

UNIVERSIDAD NACIONAL

THE OVSICORI-UNA AND LIS SEISMIC NETWORK

October 2010

Ronnie Quintero



Goals

- a) Seismic networks in CR
- b) The institutional structure of seismology in Costa Rica
- c) How geophysical information is used in warnings/planning related to earthquake and volcano hazards.
- d) How seismologists are trained in CR
- e) Goals for the future
- f) Regional collaboration

MAIN PROJECT WITHIN THE SEISMOLOGY SECTION

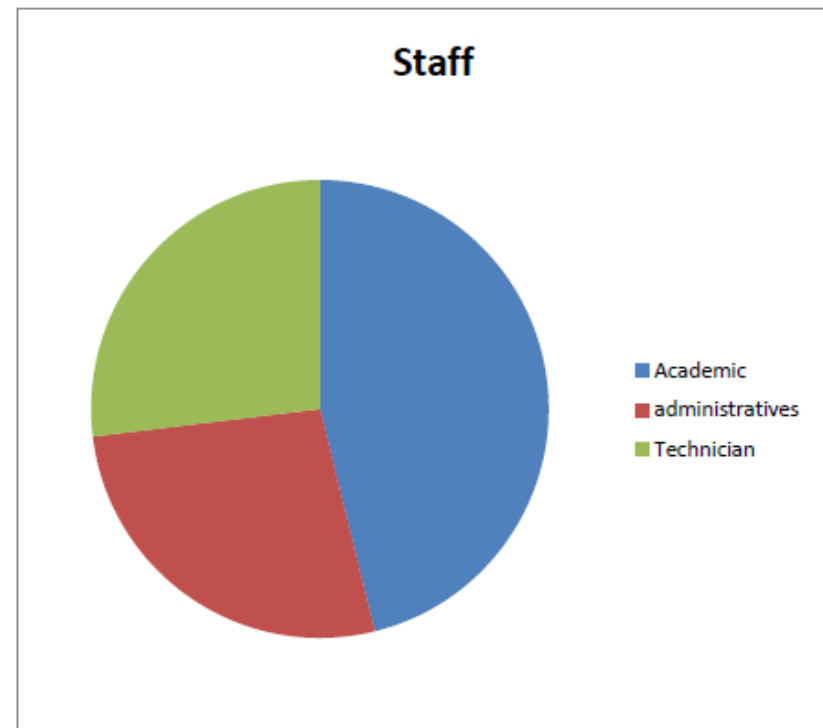
- OVSICORI-UNA permanent seismic network (maintenance & Upgrading)
- Seismic Catalogue
- GPS network
- Felt earthquakes
- Joint project with other institutions (national and international)
- Outreach program & publish research

Distribution and academic persons working in the network

OVSI-CORI-UNA CARGA ACADEMICA 2010

oct-10

NOMBRE	ADM.		RED SISMOGRAFICA					TOTAL
	ADMINISTRACION AHX02	ADMINS.ACADEMICA	CATALOGOS IAD02	MANT Y AMPLIACION DE LA RED SISMICA IAD05	RED SISMICA NAD01	REPORTE Y SEGUIMIENTO DE LA ACTIVIDAD DE SISMOS IAD04	MANT Y AMPLIACION DE LA RED GPS IAD03	
ADMINIST. ACADEMICA								
Juan Segura Torres		20		3		5	2	30
ACADEMICOS PROP								0
Carlos Montero Cascante			10					10
Ronnie Quintero Quintero			10	6	2	2	5	35
Tomas Marino			0		0		20	20
	0	20	20	9	2	7	27	95
			RONNIE QUINTERO					



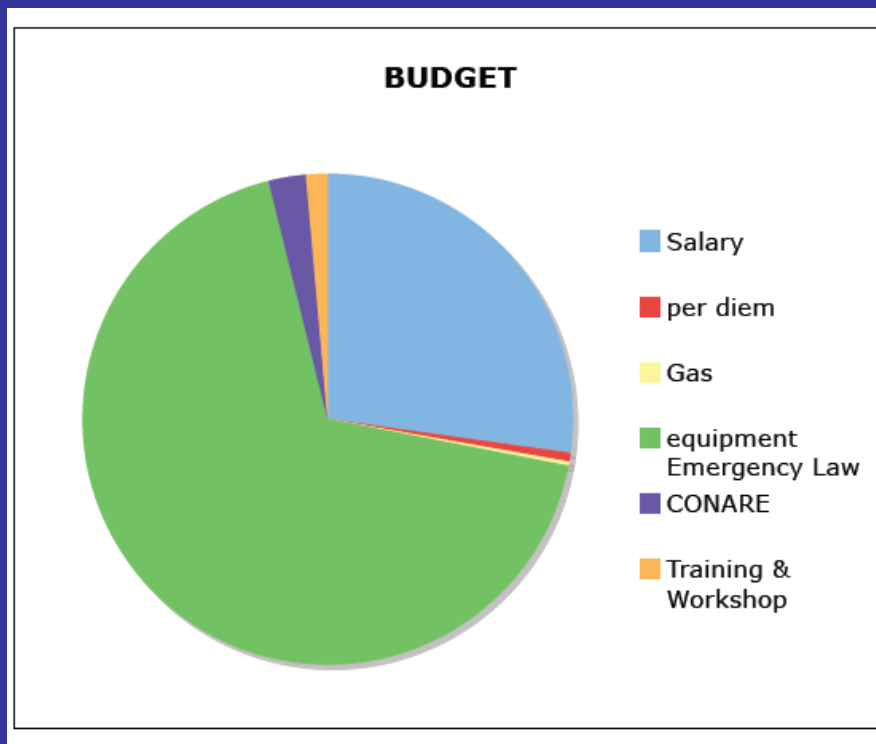
Routine work

OVSICORI-UNA

ENERO								FEBRERO							
GRUPO	L	K	M	J	V	S	D	GRUPO	L	K	M	J	V	S	D
3					1	2	3	1	1	2	3	4	5	6	7
4	4	5	6	7	8	9	10	2	8	9	10	11	12	13	14
5	11	12	13	14	15	16	17	3	15	16	17	18	19	20	21
6	18	19	20	21	22	23	24	4	22	23	24	25	26	27	28
7	25	26	27	28	29	30	31								
MARZO								ABRIL							
GRUPO	L	K	M	J	V	S	D	GRUPO	L	K	M	J	V	S	D
5	1	2	3	4	5	6	7					1	2	3	4
6	8	9	10	11	12	13	14	BETY	5	6	7	8	9	10	11
7	15	16	17	18	19	20	21	WALTER	12	13	14	15	16	17	18
1 betty	22	23	24	25	26	27	28	BETY	19	20	21	22	23	24	25
2 walter	29	30	31					WALTER	26	27	28	29	30		
MAYO								JUNIO							
GRUPO	L	K	M	J	V	S	D	GRUPO	L	K	M	J	V	S	D
BETY	3	4	5	6	7	8	9	WALTER	7	8	9	10	11	12	13
WALTER	10	11	12	13	14	15	16	BETY	14	15	16	17	18	19	20
BETY	17	18	19	20	21	22	23	WALTER	21	22	23	24	25	26	27
WALTER	24	25	26	27	28	29	30	BETY	28	29	30				
BETY	31														
JULIO								AGOSTO							
GRUPO	L	K	M	J	V	S	D	GRUPO	L	K	M	J	V	S	D
				1	2	3	4								1
WALTER	5	6	7	8	9	10	11	WALTER	2	3	4	5	6	7	8
BETY	12	13	14	15	16	17	18	BETY	9	10	11	12	13	14	15
WALTER	19	20	21	22	23	24	25	WALTER	16	17	18	19	20	21	22
BETY	26	27	28	29	30	31		BETY	23	24	25	26	27	28	29
								WALTER	30	31					
SEPTIEMBRE								OCTUBRE							
GRUPO	L	K	M	J	V	S	D	GRUPO	L	K	M	J	V	S	D
BETY	6	7	8	9	10	11	12	BETY	4	5	6	7	8	9	10
WALTER	13	14	15	16	17	18	19	WALTER	11	12	13	14	15	16	17
BETY	20	21	22	23	24	25	26	BETY	18	19	20	21	22	23	24
WALTER	27	28	29	30				WALTER	25	26	27	28	29	30	31
NOVIEMBRE								DICIEMBRE							
GRUPO	L	K	M	J	V	S	D	GRUPO	L	K	M	J	V	S	D
BETY	1	2	3	4	5	6	7					1	2	3	4
WALTER	8	9	10	11	12	13	14	WALTER	6	7	8	9	10	11	12
BETY	15	16	17	18	19	20	21	BETY	13	14	15	16	17	18	19
WALTER	22	23	24	25	26	27	28	WALTER	20	21	22	23	24	25	26
BETY	29	30						BETY	27	28	29	30	31	1	2
								WALTER	3	4	5	6	7	8	9

