

SEISMIC WAVES AND ITS **TIME PREDICTION** **MODELING**

by

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EARTHQUAKE PREDICTION

- Introduction

- Earthquake prediction is widely recognized among the most challenging scientific problems, both due to its societal relevance and to the intrinsic complexity of the problem
- Can we predict earthquake? The question remains a subject of numerous controversial discussions and debates although there exists some indirect approaches like deterministic and statistical (Probabilistic) methods but the main emphasis in my work is neither of those two.
- Existing Prediction methods are based on the study of seismic precursors phenomena (things that happen or rock properties that change prior to an earthquake). By pattern recognition technique duplicates and errors can be detected.



What Does It Mean To Predict an Earthquake

- To Predict an Earthquake means to indicate the possibilities that an earthquake will occur in a given range of
 - Space:
Geographical area within which it will occur
 - Time:
Time interval within which it will happen
 - Magnitude :
Expected magnitude
- So that ultimate success or failure of the prediction can readily be judged.

Stages of Earthquake Prediction

- Term-less Prediction of earthquake – prone areas.
- Prediction of time and location of an earthquake of certain magnitude.

Temporal, in Years		Spatial, in Source zone Size L	
Long –term	10	Long –term	up to 100
Intermediate term	1	Middle range	5-10
Short term	.01-0.1	Narrow	2-3
Immediate	0.001	exact	1

- Among all these approaches, the intermediate term middle range prediction approach has been utilized, and briefly described in the next slide



Middle- Range Intermediate – term Prediction

- Currently a realistic goal appears to be the middle range intermediate term prediction, which involves an area with linear dimensions about ten times larger than the linear dimensions of the impending event and a time uncertainty of years.



Data for Precursor Detection

- Therefore catalogue of earthquake remain the most objective record of seismic activity . It is a common knowledge that catalogues have errors, whose identification and elimination is desirable.

Algorithm For Middle Range Intermediate term Prediction

Algorithm globally tested for prediction are :

M8 algorithm (Keilis Borok and Kossobokov, 1987;

Kossobokov et al, 1999)**CN algorithm** (Gabriellov et al., 1986;
Rotwain and Novikova, 1999)

- They identify the TIPS (time increase probability)
- For the occurrence of a strong earthquake

MSC (Mendocino Scenario, Kossobakov, keilis Borok and Smith, 1990,
Kossobokov et al, 1999)

- Can be applied as a second approximation of M8. It allows us to reduce significantly the area of alarm (to a factor from 5 to 20)
- These algorithms are already tested using routine monitoring observation seismic activity data for Italy by A. Peresan, V. Kossobobkov , L. Romashkova, G. F. Panza



