



# **MAPS OF CLIMATIC AND SEISMIC ACTIONS FOR STRUCTURAL DESIGN IN MOLDOVA**

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# REPUBLIC OF MOLDOVA



- Republic of Moldova is a landlocked country in Eastern Europe, bordered on *Romania* to the west and *Ukraine* to the north, east, and south;
- The capital city - Chisinau;
- The total land area - 33,851 km<sup>2</sup>;
- Population - 3.875.159 people;
- Density of population – 105 per km<sup>2</sup>;
- Government - parliamentary republic.



# THE GEOGRAPHY OF MOLDOVA



**Average elevation of around 147 m above the sea level**

**Maximum altitude of 429.5 m**

**North with maximum altitude of 320 m**

**South with maximum altitude of 250 m**

**Average summer temperature : 20 ÷ 25°C**

**Rainfall: 620 mm in the north to 490 mm in the south**



# DEVELOPING NATIONAL ANNEXES



TECHNICAL UNIVERSITY OF  
CIVIL ENGINEERING BUCHAREST

**National Annexes:  
Eurocode EN 1990;  
Eurocode EN 1991;  
Eurocode EN 1992.**

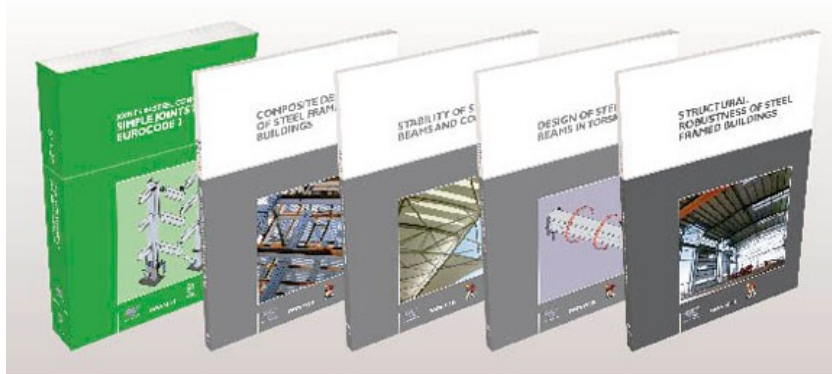


**CZECH REPUBLIC**  
DEVELOPMENT COOPERATION



CZECH OFFICE FOR STANDARDS, METROLOGY AND TESTING

**National Annexes:  
Eurocode EN 1993;  
Eurocode EN 1994;  
Eurocode EN 1995;  
Eurocode EN 1996;  
Eurocode EN 1997;  
Eurocode EN 1998;  
Eurocode EN 1999.**

