



*Elaboration of Maps for Climatic and
Seismic Actions for Structural Design
in the Balkan region - **ALBANIA***

Prof. Dr. Eng. Fisnik Kadiu

MSc. Eng. Riza Hasanaj

MSc. Eng. Ilir Qerfozi

MSc. Eng. Vasil Muka

Map of Albania



Geographic Coordinates	41°00'N - 20°00'E
Geographic Position	Southeast Europe
Total Area	28,748 km ²
Inhabitants	3,581,655
Coastline	362 km
Land Boundaries	691 km
Countries Bordered	Greece - 212 km, Montenegro - 186 km, Macedonia - 181 km, Kosovo - 112 km.
Maritime Claims	12 nautical miles (22.2 km; 13.8 mi)
Highest Point	Korabi Mountain, 2,764 m
Lowest Point	Adriatic Sea, 0 m
Climate:	Mild temperate; Winters: cool, cloudy, wet Summers: hot, clear, dry Interior climate is cooler and wetter
Terrain:	Mountains, Hills, Plains along the coasts
Natural Hazards	Earthquakes, Floods, Drought



Introduction

A Brief Reflection on the work done after two previous Workshops – Milan 2013 and Skopje 2014 –

- *During the period after the two previous Workshops organized by Joint Research Centre toward a successful implementation of the Eurocodes in Balkan region, they are prepared in Albanian language 55 parts out of 58 of the existing parts of ten Eurocodes as is shown in the table below. Our work is focused now on the three remaining parts of Eurocode 8 and on the National Annexes based on National Determined Parameters. We have decided to accept up to 80% of recommendations given in different parts of the Eurocodes and for some parts 100% of them. The entire work is programmed to be fulfilled totally within the next year.*



Eurocodes, the Parts prepared in Albanian Language

Table of the Parts prepared in Albanian Language

EN	EUROCODE	PARTS	PREPARED IN ALBANIAN LANGUAGE	STATUS OF NATIONAL STANDARDS
EN 1990	EUROCODE – Basis of Structural Design	1	1	1
EN 1991	EUROCODE 1 – Actions on structures – Densities, self-weight and imposed loads	10	10	10
EN 1992	EUROCODE 2 – Design of concrete structures –	4	4	4
EN 1993	EUROCODE 3 – Design of composite steel and concrete structures	20	20	20
EN 1994	EUROCODE 4 – Design of steel structures	3	3	-
EN 1995	EUROCODE 5 – Design of timber structures	3	3	-
EN 1996	EUROCODE 6 – Design of masonry structures	4	4	-
EN 1997	EUROCODE 7 – Geotechnical design	2	2	-
EN 1998	EUROCODE 8 – Design of structures for earthquake resistance	6	3 (Part 1, 2, 5)	3
EN 1999	EUROCODE 9 – Design of aluminium structures	5	5	-



Climatic Changes in Albania

- *Albania lies in a subtropical zone and it is a Mediterranean country. Winter is relatively short and mild and humid near the seaside areas. The summer lasts very long and it is hot and dry. To the eastern part, in the mountain areas, the climate is Mediterranean mountainous.*
- *Sunshine varies from 2560 hours per year in Tirana, up to 2046 hours in Kukesi City. Average yearly temperature varies from 16,5 °C in south Albania, 11,8 °C in north Albania and 7,0 °C in the northern area of Albanian Alps. The annual rainfalls are about 1430 mm. Albanian Alps are one of the most humid territories in Europe, where the annual rainfalls are up to 3094 mm.*



Climatic Changes in Albania

- *The multi-year studies presented here are based on the general cascade impact of the climate change on Albanian Adriatic Littoral, the decrease of country water resources, the influence on the hydrographic regime of Adriatic Sea and on ecosystems.*
- *The studies are based on the results of inversion of 6 thermologs data for the ground surface temperature history in Albania, and climate changes according to the multi annual meteorological data from different regions. The wells and the meteorological stations are located in the Sedimentary Basin of Albania, at the lowland region in the west of Central Albania and in the ophiolitic belt in the mountainous region of the northeast Albania.*



Climatic Changes in Albania

- *Based on inversion data at the western coastal plane region of Albania, the ground surface temperature history presents a gradual cooling before the middle of the 19th century, followed by 1,0 °C warming. Climate warming of 1,0 °C in the 20th century is observed in mountainous northwestern Albania also. This warming, mainly after the second half of the 20th century is presented also by meteorological data, temperature, rainfalls and wind regimes.*
- *The warming impact on country climate and ecosystems of Albania, thermal stress in the wetlands, lagoons and lakes is observed first of all on the biodiversity.*



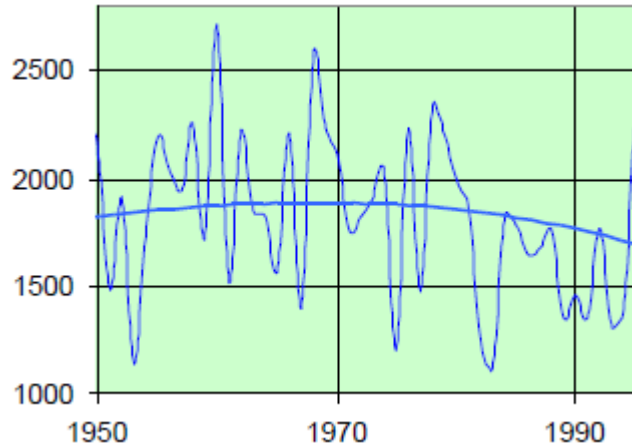
The effects of climate change

- *The effects of climate change are affecting Albania and more likely the country will experience variability of temperatures, change of patterns of precipitation, change in sea level, serious impacts in biodiversity, etc. The most consequences concerning with the Climate Change are the increasing of extreme weather events (natural disasters), flooding events, erosion, etc.*
- *Albania has experienced three major floods of January and February 2010, one in March 2014 and the last one a few days ago. The causes of disasters in Albania are complex and include land use control, deforestation, uncontrolled urbanization, infrastructure inefficiency, management of the water, human activity, etc. and it is believed that Climate Change would increase the frequency of these events.*

