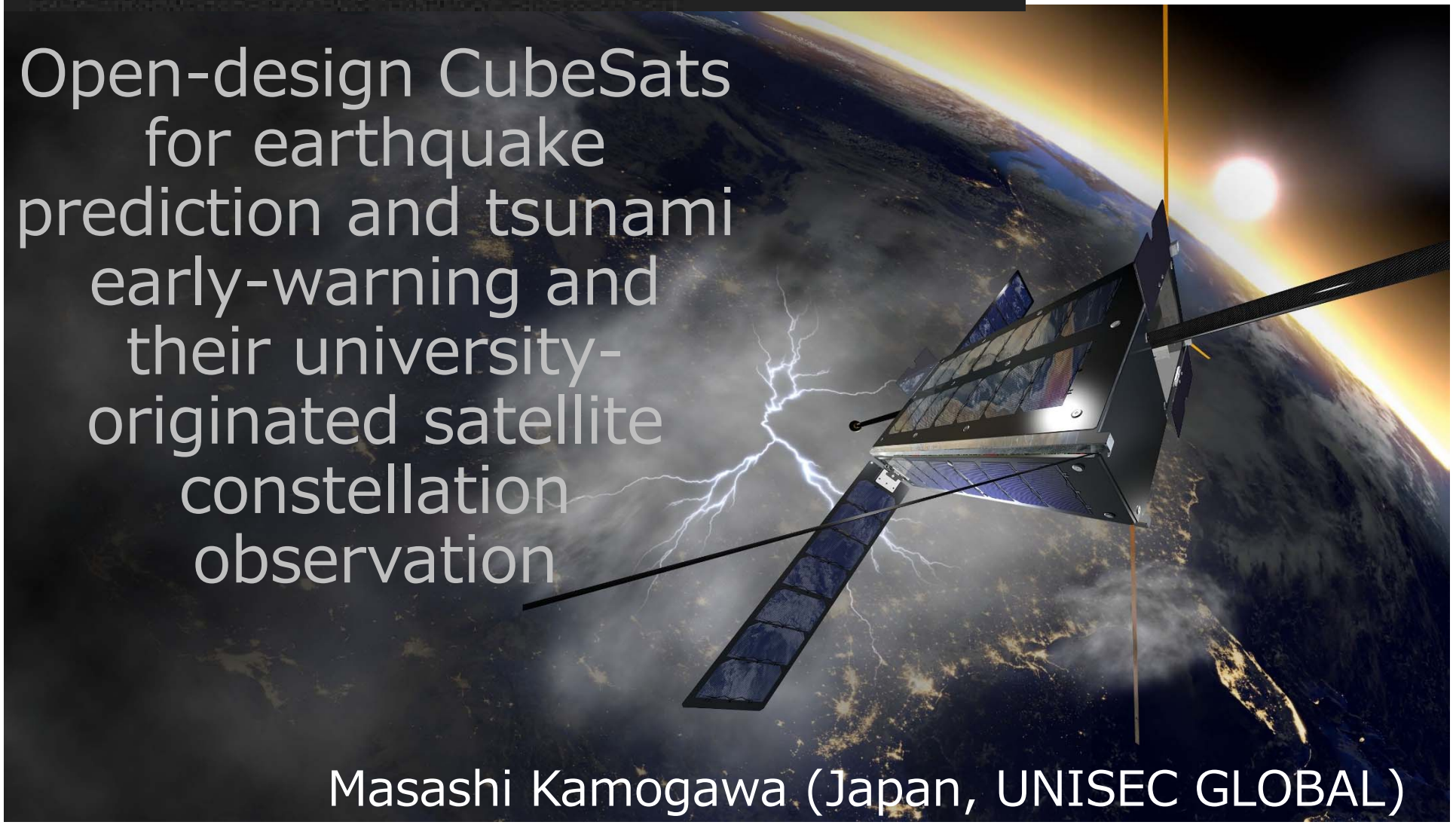
UNISEC GLOBAL
University Space Engineering Consortium

