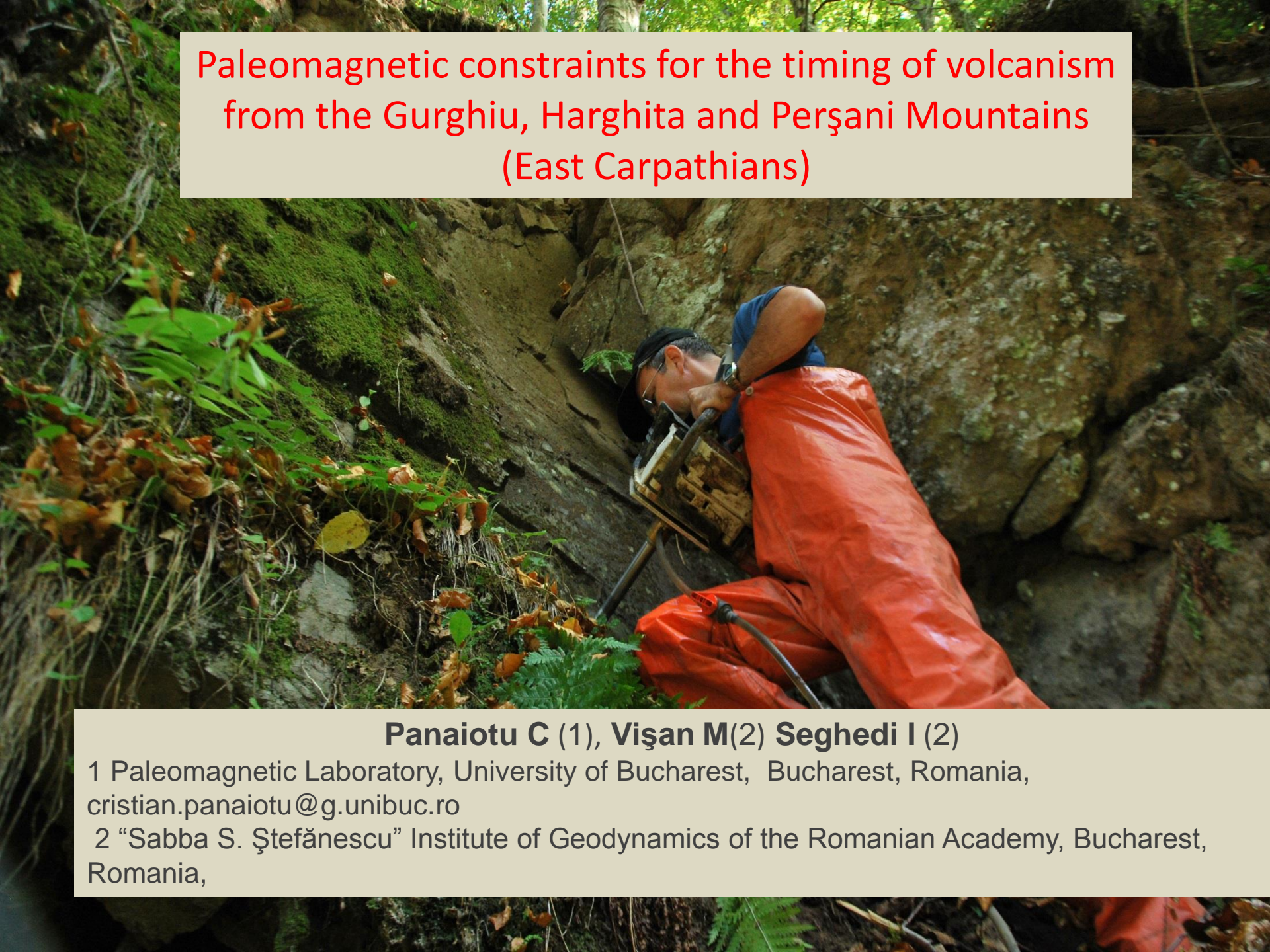


Paleomagnetic constraints for the timing of volcanism
from the Gurghiu, Harghita and Perșani Mountains
(East Carpathians)

