Caucasus Earthquakes ELF Electromagnetic Precursor Monitoring System: Scientific and Engineering Concept and Instrumentation

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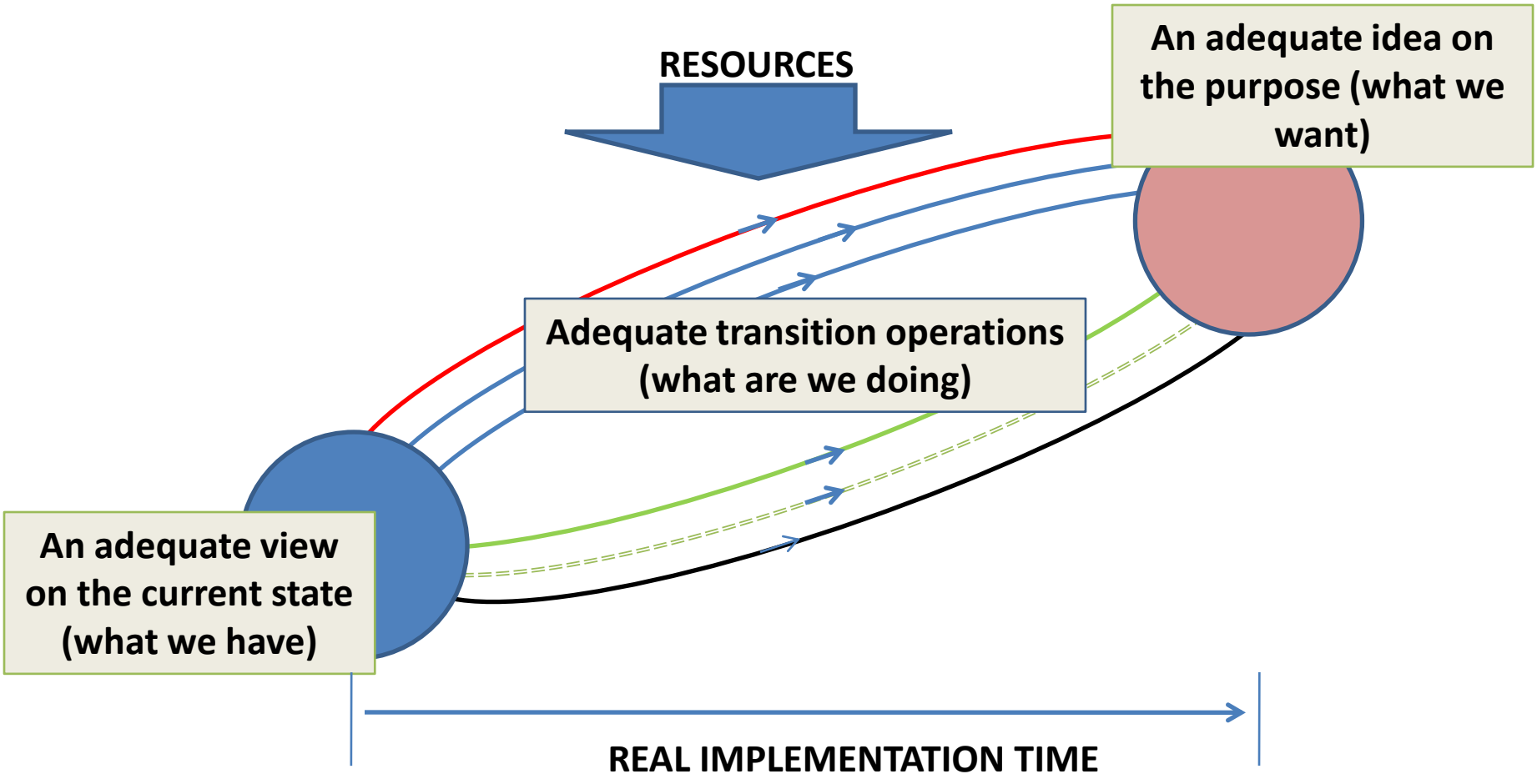
კავკასიის მიწისძვრების დაბალსიხშირული ელექტრომაგნიტური წინამორბედების მონიტორინგის სისტემა: სამეცნიერო და საინჟინრო კონცეფცია და აღჭურვილობა.

თამარ პაატაშვილი, თსუ დოქტორანტი, ილიას უნივერსიტეტის მკვლევარი,
ლევი გეონჯიანი, თსუ ასისტენტ პროფესორი

2018

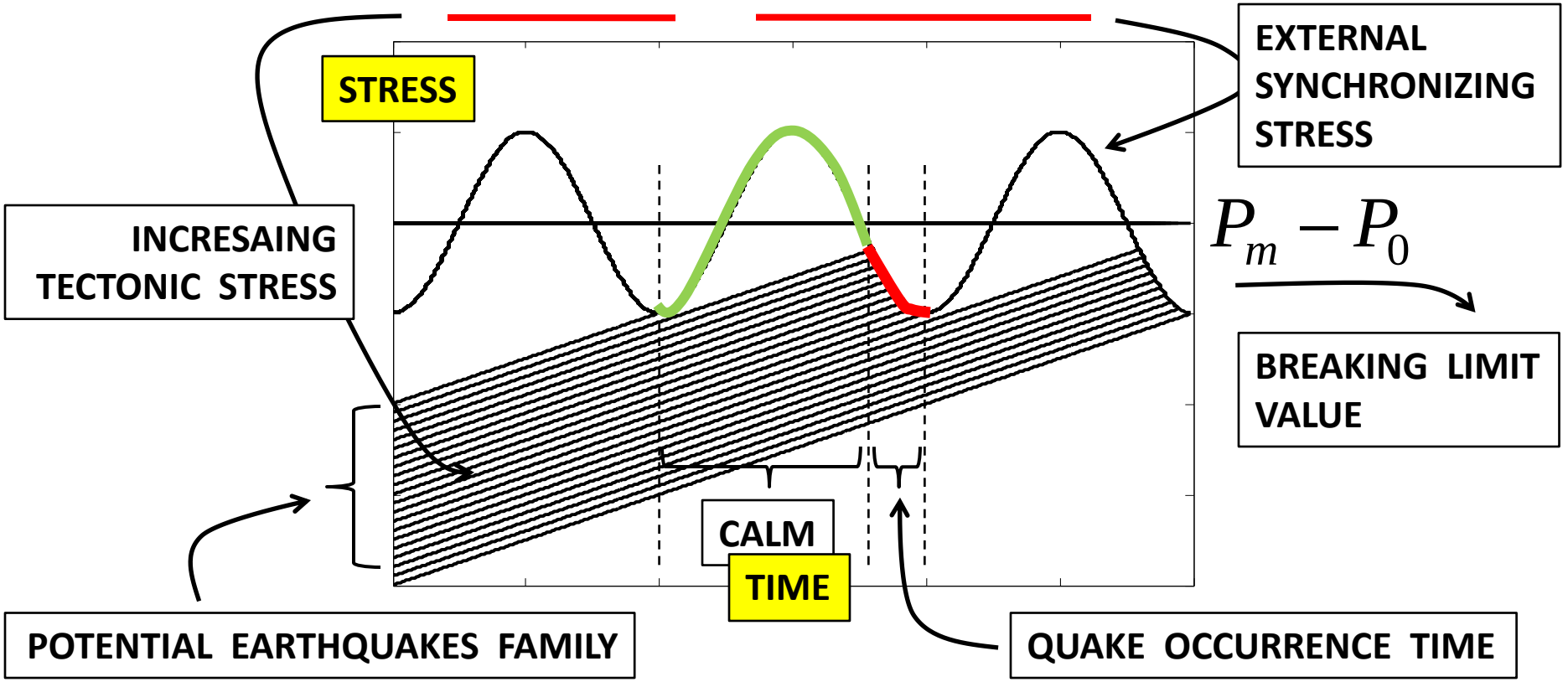
EARTHQUAKE PREDICTION PROBLEM FROM ENGINEERING POINT OF VIEW: THE NEED FOR FULL COMPLIANCE WITH THE ENGINEERING PROJECT GENERAL APPROACH