Prelude

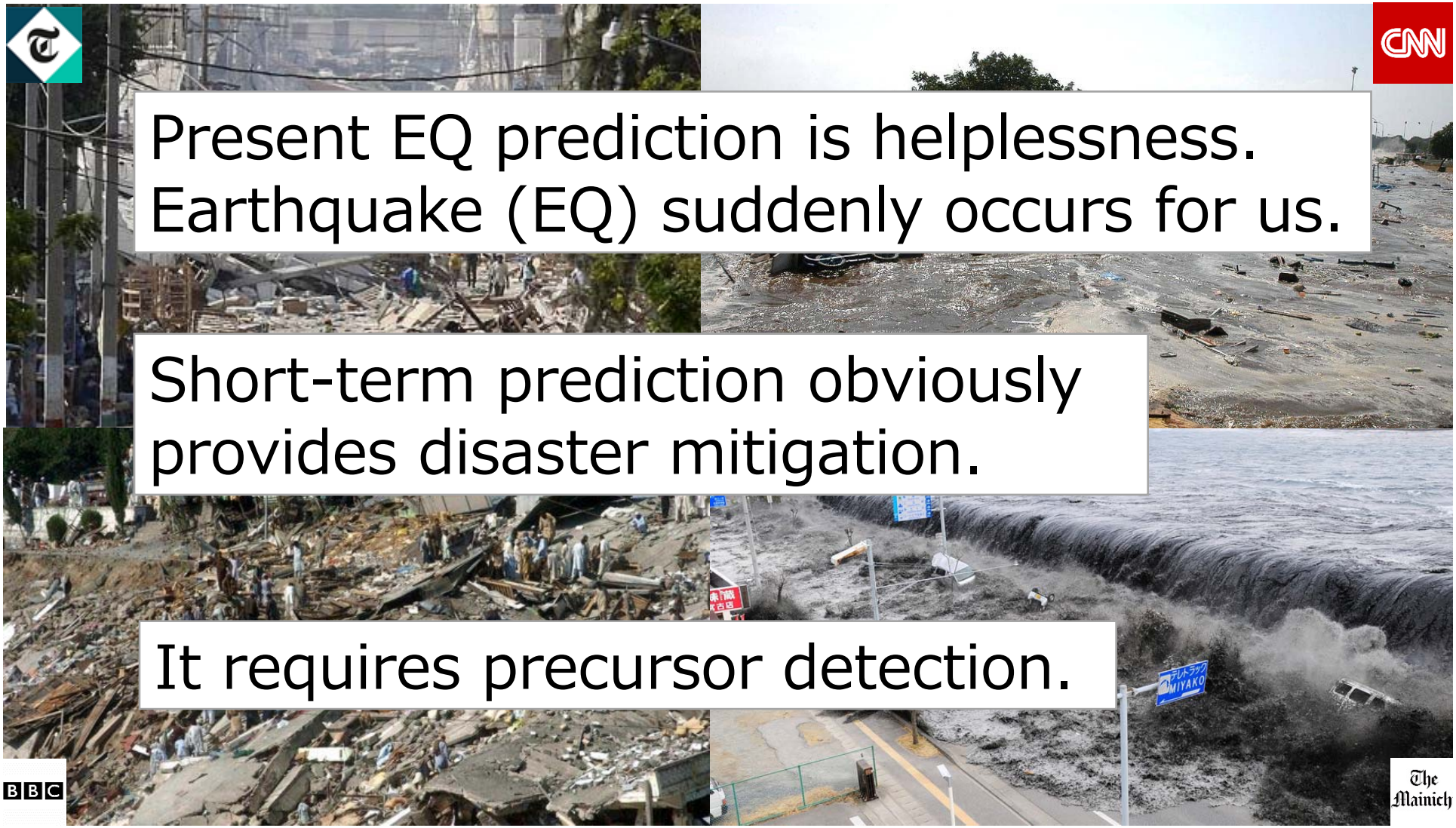
Open-design CubeSats for earthquake prediction and tsunami early-warning and their university-originated satellite constellation observation



Masashi Kamogawa (Japan, UNISEC GLOBAL)

2010 Mw7.0 Haiti Earthquake

2004 Mw9.3 Sumatra Earthquake



Present EQ prediction is helplessness.
Earthquake (EQ) suddenly occurs for us.

Short-term prediction obviously provides disaster mitigation.