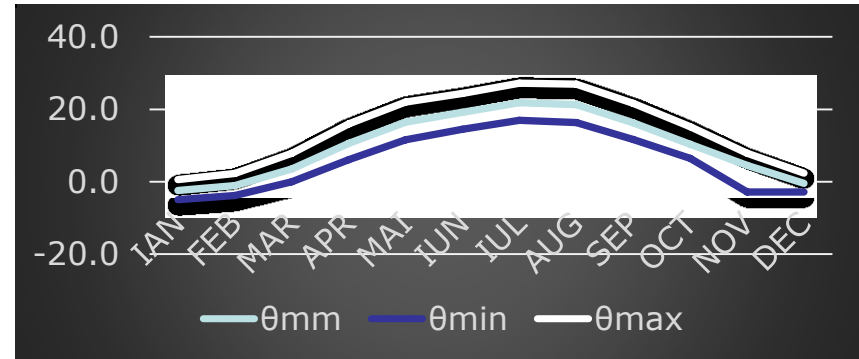
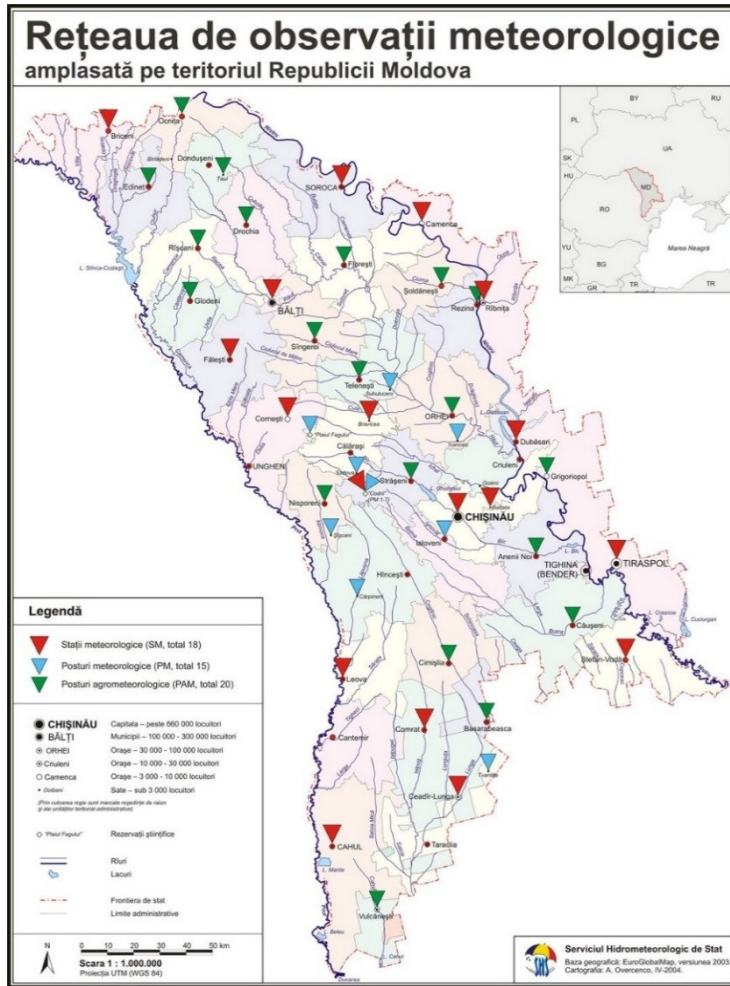


ELABORATION OF **MAPS** FOR **CLIMATIC** AND **SEISMIC** ACTIONS  
FOR STRUCTURAL DESIGN IN THE **BALKAN REGION**

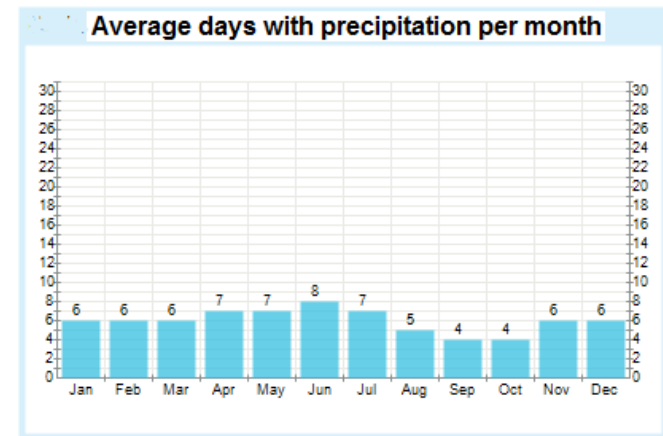
27-28 October 2015, Zagreb

# METEOROLOGICAL STATIONS

In Moldova there are 18 meteorological stations (marked in red)

