

NATIONAL AND REGIONAL PERSPECTIVES ON EXISTING CAPABILITIES AND NEEDS

- COLOMBIA -

Mónica Arcila – Geologist

National Seismological Network

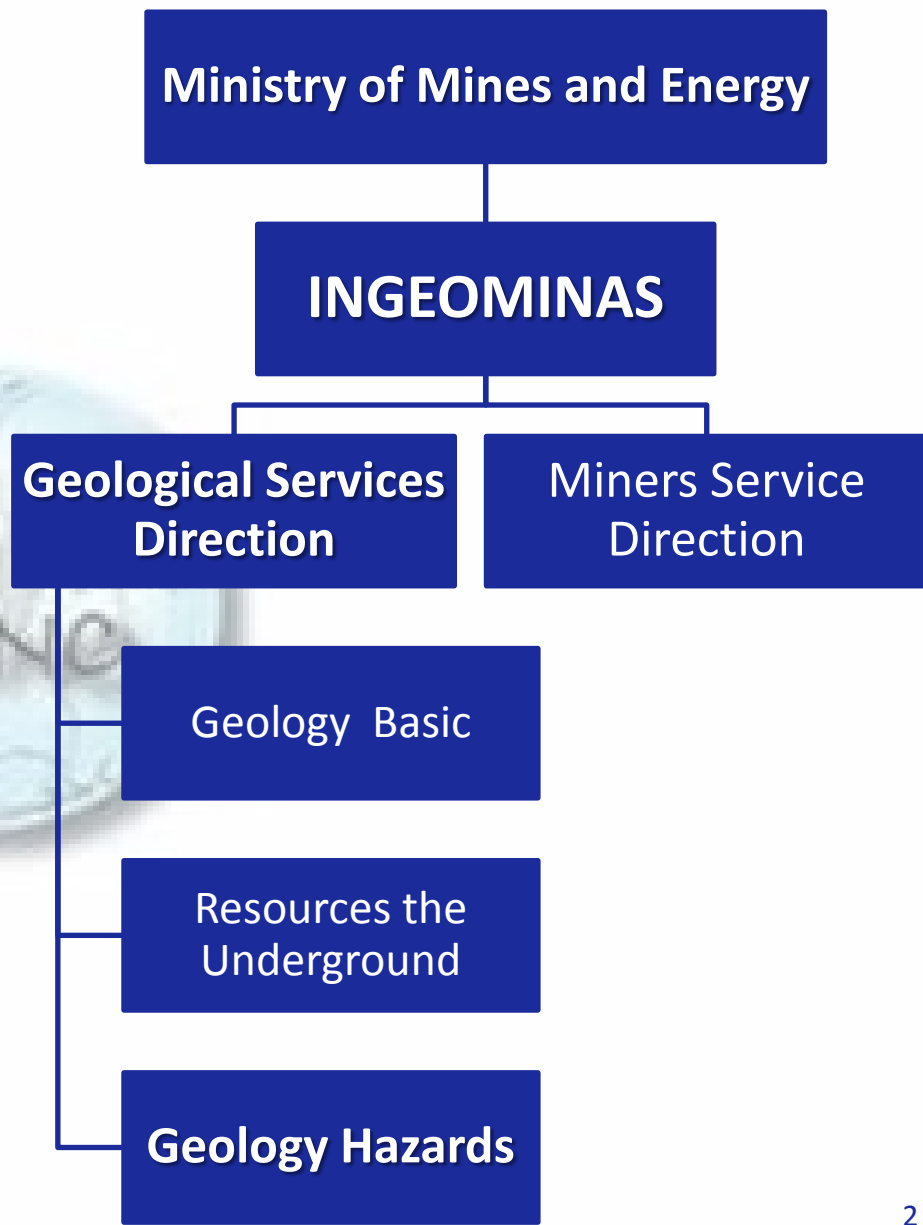
INGEOMINAS : Colombian Institute of Geology and Mining

*Geophysical Hazards and Plate Boundary Process
in Central America, Mexico and the Caribbean*

Heredia, Costa Rica - *October 25, 2010*

In Colombia, INGEOMINAS is responsible for studying and monitoring of geological hazards:

earthquakes, volcanoes and landslides.



GEOLOGICAL HAZARDS

MONITORING

INSTRUMENTATION

PROCESSING

DATABASE

Why get involved?

