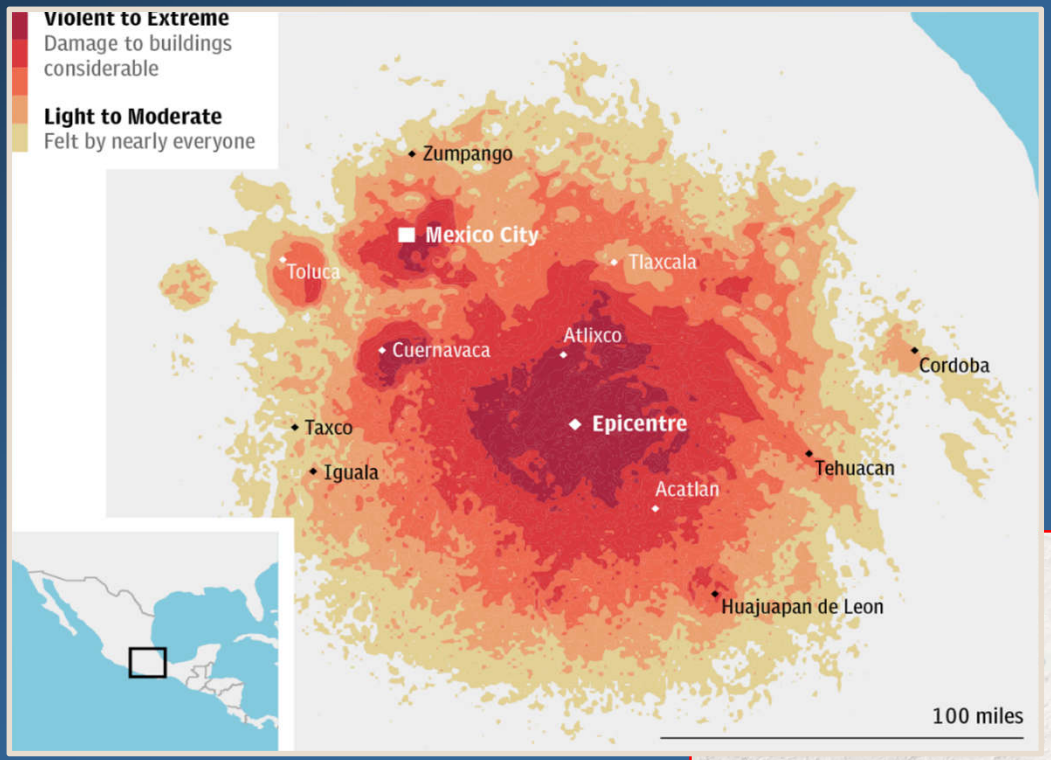








Shake intensity of the September 19, 2017 M 7.1 earthquake



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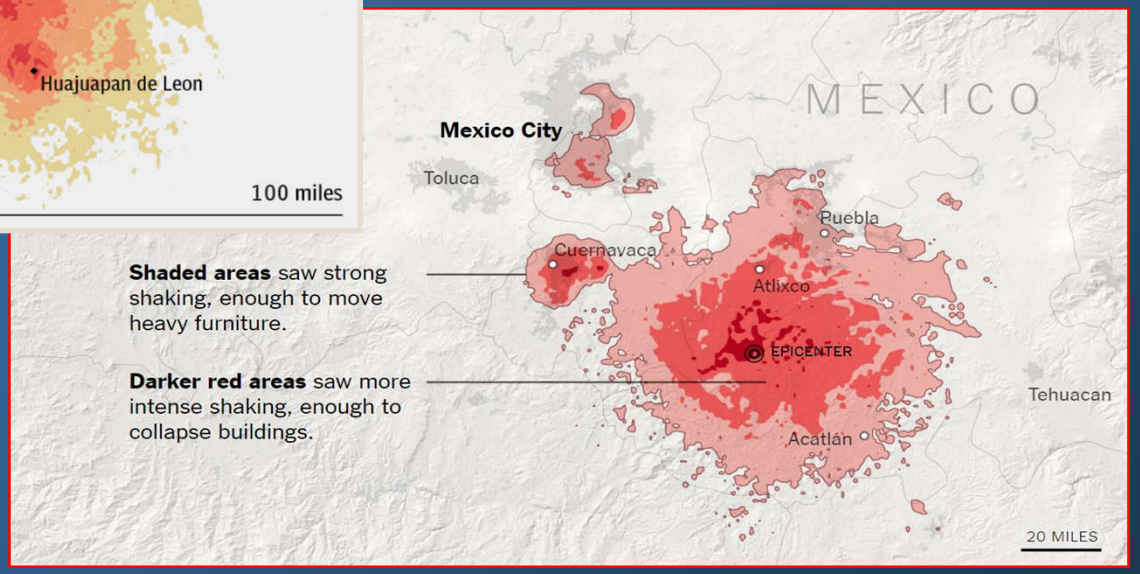
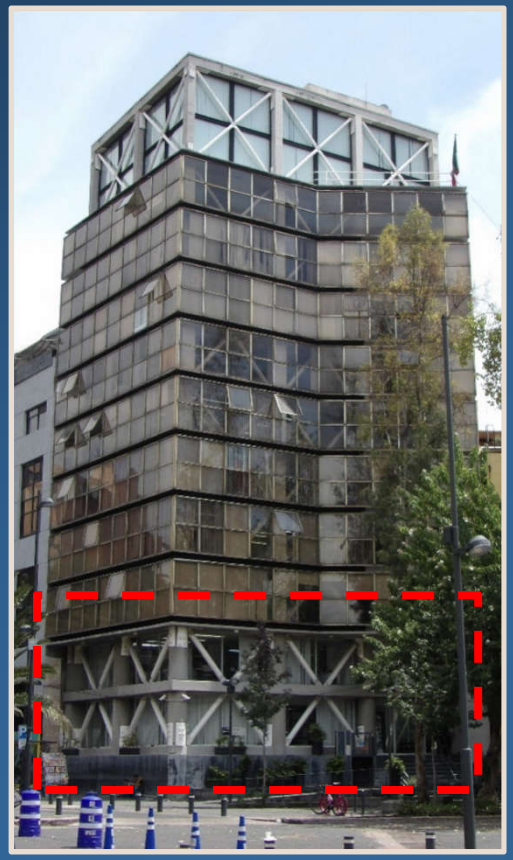
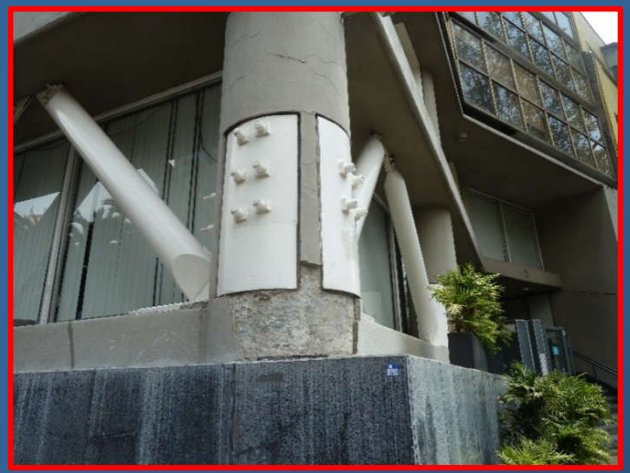
science for a changing world



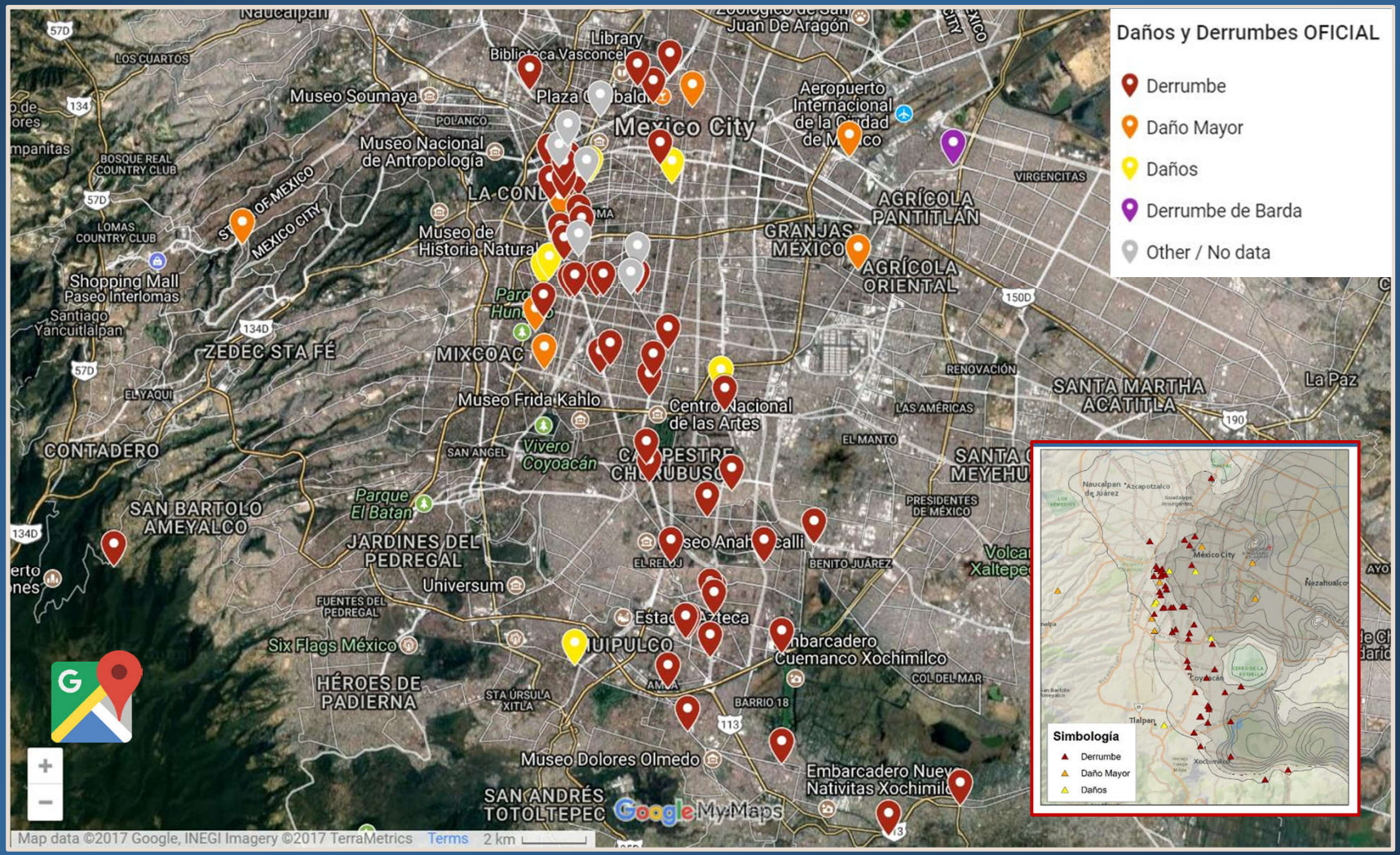
Photos credit to Lekkas, Mavroulis, Carydis

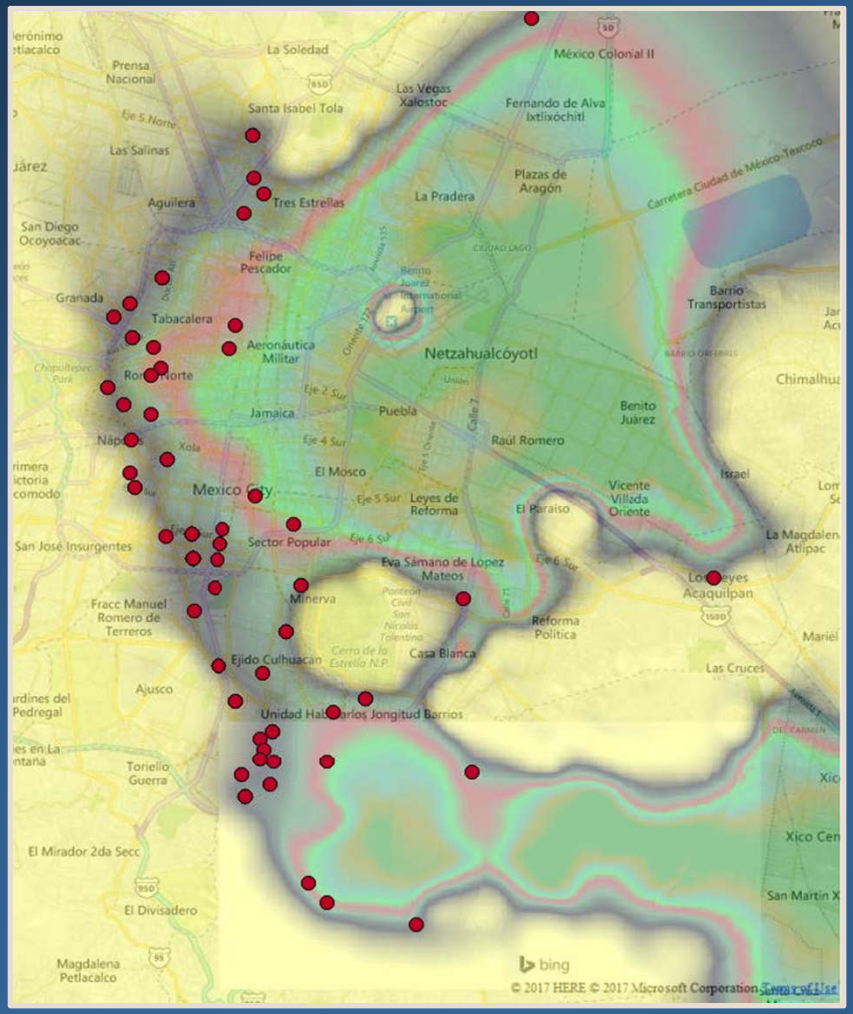
Reinforcement of buildings in the city of Mexico after the September 19, 1985 M 8.1 Michoacán earthquake (1/3)





Spatial distribution of building collapses and damage induced by the M 7.1 Puebla-Morelos earthquake in Mexico City in correlation with the lake bed zone limit




