



Research Plan and Progress of SATREPS Peru Project



March 15, 2012

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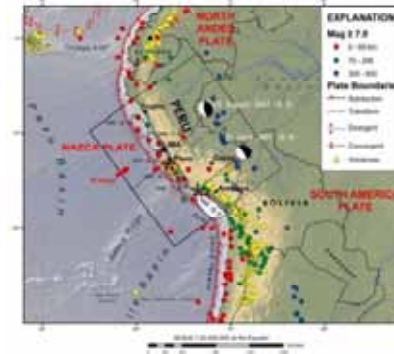
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Doctor Honoris Causa, UNI, Peru.



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Needs of EQ & T Disaster Mitigation in Peru (1)

- Peru locates in the **circum-Pacific seismic belt** with high seismic and tsunami risks.
- Large **inter-plate earthquakes** occurred in Atico (2001) and in Pisco (2007), and thus **EQ & T disaster mitigation** draws significant **attention in Peru**.



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Needs of EQ & T Disaster Mitigation in Peru (2)

- Peru has a long term **relationship with Japan** since 1873.
- **CISMID** was established within **UNI** in 1987 by the support of **Gov. of Japan**. CISMID became the **leading center** of earthquake engineering research in South America.
- CISMID has been in collaboration with Japanese research institutions.



2008 APEC-Peru

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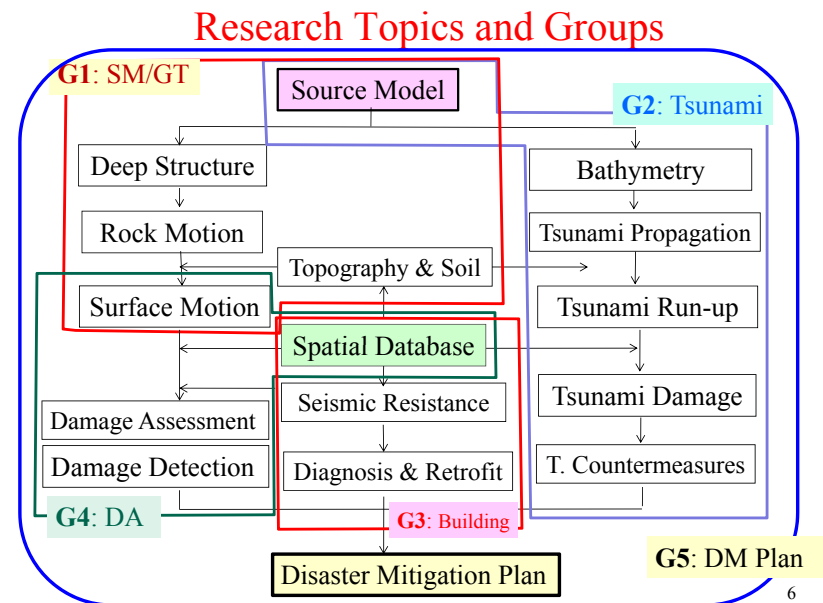
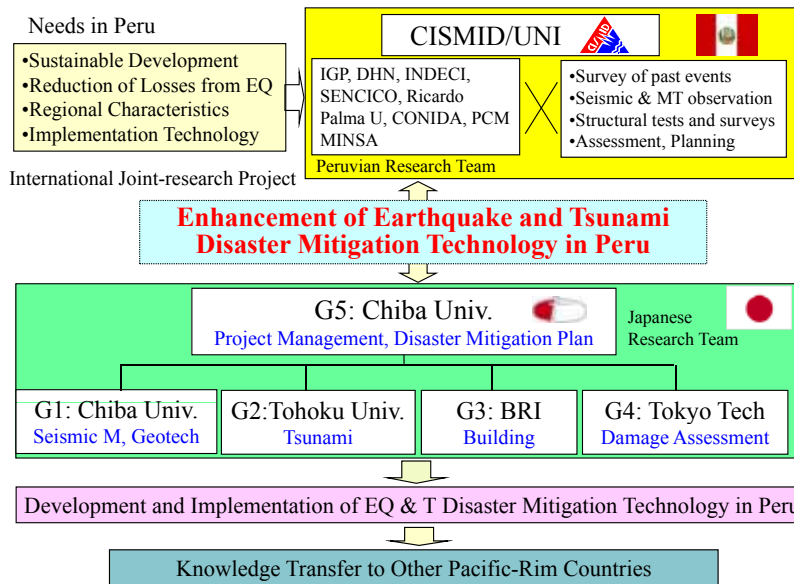
Significance of joint research between Peru and Japan

Both countries are located in a similar seismic environment, frequently hit by damaging earthquakes & tsunamis.

