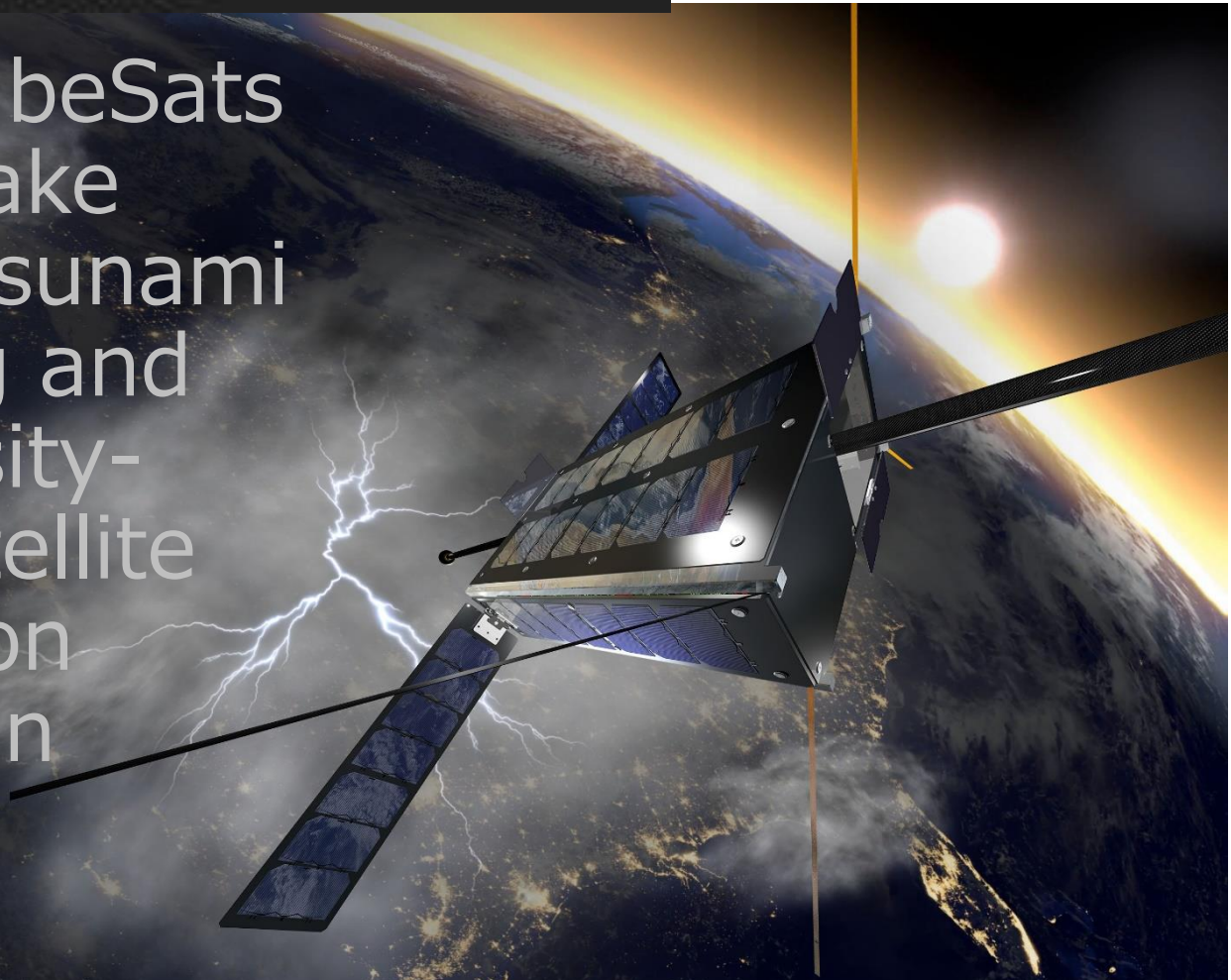




Open-design CubeSats
for earthquake
prediction and tsunami
early-warning and
their university-
originated satellite
constellation
observation



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.

