



First Joint Coordination Committee meeting Enhancement of Earthquake and Tsunami Disaster Mitigation Technology in Peru



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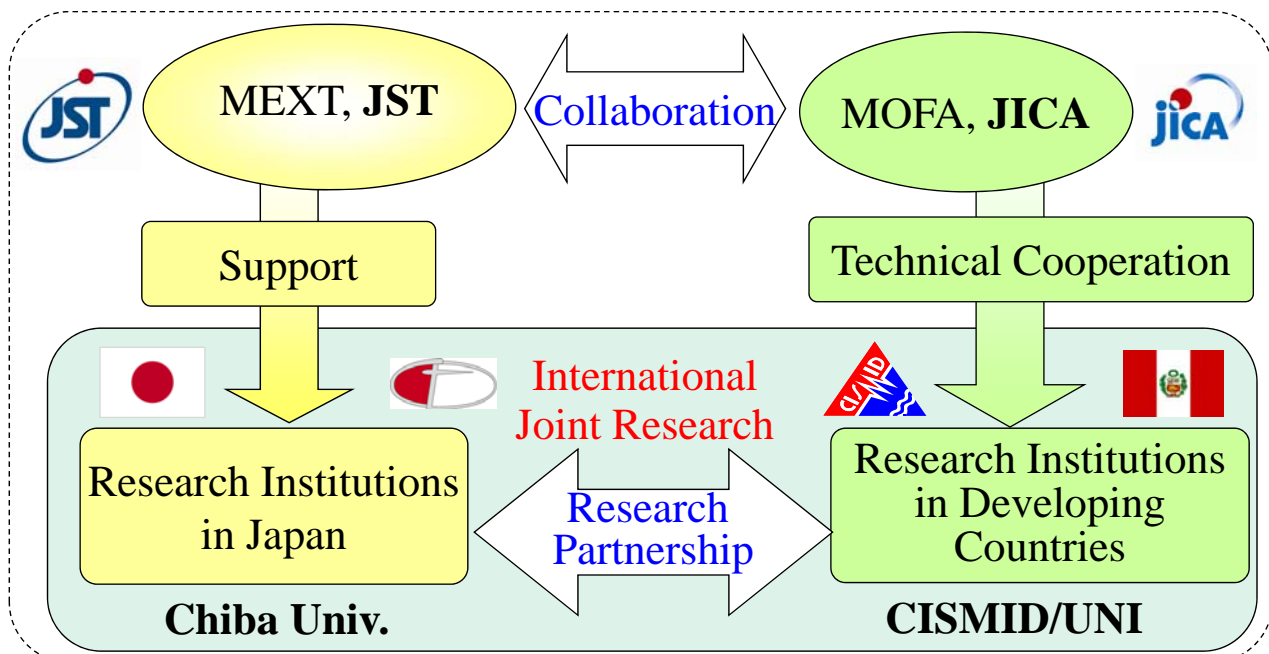


Science and Technology Research Partnership for Sustainable Development : SATREPS

- 1) Environment and Energy
- 2) Bioresources
- 3) Natural Disaster Prevention
- 4) Infectious Diseases Control

JST: Japan Science and Technology Agency

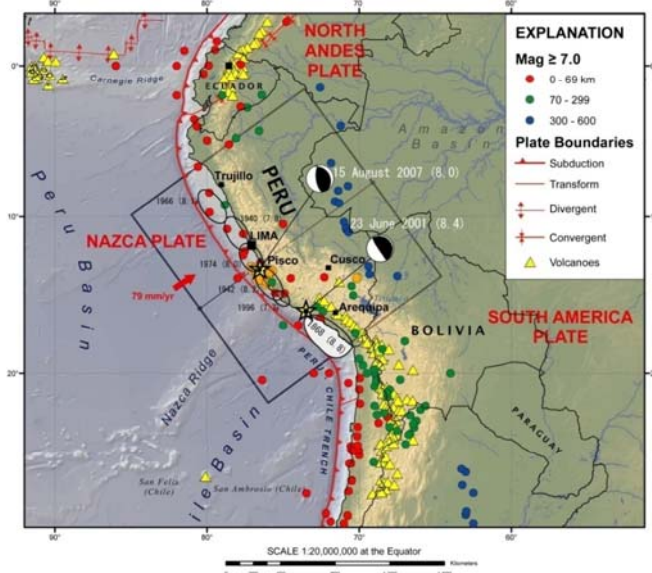
JICA: Japan International Cooperation Agency



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.