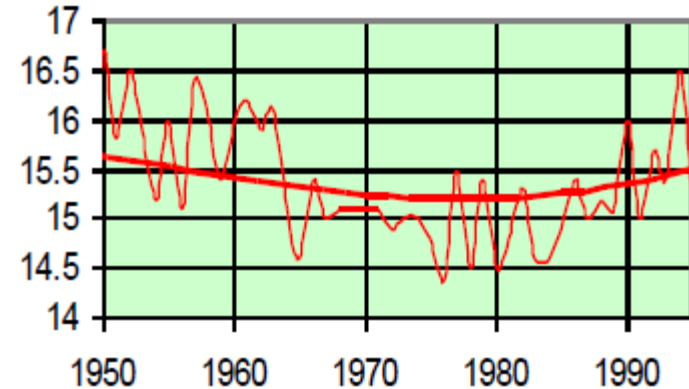


Temperature and Rainfall changes in the last 60 years

1. Total Annual Rainfall Quantity (mm)

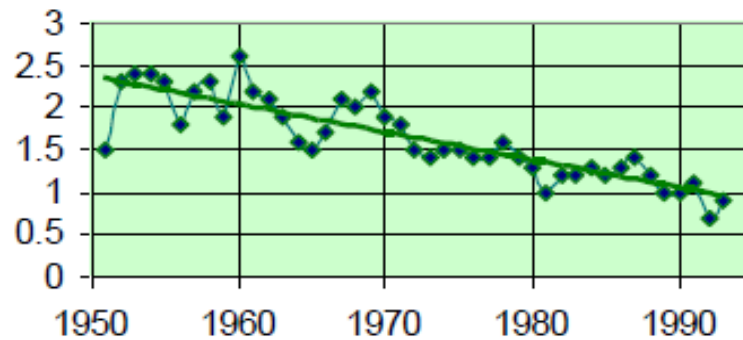


2. Air Average Annual Temperature (°C)

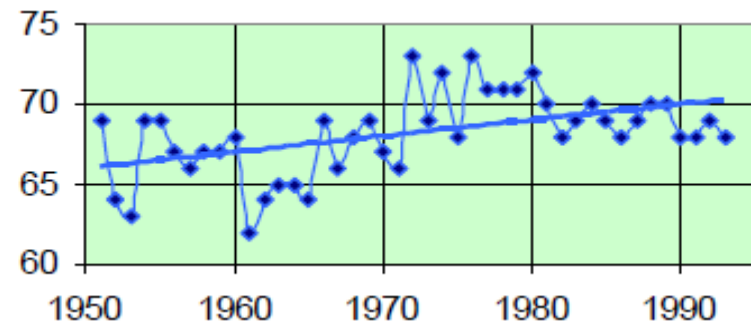


Wind speed and Air humidity in the last 60 years

1. Wind speed (m/sec)

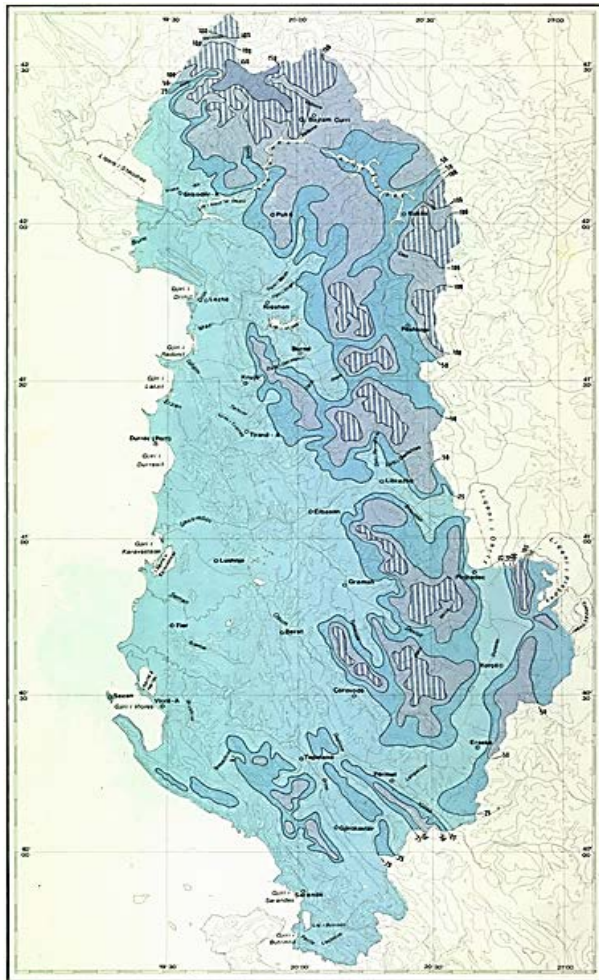


2. Air humidity (%)



Map of snow, Zonation and Characteristic Value s_k

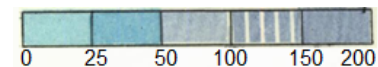
The maximum snow layer in
Albanian territory – General View



