The Abdus Salam
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8th Workshop on Non-Linear Dynamics and Earthquake Prediction

3 - 15 October, 2005

Integrated Disaster Risk Management as an Innovation of Science and Technology: Issues, Methods and Challenges. Part III

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Integrated Disaster Risk Management (IDRiM) and Governance: A Perspective and Methodology of Enhancing the Quality of Disaster Prevention

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Lecture 3

8th Workshop on Non-linear Dynamics and Earthquake Prediction, 11 October, Trieste, Italy

Challenges to be made by scientists for themselves, practitioners, and common people.

- To deal with risks, **imagination** is the source of critical, creative and upward thinking ; not depressive or downward thinking which makes people turn away from facing risks.
- To encourage people (both professional and common) to view risks as another landscape of our living sphere.
- To approach disaster planning and management in an **integrated manner** but try to solve it first as **simple and easy to act** as possible.

Integration is needed in

- Integration **DD**: Combining both **daily** and **disaster** mode (disaster and non-disaster cycle),
- Integration **MD**: Dealing with **multiple** hazards and **disasters**,
- Integration **KP**: Systematizing and linking a piece of particular, specialized **knowledge and technology** to relevant **policy concerns and governance** issues,
- Integration **DU**: Linking **disaster** management to **urban planning and management**,
- Integration **KD:** Spanning a gap between what we **know** and what we do= **Implementation knowledge,**
- Integration **MA**: **Methodological** Development by **Adaptive Management**

Integration **KD:** Spanning a gap between what we **know** and what we do= **Implementation knowledge**

Three types of missing knowledge and One Already there

- Frontier knowledge: Still much unknown

(eg. Location of active faults)

- Existing knowledge: Already much known

(eg. Lessons learned from past disasters, predicted typhoon/hurricane approaching real-time.)

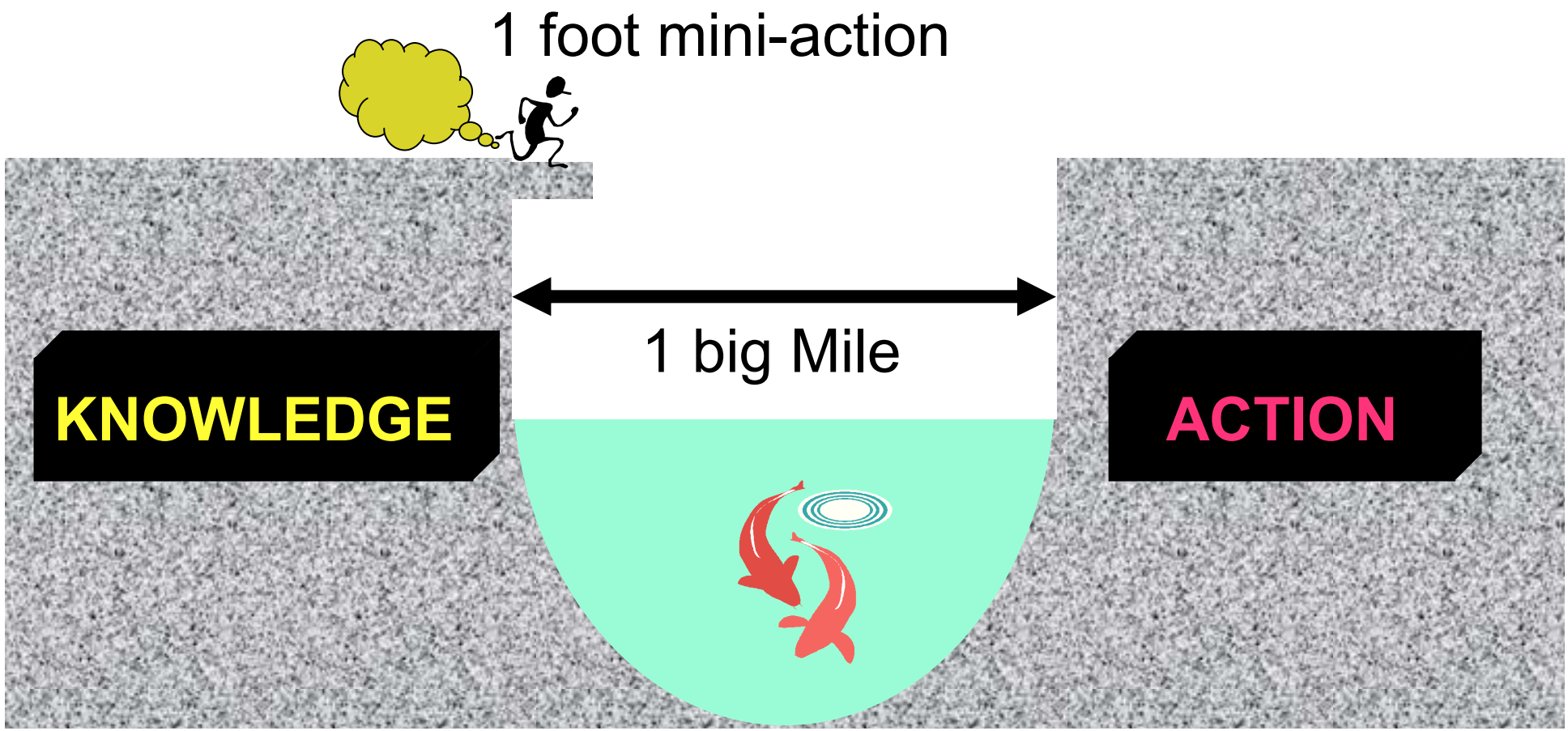
- Implementation knowledge: Yet much unknown

(eg. how to encourage and let people practice furniture nailing; still tacit and not formalized)

- We do not know enough about the above fact.

(eg. Self-isolation and Mindset by specialization)

Implementation Divide



Who are more responsible?

- Anyone who thinks it's one's mission to take a one-foot leap towards action.
- Scientists (researchers), why not take an initiative?
- Let us make the knowledge build-up of narrowing the gap a part of scientific achievements.

Challenges by scientists to approach people

- Scientists should work with practitioners and common people in fields and let them face the fact that it is rather a matter of their attitude and behaviors which keep them away from taking a leap towards action.

- Social and human scientists should take lead and formulate such knowledge of bottlenecks in attitudes and behaviors, and should find out knowledge of overcoming implementation bottlenecks in people's attitudes and behaviors.

Hurricane Catherina

Well Imagined A year ago!

- **When did this calamity happen? It hasn't—yet. But the doomsday scenario is not far-fetched.** The Federal Emergency Management Agency lists **a hurricane strike on New Orleans as one of the most dire threats to the nation, up there with a large earthquake in California or a terrorist attack on New York City.** Even the Red Cross no longer opens hurricane shelters in the city, claiming the risk to its workers is too great.

Gone with the Water

National Geographic Magazine, Oct. 2004

By Joel K. Bourne, Jr.Photographs by Robert Caputo and Tyrone Turner

The Louisiana bayou, hardest working marsh in America, is in big trouble—with dire consequences for residents, the nearby city of New Orleans, and seafood lovers everywhere.

Early warning executed but

- Many people would not evacuate

Reasons might have been:

- “**I know I should but I cannot act so**”

“Let us hope it will be okay”

“How can I move without money and transport?”

“Leave me here and do not force me out!”

Continued

Gone with the Water
National Geographic Magazine,
Oct. 2004
By Joel K. Bourne,
Jr.Photographs by Robert
Caputo and Tyrone Turner

"The killer for Louisiana is a Category Three storm at 72 hours before landfall that becomes a Category Four at 48 hours and a Category Five at 24 hours—coming from the worst direction," says *Joe Suhayda, a retired coastal engineer at Louisiana State University who has spent 30 years studying the coast.* Suhayda is sitting in a lakefront restaurant on an actual August afternoon sipping lemonade and talking about the chinks in the city's hurricane armor. **"I don't think people realize how precarious we are,"**
Suhayda says, watching sailboats glide by. **"Our technology is great when it works. But when it fails, it's going to make things much worse."**

Continued

Gone with the Water
National Geographic Magazine,
Oct. 2004
By Joel K. Bourne,
Jr.Photographs by Robert
Caputo and Tyrone Turner

Such **high stakes compelled a host of unlikely bedfellows—scientists, environmental groups, business leaders, and the U.S. Army Corps of Engineers—to forge a radical plan to protect what's left.**

Drafted by the Corps a year ago, the Louisiana Coastal Area (LCA) project was initially estimated to cost up to 14 billion dollars over 30 years, almost twice as much as current efforts to save the Everglades.

Why NOT IMPLEMENTED?!!

Mindset and Excused by High Priority Issues

Improving Communication and De-segregation

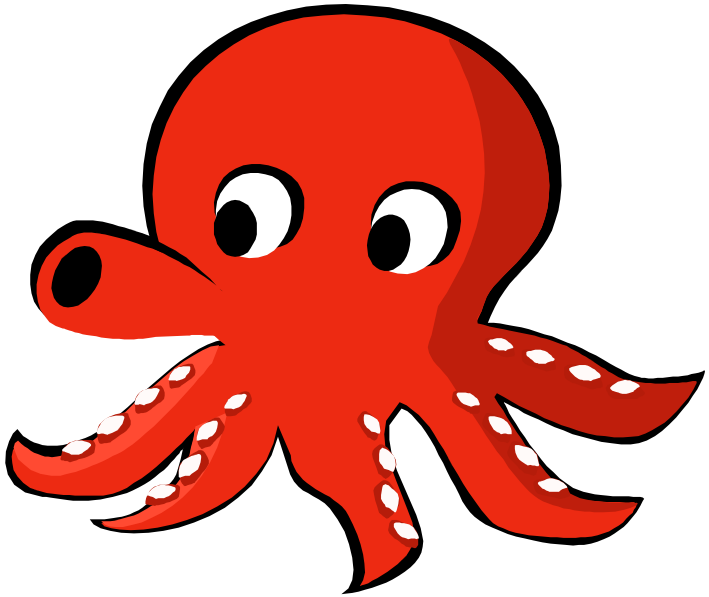
Managing Poverty

Increasing Risk Awareness and

Capacity Building

for Evacuation

(Social-Colearning)



Structural Measures for Disaster Prevention

New York, September 11, 2001

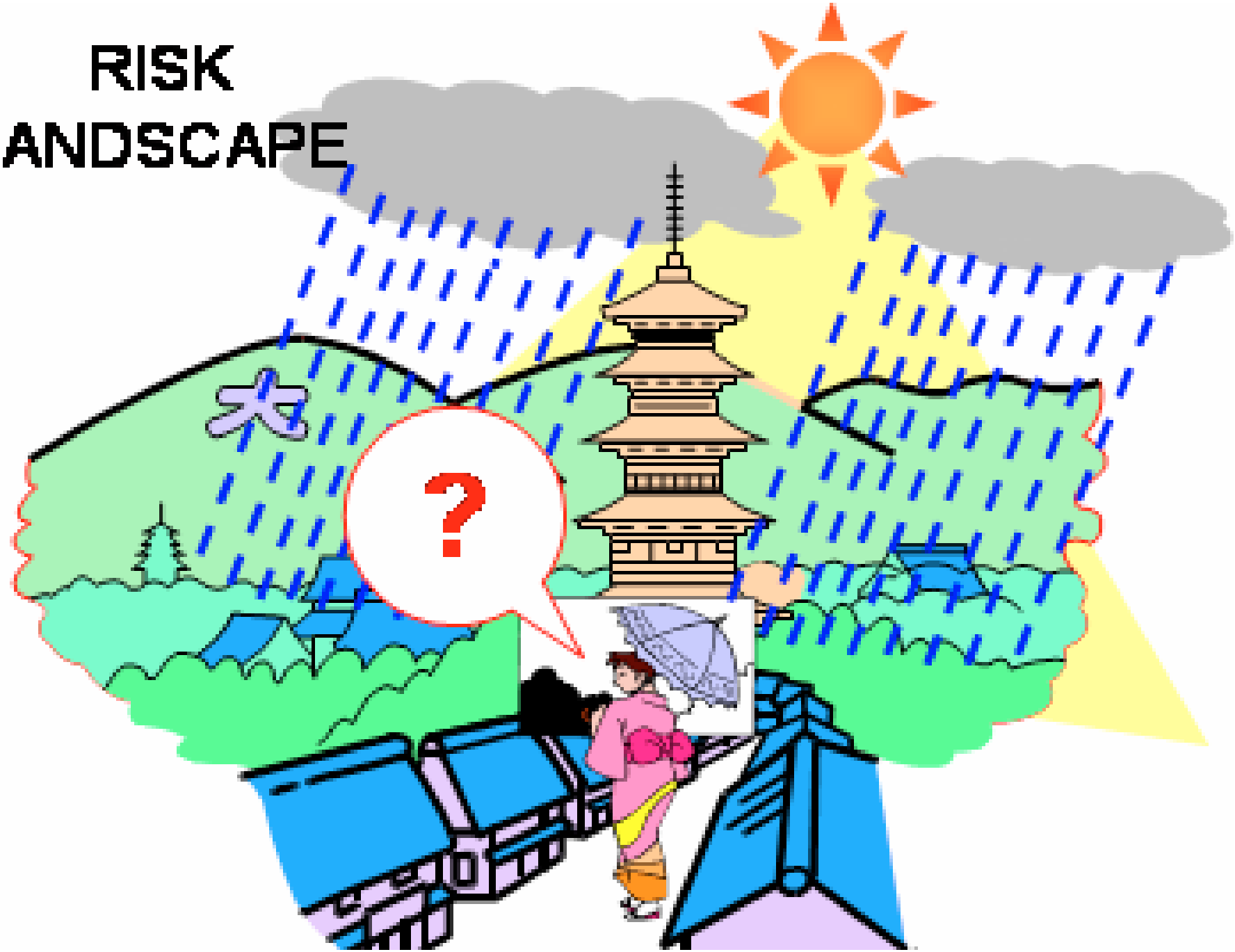
102 Minutes :The Untold Story of the Fight to Survive Inside the Twin Towers

by Jim Dwyer and Kelvin Flynn

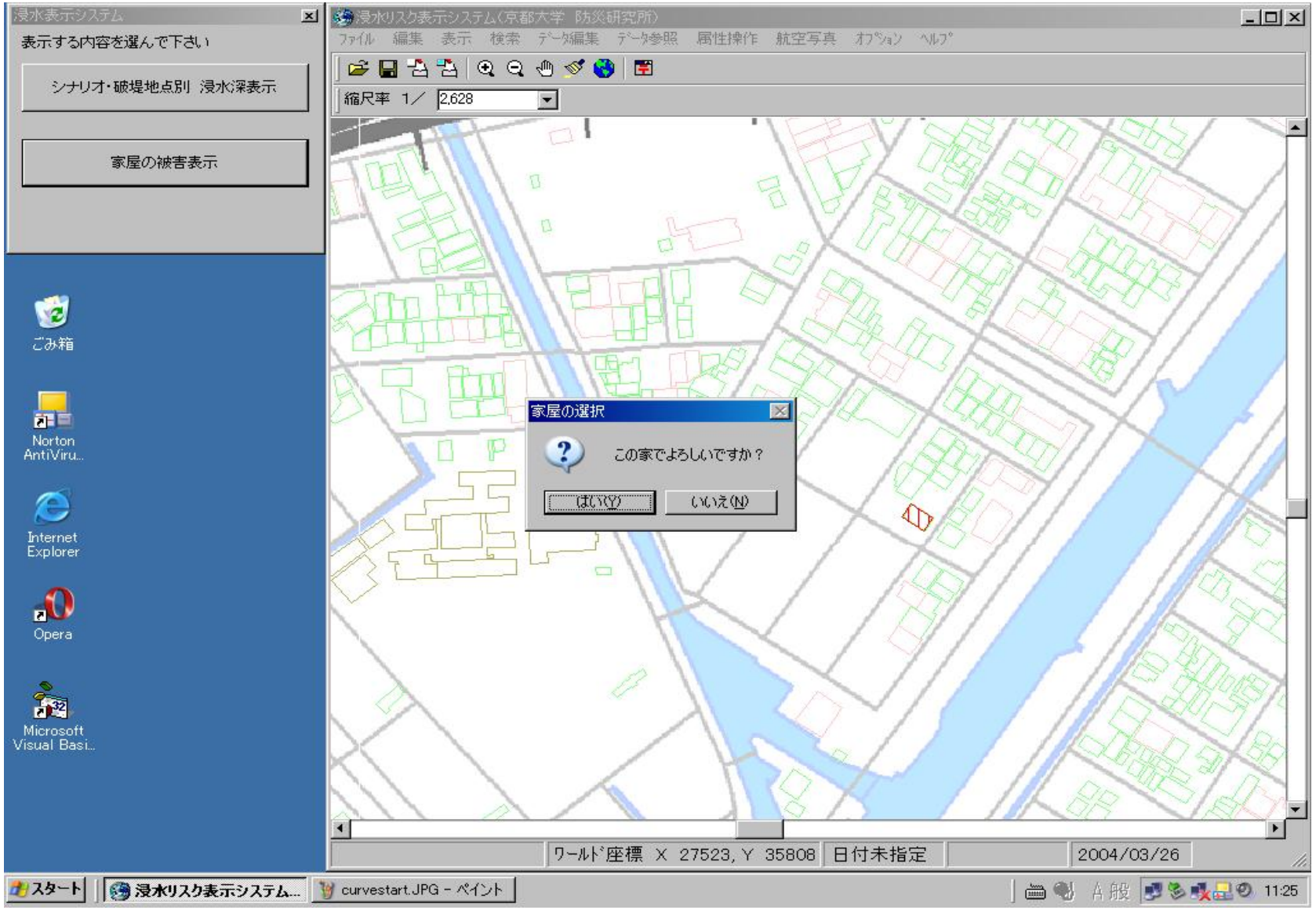
- The Police and Fire Department had no idea to work together and communicate.
- They had agreed to do so in their manuals but very reluctant to drill accordingly beforehand.
- Sense of mistrust, rivalry and fear to accept

seemingly minor technical routines (probably afraid to ruin solidarity and morale based on “the conventional methods”).

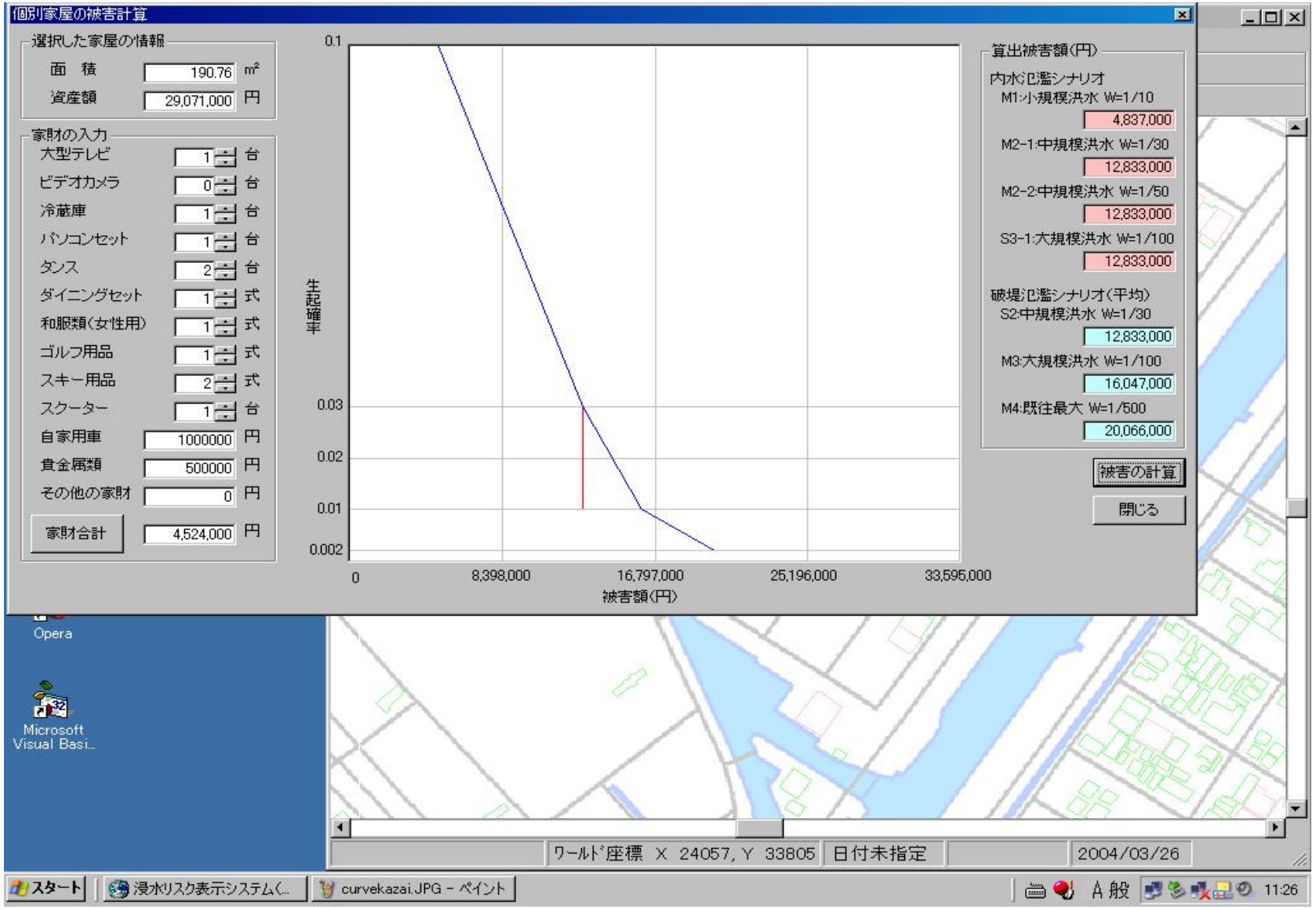
RISK LANDSCAPE



Select a house



Loss of a house property



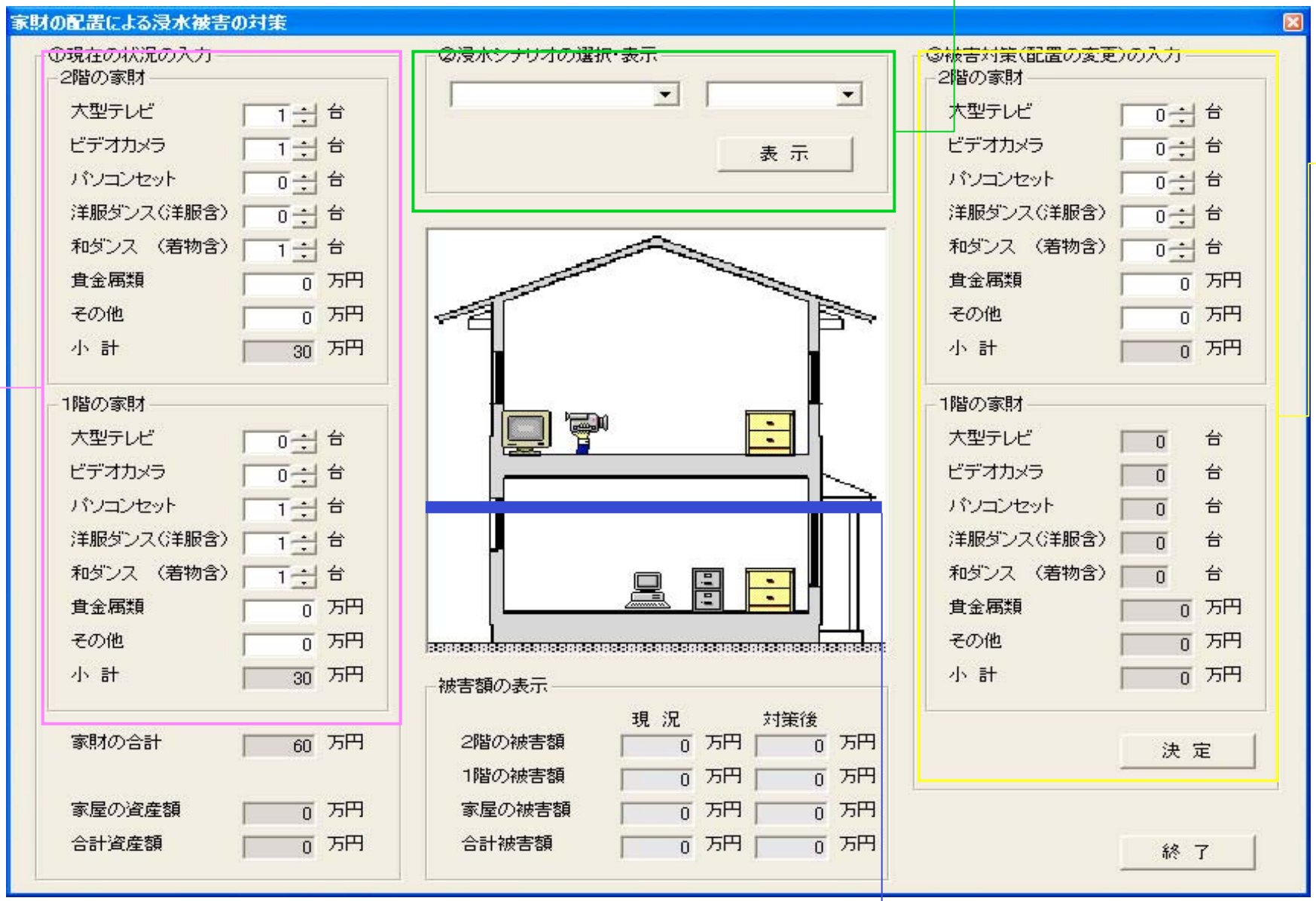
Calculated Damage in a house (Result)