México Colonial II
Las Vegas Xalostoc
Fernando de Alva Ixtlixóchitl
Santa Isabel Tola
La Soledad
Prensa Nacional
Las Salinas
Aguilera
Tres Estrellas
La Pradera
Plazas de Aragón
Carretera Ciudad de México-Texcoco
San Diego Ocoyoacac
Felipe Pescador
Granada
Tabacalera
Aeronáutica Militar
Barrio Transportistas
Netzahualcóyotl
Chimalhuacán
Jamaica
Puebla
Benito Juárez
Raúl Romero
El Mosco
Mexico City
Leyes de Reforma
El Paraíso
Vicente Villada Oriente
Israel
La Magdalena Atlipac
San José Insurgentes
Sector Popular
Eva Sámano de Lopez Mateos
Minerva
Fracc Manuel Romero de Terreros
Reforma Política
Casa Blanca
Ejido Culhuacan
Las Cruces
Ajusco
Unidad Habitacional Carlos Jongitud Barrios
Toriello Guerra
El Mirador 2da Secc
El Divisadero
Magdalena Petlacalco
bing
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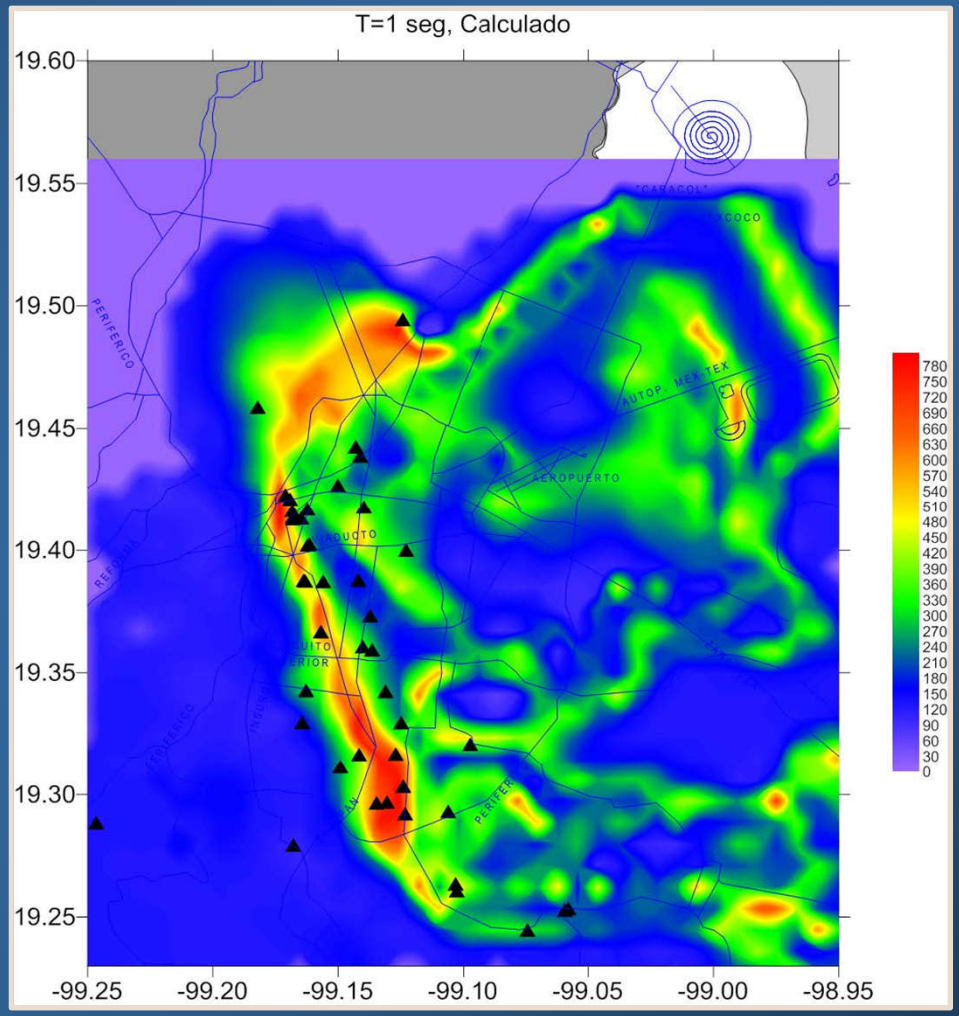
T=1 seg, Calculado
19.60
19.55
19.50
19.45
19.40
19.35
19.30
19.25
-99.25
-99.20
-99.15
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-99.00
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780
750
720
690
660
630
600
570
540
510
480
450
420
390
360
330
300
270
240
210
180
150
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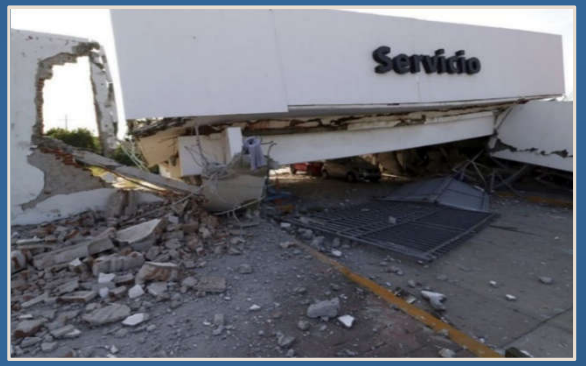
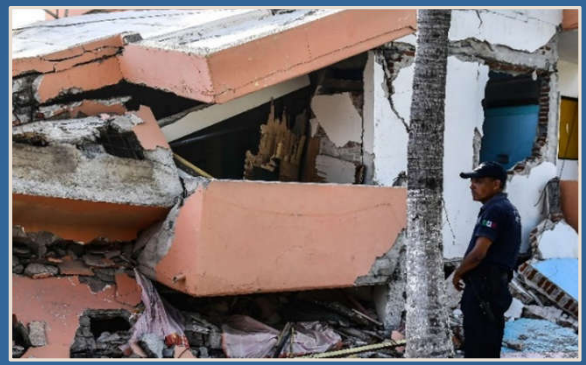
PERIFERICO
AUTOP. MEX-TEX
AEROPUERTO

Damage to reinforced concrete buildings due to the M 8.2 Chiapas earthquake





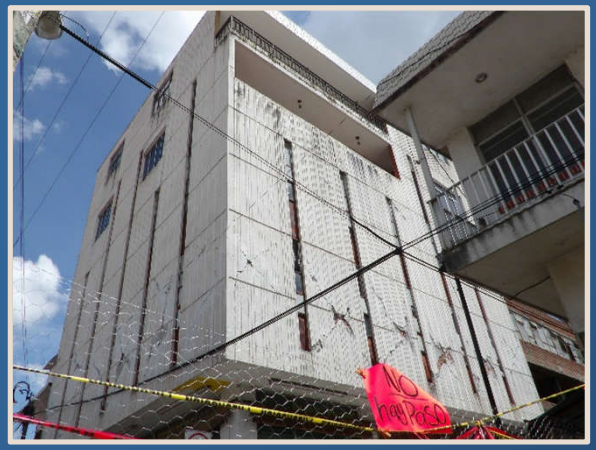
Photos credit to Lekkas, Mavroulis, Carydis

Non-structural damage to R/C buildings in Mexico City and Cuautla due to the M 7.1 earthquake
Cracks, detachment of the infill walls from the surrounding R/C frame and partial collapse of walls

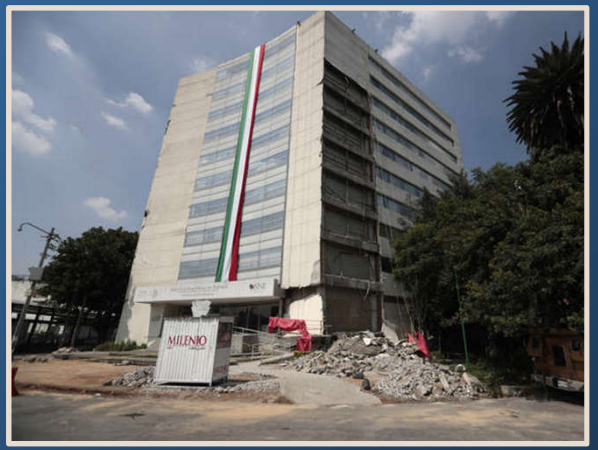
CDMX

CDMX

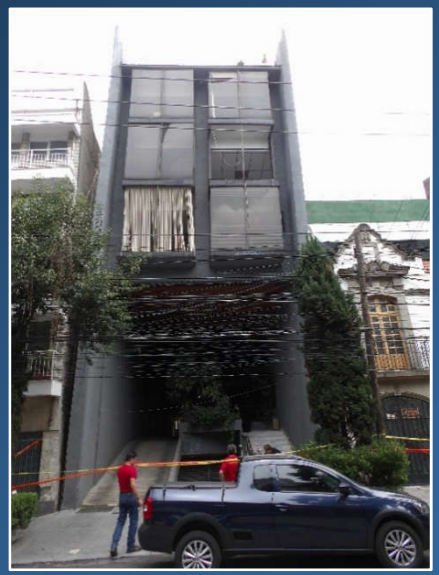
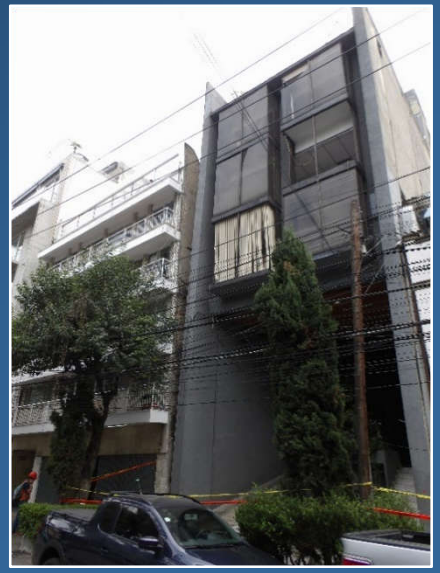
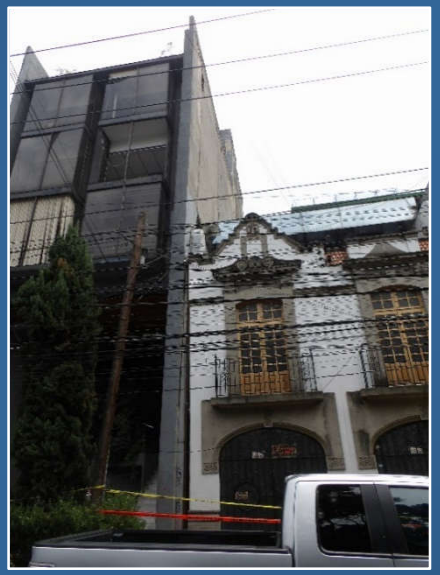
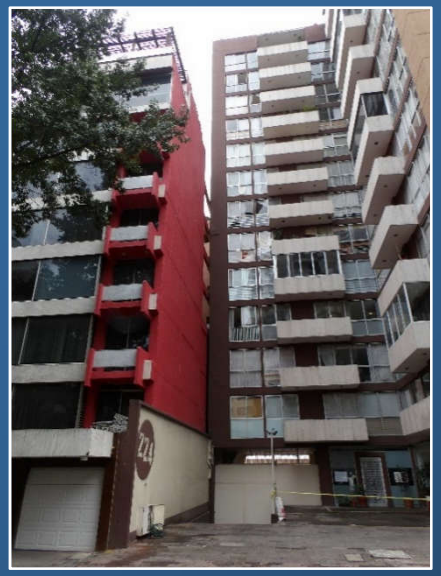
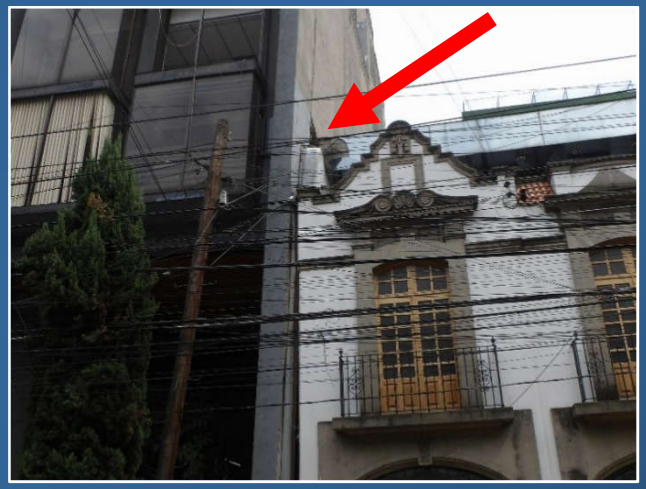
Cuautla



CDMX



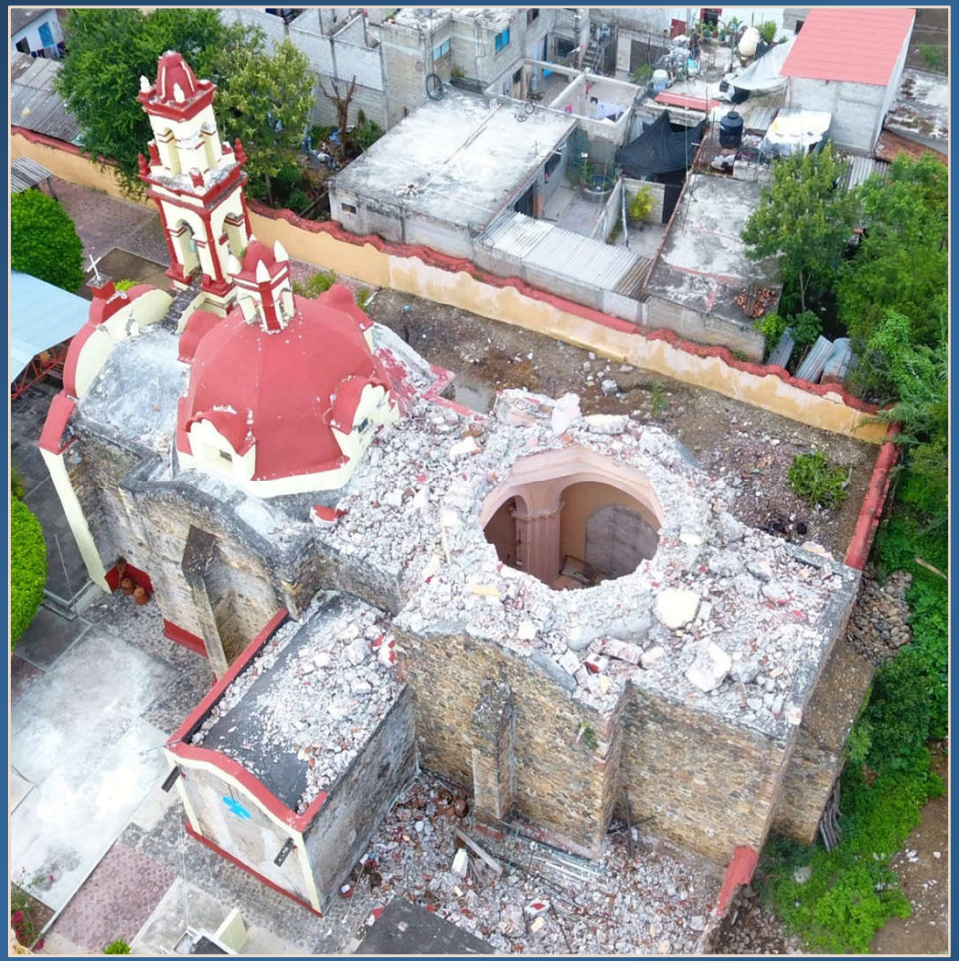
Building pounding damage due to the M 7.1 earthquake

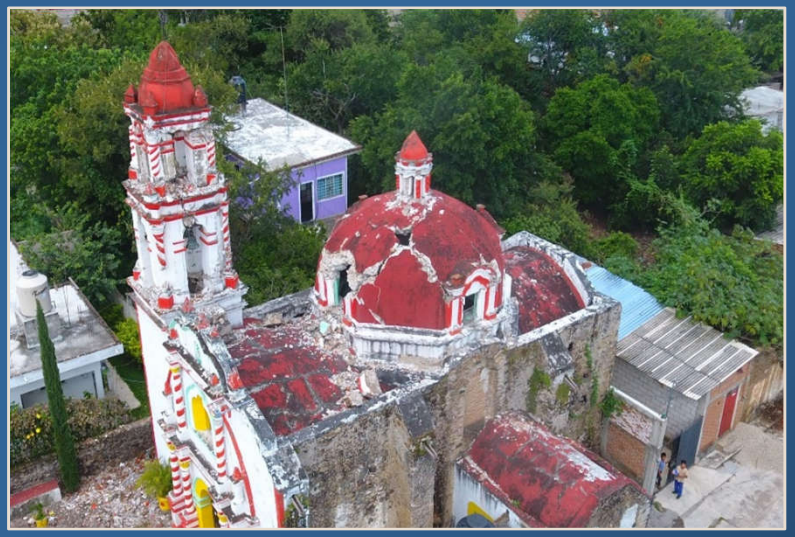






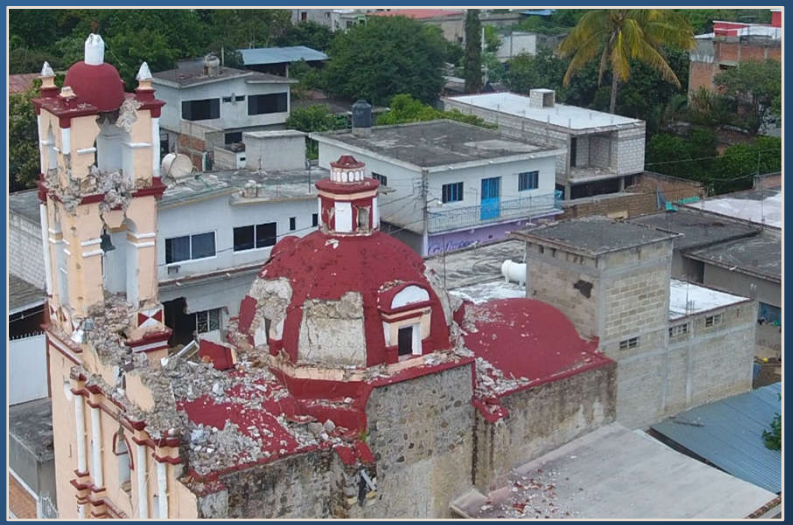

Photos credit to Lekkas, Mavroulis, Carydis

Damage to masonry buildings due to the M 8.2 Chiapas earthquake

Damage to churches due to the September 2017 M 7.1 Puebla-Morelos earthquake

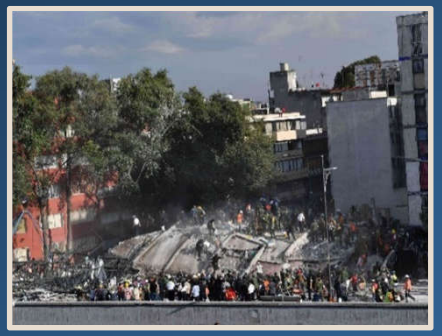






Heavy structural damage to reinforced buildings in Mexico City due to the M 7.1 earthquake

Photos credit to Lekkas, Mavroulis, Carydis



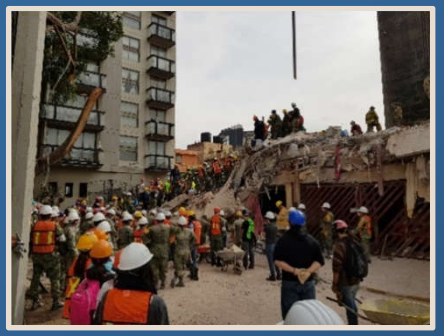
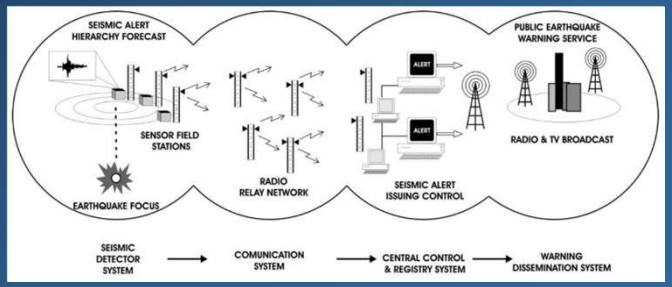



Photo credit: Francisco Caballero Gout via AP

Sistema de Alerta Sísmica Mexicano – Mexican Seismic Warning System



SISTEMA NACIONAL DE PROTECCIÓN CIVIL MÉXICO

centro de instrumentación y registro sísmico a.c.