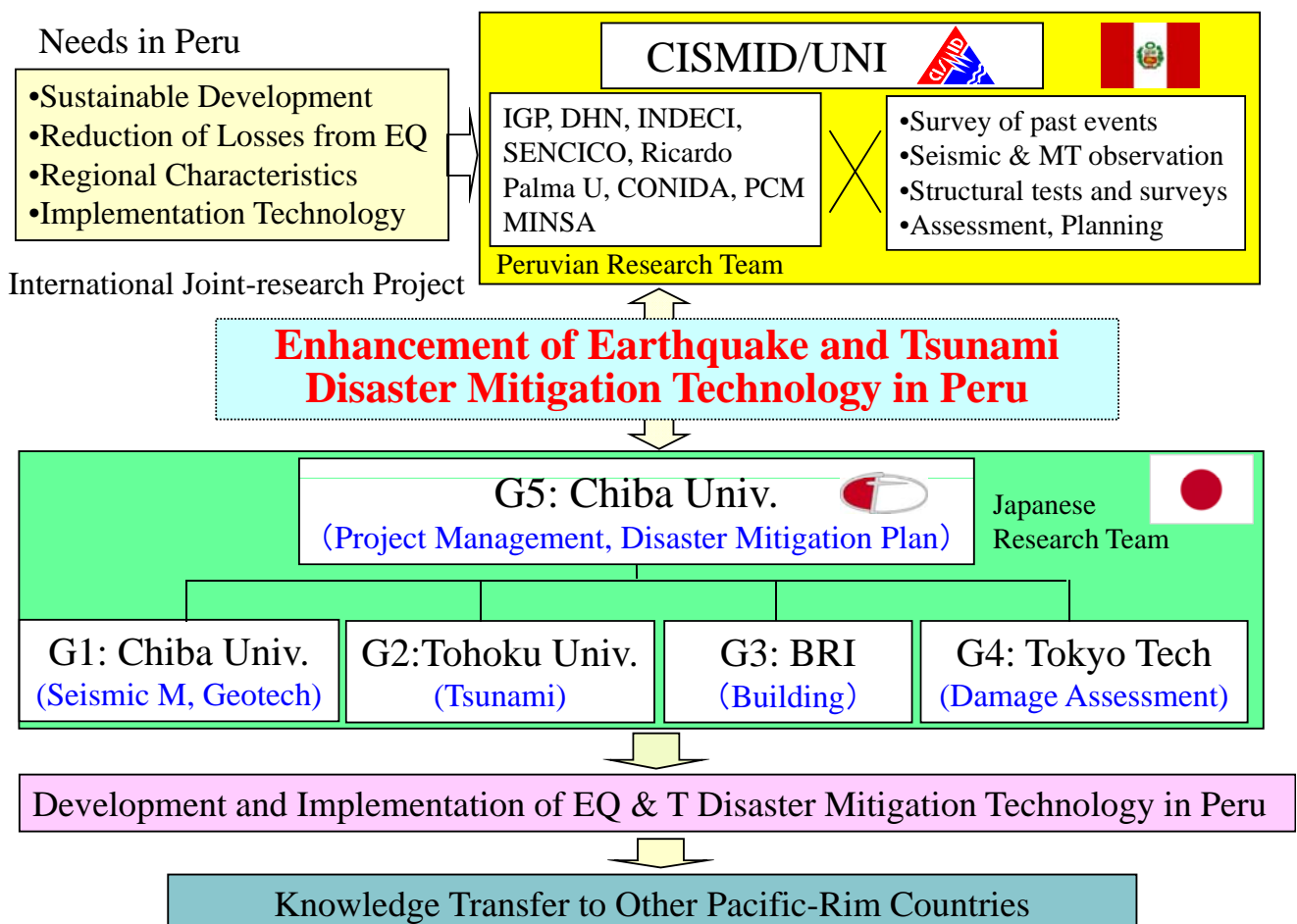
2008 APEC-Peru

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