

Central America Seismological Center (CASC) Building regional capacities

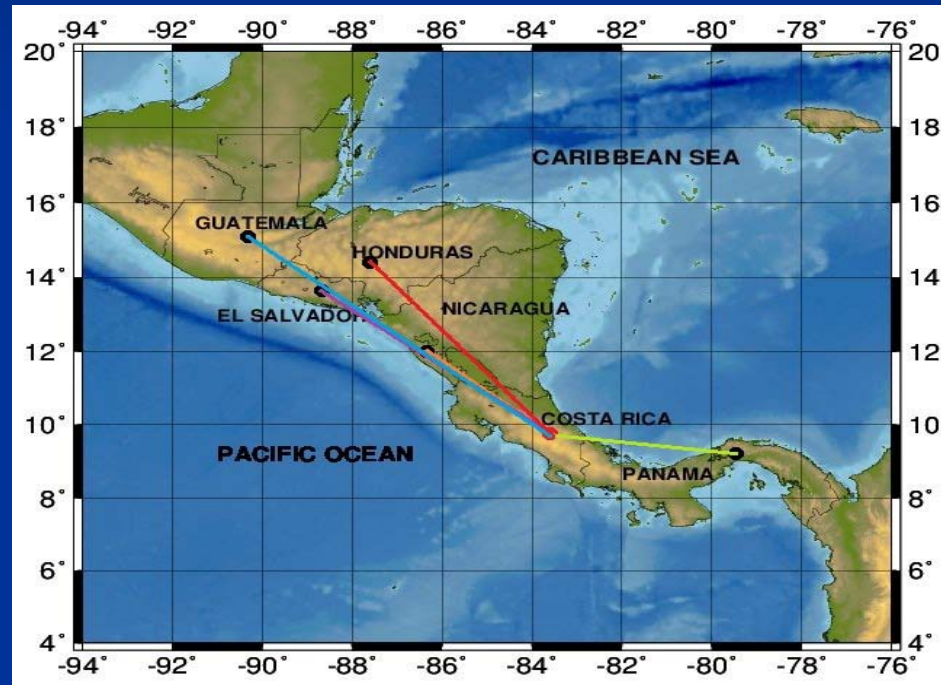
and

University of Costa Rica
Institute of Electricity
Building national capacities

Dr. Mauricio Mora Fernandez
Tec. Carlos Redondo Chavarria
Universidad de Costa Rica

Central America Seismological Center (CASC)

1992 to 2009-09



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1. CASC started to operate in 1992. At that time, it moves from one country to another. It was created with the support of Norway, through NORSAR, University of Bergen and CEPREDENAC (Centro para la Prevencion y Mitigacion de Desastres Naturales en America Central).
2. Since May 1998, the Region decided to stop moving CASC and leave it in Costa Rica, at the Escuela Centroamericana de Geología of the Universidad de Costa Rica which also operates the Red Sismologica Nacional (RSN: ICE-UCR).
3. By that time, the Region also decided to leave the Central American Tsunami Warning System at INETER in Nicaragua.
4. Primary objectives:
 - Locate automatically events with magnitude $\geq 4,0$ with all stations of the area and make a preliminary report in almost real time. (Not fully accomplished because of problems of connectivity).
 - Compile a permanent database for research and other applications. (OK)

Partners (1)

Guatemala:

Instituto Nacional de Vulcanología, Meteorología e Hidrología, INSIVUMEH

El Salvador:

Centro de Investigaciones Geofísicas, GIC, now **SNET**
Servicio Nacional de Estudios Territoriales.

Honduras:

Universidad Nacional Autónoma de Honduras, UNAH

Nicaragua:

Instituto Nicaraguense de Estudios Territoriales, INETER

Partners (2)

Costa Rica

Red Sismologica Nacional, Universidad de Costa Rica,
(RSN: UCR-ICE)