EARTHQUAKE PREDICTION PROBLEM FROM ENGINEERING POINT OF VIEW: THE TASK - NATURAL PHENOMENON SYNCHRONIZATION-TRIGGERING DETECTION AND PREDICTION

TIDAL SYNCHRONIZATION CONCEPT

$$P_0 + b(t - t_0) + a\cos(\varpi t + f) = P_m$$



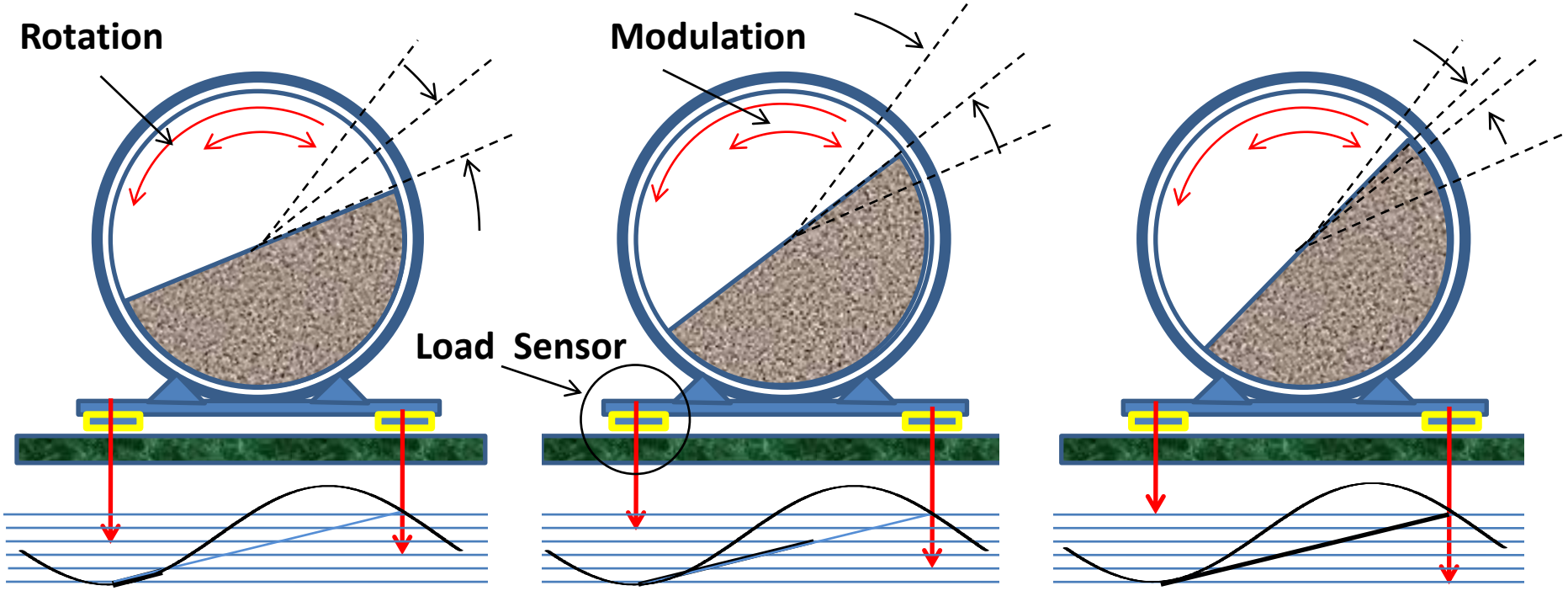
EARTHQUAKE PREDICTION PROBLEM FROM ENGINEERING POINT OF VIEW: SYNCHRONIZATION FREQUENCIES ARE IDENTIFIED

9 Significant Tidal Components Derived from Caucasus M > 6 Earthquakes				
Period (days)	Calm width ($\Delta T / T\%$)	Astronomical sense	Frequency calculation	Comment
27.303	34.2	Lunar sidereal month	*s*	Rotation frequency of: Moon –*s*, Perigee– *p*, Earth – h, Ascending Node – *N*.
13.65	25.2	1/2 of Lunar sidereal month	*2s*	
27.5449	27.9	Lunar anomalistic month	*s-p*	
29.513	30.0	Lunar synodical month	*s-h*	
347.93	31.6	Eclipse year	*h+N*	
173.56	25.7	1/2 of Eclipse year	*2(h+N)*	
411.18	30.2	Anomalistic year	*h-p*	
3177	21.5	Lunar orbit perigee revolution period	*p*	
1588.8	29.8	1/2 of Lunar orbit perigee revolution period	*2p*	

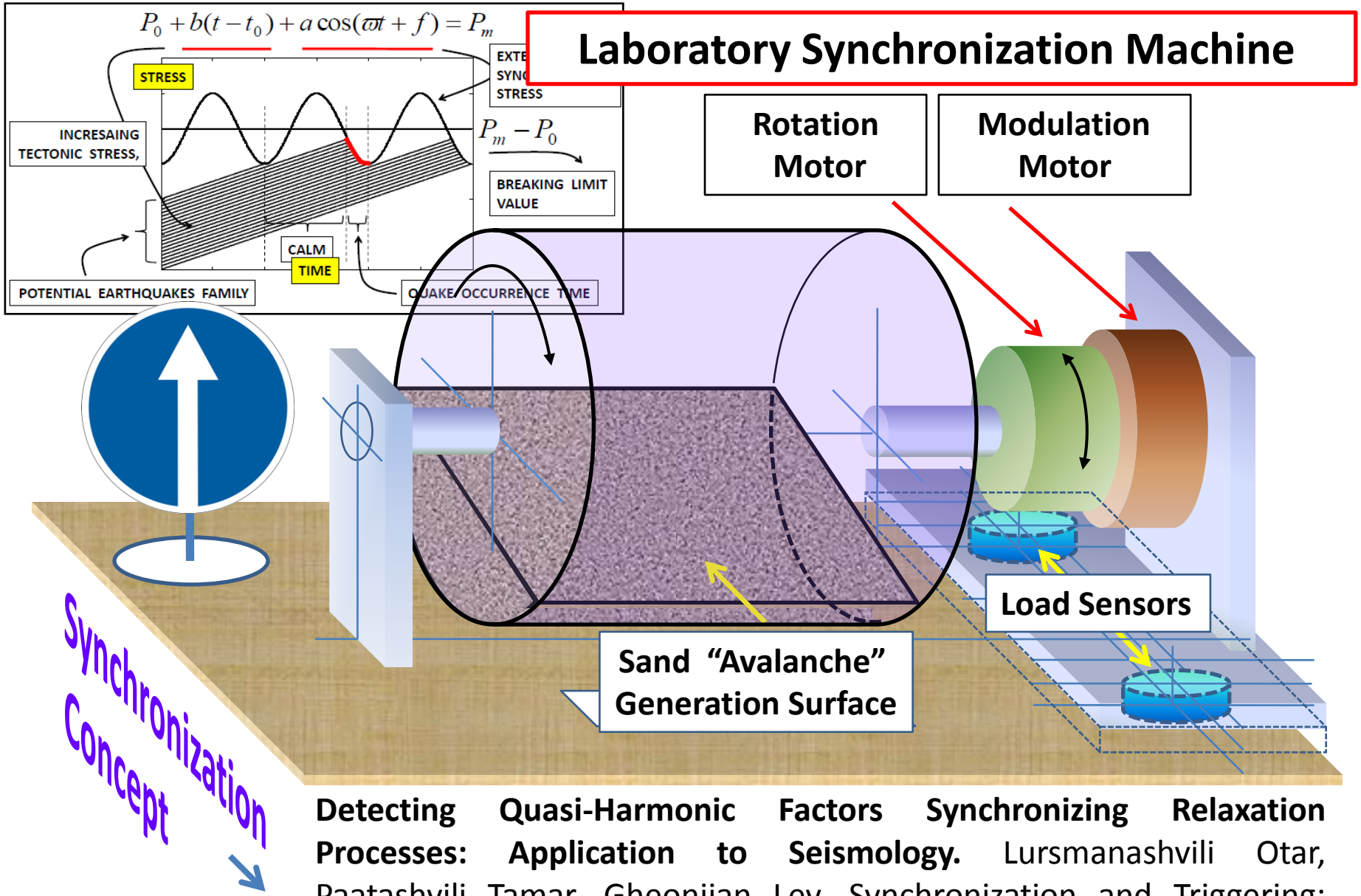
CONCLUSION: POSSIBLE EARTHQUAKE OCCURRENCE TIME INTERVALS FOR CAUCASUS CAN BE CALCULATED – RELIABLE TIME CONCEPT