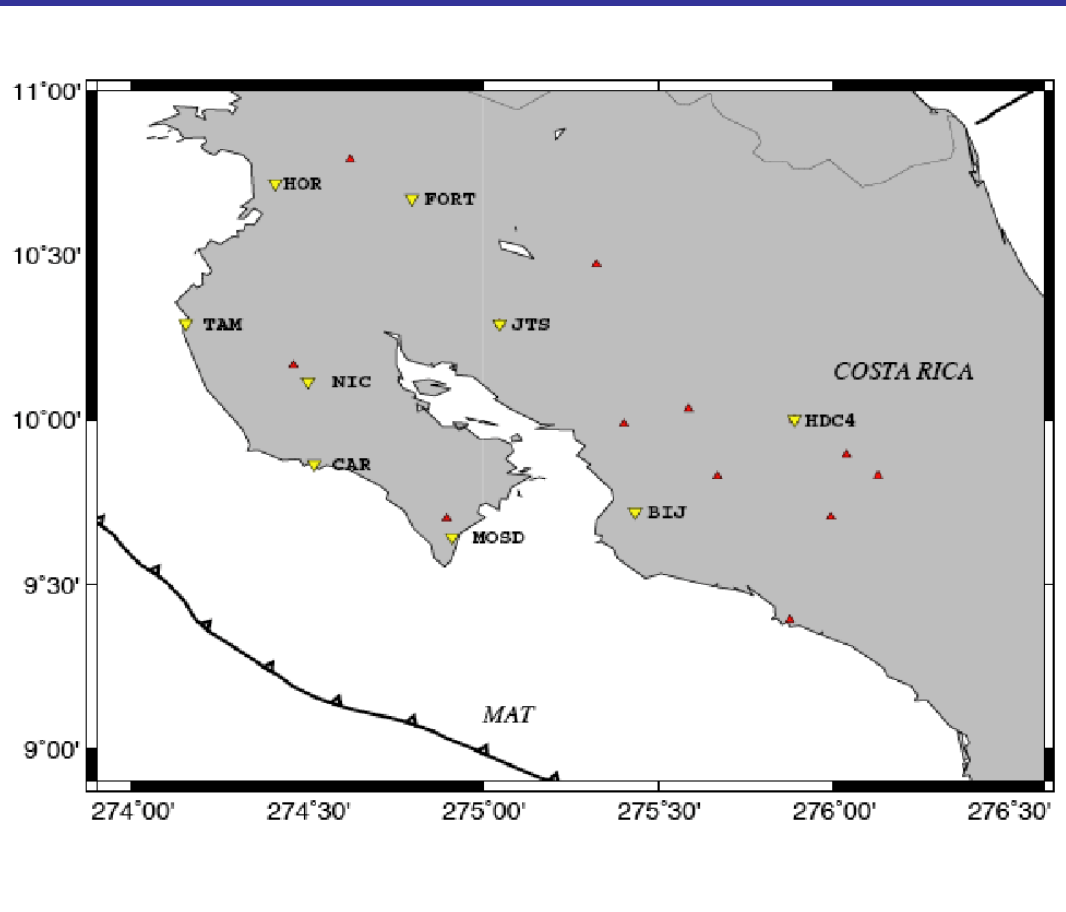
Reading are checked by Ronnie Quintero. He also help in the routine earthquake location. Here the ANTELOPE software is used.

Budget 2010



Salary	1200000
per diem	20000
Gas	7700
equipment Emergency Law	3000000
CONARE	105000
Training & Workshop	65000

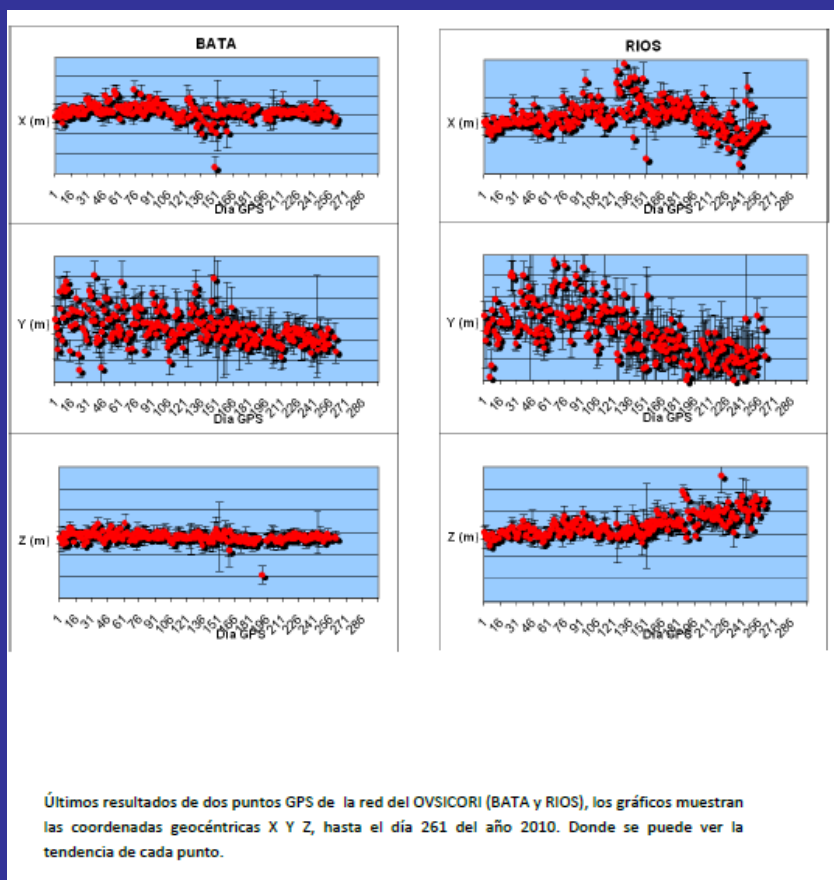
SSMAP PROJECT A JOINT UNA & FOREIGN INSTITUTIONS