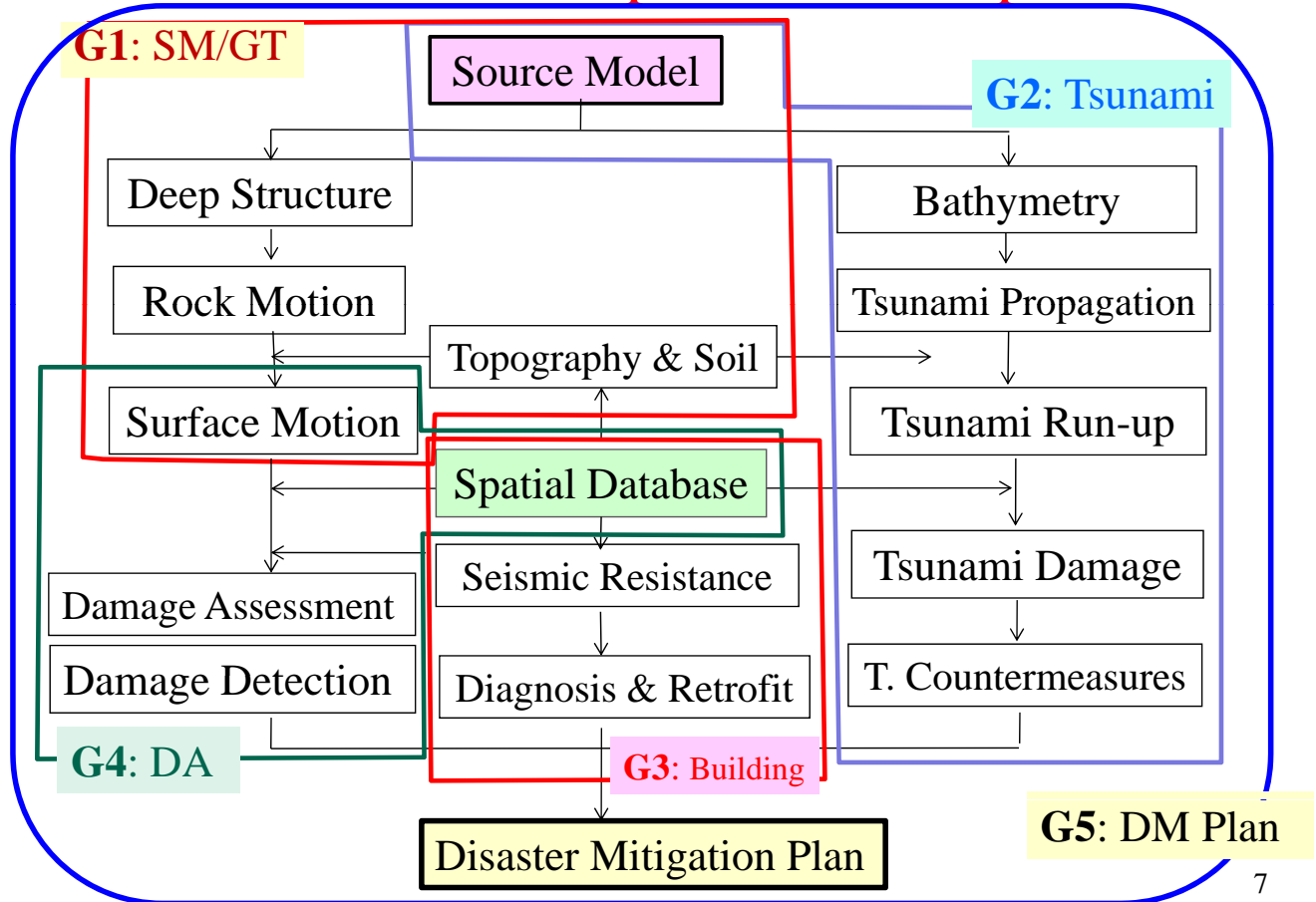
Significance of joint research between Peru and Japan