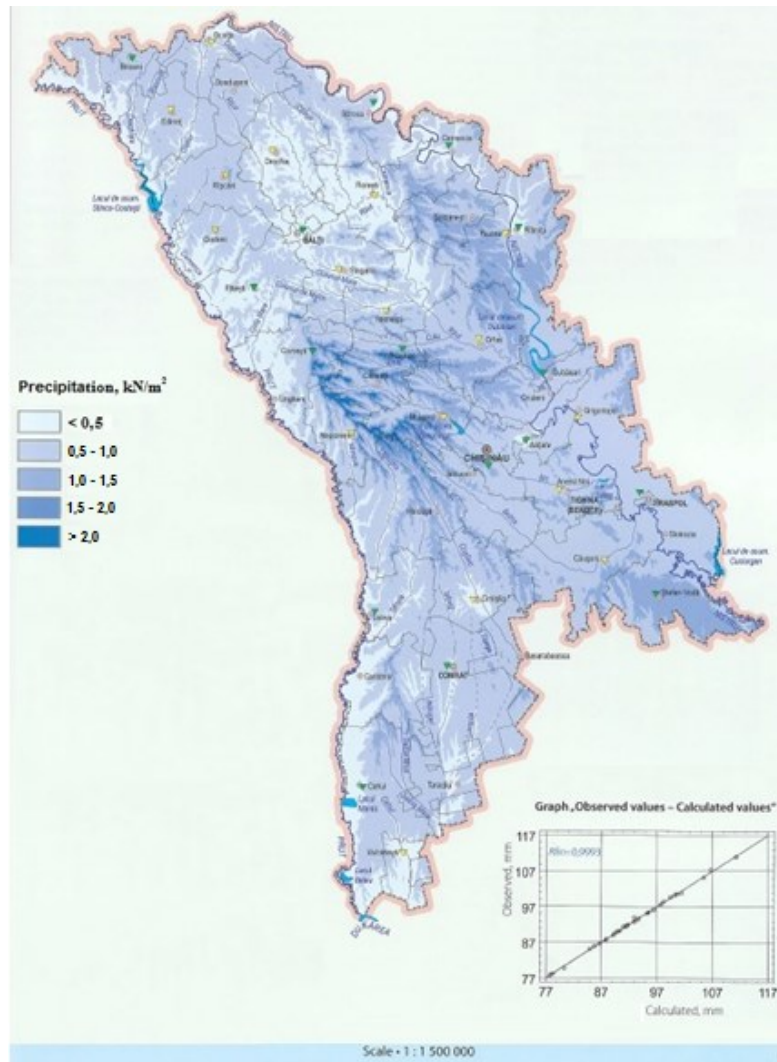


Max temperature: Average max daily (24h) temperature per month.  
 Minimum temperature: Average minimum daily (24h) temperature per month.  
 Average temperature: Average daily (24h) temperature per month.  
 The temperature normal are measured in the period 1963–2013.



Average amount of days (24h) with precipitation during a month.  
 When precipitation has surpassed 1mm per day (24h) it is defined as a day with precipitation. The estimated period is 1963–2013.

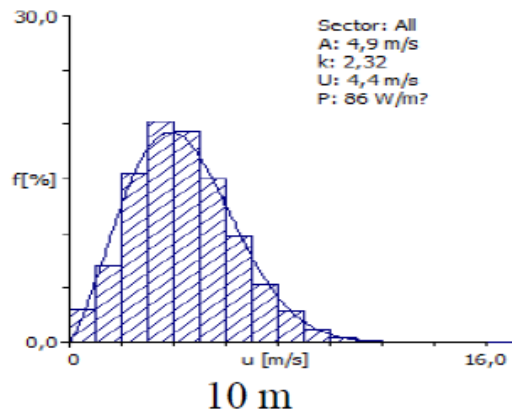
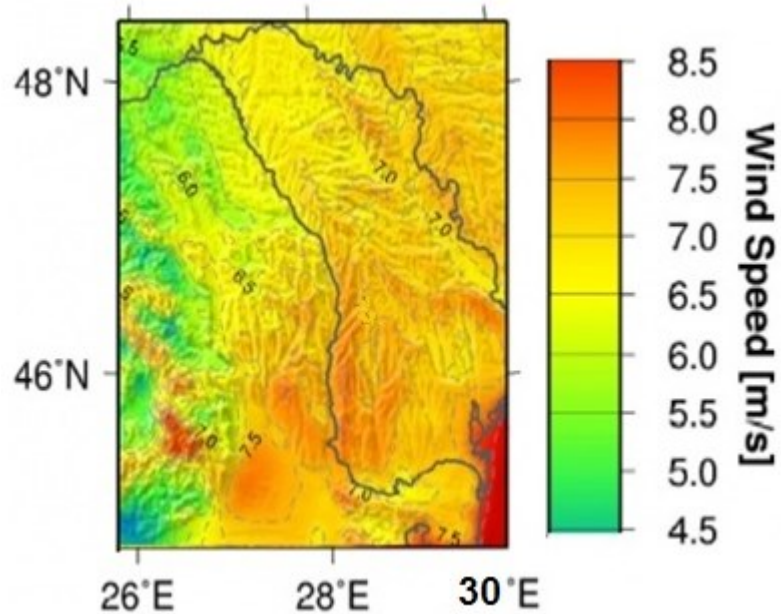
# SNOW LOADS MAP