Instituto Costarricense de Electricidad, ICE

Observatorio Vulcanológico y Sismológico de la Universidad
Nacional, OVSICORI

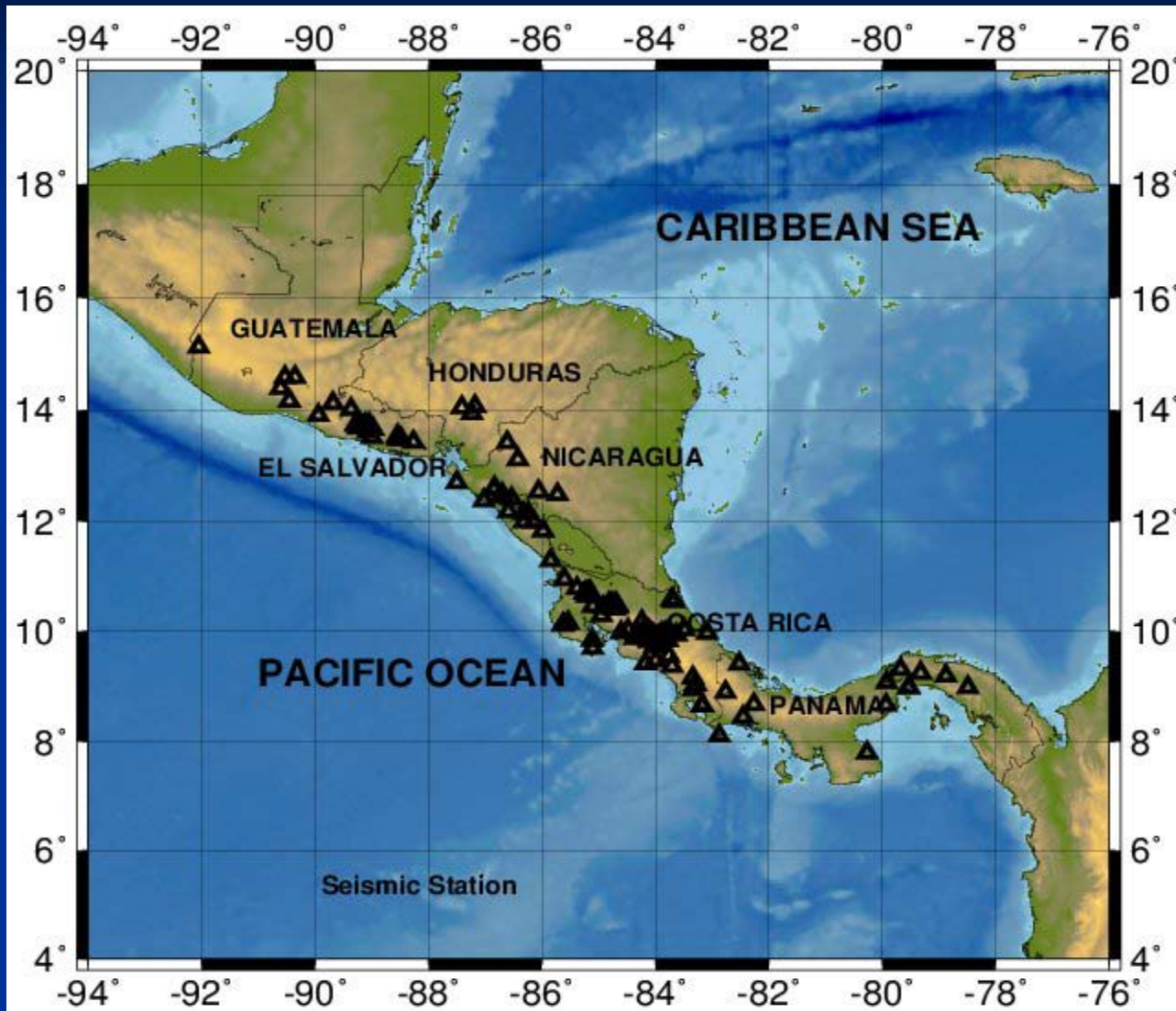
Panamá

Instituto de Geociencias de la Universidad de Panamá,
Panamá, UPA

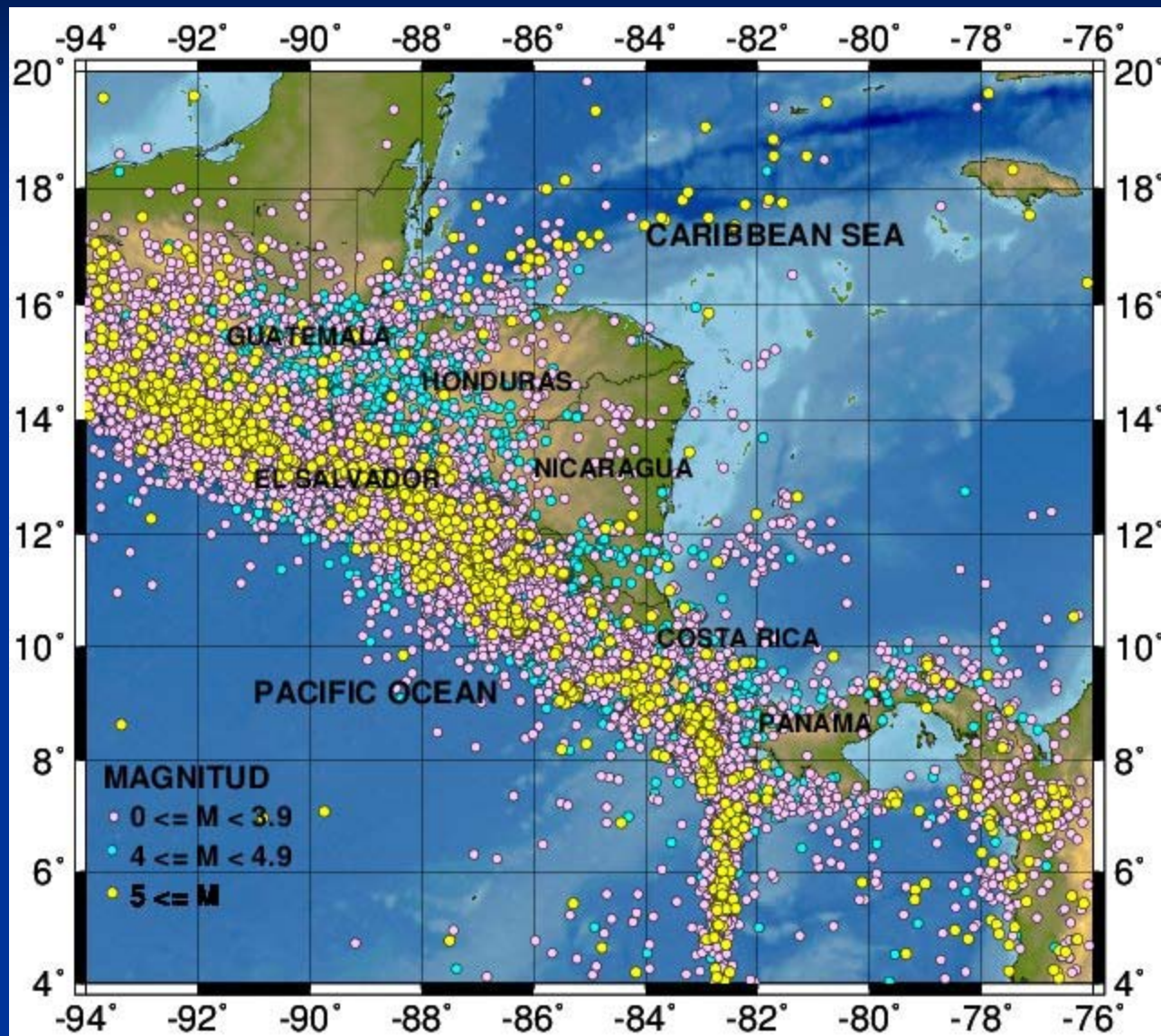
DATA PROVIDED BY THE REGIONAL NETWORKS FROM 1992-01 TO 2009-09