EARTHQUAKE PREDICTION PROBLEM FROM ENGINEERING POINT OF VIEW: RELIABLE THEORY AND LABORATORY MODEL EXISTS

SELF ORGANIZATION & TIDAL SYNCHRONIZATION MODEL



Modulation and Load Difference Signals



Detecting Quasi-Harmonic Factors Synchronizing Relaxation Processes: Application to Seismology. Lursmanashvili Otar, Paatashvili Tamar, Gheonjian Lev. Synchronization and Triggering: from Fracture to Earthquake Processes. Springer, Geoplanet: Earth and Planetary Sciences, vol. 1, pp. 305-322, 2010.

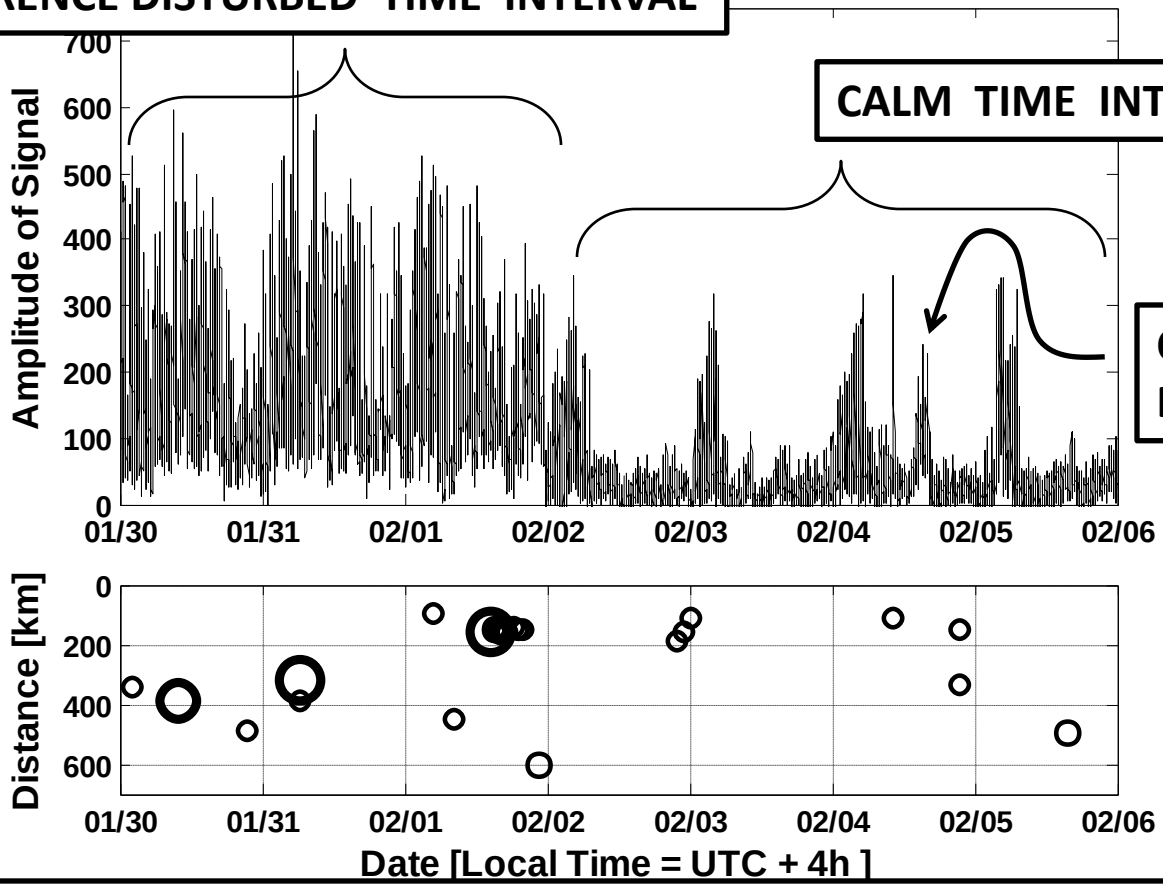
EARTHQUAKE PREDICTION PROBLEM FROM ENGINEERING POINT OF VIEW: RELIABLE PRECURSOR SIGNAL IS OBSERVED