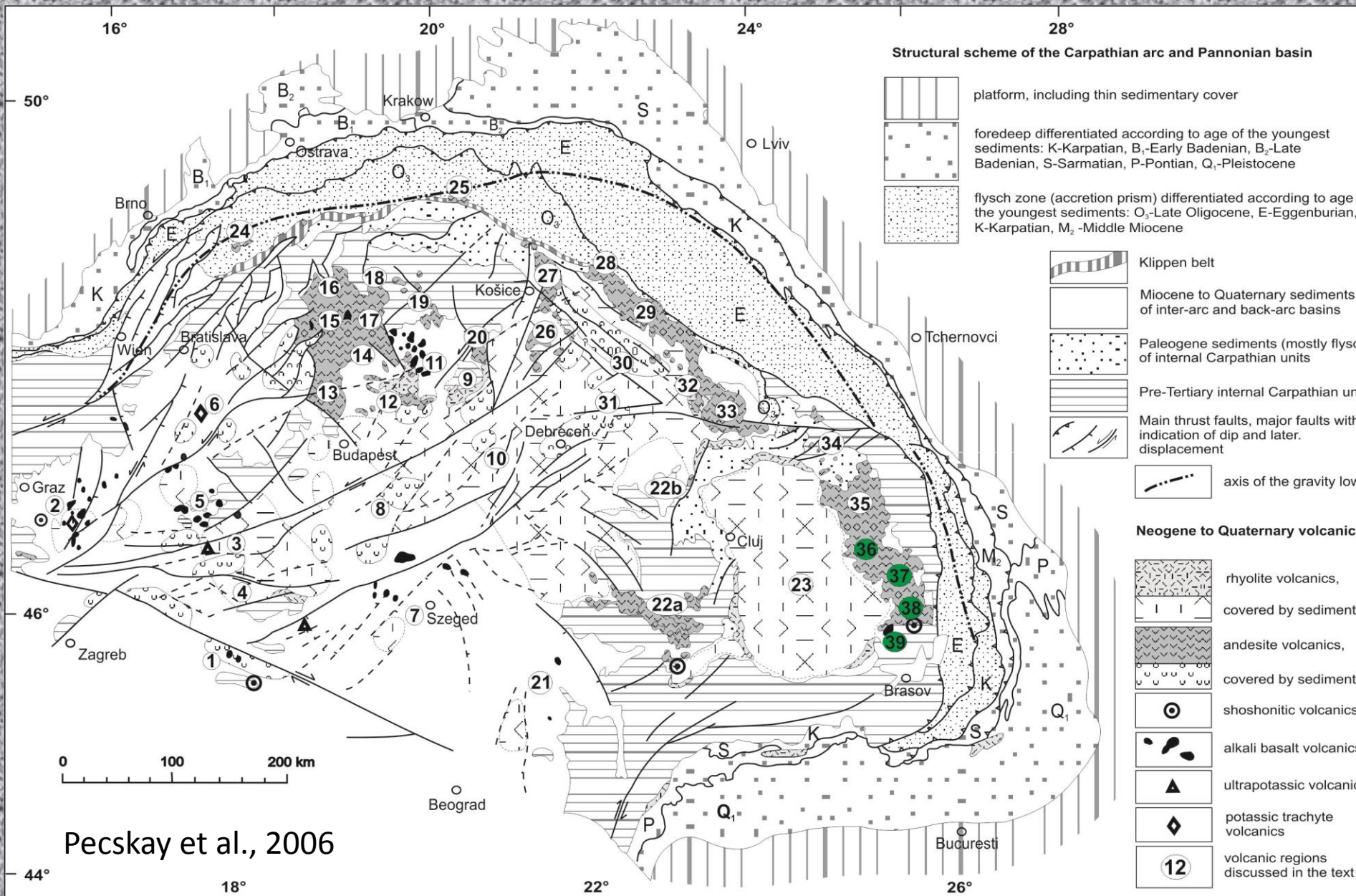


Panaiotu C (1), Vișan M(2) Seghedi I (2)