TIME SERIES AT STATIONS BATAN & RIOS

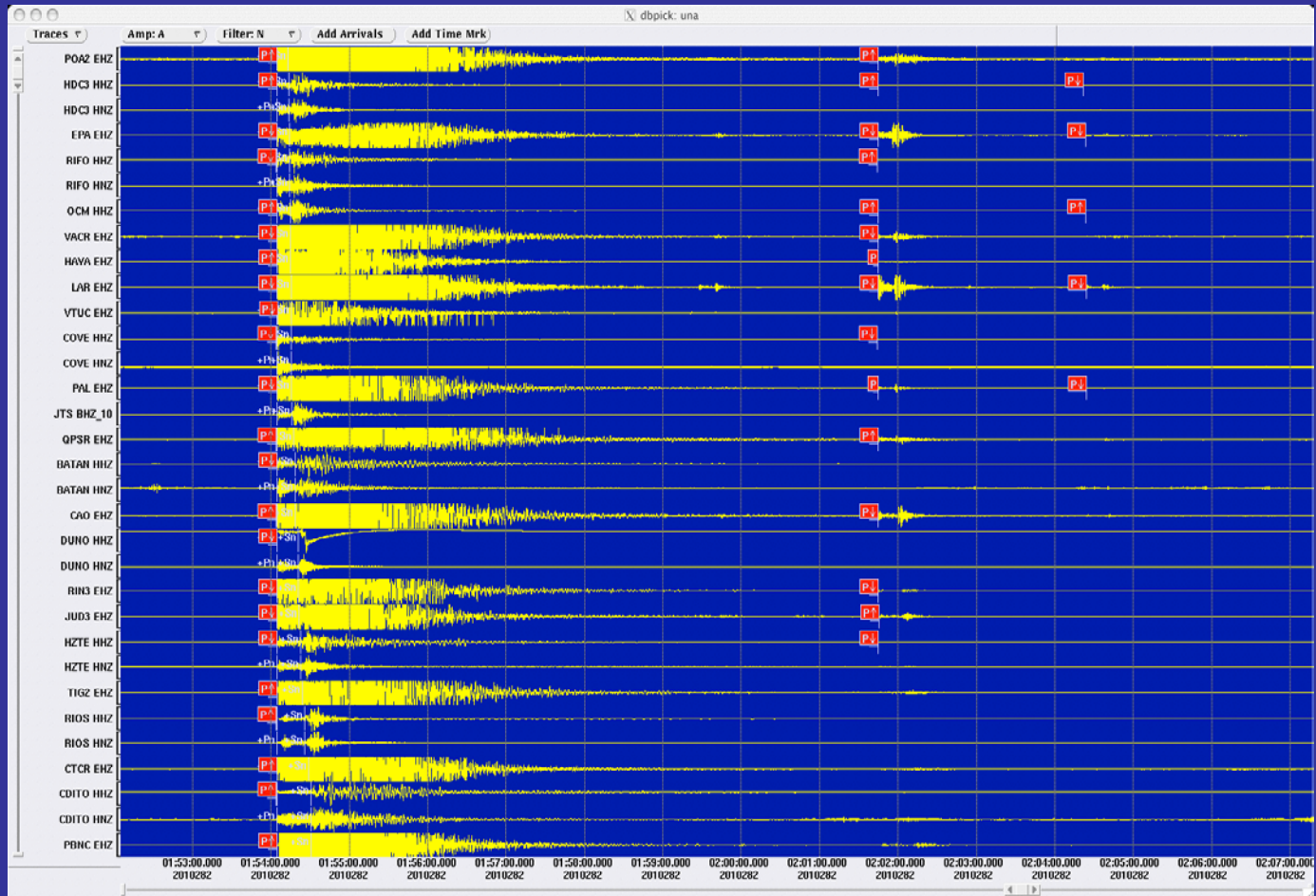
GPS data collected by OVSICORI is used:

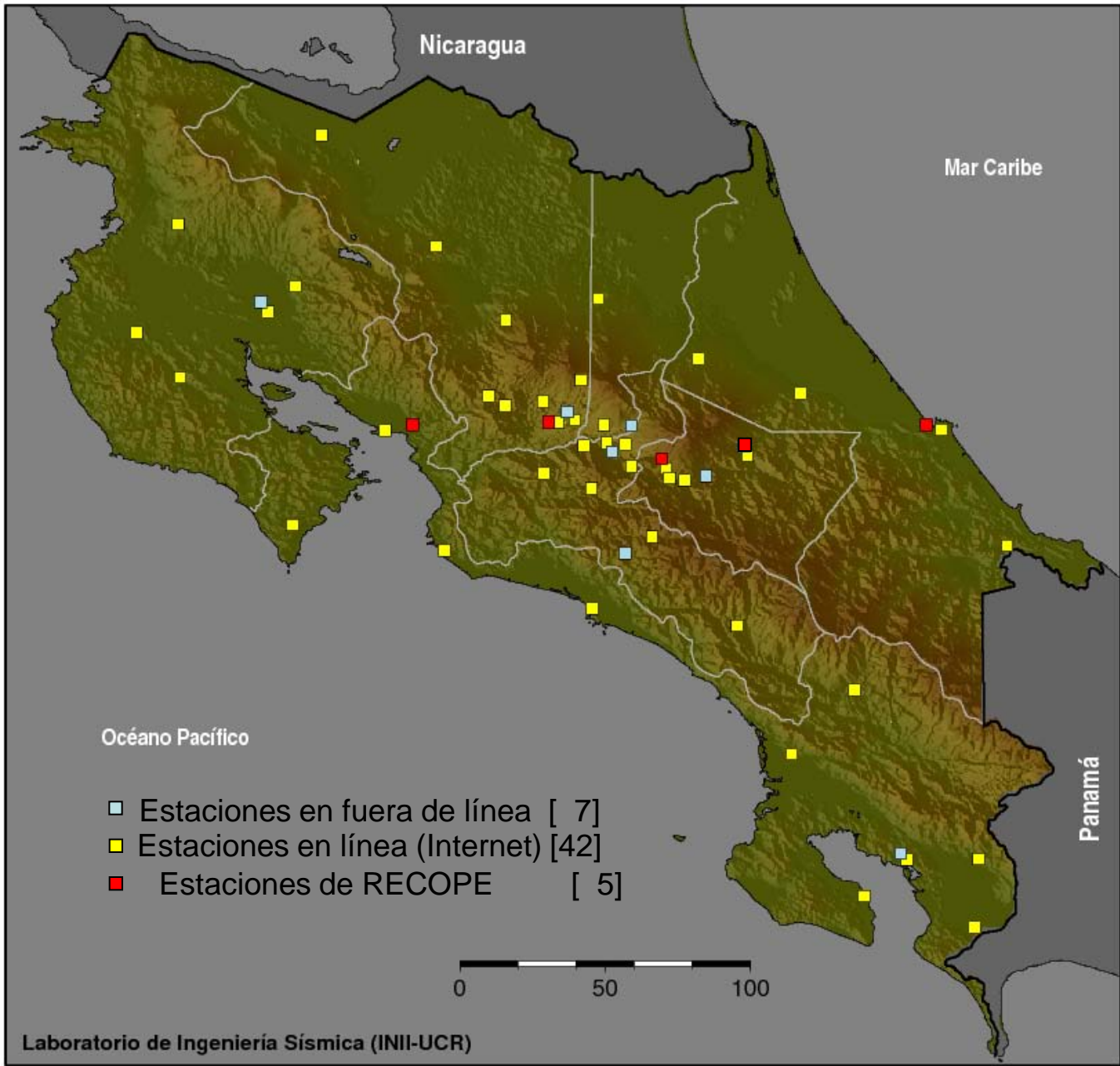
1. Dr thesis in Spain
2. Licenciata thesis at UNA



Antelope- real time recording

- Real time recording via Antelope
- Real time trace viewing via Antelope
- Data archiving in mseed and seisan format