Zoning of Moldova's territory in terms of characteristic values of snow loads on the ground, sk, for altitudes  $H < 1000 \text{ m}$



# WIND MAPS



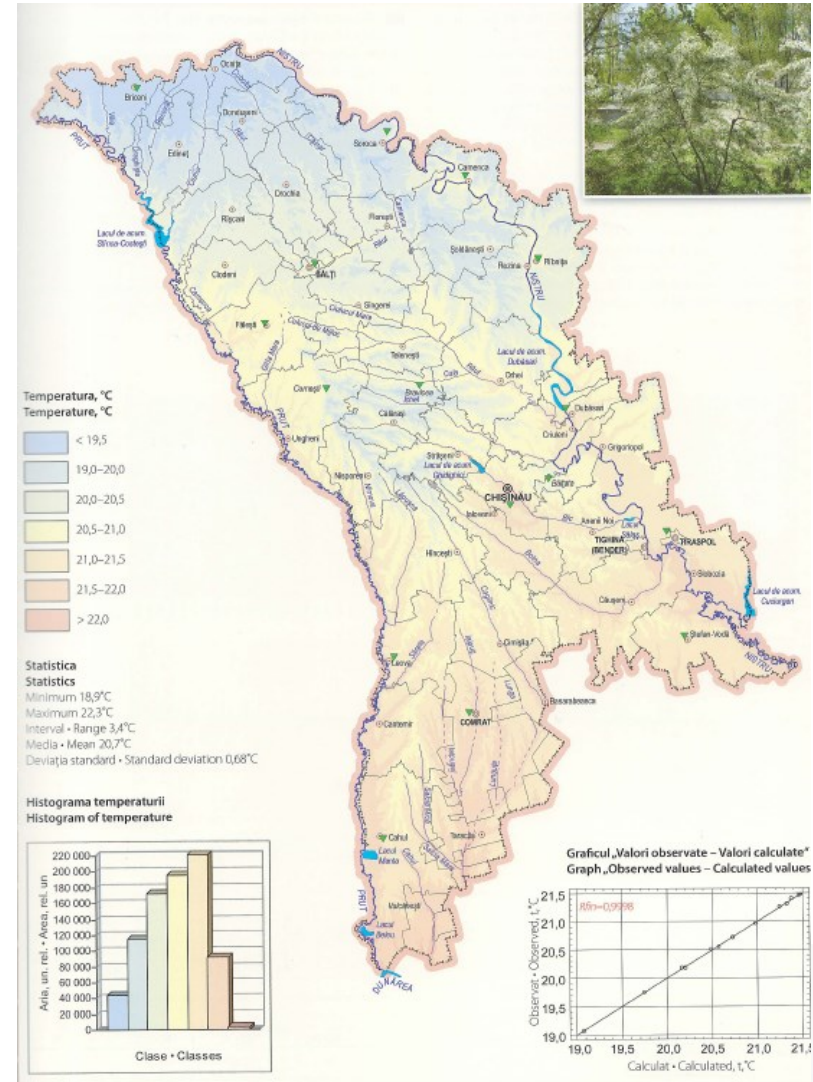
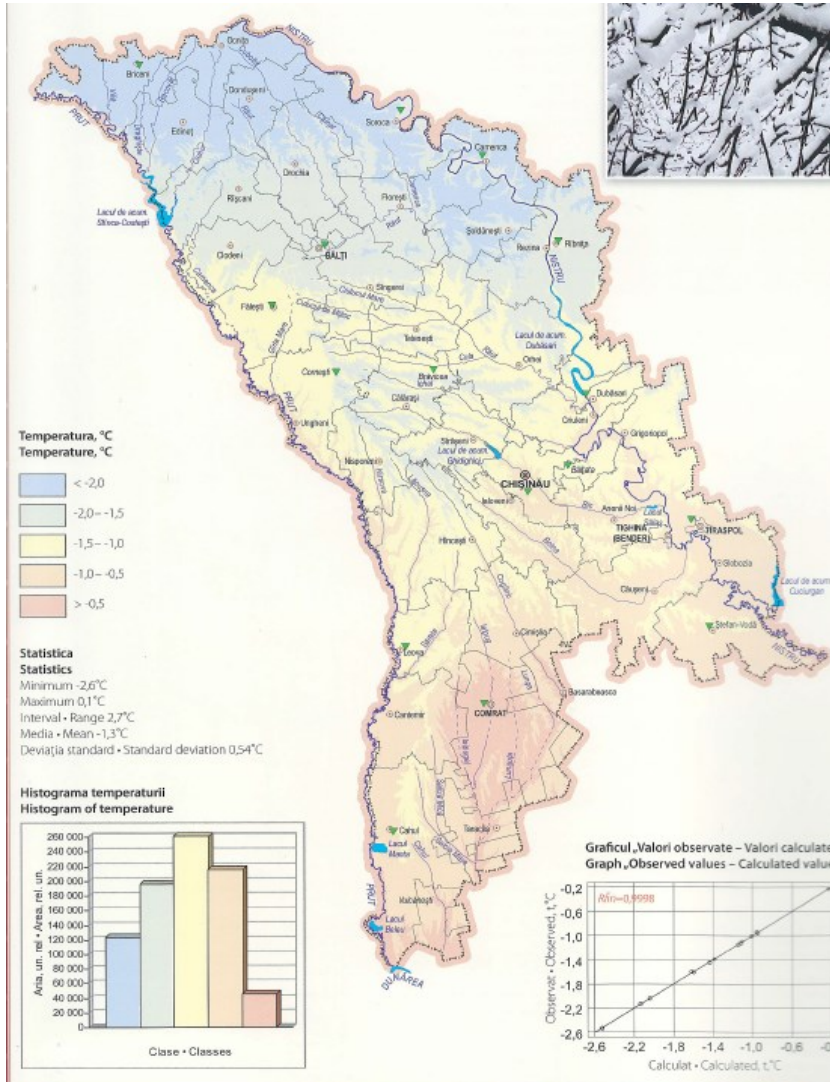
Weibull distribution for heights of 10 m