| COUNTRY | Network code | N° of events shared | N° of waveforms | Waveforms used in CAM |
|----------------------------|--------------|---------------------|-----------------|-----------------------|
| Costa Rica (UCR) | RSN | 76020 | 32350 | 14364 |
| Nicaragua (INETER) | NIC | 33997 | 28106 | 10924 |
| El Salvador (CIG) y (SNET) | SAL | 74664 | 32302 | 14745 |
| Panamá (UPA) | UPA | 5455 | 7523 | 5350 |
| Panamá (CHIRIQUI) | BRU2-ANG2 | 0 | 1400 | 2337 |
| Guatemala (INSIVUMEH) | GUA | 20324 | 10102 | 9170 |
| Honduras (UNAH) | HON | 5087 | 3900 | 3841 |
| Costa Rica (ICE) | BOR | 0 | 1021 | 768 |
| Costa Rica (ICE) | ICE | 4525 | 3120 | 3722 |
| Costa Rica (OVSICORI) | UNA | 9195 | 3100 | 3012 |
| México (UNAM) | CUIG | 0 | 105 | 101 |
| | | 229267 | 123029 | 84552 |

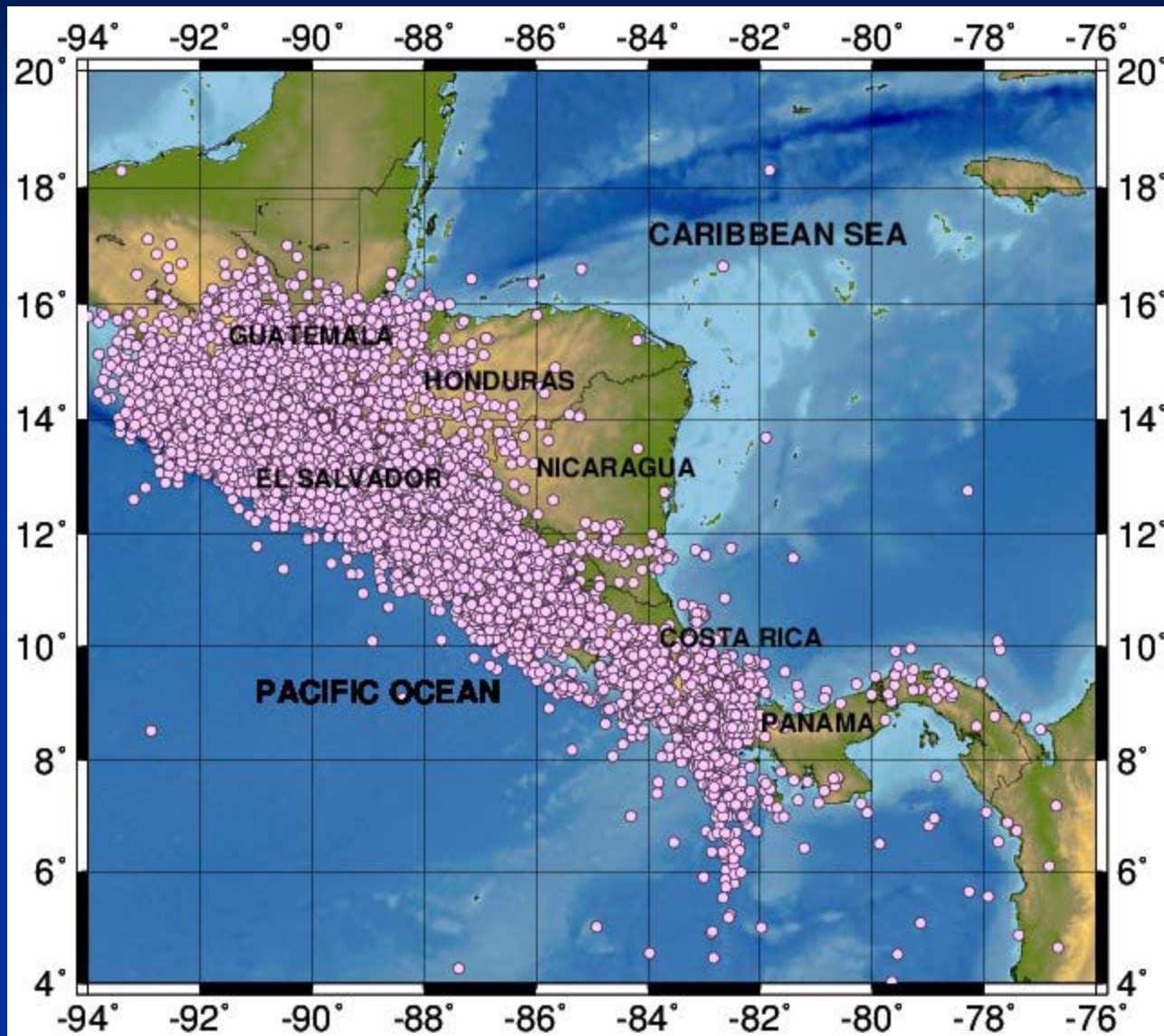
Map of the first stations (since 1998) from which CASC have received data, now there are more...