IEEE TSU ELF MONITOR

QUAKE OCCURRENCE DISTURBED TIME INTERVAL

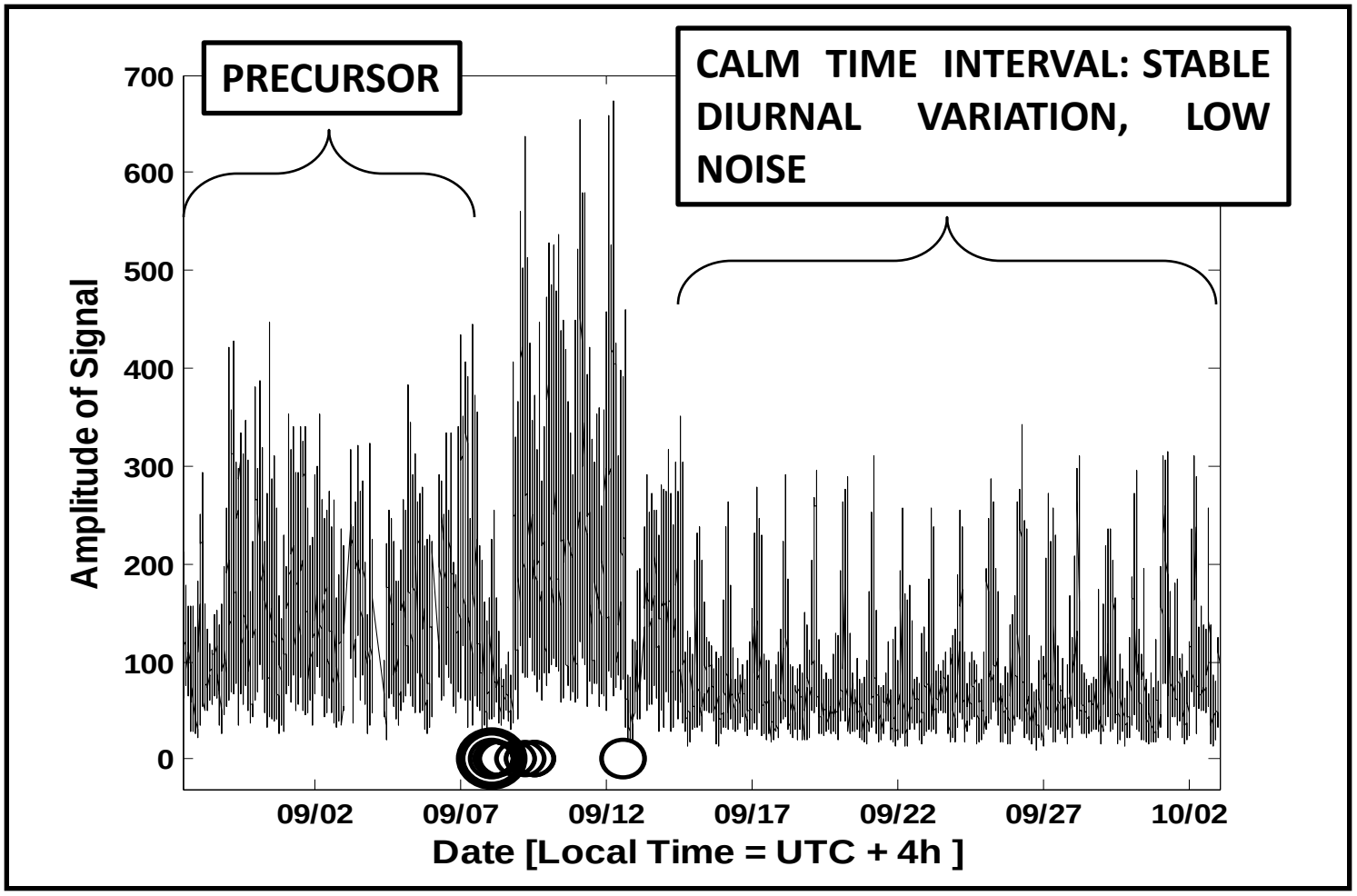
CALM TIME INTERVAL

CORONAL MASS EJECTION



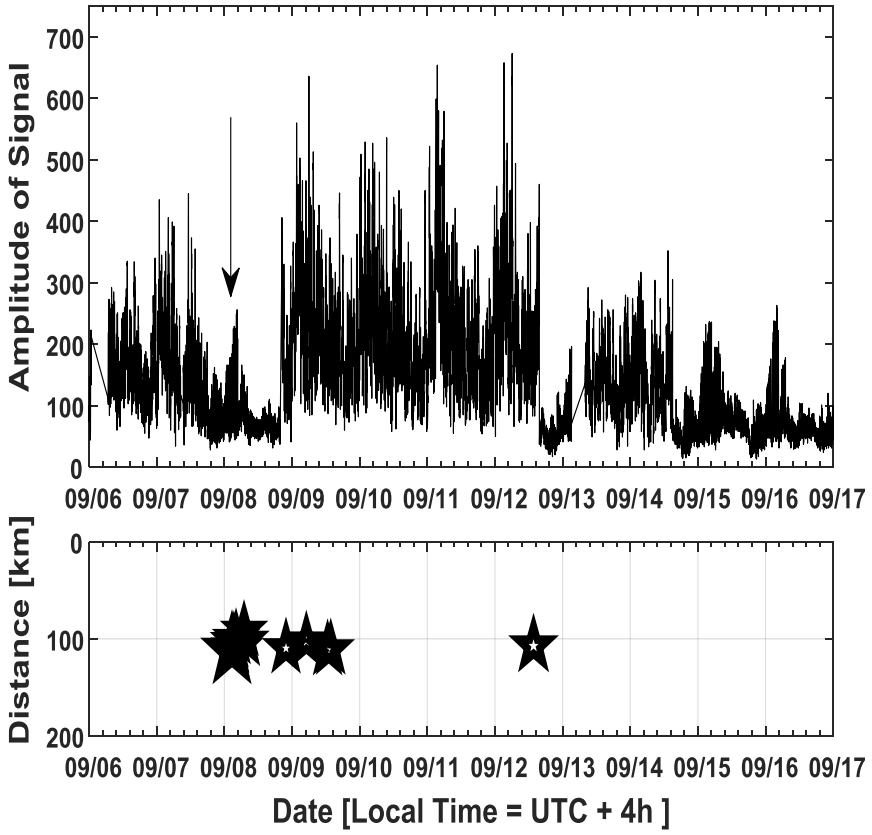
ELF MONITOR DATA AND SEISMIC SITUATION REPRESENTATION FORM