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

- **Contribution of Japanese S & T** 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** sometimes **hit Japan** (1960, 2010 Chile EQs). Thus the joint-research contributes to **the tele-tsunami study** in Japan.
- Promotion of **disaster mitigation** and **capacity building** through **sharing the knowledge** from the international joint research



Research Topics and Groups



Research Plan

Project Management and Coordination

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

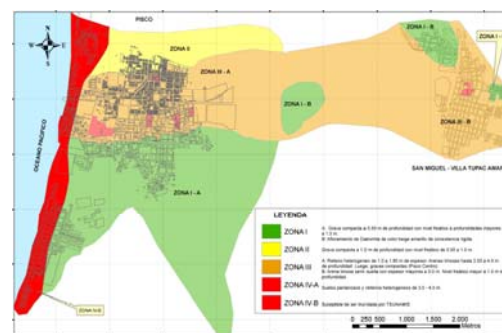
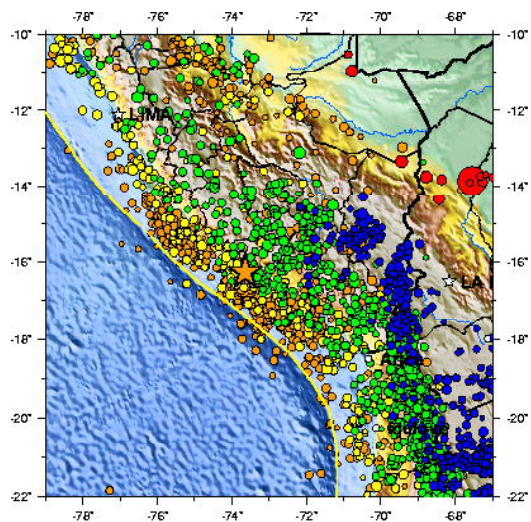
- Project Management, International & domestic coordination
- Public relations, Information dissemination
- International workshops, symposia <http://ares.tu.chiba-u.jp/peru/>



