SEISMIC HAZARD OF HISTORICAL HERITAGE IN ALBANIA

Anila XHAHYSA, Neki KUKA, Migena CEYHAN

Institute of Geosciences in Albania in collaboration with Global Earthquake Foundation Model

Albania Seismic Hazard Model Overview

o The collaboration between GEM and IGEO has been essential in enhancing Albania's seismic hazard modeling capabilities.

o By leveraging GEM's advanced methodologies and tools, particularly the OpenQuake Engine, IGEO has enhanced its ability to independently create, update, and refine seismic hazard models.

o This partnership supports the adoption of Eurocode 8 standards, promoting earthquake-resistant construction practices.
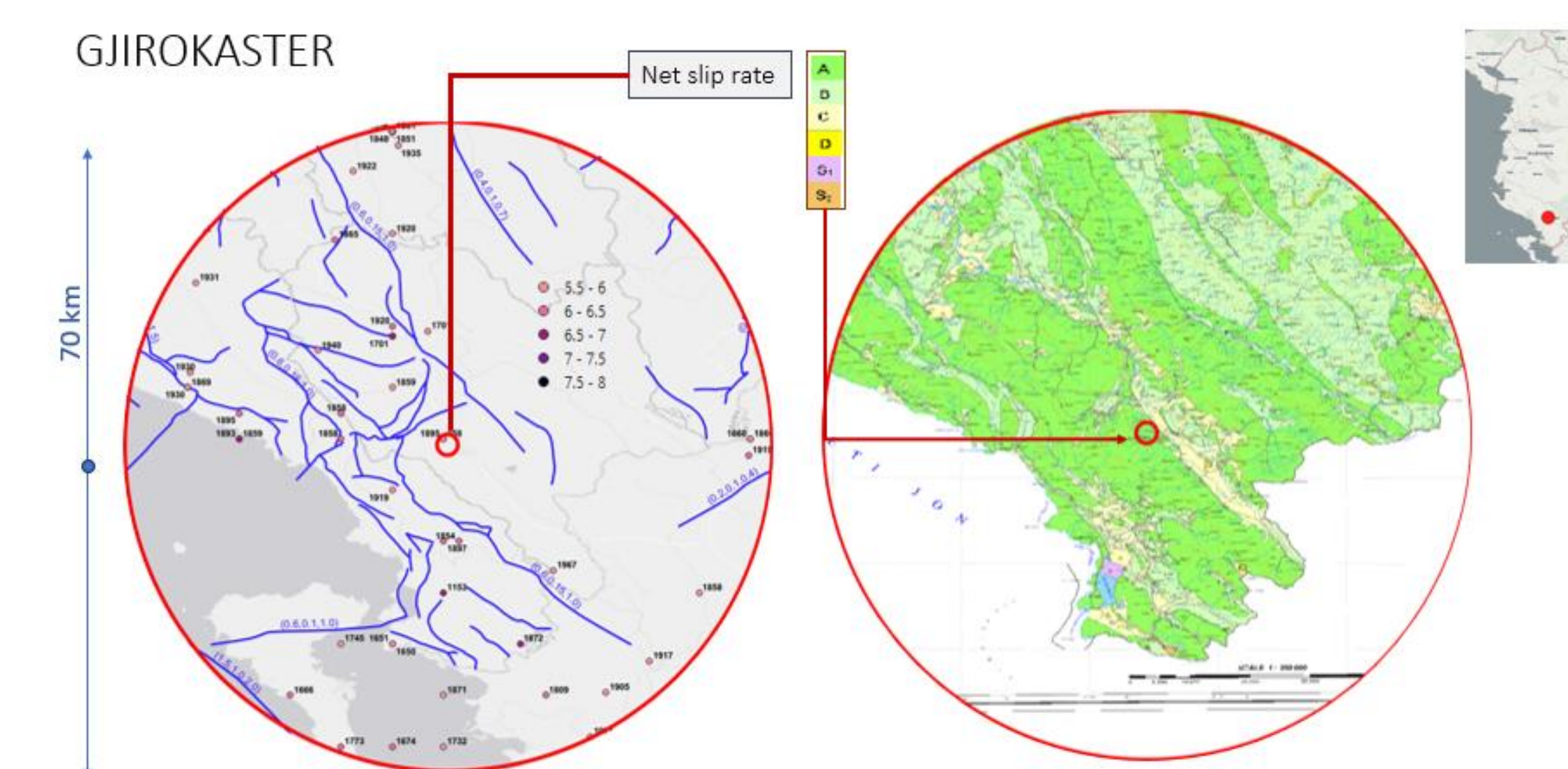