The CAM database has a total of 28,519 events which are reported to the ISC (International Seismological Center) database



From the 28.519 events, 15.975 have magnitudes $\leq 3,9$ and are located with data of at least 2 countries.



The data has been used for...

- Undergraduate, Master and Ph.D. thesis.
- Research.
- Regional studies of seismic hazard.

- We keep the original database for each country. So, it is also a very important backup for those countries that for any reason lose their databases...

Example:



PROYECTO RESIS II

Evaluación de la Amenaza Sísmica en Centroamérica

Informe preparado por:

Guatemala: Enrique Molina

El Salvador: Griselda Marroquín

Honduras: José Jorge Escobar

Nicaragua: Emilio Talavera

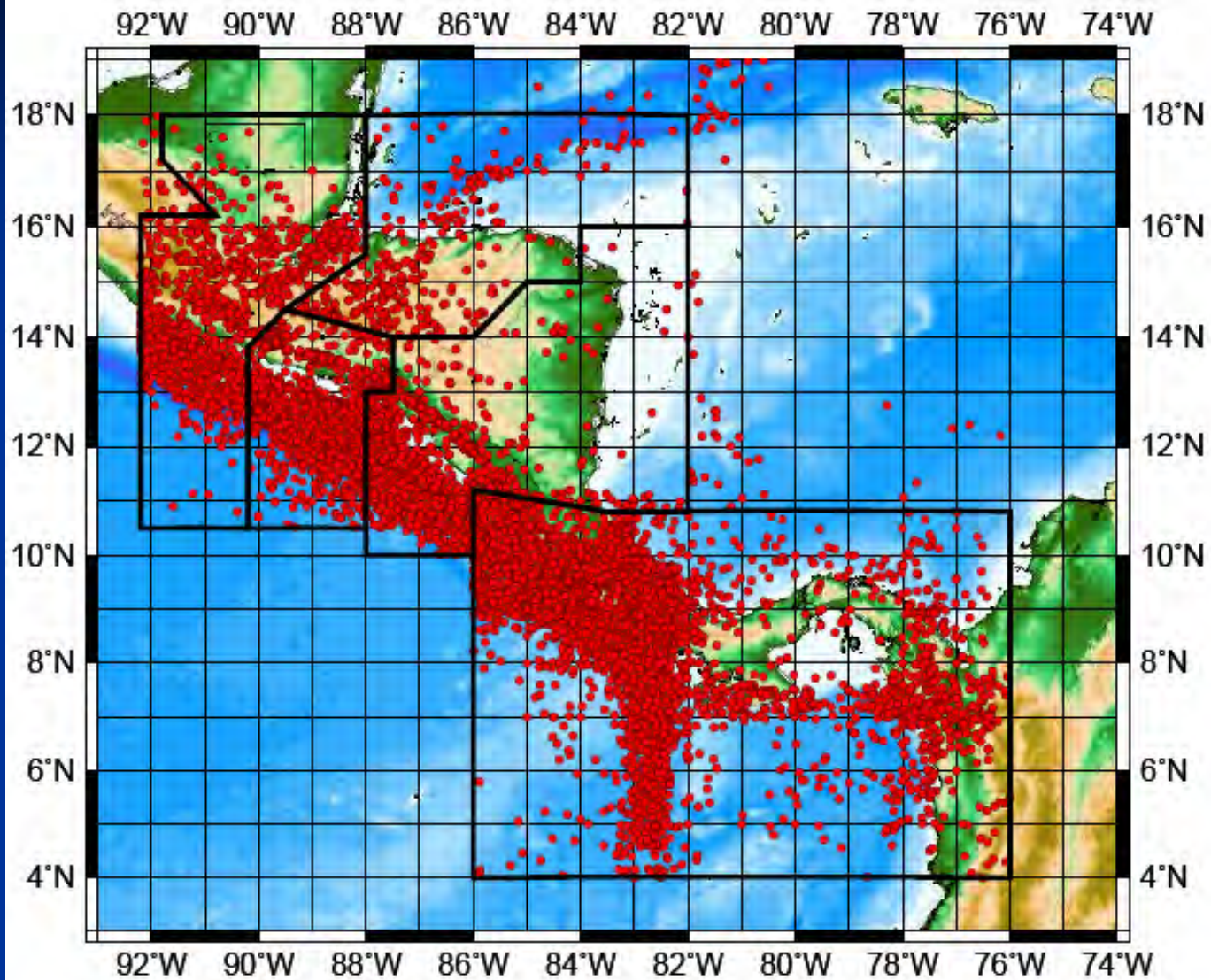
Costa Rica: Wilfredo Rojas y Álvaro Climent