methodology

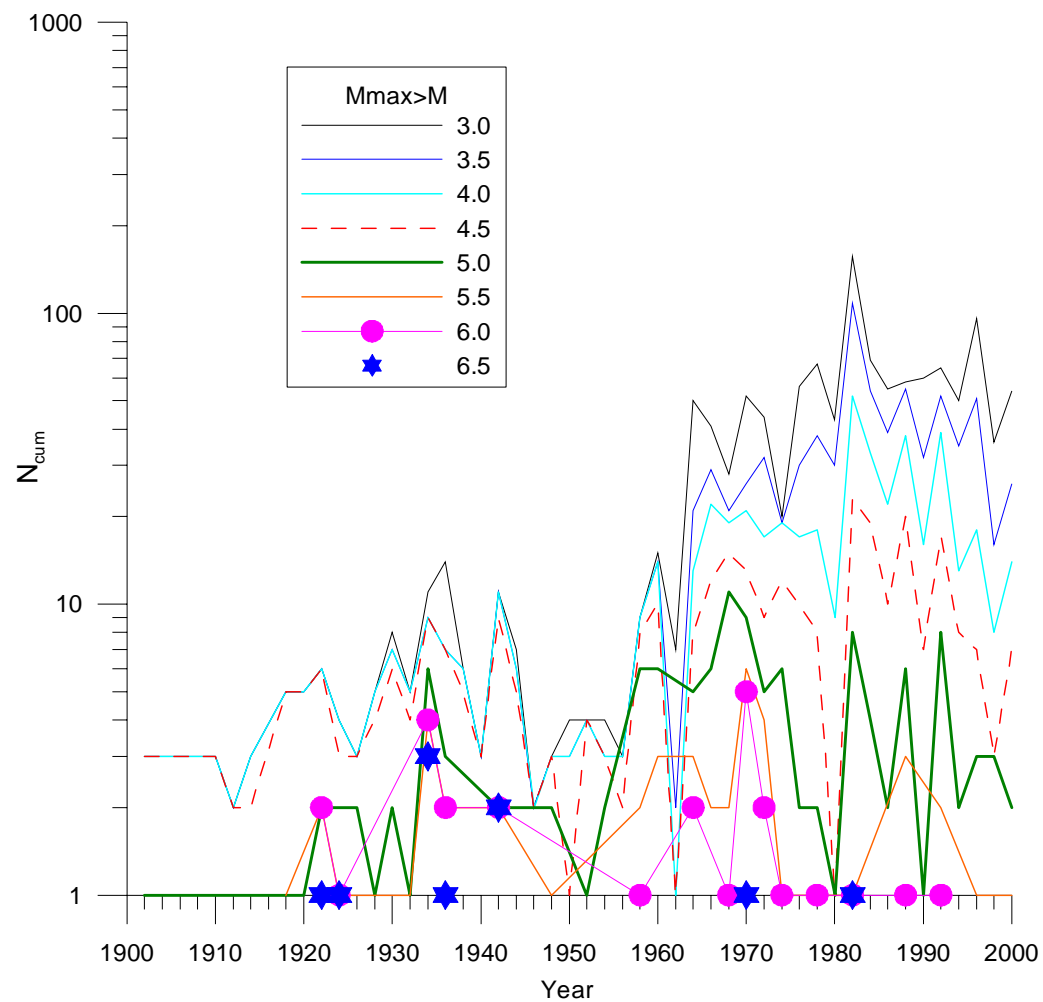
- The general methodology common to the two different algorithms makes use of general concept of pattern recognition that permit to deal with multiple sets of precursors and allows for systematic monitoring of seismicity.