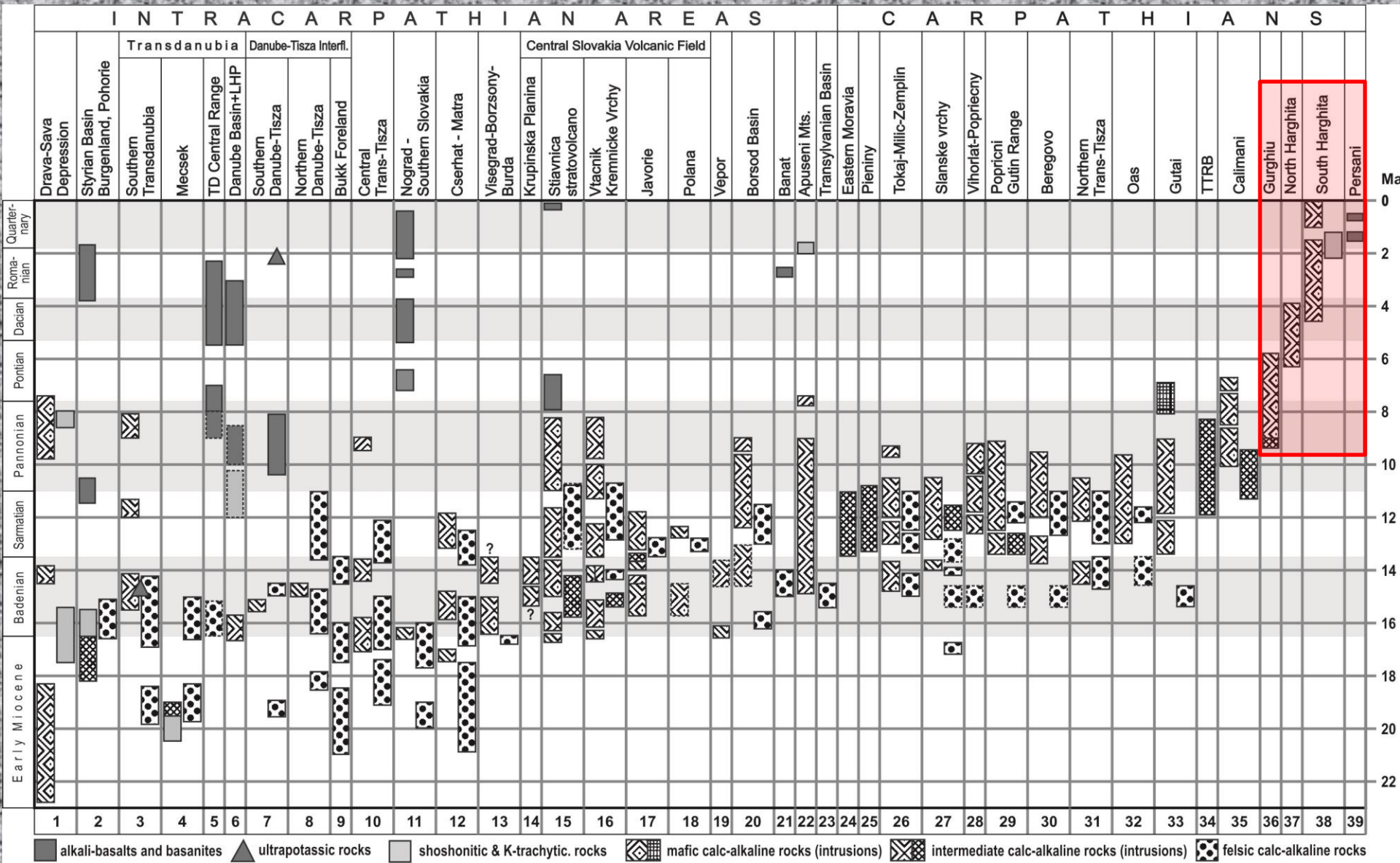
1 Paleomagnetic Laboratory, University of Bucharest, Bucharest, Romania,
cristian.panaiotu@g.unibuc.ro