Sistema de Alerta Sísmica Mexicano – Mexican Seismic Warning System

ALERTA SÍSMICA

Photos credit to Lekkas, Mavroulis, Carydis

CIVIL PROTECTION IN MEXICO – Following the evacuation route to the "Punto de Reunion" after the seismic alert for the M 6.1 Oaxaca aftershock on September 23, 2017 in Mexico City

NATIONAL & KAPODISTRIAN UNIVERSITY OF ATHENS

POST GRADUATE PROGRAM

ENVIRONMENTAL, DISASTER AND CRISES MANAGEMENT

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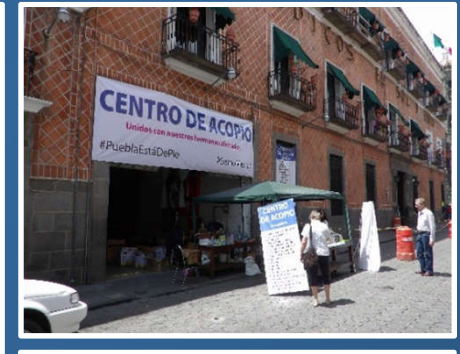
Photos credit to Lekkas, Mavroulis, Carydis

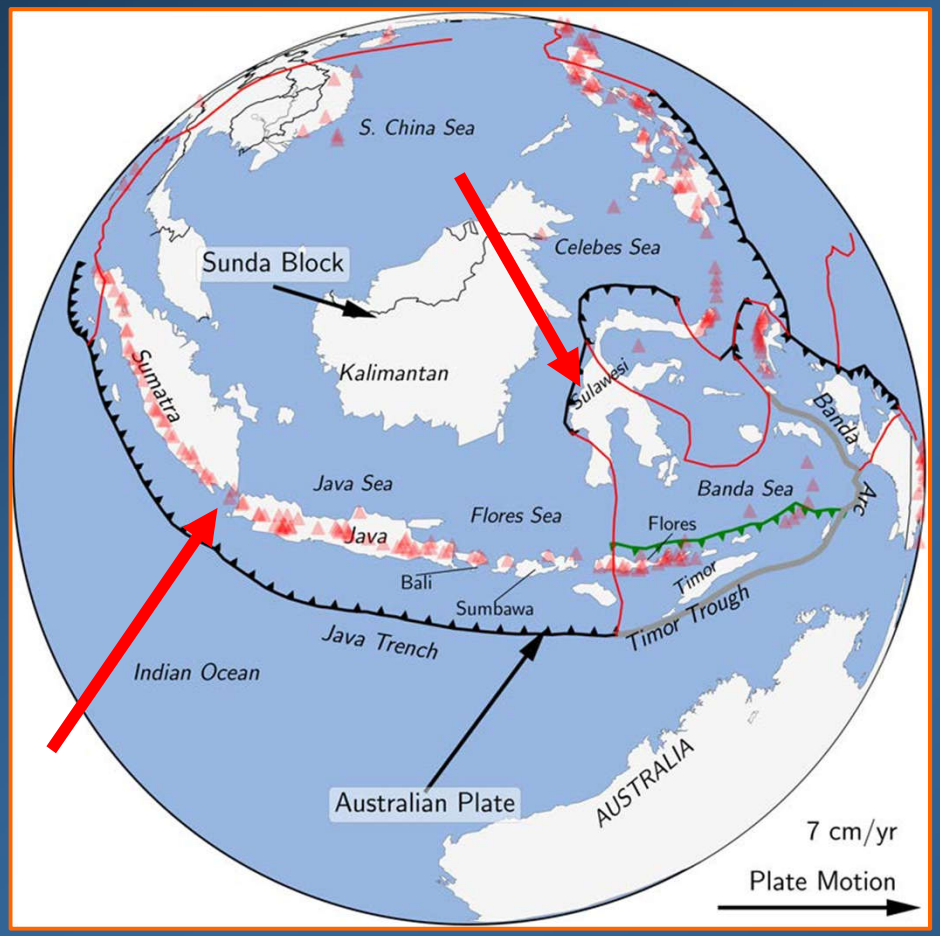
Centros de Acopio

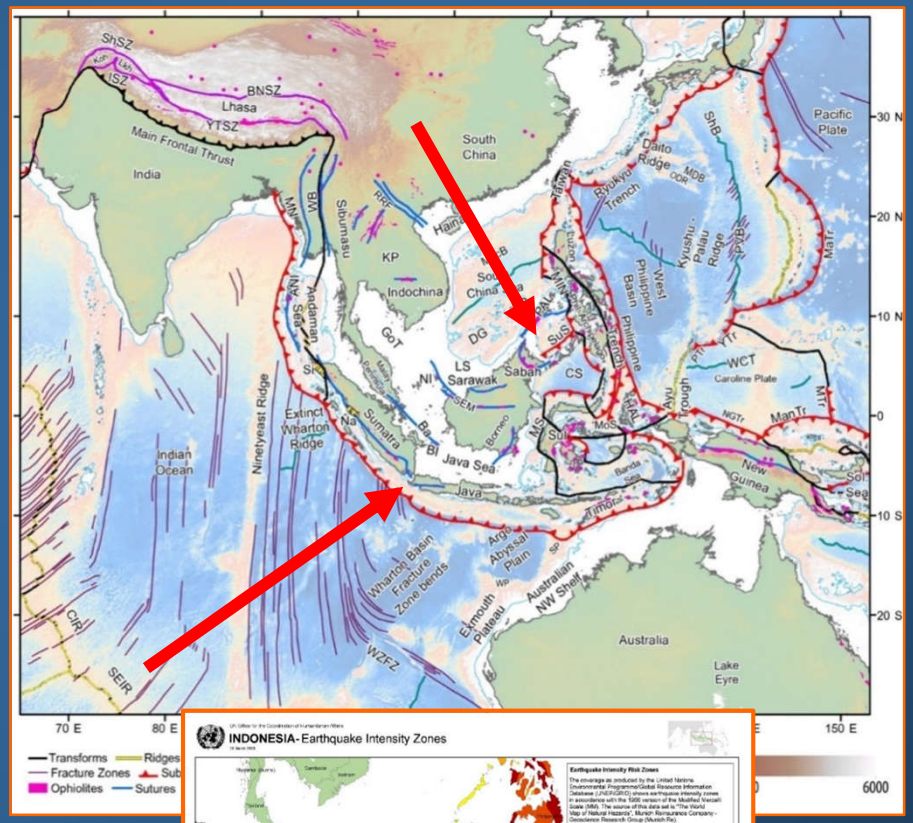


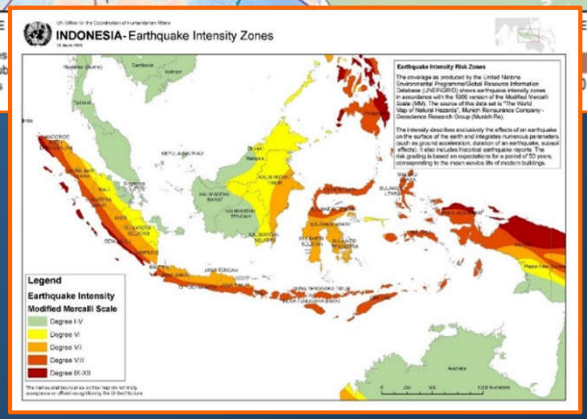
Photos credit to Lekkas, Mavroulis, Carydis

The September 2018 Mw 7.5 Palu (Sulawesi Island, Indonesia) earthquake and tsunami disaster

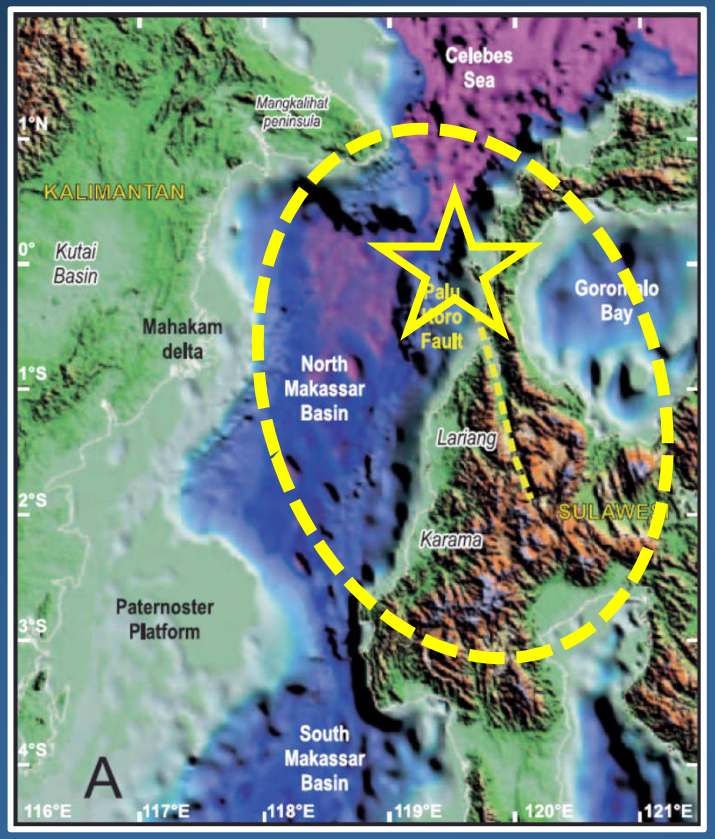
Active tectonics of the Indonesian Region

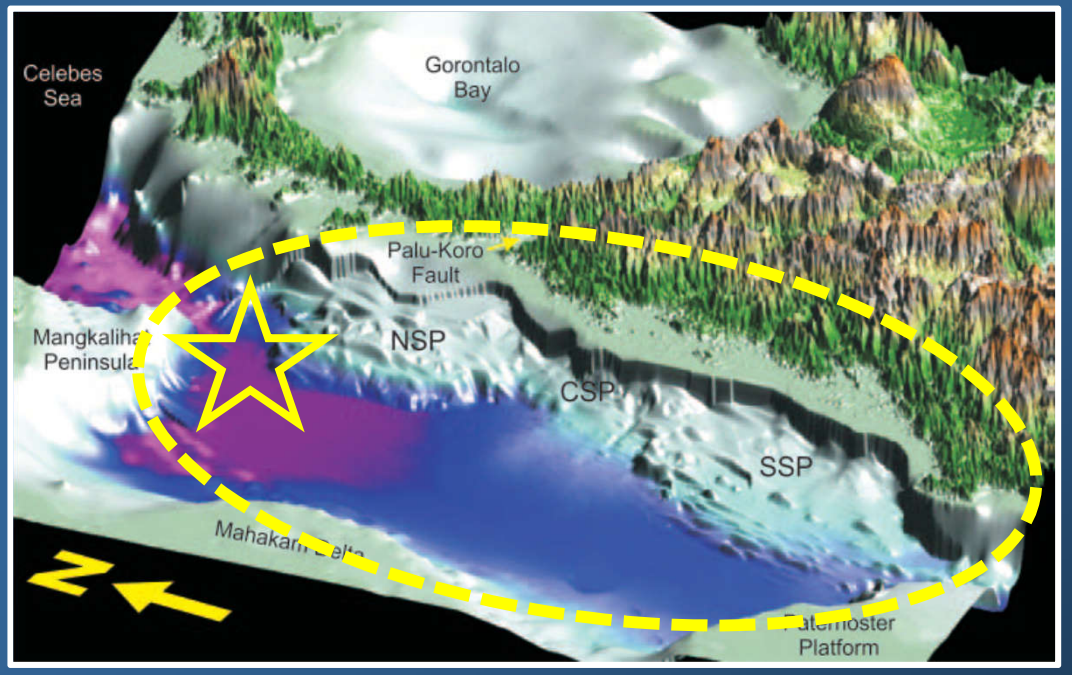




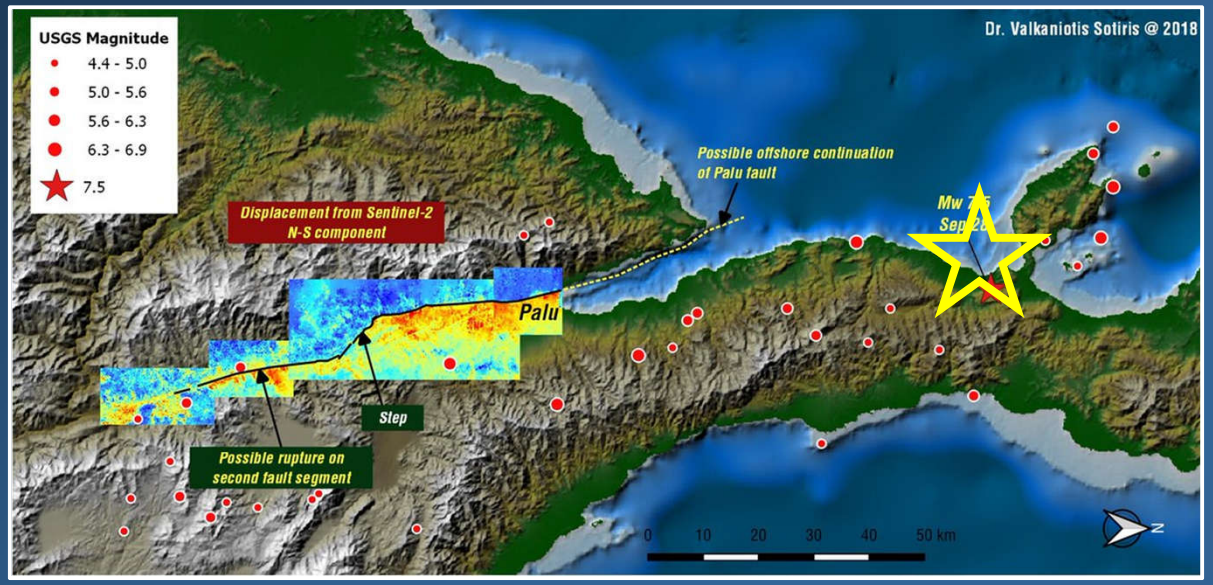


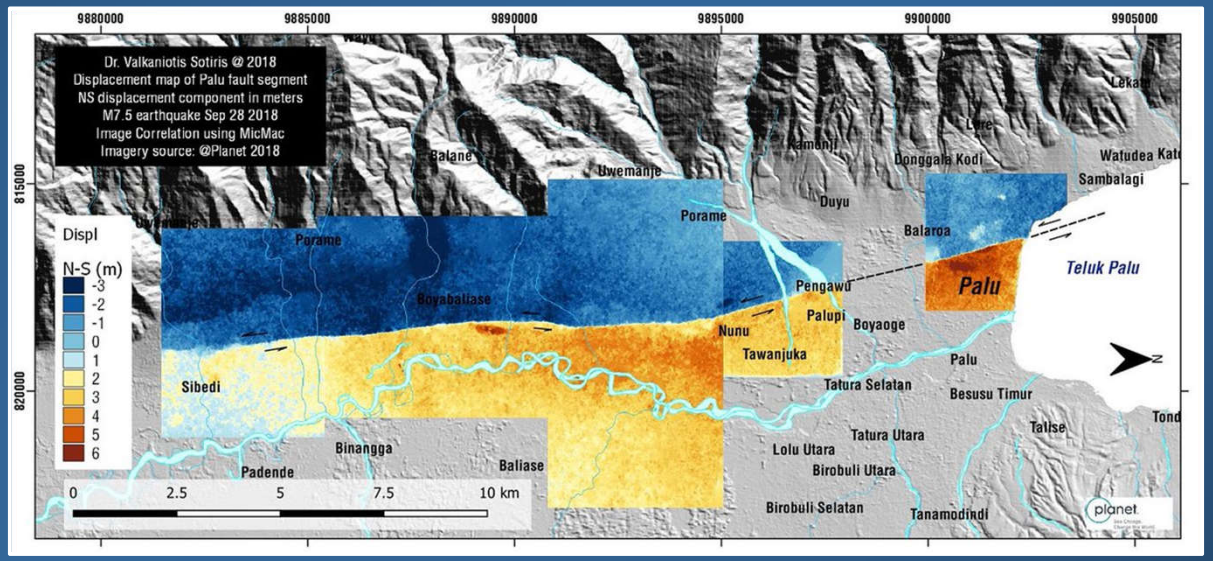
Bathymetry of the North Makassar Straits and topography of Western Sulawesi