EVALUATION

QUATERNARY GEOLOGY

SEDIMENTOLOGY / STRATIGRAPHY

STRUCTURAL GEOLOGY / QUATERNARY TECTONIC

HISTORICAL EVENTS / PALAEOEVENTS

GEOPHYSICS / GEOCHEMISTRY

MAGMATISM / VOLCANOLOGY

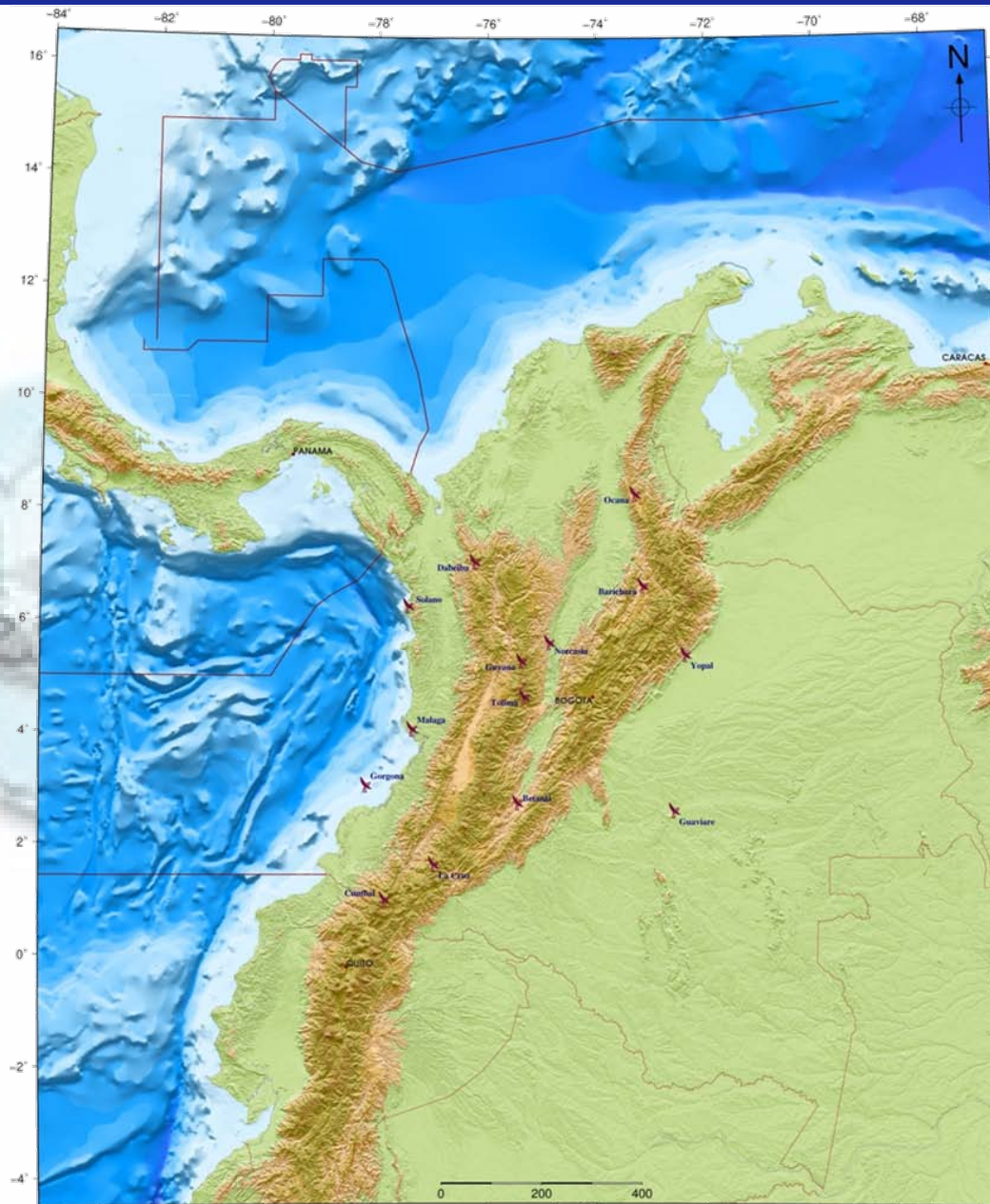
MODELING

What we do?

National Seismological Network

Since 1993, INGEOMINAS established the NSN, in order to maintain a permanent watch on seismic activity in the country. This network currently has with 27 remote stations strategically located: 25 on the mainland, and 2 on islands. The Institute also has seismographs in the major volcanoes that support the NSN.

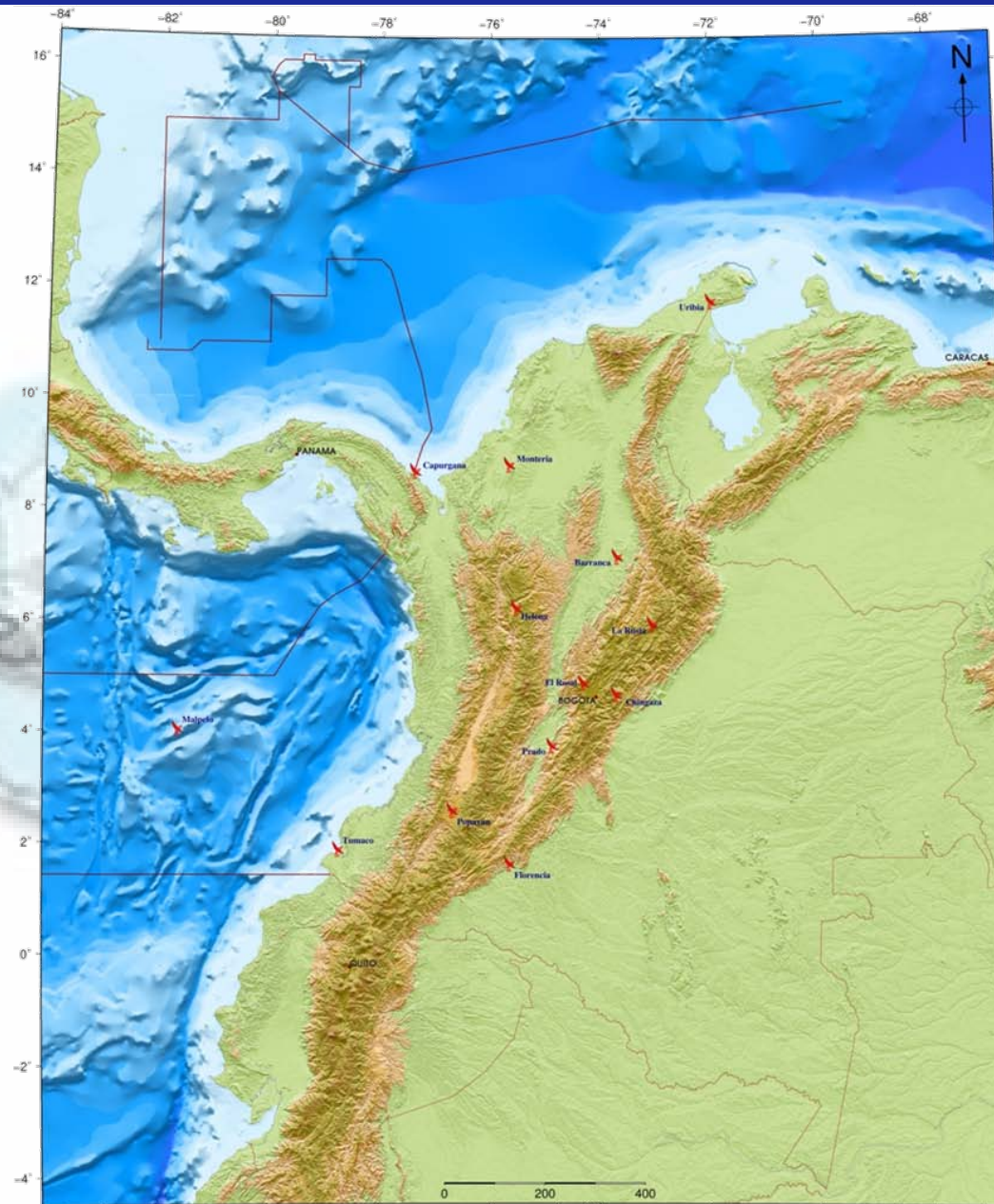
The figure shows the location of 14 short-period stations, mainly from the initial network