Zoning of Moldova's territory in terms of reference values of dynamic wind pressure,  $q_b$ , for altitudes  $H < 1000$  m

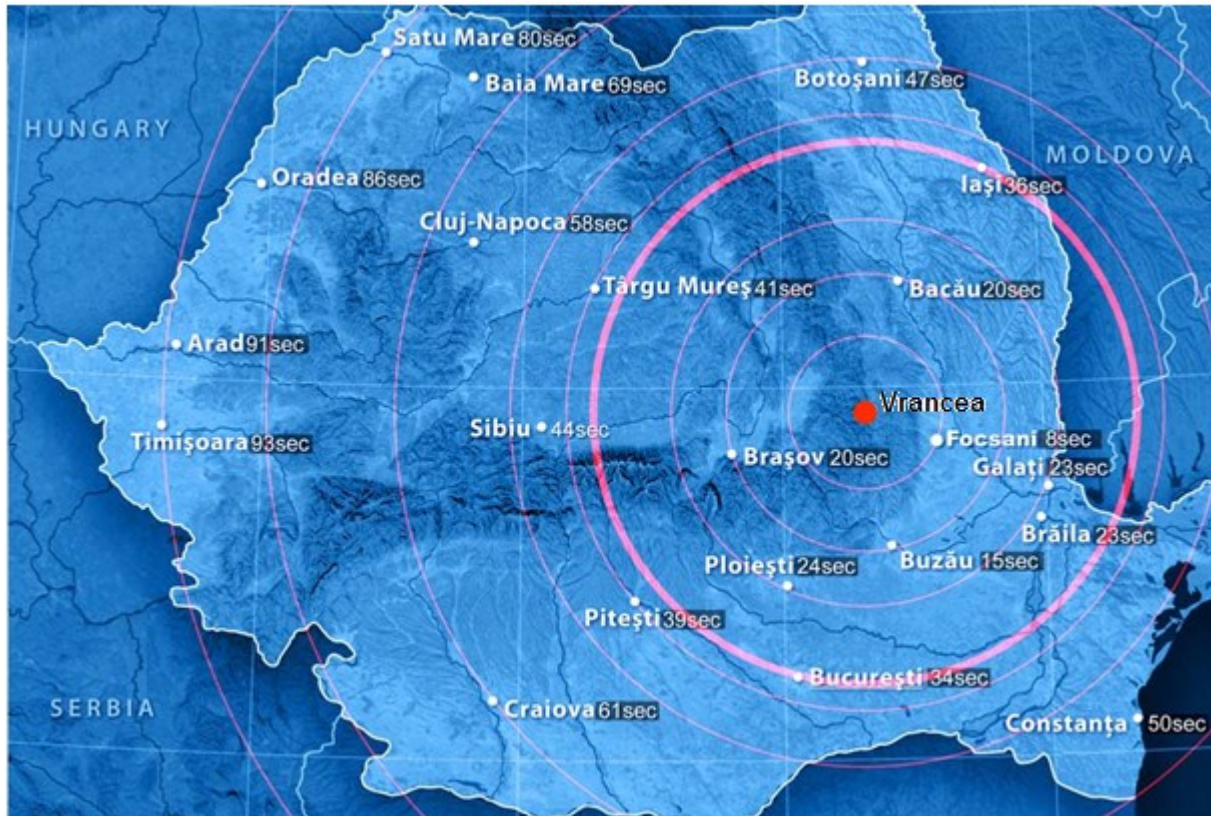


# AVERAGE AIR TEMPERATURE IN THE WINTER AND