Three-dimensional view of bathymetry of the North Makassar Straits and topography of Western Sulawesi produced by merging bathymetric data from seismic data with the global bathymetry of Smith and Sandwell (1997) and SRTM topographic data for onshore Sulawesi. SSP: Southern Structural Province; CSP: Central Structural Province; NSP: Northern Structural Province. [From *Hall et al. (2009)*, Petroleum Geoscience]





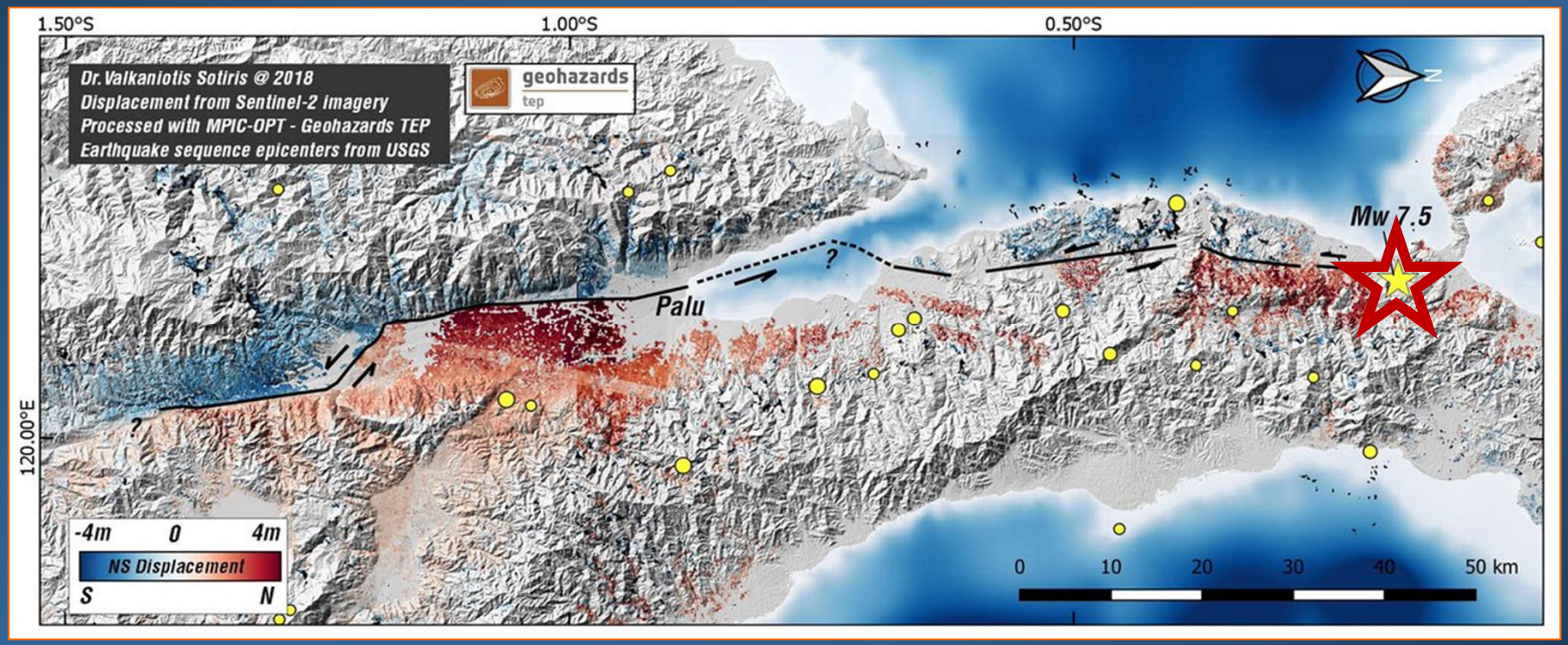
Displacement maps of Palu fault segment

Displacement maps of Palu fault segment

https://twitter.com/SotisValkan/status/1047165698542383104

https://twitter.com/SotisValkan/status/1046818189349462016

Displacement maps of Palu fault segment



Displacement from Sentinel2 Copernicus EU image frames for the whole length of the Palu earthquake sequence. There is displacement on the northern part (partially clouded) as reported from InSAR results. Dotted faults are inferred.

https://twitter.com/SotisValkan/status/1047515941570007042

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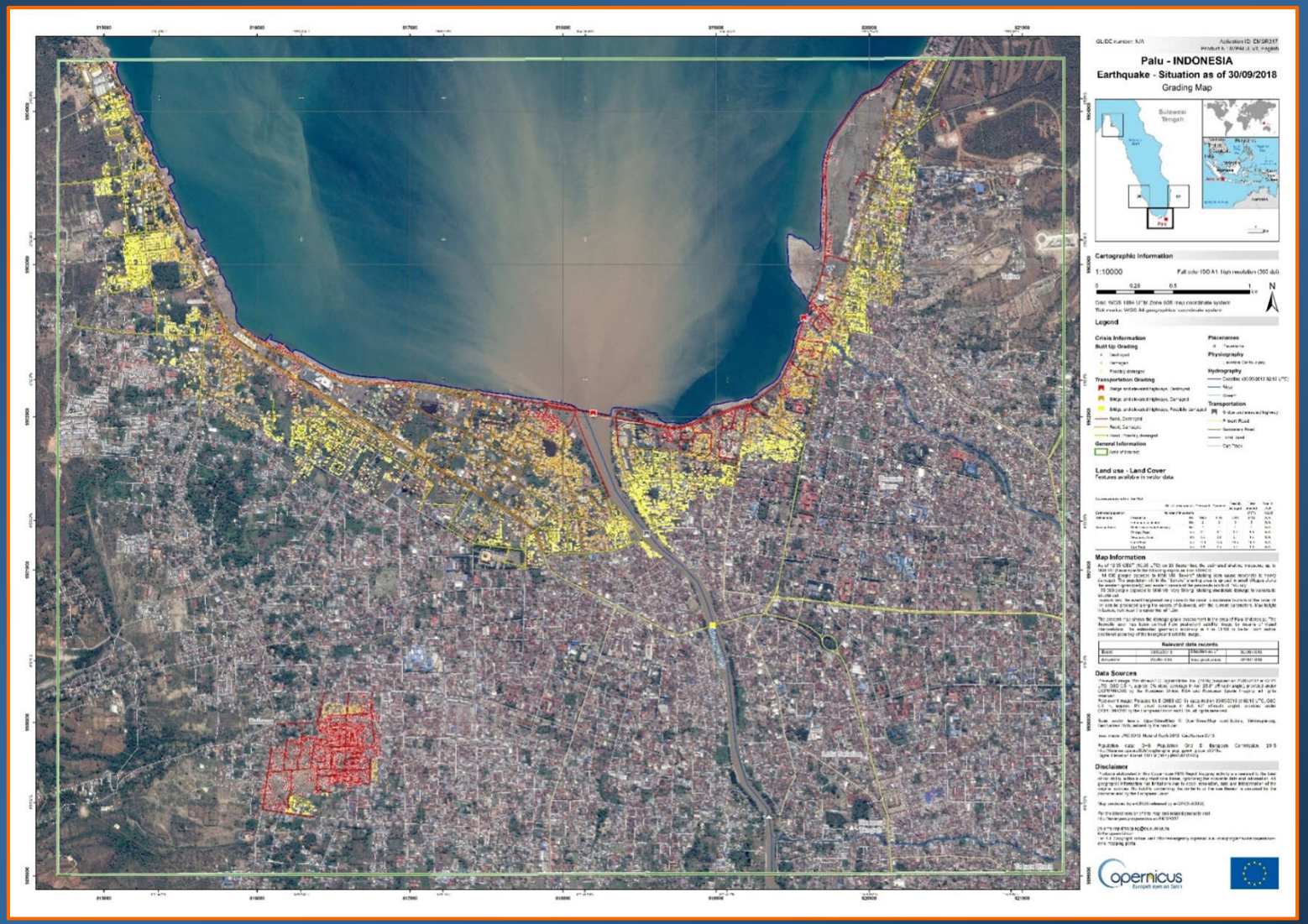
Coseismic surface rupture in Palu City

photos by Lekkas, Carydis, Mavroulis

The deformed asphalt pavement as well as the adjacent damaged buildings along with the perimeter walls and railings reveal left lateral offset which is in coincidence with the causative Palu-Koro strike-slip fault

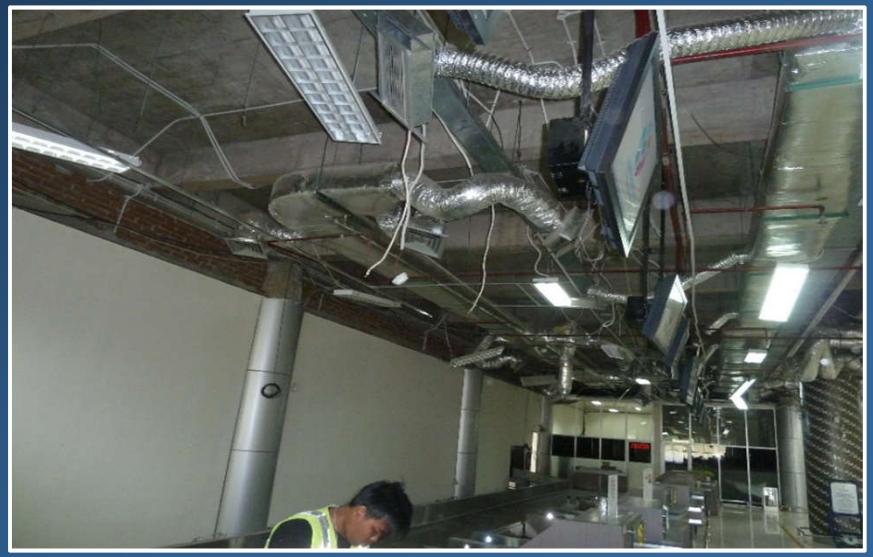
Damage assessment of 2018 Sulawesi Island Earthquake and Tsunami
Palu as of 30/09/2018