Panamá: Eduardo Camacho Astigarrabia

España: Belén Benito

Noruega: Conrad Lindholm

Abril de 2008



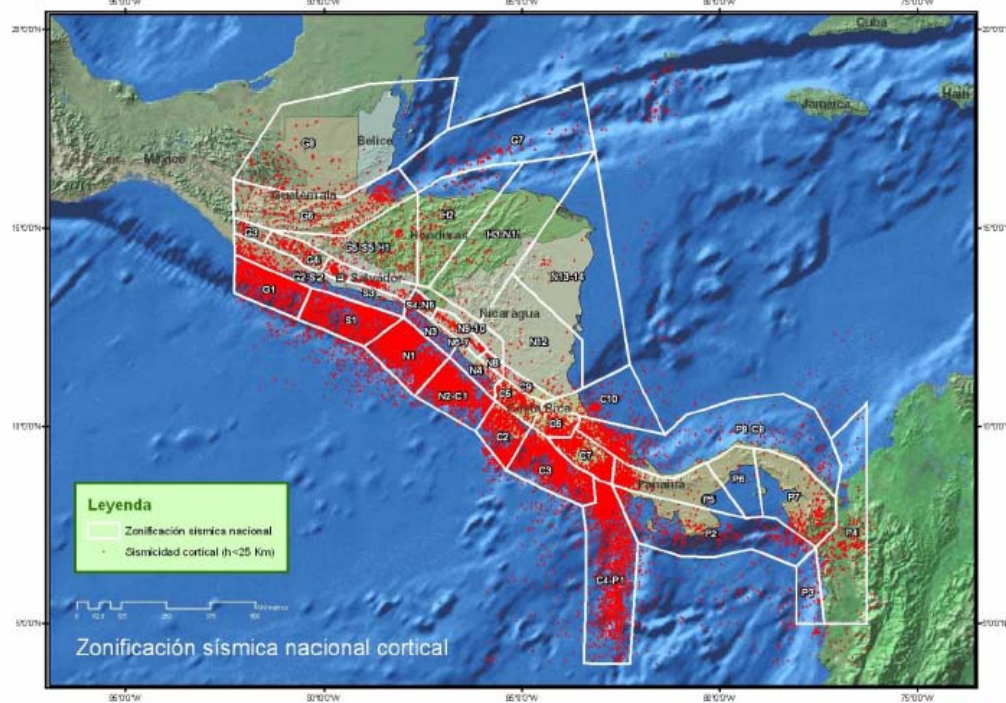


Figura 4. 7 Zonificación sísmica a detalle nacional. Zonas corticales superpuestas a la sismicidad superficial, con epicentros de sismos para profundidad $h < 25$ km

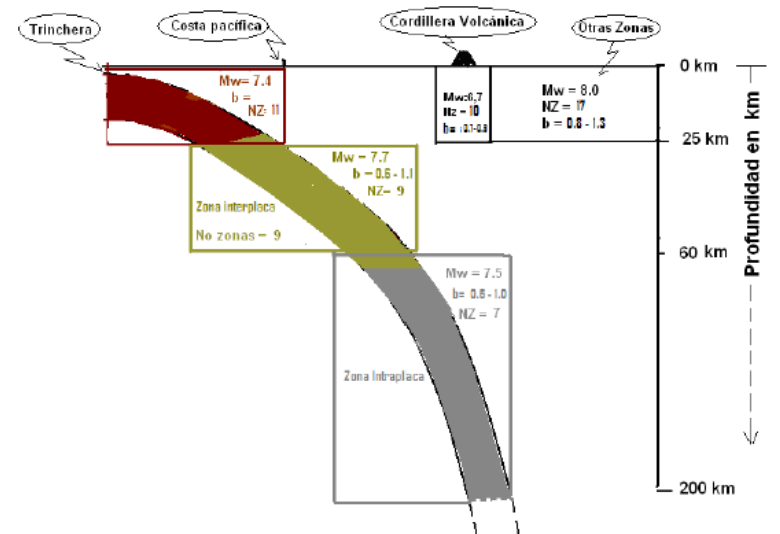


Figura 4. 19 Modelo en perfil de zonas sísmicas en profundidad: Mw es la magnitud máxima esperada, Nz es el número de zonas locales asociadas a la región sismotectónica, b es el índice sísmico característico de la región sismotectónica