Página Web



Servidor de datos



Acelerógrafo digital



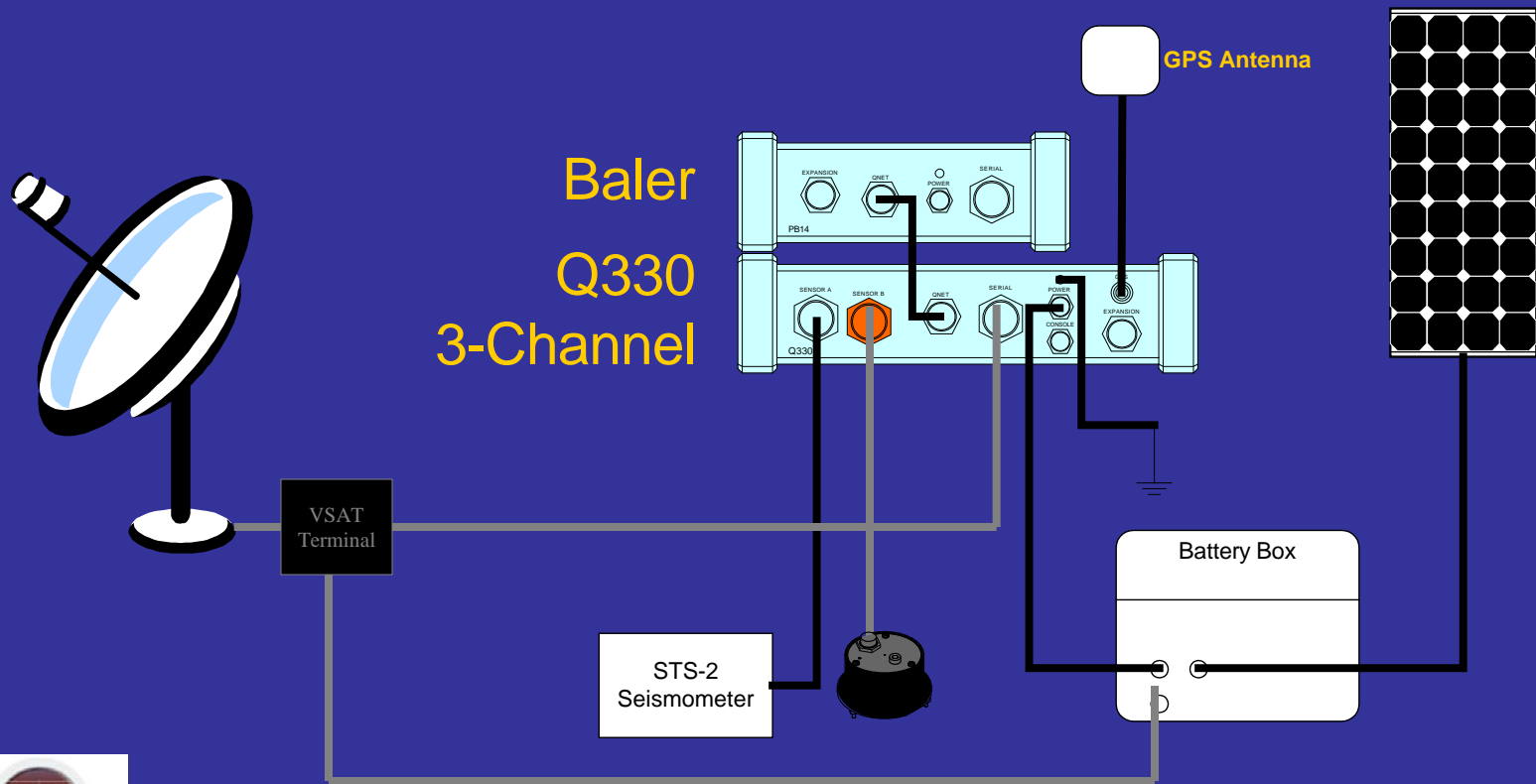
Budget at LIS

- Apoyo de la Vicerrectoría de Investigación de la Universidad de Costa Rica
- Apoyo de la Ley Nacional de Emergencia y Prevención del Riesgo No. 8488.
- Apoyo del presupuesto ordinario del Instituto de Investigaciones en Ingeniería (INII).
- Venta de servicios

Staff

- Se cuenta con 3 investigadores y 3 técnicos tiempo completo en las áreas de Ingeniería Civil, Sismología, Geología, Electrónica y Redes.
- Capacitaciones a través de visitas técnicas y contactos con instituciones en el extranjero.
- Apoyo de 5 asistentes de investigación de la Escuela de Ingeniería Civil y de Geología.

IP Telemetry Deployment



Broadband Stations



Trillium 240



DAS Q330+EST



CMG-6TD
30sec

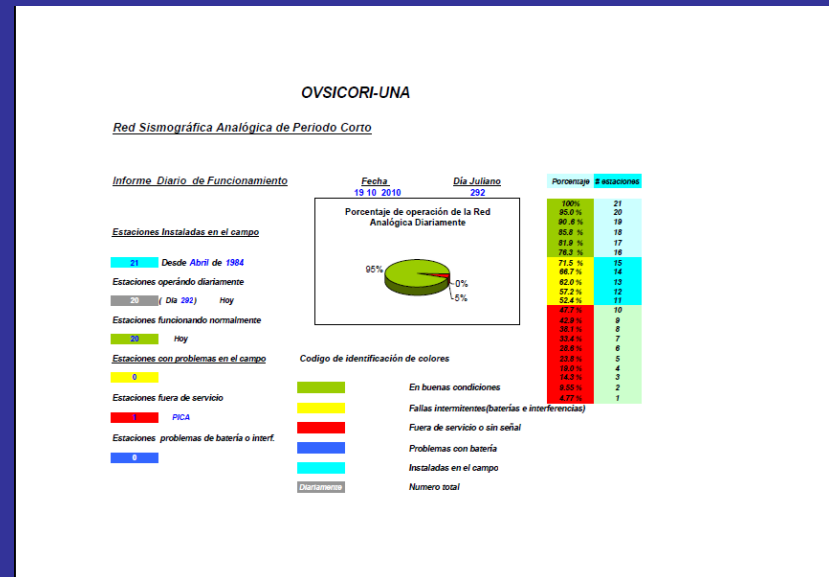
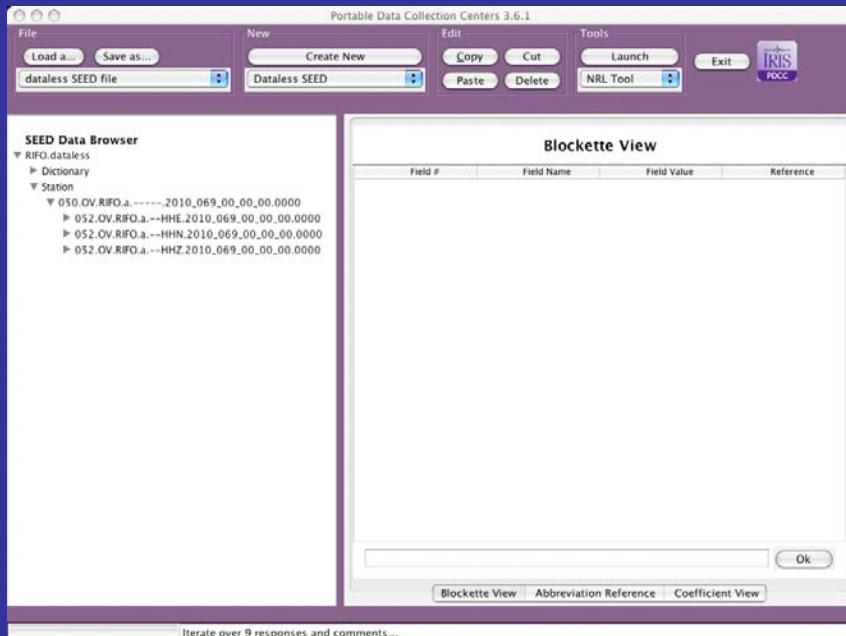
Vault, Pier and Deployed equipment