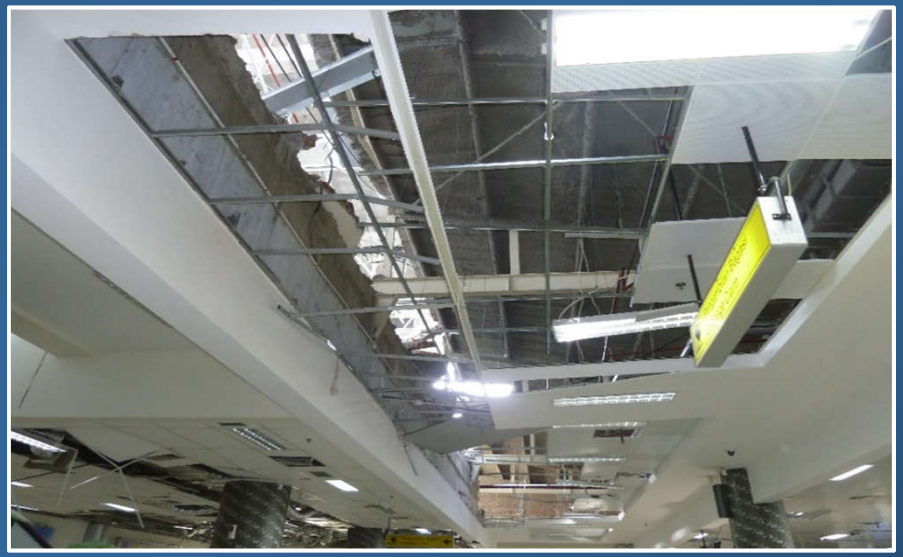



HOTEL

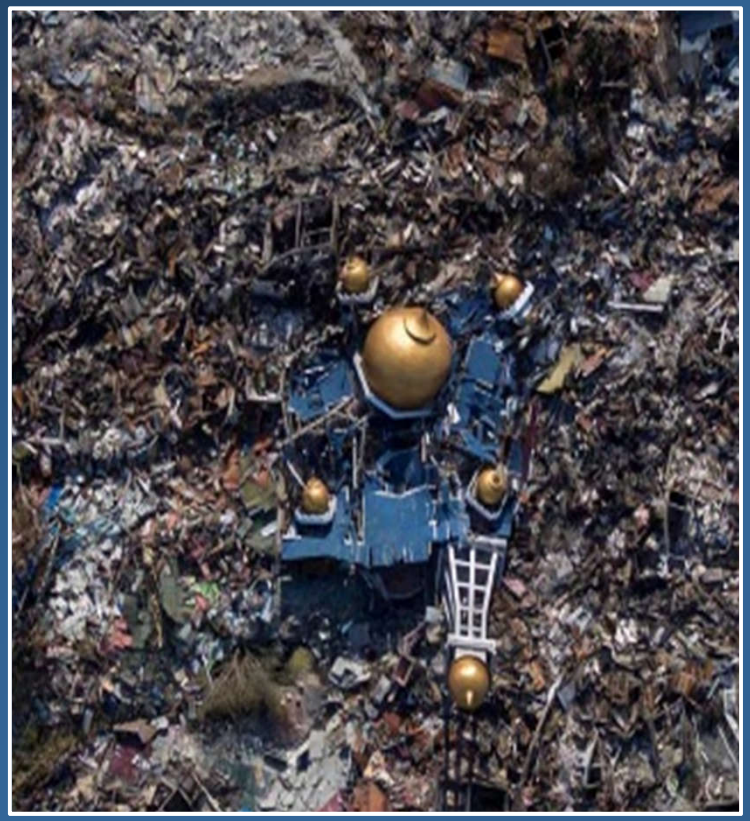
Earthquake-induced building damage

photos by Lekkas, Carydis, Mavroulis

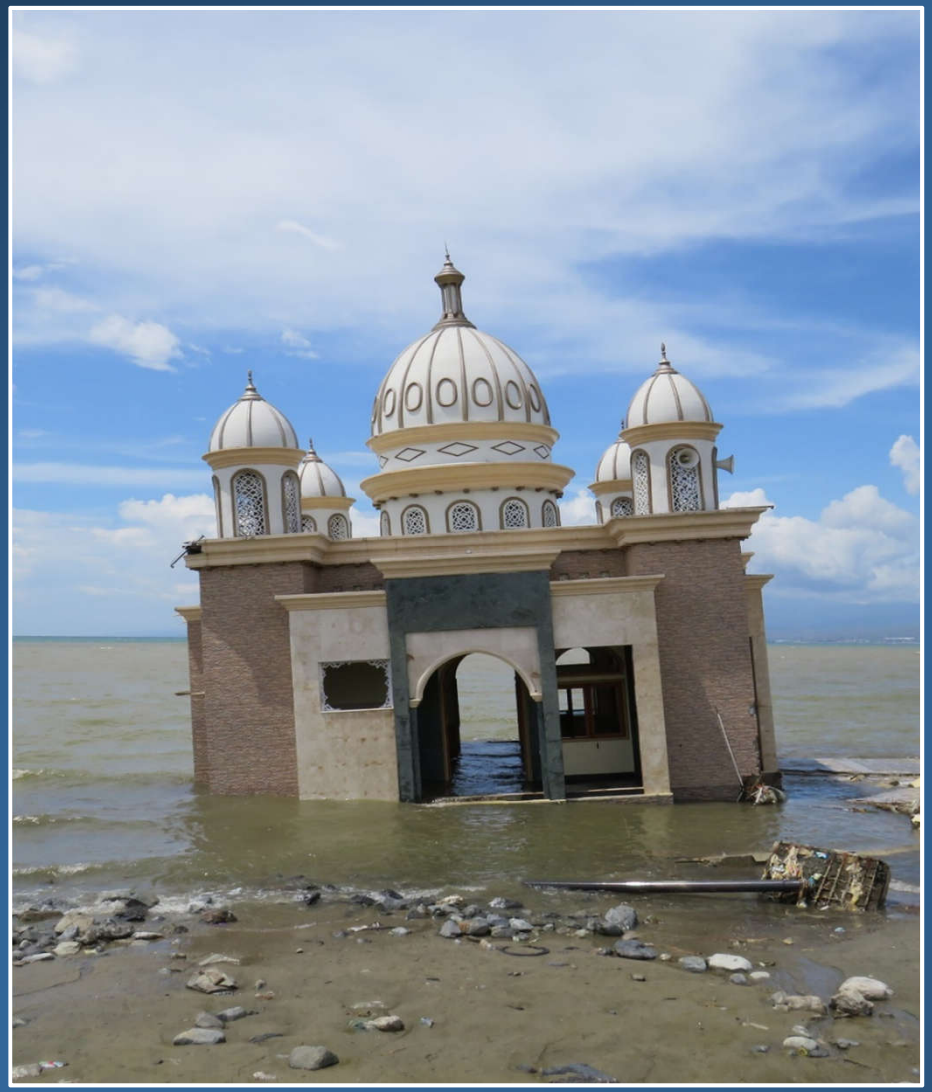




Mosque in Balaroa neighborhood



Arkham Babu Rahmat Mosque



Building damage induced by soil liquefaction and lateral spreading

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Professor Efthymis Lekkas

PhD c. Spyridon Mavroulis

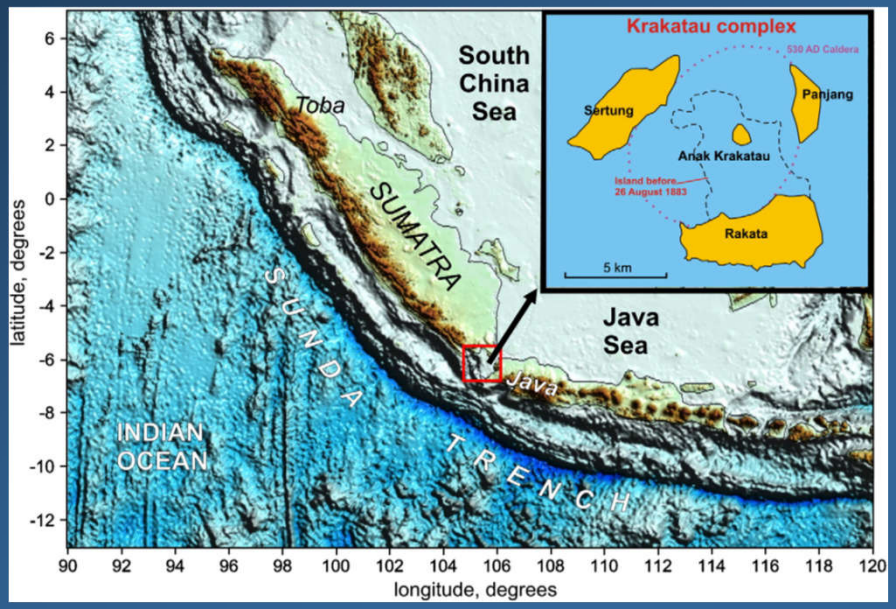
Em. Professor Panayotis Carydis

PhD c. Dimitrios Milios

The December 2018 volcano-triggered tsunami in Krakatau complex (Sunda Strait, Indonesia)

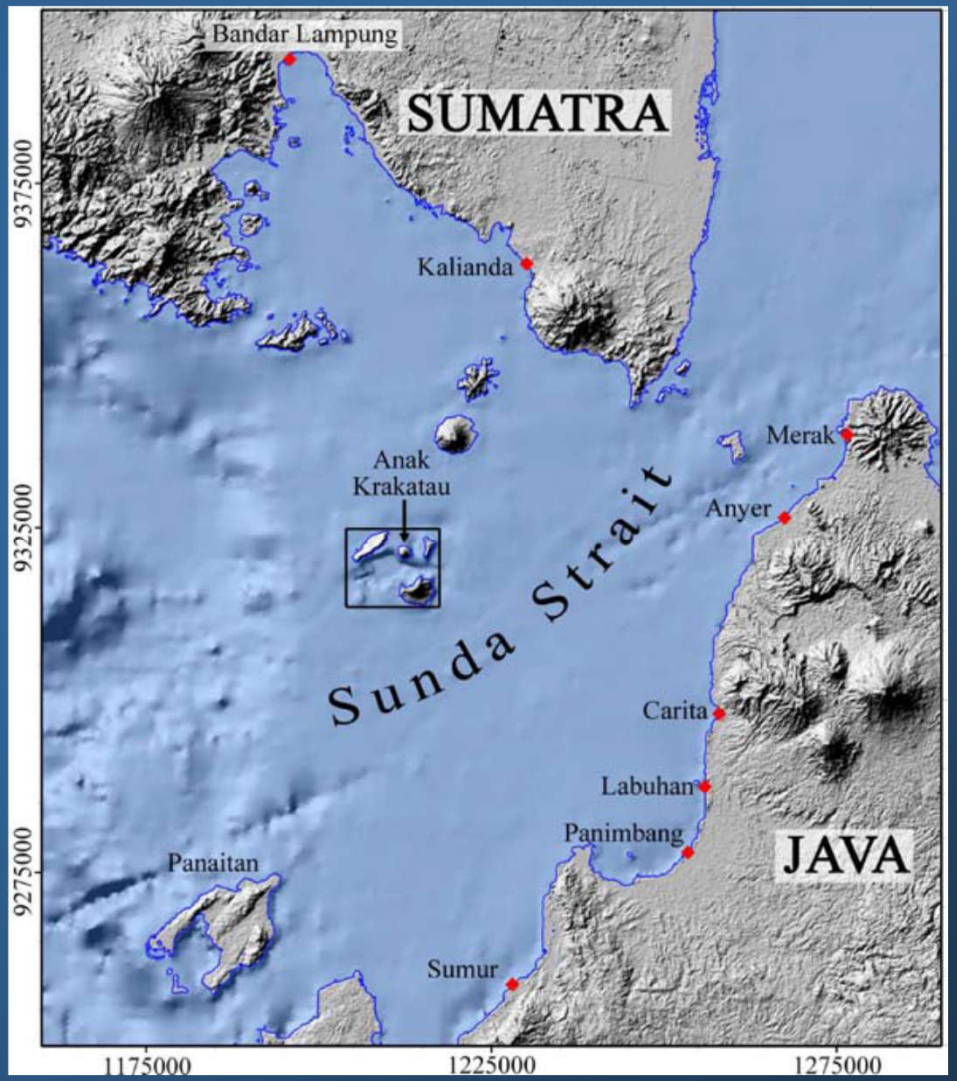
Carita, 2018

THE KRAKATAU COMPLEX IN SUNDA STRAIT

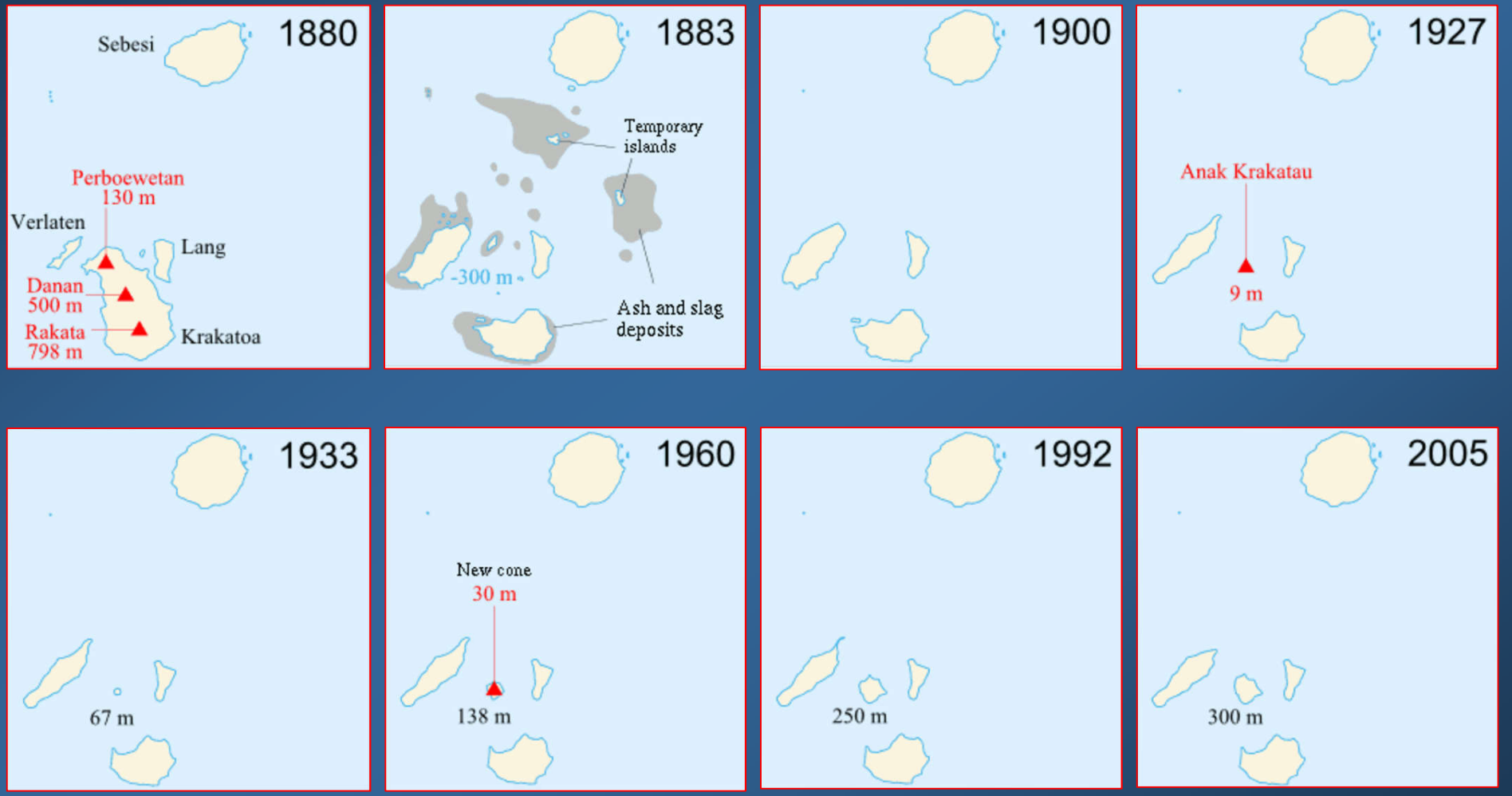


Topography and bathymetry of the Sunda Arc and surrounding areas. Red rectangle indicates the Krakatau complex. Coastal line of Krakatau Island before the catastrophic 1883 eruptions is indicated by black dashed line. Caldera corresponding to the ~530 AD eruption is marked by red dotted line.

From *Jaxybulatov et al. (2011)*, Journal of Volcanology and Geothermal Research



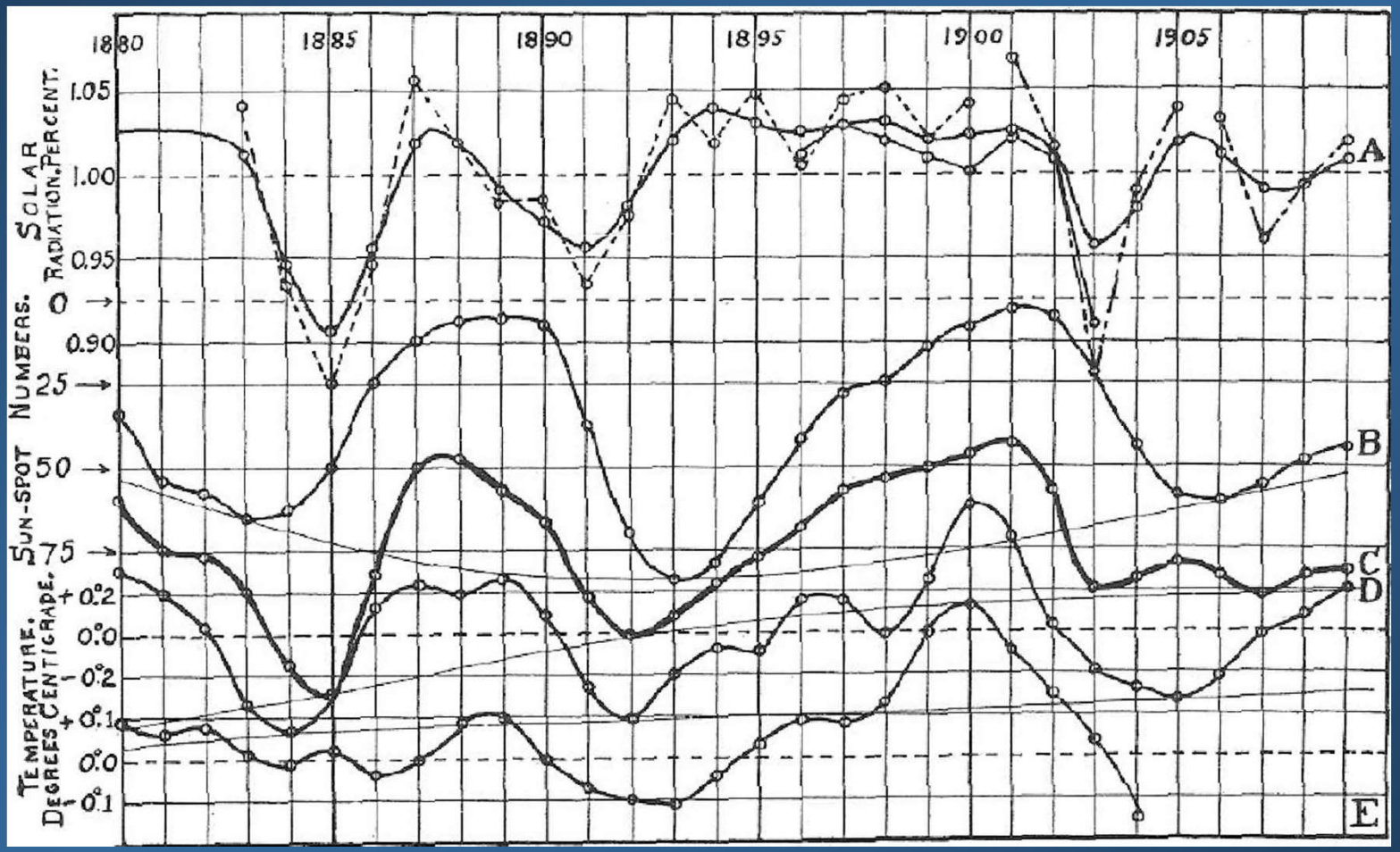
THE EVOLUTION OF KRAKATAU VOLCANIC COMPLEX FROM 1880 TO 2005