SUMMER SEASONS





# SEISMIC ZONE VRANCEA, Romania



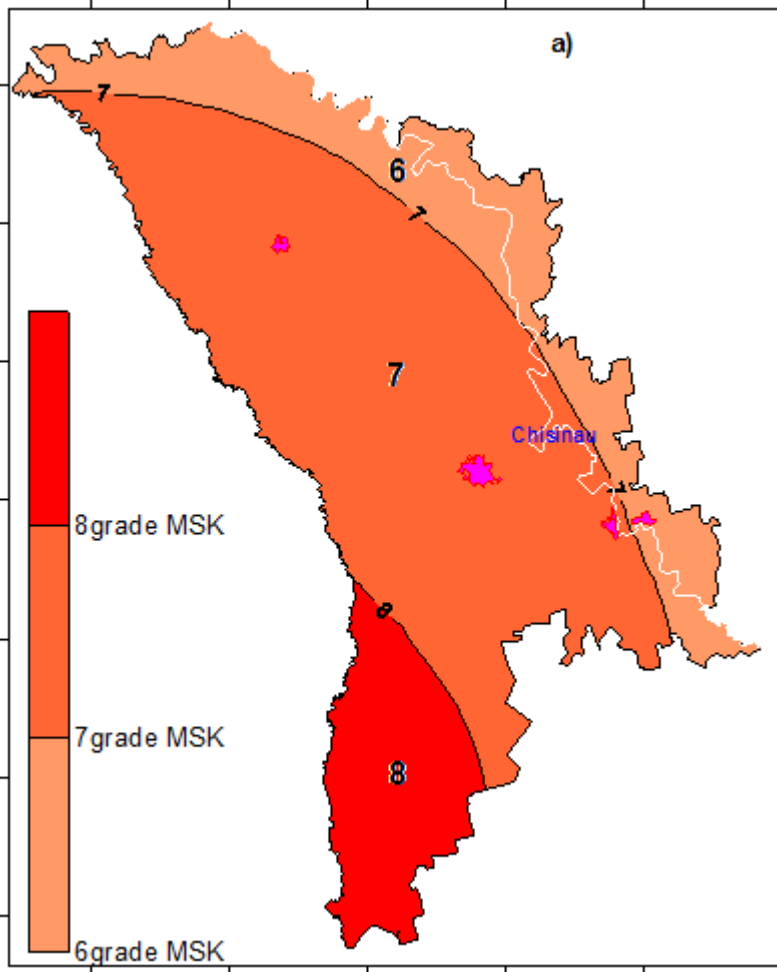
The earthquakes foci achieve a depth of about 180 km.

Maximal magnitude achieves 7.5-7.8 (Mmax) on Richter's scale.