2 “Sabba S. Ștefănescu” Institute of Geodynamics of the Romanian Academy, Bucharest,
Romania,

Sampling area: Gurghiu (36), North Harghita (37), South Harghita (38), Persani (39)



K-Ar ages of sampled areas according to Pecskey et al. (2006) and references therein.



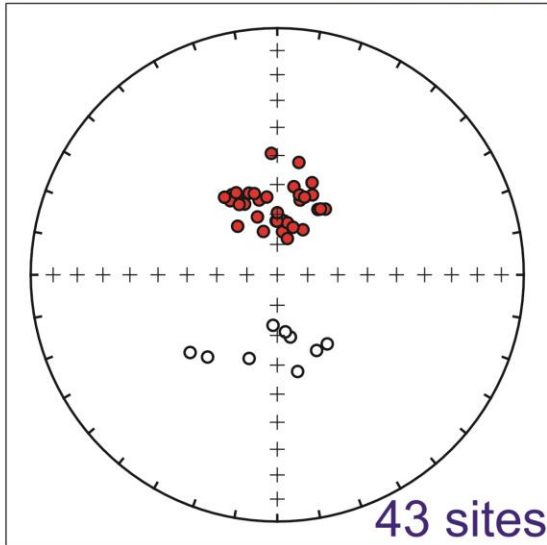
Paleomagnetic method



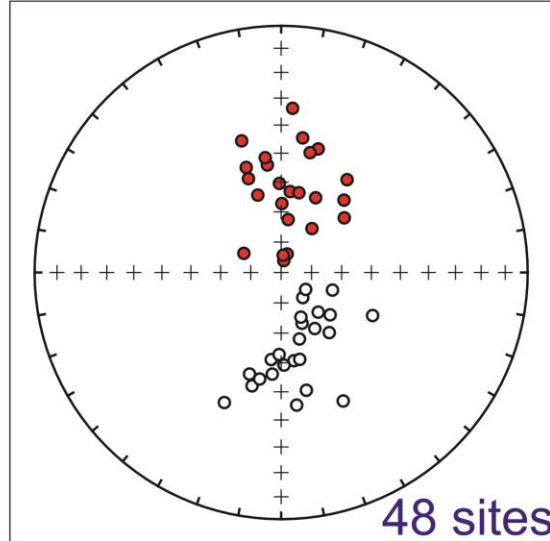
Quality criteria: 2 demagnetization methods; full demagnetization of each specimen; minimum 5 samples per site; precision parameter $k > 50$ (Johnson et al., 2008)