Zone N^o. Characteristic value
 s_k [kN/m²] (A=0)

1	0,2
2	0,8
3	1,3
4	1,7
5	2,0

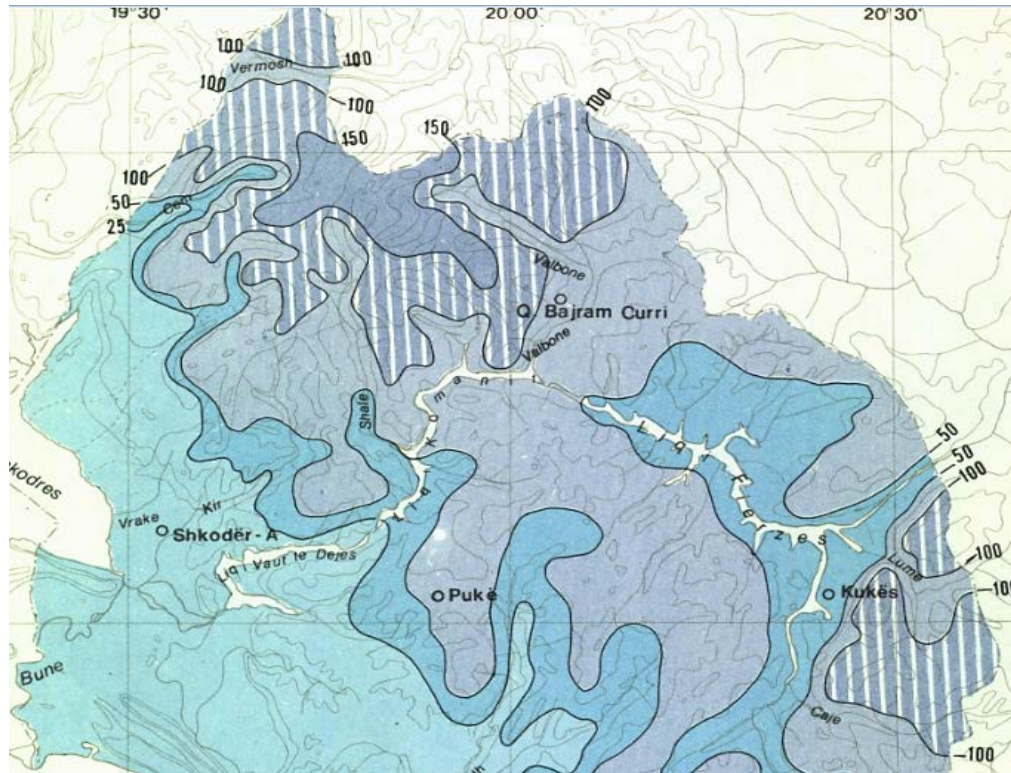
Key:



(snow thickness in cm)

Map of snow

The maximum snow layer in North and Northeast Albania



Key:

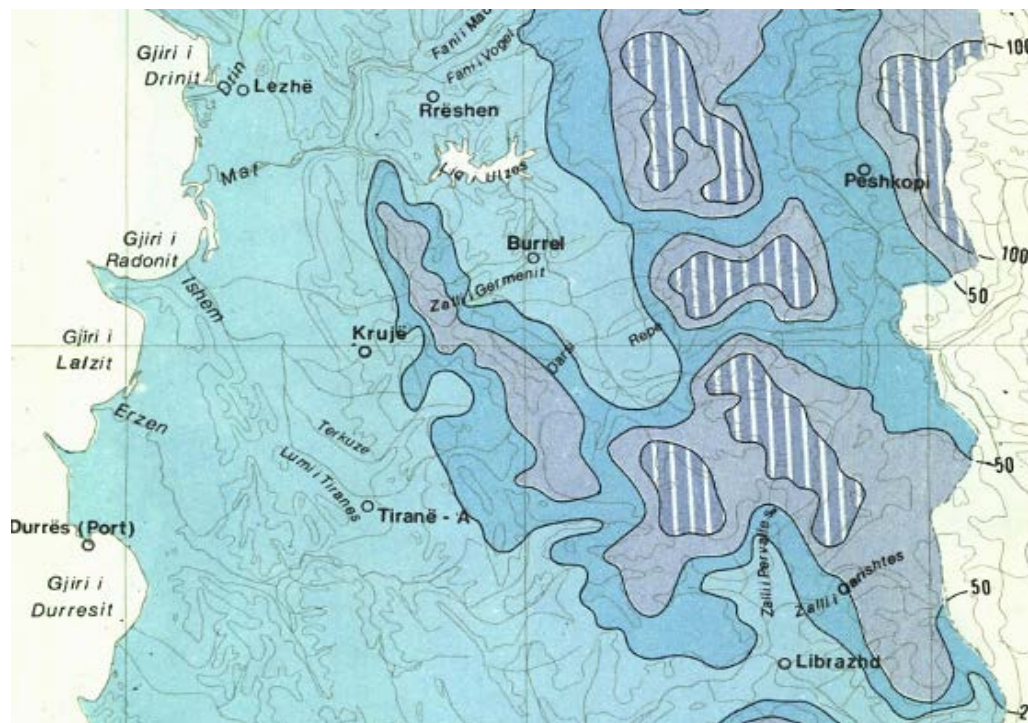


(snow thickness in cm)



Map of snow

The maximum snow layer in Central and Eastern Albania



Key:

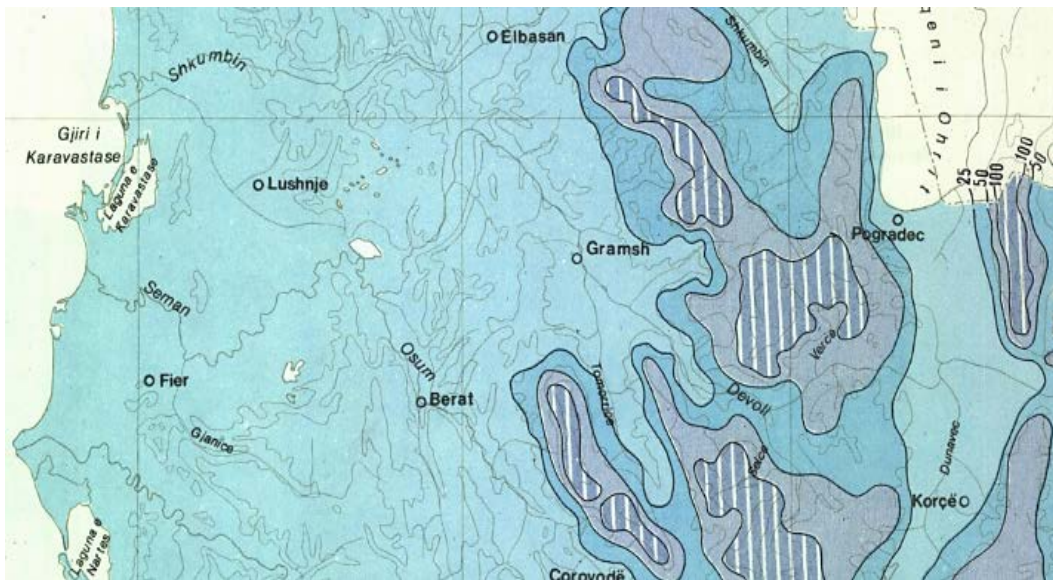


(snow thickness in cm)



Map of snow

The maximum snow layer in South and Southeast Albania



Key:

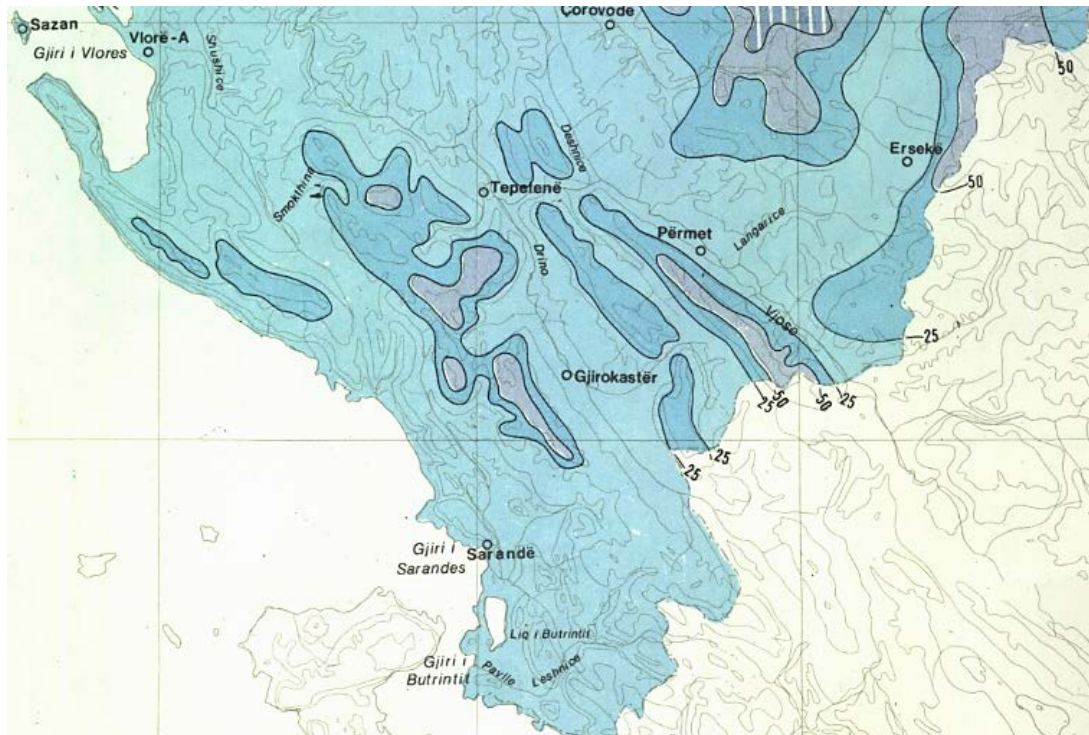


(snow thickness in cm)