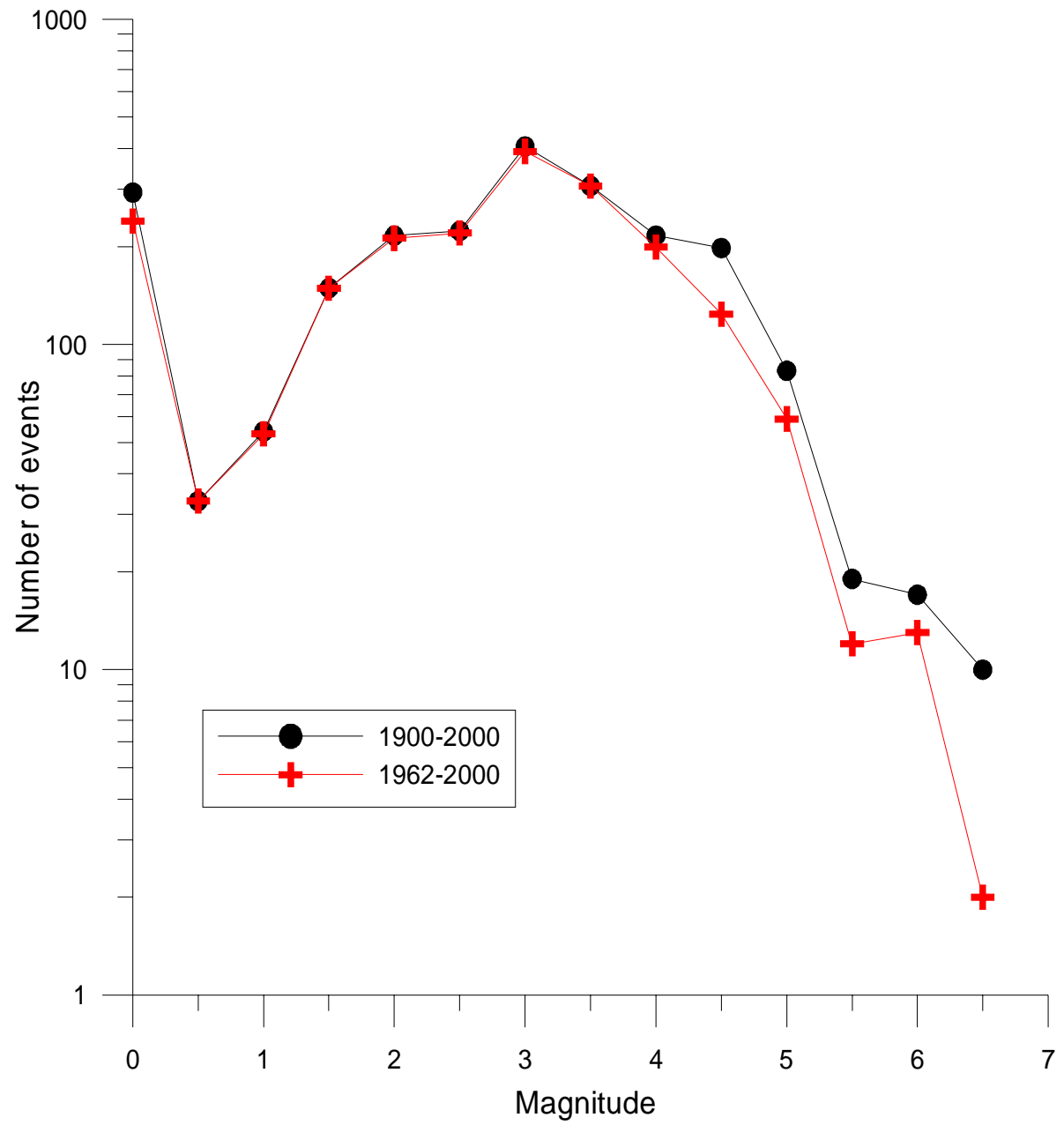
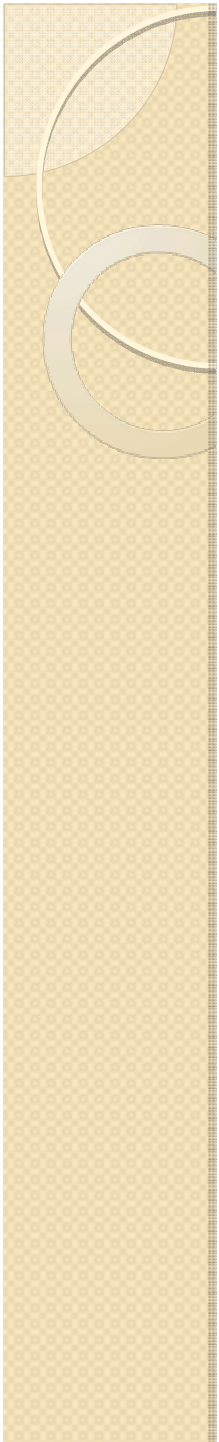


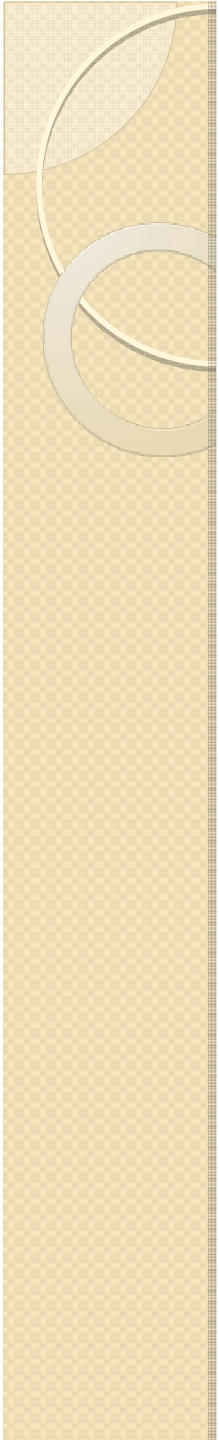
My objectives:

- To test the feasibility of earthquake prediction methods
- To analyze the earthquake data for the Quetta Balochistan region for the period of 30 years and do the prediction modeling

Catalog of seismicity for the Quetta region







Thank you