National Seismological Network

In 2005-2006 begins the process of updating and expanding the Seismological and Volcanological System. This process continues today and is funded by a multilateral bank loans (BIRF 7293-CO) in the development of Fiscal Vulnerability Reduction Program of the Colombian State against Natural Disasters

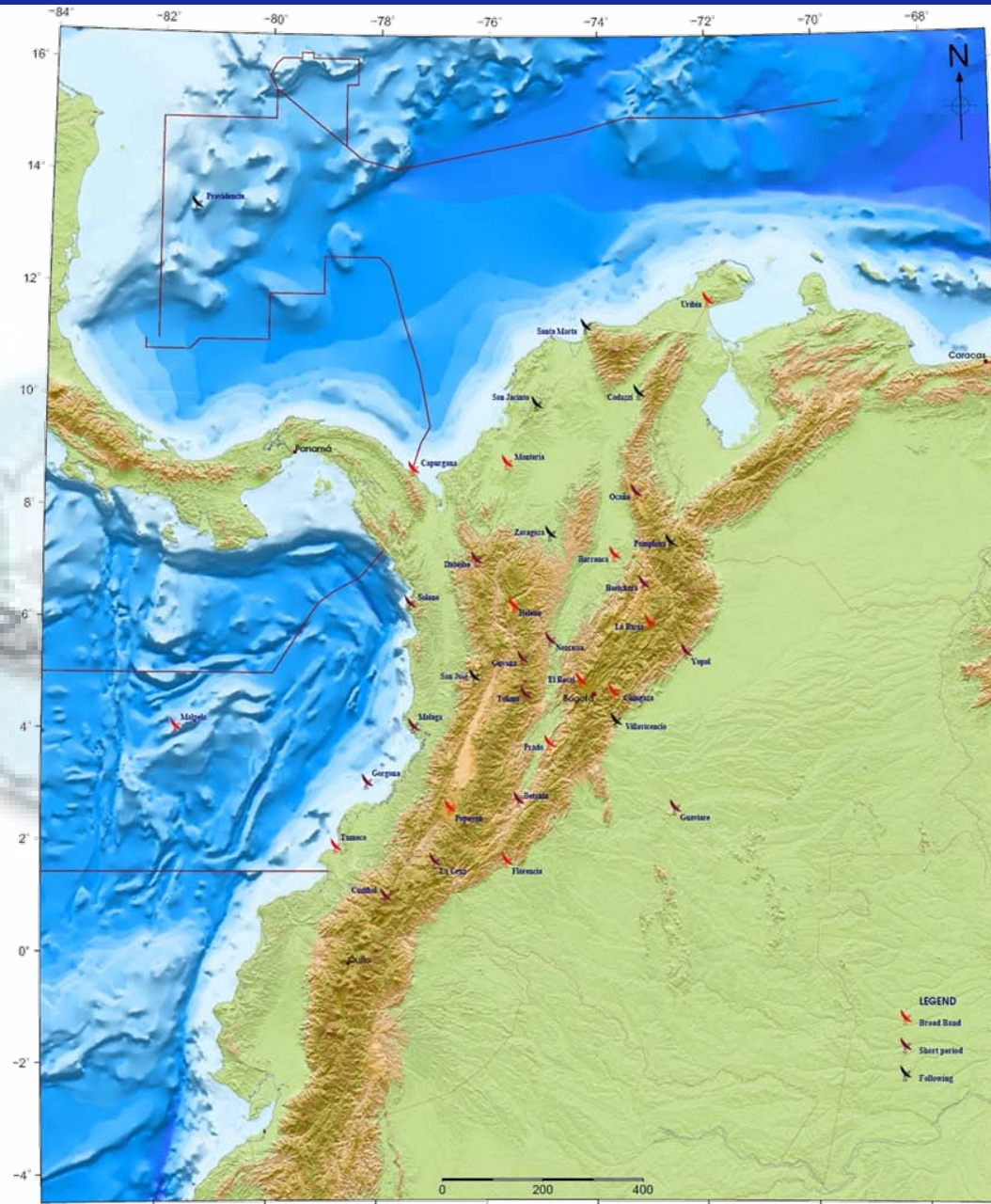
The figure shows the location of 13 broad-band stations.