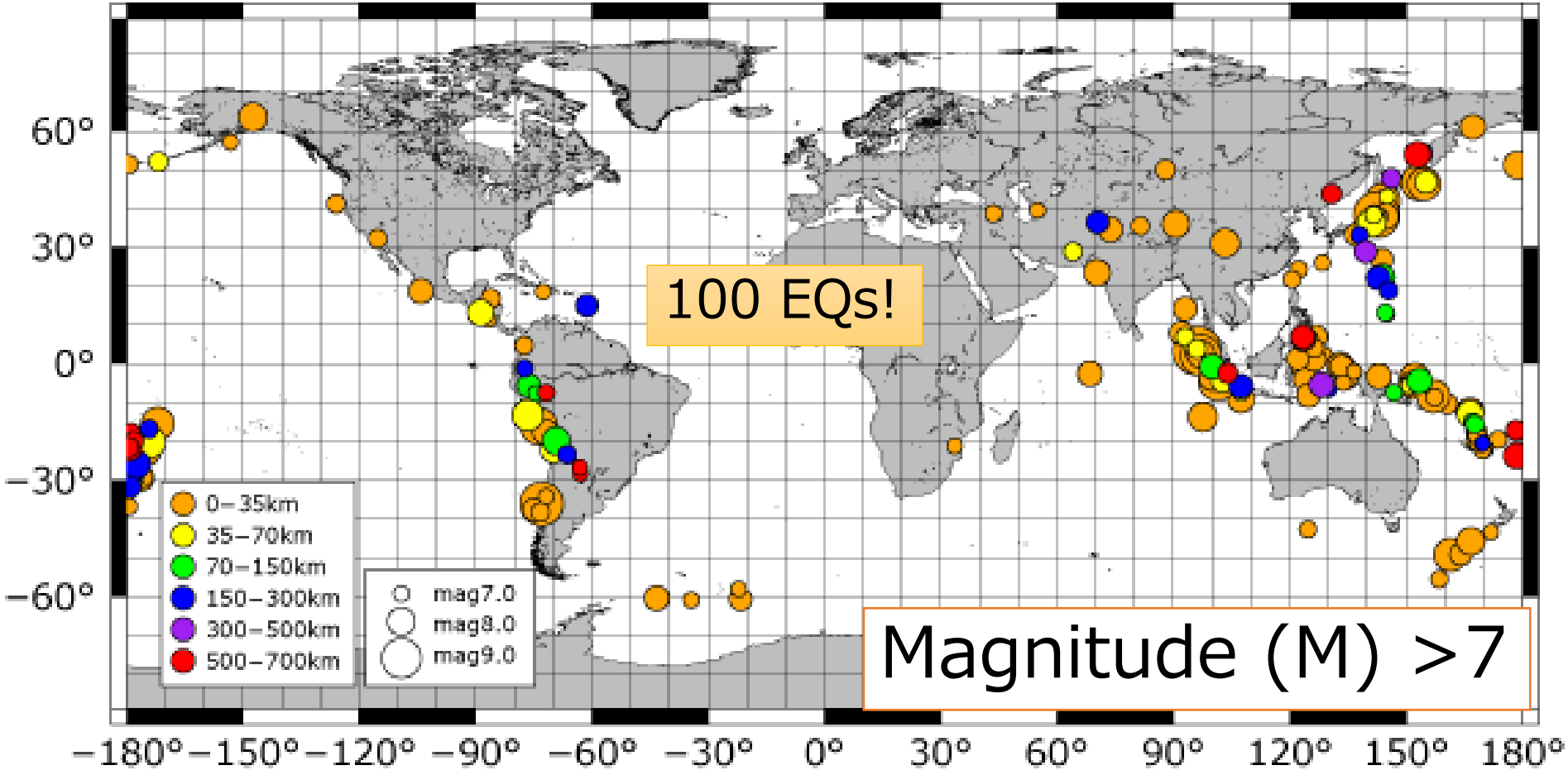
It requires precursor detection.