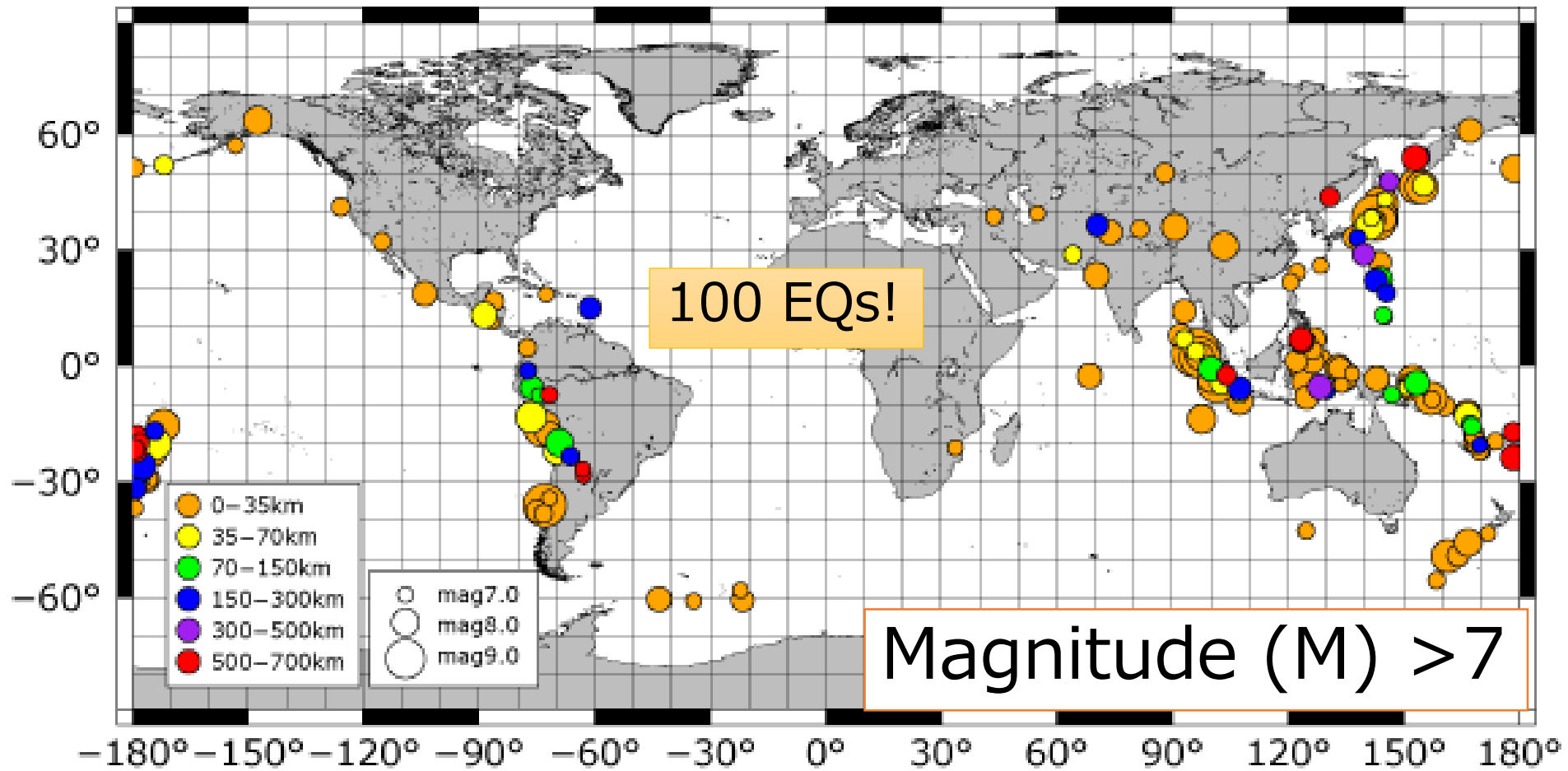
2005 Mw7.6 Kashmir Earthquake

2011 Mw9.0 Tohoku Earthquake



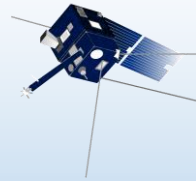
Most large EQ occurred inside land and near ocean.

(USGS, 2000-2011)



Large EQs are a major risk for human being.