Selected Flood Scenario

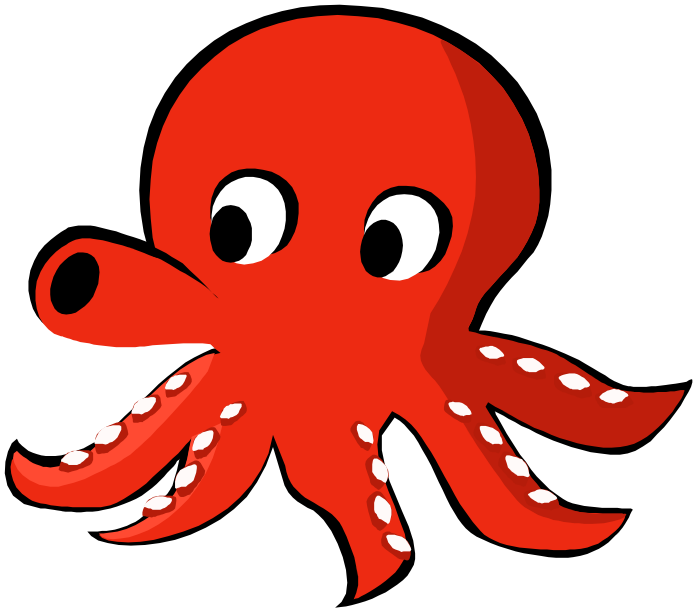
Current Furniture Allocation

Furniture Reallocation plan considering Inundated Depth

Inundated Depth



Integration **KP**: Systematizing and linking a piece of particular, specialized **knowledge & technology** to relevant **policy concerns and governance** issues

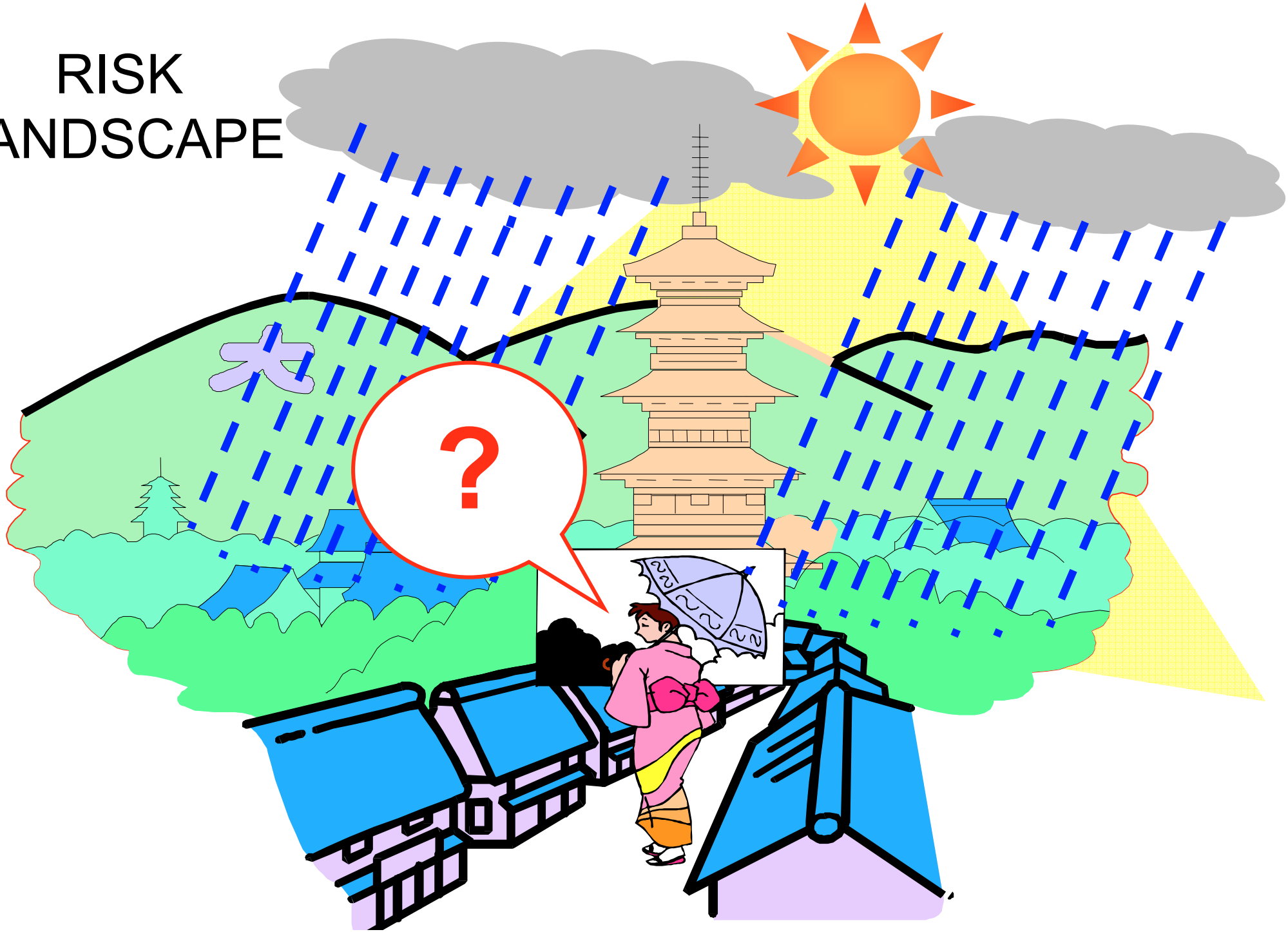


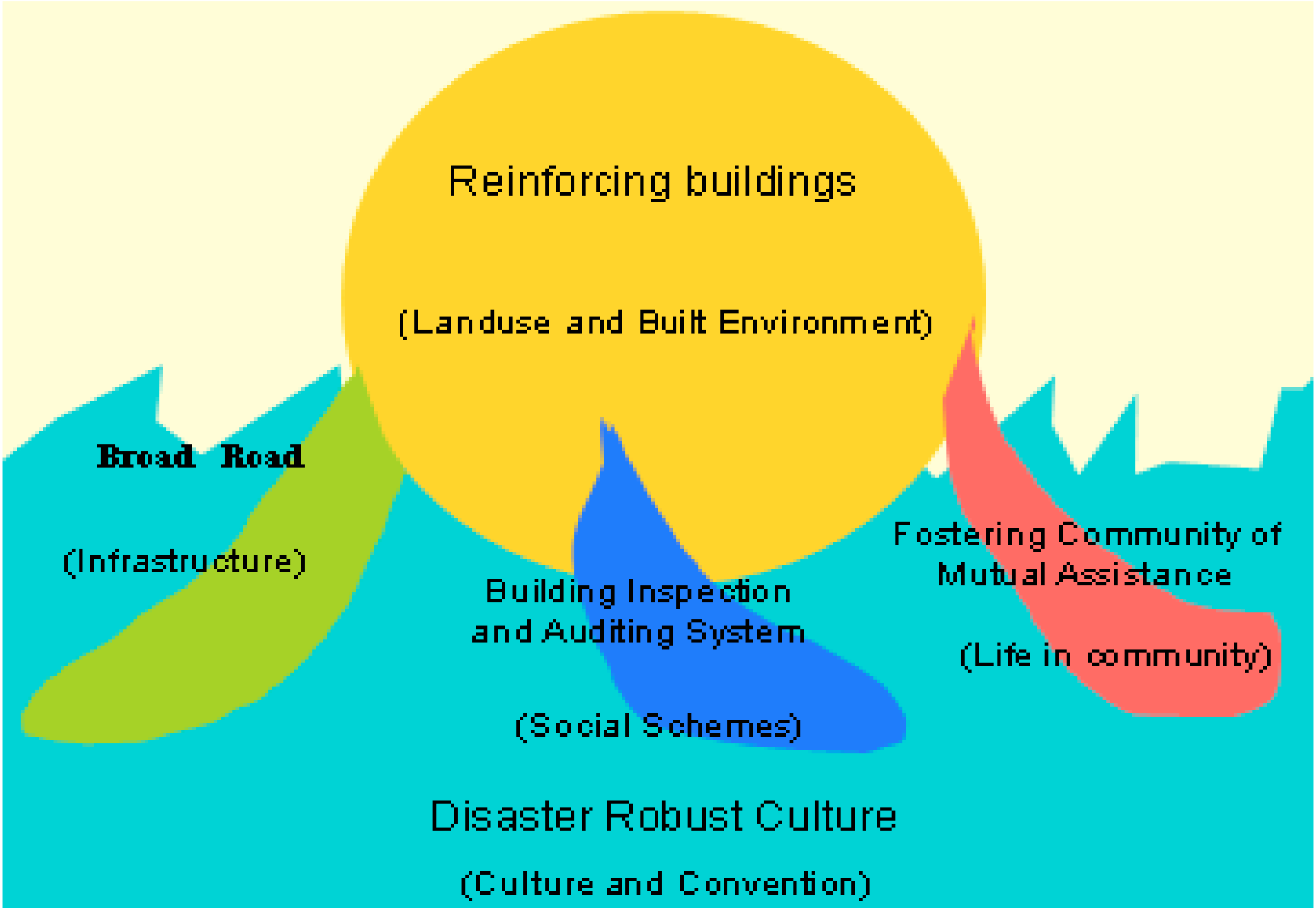
Policy Linkage: **Octopus Model**

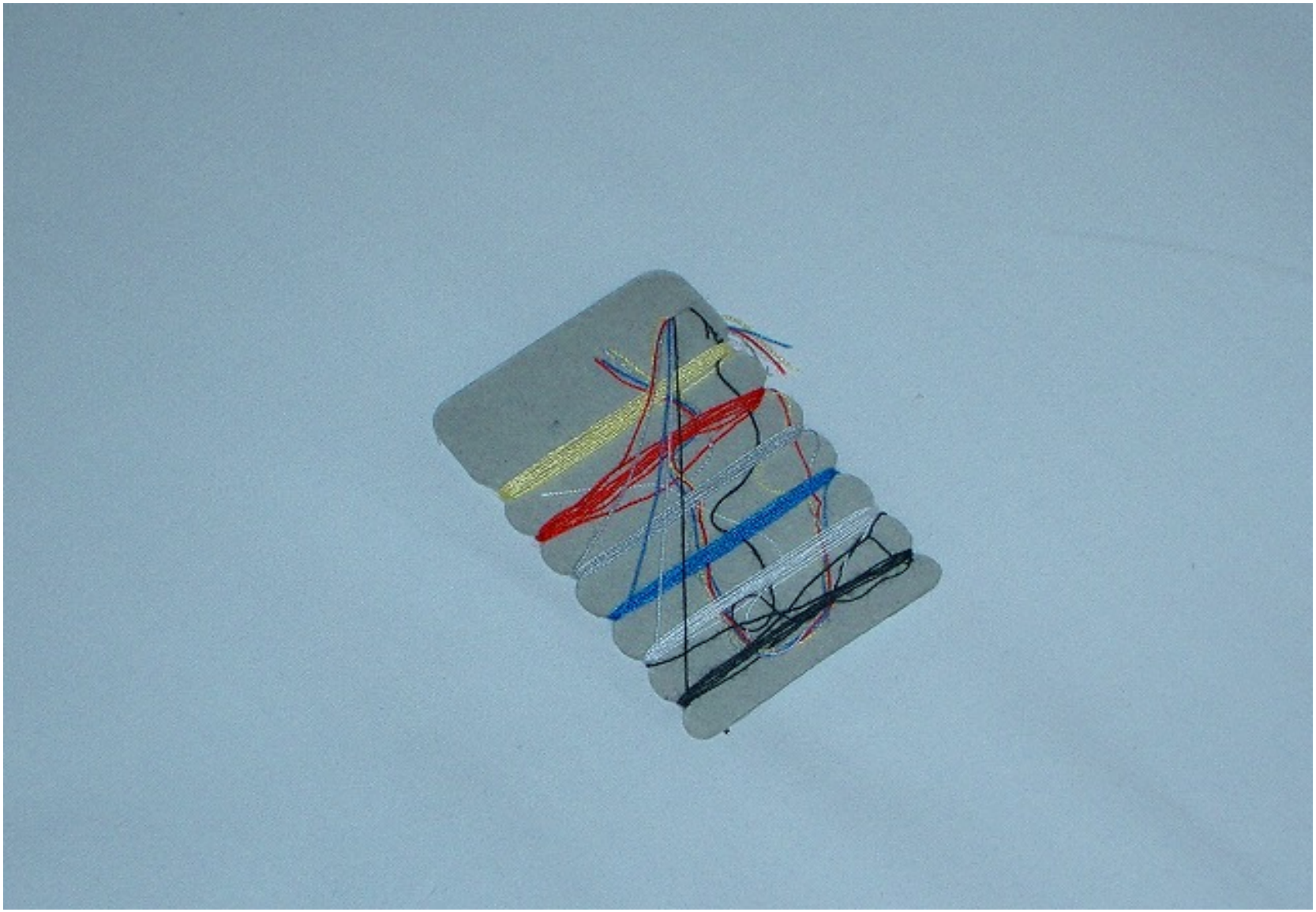
(Okada,2002)Multidisciplinary Approach

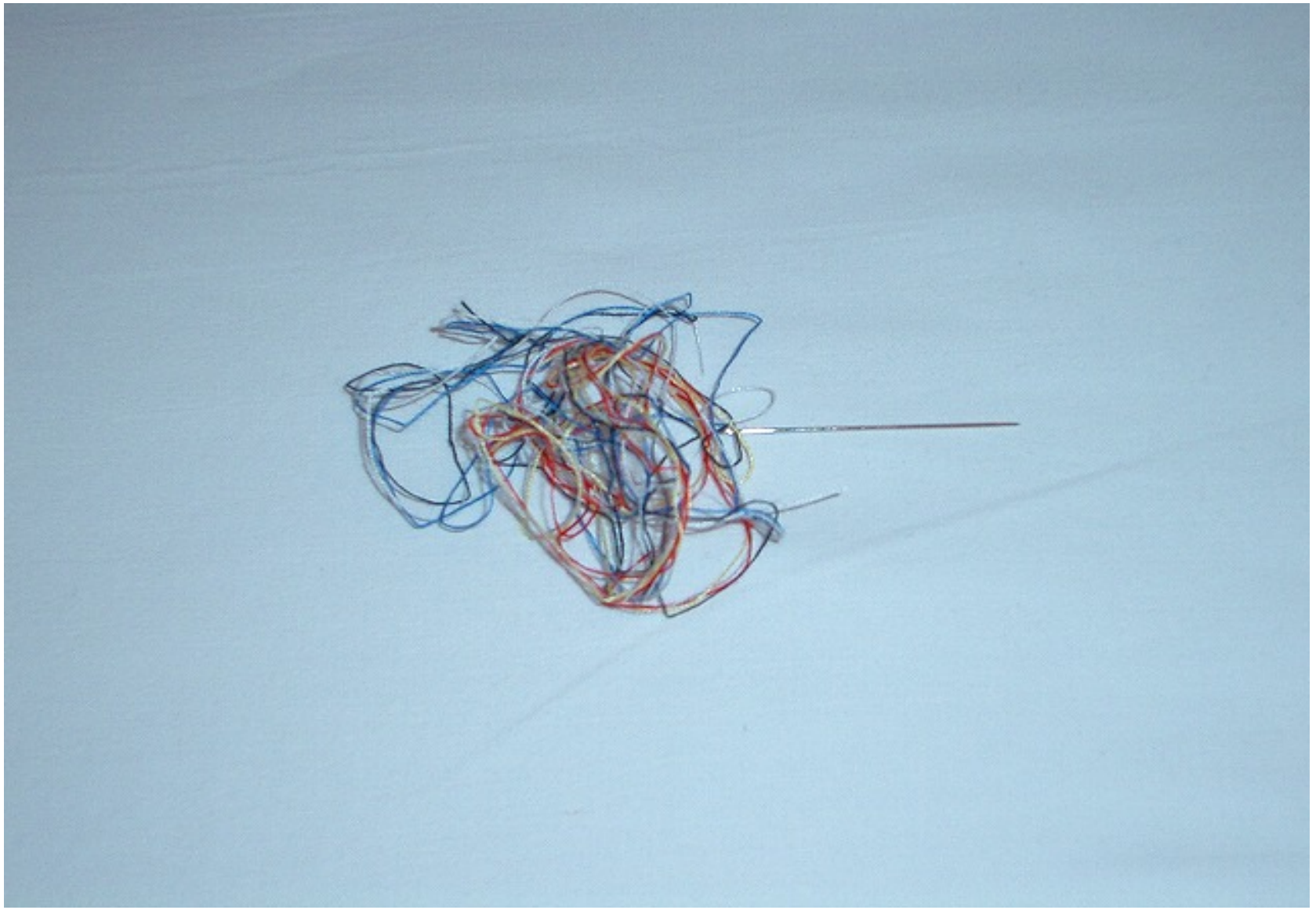
We need multiple legs (polyped) which cling to other interface areas.

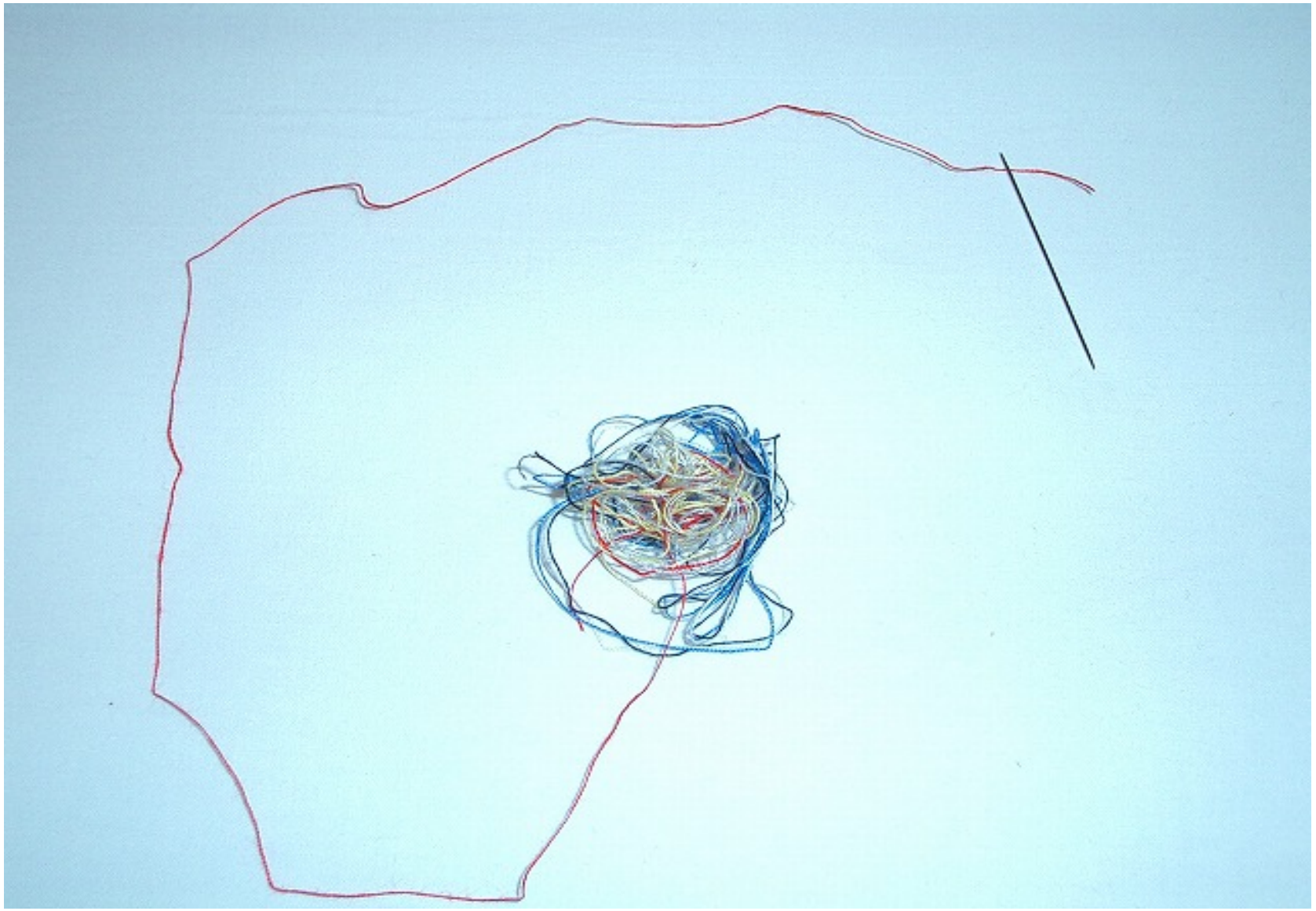
RISK LANDSCAPE




Reinforcing buildings
(Landuse and Built Environment)
Broad Road
(Infrastructure)
Building Inspection
and Auditing System
(Social Schemes)
Fostering Community of
Mutual Assistance
(Life in community)
Disaster Robust Culture
(Culture and Convention)

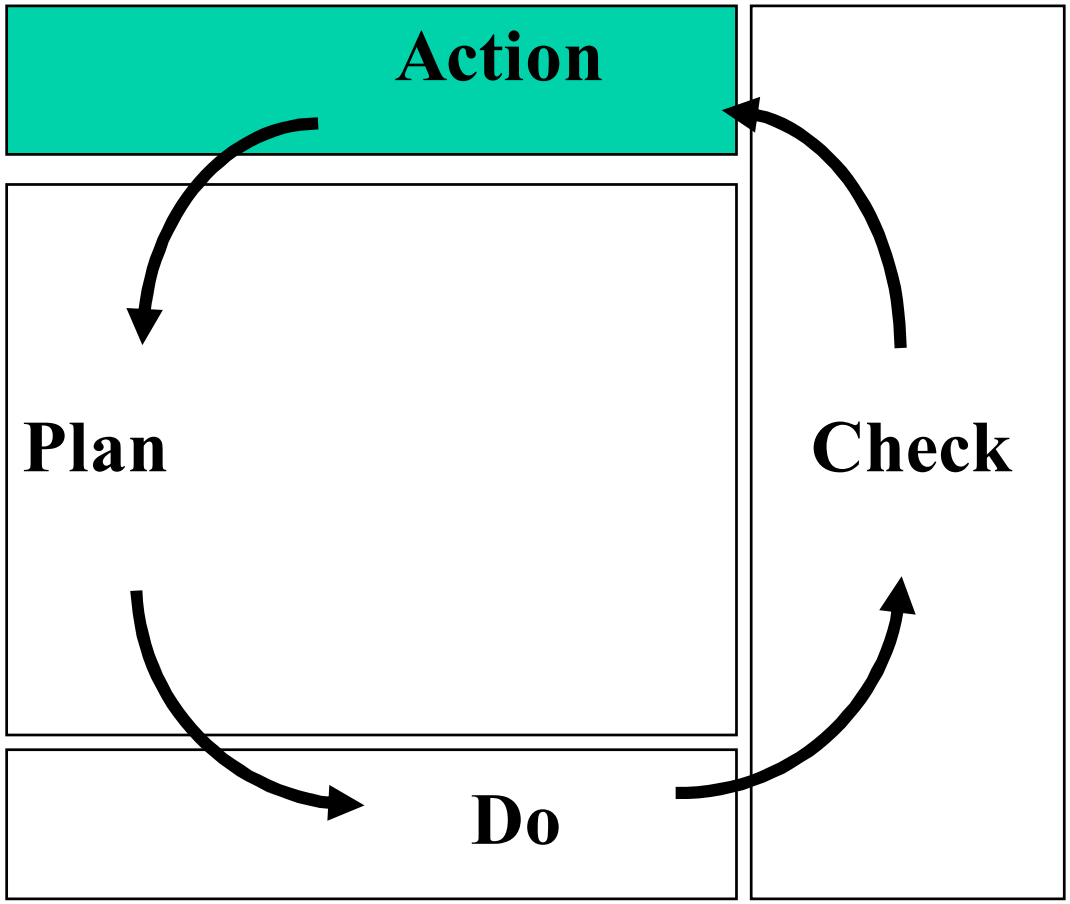


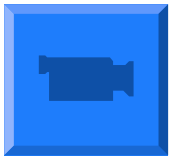




Participatory Approach based on a Workshop Method

As a PDCA Cyclic Process





(10 times speed than actual time)

Imagination+ Simulation=Ima-simulation

Imagination+ Experience =Experi-magination

Critical Ima-simulation
Critical Experi-magination

vs.

Vital (Lively, Communicative, critical-implicit)
Vital Experi-magination

Problems in conventional disaster risk case studies (2)

- ignore potential for participative approach to “social co-learning” among potential stakeholders
- fail to provide for continuous monitoring as part of a proactive, anticipatory approach
- identify learning points, but are not designed to convert learning to knowledge that leads to action
- research driven by narrow academic agenda, not broader need for knowledge that will benefit actual communities

What makes CASiFiCA different and unique?