- **Contribution of Japanese science & technology** to disaster mitigation in Peru
- Merits to Japanese **geoscience** since subduction-zone EQs are **rare events**
- **Tsunamis** caused by subduction-zone earthquakes in **South America** hit **Japan** (1960, 2010 Chile EQs) and vice verse (2011 Tohoku EQ). Thus the joint-research contributes to **the tele-tsunami study** in the world.
- Promotion of **disaster mitigation** and **capacity building** through **sharing the knowledge** from the international joint research



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Research Plan

Project Management and Coordination

PI: F. Yamazaki (Chiba U), C. Zavala (CISMID/UNI)

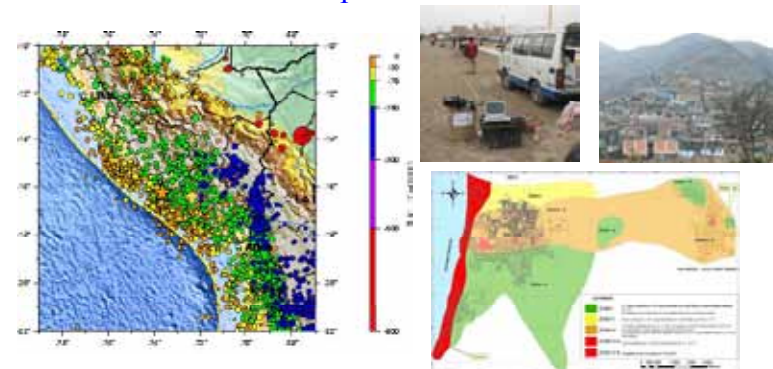
- Project Management, International & domestic coordination
- Public relations, Information dissemination
- International workshops, symposia <http://ares.tu.chiba-u.jp/peru/>



G1: Seismic Motion and Geotechnical Issues

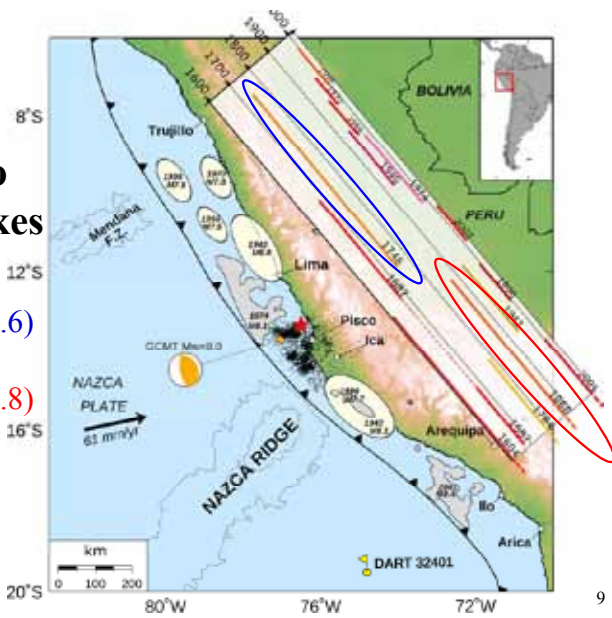
GL: S. Nakai (Chiba U), Z. Aguilar (UNI) & H. Tavera (IGP)

- Source Modeling and Simulation of Seismic Motion
- Microzonation based on EQ and MT observations
- Risk Assessment of Slope Failures



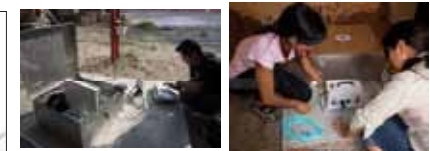
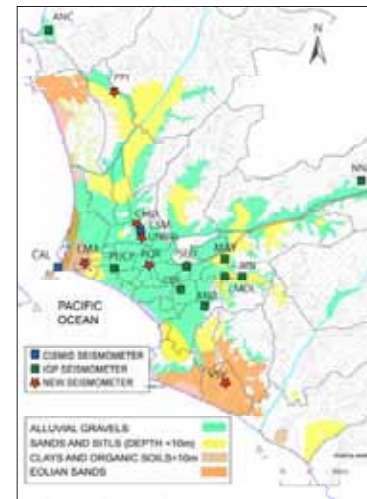
Scenario Earthquakes

1746 ($M_w=8.6$)
and
1868 ($M_w=8.8$)

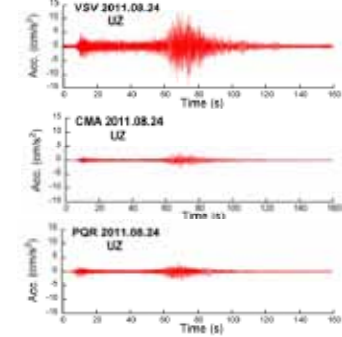


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Implementation of New Seismometers