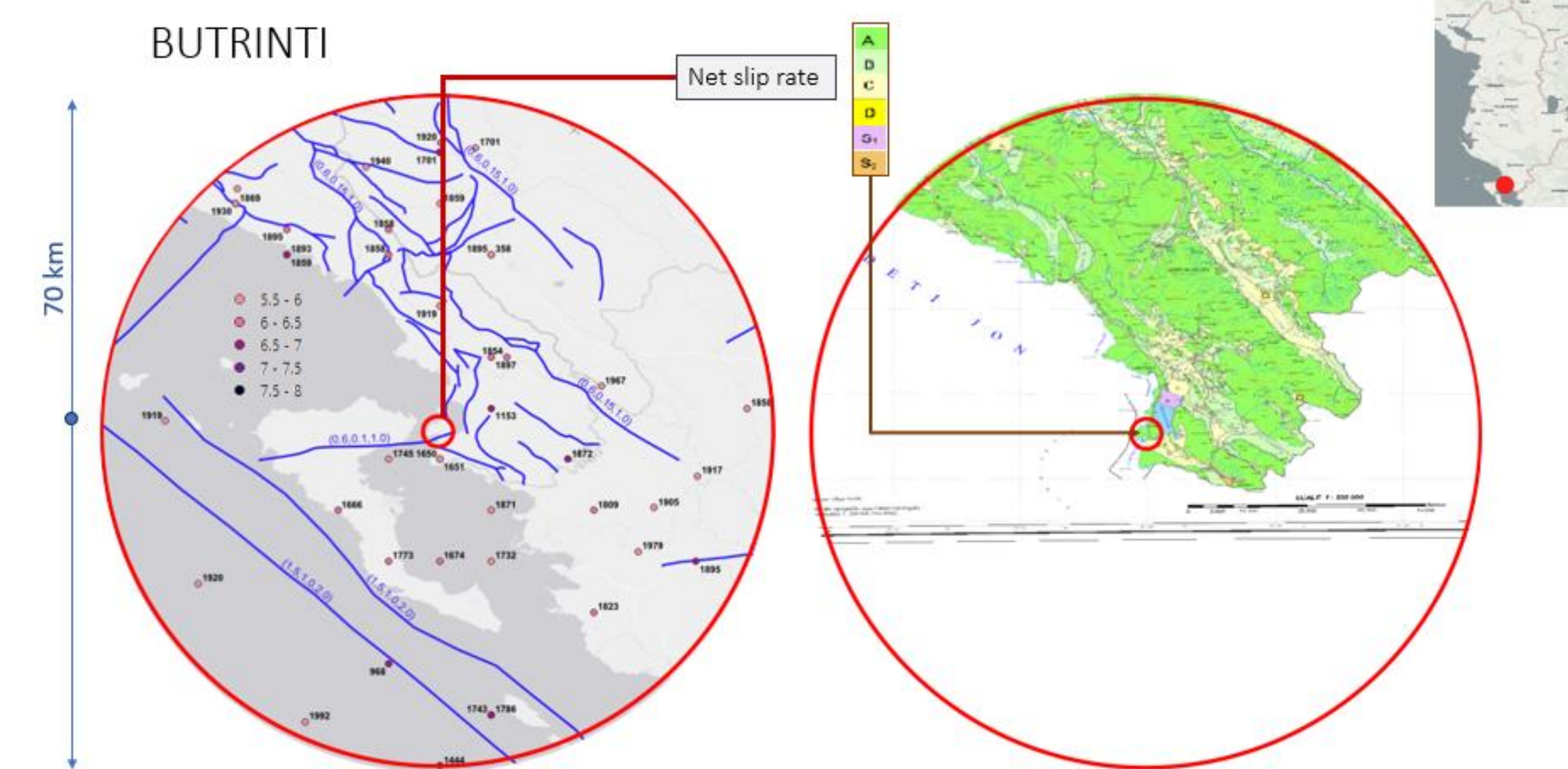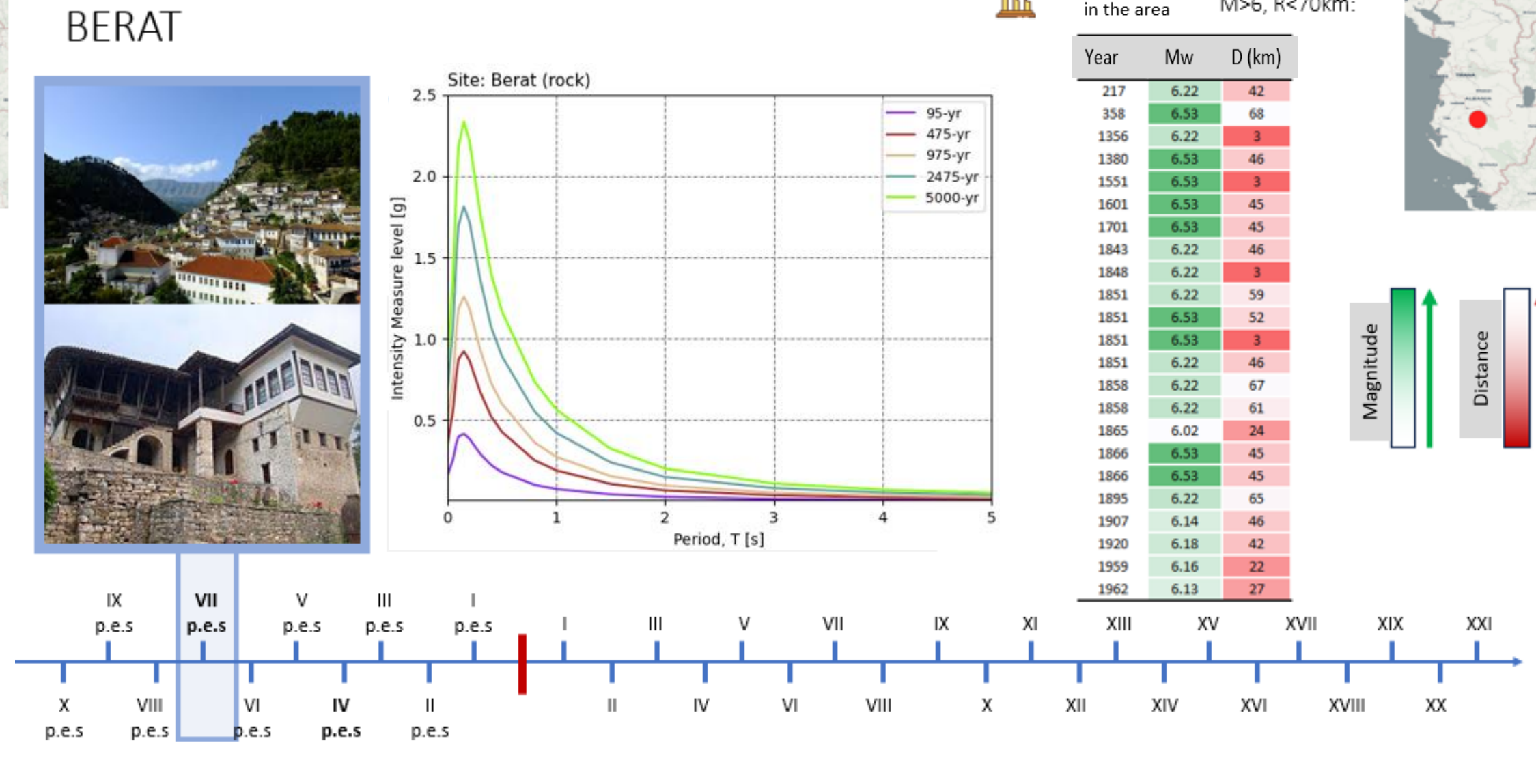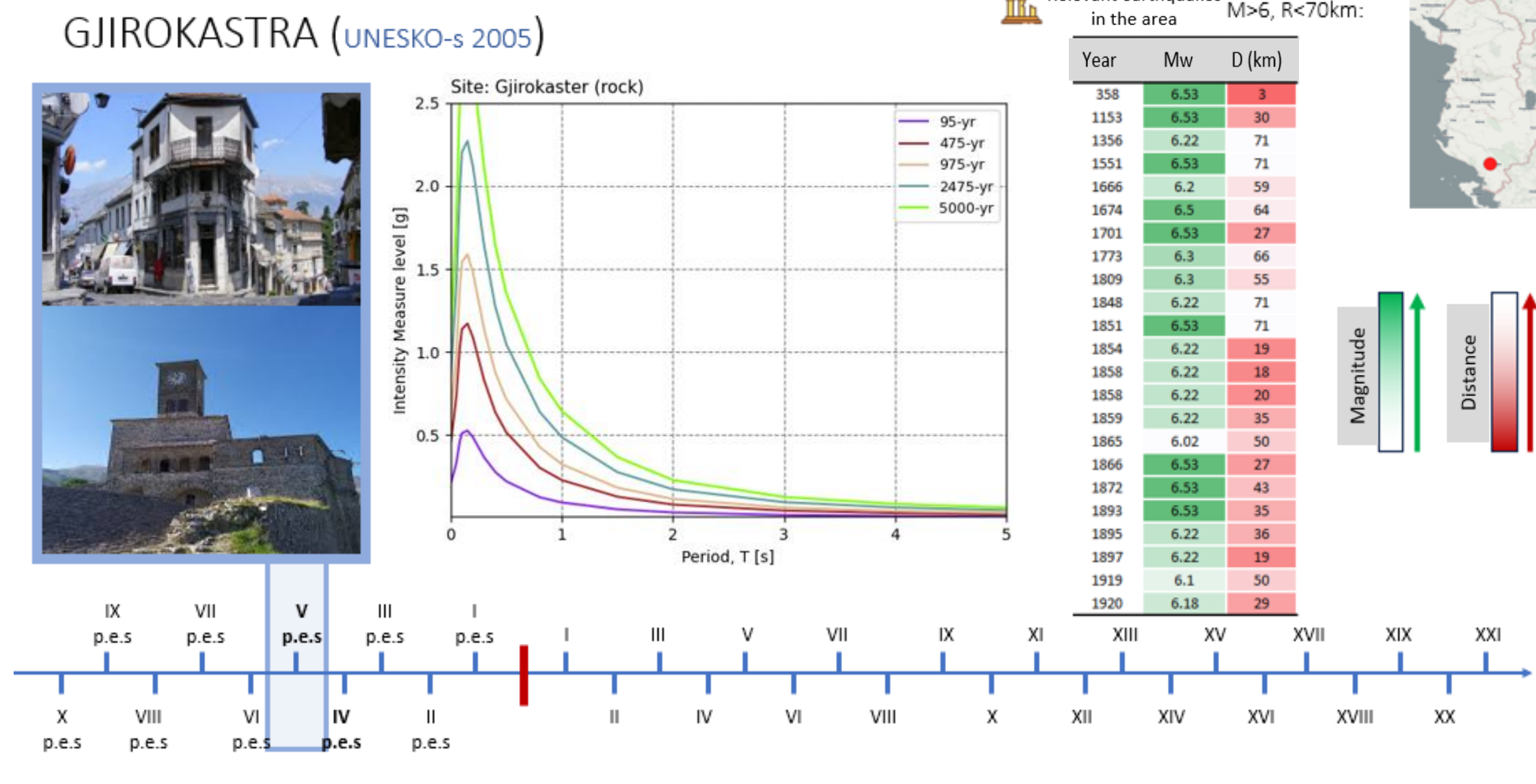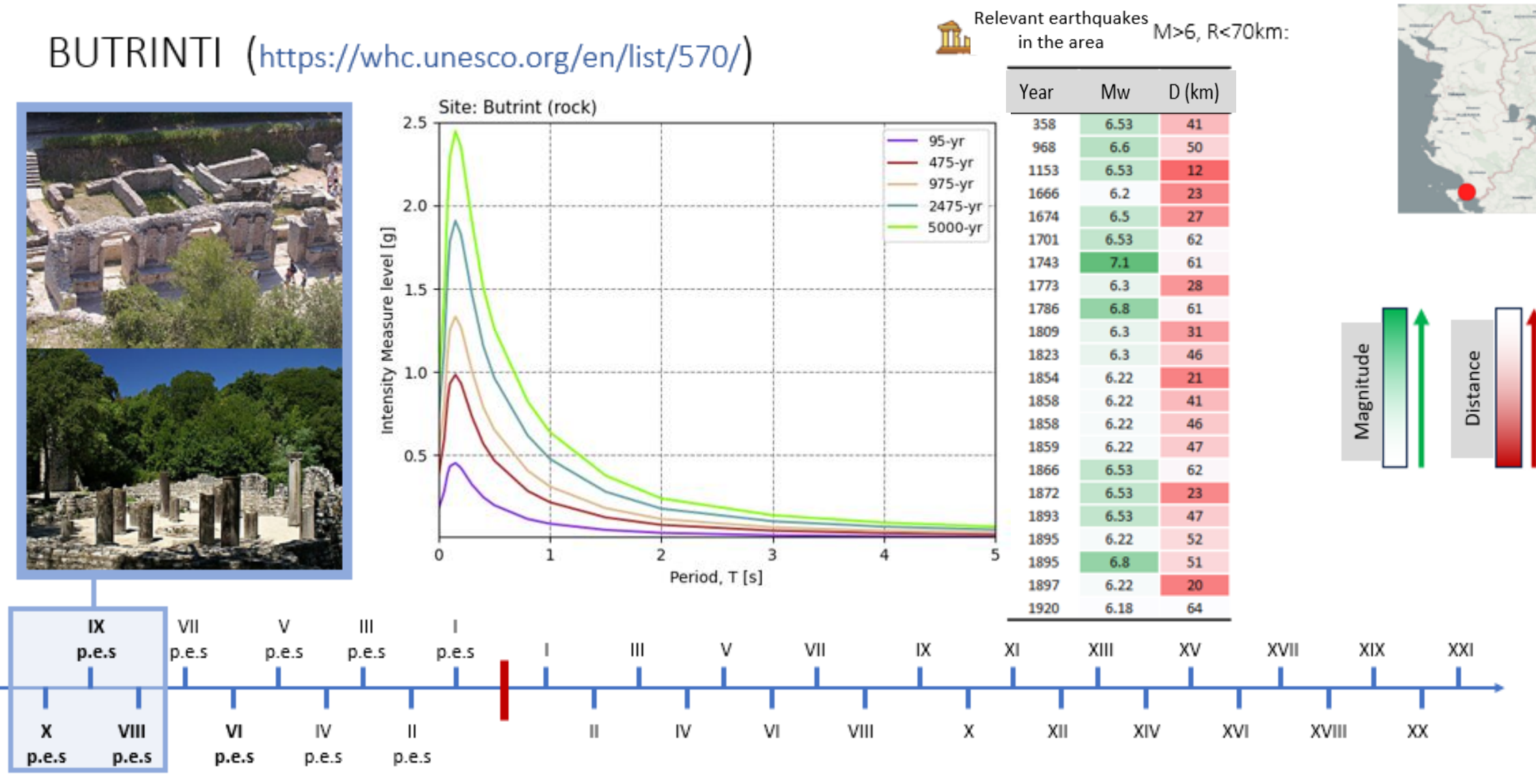
IMPORTANT STATISTICS:

o 46,000 earthquakes in the catalogue for a polygon 300 km beyond the border of Albania

o Updated regression equations for Mw proxy yielding a homogeneous earthquake catalogue in terms of Mw.

o Refine magnitude and location of 168 earthquakes using the relevant macroseismic datapoints and Boxer methodology.

o Residual analysis for 1600 strong motion records of 318 earthquakes.

o Three seismic source models (ASHM,ESHM,SSM1)

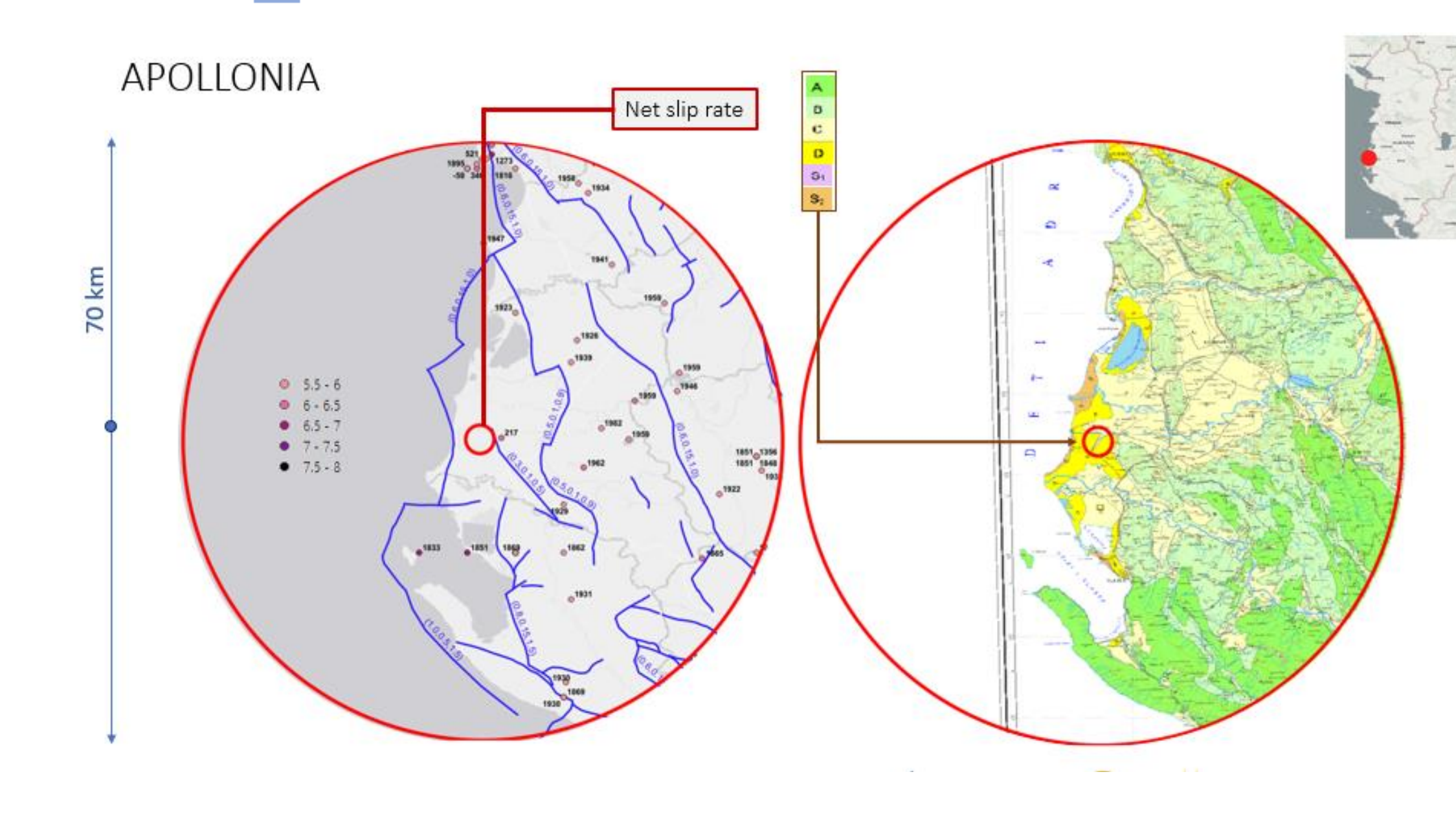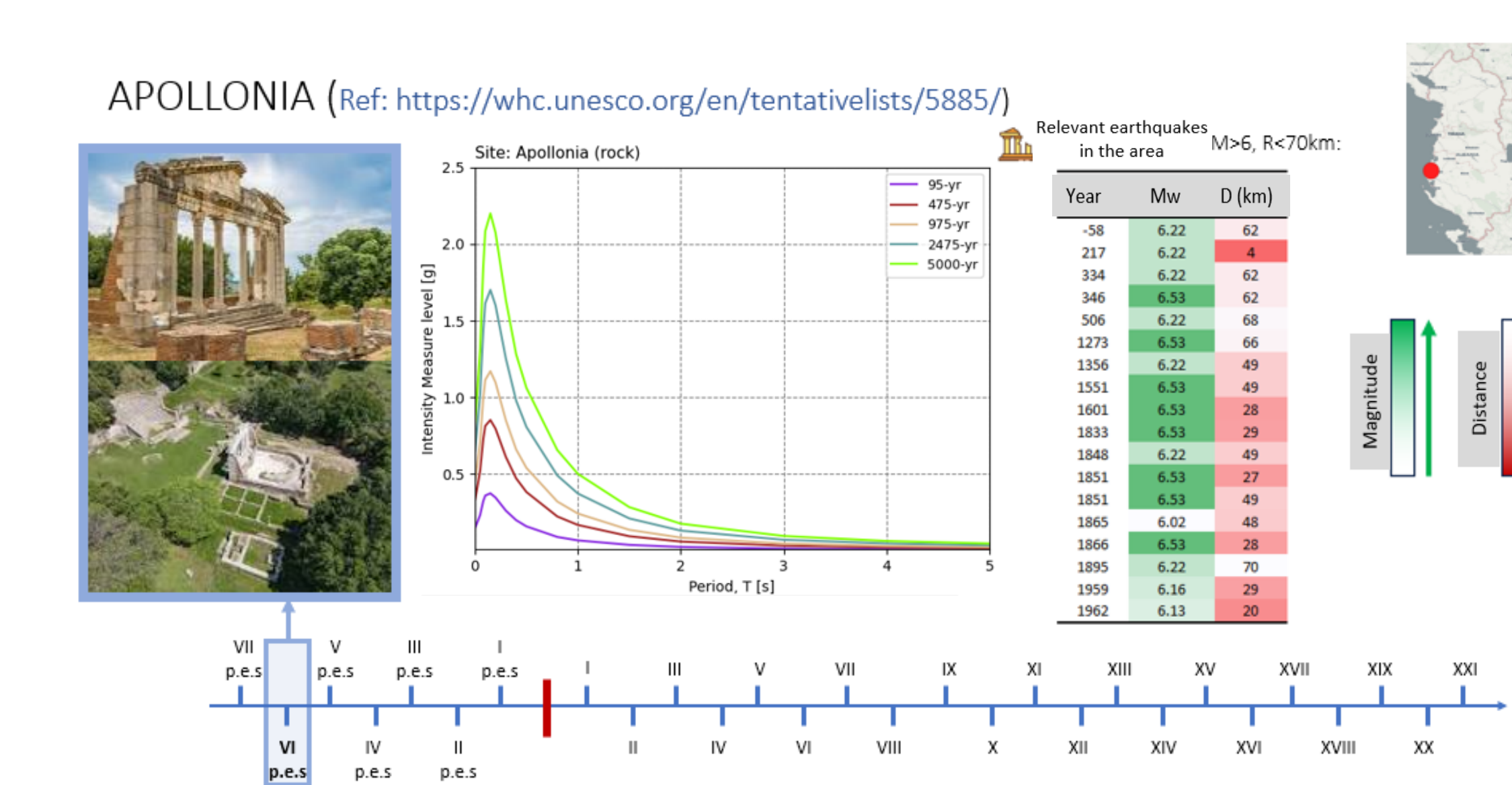o Eight GMP models for shallow active crustal regions