- Continuous monitoring (from Pre- to Post disaster time)
- Cross-referencing (Multilateral Monitoring, from region to region) and Collaborative monitoring
- Adaptive Management for Field-Based Disaster Research (starting from a small but testable research piece)
- Time-bound (three years)
- Practice-bound (Policy-makers, Practitioners, End-users-involved)
- Benchmarking for research outcomes

Typical Conventional Case Study Approach

Place

Time

A

START END

Disaster A

retroactive
non-continuity

NO CROSS-PLACE REFERENCE

B

START END

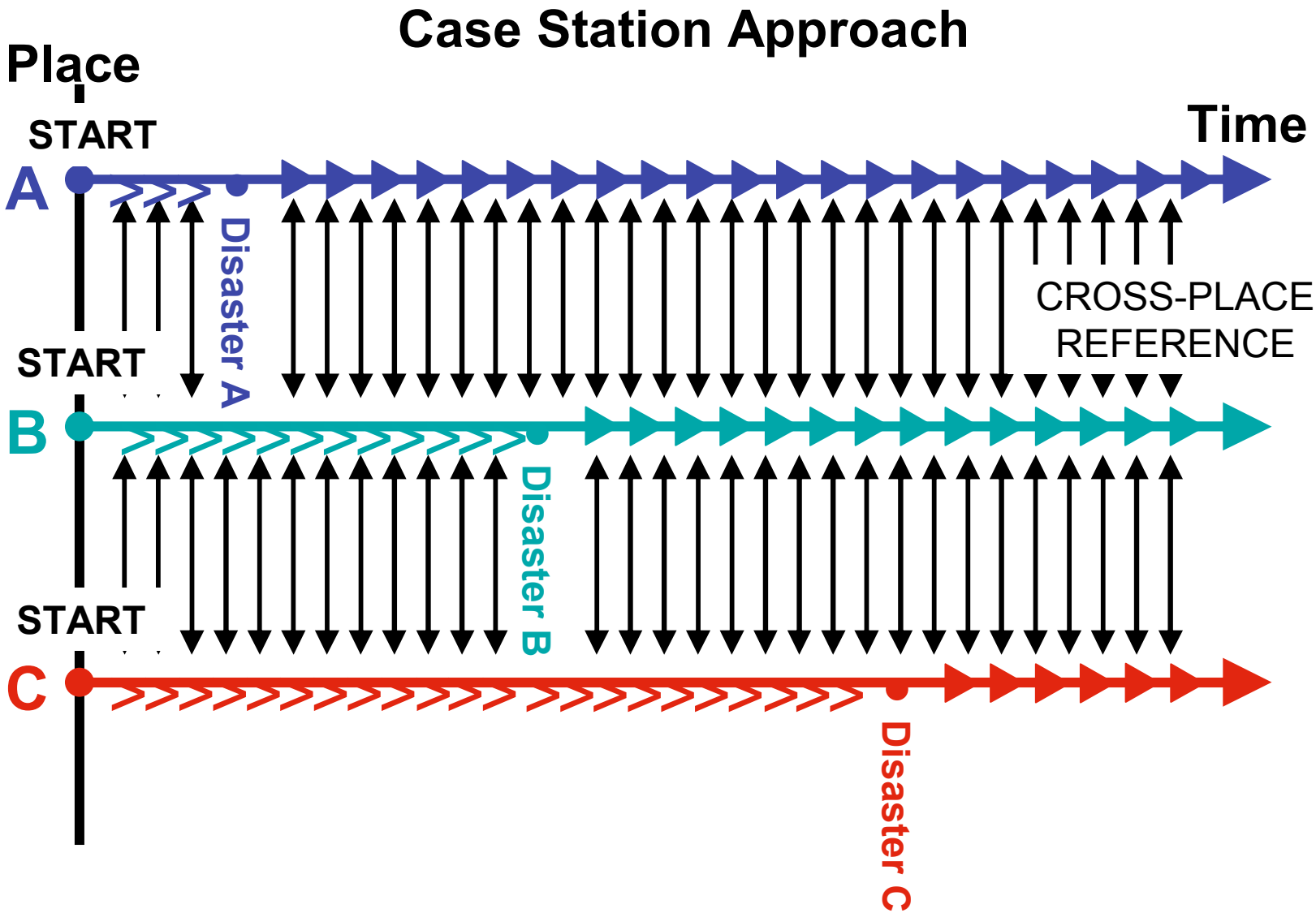
Disaster B

NO CROSS-PLACE
REFERENCE

C

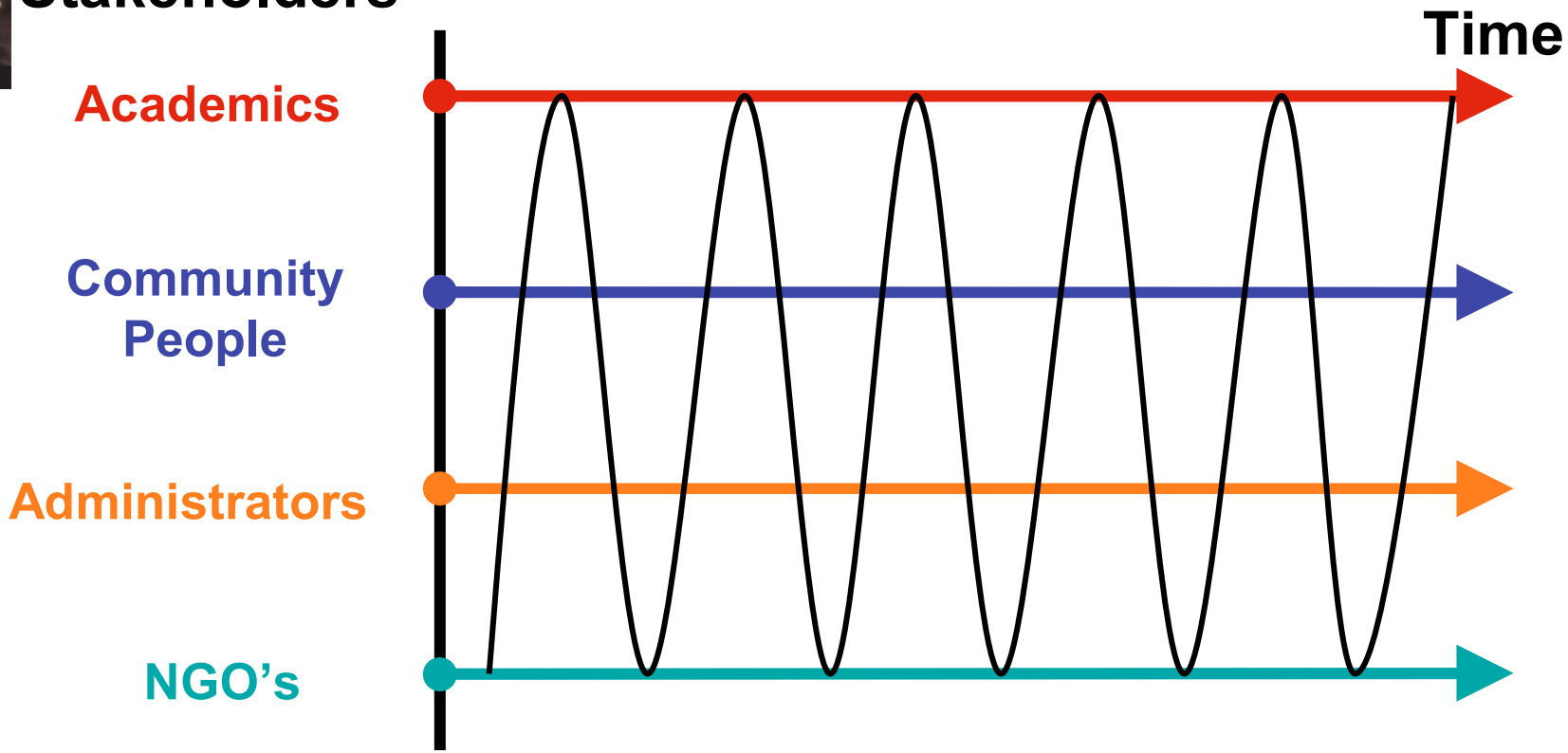
START END

Disaster C

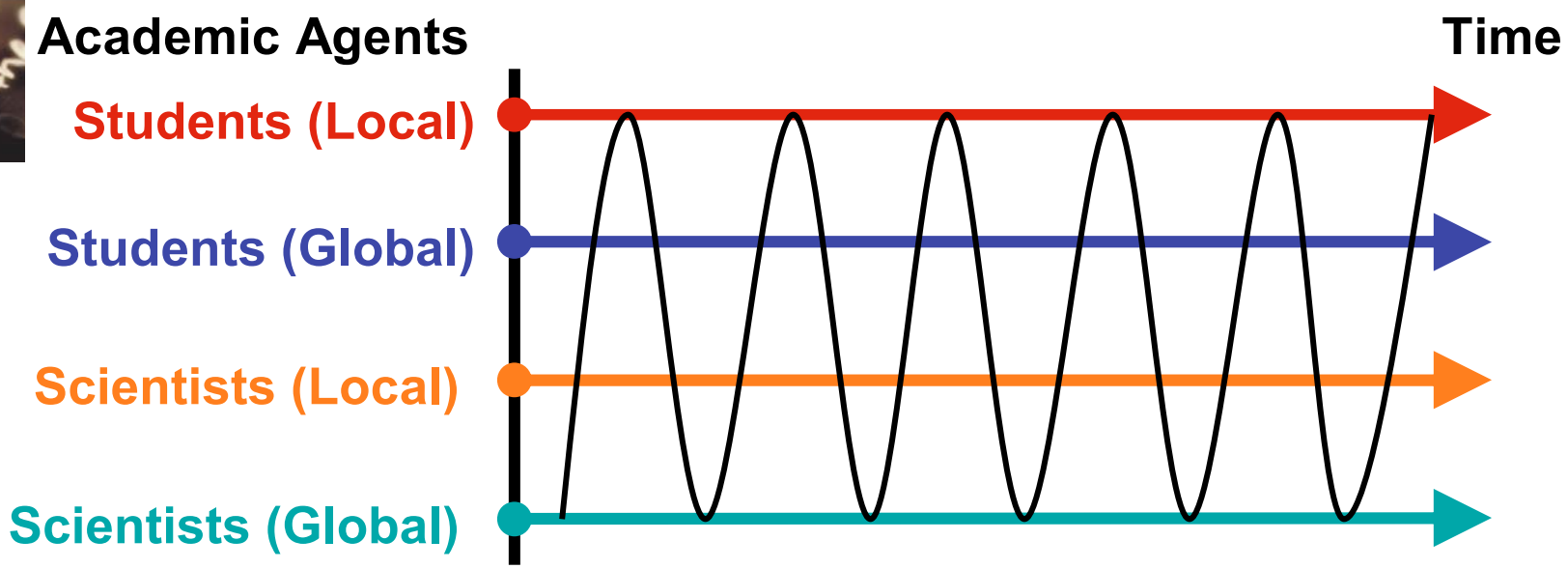

Case Station Approach
Place
Time
START
A
Disaster A
START
B
Disaster B
START
C
Disaster C
CROSS-PLACE
REFERENCE

Social Co-learning Process
= Multilateral Knowledge Development

Stakeholders



Academic Co-learning and Life-cycle Process
= Multilateral Human Resource Development



(a) Students as Future Scientists
(b) Students as Future Practitioners
(c) Students as knowledge-carriers, spirit-holders, capacity-disseminators

CASiFiCA-MEXT
Definition and Qualification

- Case station and Field campus are a set of each CASiFiCA Country sub-project.
- The case station is an organ of research function.
- The field campus(es) is (are) field work place where PhD and postdoc-level students work with practioners, and write a thesis, guided by (a) local supervisor(s) and international/interdisciplinary supervisor(s).
- The NEXUS-IDRiM community is a primary source of international/interdisciplinary supervisor candidates.

NEXUS-IDRiM Charter

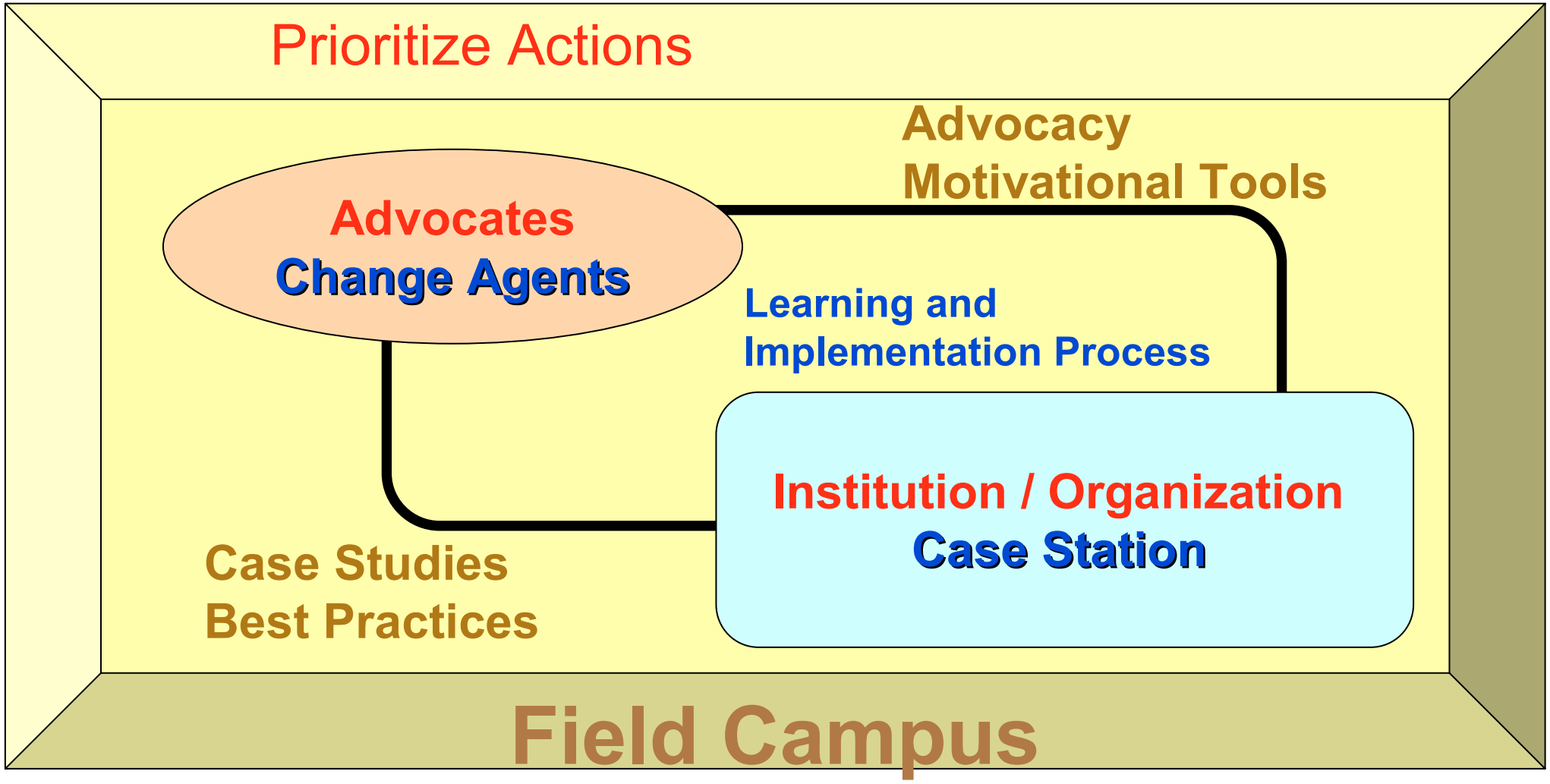
Academic Initiative Network Community oriented towards Implementation Science for Integrated Disaster Risk Management (IDRiM)

Whereas, the world is afflicted by continuing disasters of greater and greater severity, and

Whereas, the key to reducing the impacts of disasters and advancing progress in our societies is growth and sharing of knowledge, and

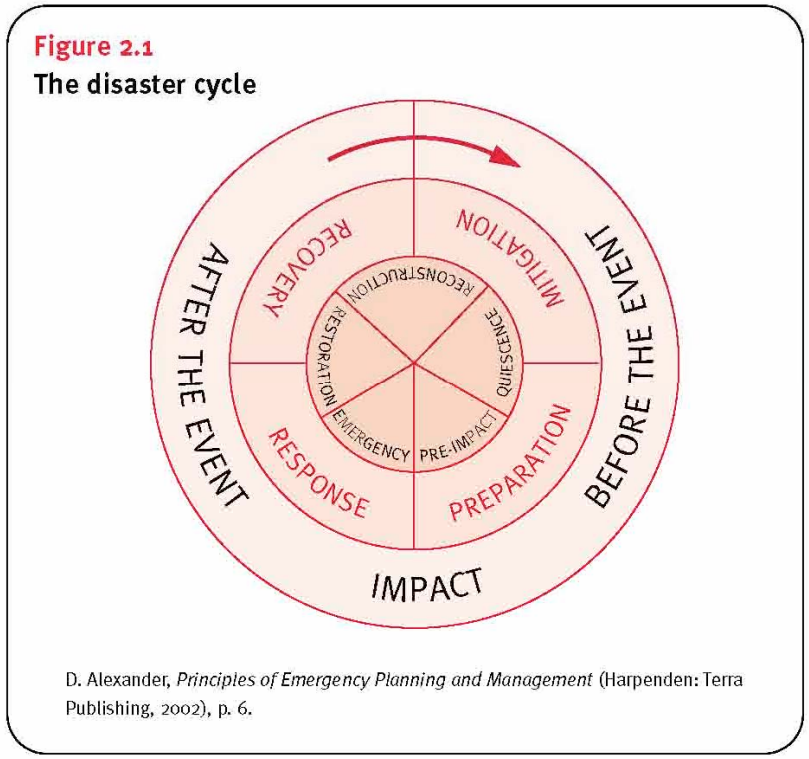
Whereas, the academic community is the nexus for knowledge, therefore

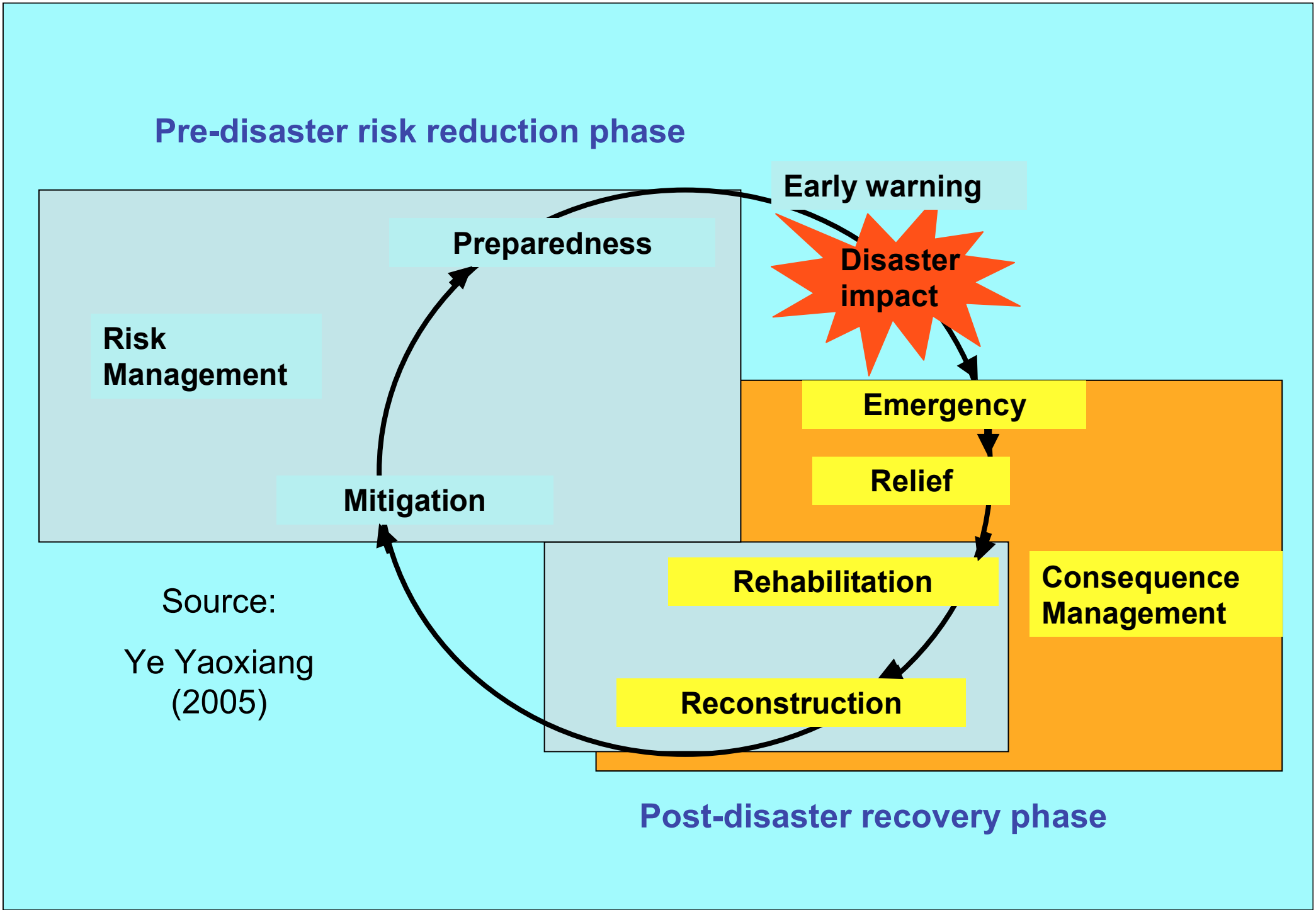
Case Station/ Field Campus



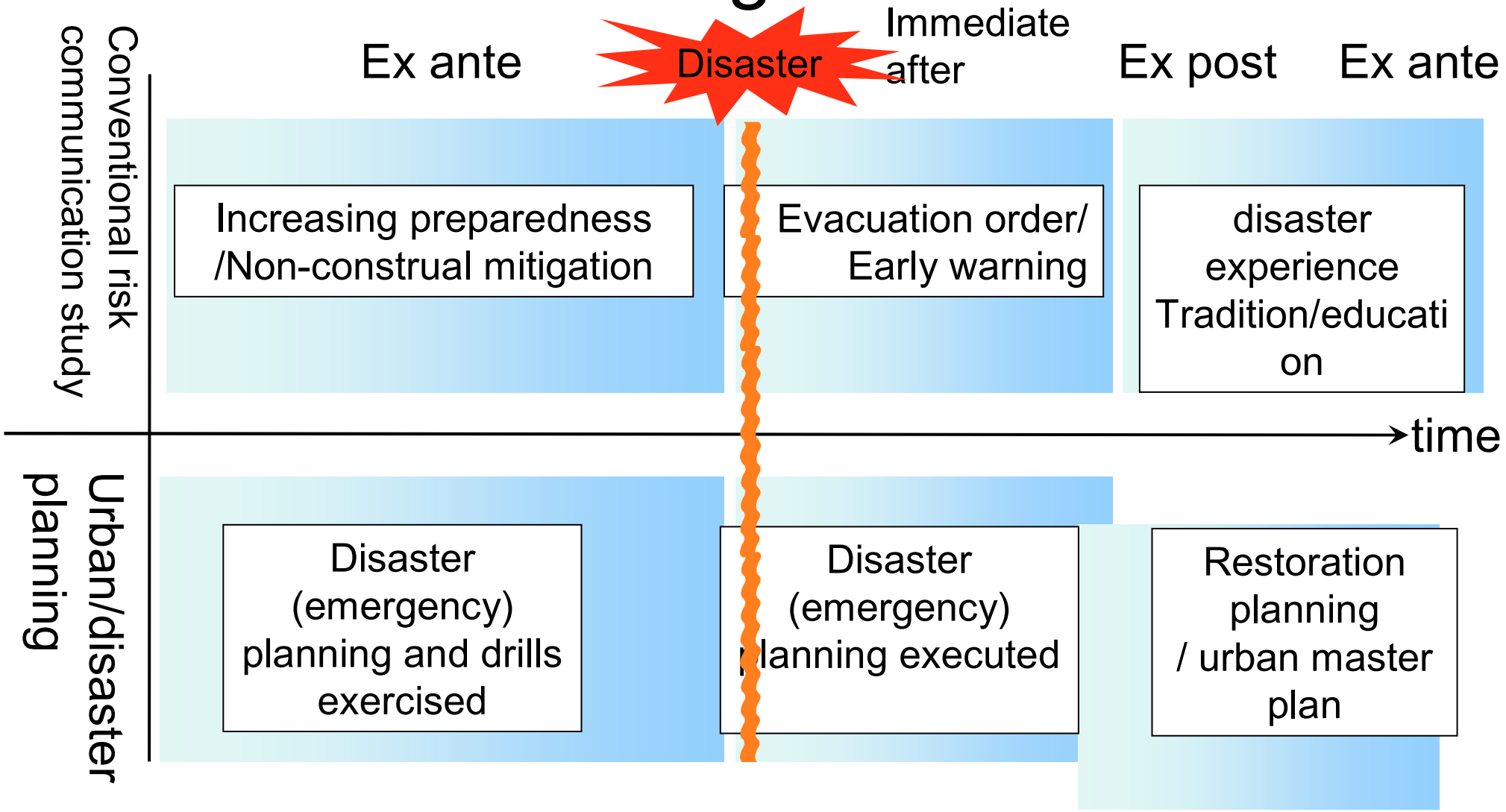
Integration **DD**:
Combining both **daily** and **disaster** mode (disaster and non-disaster cycle),