Contamana Earthquake 2011.08.24 M_L 7.0



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G2: Tsunami Simulation and Damage Mitigation

GL: S. Koshimura (Tohoku U), C. Jemenez (DHN), IGP, CISMID

- Tsunami Source, Propagation and Impacts
- Tsunami Hazard and Impacts Mapping
- Implementation of Tsunami Disaster Mitigation Technology



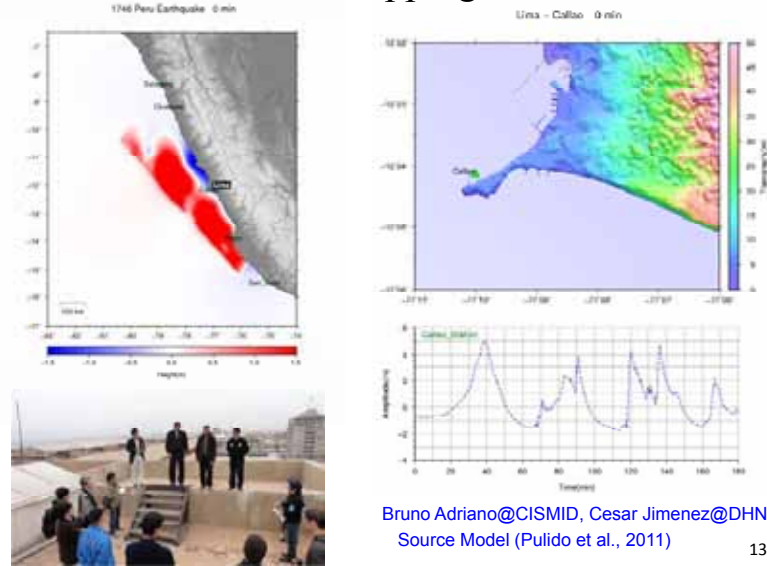
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Data Collection, Hazard Mapping, and Evacuation Planning



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Tsunami Hazard Mapping in Lima-Callo



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G3: Seismic Resistance of Buildings

GL: T. Saito (BRI), C. Zavala (UNI)

- Develop Database of Structural Tests for Masonry Buildings
- Develop Seismic Diagnosis and Retrofit Technologies
- Assessment and Retrofit of Historical Buildings



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Equipment introduced to Peru

Structural testing

Self supporting loading system

Equipment

4-oil jacks with Control system

Material testing

Renewal of old CISMID machine

Equipment

Equipment

50ton Universal 300ton Compression

Building monitoring

Sensor

Equipment

Internet sensor monitored by Peru and Japan

Dynamic behavior monitoring & test

Shaking machine

Equipment

Acc. sensor

Laser sensor

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Research Progress of Building Group

Seismic Test Database

Structural Test at National Yokohama University (2010-2011)

Computer Simulation of Seismic Diagnosis

BRI and Akita Pref. Univ.

Vibration Characteristics of Adobe-Quincha Buildings

3.7 Hz

NS

- Cyclic load
- 1/3 Scale
- Displacement control

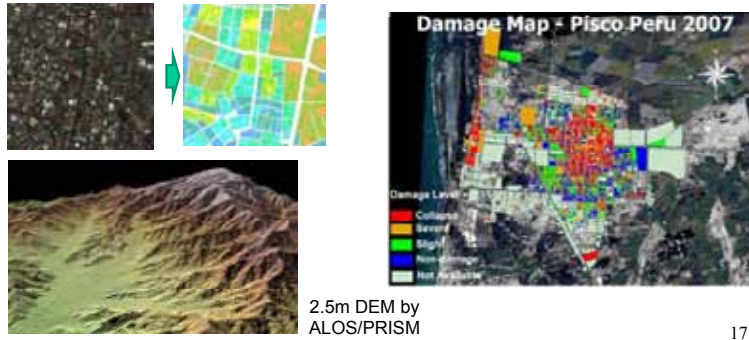
Normal Spring Shear Spring

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G4: Geo-spatial Database and Damage Assessment

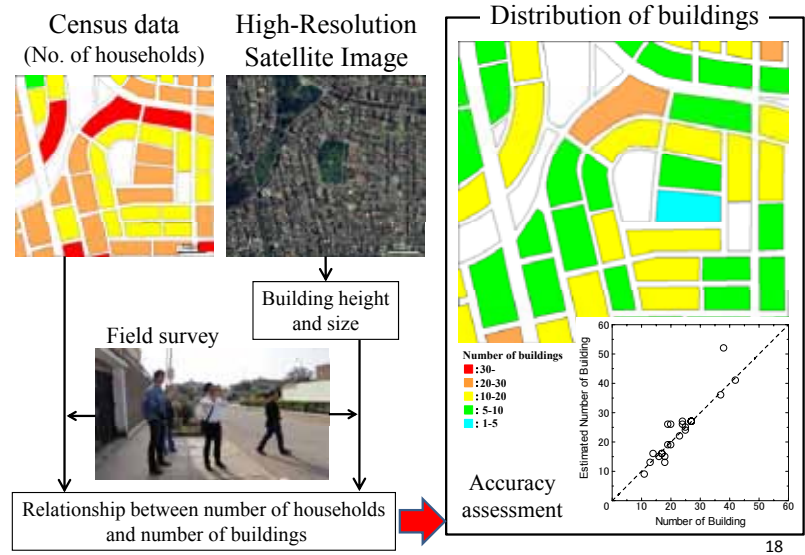
GL: S. Midorikawa (Tokyo Tech), M. Estrada (UNI)