Vault and Pier



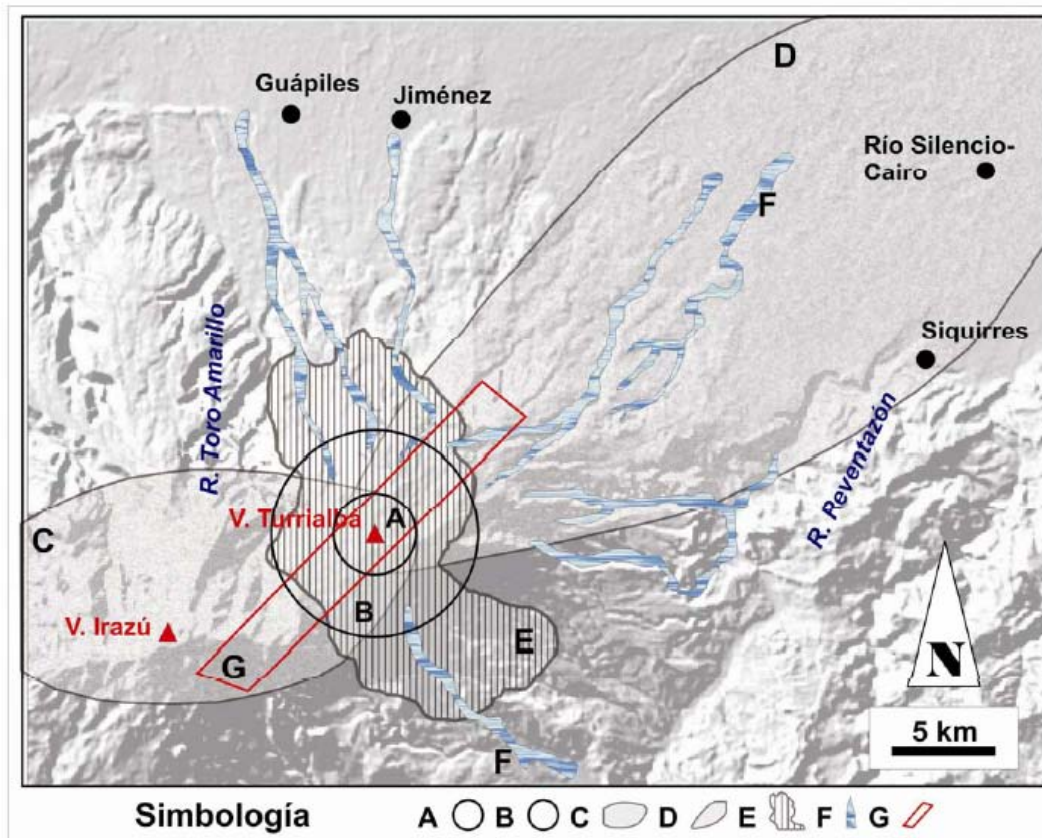
DATALESS AND QUALITY CONTROL



Geophysical collected information

Earthquake and volcano hazards.

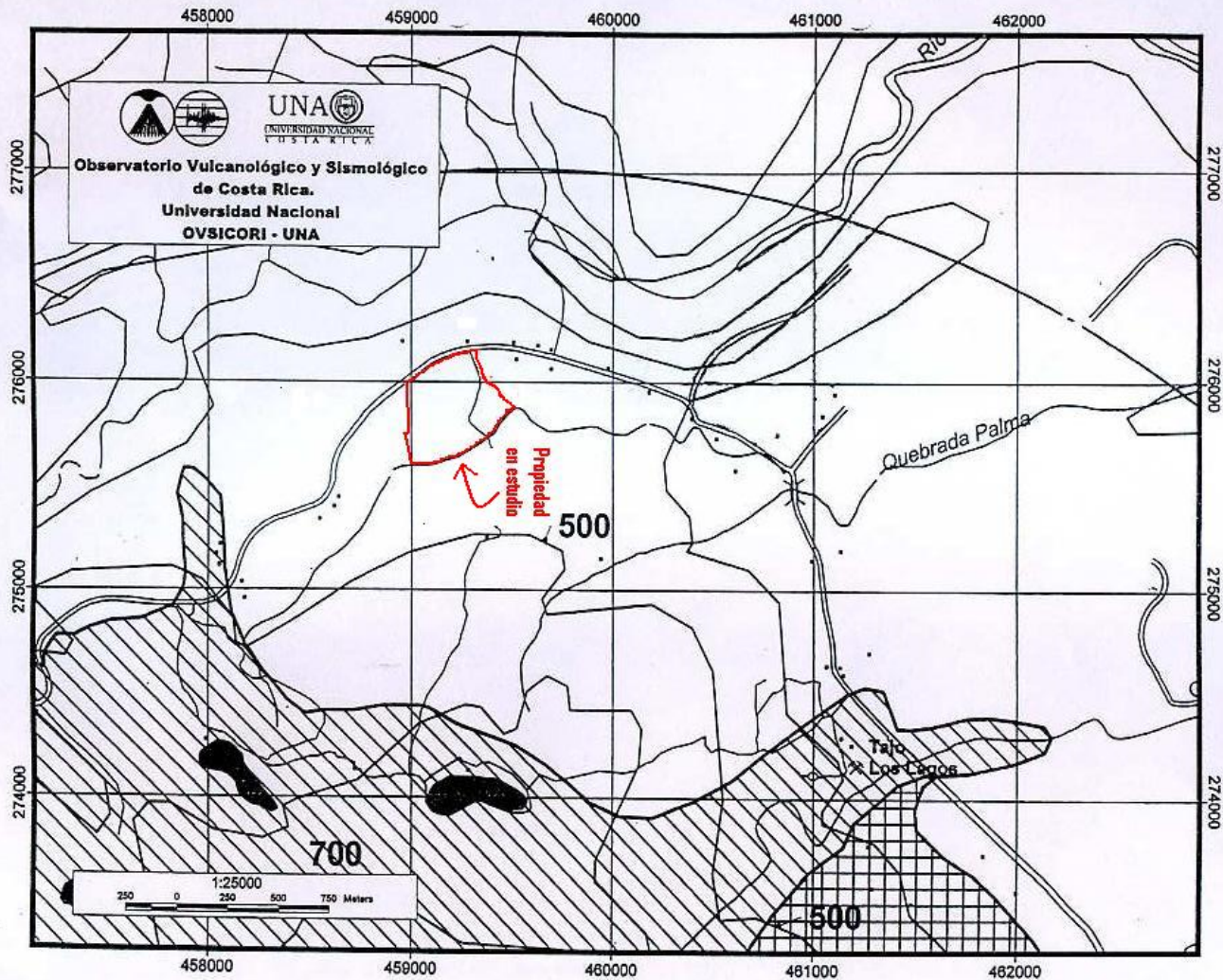
Volcanic hazard map for Turrialba volcano



Mapa de peligros volcánico del volcán Turrialba

- A: área de alto peligro por bombardeo balístico (2 km de radio);
 - B: ídem de mediano peligro (5 km de radio);
 - C: área de alto-mediano peligro por caída de piroclastos y distribución de lluvia ácida;
 - D: área de bajo peligro por caída de cenizas finas con vientos anómalos;
 - E: áreas de mediano-alto peligro por flujos y oleadas piroclásticas, y lavas;
 - F: áreas de mediano-alto peligro por lahares;
 - G: área de debilidad estructural con posibilidades de erupciones fisurales.
- Tomado de Soto & Alvarado (2008); reformado de Paniagua & Soto, 1986; Jerez & Cline, 1990; Reagan et al., 2006.