Site mean directions

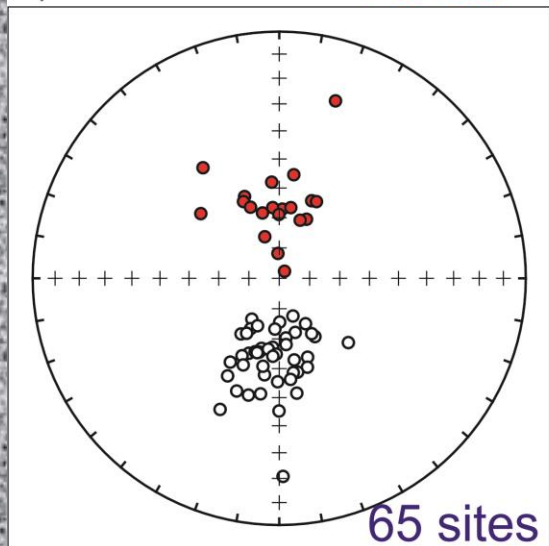
Equal Area Plot **0-1.1 Ma**



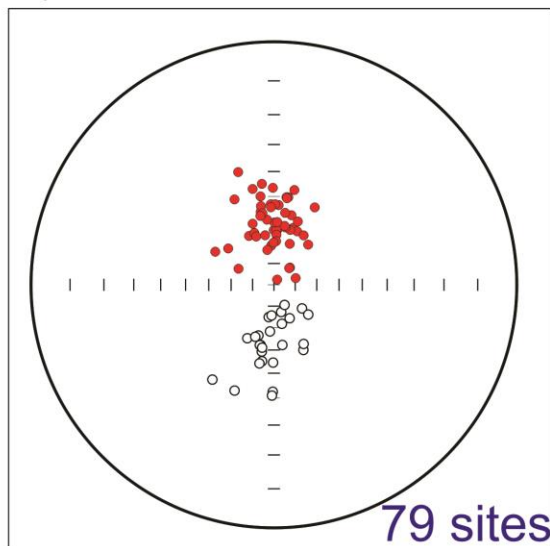
Equal Area Plot **1.5-4 Ma**



Equal Area Plot **4-6 Ma**



Equal Area Plot **6-9 Ma**



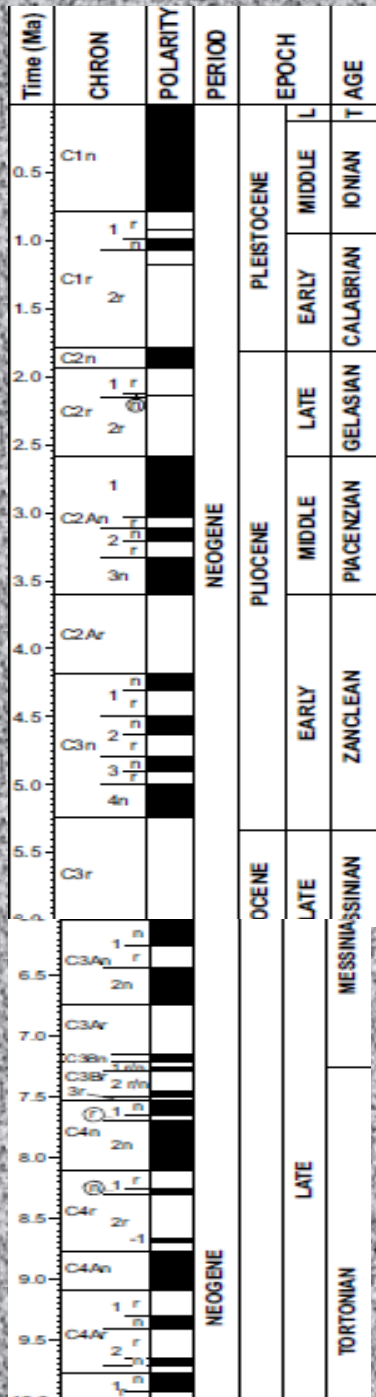
Total number of sites: 235

Dispersion of directions is produced only by the secular variation of the geomagnetic field.