G1: Seismic Motion and Geotechnical Issues

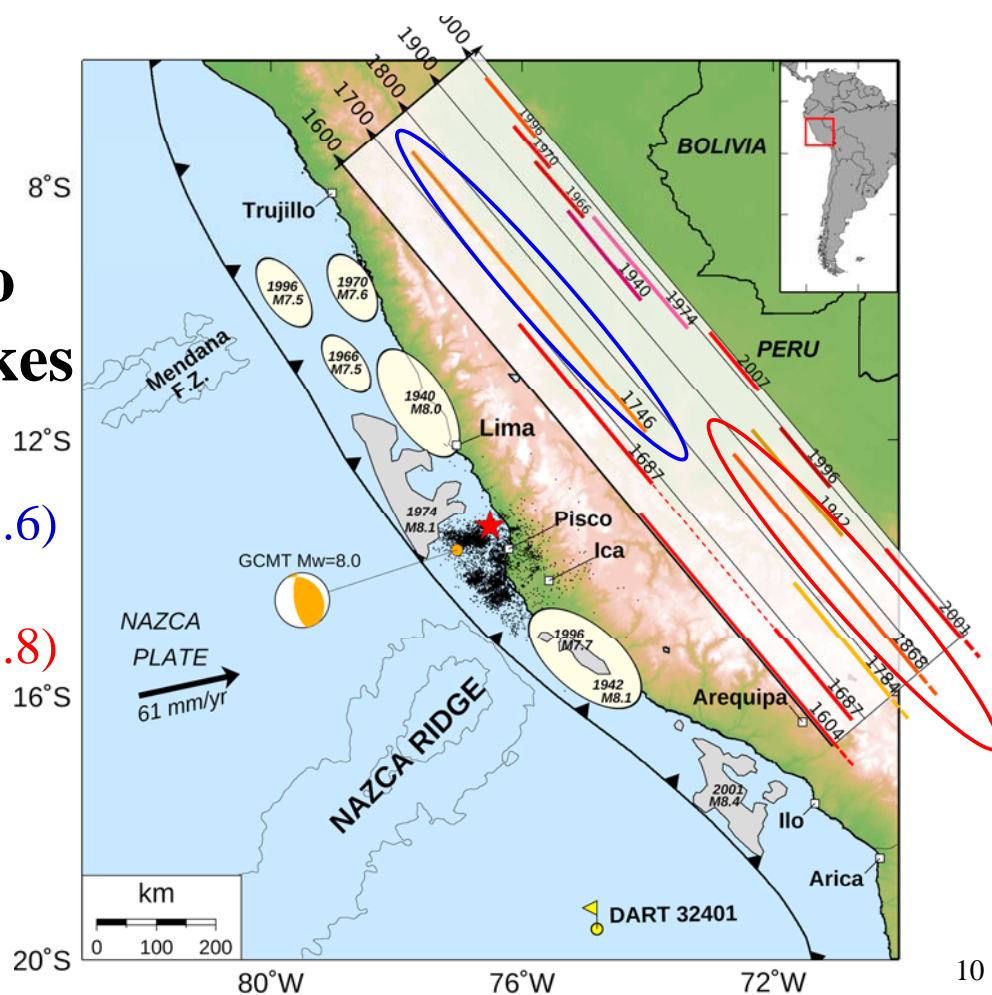
GL: S. Nakai (Chiba U), Z. Aguilar (UNI) & H. Tavera (IGP)

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



Scenario Earthquakes

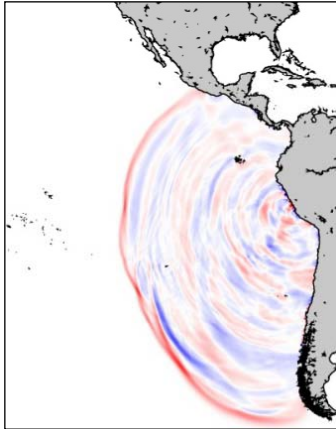
1746 ($M_w=8.6$)
and
1868 ($M_w=8.8$)



G2: Tsunami Simulation and Damage Mitigation

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

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

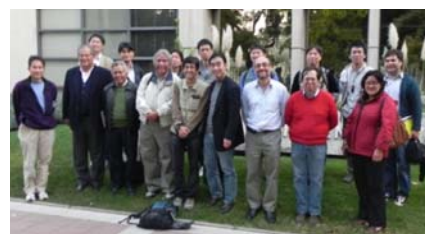


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G3: Seismic Resistance of Buildings

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

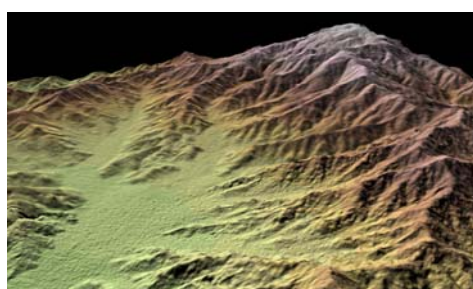


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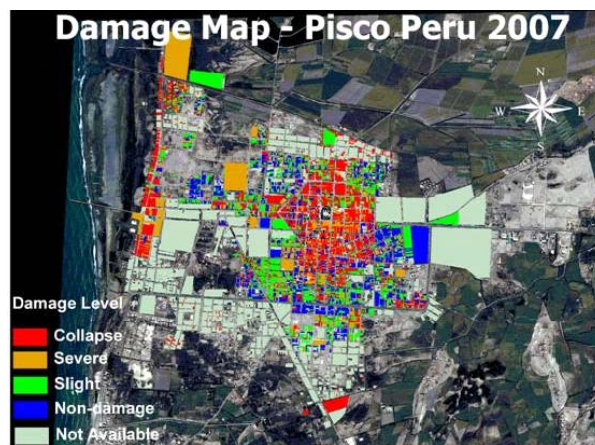
G4: Geo-spatial Database and Damage Assessment