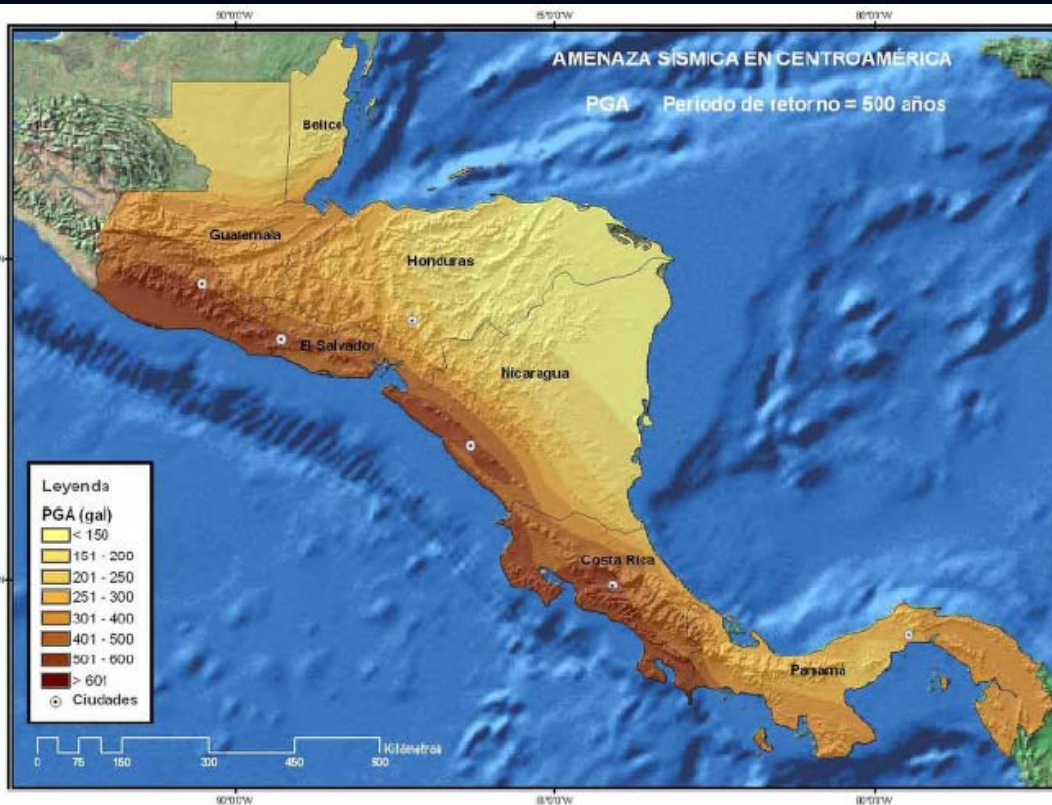


Figura 5. 1 Mapa de amenaza en términos de PGA (gal) para PR=500 años

In Costa Rica, the results were officially delivered to the:

1. Government.
2. Seismic Code Commission.
3. Civil Protection authorities.

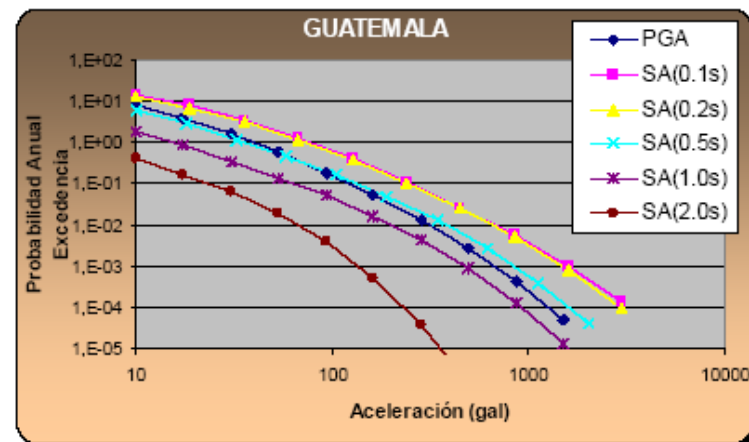


Figura 5. 10 Curvas de amenaza para ciudad de Guatemala

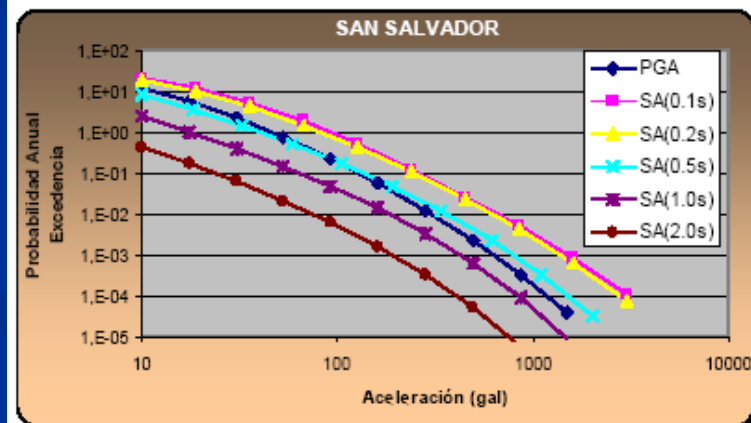


Figura 5. 11 Curvas de amenaza para ciudad de San Salvador

This example means that:

- It is possible to do things together.
- Specially when we have foreign support.

But the point is:

1. When does Central America will be able to make things by itself?
2. What do we need to reach that goal?

The problem is not simple:

- We have different kinds of limitations at each country (social, political, economical, technological ...).

What might be needed?

- Improve technology.
- A better scientific formation of the personnel and adequate working conditions (good salaries, budget for equipment, research, ...)
- More coordination and collaboration among countries of the region and from outside.
- Move CASC to another level through international cooperation?
- Better politicians? THAT'S A DREAM!!!