Volcano hazard at Arenal volcano



From E. Hernandez, September 2010. Master Thesis, Nagoya University. Japan

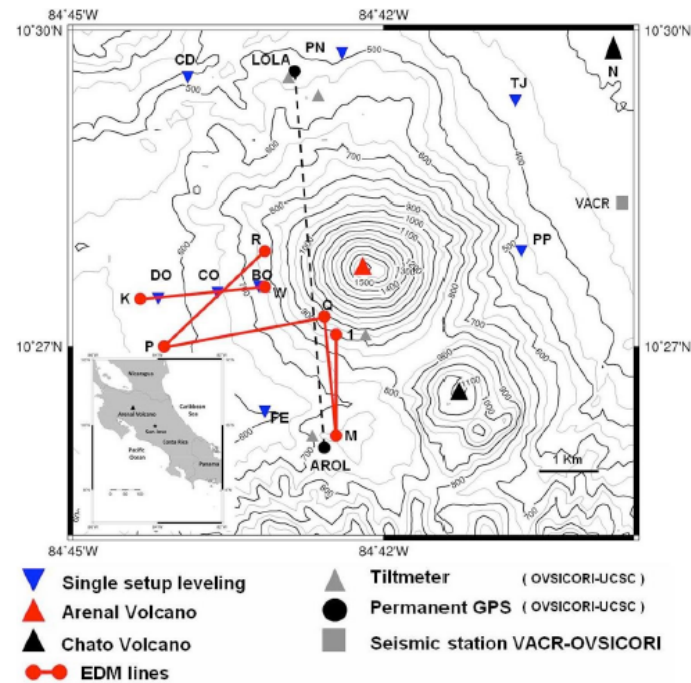


Figure 3. Topographic map of Arenal Volcano, showing a location of the single setup leveling (blue triangles) established by OVSICOR-UNA in 1982. Red triangle denoted the summit location of Arenal volcano and black triangle shown the location of Chato Volcano. Black circles shown two permanent GPS sites, gray triangles shown five tiltmeter, OVSICORI-UCSC network since 1995. VACR OVSICORI-UNA seismic station denoted by gray square and Arenal location in Costa Rica is shown by the square in the inset map. (From E. Hernandez, September 2010. Master Thesis, Nagoya University. Japan)