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

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



2.5m DEM by
ALOS/PRISM

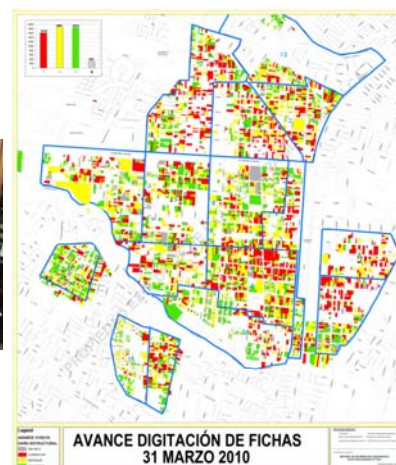


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2010 Chile EQ joint survey (G4+G5) by 5 SATREPS members



Talca city hall



Comparison of satellite images in Talca



(a) Before EQ
2008/1/1 QuickBird



(b) After EQ
2010/3/10 WV



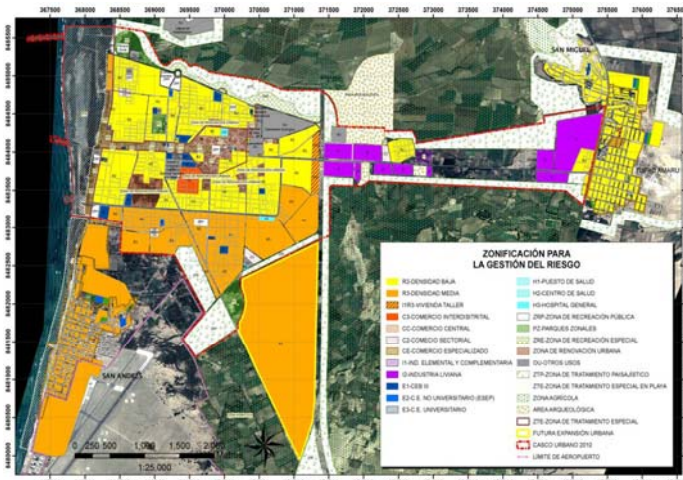
(c) GIS damage map

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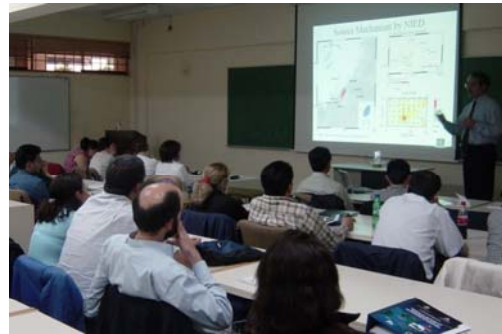
G5: Development of Disaster Mitigation Plan

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



Land-use plan after the 2007Pisco EQ (CISMID)



Technical seminar (JICA-Peru, 2004)

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.



Schedule of the Research Project

Research Items	Period (2010-2015)				
	1 st	2 nd	3 rd	4 th	5 th
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		Microzonation	Hazard map
	EQ and MT observation, Geological survey				
	Field survey, measurement		Seismic Response Analysis		
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			
	Data collection	Damage assessment method		Tsunami damage analysis	
	Historical tsunami data		Tsunami DM technology		
G3: Buildings 【BRI and CISMID】 3-1 Seismic tests database 3-2 Diagnosis and Retrofit 3-3 Retrofit of historical buildings	Literature Survey, Tests		Database development		
	Develop diagnosis method	Retrofit technology, Validation tests		Guideline	
	Survey, Risk assessment		Retrofit Technology		Guideline
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	Database development		
	Data collection	Methodology	Damage detection		
	Damage assessment method		Assessment, risk map		
G5: Disaster Mitigation Plan 【Chiba U and INDECI, CISMID】		Literature Survey	Planning	Dissemination, Education	