Map of snow

The maximum snow layer in South Albania



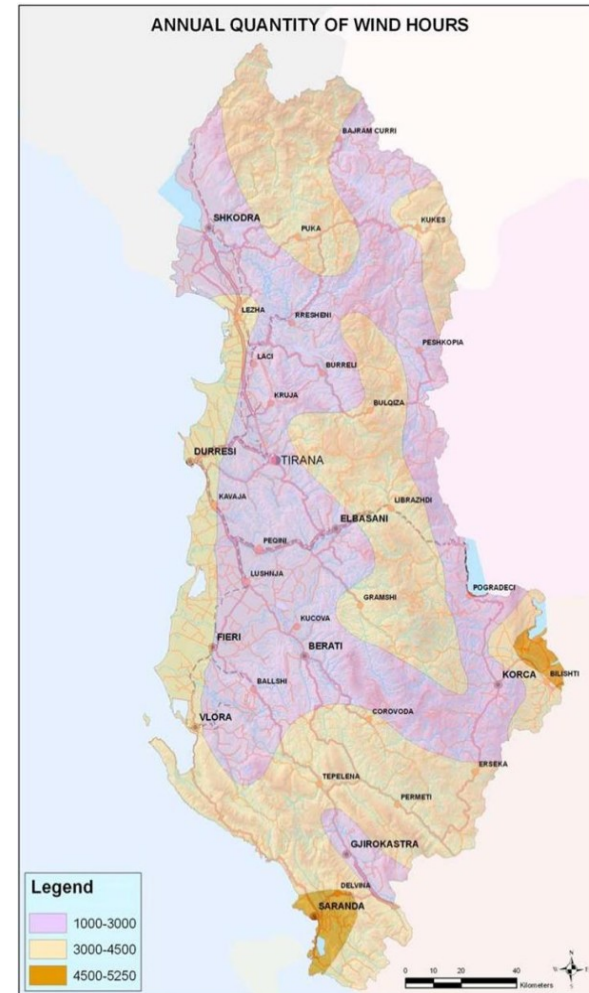
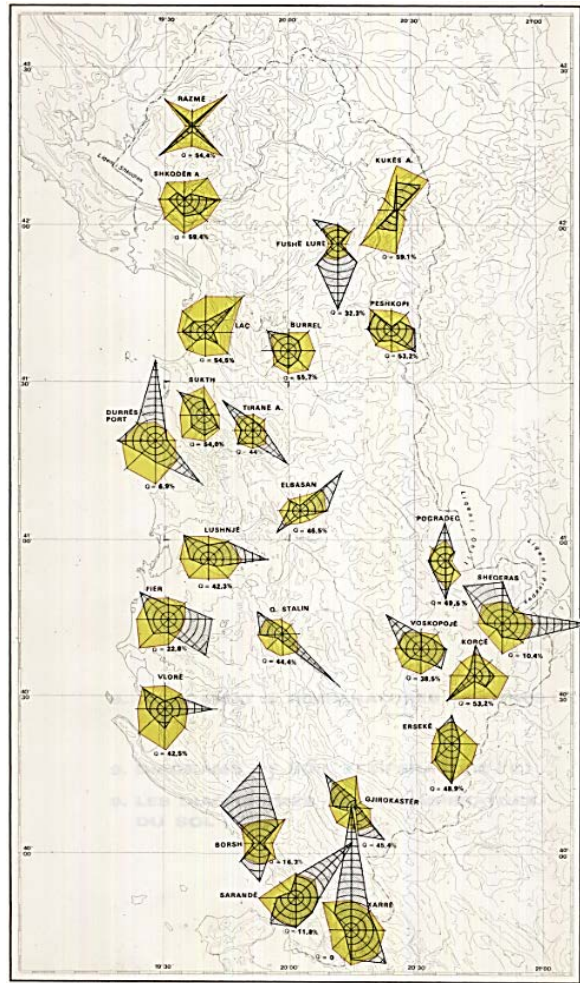
Key:



(snow thickness in cm)