In 2017 the elevation of Anak Krakatau was reported as over 400 meters above sea level

https://en.wikipedia.org/wiki/File:Krakatoa_evolution_map-en.gif

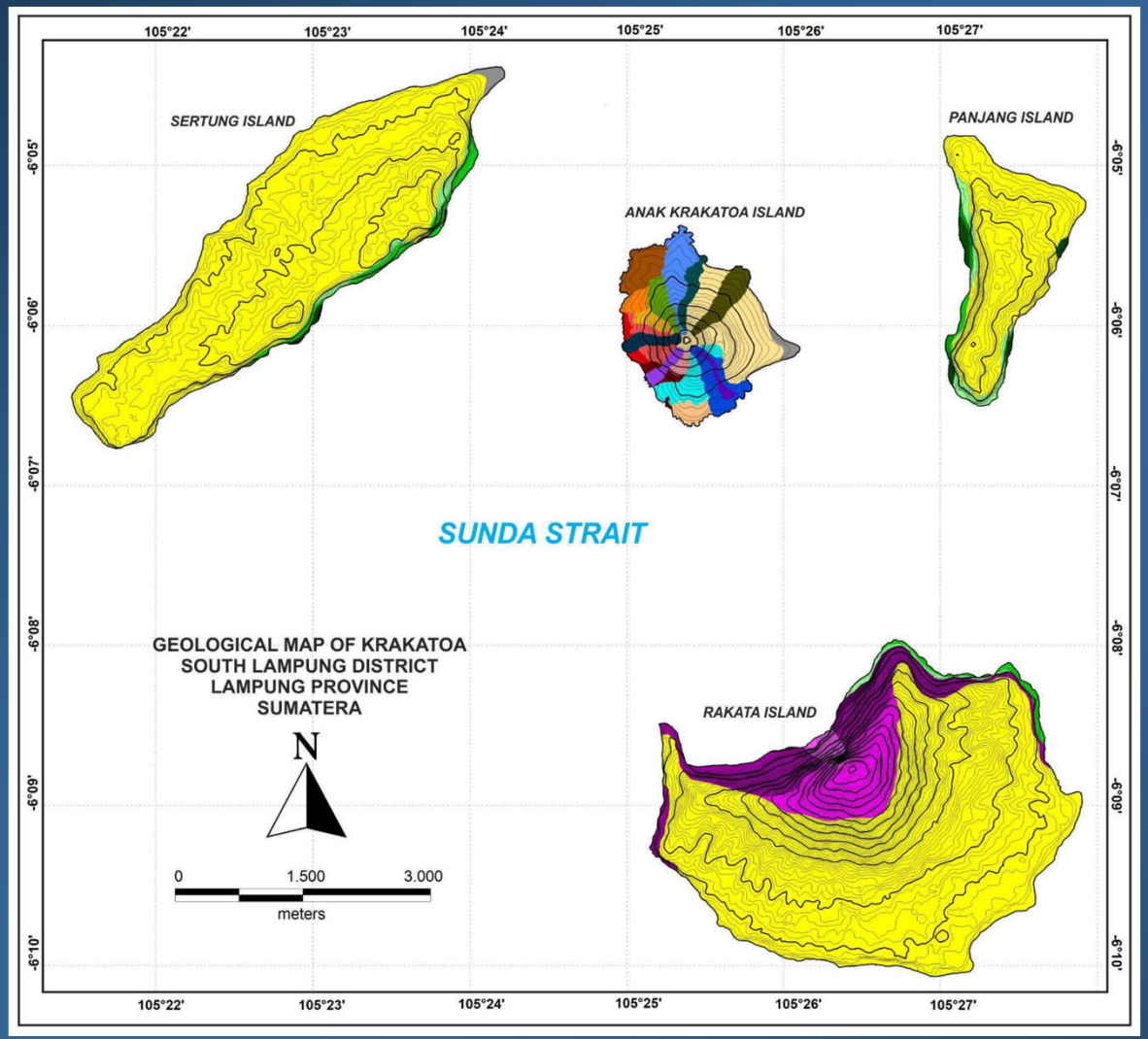
THE 1883 KRAKATAU ERUPTION
CLIMATE EFFECTS

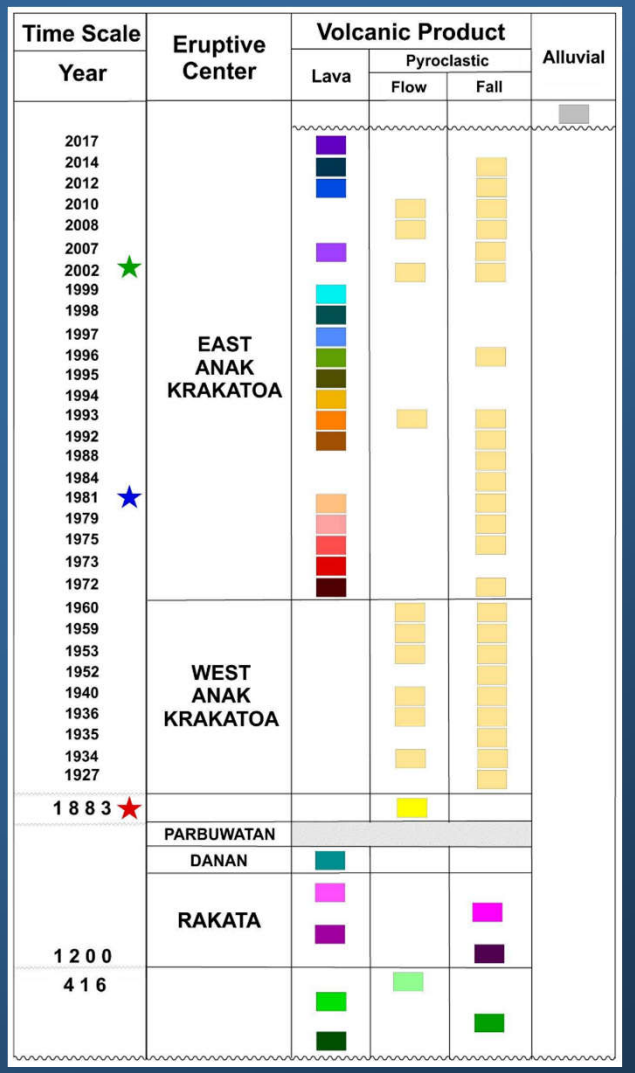


Solar radiation, sunspot number, and temperature from 1880 to 1910. A. Observed and smoothed annual mean noon solar radiation. B. Wolf's smoothed sun-spots numbers. C. Combined solar radiation and sun-spot numbers. D. Smoothed annual mean departures, United States maximum temperatures (15 stations). E. Smoothed annual mean departures, world temperature (47 stations) (from Abbot and Fowle, 1913).

From *Schaller et al. (2009)*, Vierteljahrsschrift der Naturforschenden Gesellschaft in Zürich (2009)

GEOLOGICAL STRUCTURE OF THE KRAKATAU COMPLEX





From *Abdurrachman et al. (2018) Geosciences*

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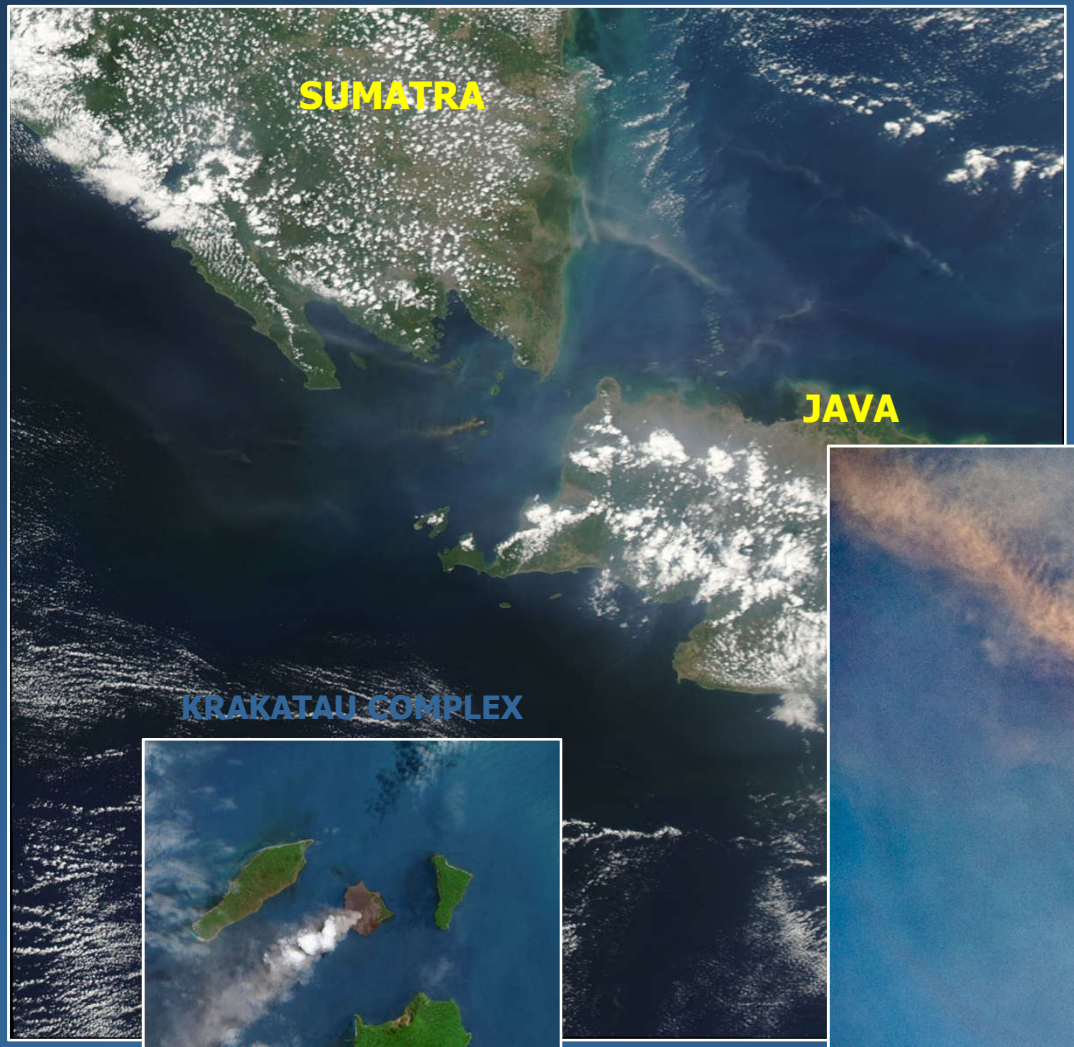
EVOLUTION OF THE ANAK KRAKATAU BEHAVIOR OVER THE PAST 3 MONTHS

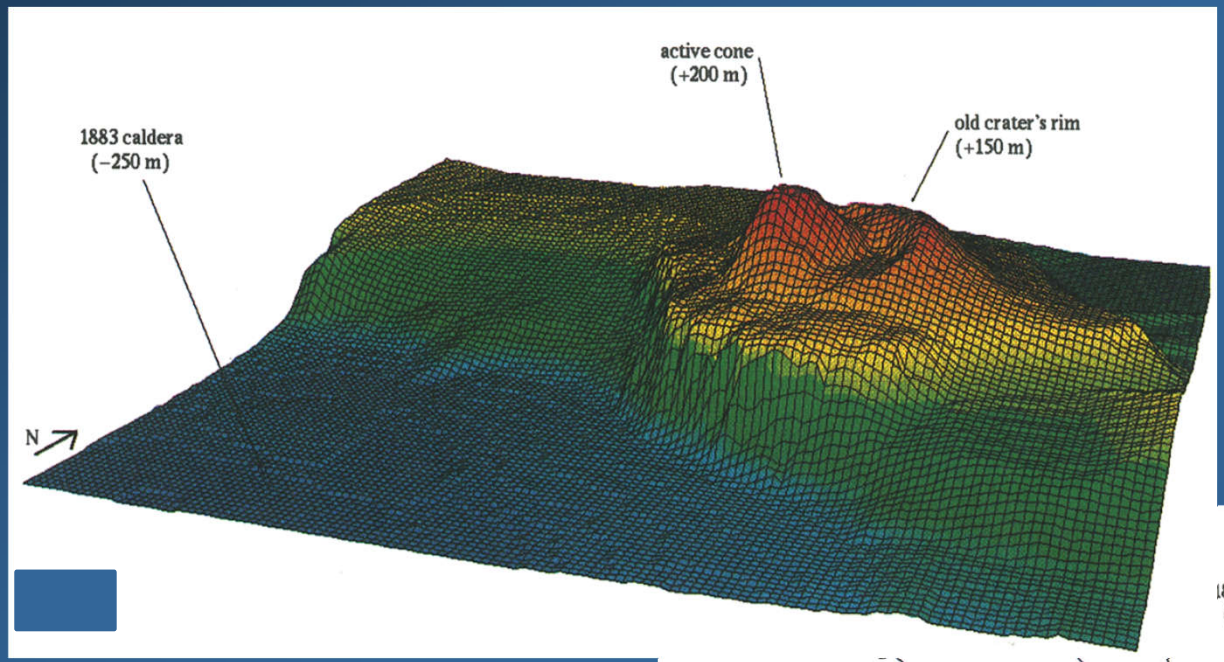


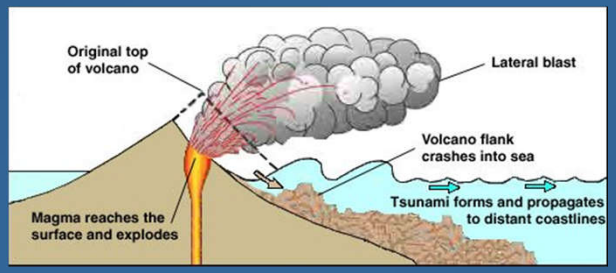
Activity at the Indonesian volcano Anak Krakatau is not unusual; eruptions have occurred sporadically over the past few decades. It is somewhat unusual, however, for satellites to get cloud-free views, as they did in September 2018. Local sources reported that this eruption has been ongoing since June 19, 2018. Ash plumes have been observed rising to altitudes up to 1.8 km (6,000 ft). The plume was also visible from the International Space Station. European Space Agency astronaut Alexander Gerst snapped this photograph of the plume on September 24.

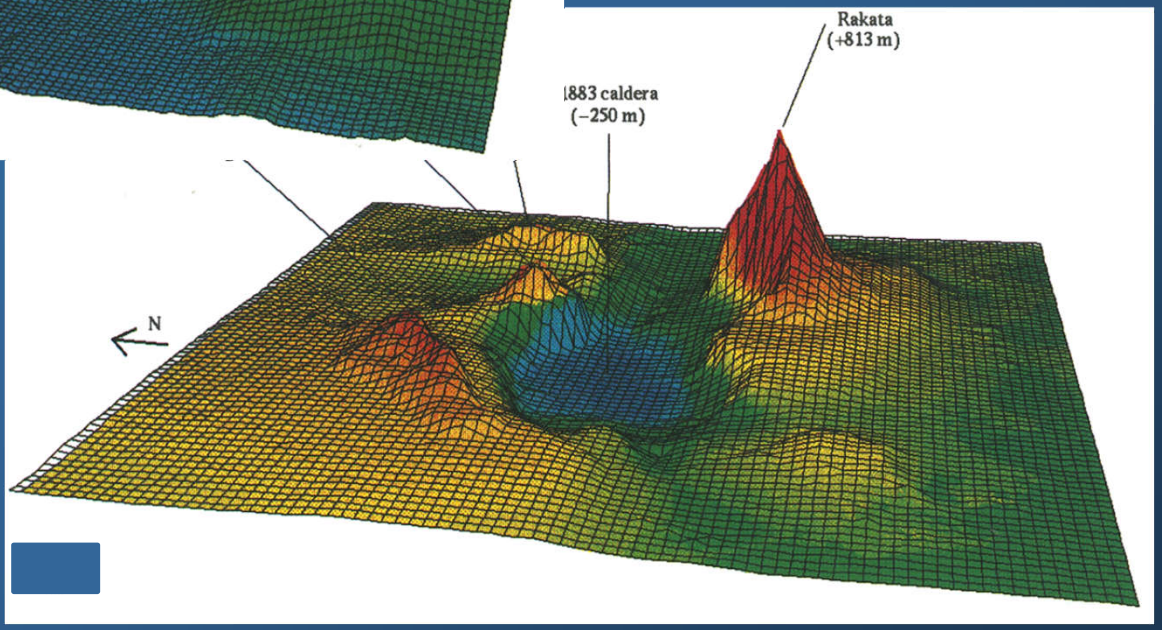
THE ERUPTION OF THE ANAK KRAKATAU A DAY AFTER THE TSUNAMI

A plume of ash rises as the Anak Krakatau volcano erupts in Sunda Strait, Indonesia on December 23, 2018