EARTHQUAKE PREDICTION PROBLEM FROM ENGINEERING POINT OF VIEW: RELIABLE PRECURSOR EXISTS

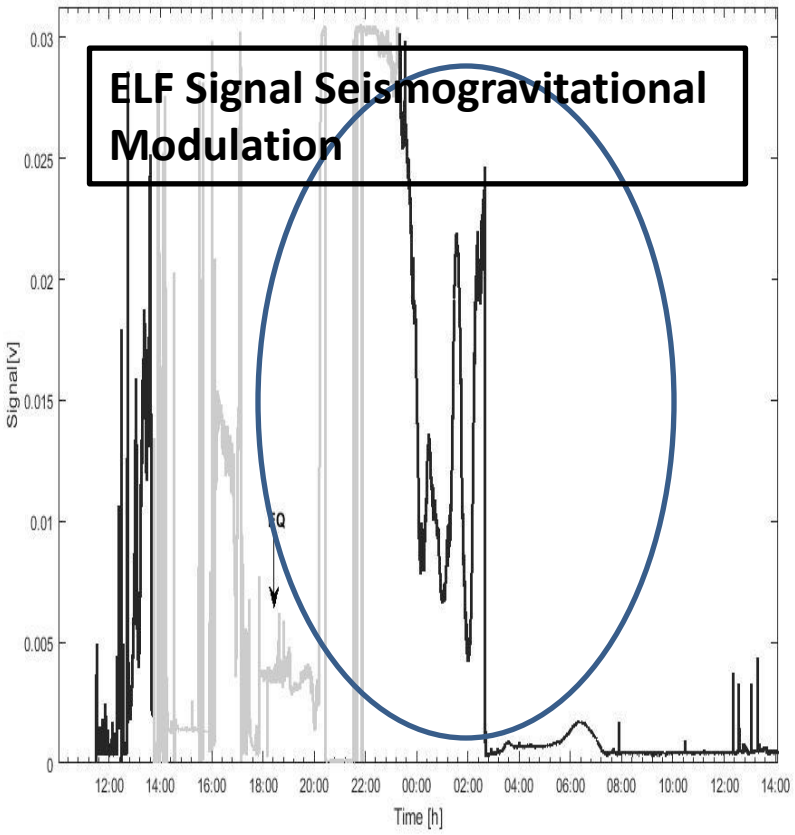


M 6.0 EARTHQUAKE PRECURSOR, ONI, 07.09.2009, 100 km DISTANCE

EARTHQUAKE PREDICTION PROBLEM FROM ENGINEERING POINT OF VIEW: RELIABLE PRECURSOR SIGNAL HAS AN EXPLANATION

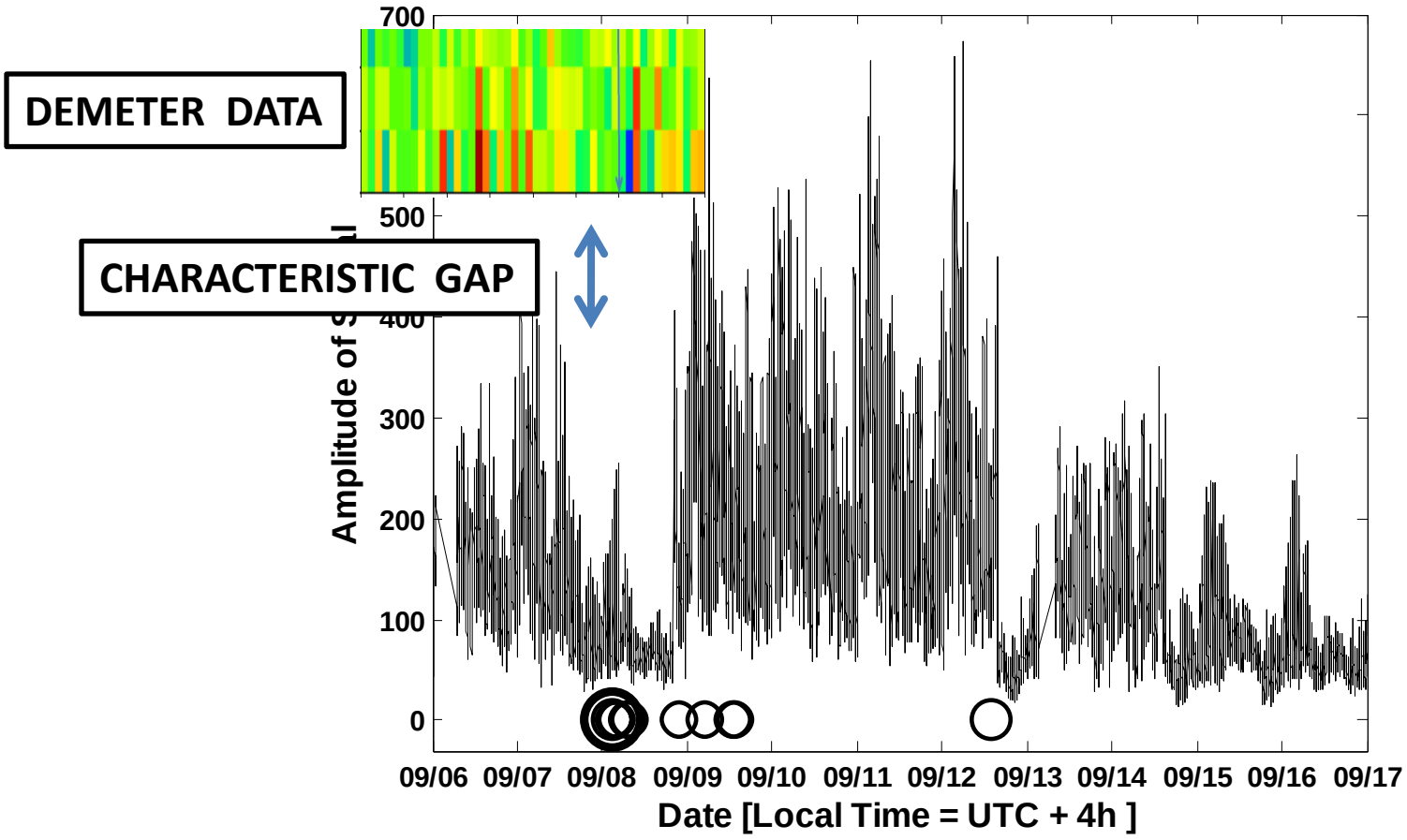


ONI, M6.0, 07.09.2009, 100km

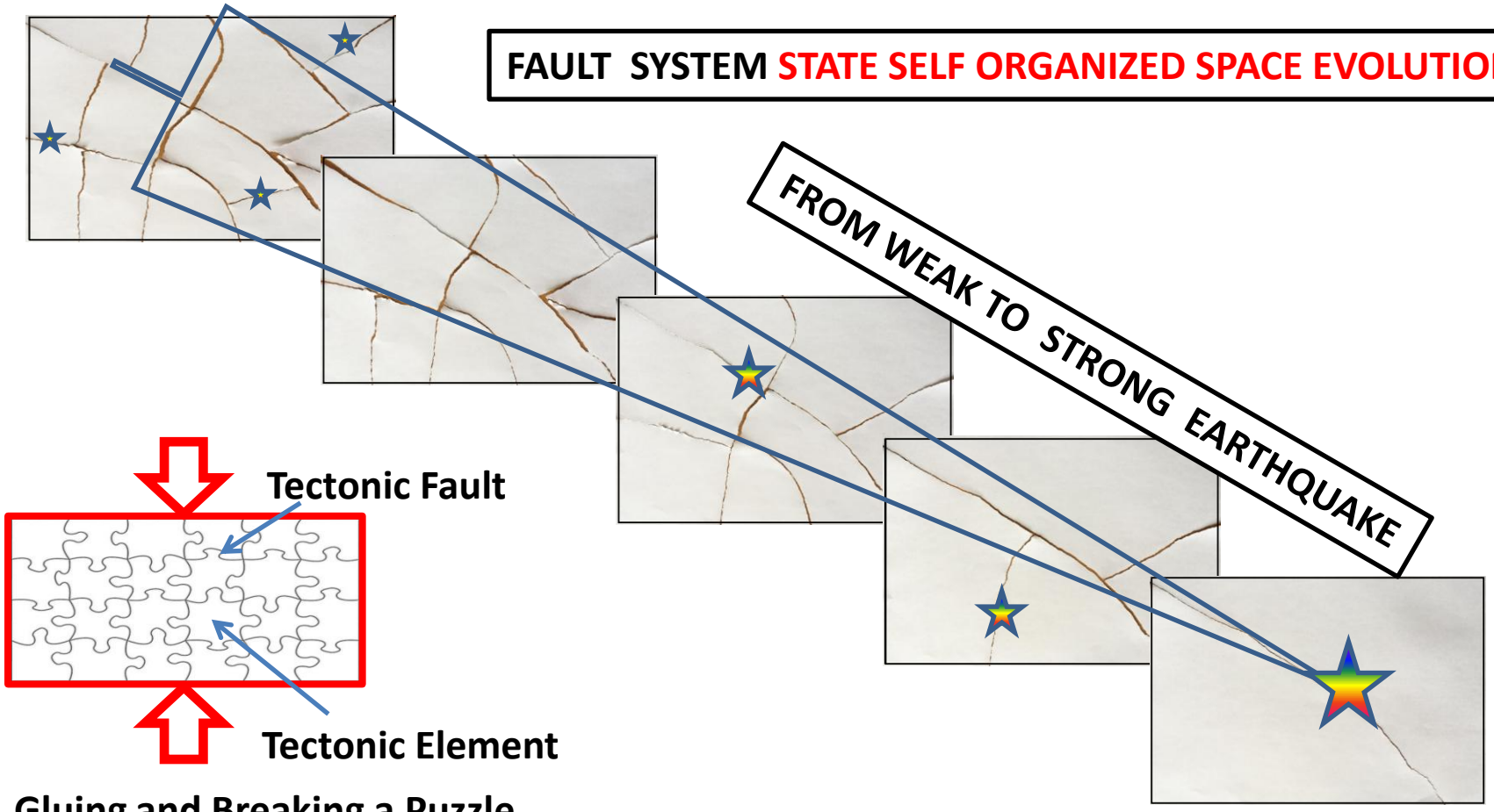


ZAKATALA, M5.1 , 2013, 150 km

EARTHQUAKE PREDICTION PROBLEM FROM ENGINEERING POINT OF VIEW: EXISTS RELIABLE STATISTICAL CONFIRMATION OF PRECURSOR– DEMETER PROJECT SPACE OBSERVATIONS