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



Night time
30 % detectability

600 km

90 km

Precursor:
Electron density increase

4 hours



1000 km

10 km

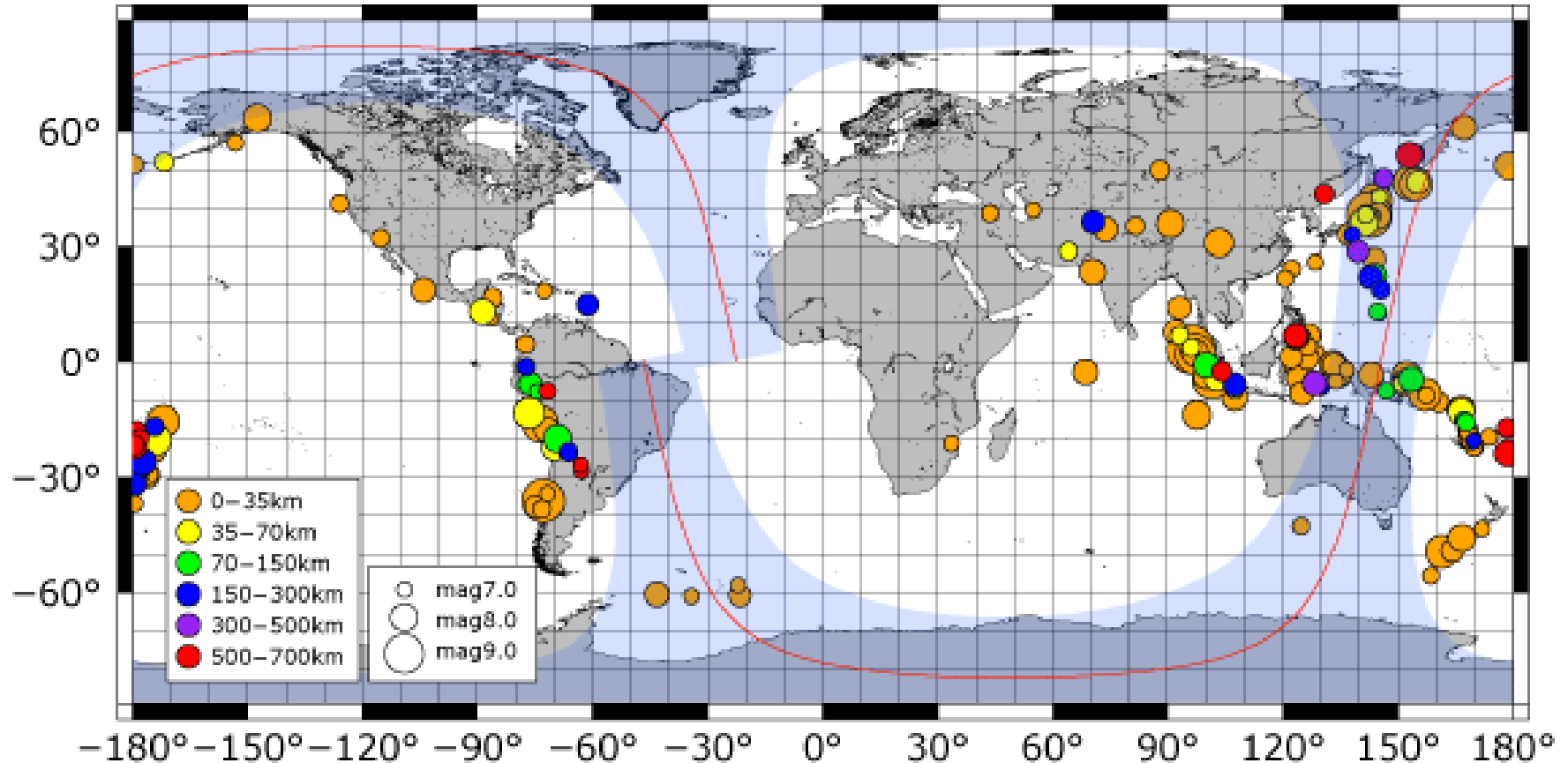
-10 km



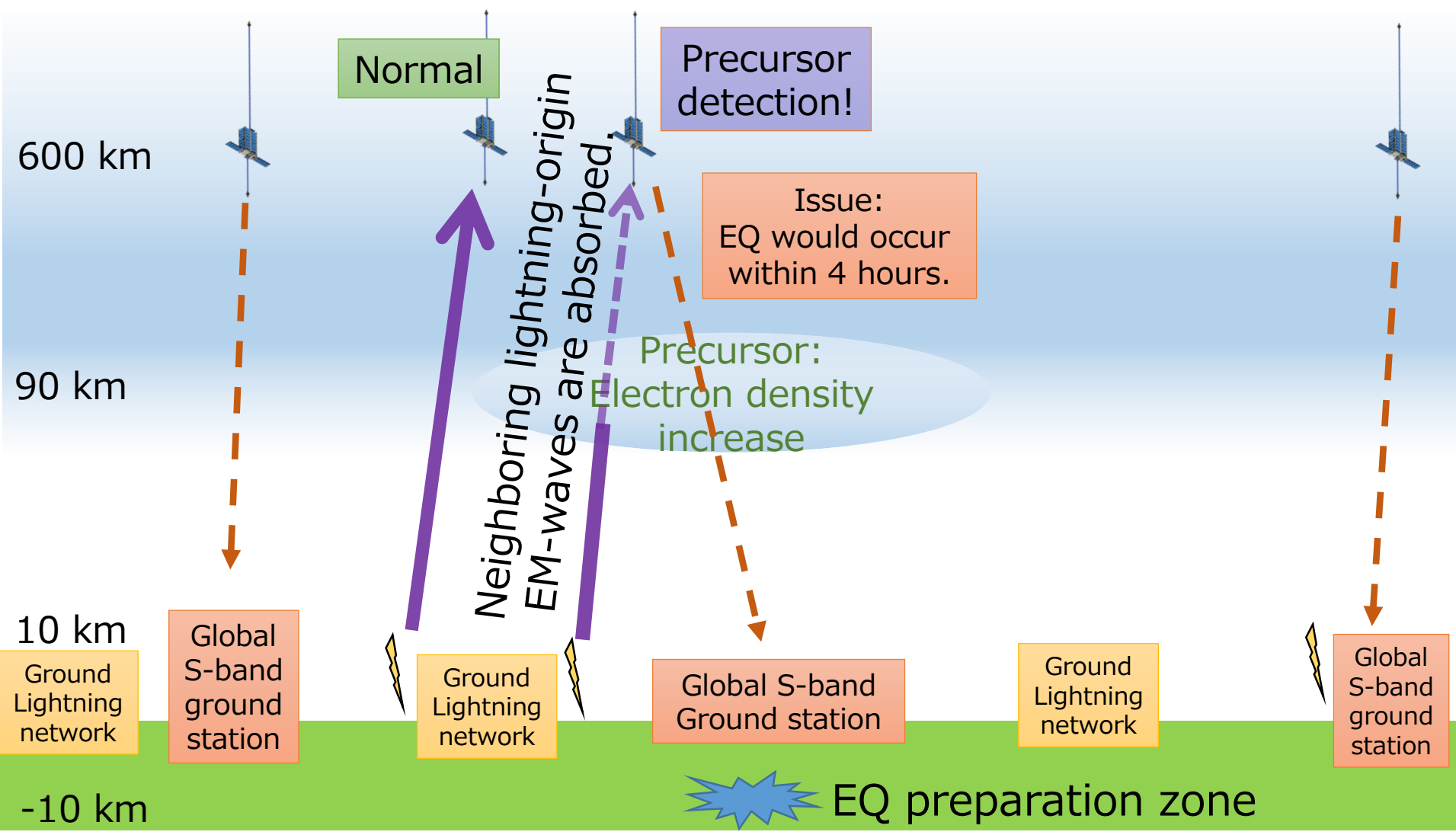
EQ preparation

$M > 5$

Satellite precursor observation is useful for EQ prediction.