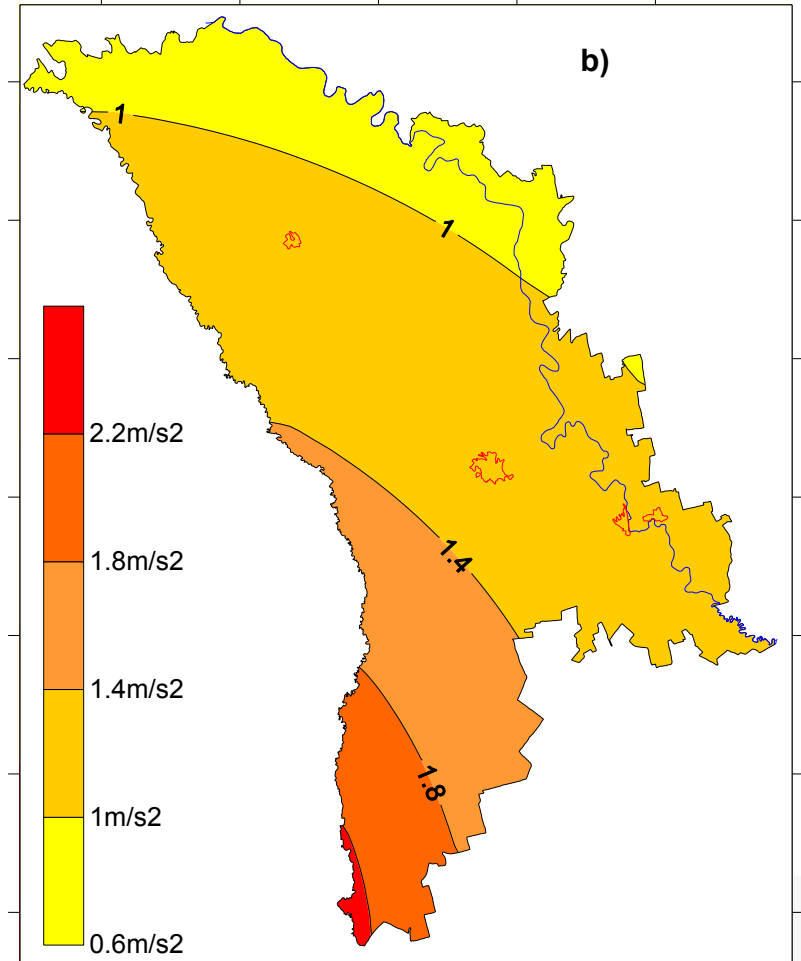
The maximal seismic intensity is evaluated at the level of 8-9 degrees according to the 12-degree scale.



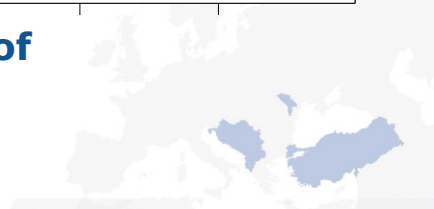
# Seismic zoning map of the territory of the Republic of Moldova