National Seismological Network

In 2011 we expect to have 34 stations in operation, and 6 more in 2012, to complete a basic network of 40 seismic stations with satellite transmission

The figure shows the proposed network for 2011, including 7 new stations under construction



Field instrumentation

Sensor

- GURALP 3T
- STRECKEISEN STS-2
- TRILLIUM-NANOMETRICS



Digitizer

- GURALP DM 24
- QUANTERRA Q330
- TAURUS



Santa Helena station



Monteria station



Communication system

Modem

- COMTECH CDM-570L



Satellite

- INTELSAT IV



MES



Receiving antenna

HUB Bogotá



Processing system

Acquisition

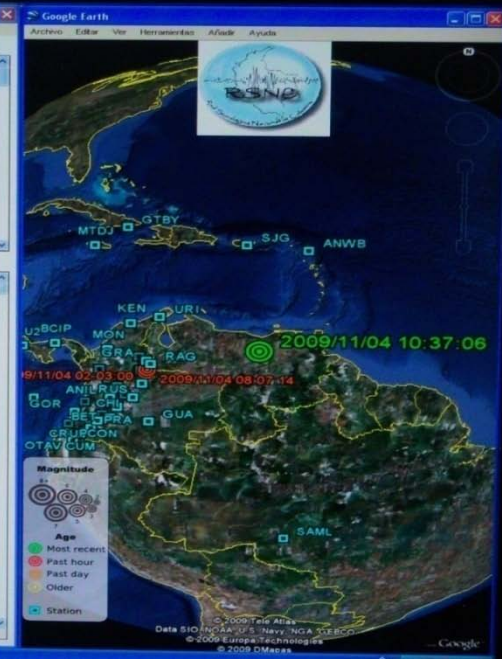
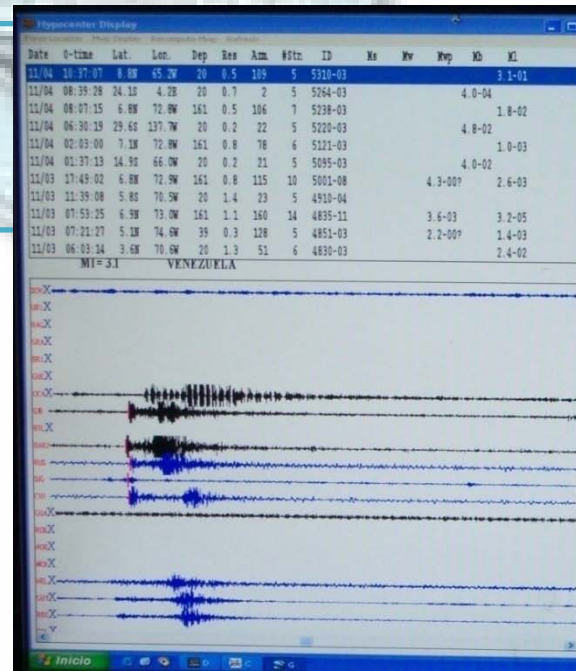
- Earthworm
- Seislog