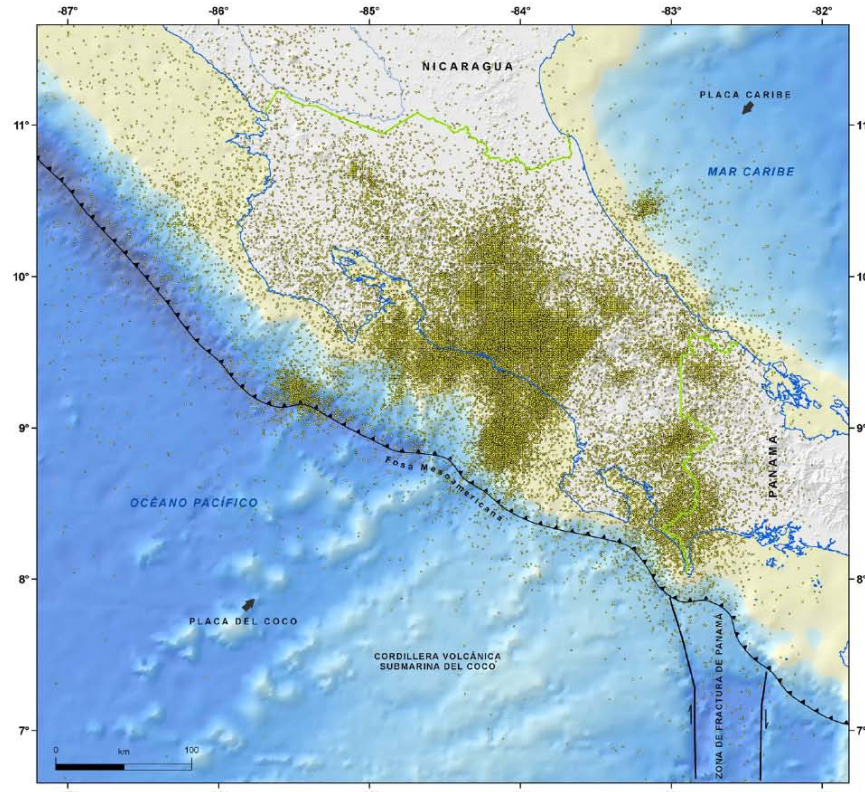
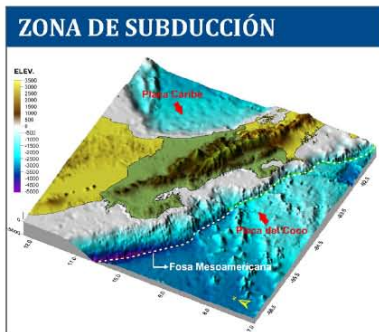
Building national (interinstitutional) capacities in Geological Sciences, Seismology and Seismic Engineering:

1. Central American School of Geology (**ECG**): Provides formation in Geological Sciences at undergraduate level. It also has a graduate programs (Master level) in Hydrogeology and in Risk Management.
2. The ECG also operates the National Seismological Network (**Red Sismologica Nacional: RSN**) in collaboration with the National Institute of Electricity (ICE).
3. Laboratory of Seismic Engineering (**LIS**) operated by Engineering Research Institute.
4. Recently the UCR created the Geological Sciences Research Center (**CICG**).



SISMICIDAD DE COSTA RICA 1985-2008

Rafael Barquero⁽¹⁾, Guillermo Alvarado^(1,2), Alberto Vargas⁽¹⁾, Wilfredo Rojas⁽²⁾, Carlos Redondo⁽²⁾ & Mauricio Mora⁽²⁾
(1) Área de Amenazas y Auscultación Sísmica y Volcánica, Instituto Costarricense de Electricidad
(2) Escuela Centroamericana de Geología, Universidad de Costa Rica