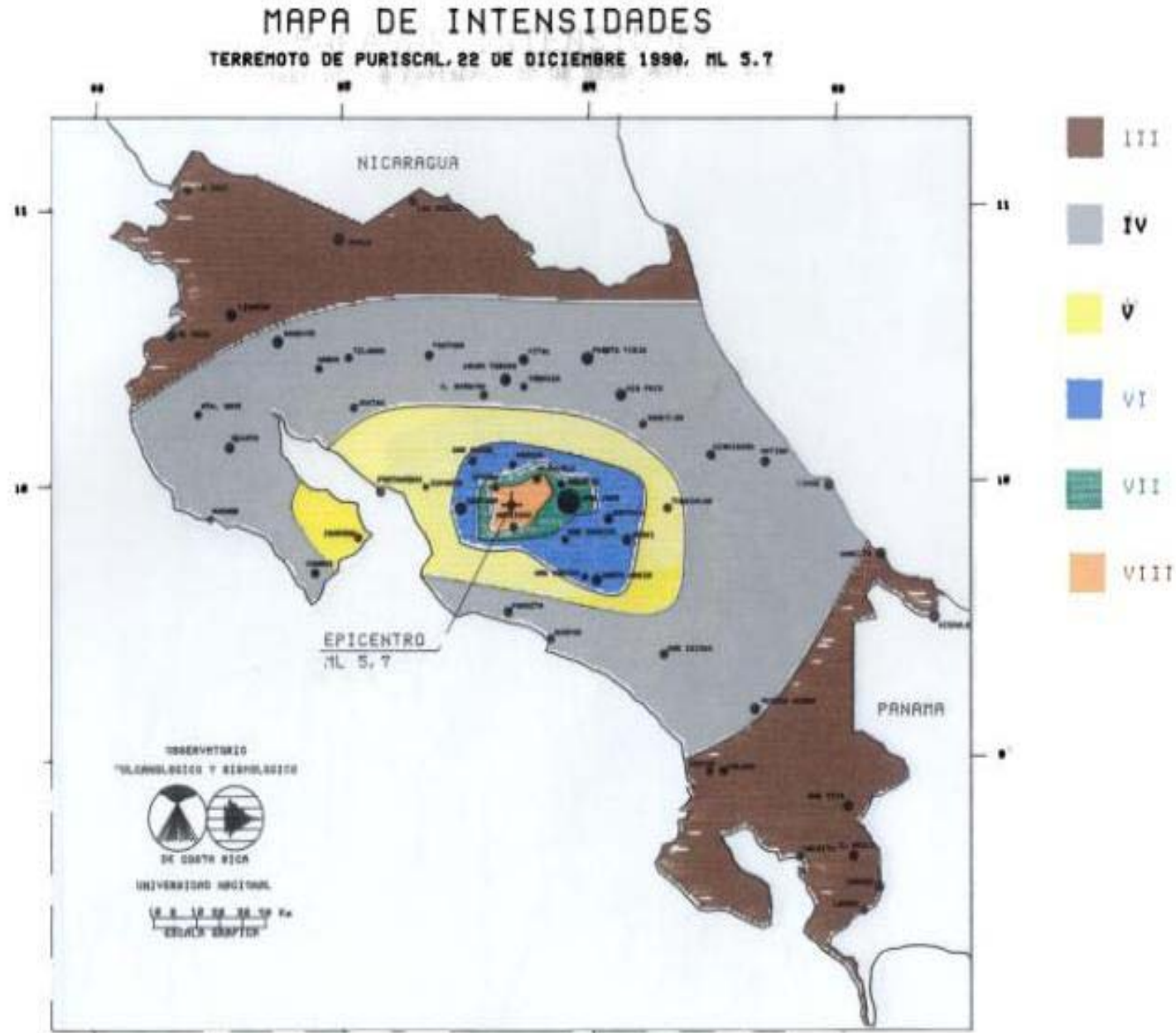
CR Seismic code

Código Sísmico de Costa Rica 2002

Colegio Federado de Ingenieros
y de Arquitectos de Costa Rica

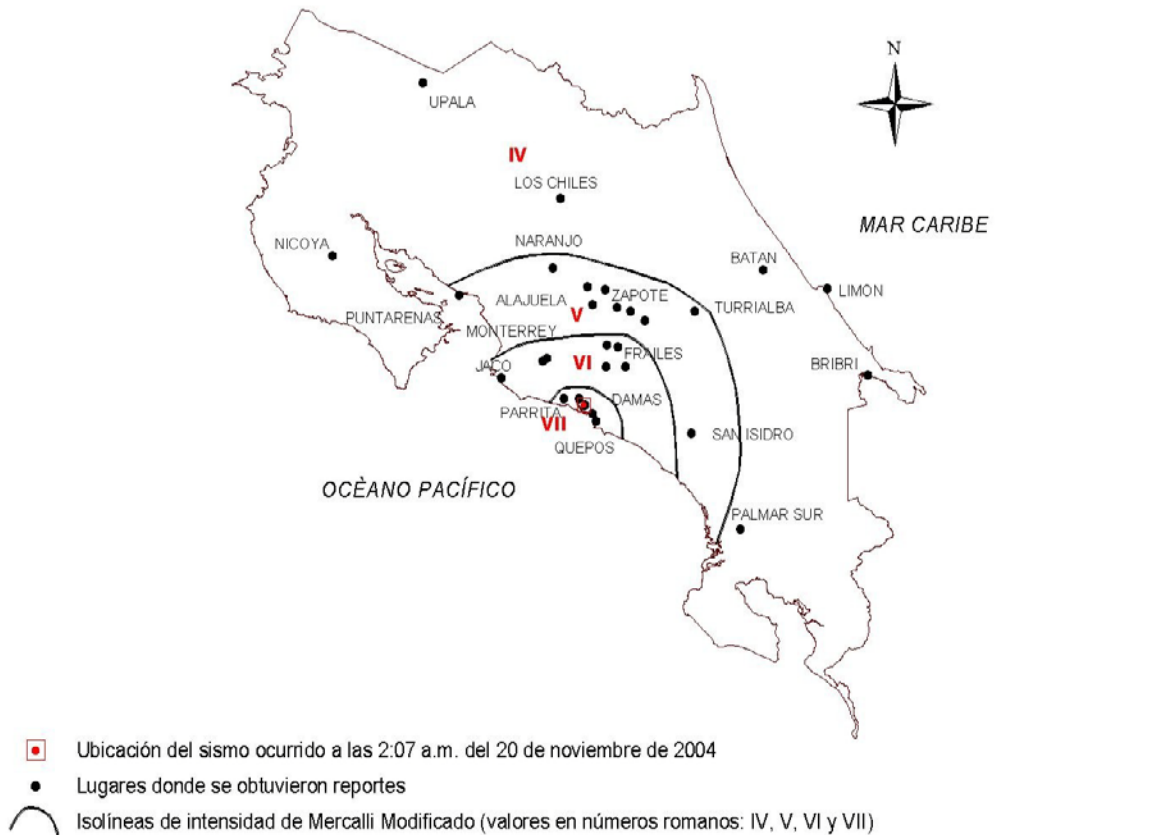


Intensity Map for Dec. 22, 1990



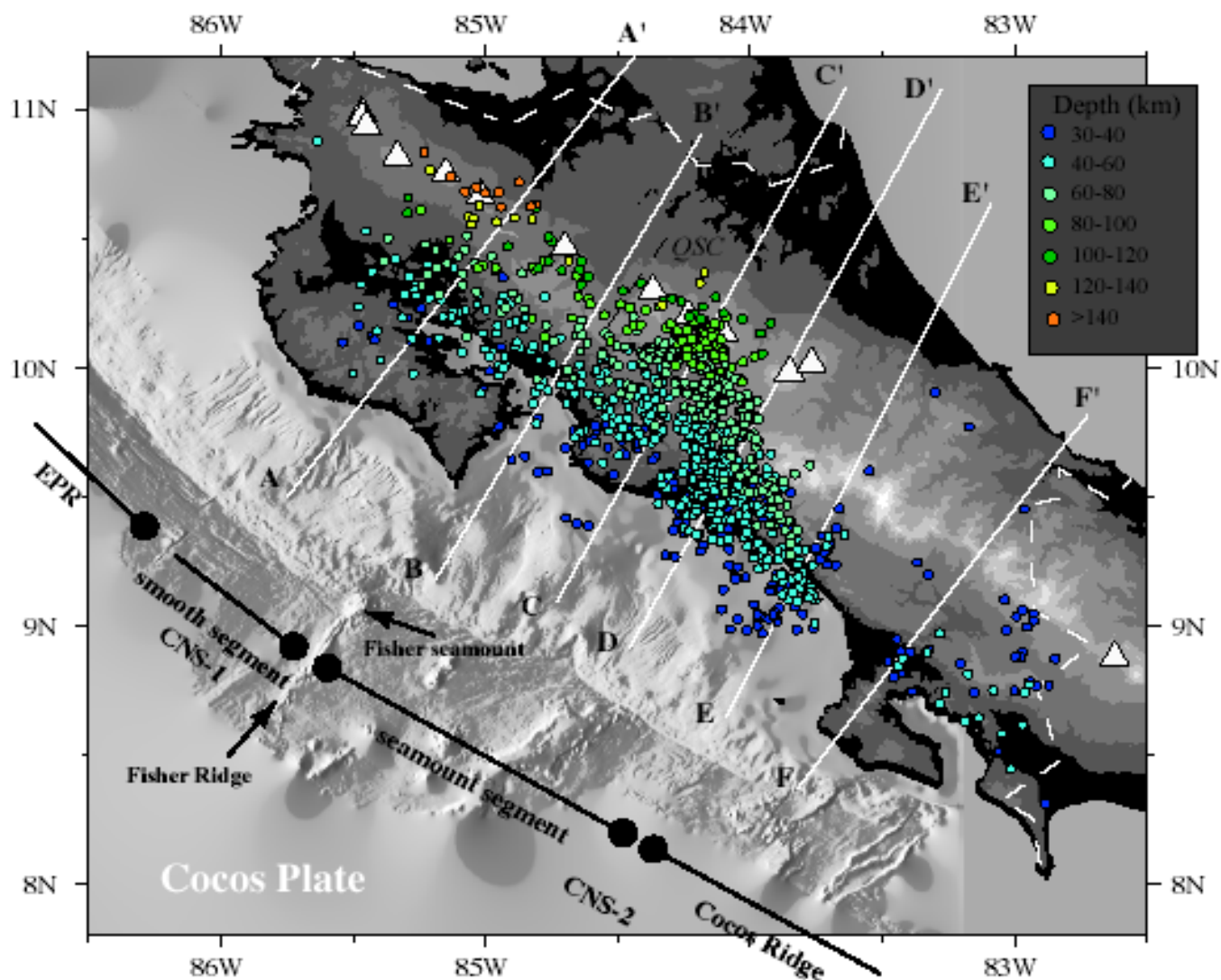
INTENSITY MAP OF THE NOV. 20, 2004 Mw 6.4 EARTHQUAKE

**MAPA PRELIMINAR DE INTENSIDADES DEL SISMO OCURRIDO A LAS 2:07 A.M.
DEL 20/11/2004, ML 6.0 ELABORADO CON REPORTES DE LA POBLACIÓN**



Fuente: elaborado por el OVSICORI-UNA, 2004. J. Arauz y C. Montero.