Processing

- Seisan
- *Early Bird (autolocation)*

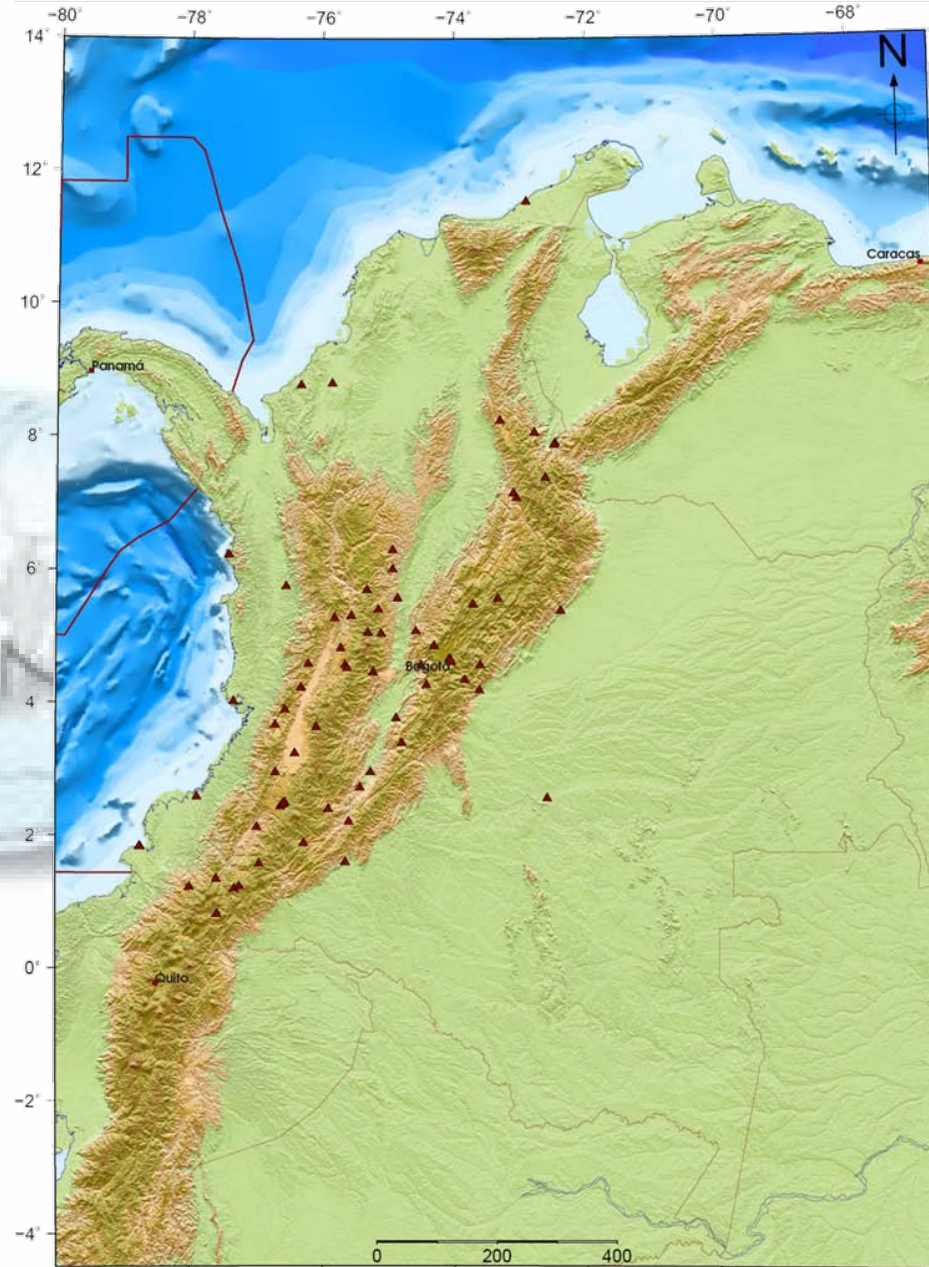
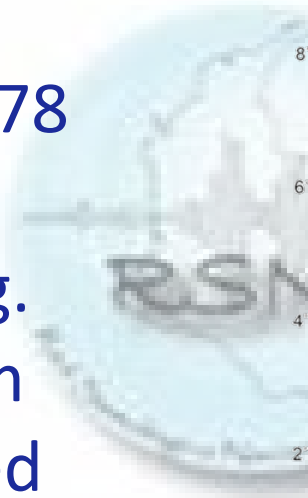
File

- Seisan
- Miniseed



National Network Accelerometric

Distribution of active stations of the network. Currently has 78 stations, most field recording. Only 6 of them are transmitted to Bogota





Modelo	SSA-1	SSA-2	SSA-2MC	ETNA	K-2
Tipo	Digital	Digital	Digital	Digital	Digital
Grabación	RAM (512 Kb.)	RAM (256 Kb.)	Tarjeta (1 Mb.)	Tarjeta (2.5 Mb.)	Tarjeta (5 Mb.)
Respuesta	DC a 50Hz	DC a 50Hz	DC a 50Hz	DC a 80Hz	DC a 80Hz
Tiempo de grabación (min.)	20	10	40	100	200
Adquisición de datos (muestras / seg)	200	200	200	100,200 ó 250	100,200 ó 250
Escala máxima (g)	1 ó 2	1 ó 2	1 ó 2	1 ó 2	1 ó 2
Tiempo de pre-evento (seg)	0 a 15	0 a 15	0 a 15	0 a 180	0 a 180
Tiempo de post-evento (seg)	10 a 60	10 a 90	10 a 90	0 a 65000	0 a 65000

Limitations

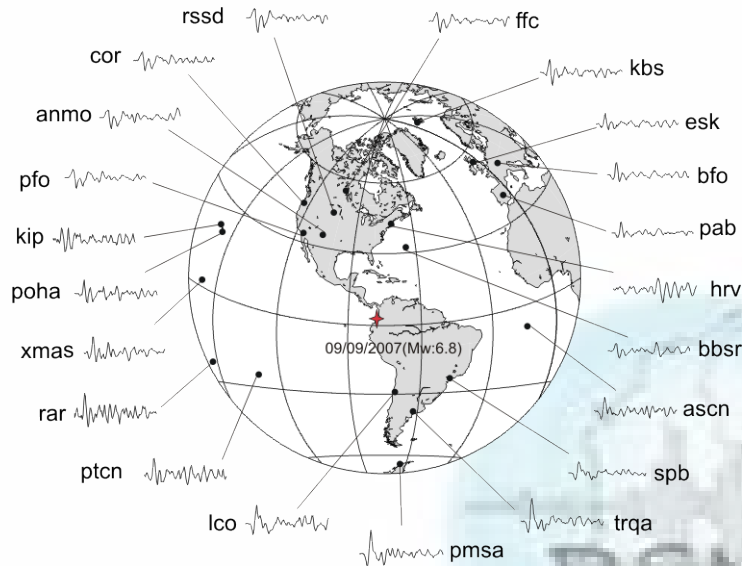
- We have no available instrumental response files
- We need to verify instrument response equipment
- Staff temporary (under contract)
- Need for training in seismology, electronics and systems

Among other...