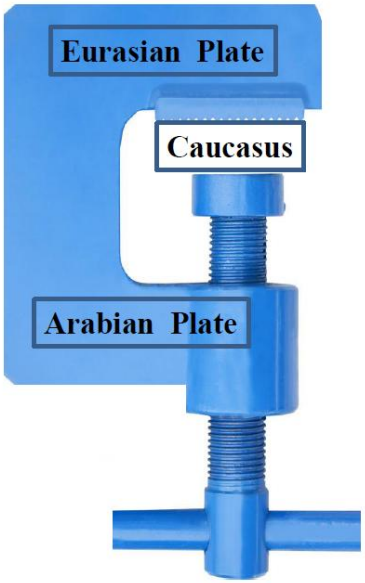


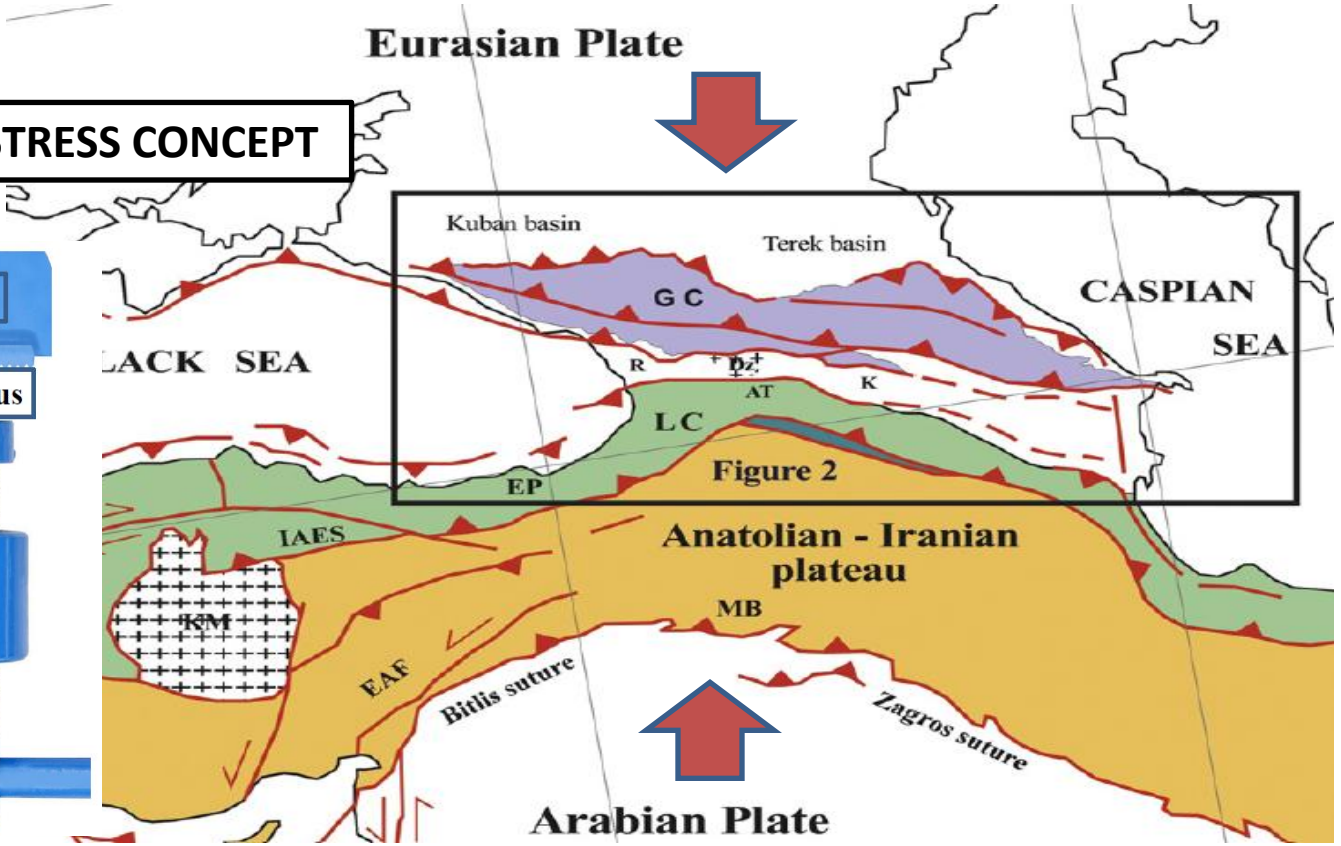
EARTHQUAKE PREDICTION PROBLEM FROM ENGINEERING POINT OF VIEW: THE PROCESS HAS RELIABLE SCIENTIFIC CONCEPT



EARTHQUAKE PREDICTION PROBLEM FROM ENGINEERING POINT OF VIEW: THE PROCESS HAS RELIABLE TECTONIC CONCEPT

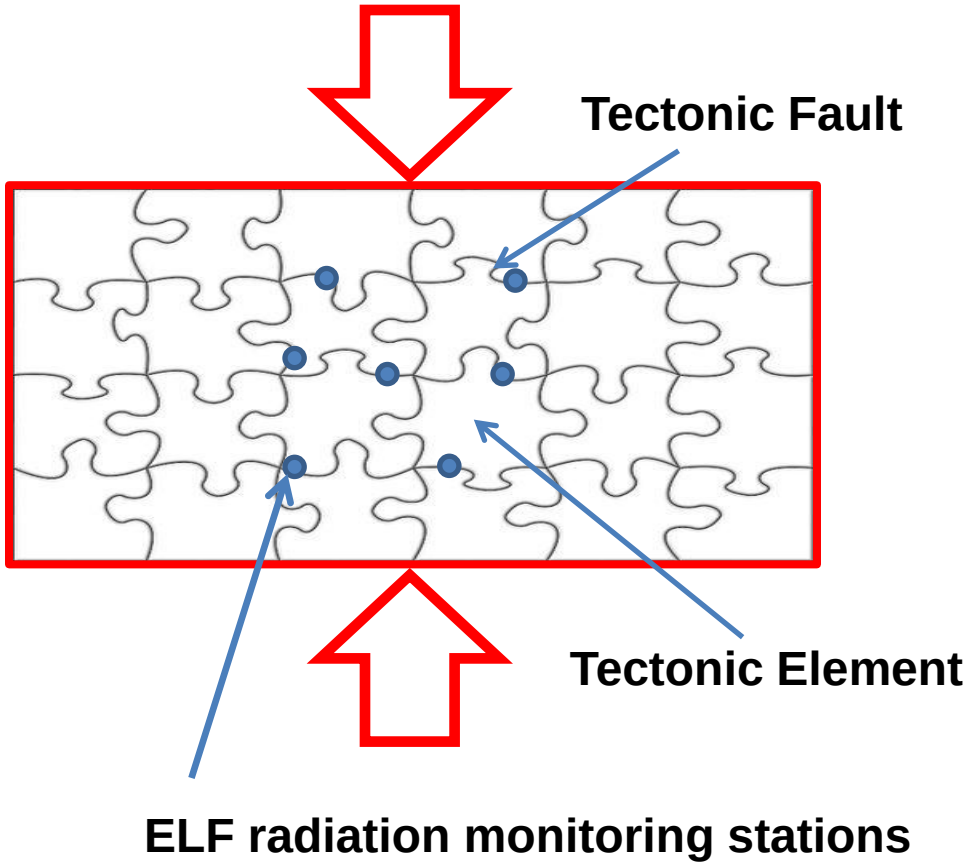
CAUCASUS STRESS CONCEPT





EARTHQUAKE PREDICTION PROBLEM FROM ENGINEERING POINT OF VIEW: EXISTS RELIABLE ENGINEERING CONCEPT

Monitoring of geotectonic compression and main fault formation process by ELF radiation receiver stations