HAZARD RESULTS

o Hazard estimates were obtained using the OpenQuake software (v. 20)

o The updated seismic hazard model (ASHM24) comprise a logic-tree with 576 branches

o The assessment was carried out for firm-rock conditions ($V_{S,30} \geq 800$ m/s).

o The ASHM24 is expected to improve public and private sector strategies for seismic risk reduction, enhance emergency response planning, and contribute to the modernization of seismic hazard modeling in Albania.

Some references for this poster:

o https://whc.unesco.org/en/list/
o https://www.seismofaults.eu/efsm20
o Albania Soil Category Map – Muceku. Y., et al. 2022
o Probabilistic Seismic Hazard Maps of Albania - Kuka et al ., 2024

Uniform hazard spectra for different return periods for historical sites in Albania (UNESCO Heritage) in light of new findings from the National Seismic Hazard Model

BUTRINTI (https://whc.unesco.org/en/list/570/)

Relevant earthquakes in the area M>6, R<70km:

Year	Mw	D (km)
358	6.53	41
968	6.6	50
1153	6.53	23
1866	6.2	59
1674	6.5	27
1786	6.8	81
1743	7.1	61
1773	6.3	46
1806	6.3	81
1809	6.8	71
1823	6.3	46
1854	6.22	21
1858	6.22	41
1858	6.22	46
1859	6.22	27
1869	6.53	62
1872	6.53	23
1893	6.53	47
1895	6.22	52
1897	6.8	51
1920	6.18	64

GJIROKASTRA (UNESKO-s 2005)

Relevant earthquakes in the area M>6, R<70km:

Year	Mw	D (km)
358	6.53	3
1153	6.53	68
1356	6.22	71
1551	6.53	71
1866	6.2	59
1674	6.5	64
1701	6.53	66
1773	6.3	55
1809	6.3	59
1846	6.22	31
1854	6.53	71
1858	6.22	19
1858	6.22	30
1859	6.22	35
1865	6.02	50
1869	6.53	27
1872	6.53	41
1893	6.53	35
1895	6.22	16
1897	6.53	43
1929	6.11	51
1920	6.18	67

BERAT

Relevant earthquakes in the area M>6, R<70km:

Year	Mw	D (km)
217	6.22	42
358	6.53	49
1356	6.22	46
1380	6.33	69
1601	6.53	45
1701	6.33	45
1843	6.22	49
1848	6.22	37
1851	6.2	23
1851	6.53	52
1853	6.2	44
1856	6.53	67
1865	6.02	24
1907	6.14	40
1920	6.18	22
1930	6.16	21
1962	6.33	27

APOLLONIA (Ref: https://whc.unesco.org/en/tentativelists/5885/)

Relevant earthquakes in the area M>6, R<70km:

Year	Mw	D (km)
-58	6.22	62
217	6.22	4
334	6.33	62
346	6.33	62
506	6.22	68
1279	6.53	66
1356	6.22	49
1551	6.53	49
1601	6.53	26
1848	6.22	43
1851	6.53	27
1865	6.53	30
1895	6.22	70
1895	6.22	26
1962	6.33	20

Probabilistic Seismic Hazard Map for Albania ($V_{S,30} \geq 800$ m/s), PGA (10% probability of exceedance in 50 years)

Coordinate System: ETRS89 / Albania LCC 2010   July 2024