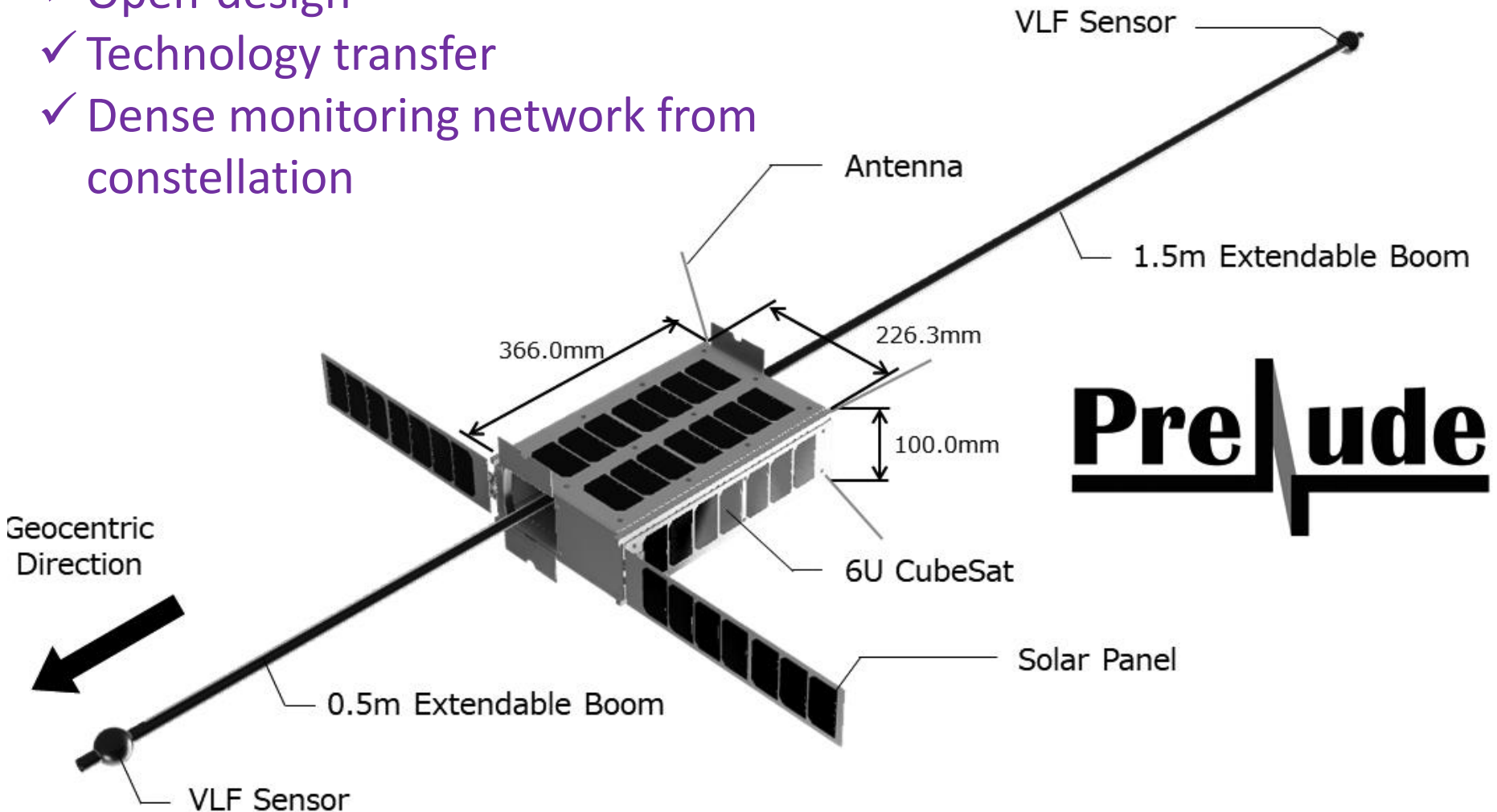
Methodology of EQ prediction from space



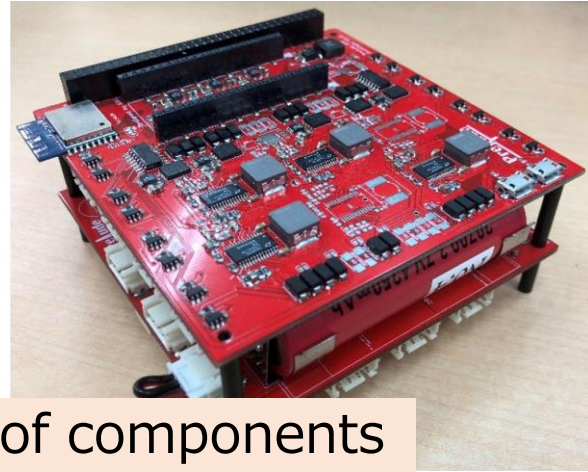
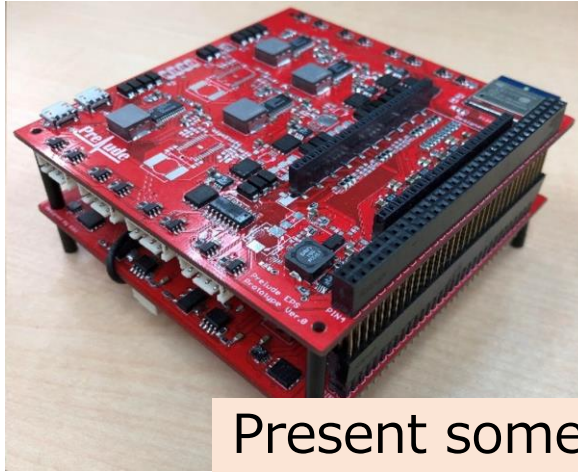
- ✓ **Lightning**-origin EM waves are used as a **natural radar** for precursor monitor.
- ✓ Dense global ground-stations provides **real-time** precursor monitoring.
- ✓ Satellite **constellation** supports globally-covered EQ monitoring.