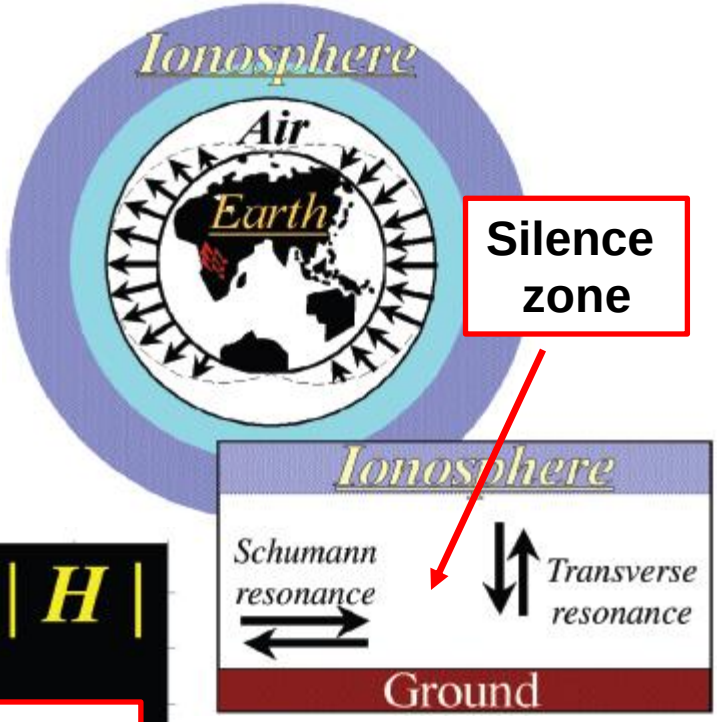
System of ELF Receivers 300-3000Hz

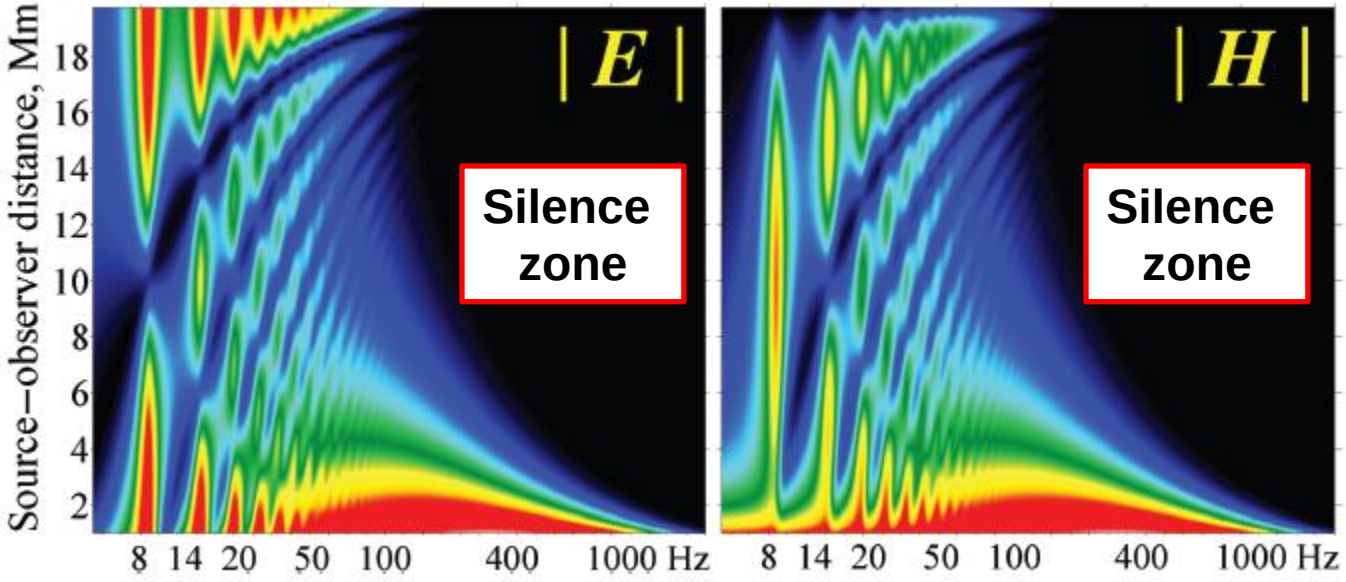
EARTHQUAKE PREDICTION PROBLEM FROM ENGINEERING POINT OF VIEW: EXISTS FAVORABLE FREQUENCY RANGE FOR THE FAULT STRESS STATE MONITORING IN ELF RADIO SILENCE ZONE

PROPAGATION OF EXTRIMELY LOW-FREQUENCY RADIO WAVES

1. INTRODUCTION

The extremely low frequencies (ELF) extend from 3Hz to 3kHz. This formal limit corresponds to real physical phenomena in subionospheric radio propagation: the Schuman resonance (SR) observed in the band between 4 and 40 Hz and the transverse resonance with the basic frequency about 1.7 kHz. When speaking about ELF radio waves, we usually have in mind the subionospheric propagation when electromagnetic waves travel in the spherical dielectric strata formed by the Earth's surface and the lower edge of the ionospheric plasma.





ALEXANDER P. NICKOLANEKO

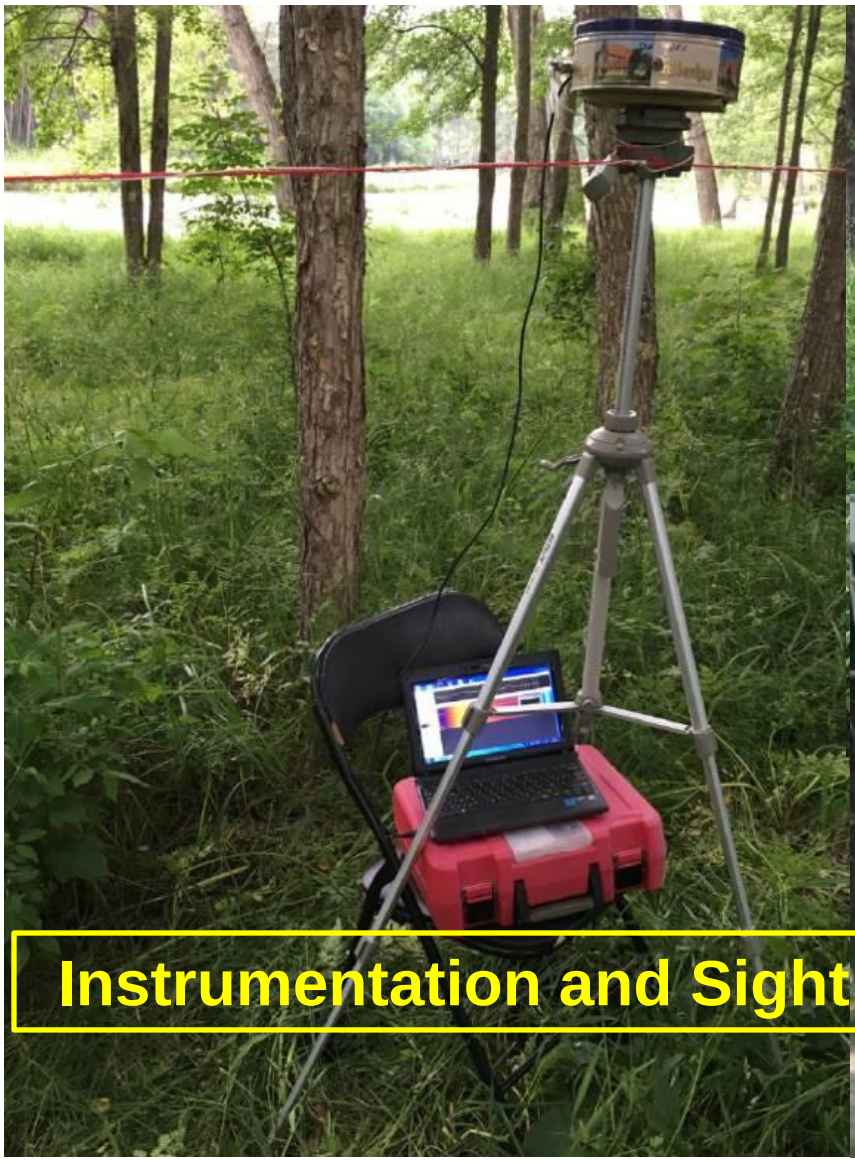
ALEXANDER V. SHVETS

MASASHI HAYAKAWA

EARTHQUAKE PREDICTION PROBLEM FROM ENGINEERING POINT OF VIEW: EXISTS RELIABLE PROJECT DEVELOPMENT STRATEGY AND TEAM

OUR RESEARCH TEAM WITH PROFESSOR DAVID POMERENKE: LECTURE, SEMINAR AND TRAINING ON RADIO WAVE PROPAGATION. 2017, Mt. DIDI ABULI, GEORGIA

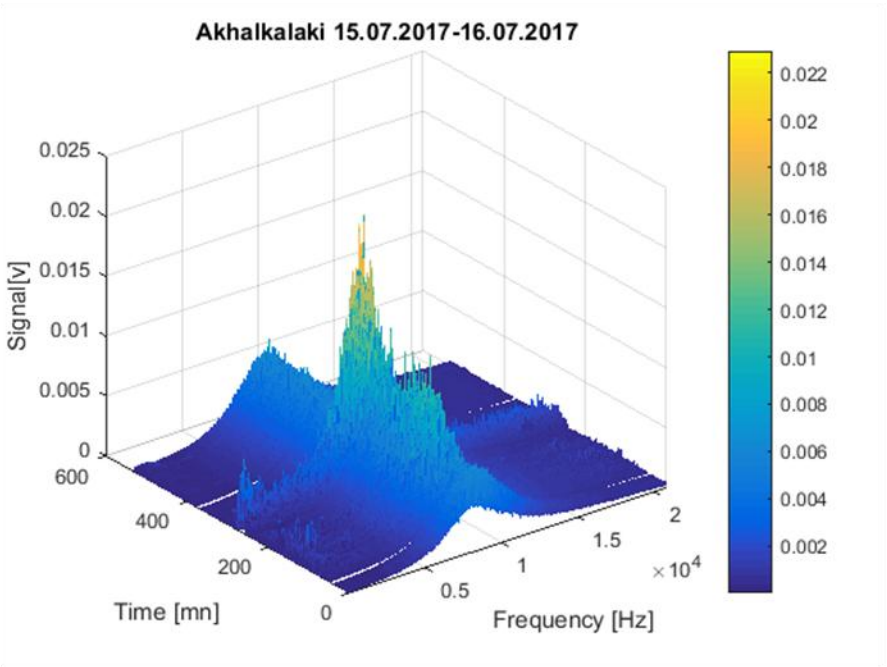
EARTHQUAKE PREDICTION PROBLEM FROM ENGINEERING POINT OF VIEW: RELIABLE INSTRUMENTATION PROTOTYPE IS CREATED