Map of wind, Direction and Velocity

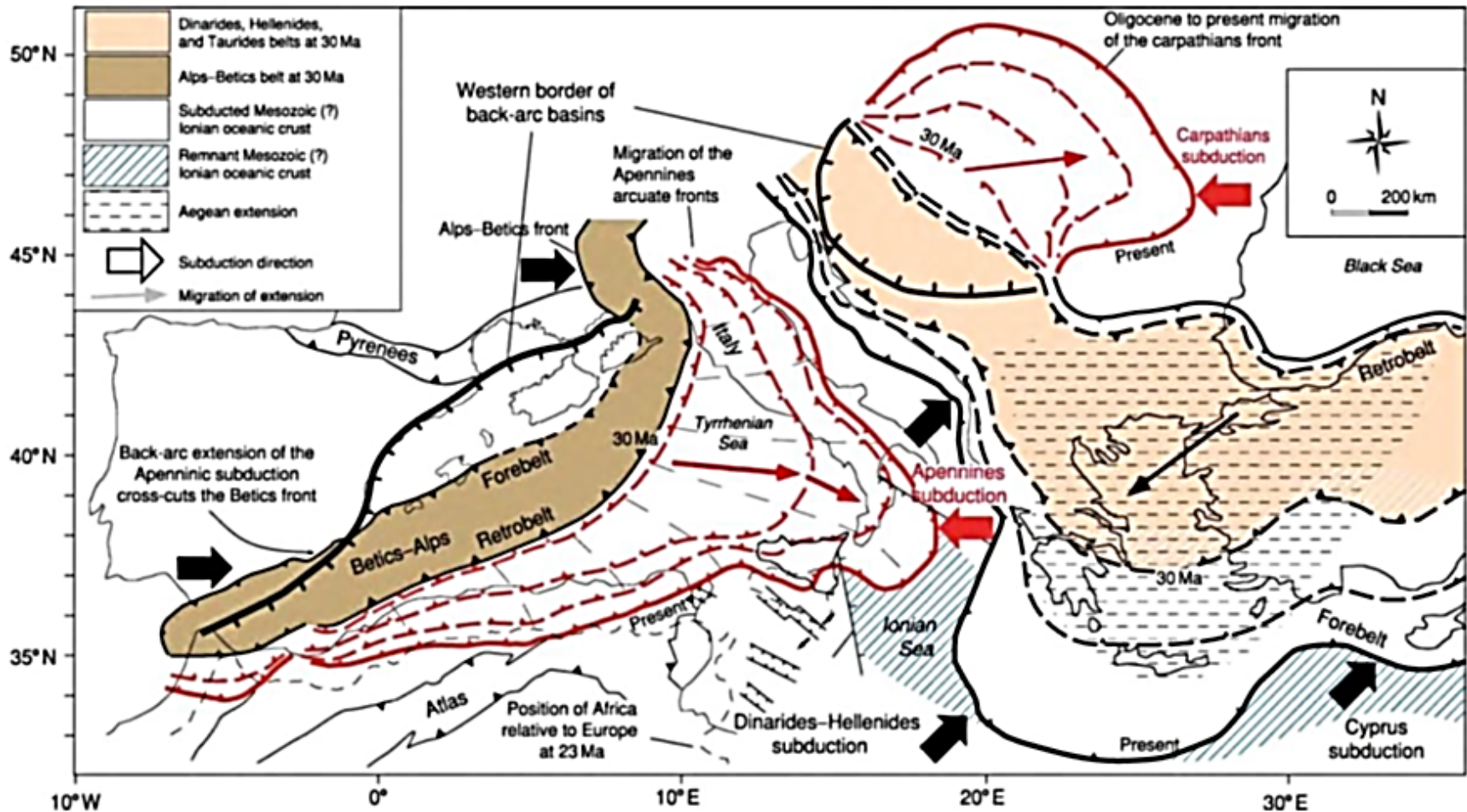


Seismicity in Albania - General

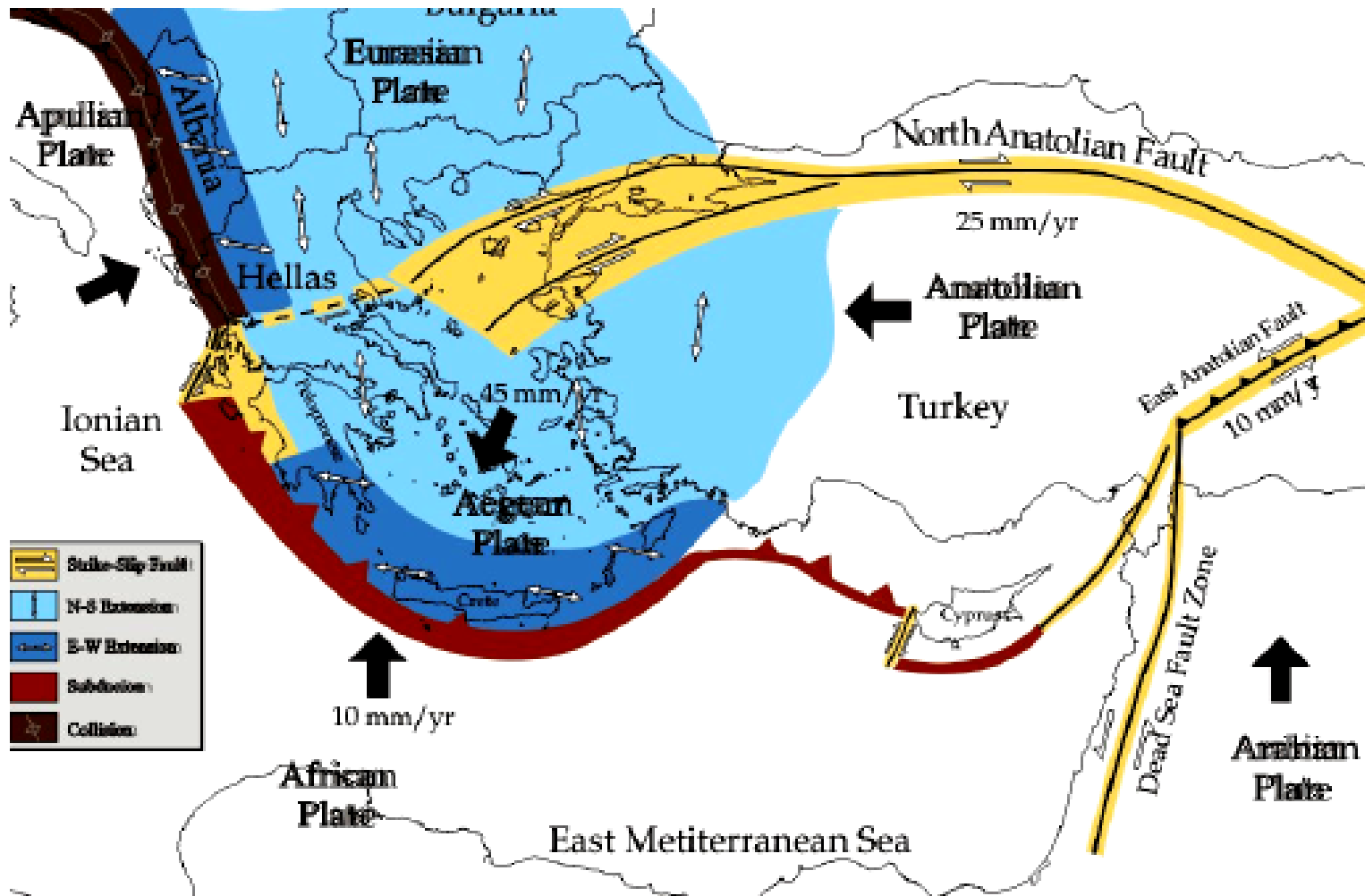
- *The Albanides represent the main geological structures that lie on the territory of Albania. They are located between the Dinarides in the north and the Hellenides in the south, and form together the Dinaric Branch of Mediterranean Alpine Belt. Albanides are divided in two big paleogeographical zones: the Inner Albanides and the External Albanides.*
- *The structures of the Albanides are typically Alpine ones. The SSE-NNW directions represent their general strike. The structures are asymmetrical and have a western declining trend. They are found recumbent, over thrust and over twisted structures too. Generally, their western flanks are affected by disjunctive tectonics.*