Future Directions

- We are working on far-field waveform inversion for focal mechanisms and calculate M_w
- We want to implement W phase inversion, for regional tsunami warning and rapid earthquake hazard assessment
- Continue to work intensity maps by web and work our own shake maps

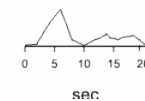
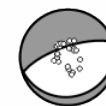
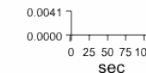
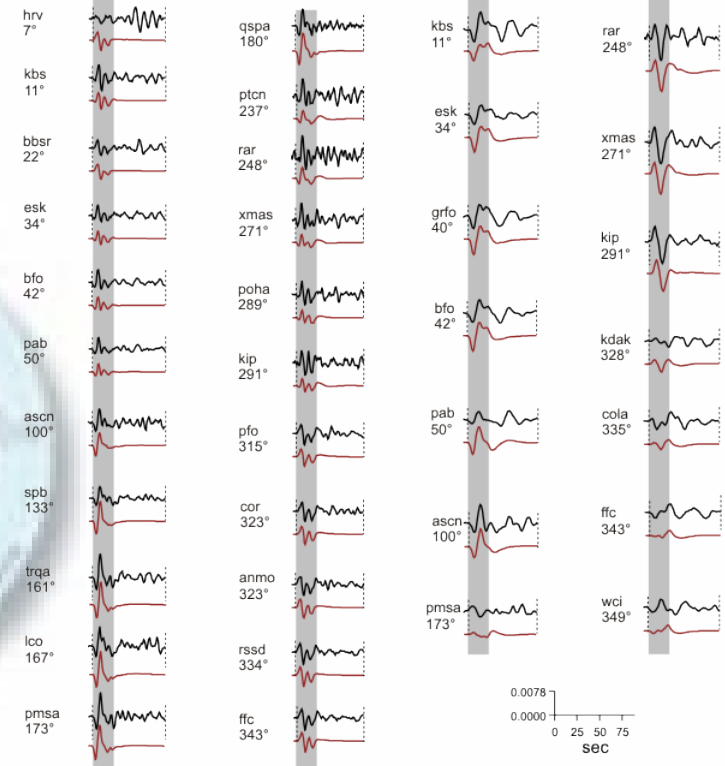
Among other...



Gorgona Island earthquake (September 10, 2007 - Mw= 6.8)