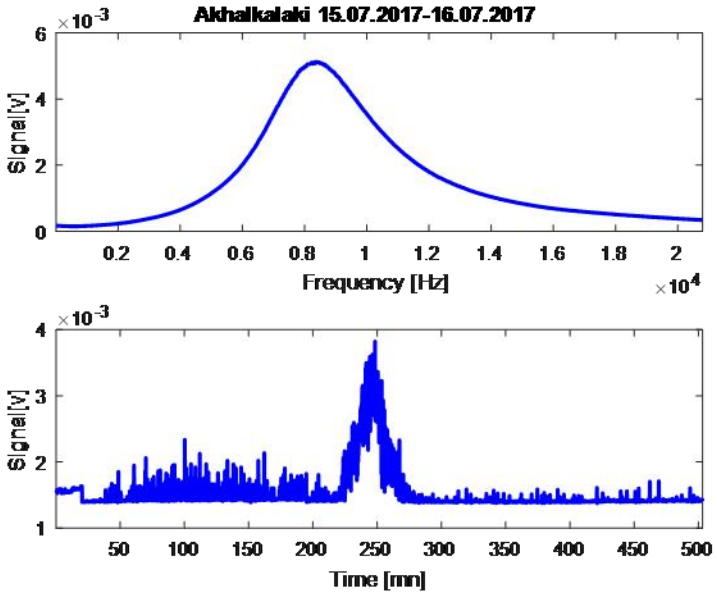


Instrumentation and Sight Testing

EARTHQUAKE PREDICTION PROBLEM FROM ENGINEERING POINT OF VIEW: WE HAVE RELIABLE TEST RESULTS

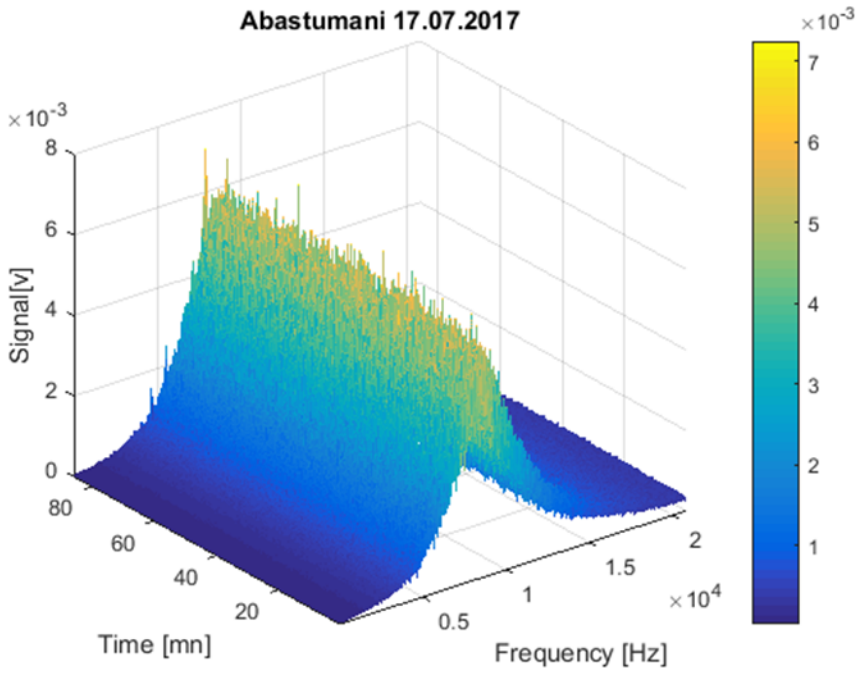
ELF Measurements in Akhalkalaki. Thunderstorm Preparation and Discharge Process

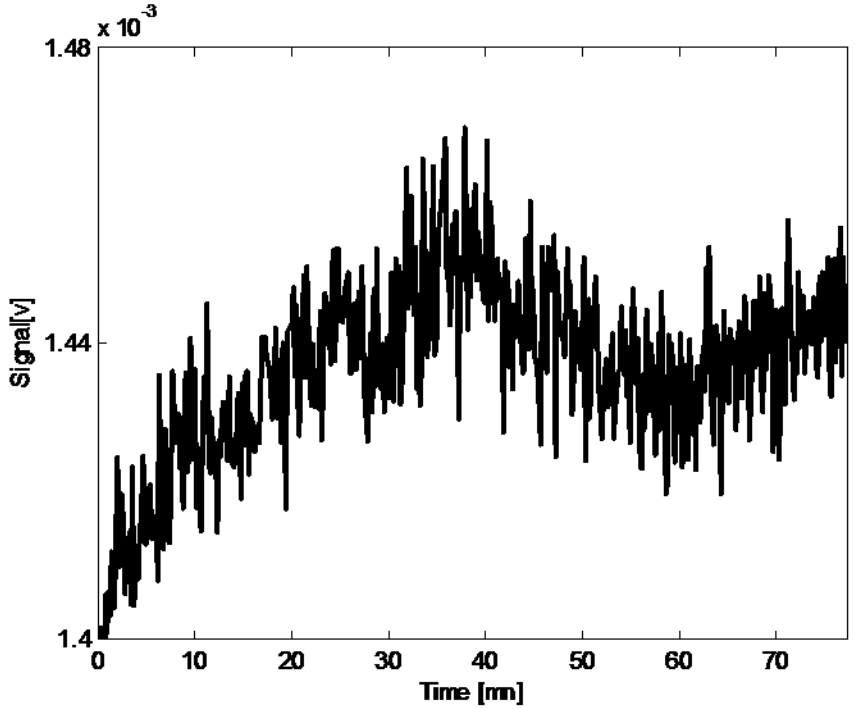




EARTHQUAKE PREDICTION PROBLEM FROM ENGINEERING POINT OF VIEW: WE HAVE RELIABLE TEST RESULTS

Measurements in Abastumani, Mt. Kanobili. Seismogravitation Wave Process Fragment





EARTHQUAKE PREDICTION PROBLEM FROM RESEARCH ENGINEERING POINT OF VIEW:

1. THE TASK - NATURAL PHENOMENON SYNCHRONIZATION-TRIGGERING DETECTION AND PREDICTION,
2. SYNCHRONIZATION FREQUENCIES ARE IDENTIFIED,
3. RELIABLE THEORY AND LABORATORY MODEL EXISTS,
4. RELIABLE TRIGGERING PRECURSOR SIGNAL IS OBSERVED,
5. EARTHQUAKE RELIABLE PRECURSOR EXISTS,
6. RELIABLE PRECURSOR SIGNAL HAS AN EXPLANATION,
7. EXISTS RELIABLE STATISTICAL CONFIRMATION OF PRECURSOR,
8. THE PROCESS HAS RELIABLE SCIENTIFIC CONCEPT,
9. EXISTS RELIABLE ENGINEERING CONCEPT,
10. EXISTS FAVORABLE FREQUENCY RANGE FOR ELF OBSERVATIONS,
11. EXISTS RELIABLE PROJECT DEVELOPMENT STRATEGY AND TEAM,
12. RELIABLE INSTRUMENTATION PROTOTYPE IS CREATED,
13. TESTING OF THR PROTITYPE WAS SUCCESSFUL,

WE HAVE EVERYTHING TO START INTERNATIONAL STUDENT RESEARCH ENGINEERING PROJECT.