Disaster Cycle (Alexander)

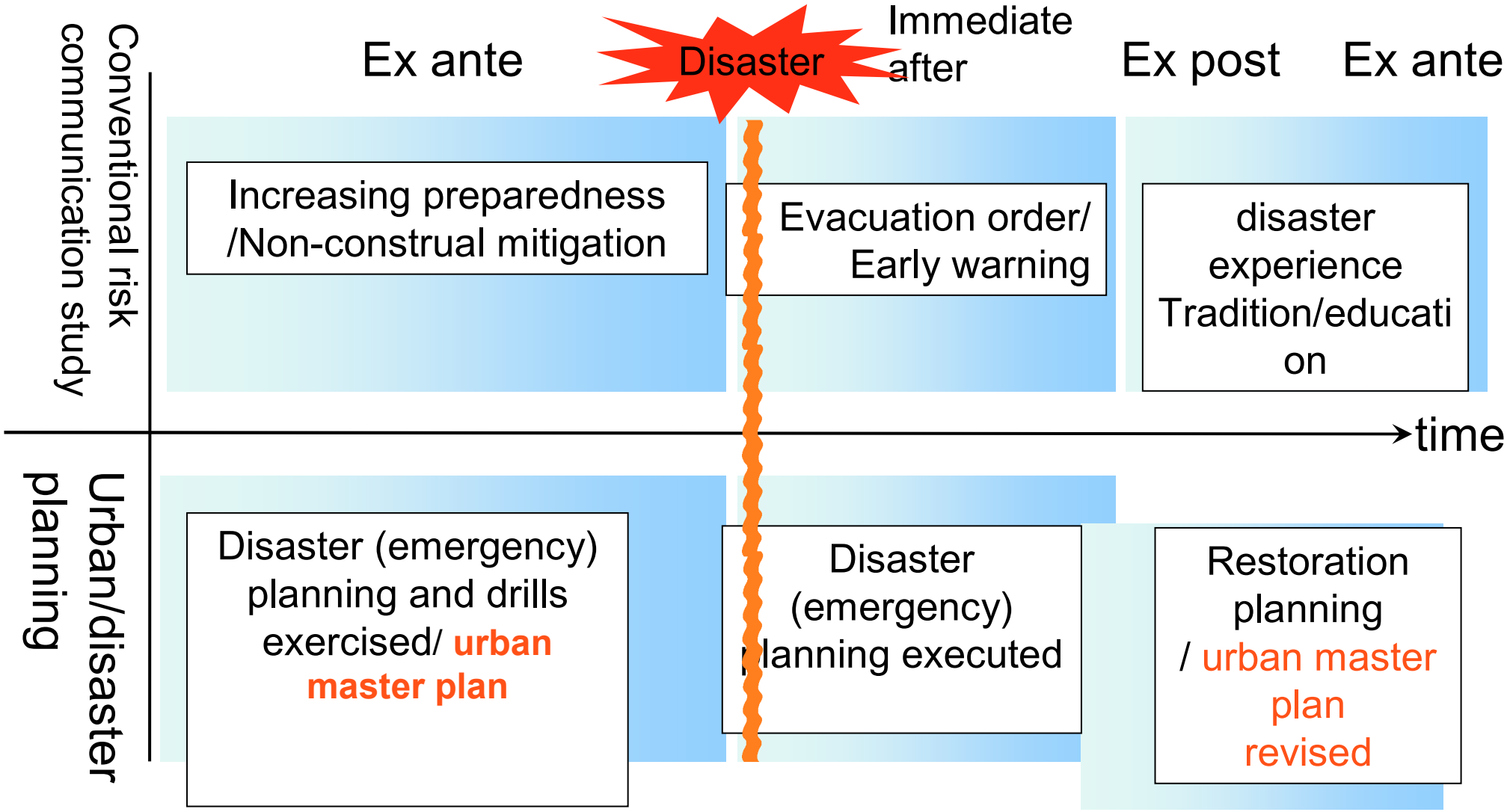


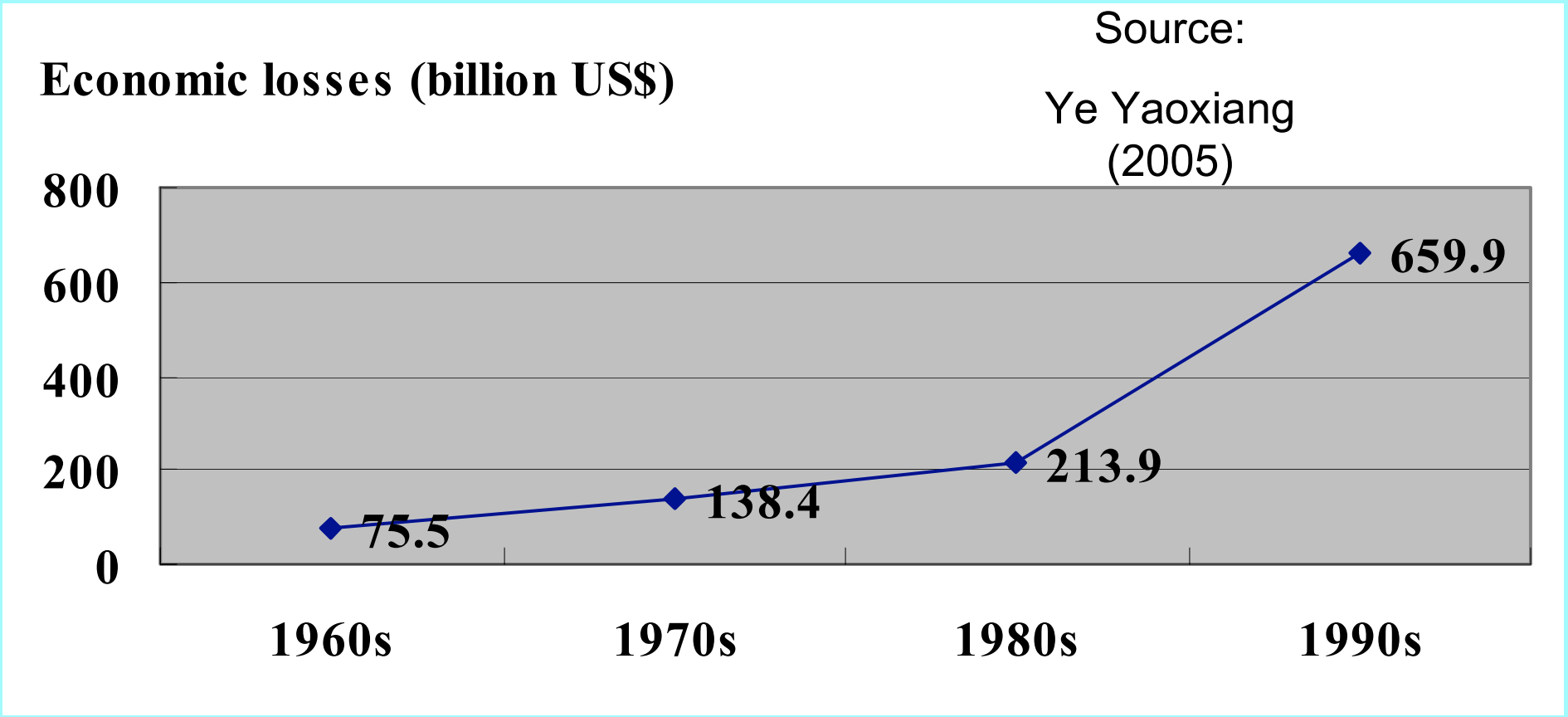

Pre-disaster risk reduction phase
Early warning
Preparedness
Disaster impact
Risk Management
Emergency
Relief
Mitigation
Rehabilitation
Consequence Management
Reconstruction
Source:
Ye Yaoxiang (2005)
Post-disaster recovery phase

Proactive and Retroactive Disaster Management



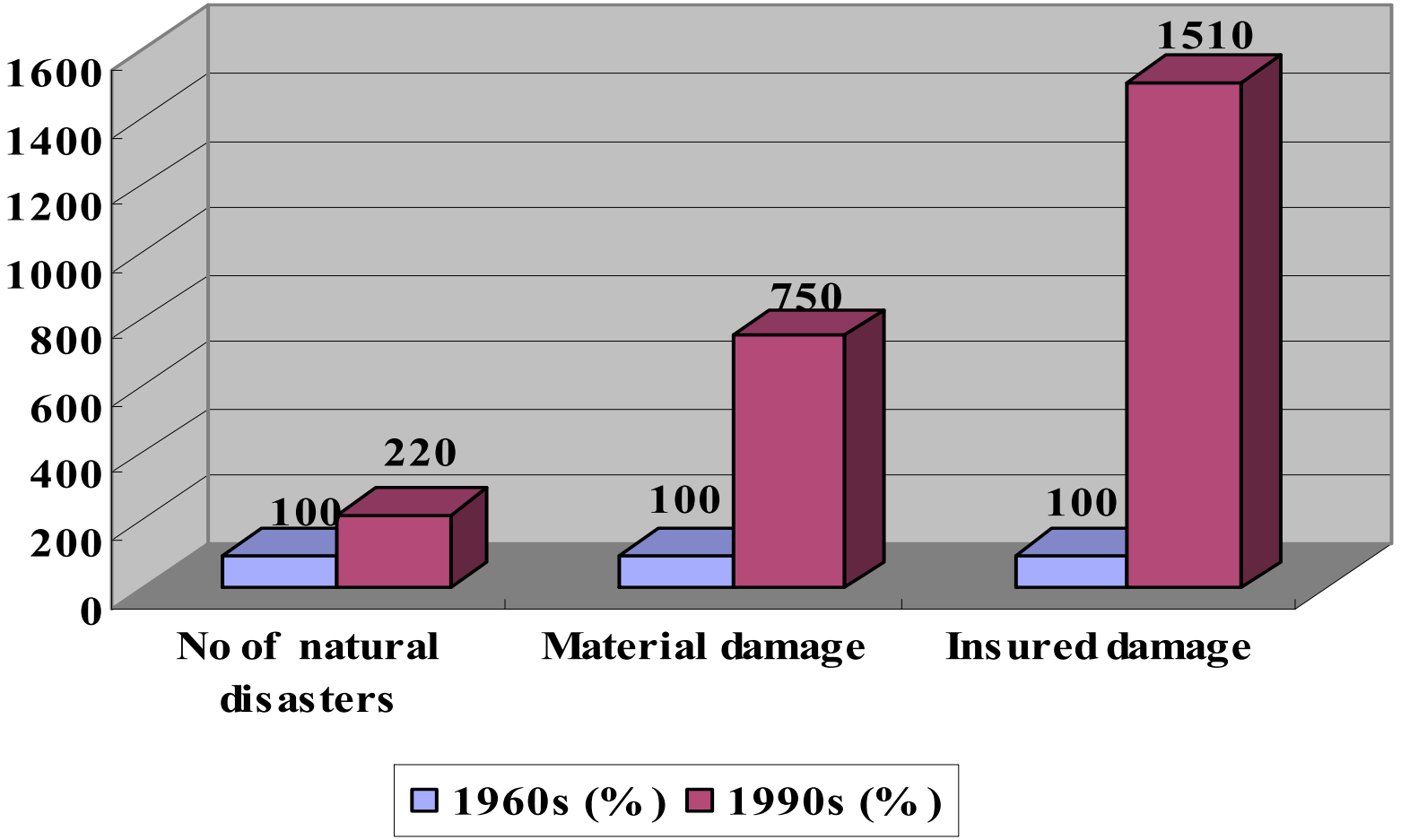
Integration **DU**: Linking **disaster** management to **urban planning and management**



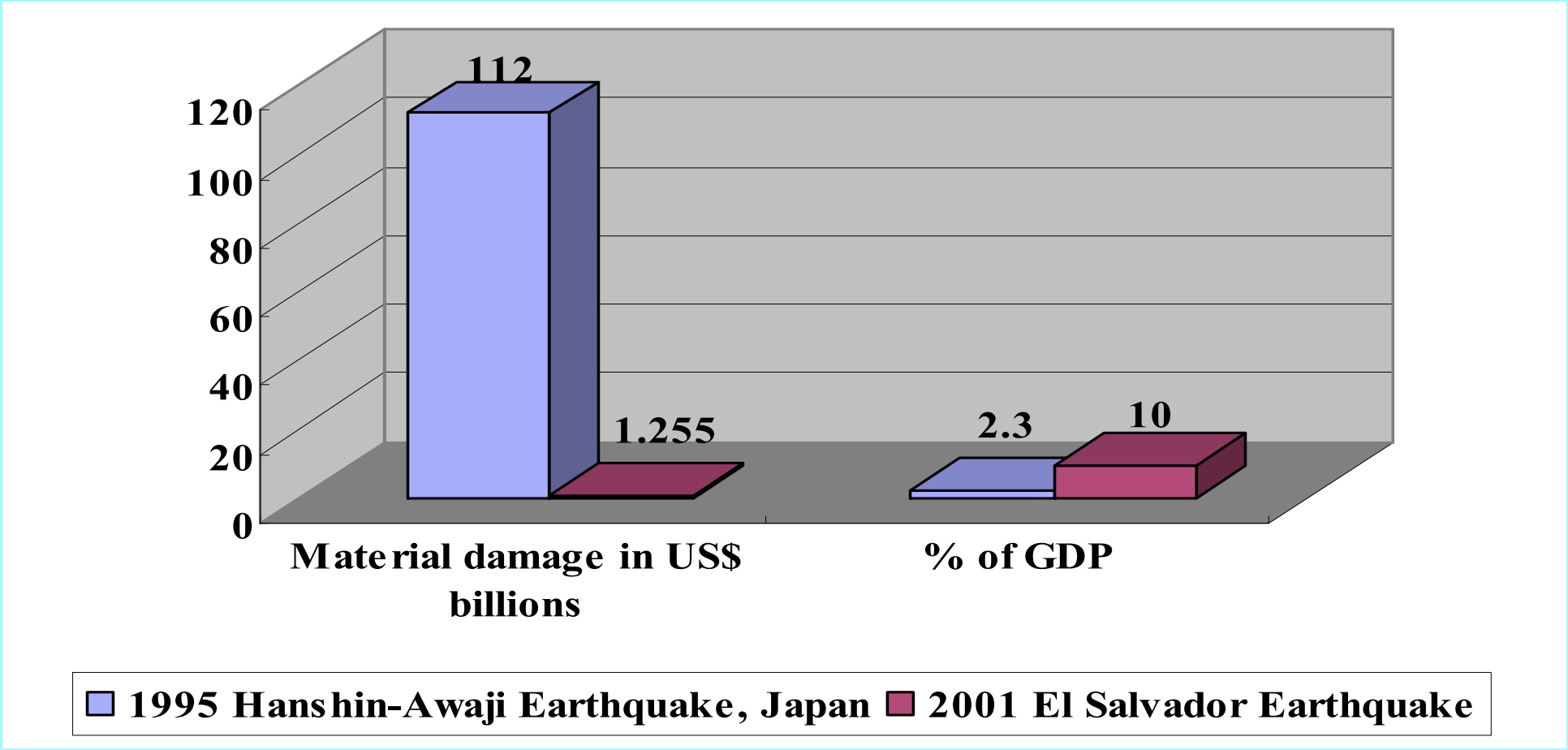


Annual averaged economic losses caused by natural disasters in 1960s-1990s

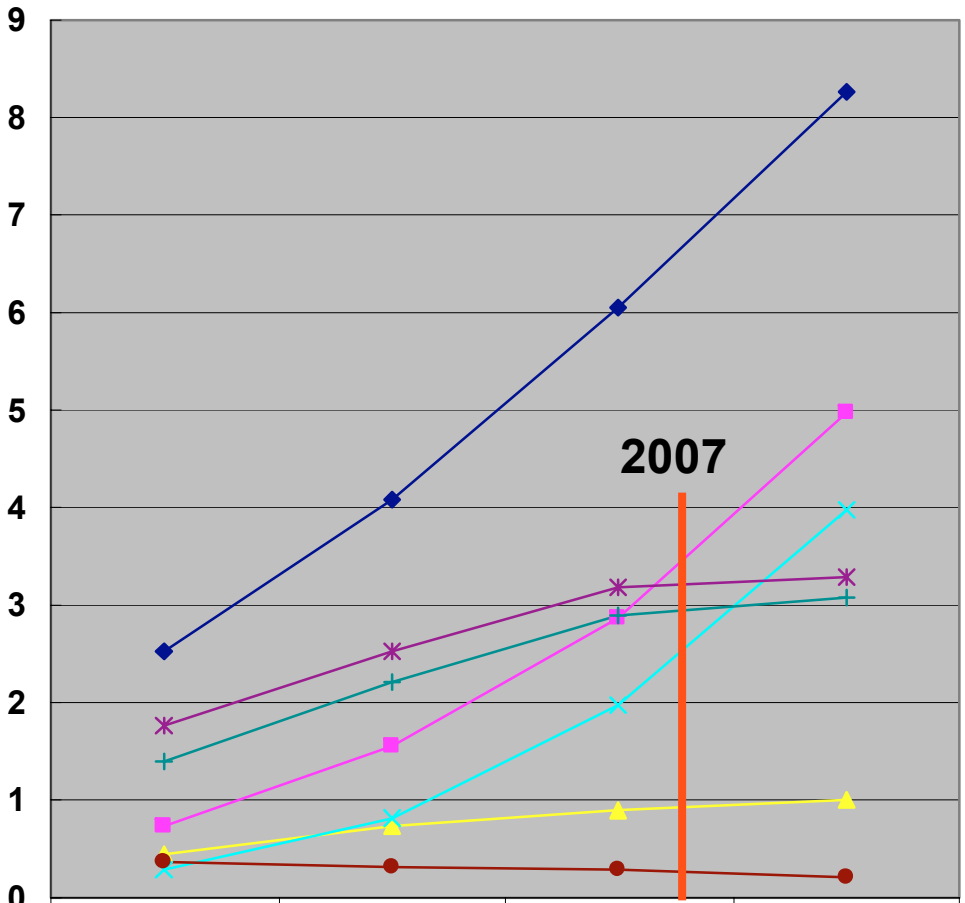
Source:Ye Yaoxiang (2005)



1960s - 1990s on a global level



Source: GTZ.2002, Yaoxian Ye & Norio Okada. 2003



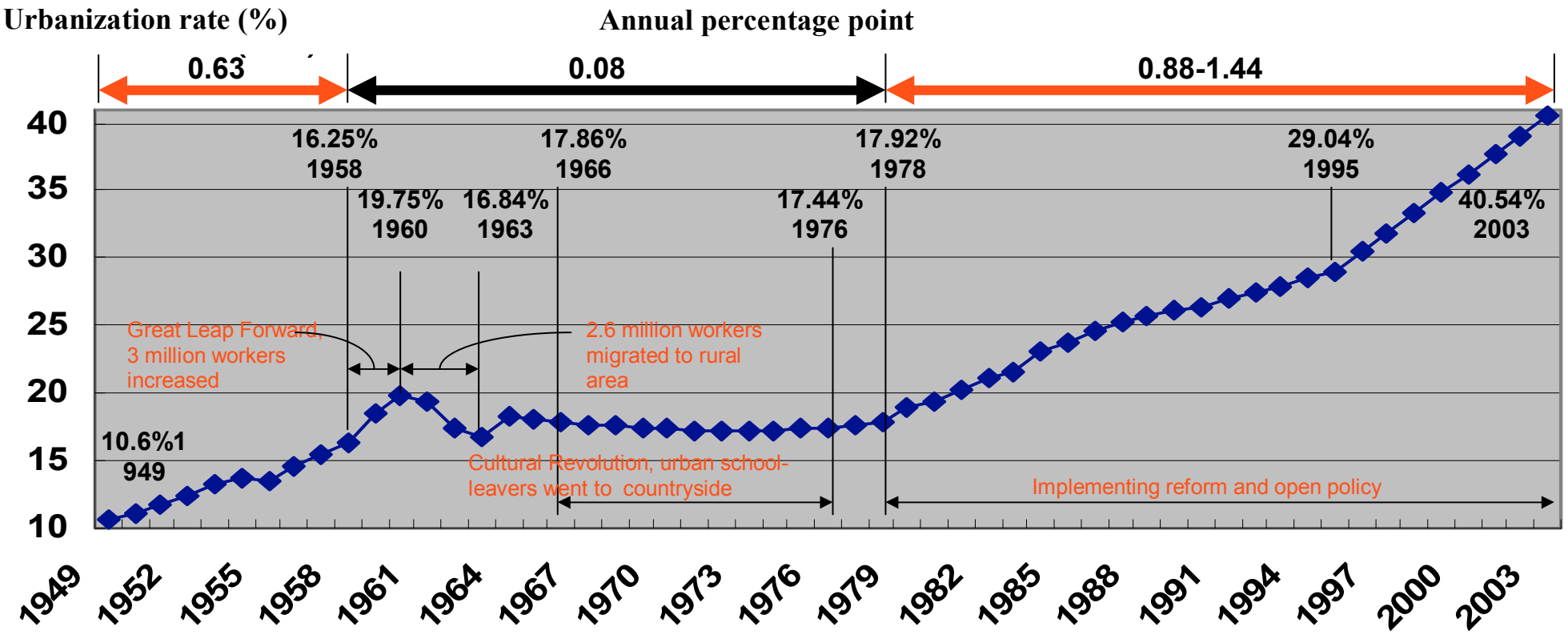
	1950	1975	2000	2030
Total	2.52	4.07	6.06	8.27
Urban	0.75	1.55	2.87	4.98
Developd Urban	0.45	0.74	0.9	1
Developing Urban	0.3	0.81	1.97	3.98
Rural	1.77	2.52	3.19	3.29
Developd Rural	0.37	0.31	0.29	0.21
Developing Rural	1.4	2.21	2.9	3.08

World population (billions)

http://www.un.org/esa/population/publications/wup2001/WUP2001_CH1.pdf

Source:

Ye Yaoxiang
(2005)



China's Urbanization Rate

Integration **KP**: Systematizing and linking a piece of particular, specialized **knowledge & technology** to relevant **policy concerns and governance** issues

- This world is now a man-techno-complex system society.
- Governance is indispensable but its knowledge unexplored yet.
- Participatory approach on different levels of social autonomy is just one way of achieving a governance scheme.
- Adaptive management is just one of way of governing the man-techno-complex system society.

Nailing Furniture to the Wall (a Japanese Experience)

- Everybody agrees it's important, but
- Very few people practices it. Why so??
- Hypotheses to be continuously tested (for example):

There are different groups of peoples with different attitudes.

We need to identify some appropriate target people.

→ "Social Marketing" Methods may be needed.

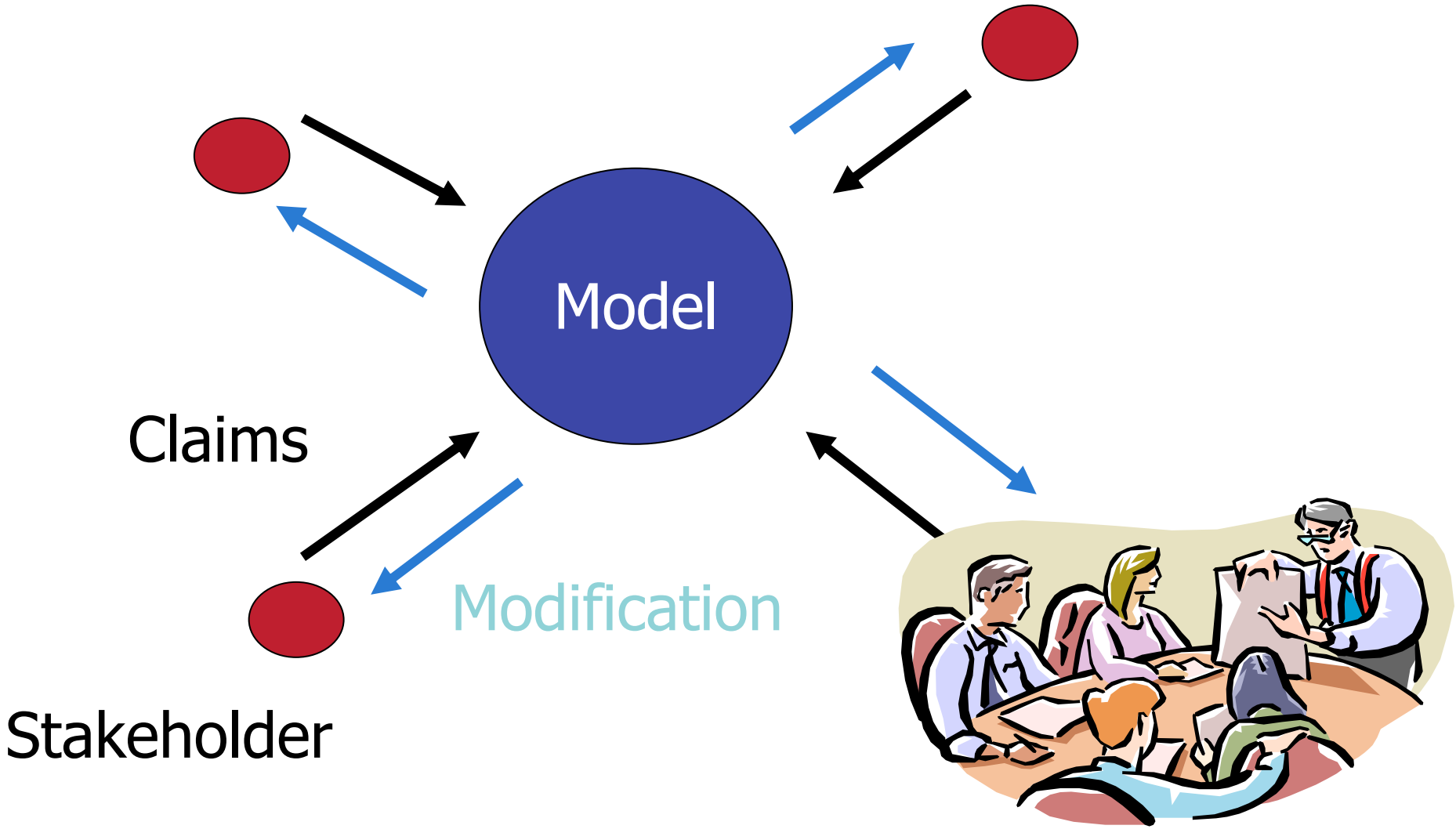
Typology hypothesized:

- I am eager to learn and practice it. Then I would like to assist others.
-So far it was all right without it, so it will always be all right with me.
-It is troublesome and I have more important things to do.
-I would like to find some one who can help me but don't know who he/she is.
-Even if I can find someone like that, I still feel uncomfortable to have him/her step in my bedroom.

