

# A Deep-Learning Parallel Processing Agglomerative Algorithm for the Identification of Distinct Seismic Regions in the Southern Hellenic Seismic Arc

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ALL SEISMIC EVENTS SORTED BY TIME OF OCCURRENCE

ENTER "NON-CLUSTERED EVENTS' PROCESSING LOOP"  
 CURRENT PROCESS EVENT = FIRST SEISMIC EVENT

ENTER "MAIN EVENT CLUSTERING LOOP"

CALCULATE CURRENT PROCESS EVENT STRAIN RADIUS  
 CALCULATE CURRENT PROCESS EVENT TIME WINDOW  
 IF CURRENT PROCESS EVENT BELONGS TO A CLUSTER:  
 MERGE CURRENT PROCESSED EVENT TO CLUSTER  
 CURRENT PROCESS EVENT = NEXT UNPROCESS EVENT  
 LOOP TO "MAIN EVENT CLUSTERING LOOP"

ELSE

CREATE NEW CLUSTER INCLUDING ALL EVENTS  
 WITHIN STRAIN RADIUS AND TIME WINDOW OF  
 CURRENT PROCESS EVENT

IF CURRENT PROCESS EVENT MAGNITUDE IS NOT  
 MAXIMUM MAGNITUDE IN THE CLUSTER  
 CURRENT PROCESS EVENT = MAXIMUM MAGNITUDE  
 EVENT OF THE NEW CLUSTER  
 END "MAIN EVENT CLUSTERING LOOP"

MAIN EVENT OF THE NEWLY-CREATED CLUSTER =  
 CURRENT PROCESS EVENT

IF THERE IS AN UNPROCESS EVENT NEXT  
 CURRENT PROCESS EVENT = UNPROCESS EVENT  
 LOOP TO "ENTER MAIN EVENT CLUSTERING LOOP"

ELSE

FIND ALL UNCLUSTERED EVENTS

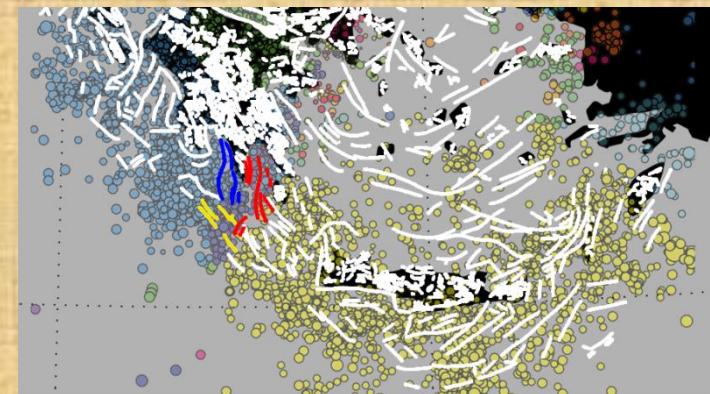
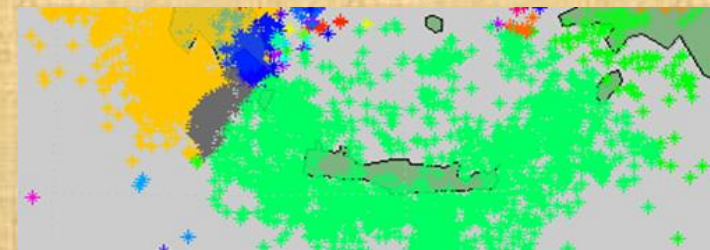
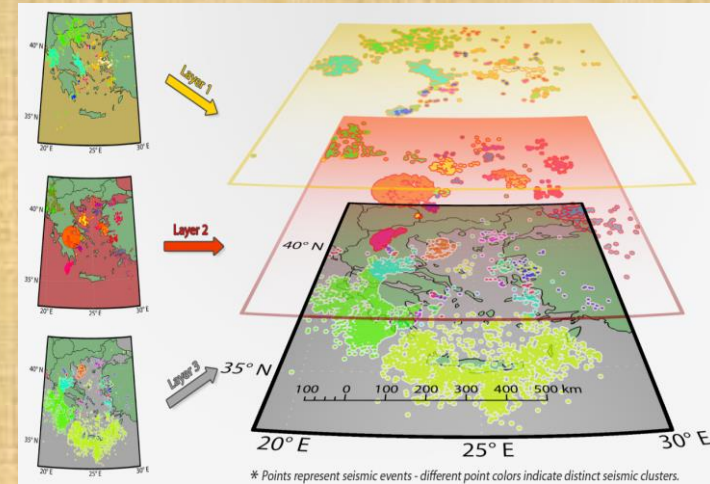
IF UNCLUSTERED EVENTS STILL  
 PROCESSED DATASET REDUCED TO UNCLUSTERED  
 EVENTS  
 LOOP TO "CURRENT PROCESS EVENT = FIRST SEISMIC  
 EVENT"

ELSE

END "NON-CLUSTERED EVENTS' PROCESSING LOOP"

DISPLAY SEISMIC CLUSTERS

*This research work unveils the potential presence of a distinct seismic region located in between the Ionian and the Cretan see, south-east of Peloponnesus, Greece. This observation has emerged as a result of the development and application of a self developed parallel spatio-temporal clustering algorithm based on expert knowledge and upon seismic data kindly provided by the Geodynamics Institute of Athens. These findings are further supported by geological observations, which reveal the presence of two parallel groups of underground faults directly underneath the, classed as, potentially distinct seismic region. The remaining spatio-temporal clustering results throughout the Greek vicinity are well in accordance with empirical observations reported in the literature and appear to coincide with parallel-clustered underground fault mappings in the Greek vicinity.*



$$t_{before} = 10^{(0.5 M - 2.1)} \text{ days}, \quad t_{after} = 10^{(0.51 M - 1.15)} \text{ days}, \quad \rho = 10^{0.414 M - 1.696} \text{ km}$$

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