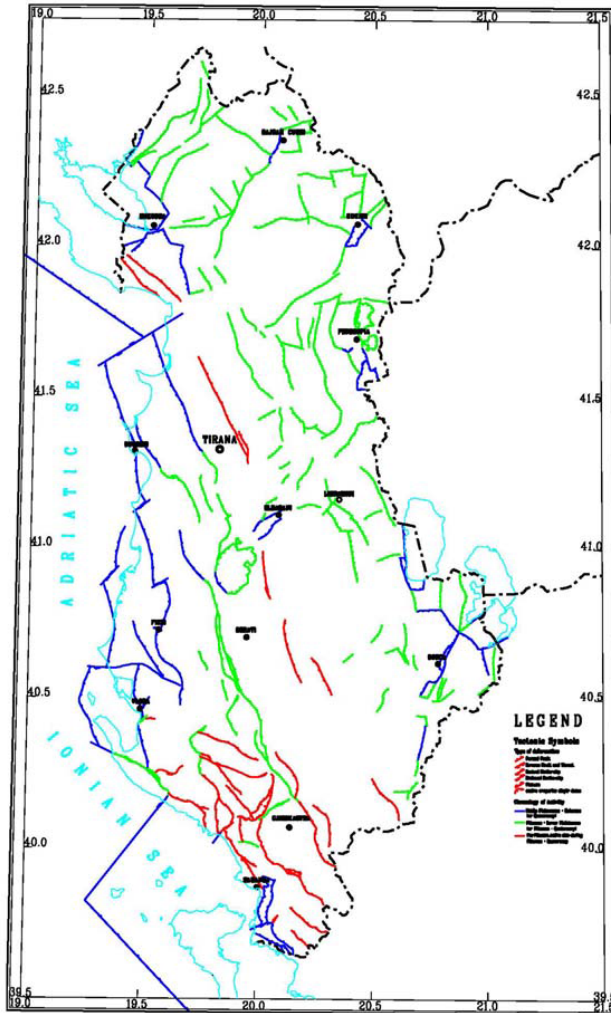
Present geodynamic framework in the central and western Mediterranean



Geodynamic position of Albanides



Map of active faults of Albania



Neotectonic Structure

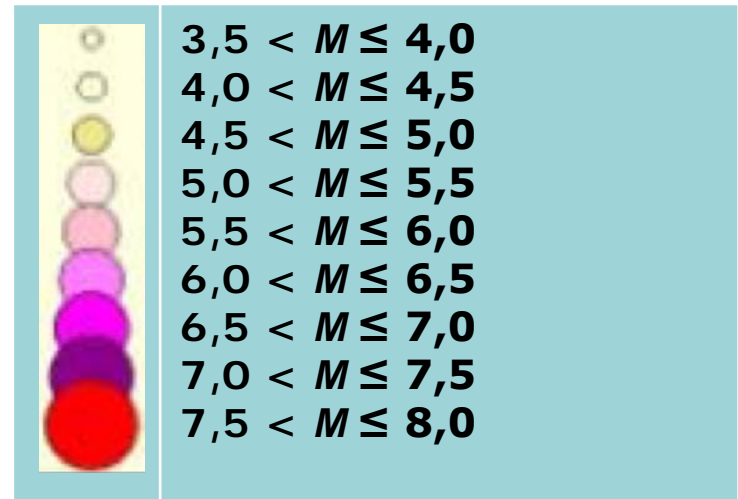
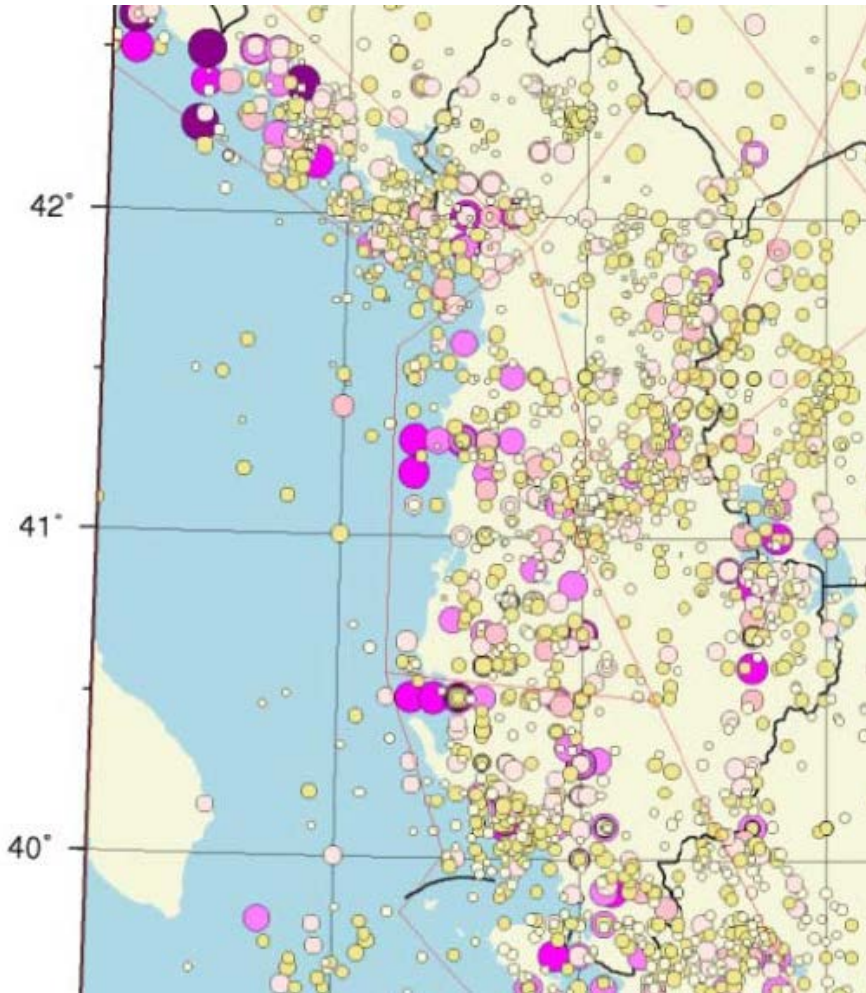
The Albanian orogen lies on the most southwestern part of the Eurasian plate, and is a convergent zone due to northeastward movement of the Adriatic plate (Adria microplate).