Workshop and participatory approach may or may not work

- Adaptive management in a PDCA cycle process
- **Hypothesized models/policies**
- Proactive approach
- **Continuous monitoring**
- Evaluation of process development
- Formalization of implicit knowledge
- **Social co-learning by specialists,students and residents**, like capacity building for Tsunami disaster in inexperienced regions
- **Cultural calibration through cross-country monitoring**

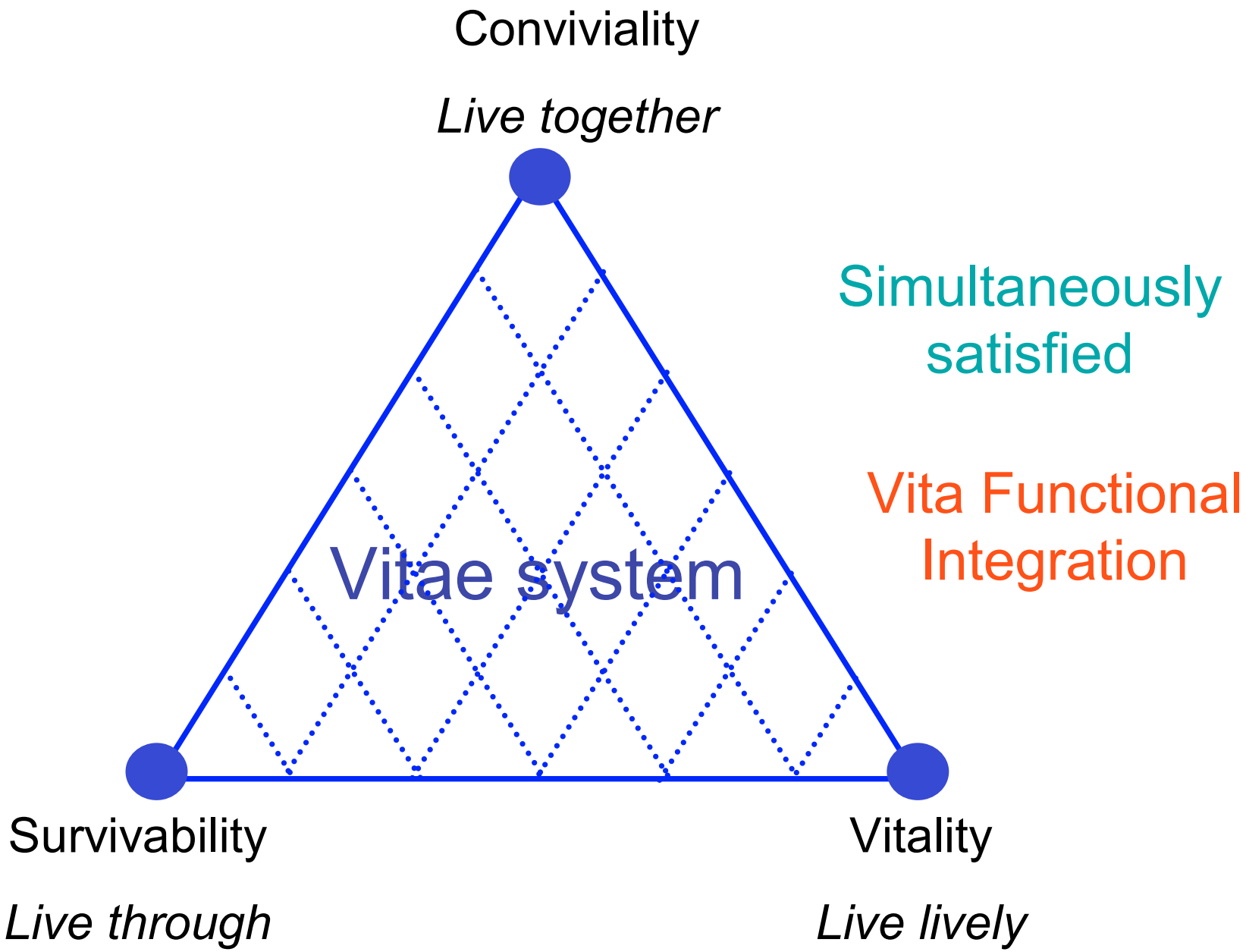
Collaborative Modeling

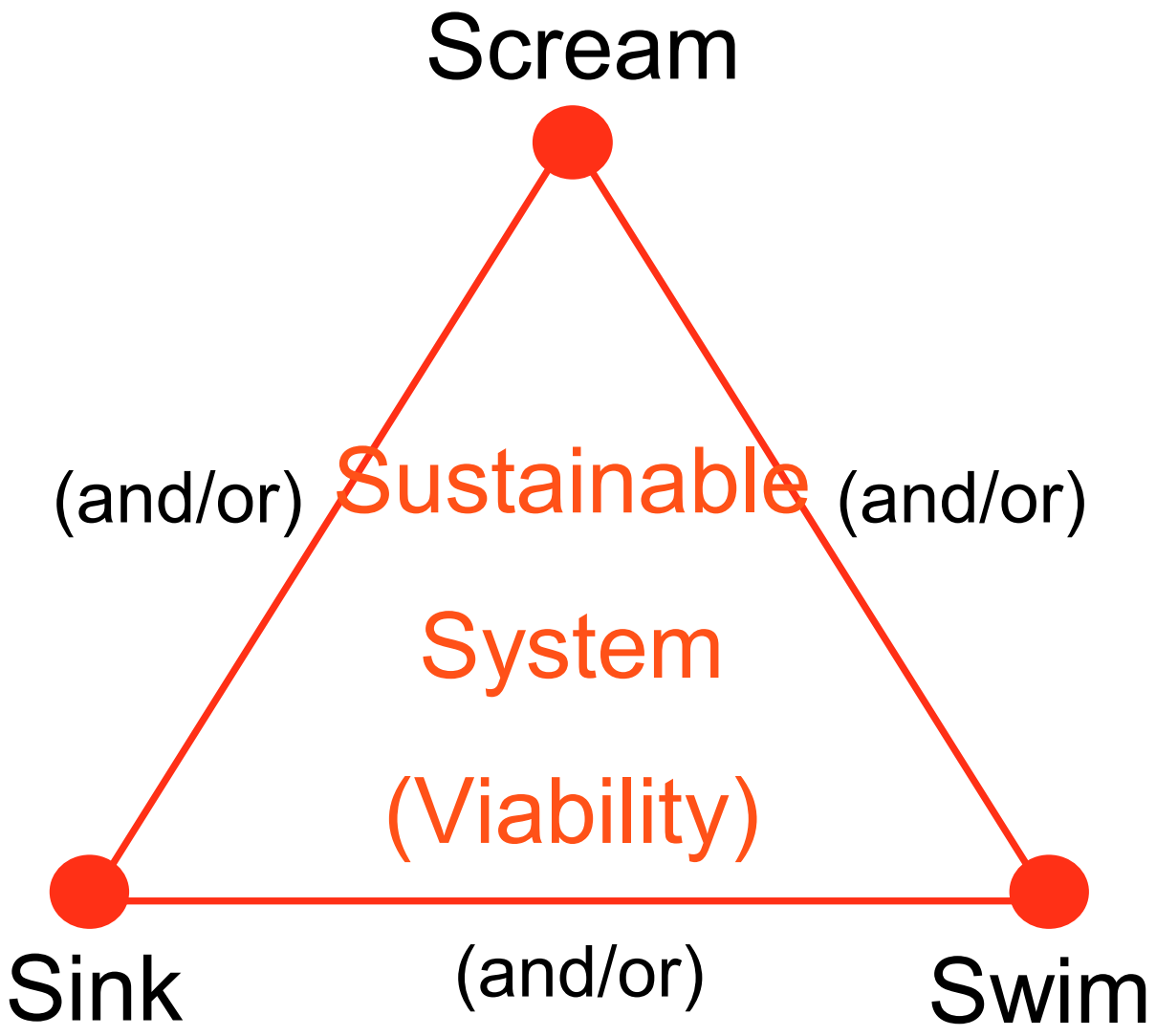


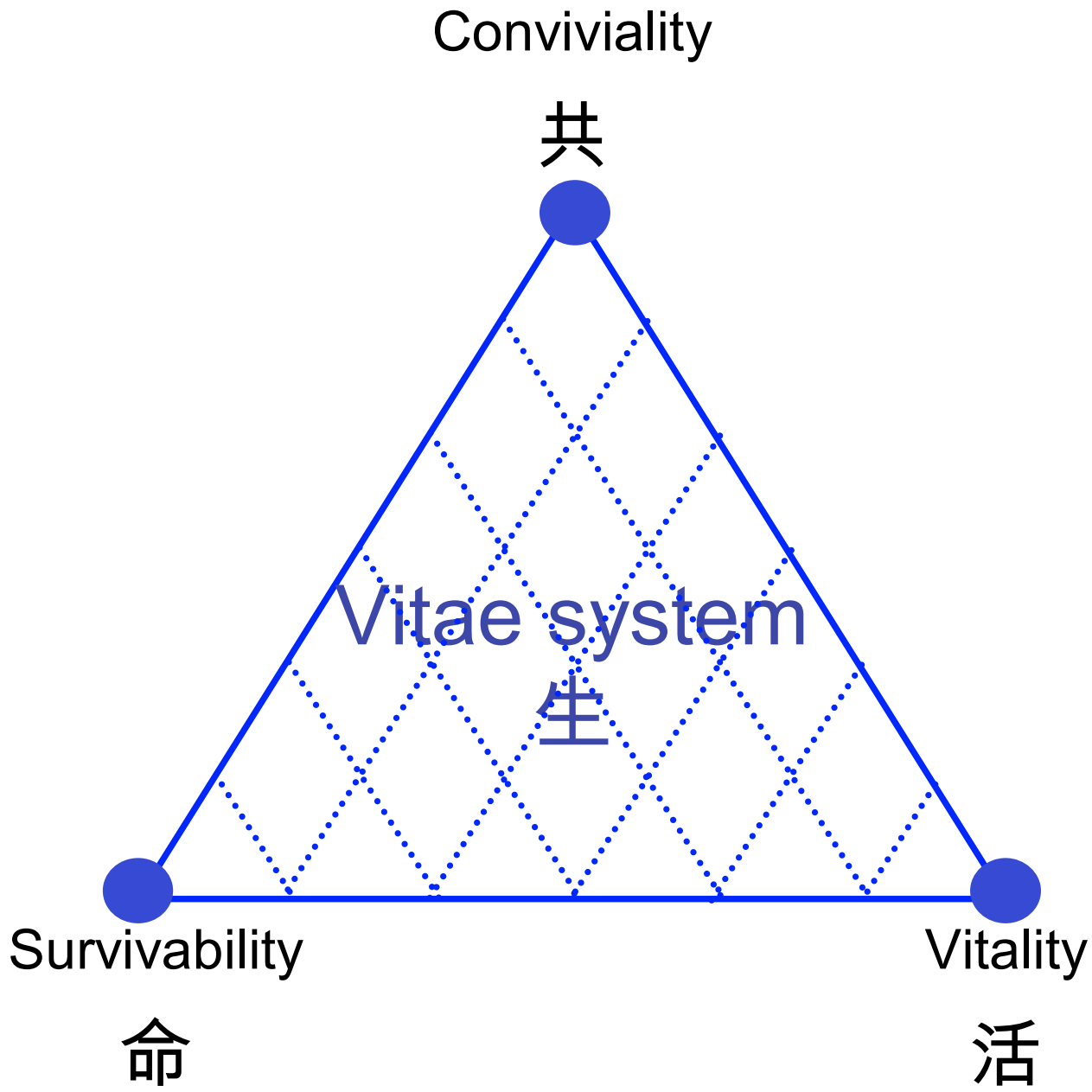
Missing Knowledge of Sustainability: Vital Integration

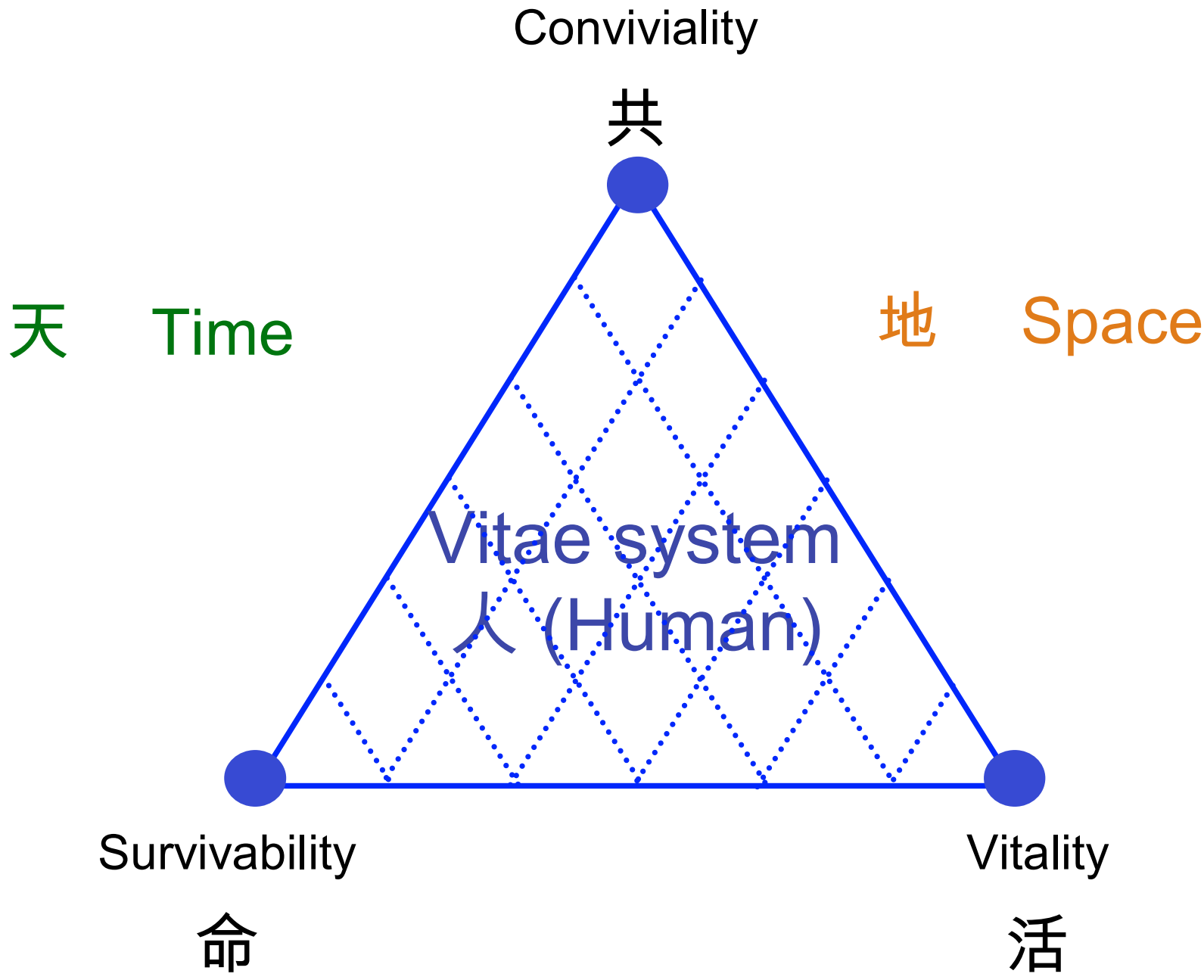
- Vitae system (Living body) as both the object and subject of Sustainable Management
- Three functions as a systemic (organic) whole.
- (1)To live through (to survive)
- (2) To live vigorously (to vitalize)
- (3) To live together with others (to con-vive)
- To build resilient capacity should mean

  dynamic and rhythmic balance of the whole in tension and relaxation over time.


Conviviality
Live together
Simultaneously satisfied
Vita Functional Integration
Vitae system
Survivability
Live through
Vitality
Live lively


Scream
(and/or)
Sustainable
System
(Viability)
(and/or)
Sink
(and/or)
Swim


Conviviality
共
Vitae system
生
Survivability
命
Vitality
活

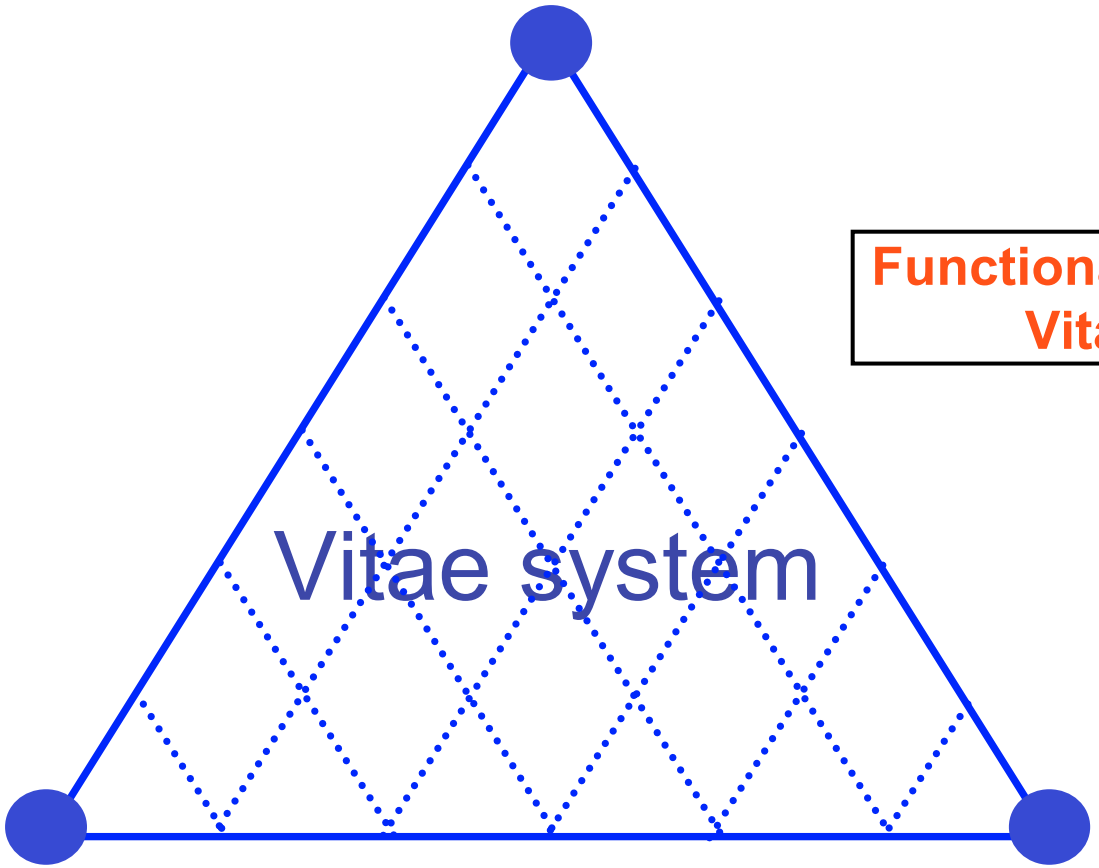

Conviviality
共
天 Time
地 Space
Vitae system
人 (Human)
Survivability
命
Vitality
活

Tension mode 緊張位相

Conviviality

Live together

Sympathetic nerve mode
交感神経系位相



Functional Integration of Vitae System

Survivability

Live through

Vitality

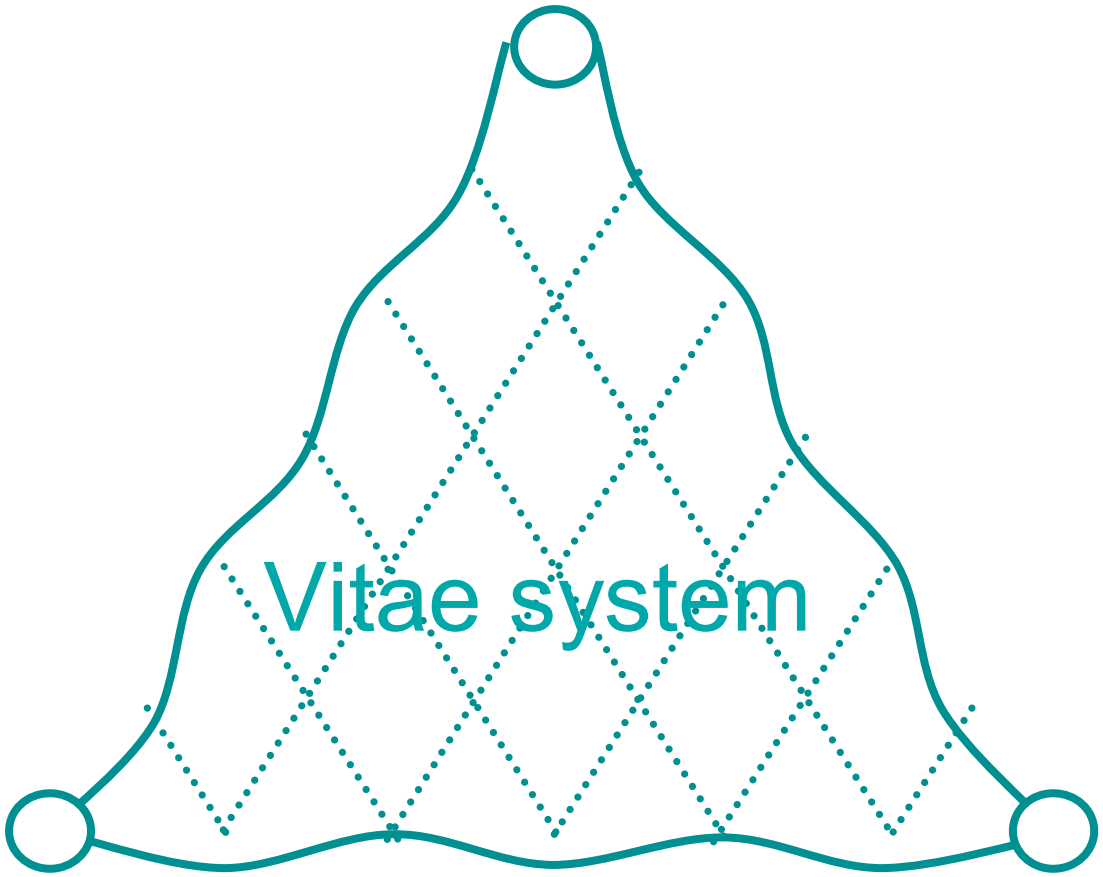
Live lively

Relaxation mode 弛緩位相

Para sympathetic nerve mode
副交感神経系位相

Conviviality

Live together



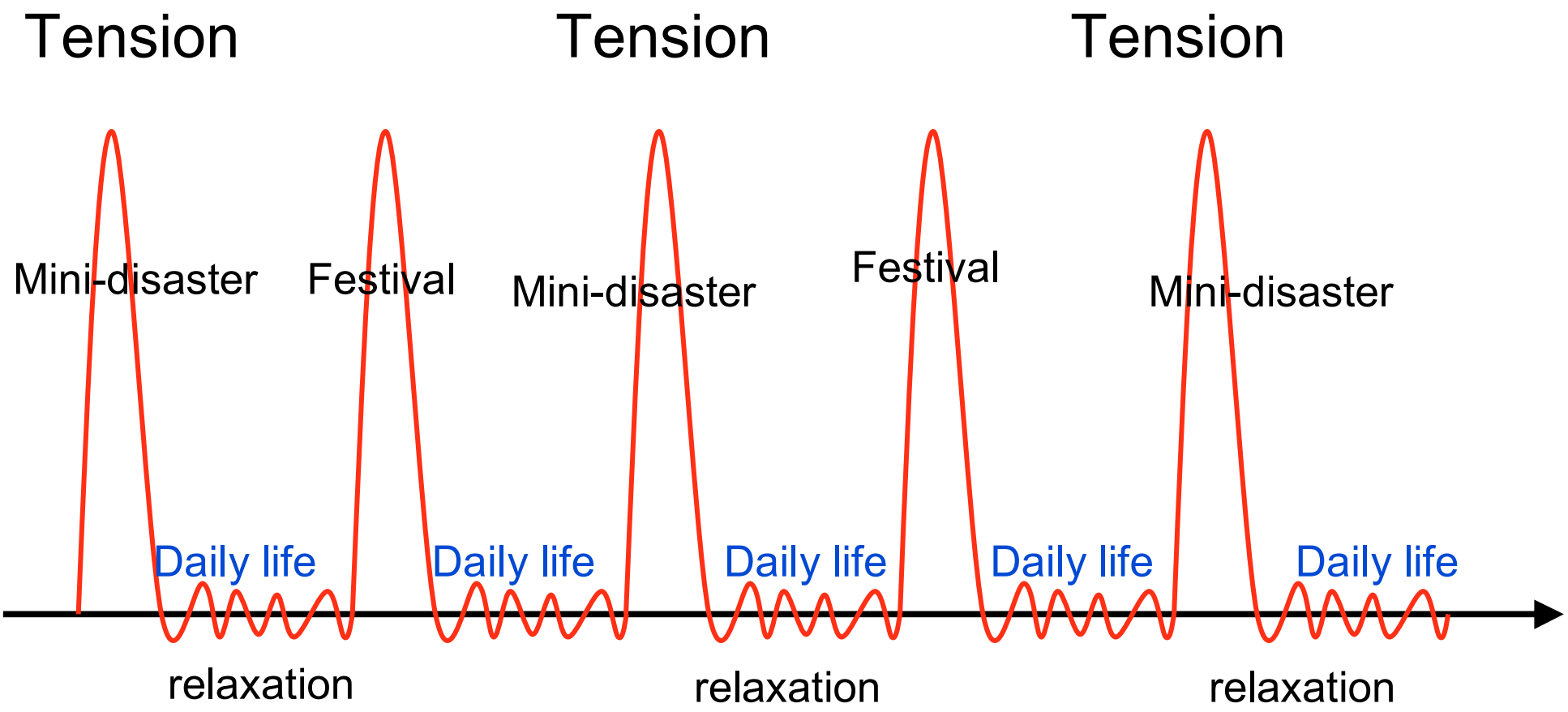
Survivability

Live through

Vitality

Live lively

Vital Rhythms



Integrated disaster reduction drill

ENJOY and CREATIVE!