2005 Mw7.6 Kashmir Earthquake

2011 Mw9.0 Tohoku Earthquake

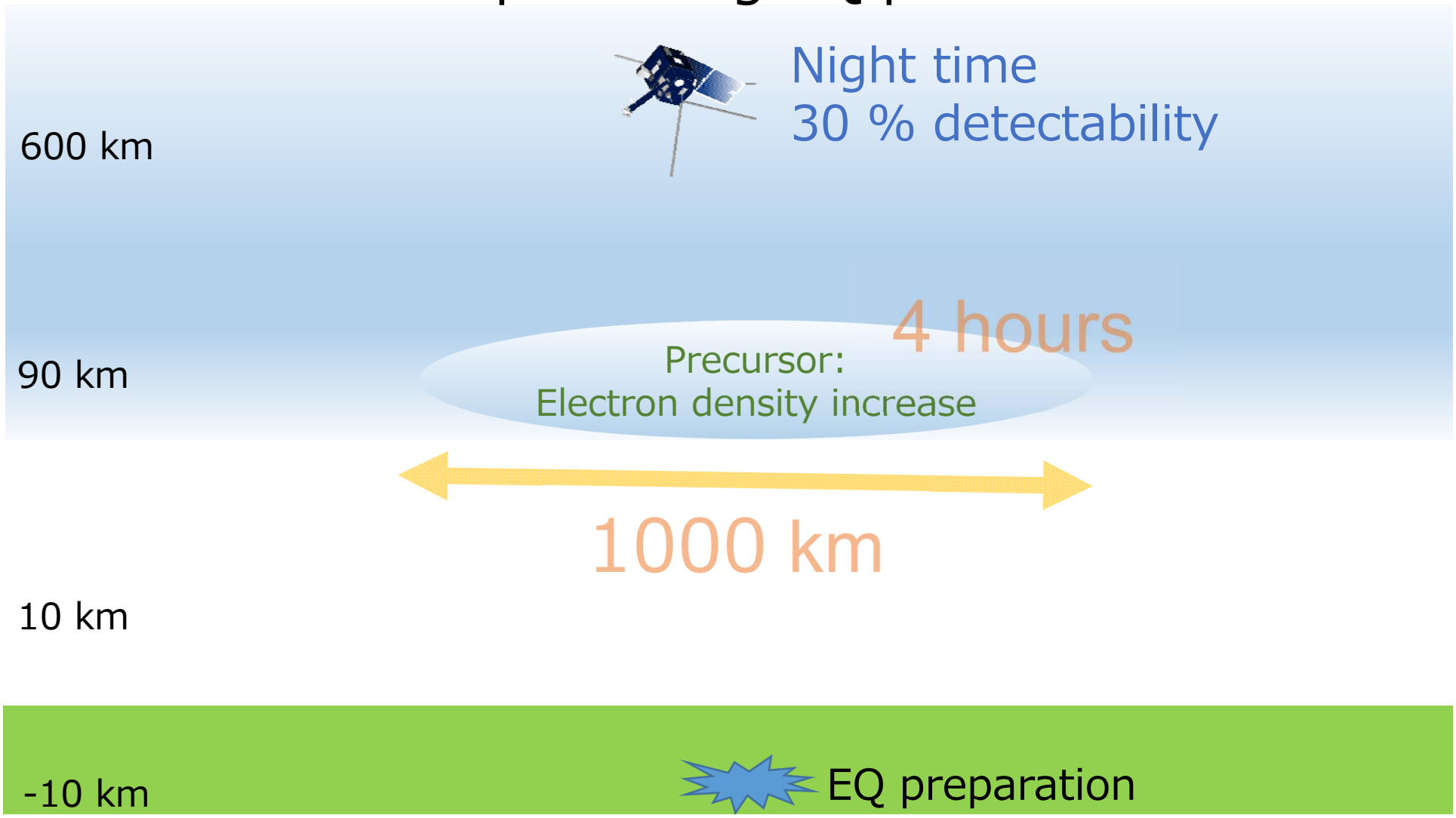
Most large EQ occurred inside land and near ocean.

(USGS, 2000-2011)