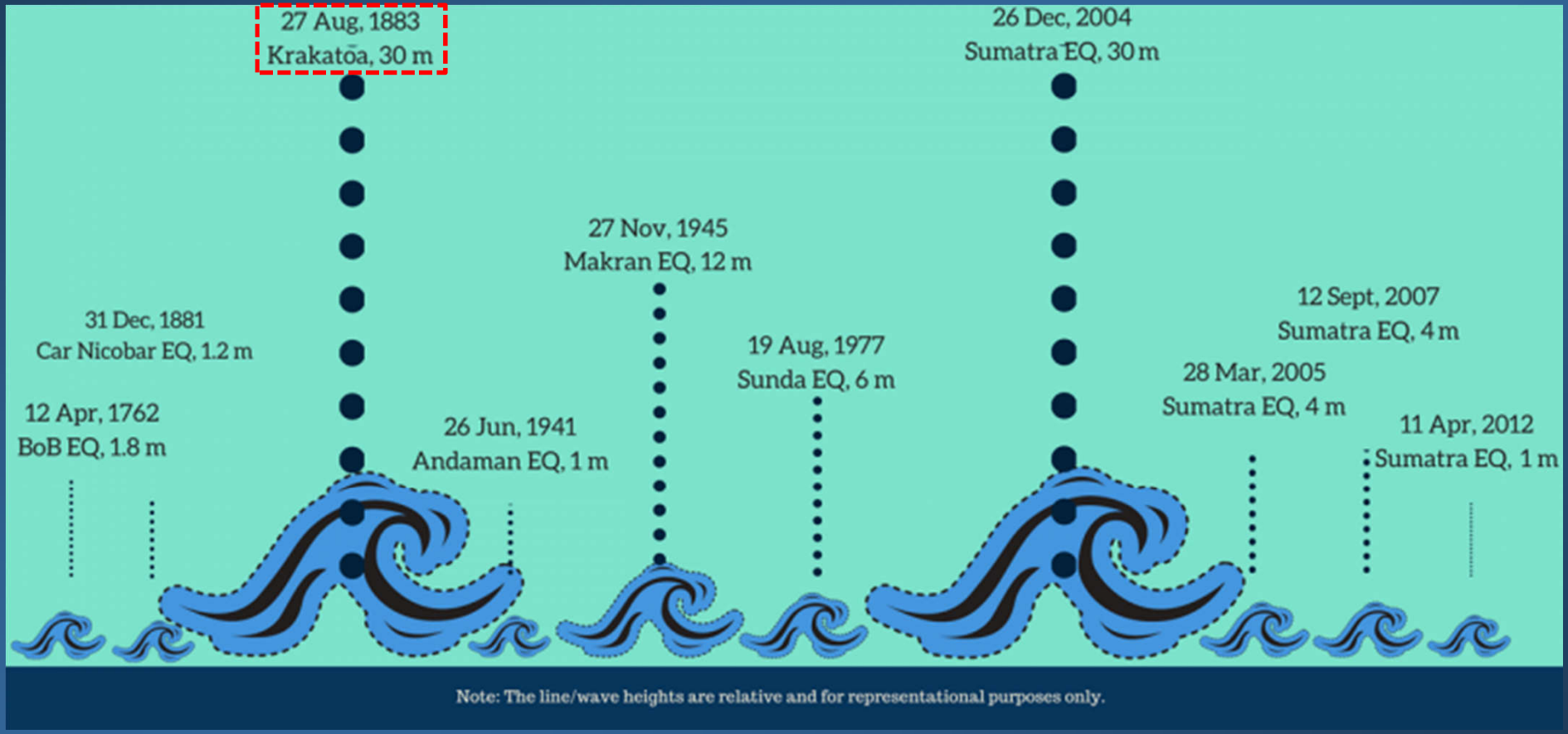
THREE DIMENSIONAL NUMERICAL MODEL OF KRAKATAU VOLCANIC COMPLEX





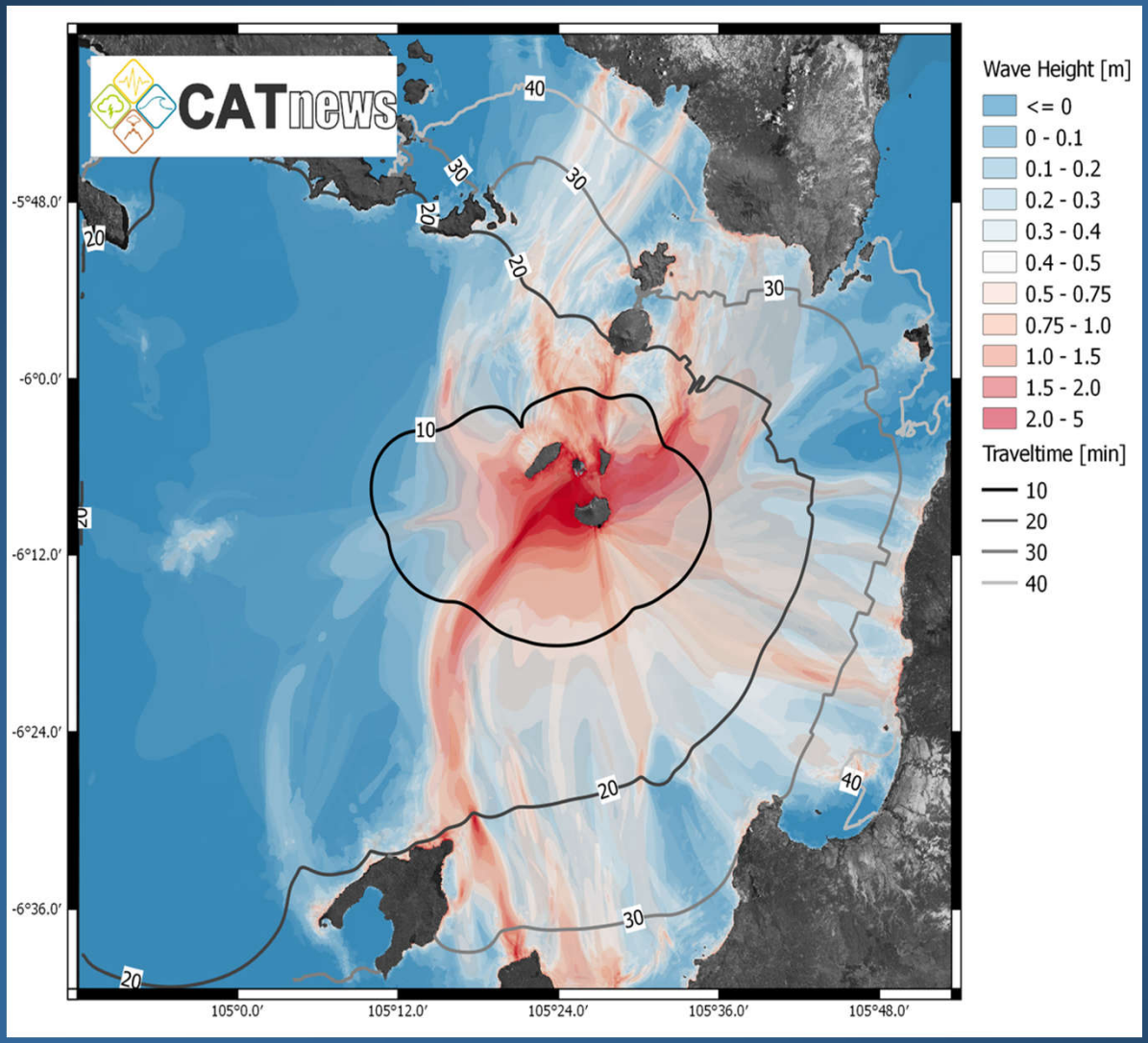


HISTORICAL EARTHQUAKE- AND TSUNAMI- TRIGGERED TSUNAMIS IN THE INDIAN OCEAN



Volcano-triggered tsunamis are rare not only in Indian Ocean but throughout the world

IMPACT OF THE DECEMBER 2018 INDONESIA TSUNAMI



Overlay of several different Krakatoa tsunami landslides on the south eastern and western flanks, also showing expected travel times affecting coasts of Banten, Indonesia. Triggering around 13:50-14:00 UTC, explosion on satellite and low frequency seismic signal observed.

https://twitter.com/CATnewsDE/status/1076822986278273024

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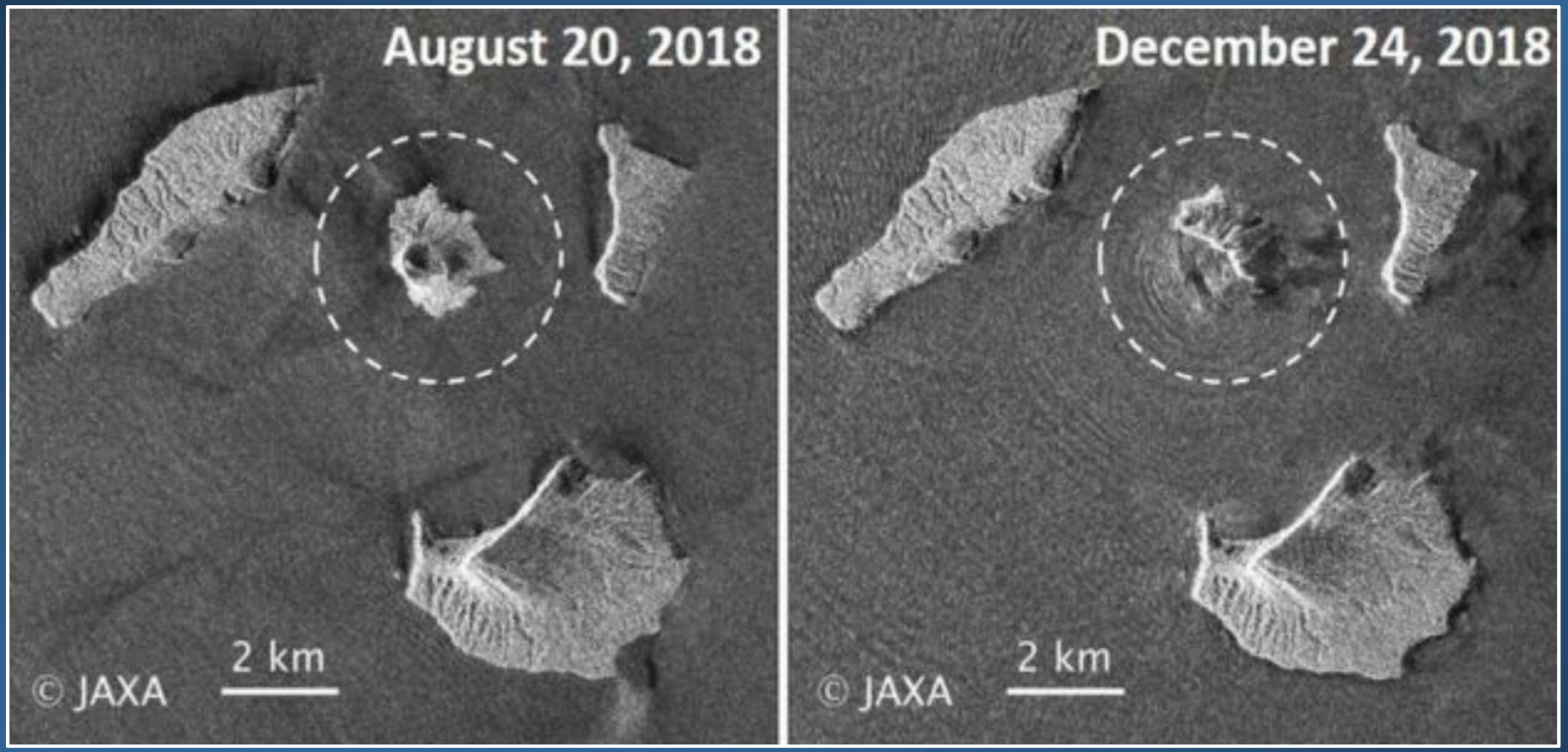
ORIGIN OF THE DECEMBER 2018 INDONESIAN TSUNAMI

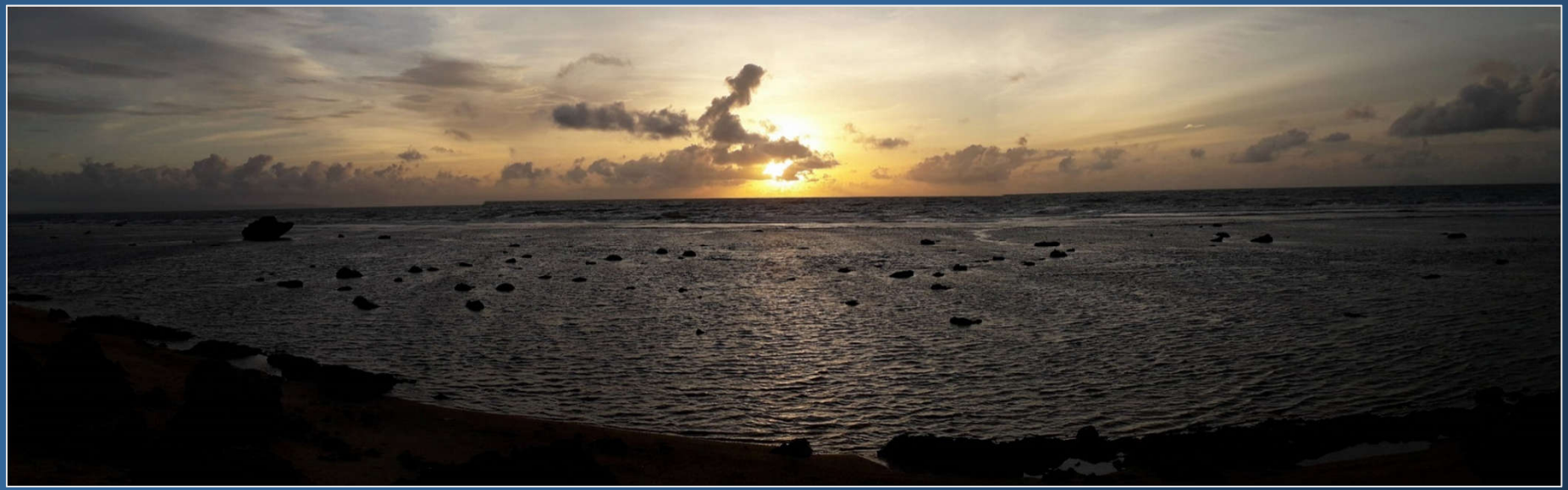


The Japanese Alos-2 radar satellite used to monitor Anak Krakatau before and after the December 2018 tsunami disaster in Sunda Strait between Southern Sumatra and Western Java As it is indicated by the analysis of SAR intensity images of ALOS-2/PALSAR-2 data and the detected geomorphic changes caused by the eruption, the tsunami was most likely triggered by a chunk of the Anak Krakatau volcano slipping into the ocean. Geomorphic change is clearly detected in the southwestern part of the Anak Krakatau volcano. It can be estimated that approximately 2 km squares of southwestern part of the island was collapsed by December 24th at 5 pm (UTC).