Source:Yamori,2005

Fire extinguisher drill

Emergency toilet set-up training

Furniture fixing device set-up training

Disaster map drawing

Tsunami monument

Tsunami parade at Hiro.

REMEMBER THE PAST

Storm surge trace

EVACUATION DRILL INVOLVING TOURISTS

海水浴客誘導し
津波から守ろう
訓練

災無線放送を合図に、避難誘導員が、海水浴を楽しむ人に避難を呼びかけた。

高田松原野外活動センターでは、小学校高学年の児童17人を集めていかだ遊びをしていた。警報の直後に、いかだの組み立てをやめて、50㍍ほど離れた場所に駆け足で避難した。

一関市立南小6年菊池大伸君(12)は「津波、と聞いてびっくりしたけど、訓練とわかって安心した」と話した。

この海水浴場には年間3万人が8月に今

The City of Rikuzen-Takada, Japan

津波訓練に2000人が参加

昨年末のスマトラ沖大地震で津波の被害を受けたタイ・プーケットのパトンビーチで29日、避難訓練をする住民たち＝ロイター。約2千人が参加した

は今回の訪中を花道にする形で党主席を辞任する方向。7月に実施される

主席選挙での勝者が08年の総統選挙の国民党候補になるとみられる。「中国との協調」をより鮮明に掲げ、政権奪還に向けた動きを早める構えだ。

Phuket, on April 29, 2005.

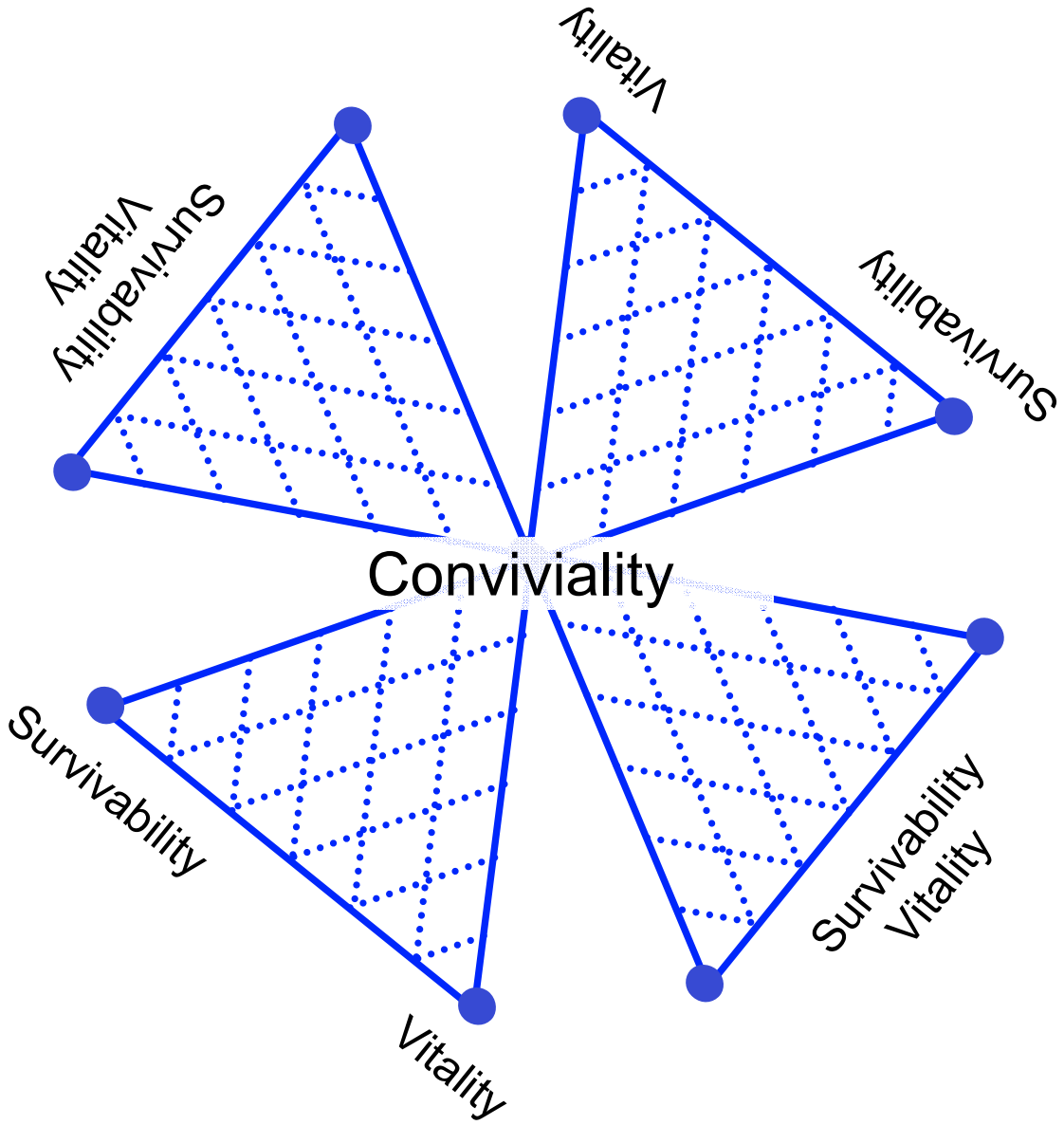
Vitae System Dynamics

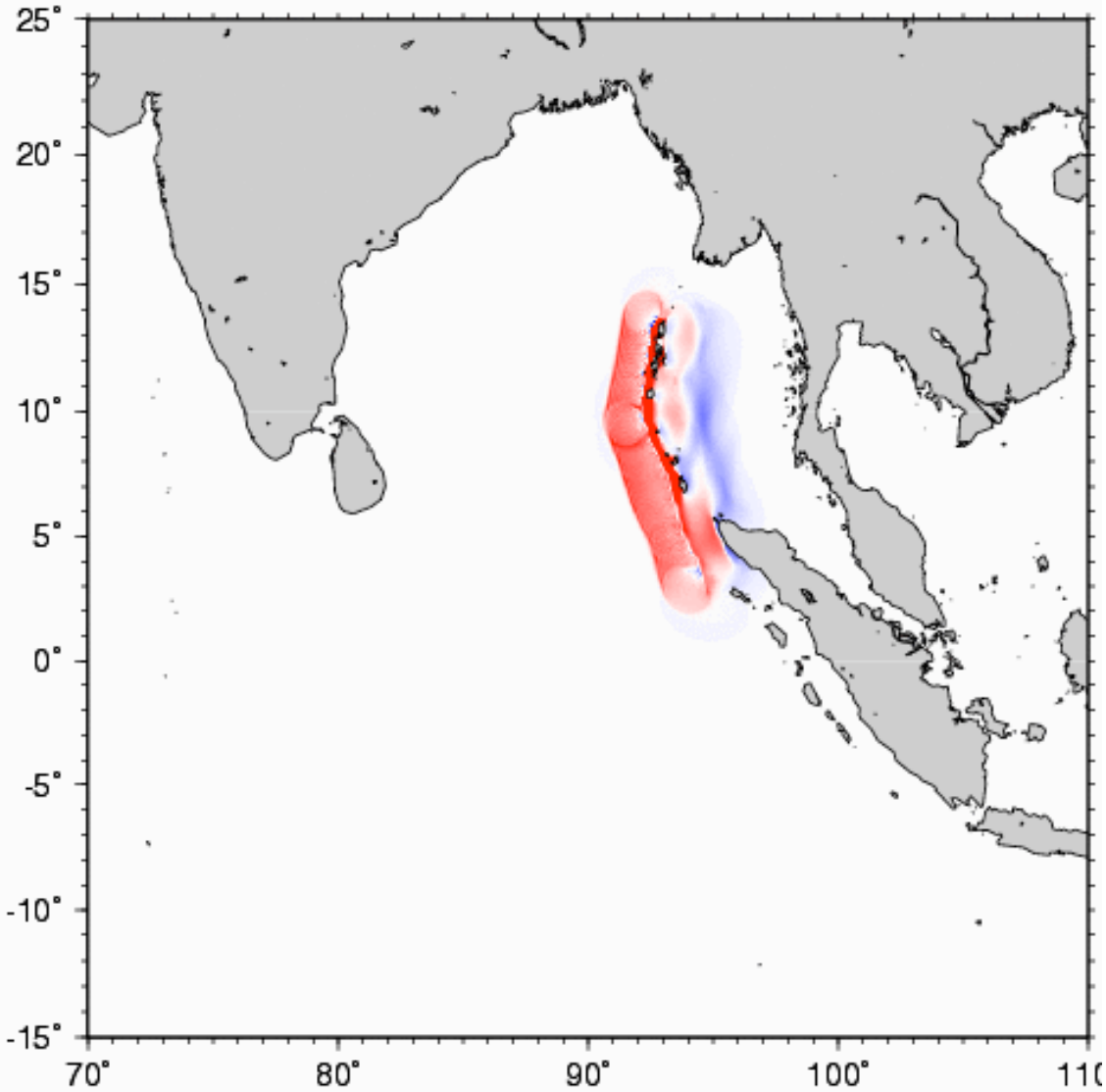
- S=Survivability, V=Vitality, C=Convivality
  E=Environment, t=time
- S (t) as Stamina= Function of V (t) and C (t).
- V (t)=Function of S (t) and C (t).
- C (t)=Function of S (t), V (t) and E (t).
- S (t), V (t) and C (t) are mutually interactive and interdependent.
- The Dynamism is highly nonlinear and complex.
- The System is semi-open-ended.
- The 21st century still misses the knowledge of this kind.
- This is a part of implementation knowledge (science).

Networked Vitae System

- Every vitae system covers a marginally extended and thus a more resilient system is expected.
- Thus each governs the area of one's own locality, and thus to be networked to service the entire region.