Key colors:

- Blue: Middle Pleistocene-Holocene;
- Green: Pliocene - Lower Pleistocene;
- Red: Pre-Pliocene, active also during Pliocene-Quaternary



Seismicity of Albania (510 B.C. – Present: $M \geq 4.0$)



Seismicity of Albania -Earthquake Source Zones

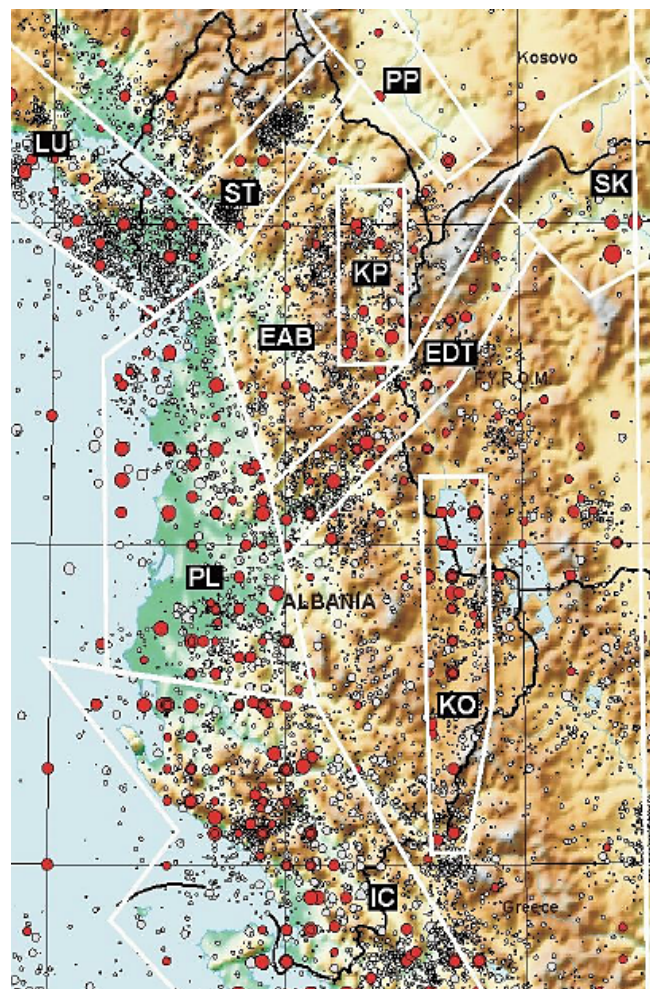
- *Seismic source zones were determined from consideration of the present-day tectonic regime of the region, the subset of the Albanian catalogue, and the full catalogue for smaller earthquakes from 1964-2010.*
- *The regional seismicity of concern to Albania was divided into 10 seismic sources, which includes some redefinition of eight zones previously discussed for Albania together with an interior background zone and a source zone to model earthquakes in the Skopje region.*



Seismicity of Albania -Earthquake Source Zones

Earthquake Source Zones

ACRONYM	EARTHQUAKE SOURCE ZONE
1. LU	LEZHA-ULQINI
2. PL	PERIADRIATIC LOWLAND
3. IC	IONIAN COAST
4. PP	PEJA-PRIZRENI
5. KP	KUKESI-PESHKOPIA
6. KO	KORÇA- OHRID
7. ST	SHKODRA-TROPOJA
8. EDT	ELBASANI-DIBRA-TETOVA
9. SK	SKOPJE
10. EAB	EASTERN ALBANIAN BACKGROUND



Seismicity of Albania -Earthquake Source Zones

Earthquake Source Zones

ACRONYM	EARTHQUAKE SOURCE ZONE
1. LU	LEZHA-ULQINI
2. PL	PERIADRIATIC LOWLAND
3. IC	IONIAN COAST
4. PP	PEJA-PRIZRENI
5. KP	KUKESI -PESHKOPIA
6. KO	KORÇA- OHRID
7. ST	SHKODRA-TROPOJA
8. EDT	ELBASANI-DIBRA-TETOVA
9. SK	SKOPJE
10. EAB	EASTERN ALBANIAN BACKGROUND



Thank you for the kind attention !