WB ZONE

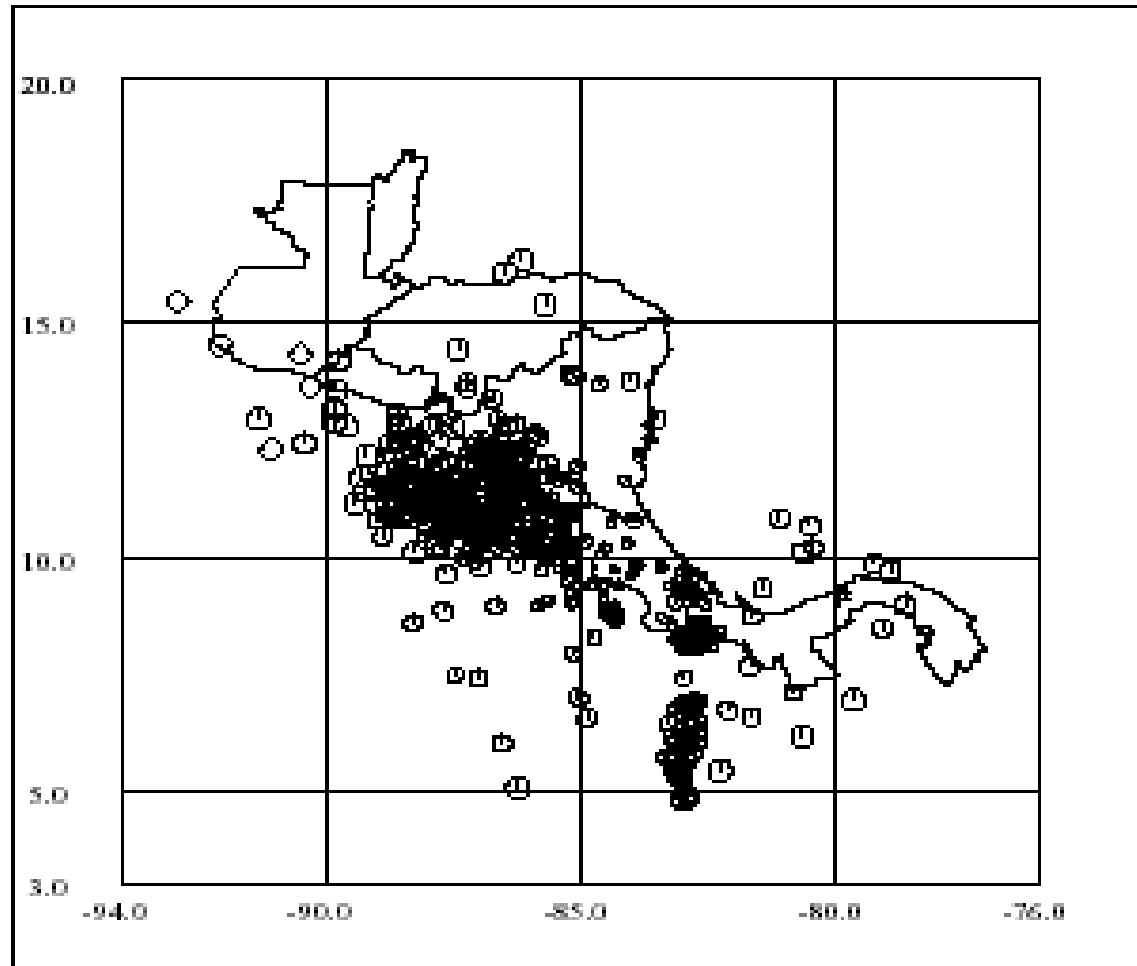


Some Regional Events LOCATED BY OVSICORI-UNA NETWORK

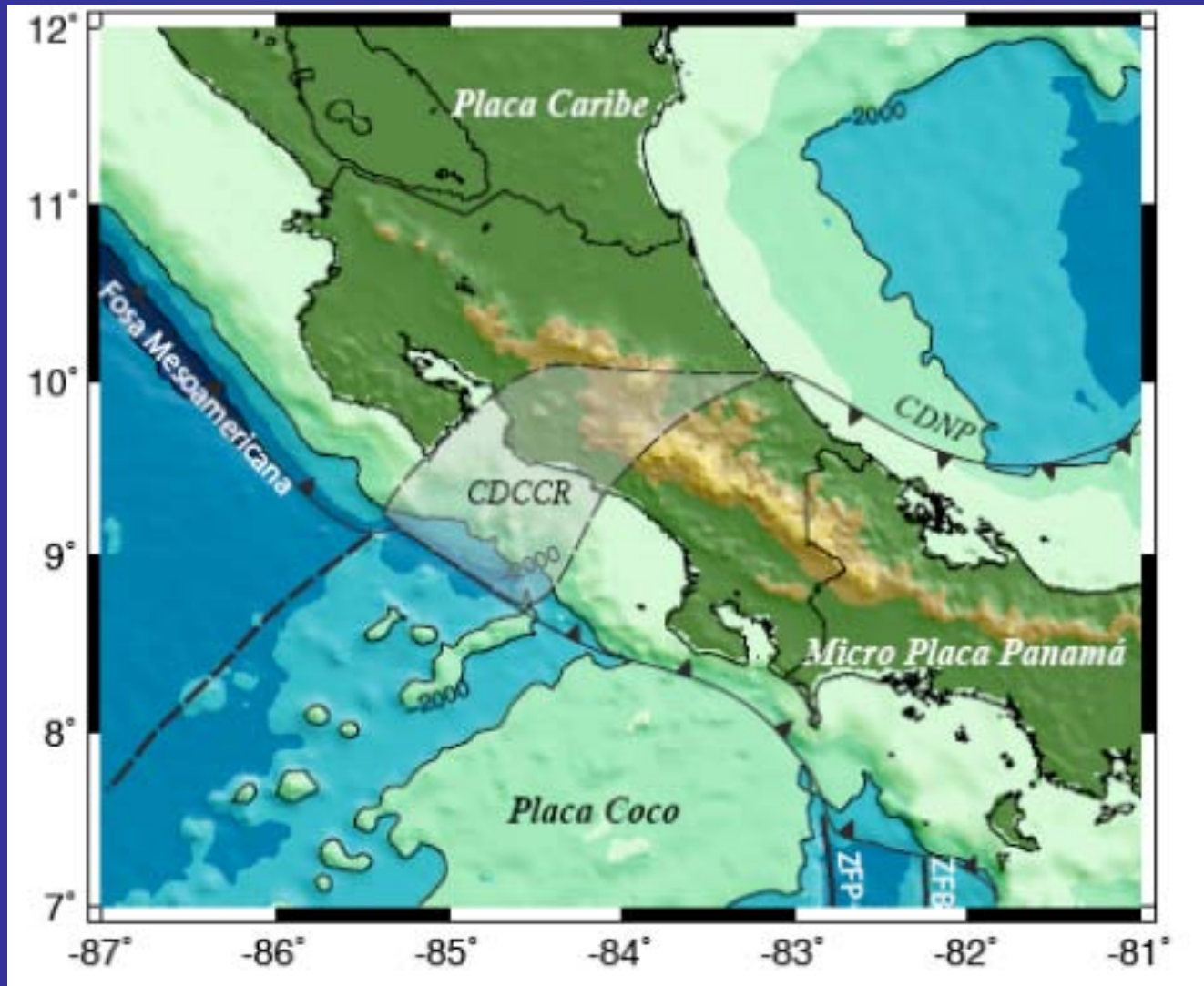
Total events: 442
Selected events: 442

Magnitudes:

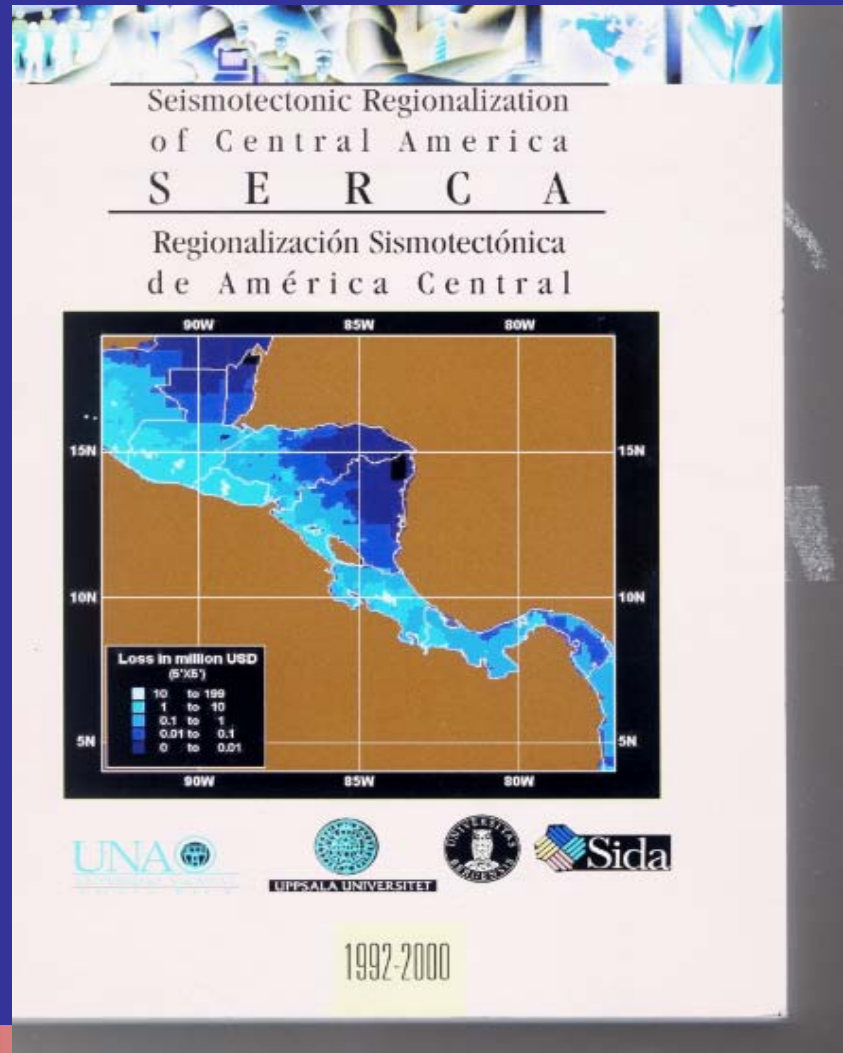
$M \leq -1$	+
$-1 < M \leq -2$	•
$-2 < M \leq -3$	◻
$-3 < M \leq -4$	⊗
$-4 < M \leq -5$	⊠
$-5 < M \leq -6$	⊙
$M > -6$	○



Tectonic



Project founded by SAREC



Future goals

- Upgrading the seismic and GPS network to 35-40 stations
- Improving quality control of data
- More training for the analysts
- Organization of international courses
- Publish research using collected data
- Improve contact with CNE and implement SHAKEMAP for emergency response and other graphic facilities using the web page