Networking of Vitae systems

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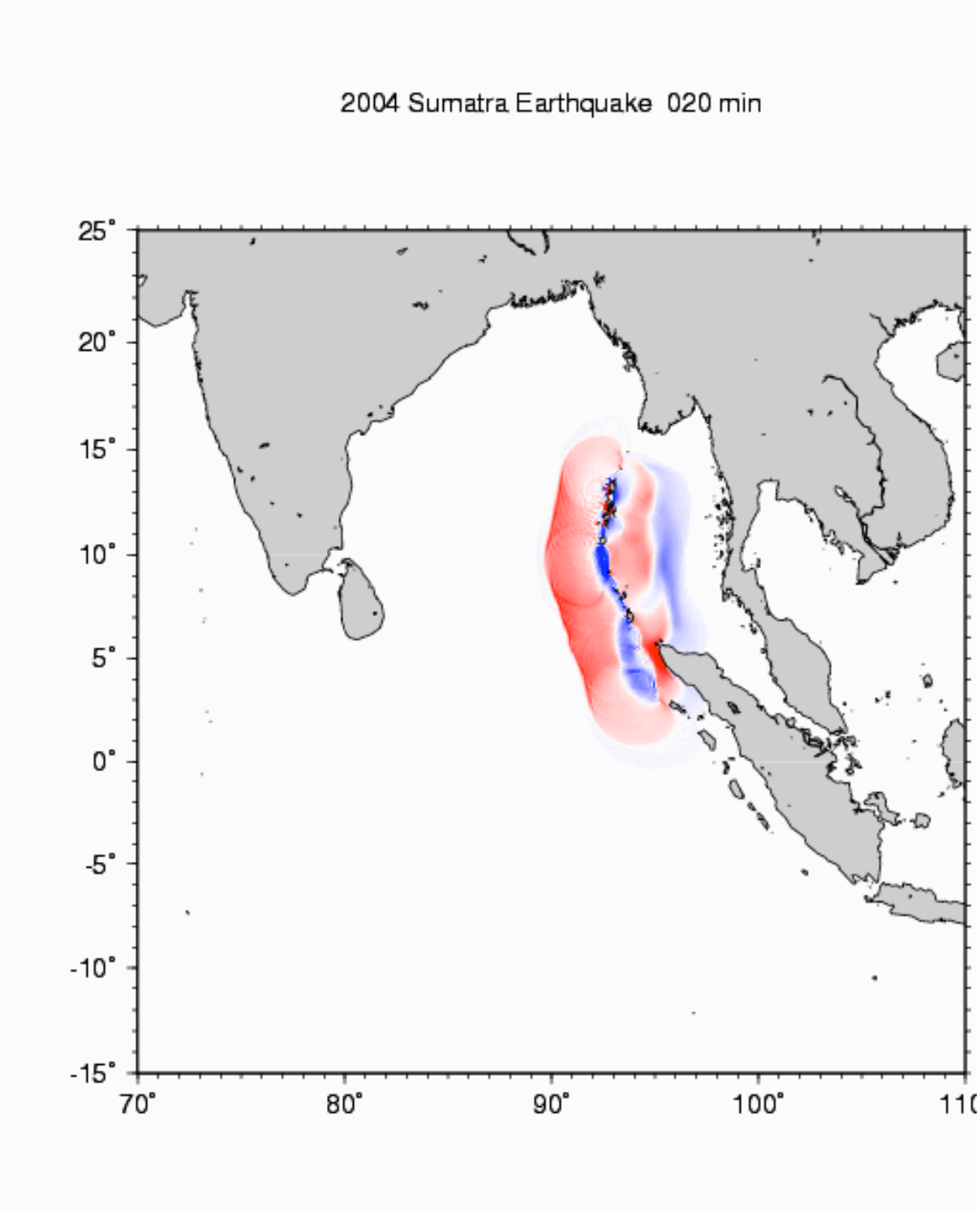
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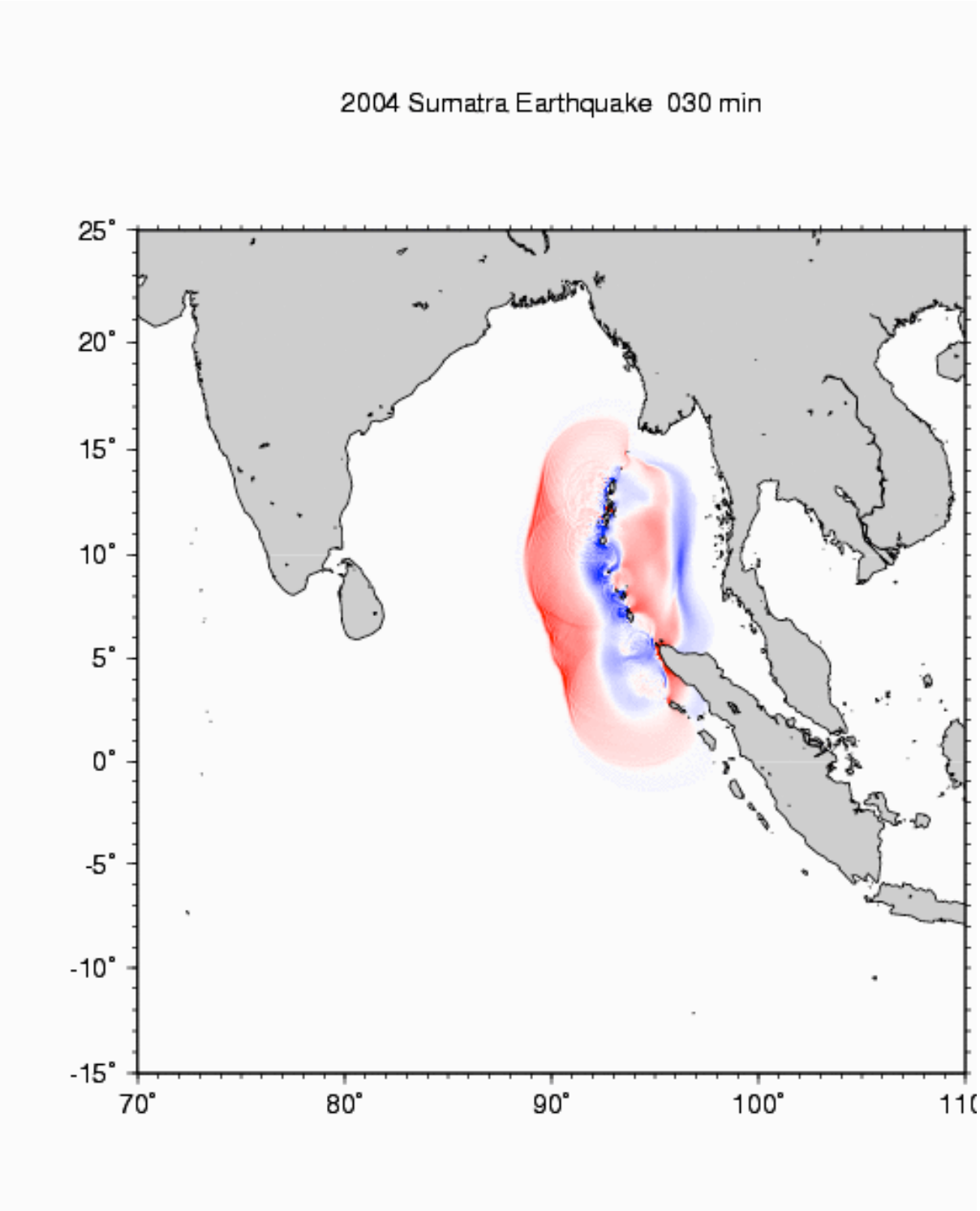
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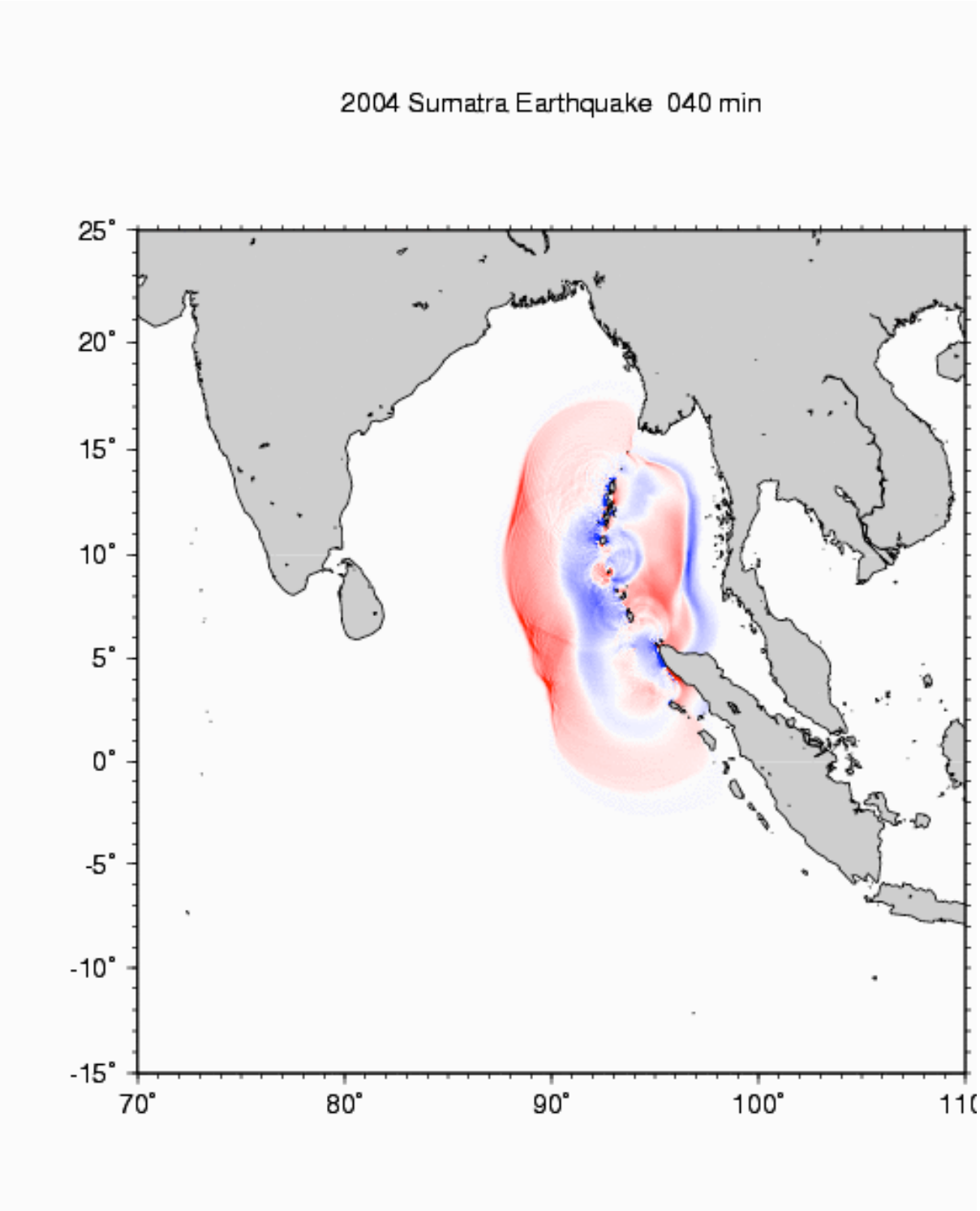
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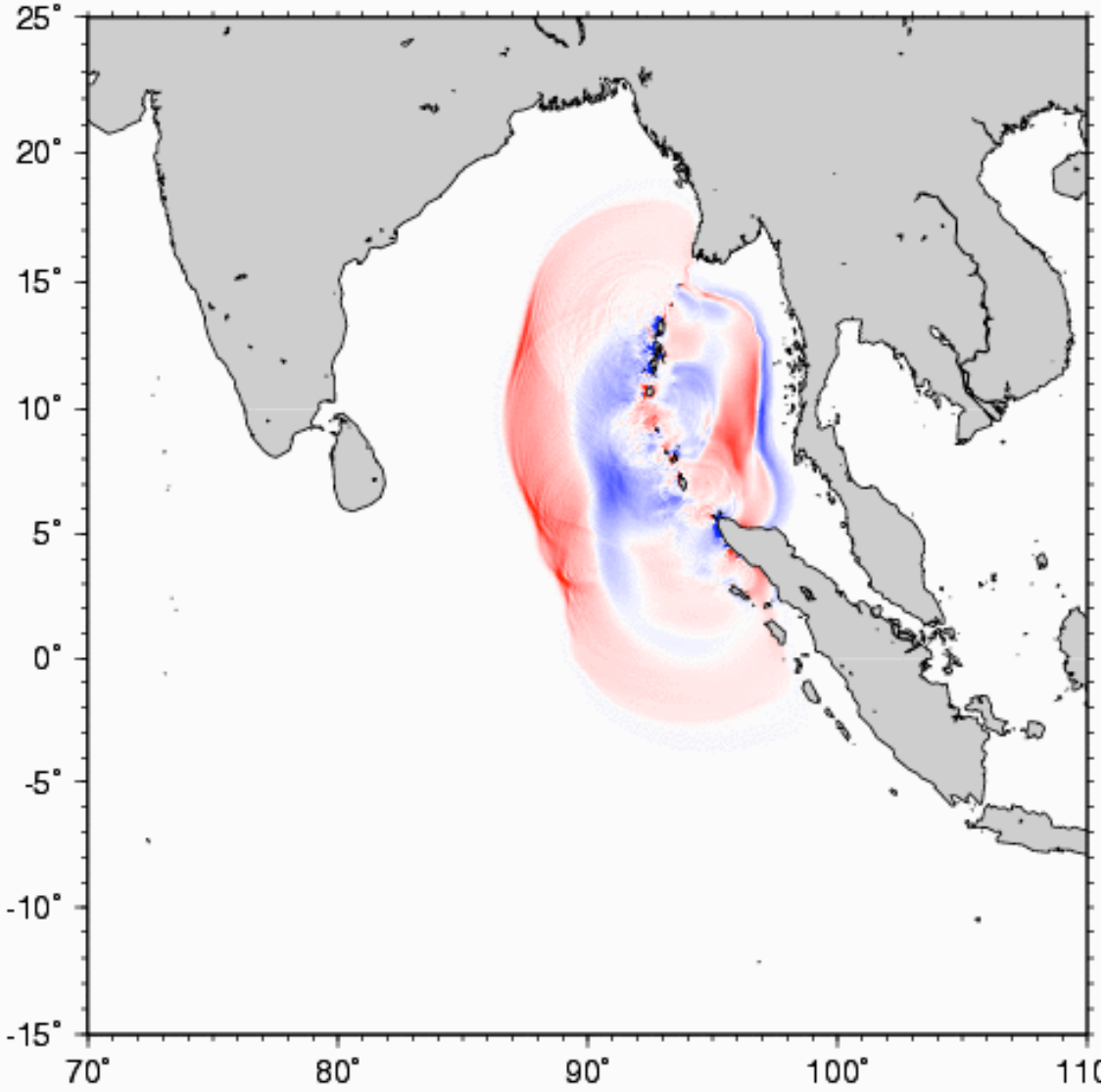
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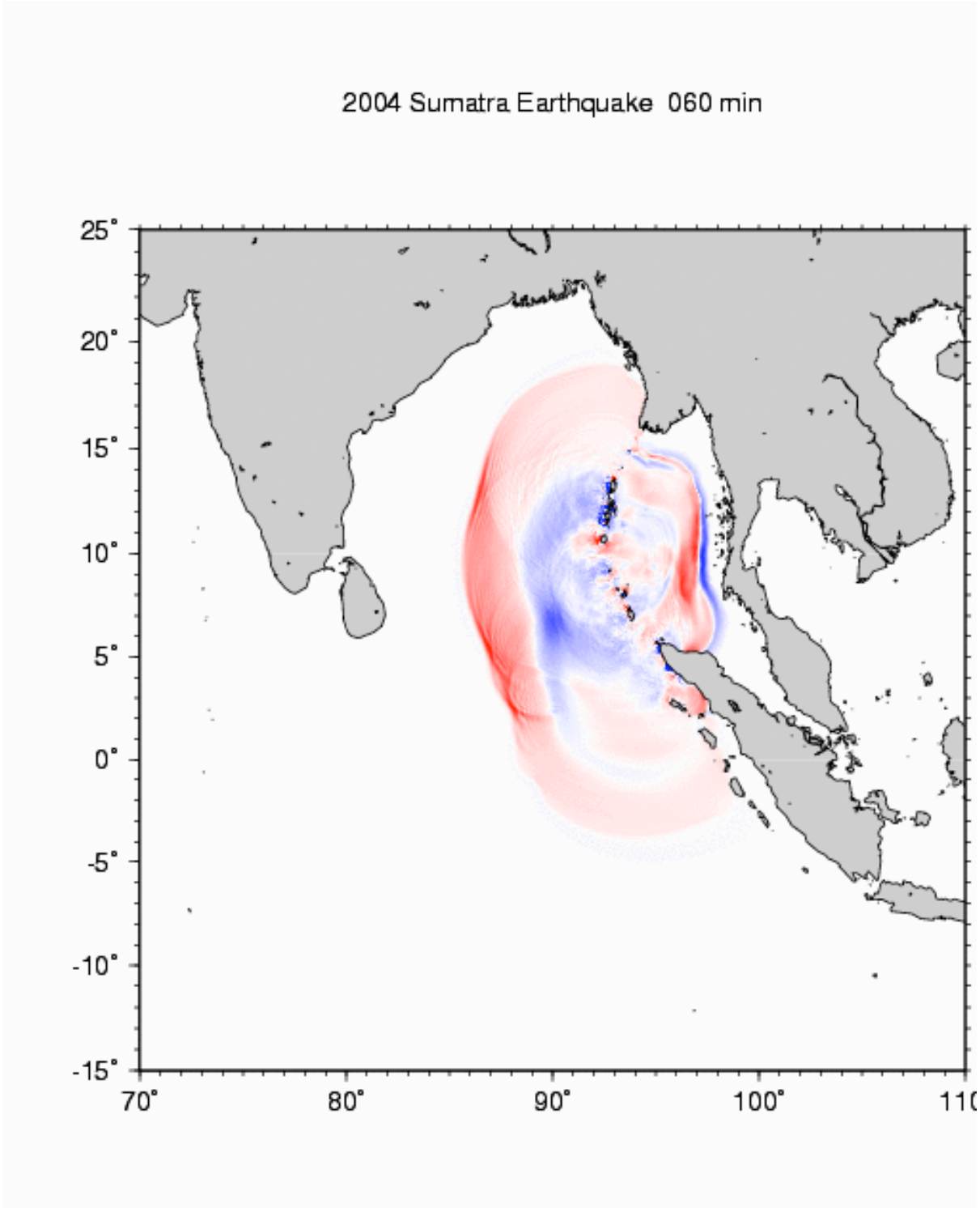
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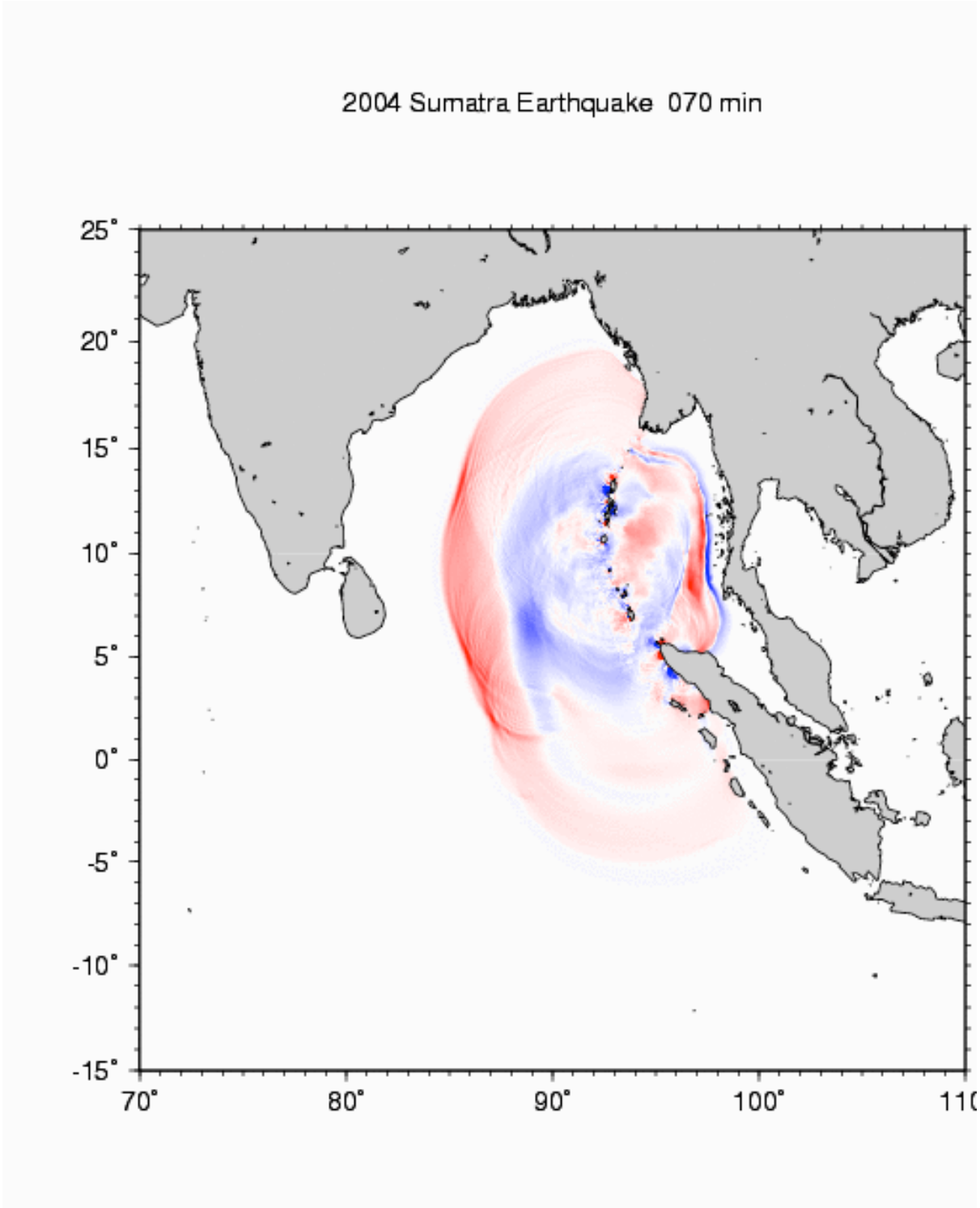
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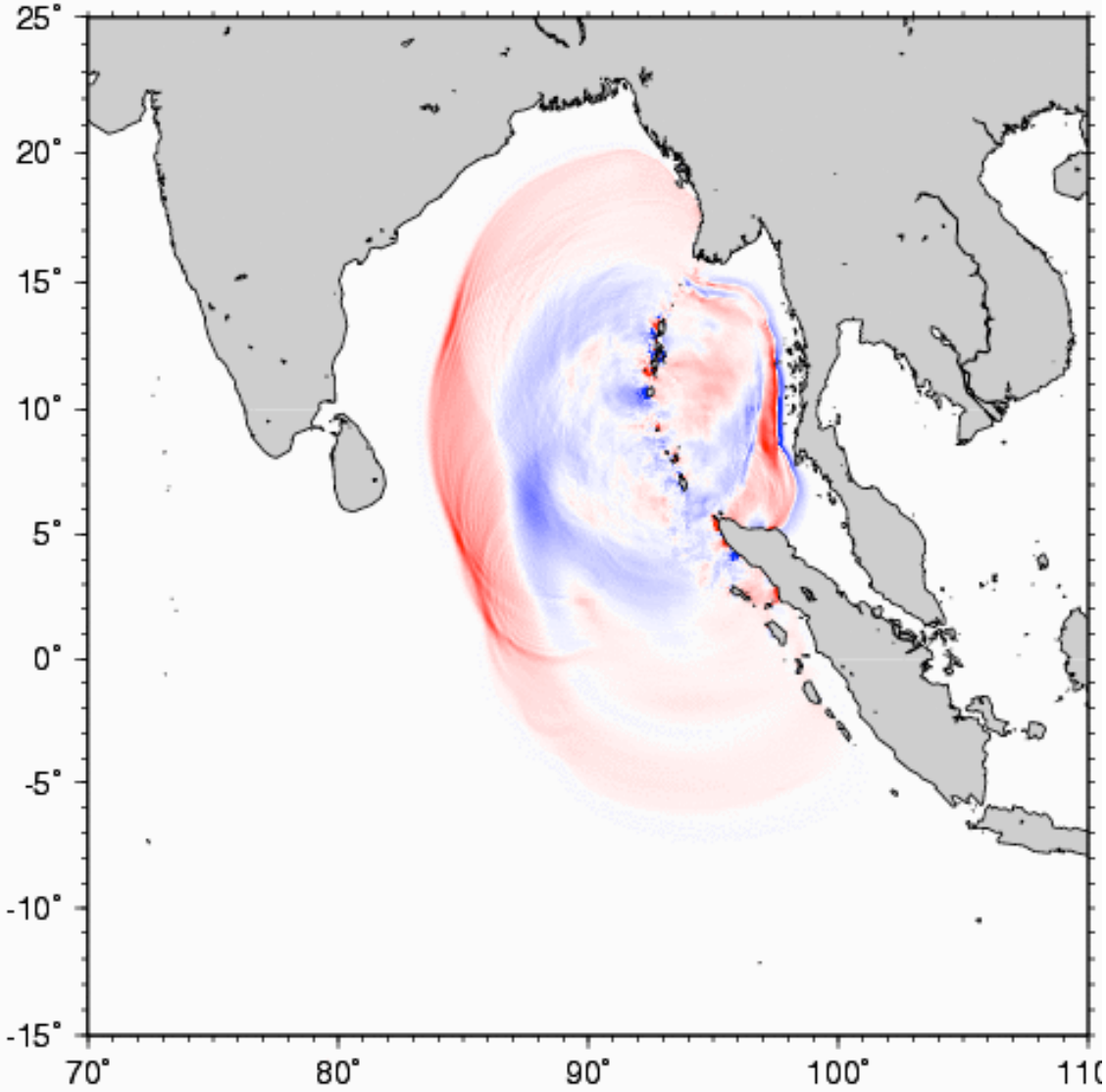
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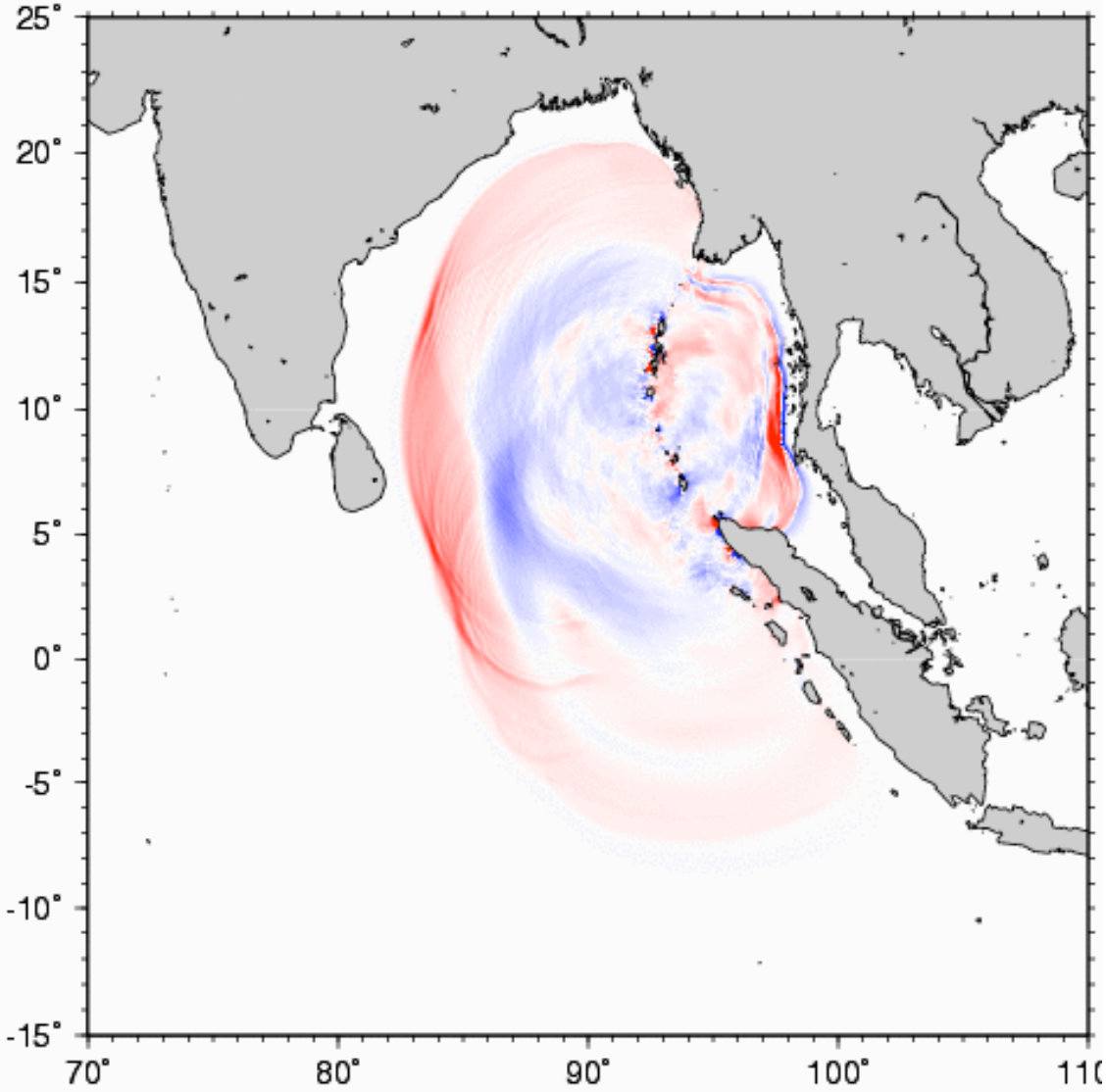
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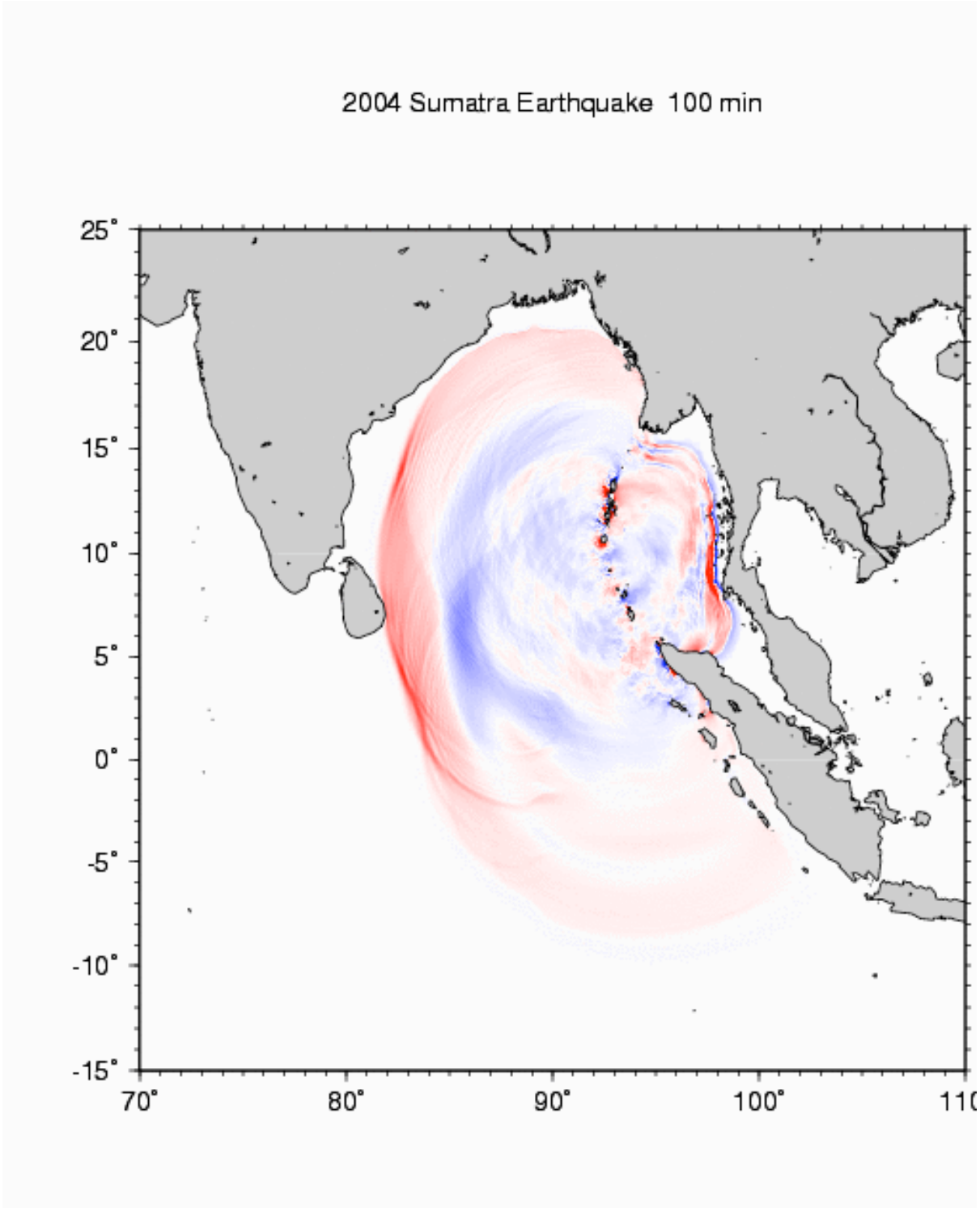