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Total budget from 2009 to 2014

Funding Organization	Items	Budget
JICA	Equipment	¥146,289,604
	Human Development	¥44,289,600
	Travel	¥92,207,330
	Others (Project Coordinate)	¥99,538,786
	Total	¥382,325,320
JST	Equipment	¥50,863,000
	Travel	¥45,494,000
	Others (Project Coordinate)	¥93,556,000
	Total	¥189,913,000

Equipment List to Peru

Group	Year	Items	Price (Yen)	Price (Dollars)
<i>Seismic Motion & Geotechnical</i>	2010	Strong Motion Network (10 sets)	¥16,786,000	\$215,205
	2010	Microtremor sets (6 sets)	¥9,294,861	\$119,165
	Total			¥26,080,861
Group	Year	Items	Price (Yen)	Price (Dollars)
<i>Tsunami</i>	2010	Tsunami Analysis Computer	¥1,650,596	\$21,161
	2010	High Resolution Satellite Image Data	¥1,519,105	\$19,476
	Total			¥3,169,701
Group	Year	Items	Price (Yen)	Price (Dollars)
<i>Building</i>	2011	Dynamic behavior monitoring & test	¥2835000	\$36,346
	2011	Static structural testing	¥26,974,500	\$345,827
	2011	Dynamic structural testing	¥6,329,190	\$81,143
	2011	Material testing	¥13,702,500	\$175,673
	2011	Building monitoring	¥2,992,500	\$38,365
Total			¥52,833,690	\$677,355
Group	Year	Items	Price (Yen)	Price (Dollars)
<i>Damage Assessment</i>	2010-2011	Basic Geo-spatial data	¥8,330,973	\$106,807
	2010-2011	Analysis of Geo-spatial data	¥1,772,426	\$22,723
	2010	Equipment for field survey (GPS and GPS Camera)	¥1,865,400	\$23,915
	2011	Spectroradiometer	¥1,500,000	\$19,231
Total			¥13,468,799	\$172,677
Group	Year	Items	Price (Yen)	Price (Dollars)
<i>Disaster Mitigation Plan</i>	2011	Vehicle for Field Observation (Wagon)	¥2,745,600	\$35,200
Total			¥2,745,600	\$35,200

90% of total budget will be fused by this year.

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Travel Expense Overview

JICA

We traveled with JICA's support as follows from 2009-2011.

Year	Items	People	Price
2009-2010	From Japan to Peru	13	¥7,875,648
	From Peru to Japan	14	¥4,995,225
	Total	27	¥12,870,873
2011	From Japan to Peru	16	¥10,751,785
	From Peru to Japan	10	¥3,000,000+α
	Total	26	¥13,751,785

JST

From JST funding, we also traveled from 2009-2010 as follows.

- *Invite researchers from Latin America to Japan (4 people)*
- *Travel from Japan to Peru (6 people)*
- *Travel from Japan to Chile (13 people)*

In total, 22 people traveled, which budget was ¥19,344,000.

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Human Resources Development

In total, 6 to 7 trainees will study from 2010 to 2014 in Japan for earthquake and tsunami disaster mitigation. Travel expense, living costs, and tuitions are supported by JICA.

Period	Person	Organization in Peru	Organization in Japan
2011. 1 - 7	César Omar Jiménez Tintaya	DHN	Tohoku University
2011. 4 - 10	Carlos Eduardo Gonzales Trujillo	CISMID	Chiba University
2011. 4 - 10	Rocio Del Pilar Uriarte Berrios	CISMID	Chiba University
2012. 1 - 7	xxxx (To be decided)	CISMID	Building Research Institute

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Thank you very much!
Muchas Gracias!
ご清聴ありがとうございます。