**a) in terms of MSK;**



**b) in terms of  
Eurocode 8**

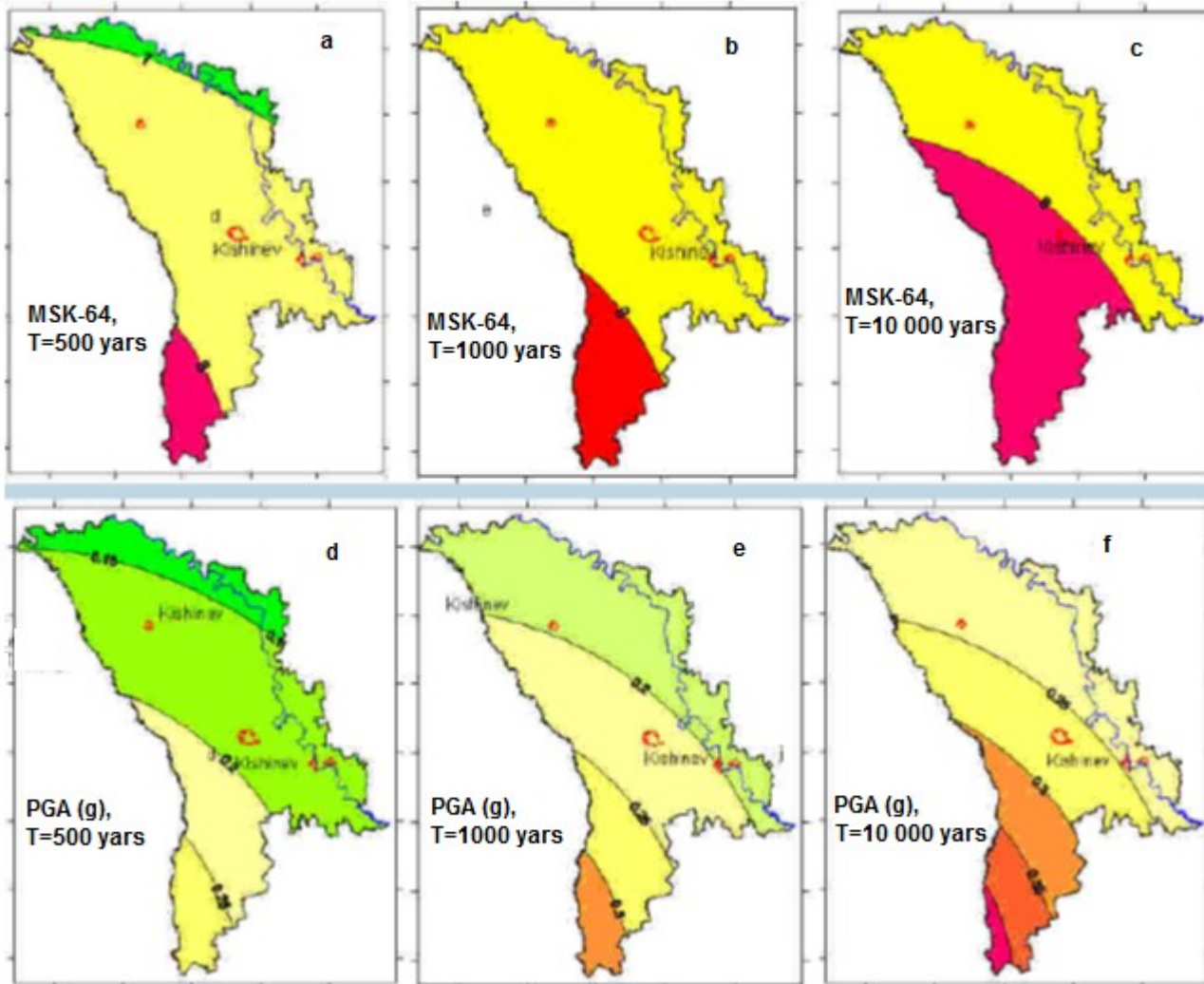


## Damage Losses from March 4, 1977 and August 31, 1986 Seismic Events

Type of construction	Total analyzed (Number of buildings)		Severely damaged, need reconstruction		Completely destroyed	
	1977	1986	1977	1986	1977	1986
State-owned dwellings	2821	7000	1449	1152	1372	757
Private dwellings	6984	49000	6096	4820	888	-
Schools	334	546	263	128	71	26
Preschool institutions	188	562	141	88	47	33
Health care institutions	181	353	126	64	55	39
Cultural institutions	238	262	161	189	77	73
Commercial institutions	314	326	110	105	34	221
Other institutions	789	489	568	469	221	20
<b>Total</b>	<b>11849</b>	<b>58538</b>	<b>8914</b>	<b>7015</b>	<b>2765</b>	<b>1169</b>



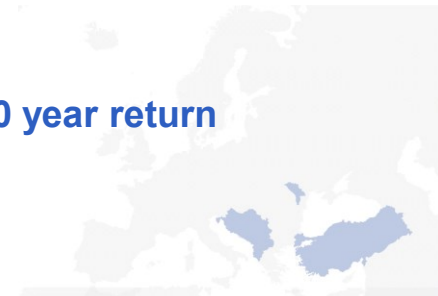
# New Generation of Seismic Hazard Maps of Republic of Moldova



MSK-intensity

PGA-acceleration

Earthquake hazard maps for subcrustal Vrancea zone for 500, 1000, and 10 000 year return periods: a, b, c - MSK-intensity; d, e, f - PGA-acceleration.



***Thank you for your attention!***

***Ministry of Regional Development  
and Construction of Republic  
of Moldova***

*([www.mdrc.gov.md](http://www.mdrc.gov.md))*

**Useful links:**

**INCERCOM State Scientific and  
Research Institute in Construction**

*([www.incercom.md](http://www.incercom.md))*

**National Institute for Standardization**

*([www.standard.md](http://www.standard.md))*

**National portal for construction  
regulations ([www.ednc.gov.md](http://www.ednc.gov.md))**