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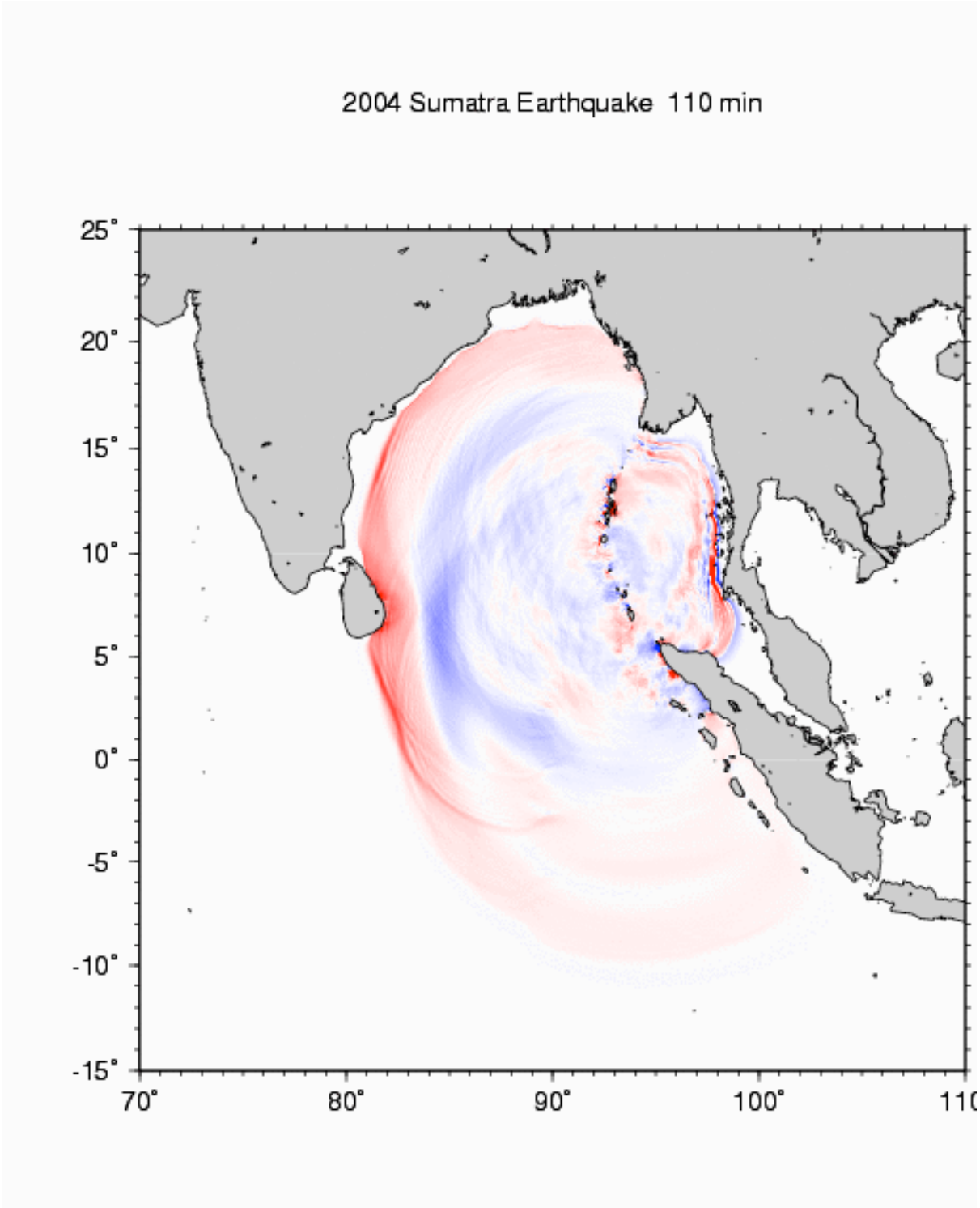
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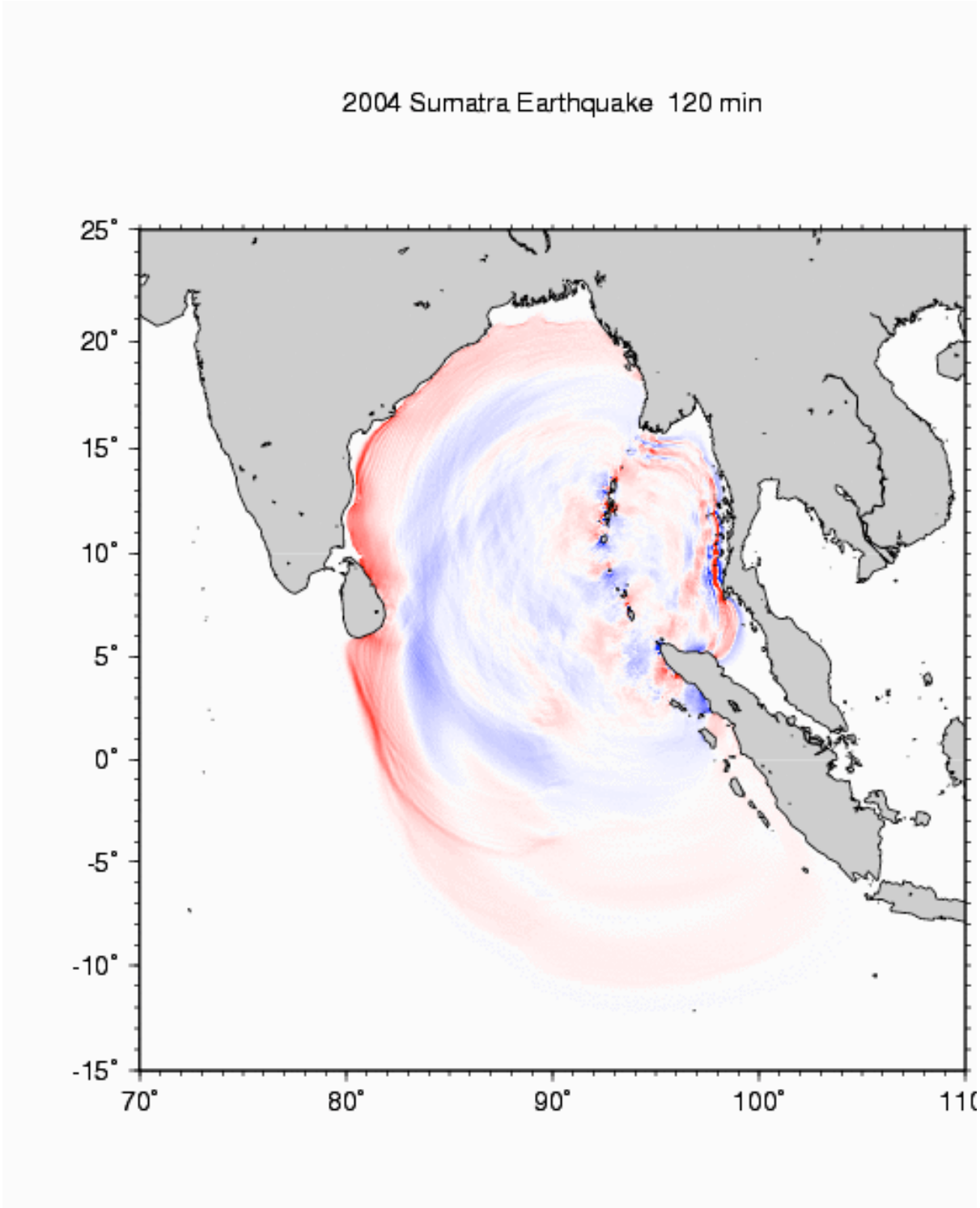
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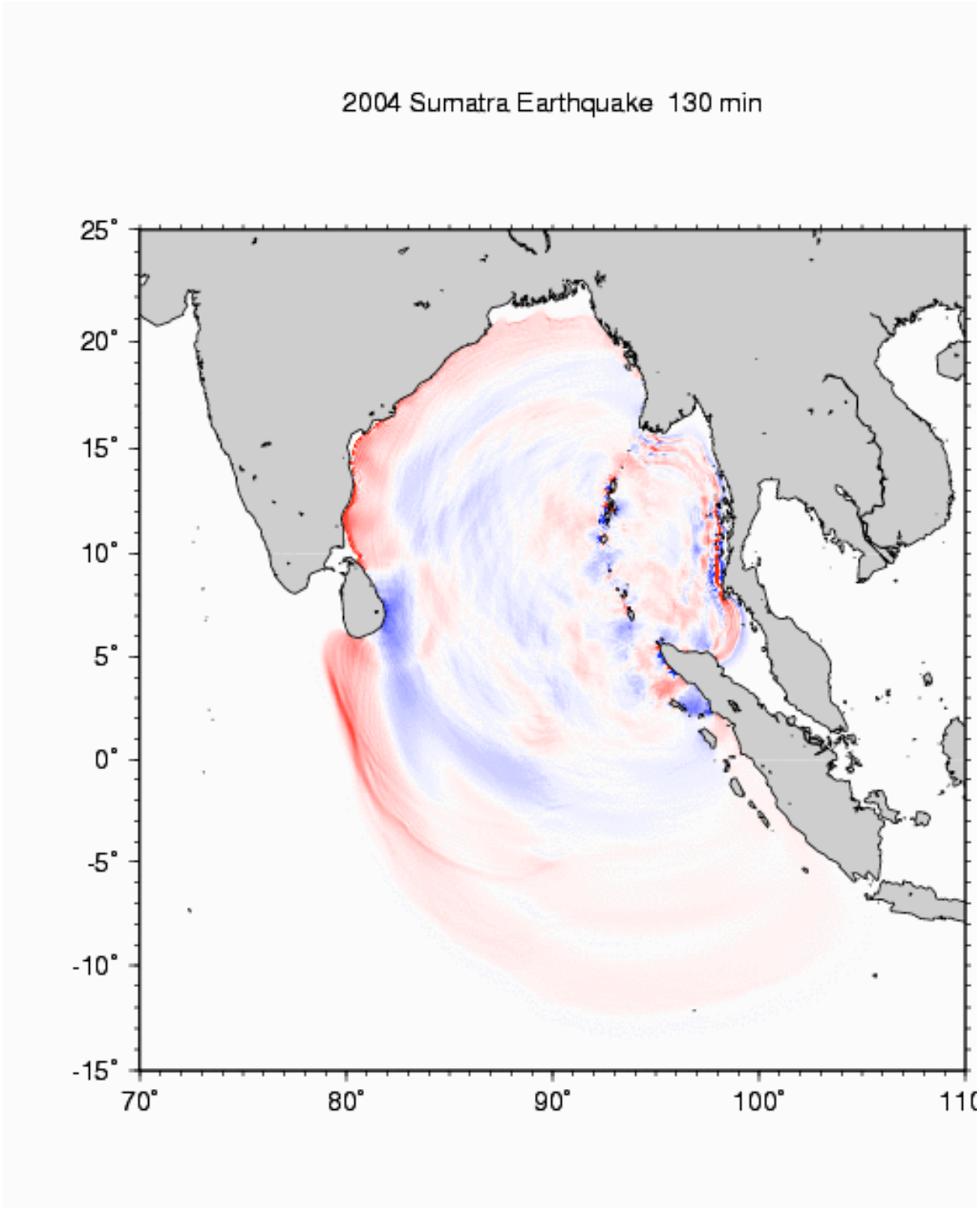
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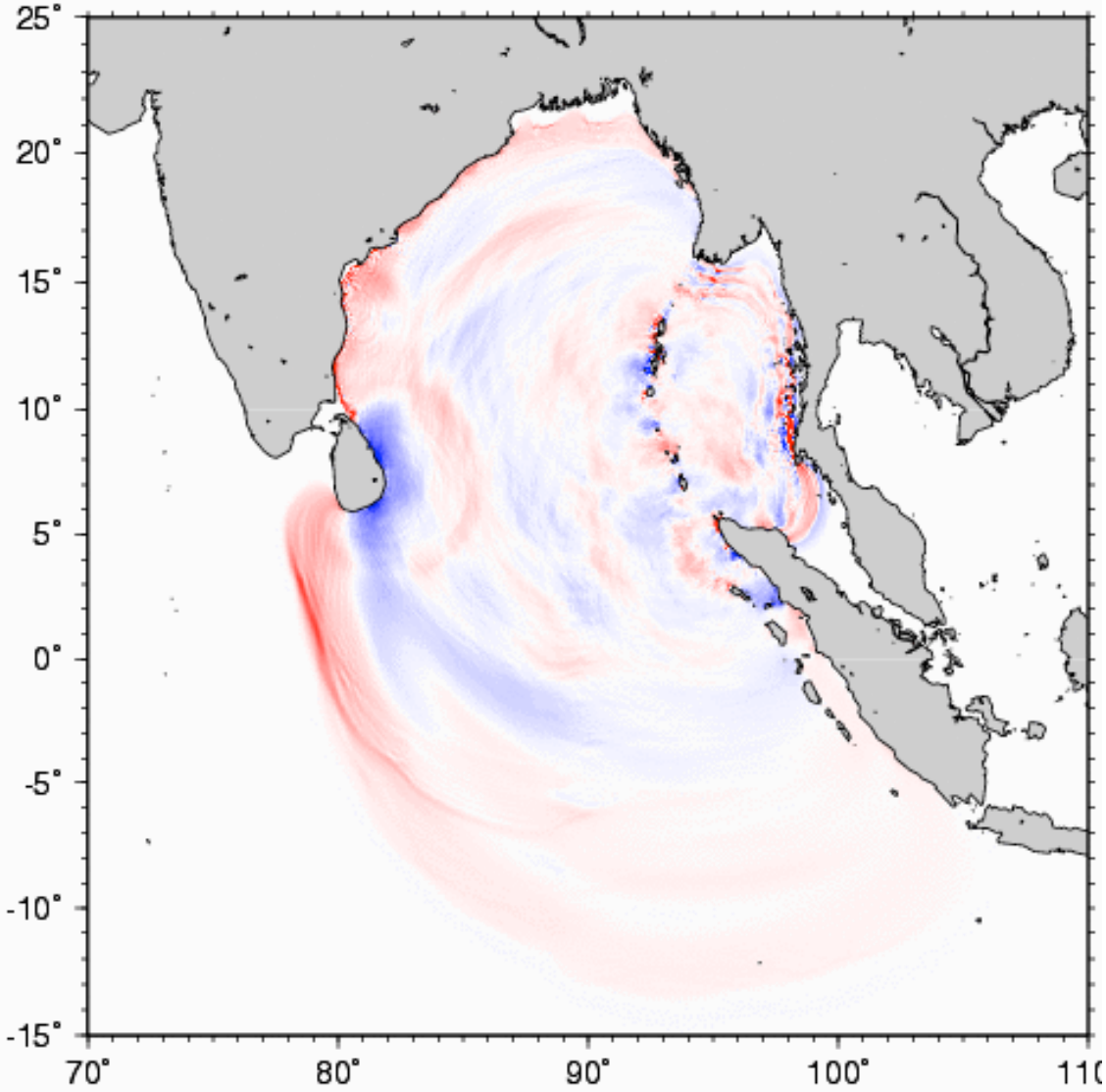
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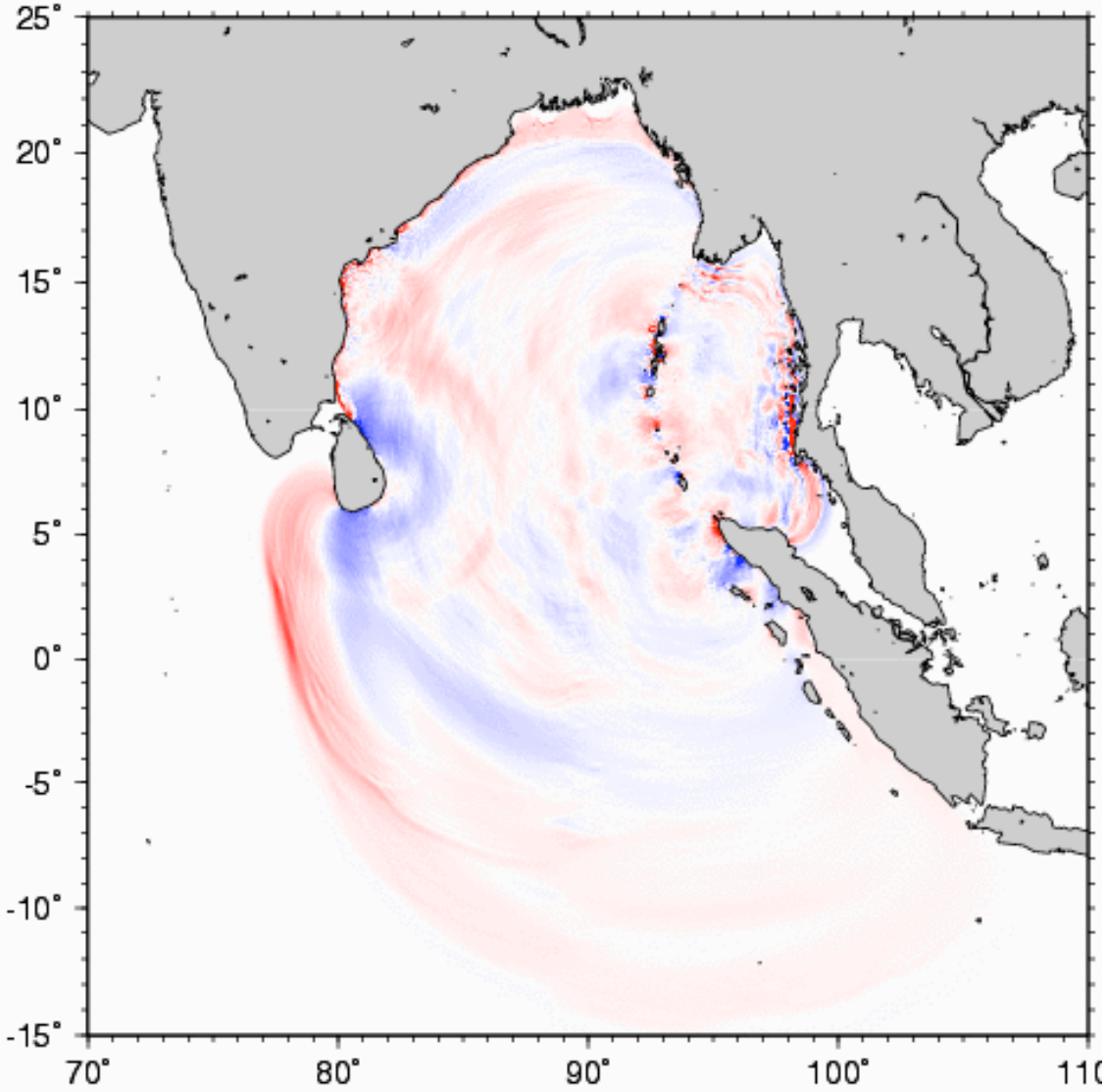
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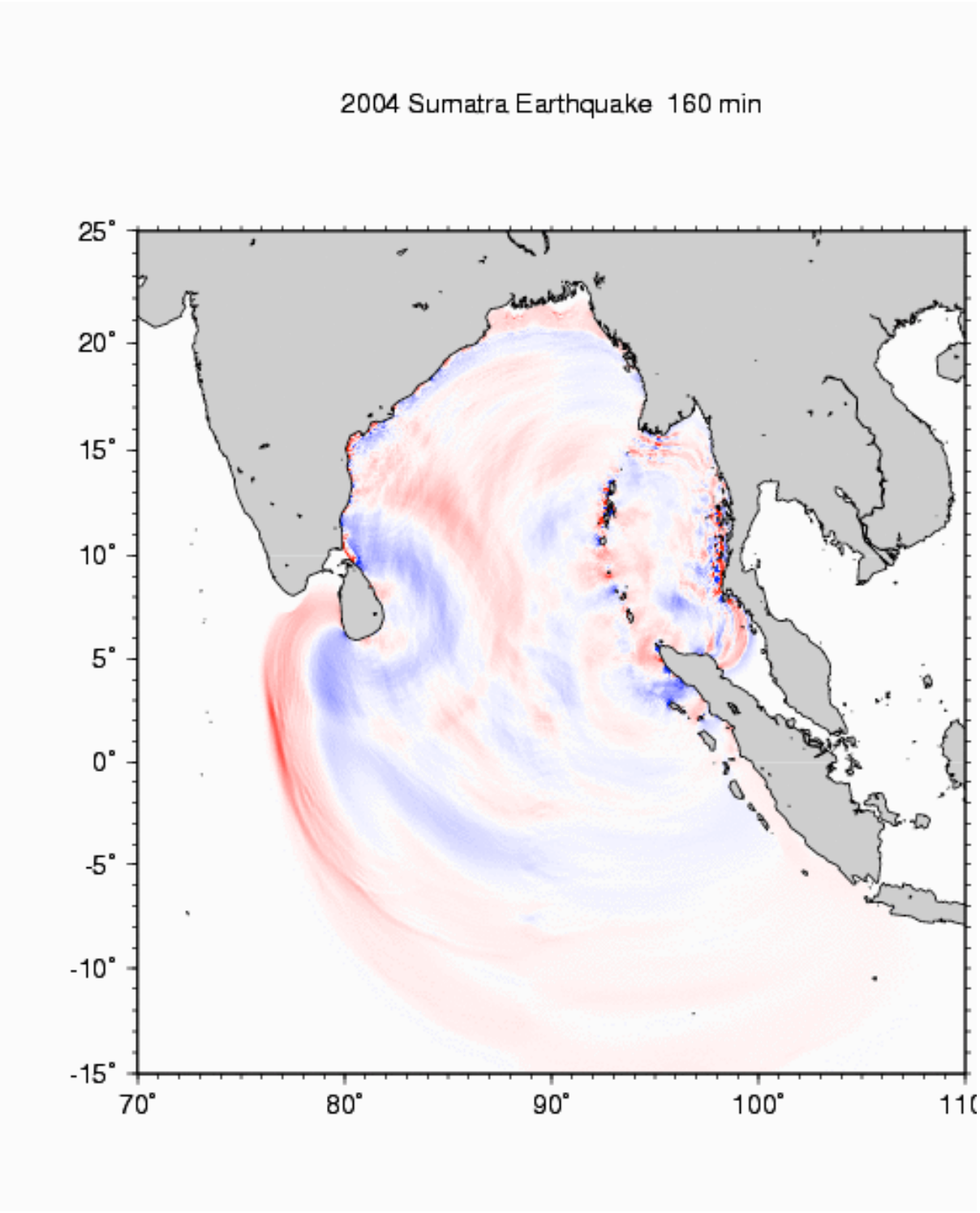
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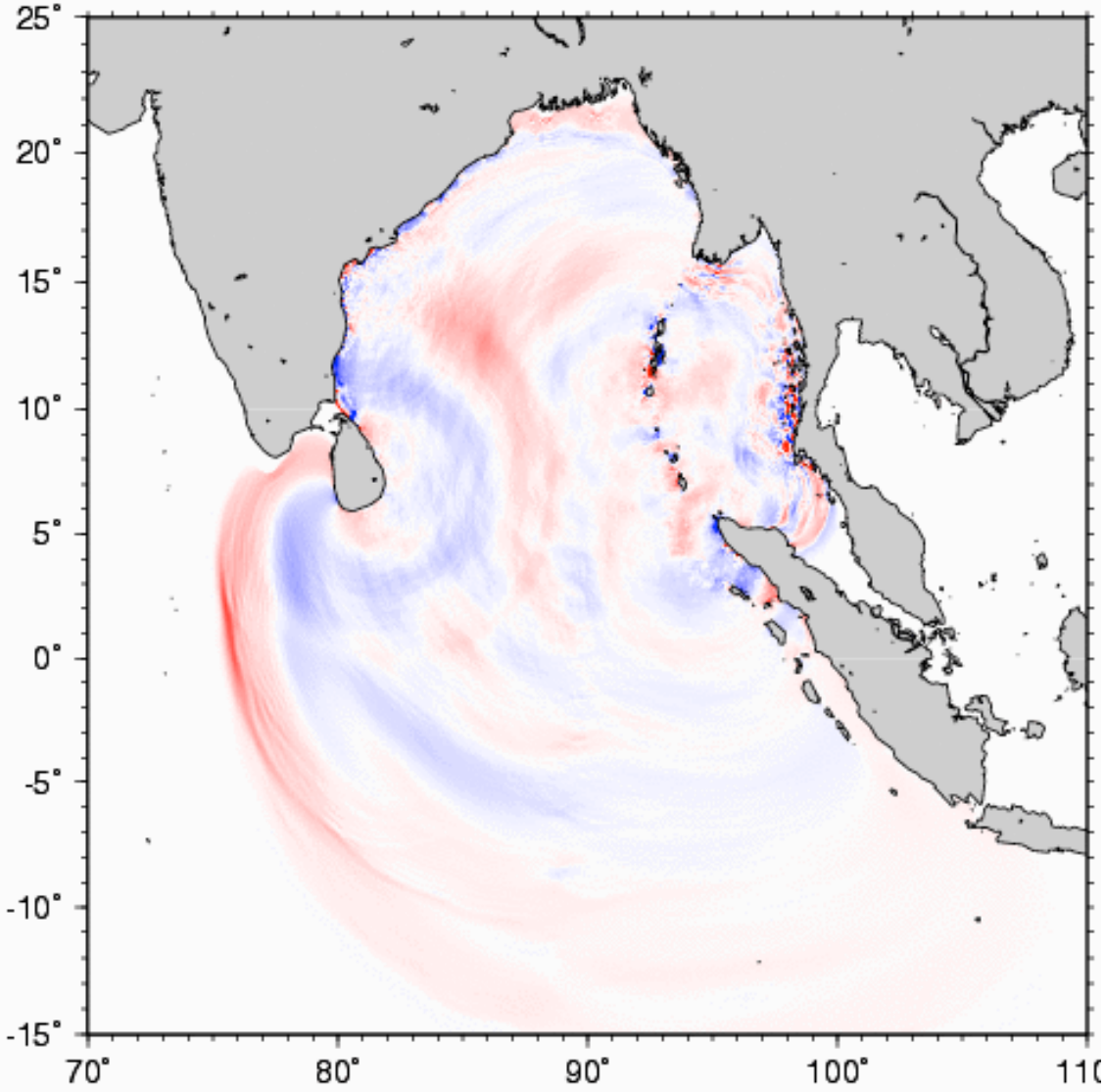
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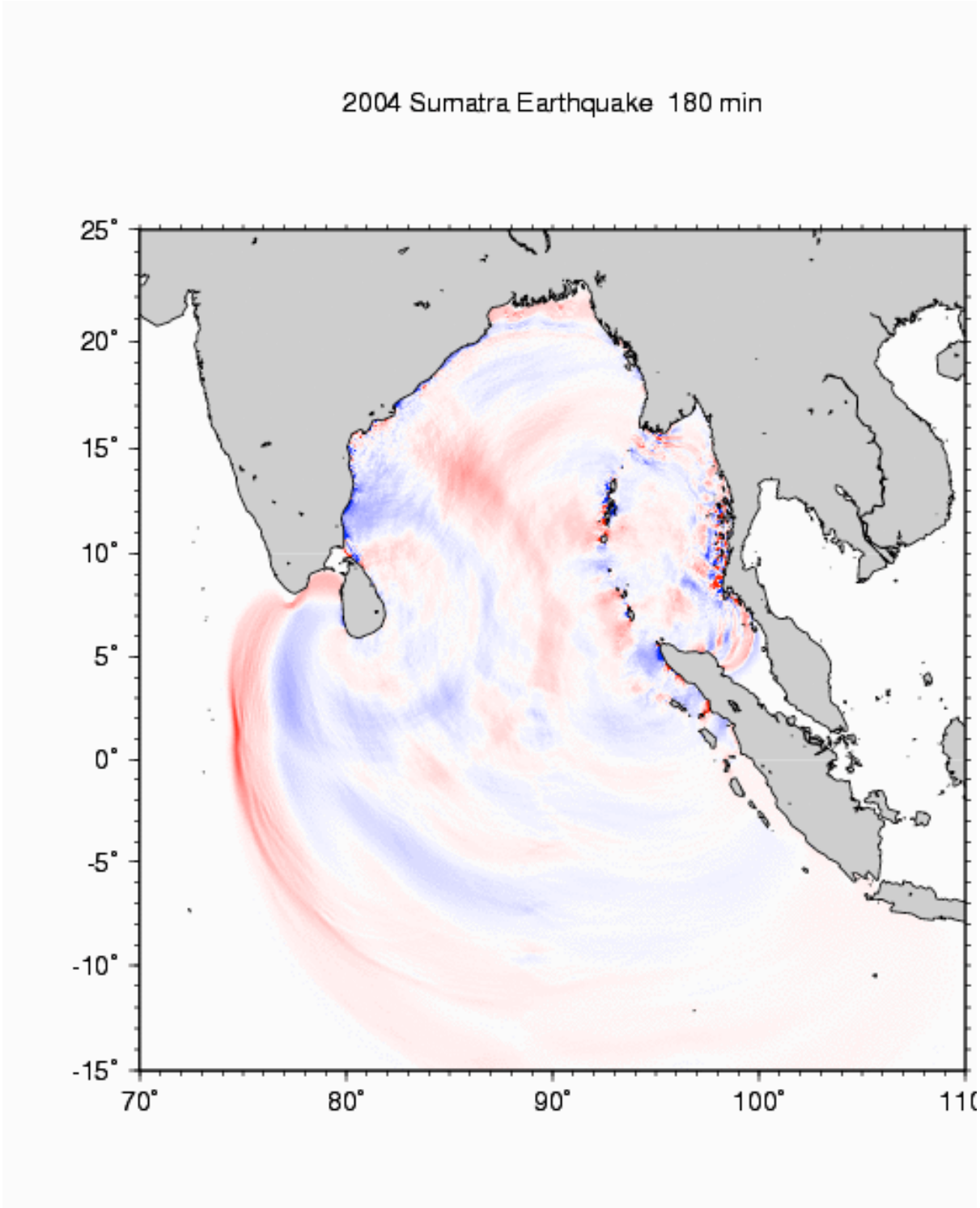
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