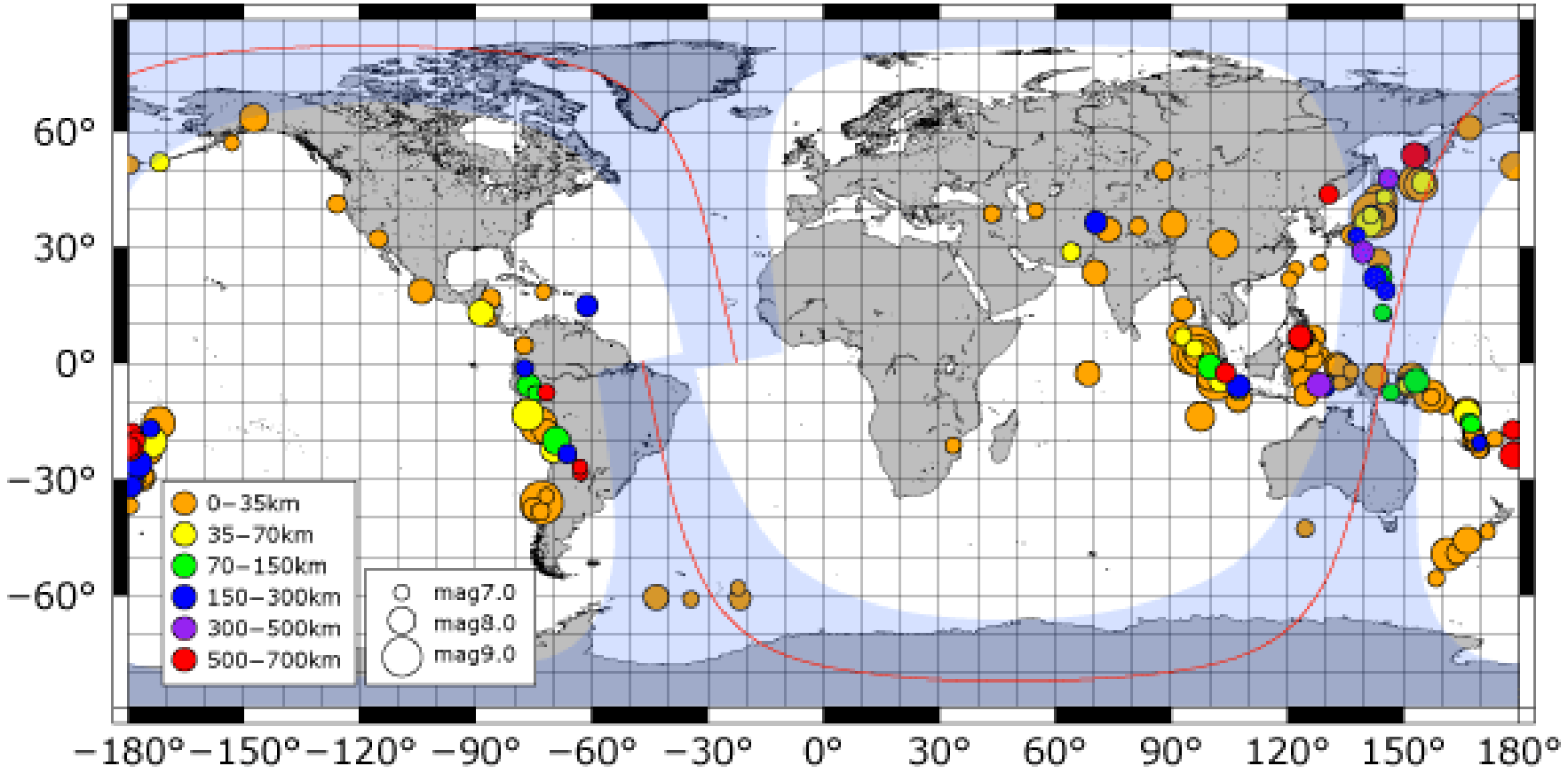


Large EQs are a major risk for human being.