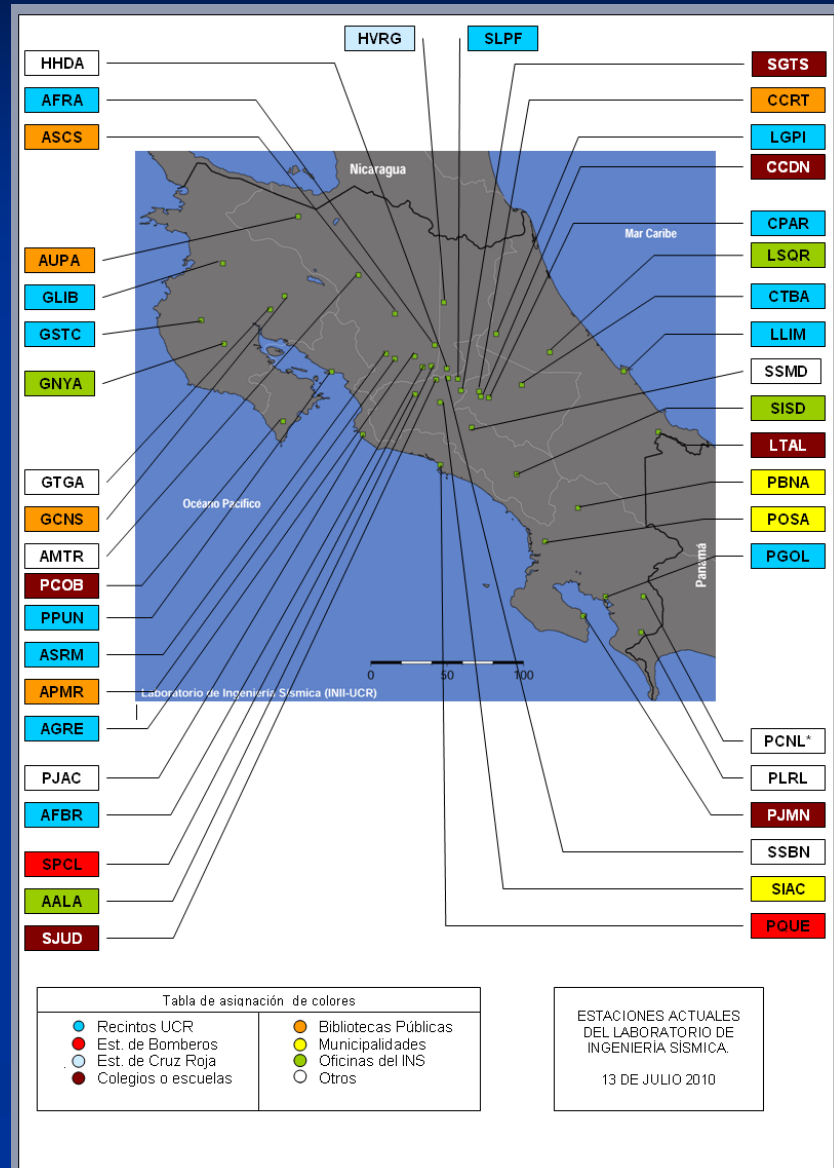


UCR (24 short and 10 BB + 15 coming soon) + ICE (>50 short period) + LIS (~33 Acc)

<http://rsn.geologia.ucr.ac.cr>
<http://www.lis.ucr.ac.cr/>



Seismic Engineering Laboratory Accelerometers network





UNIVERSIDAD DE COSTA RICA



SISMICIDAD DE COSTA RICA 1985-2008

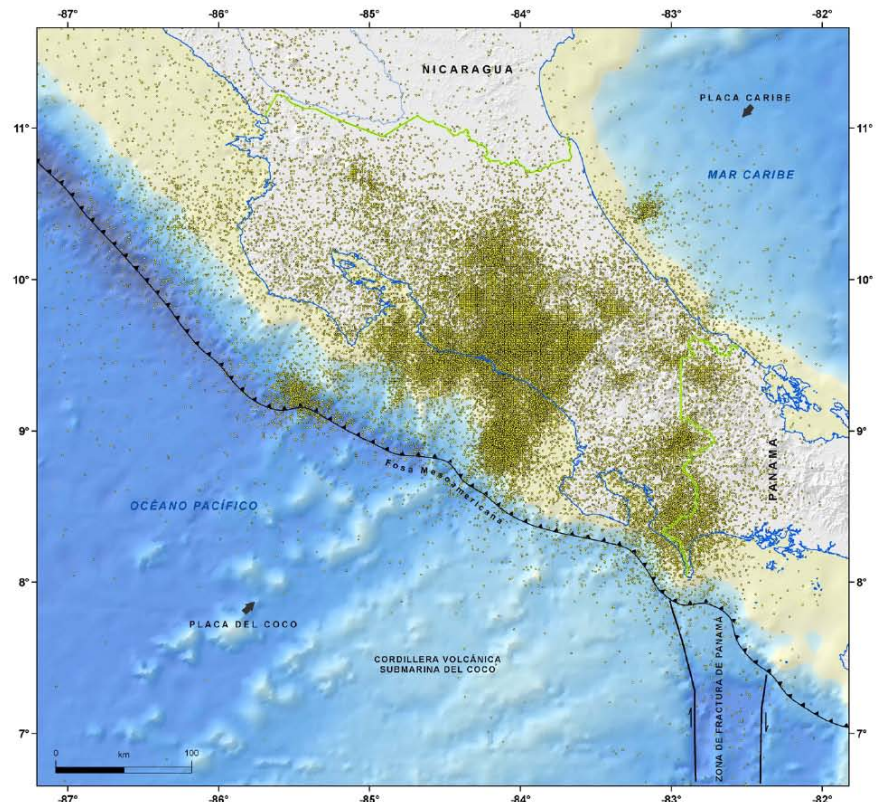
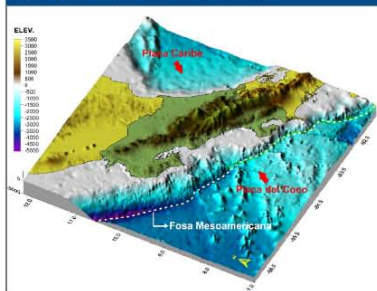
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RED SISMOLÓGICA NACIONAL



ZONA DE SUBDUCCIÓN



UCR (24 short and 10 BB + 15 coming soon) + ICE (>50 short period) + LIS (~33 Acc)



Figura 1: Mapa con ubicación de Estación Sísmica ICCO en Isla del Coco





P.H. BORUCA

Total de estaciones sismológicas: 8





Atlas Tectónico de Costa Rica: hoja San José (figura 17)

Percy Denyer, Walter Montero & Guillermo E. Alvarado