- Development of **Geo-spatial Database**
- **Damage Detection** using Satellite Images
- **Damage Assessment** for Scenario Earthquakes



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G4: Development of Building Inventory Data in Lima

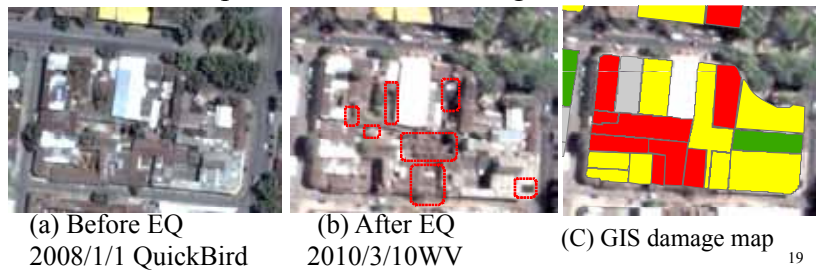


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2010 Chile EQ joint survey (G4+G5) by 5 SATREPS members



Comparison of satellite images in Talca

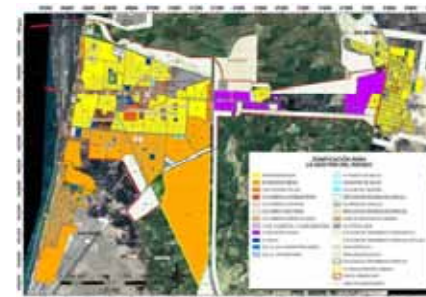


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G5: Development of Disaster Mitigation Plan

GL: F. Yamazaki (Chiba U), A. Bisbal (INDECI)

- Formulate **Land-use Policies** for Disaster Mitigation
- Develop **Local Disaster Mitigation Plans** for the Study Areas
- **Awareness Raising and Dissemination** Activities



Technical seminar (JICA-Peru, 2004)

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G5 Activities in 2010-2011

Selection of target areas and field survey

Public Relations

Meeting with INDECI



Field survey in Tacna



Seminar at Peruvian Congress



Recovery survey in Pisco



Meeting at Tacna Private Univ.



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Human Resources Development



Trainees from CISMID to Chiba U.



Tsunami Training Course at CISMID



Attending a practical class at Chiba U.



C. Jemenez in Onagawa

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Schedule of the Research Project

Research Items	Period FY. (2010-2014)				
	2010	2011	2012	2013	2014
Project Management 【Chiba U and CISMID/UNI】	WS▼	ws▼ JCC▼	ws▼ JCC▼	ws▼ JCC▼	ws▼ JCC▼
G1: Seismic motion & Geotechnical 【Chiba U and CISMID, IGP】 1-1 Source modeling and seismic motion 1-2 Site response & Microzonation 1-3 Slope failure assessment	← Source modeling	← Simulation of SM	← EQ and MT observation, Geological survey	← Microzonation	← Hazard map
G2: Tsunami 【Tohoku U and DHN, CISMID】 2-1 Tsunami propagation and impacts 2-2 Tsunami hazard mapping 2-3 Tsunami DM technology	← Tsunami simulation	← Inundation and impact	← Historical tsunami data	← Tsunami DM technology	← Tsunami damage analysis
G3: Buildings 【BRI and CISMID】 3-1 Seismic tests database 3-2 Diagnosis and Retrofit 3-3 Retrofit of historical buildings	← Literature Survey, Tests	← Develop diagnosis method	← Survey, Risk assessment	← Database development	← Retrofit technology, Validation tests
G4: Damage Assessment 【Tokyo Tech and CISMID, CONIDA】 4-1 Geo-spatial database 4-2 Damage detection using RS 4-3 Damage assessment for Scenario EQ	← Data collection	← Geospatial data	← Data collection	← Database development	← Damage detection
G5: Disaster Mitigation Plan 【Chiba U and INDECI, CISMID】	← Literature Survey	← Planning	← Dissemintation, Education		

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Thank you very much!

Muchas Gracias!

ご清聴ありがとうございます。



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