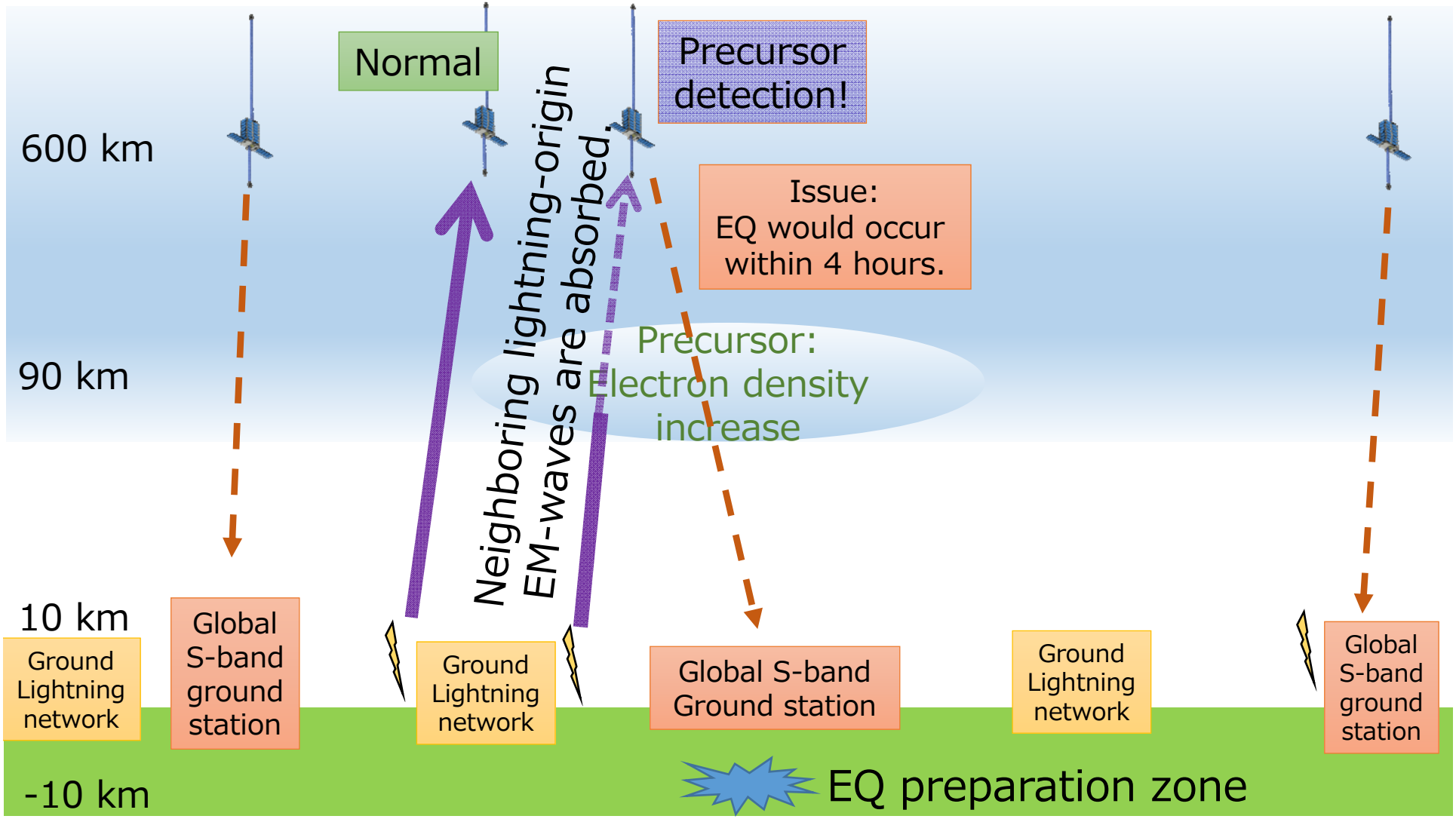
French DEMETER satellite (2004-2010) statistically found promising EQ precursor



Satellite precursor observation is useful for EQ prediction.