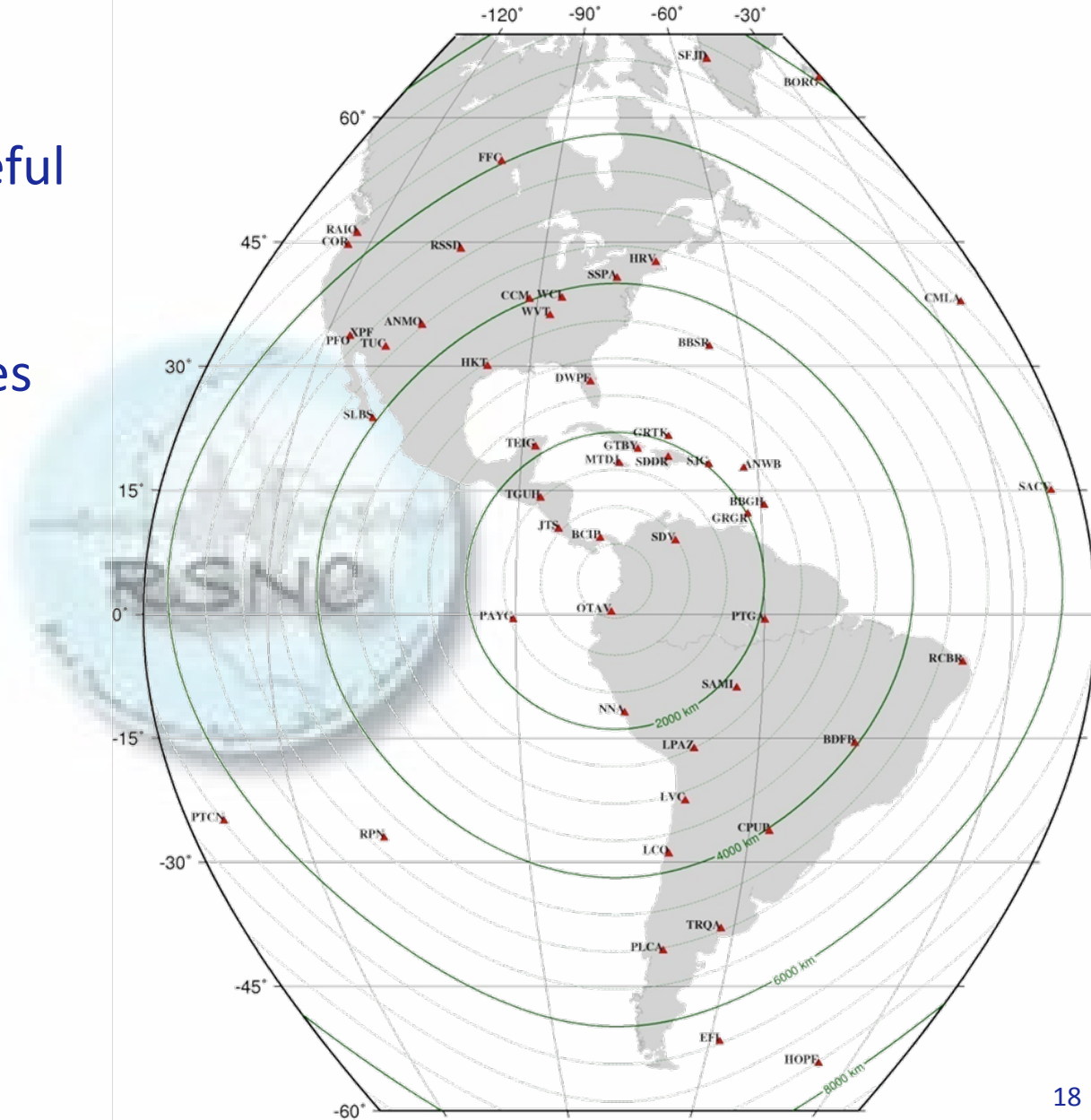
ONDAS P

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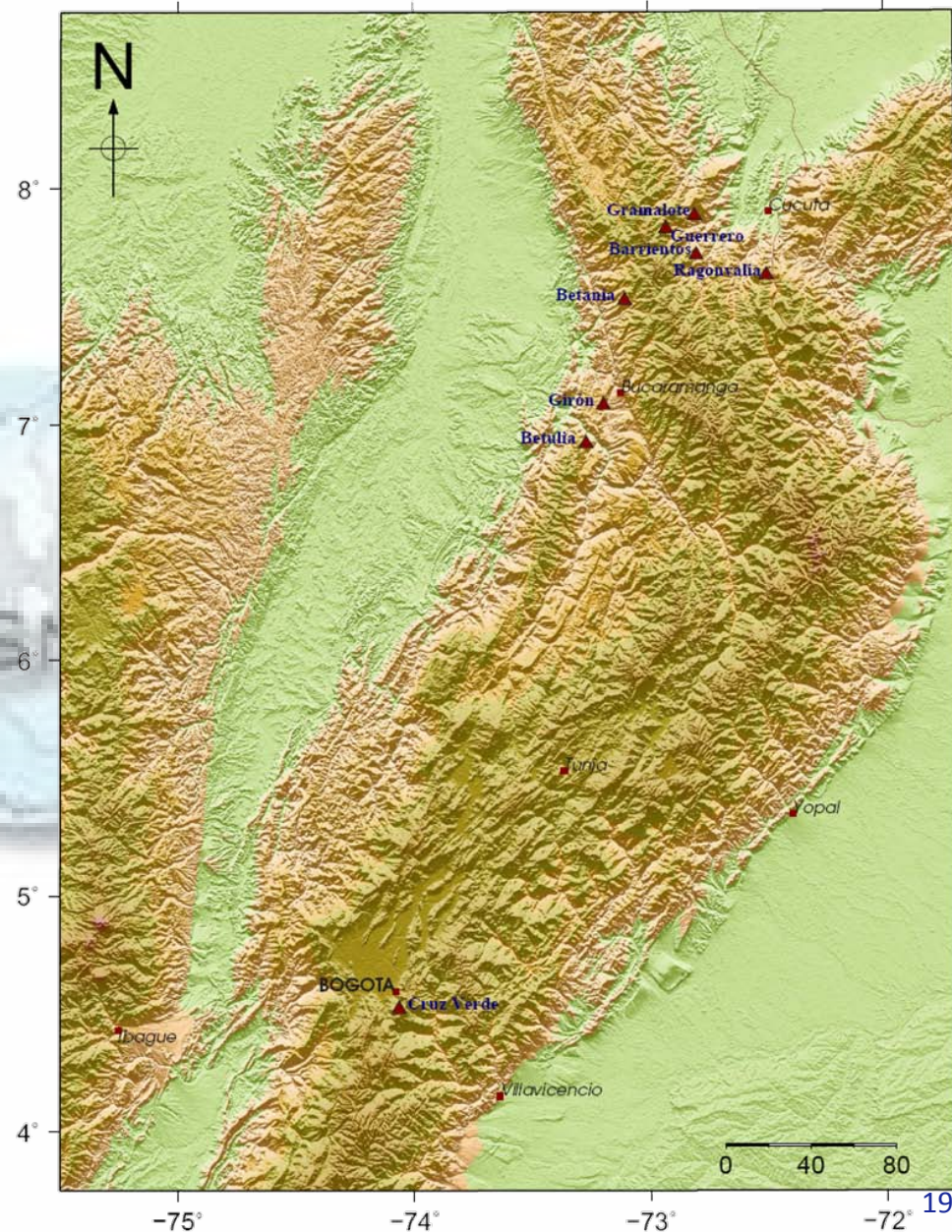
Global Seismological Network

GSN station useful
for waveform
inversion at
regional distances



Short-period stations with telemetric transmission to a satellite station or a regional headquarters Ingeominas and from there via internet to Bogota:

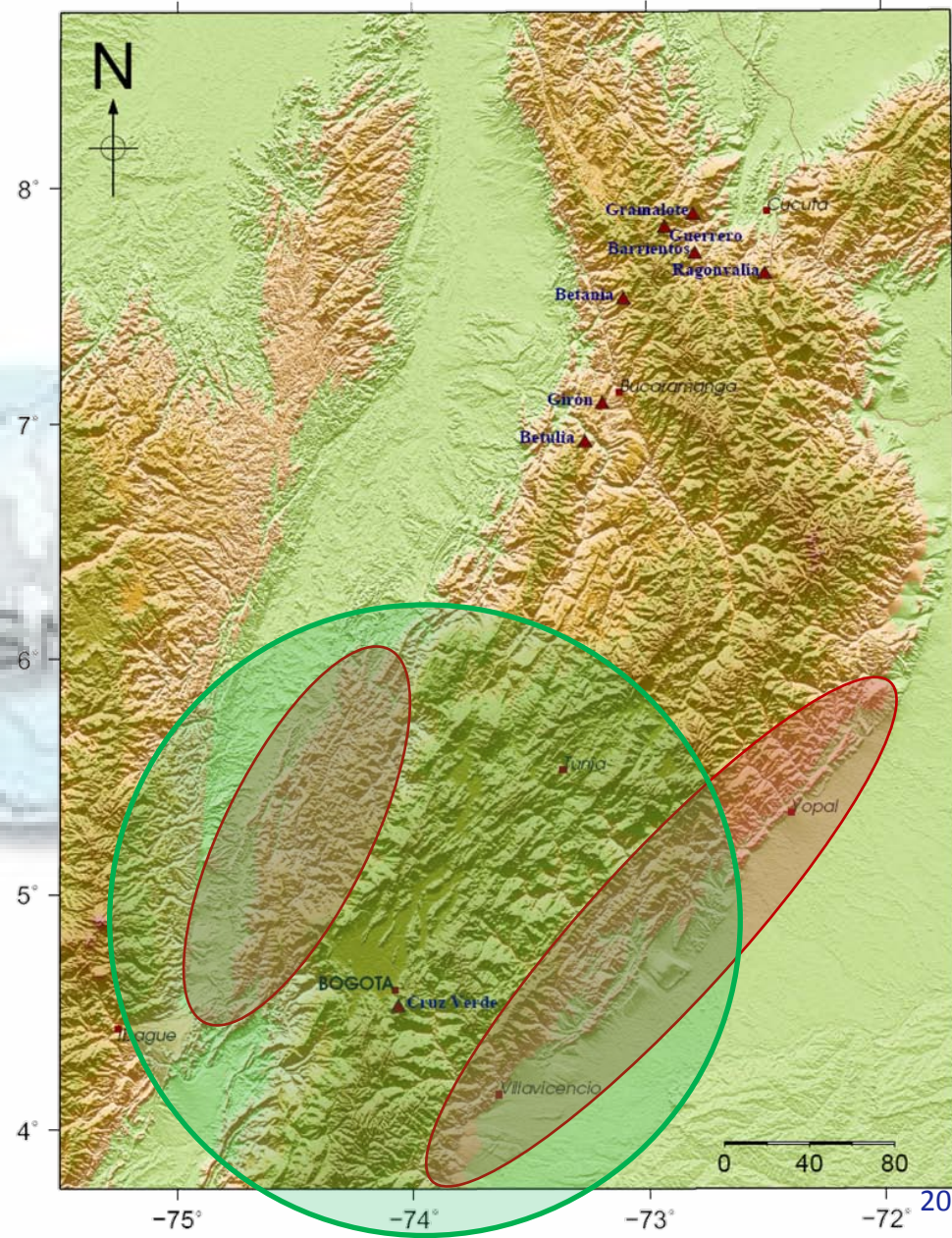
Densification of stations in Northeastern Colombia



Local Network

Short-period stations with telemetric transmission to a satellite station or a regional headquarters Ingeominas and from there via internet to Bogota:

Areas to cover in the Cordillera Oriental, which could have effects on Bogotá (INGEOMINAS – UN – DPAE)



THANK VERY MUCH!



Fernando Botero, 1999. Terremoto en Popayán



REDES DE VIGILANCIA VOLCANICA EN GALERAS CON TRANSMISION TELEMETRICA

TIPO DE ESTACION	ESTACION	Frecuencia Tx [MHz]	REPETIDORA1	Frecuencia Tx [MHz]	REPETIDORA2	Frecuencia Tx [MHz]	SISTEMA DE RECEPCION Y ADQUISICION OVSP
SISMICA	ANGANÓY	409.125*					PC-SEIS / EW
	CRATER-2	409.88125*	TESCUAL	413.000			
	NARIÑO-2	459.000*					
	URCUNINA	419.999375*					
	COBANEGRA-3	473.500*					SCREAM! / EW
	CONDOR	408.49375*	CRUZ DE AMARILLO	417.775			
	OBONUCO	472.495*					
	CUFIÑO-BB	902-928**					
CALABOZO	902-928**	BRUMA	902-928**				
CRATER-BB	902-928**	CUJACAL	902-928**				
ACUSTICA	CALABOZO	902-928**	BRUMA	902-928**			SCREAM! / EW
INLINOMETRIA	CRATER	411.725*					NU_TILT (GWBasic)
	PELADITOS	411.725*					SCREAM! / Inclinom (Matlab)
	CALABOZO	902-928**	BRUMA	902-928**			
DOAS	STA. BARBARA	902-928**	ALTO DE LA PALMA	902-928**	PLAZUELAS	902-928**	NOVAC program
	ALTO JIMENEZ	902-928**					
	ALTO TINAJILLAS	902-928**					
CLIMATOLOGIA	CRATER-WS	902-928**	CUJACAL	902-928**			SCREAM! / Excel

* UHF

** Espectro Ensanchado