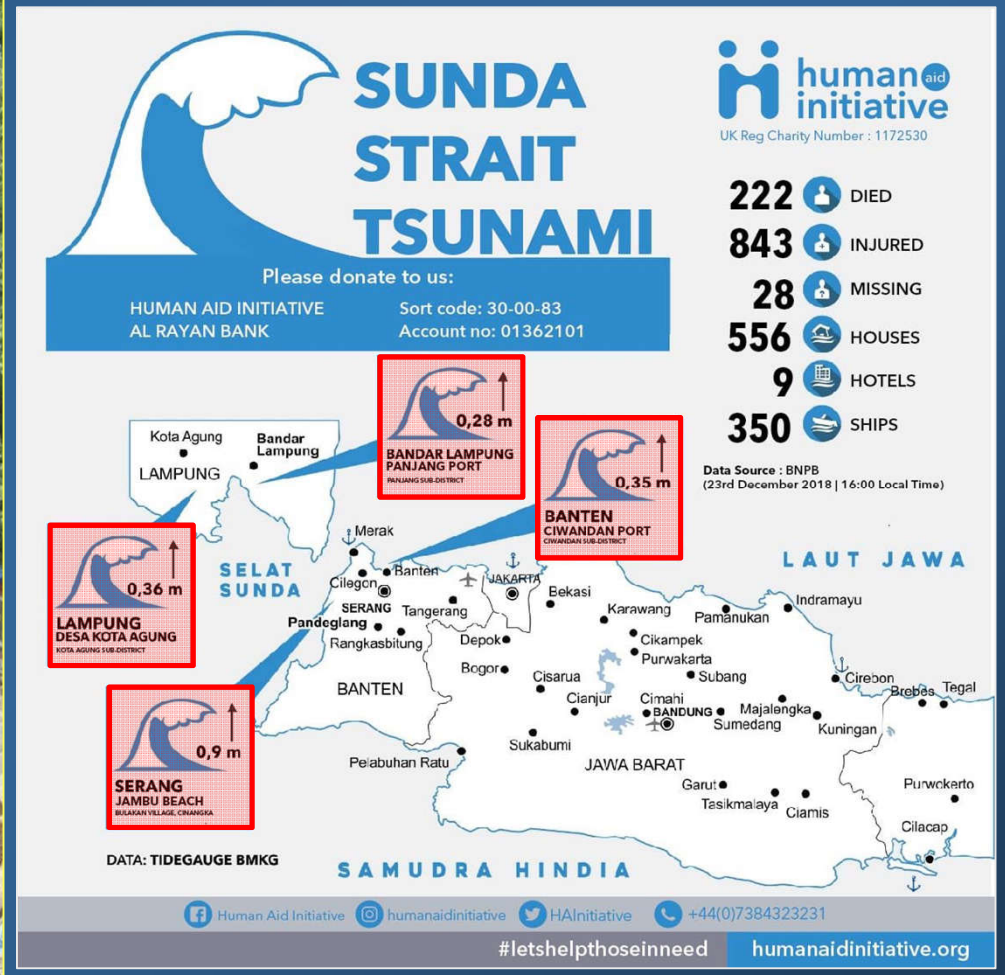
From http://www.gsi.go.jp/cais/topic181225-index-e.html

THE SHALLOW COASTAL AREA OF THE SEVERELY AFFECTED WESTERN JAVA

Panoramic view of the shallow coastal area of the western Java in Carita beach. The small depth increased the height of the waves and their devastating power along the coast resulting in severe structural damage in buildings and infrastructures and many fatalities.



WAVE HEIGHTS OF THE DECEMBER 2018 INDONESIAN TSUNAMI



Scars and marks on trees from tsunami in Carita beach (western Java)

IMPACT OF THE VOLCANO-TRIGGERED TSUNAMI ON MOBILE OBJECTS

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IMPACT OF THE VOLCANO-TRIGGERED TSUNAMI ON MOBILE OBJECTS

Vessels and boats are washed away, destroyed or moved to higher elevation

→ Arrows indicate direction of tsunami water flow

IMPACT OF THE VOLCANO-TRIGGERED TSUNAMI ON REINFORCED CONCRETE BUILDINGS

IMPACT OF THE VOLCANO-TRIGGERED TSUNAMI ON REINFORCED CONCRETE BUILDINGS

IMPACT OF THE VOLCANO-TRIGGERED TSUNAMI ON RC BUILDINGS

Many sea front RC buildings were also swept away. The tsunami washed away many of them, leaving only their concrete base and buckled the remaining still standing columns.

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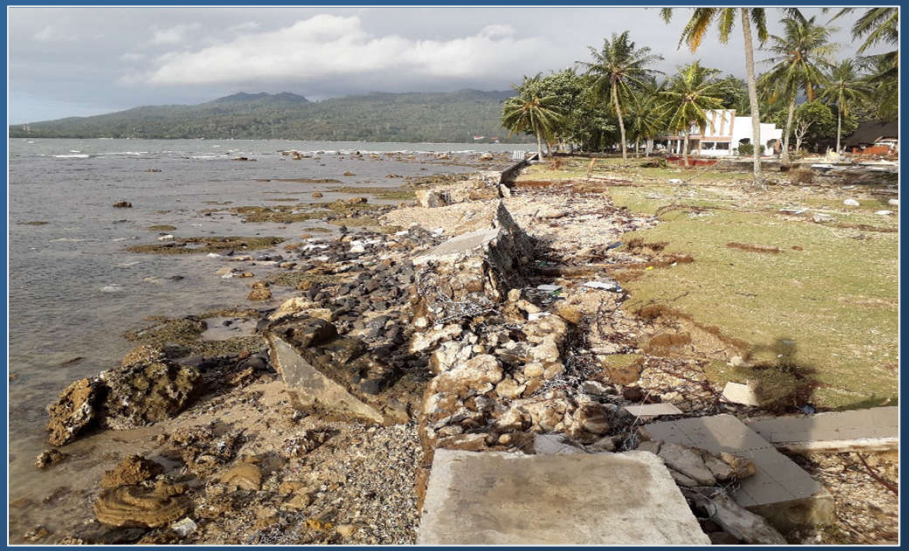
IMPACT OF THE VOLCANO-TRIGGERED TSUNAMI ON SEA FRONT WALLS



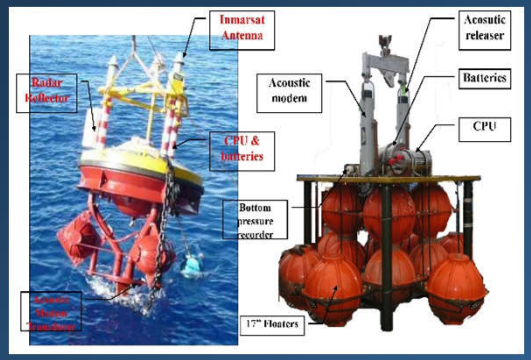
IMPACT OF THE VOLCANO-TRIGGERED TSUNAMI ON COASTAL VEGETATION

Uprooted palm trees due to tsunami on the sand. indicator of the advancing direction of tsunami.

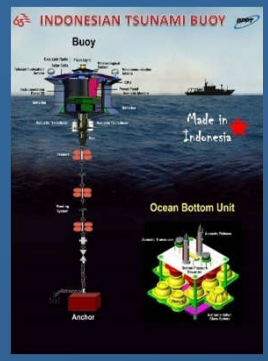
GEOMORPHOLOGICAL CHANGE AND COASTAL EROSION DUE TO THE TSUNAMI

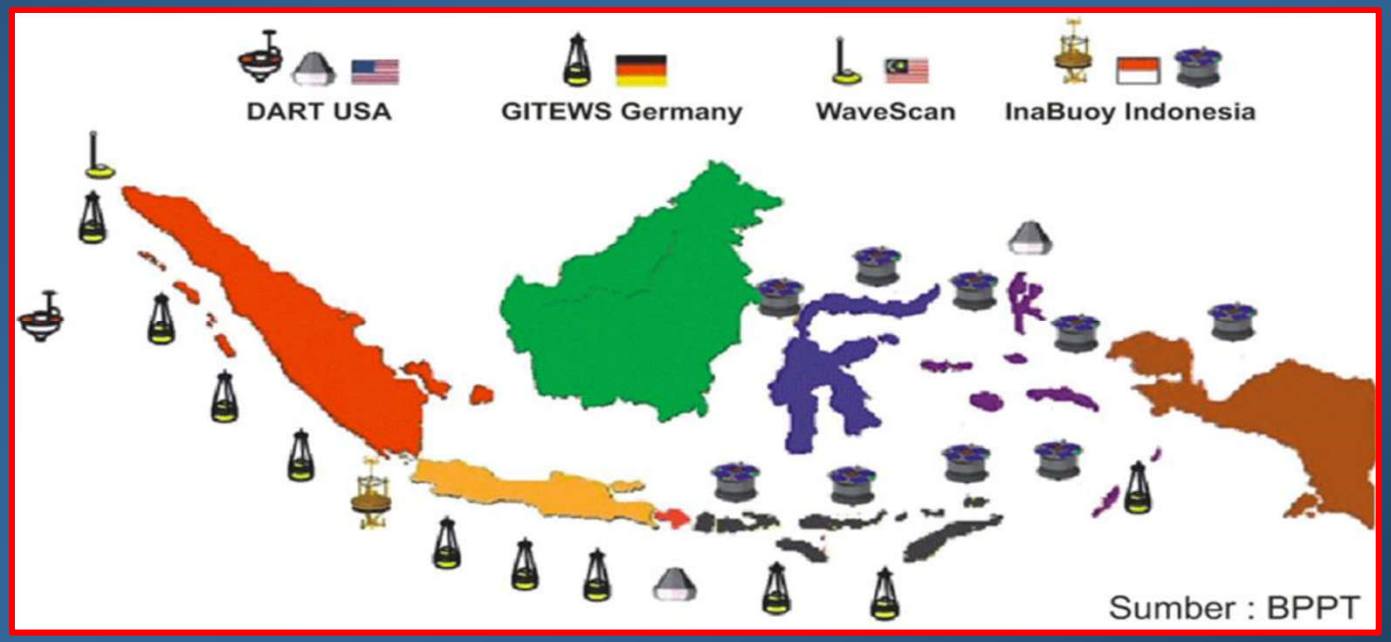
Beach erosion was induced due the tsunami.

Waves removed beach sand about 1 m vertically and 20 to 30 meters wide and deposited it further inland.



TSUNAMI BUOY ARRAY IN INDONESIAN WATERS NO OPERATING SINCE 2012





Tsunami detecting and early warning systems in Indonesian waters have not been operating since 2012. Vandalism, limited budget, technical damage have caused no current tsunami system. There is need to be rebuilt in order to strengthen the Indonesian Tsunami Early Warning System and to protect the Insdonesian population. Indonesia must build an early warning system able to detect underwater landslides and volcanic eruptions.

https://library.wmo.int/pmb_ged/dbcp-td_36_en/presentations/22_Pandoe-Indonesia-Tsunameters.pdf

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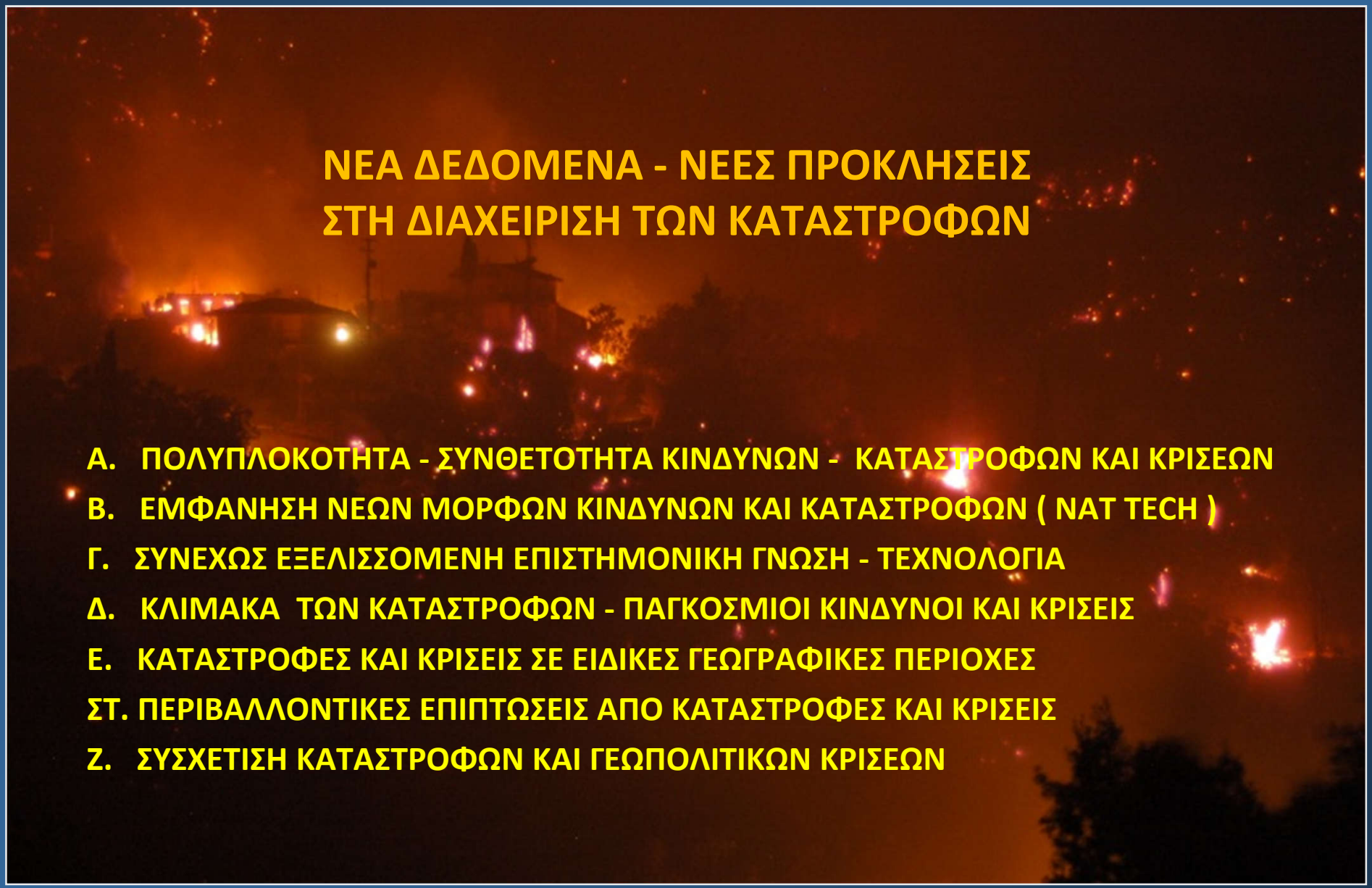

ΝΕΑ ΔΕΔΟΜΕΝΑ - ΝΕΕΣ ΠΡΟΚΛΗΣΕΙΣ ΣΤΗ ΔΙΑΧΕΙΡΙΣΗ ΤΩΝ ΚΑΤΑΣΤΡΟΦΩΝ

Α. ΠΟΛΥΠΛΟΚΟΤΗΤΑ - ΣΥΝΘΕΤΟΤΗΤΑ ΚΙΝΔΥΝΩΝ - ΚΑΤΑΣΤΡΟΦΩΝ ΚΑΙ ΚΡΙΣΕΩΝ

Β. ΕΜΦΑΝΗΣΗ ΝΕΩΝ ΜΟΡΦΩΝ ΚΙΝΔΥΝΩΝ ΚΑΙ ΚΑΤΑΣΤΡΟΦΩΝ (NAT TECH)

Γ. ΣΥΝΕΧΩΣ ΕΞΕΛΙΣΣΟΜΕΝΗ ΕΠΙΣΤΗΜΟΝΙΚΗ ΓΝΩΣΗ - ΤΕΧΝΟΛΟΓΙΑ

Δ. ΚΛΙΜΑΚΑ ΤΩΝ ΚΑΤΑΣΤΡΟΦΩΝ - ΠΑΓΚΟΣΜΙΟΙ ΚΙΝΔΥΝΟΙ ΚΑΙ ΚΡΙΣΕΙΣ

Ε. ΚΑΤΑΣΤΡΟΦΕΣ ΚΑΙ ΚΡΙΣΕΙΣ ΣΕ ΕΙΔΙΚΕΣ ΓΕΩΓΡΑΦΙΚΕΣ ΠΕΡΙΟΧΕΣ

ΣΤ. ΠΕΡΙΒΑΛΛΟΝΤΙΚΕΣ ΕΠΙΠΤΩΣΕΙΣ ΑΠΟ ΚΑΤΑΣΤΡΟΦΕΣ ΚΑΙ ΚΡΙΣΕΙΣ

Ζ. ΣΥΣΧΕΤΙΣΗ ΚΑΤΑΣΤΡΟΦΩΝ ΚΑΙ ΓΕΩΠΟΛΙΤΙΚΩΝ ΚΡΙΣΕΩΝ

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Εθνικόν και Καποδιστριακόν Πανεπιστήμιον Αθηνών
ΙΔΡΥΘΗΝ ΤΟ 1837

Η συμβολή των **Ερευνητικών Φορέων** της χώρας στη **Διαχείριση** των **Καταστροφών**

14 & 15 Μαρτίου 2019

Αμφιθέατρο
Άλκης Αργυριάδης

Κεντρικό Κτήριο
Εθνικού & Καποδιστριακού
Πανεπιστημίου Αθηνών

Προπύλαια
(Πανεπιστημίου 30)

Δηλώσεις συμμετοχής Φορέων & αποστολή τίτλων εισηγήσεων έως **18 Ιαν. 2019**

Πρόγραμμα Μεταπτυχιακών Σπουδών
Στρατηγικές Διαχείρισης Περιβάλλοντος, Καταστροφών & Κρίσεων

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