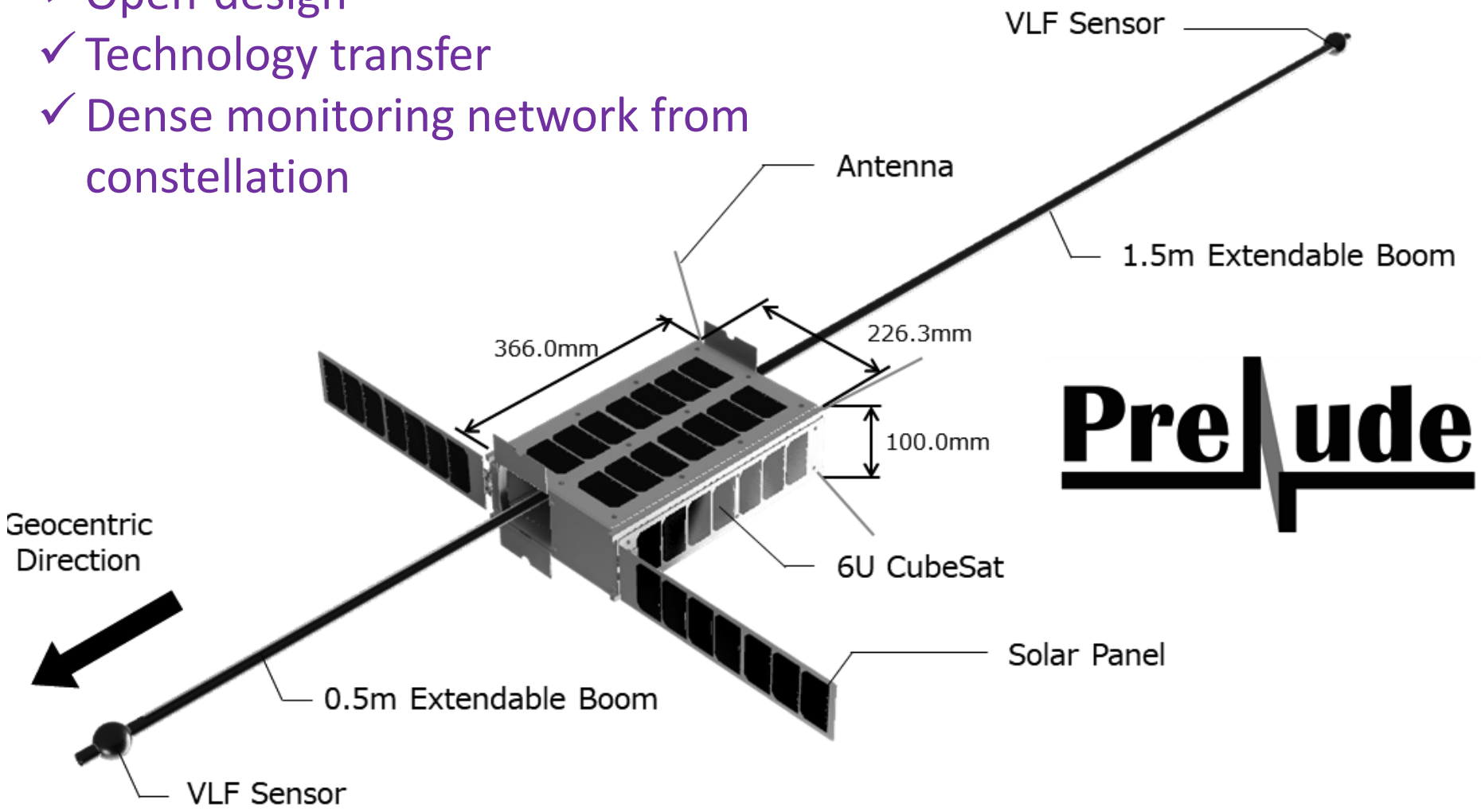
Methodology of EQ prediction from space



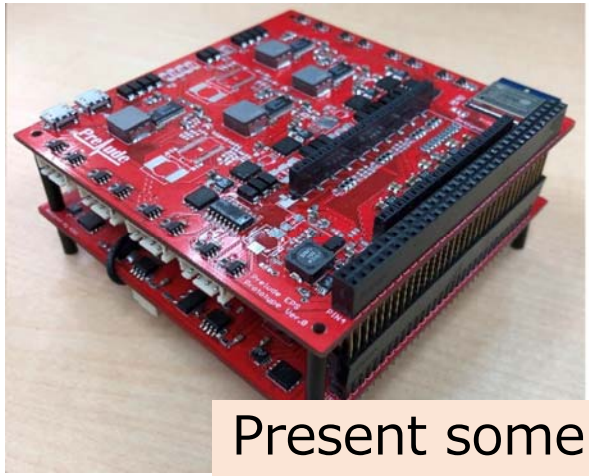
- ✓ **Lightning**-origin EM waves are used as a **natural radar** for precursor monitor.
- ✓ Dense global ground-stations provide **real-time** precursor monitoring.
- ✓ Satellite **constellation** supports globally-covered EQ monitoring.

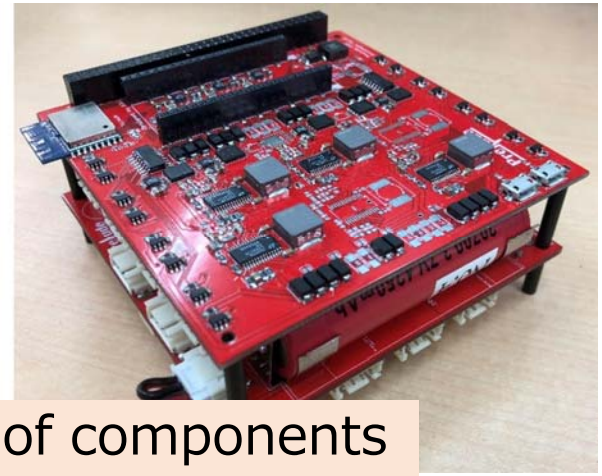
PRELUDE: **Pre**cursory e**l**ectric field observation C**u**beSat **de**monstrator

- ✓ CubeSat dedicated to EQ prediction
- ✓ Only matured technology
- ✓ Open-design
- ✓ Technology transfer
- ✓ Dense monitoring network from constellation