PRELUDE: Precursory electric field observation CubeSat demonstrator

- ✓ 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

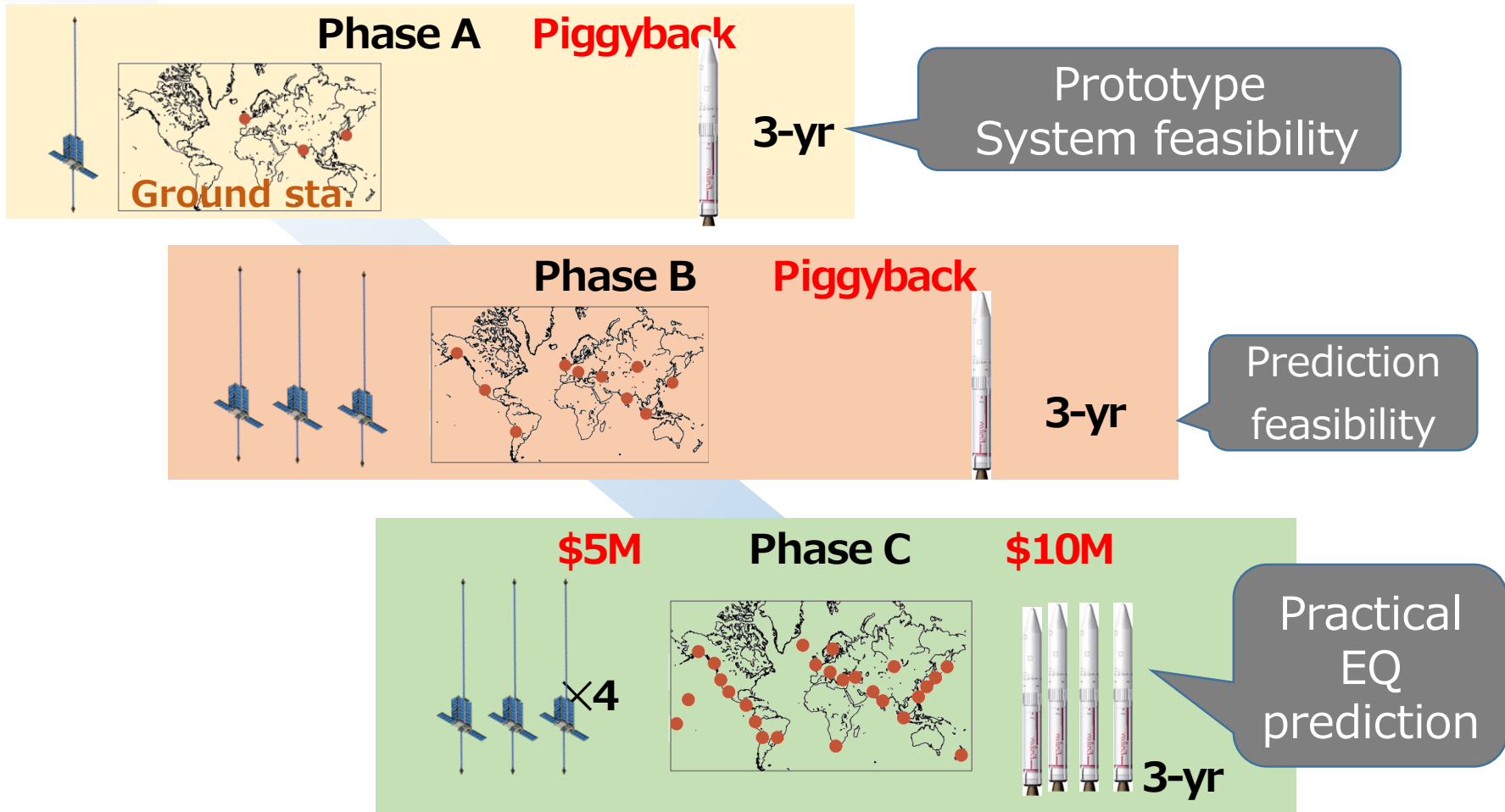
2018
Bread
Board
Model

2019
Enginee
ring
Model

2020
Flight
Model

2021
Launch

Our scheme



Final goal:
70% success prediction rate
70% decrease of victims

Why don't you join space EQ prediction project?