Prototype PRELUDE





Present some of components for Bread Board Model

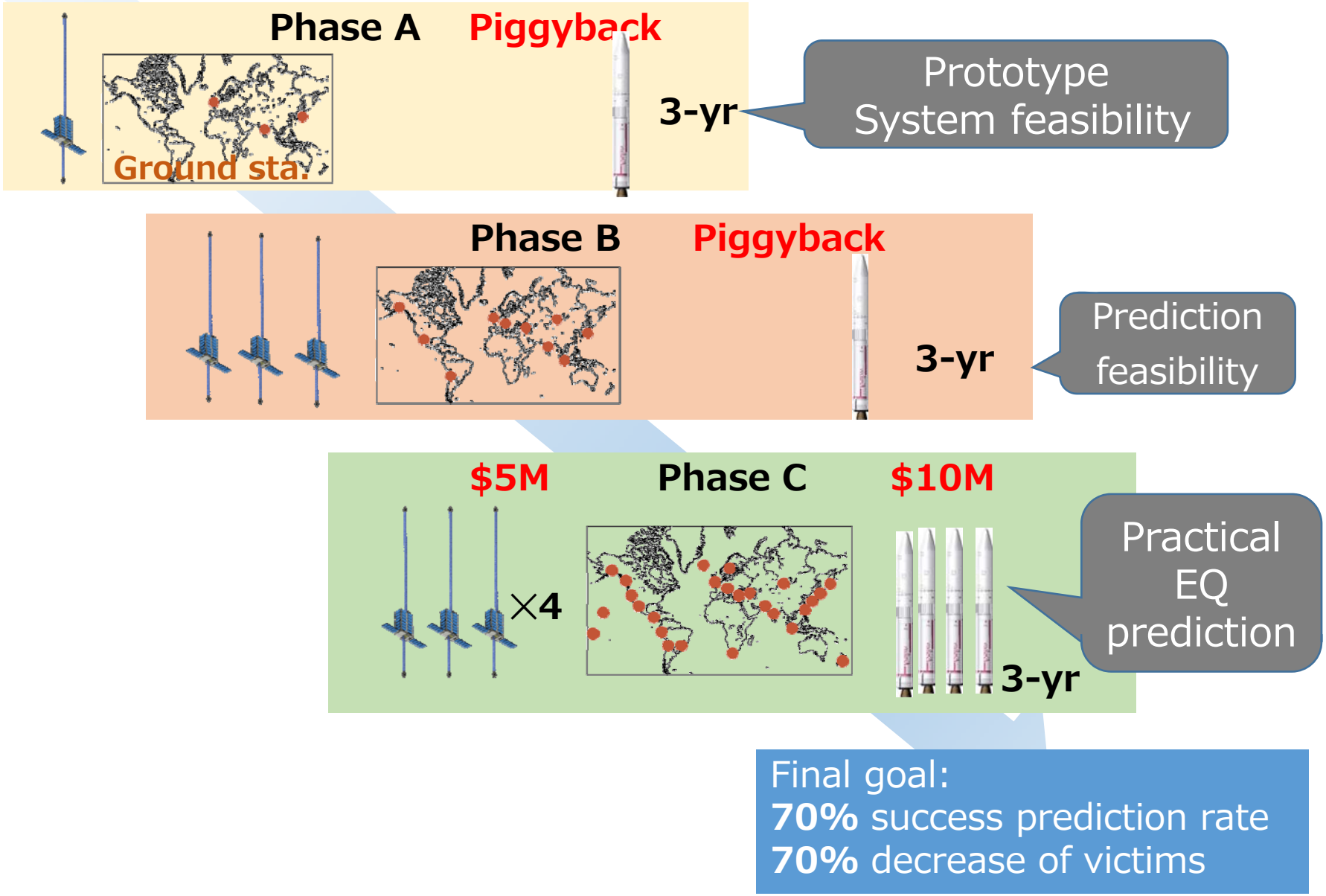
2018 Bread Board Model

2019 Enginee -ring Model

2020 Flight Model

2021 Launch

Our scheme


Phase A
Piggyback
Ground sta.
3-yr
Prototype
System feasibility
Phase B
Piggyback
3-yr
Prediction
feasibility
$5M
Phase C
$10M
×4
3-yr
Practical
EQ
prediction
Final goal:
70% success prediction rate
70% decrease of victims

Why don’t you join space EQ prediction project?