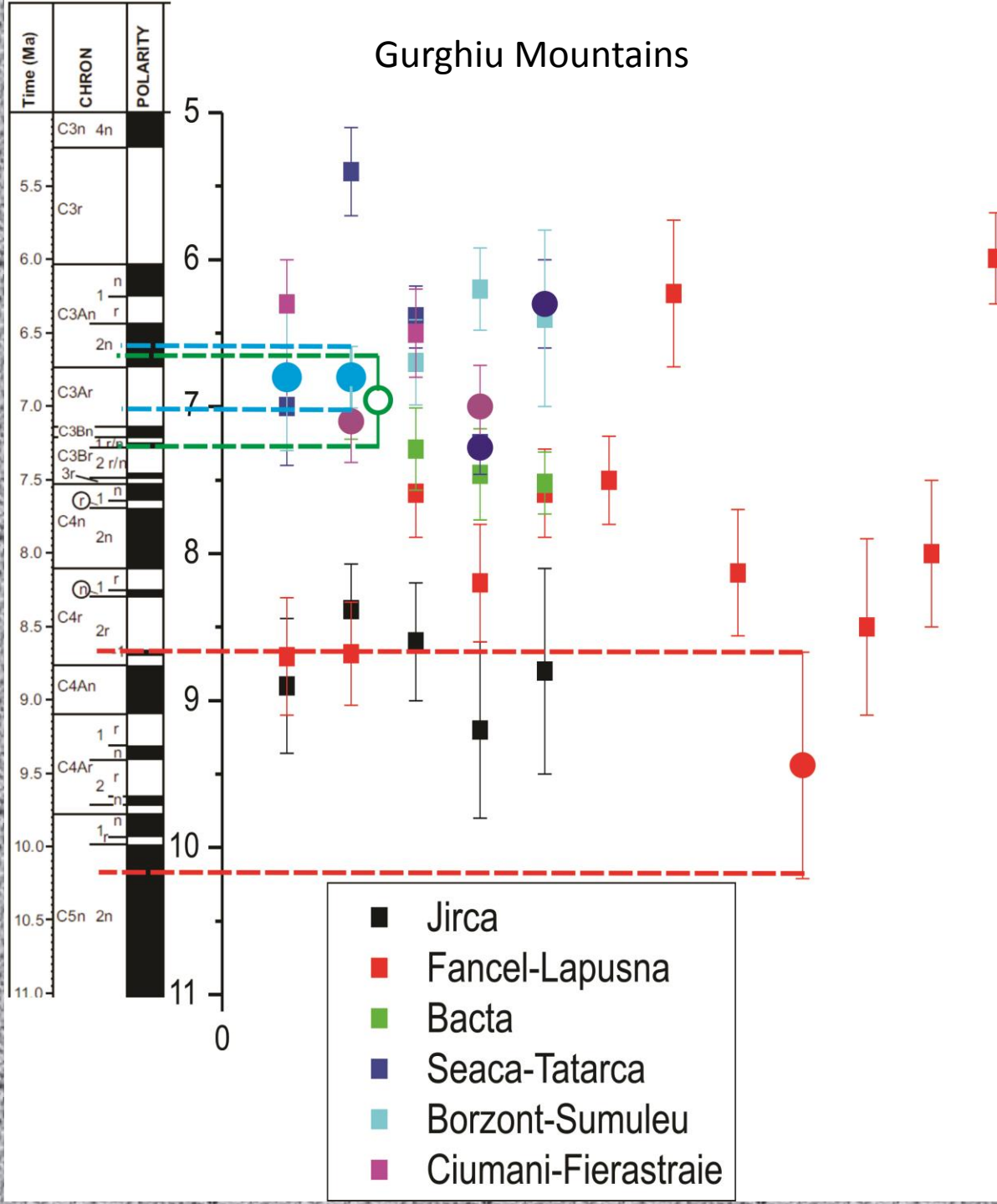
**Magnetic polarity time scale
(Lourens et al. 2004)**

Objective:

Correlation of main eruption phases with magnetic polarity time scale based on available radiometric ages and geographical distribution of magnetic polarity



Gurghiu Mountains



Difficulties:

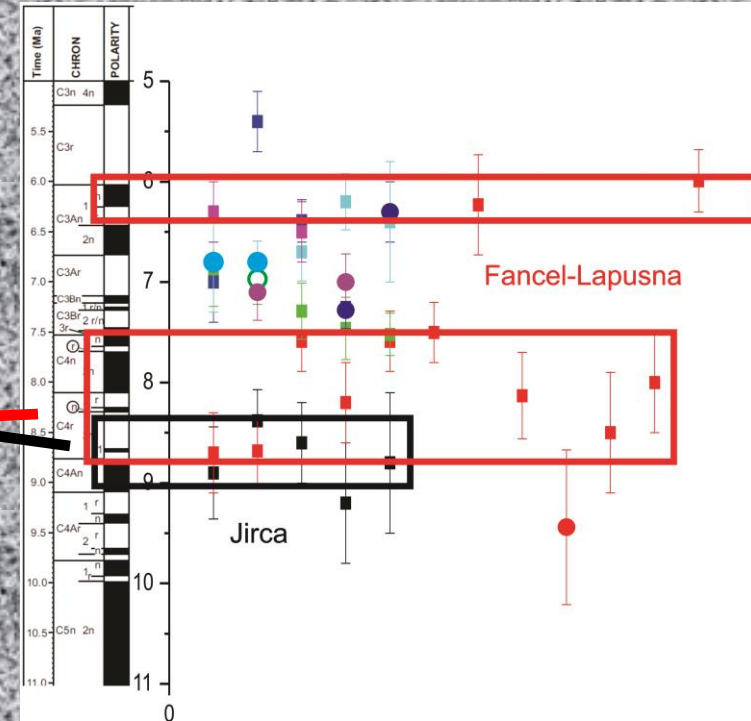
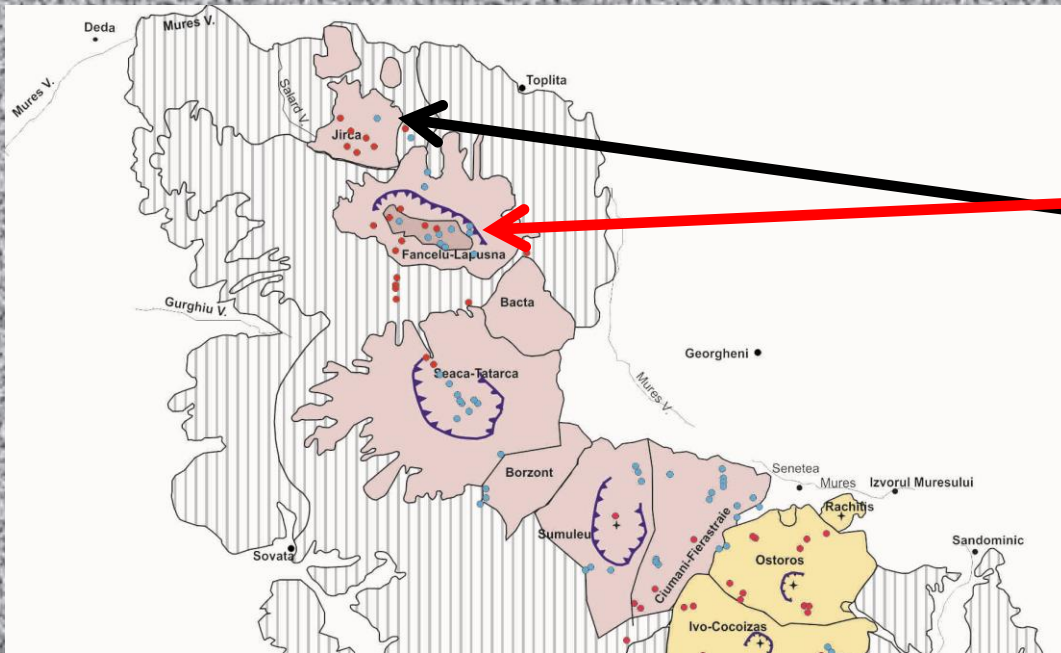
1. K-Ar ages have errors which cover several reversals (no unique solution)
2. Correlation with polarity time scale suggest that the “true age” is located near the limits of error bars.

Solutions:

1. Identification of time interval of main phase of volcanic activity supported by most of K-Ar ages.
2. Identification of most probable chrons which fit both this time interval and geographical distribution of magnetic polarity data.

Gurghiu

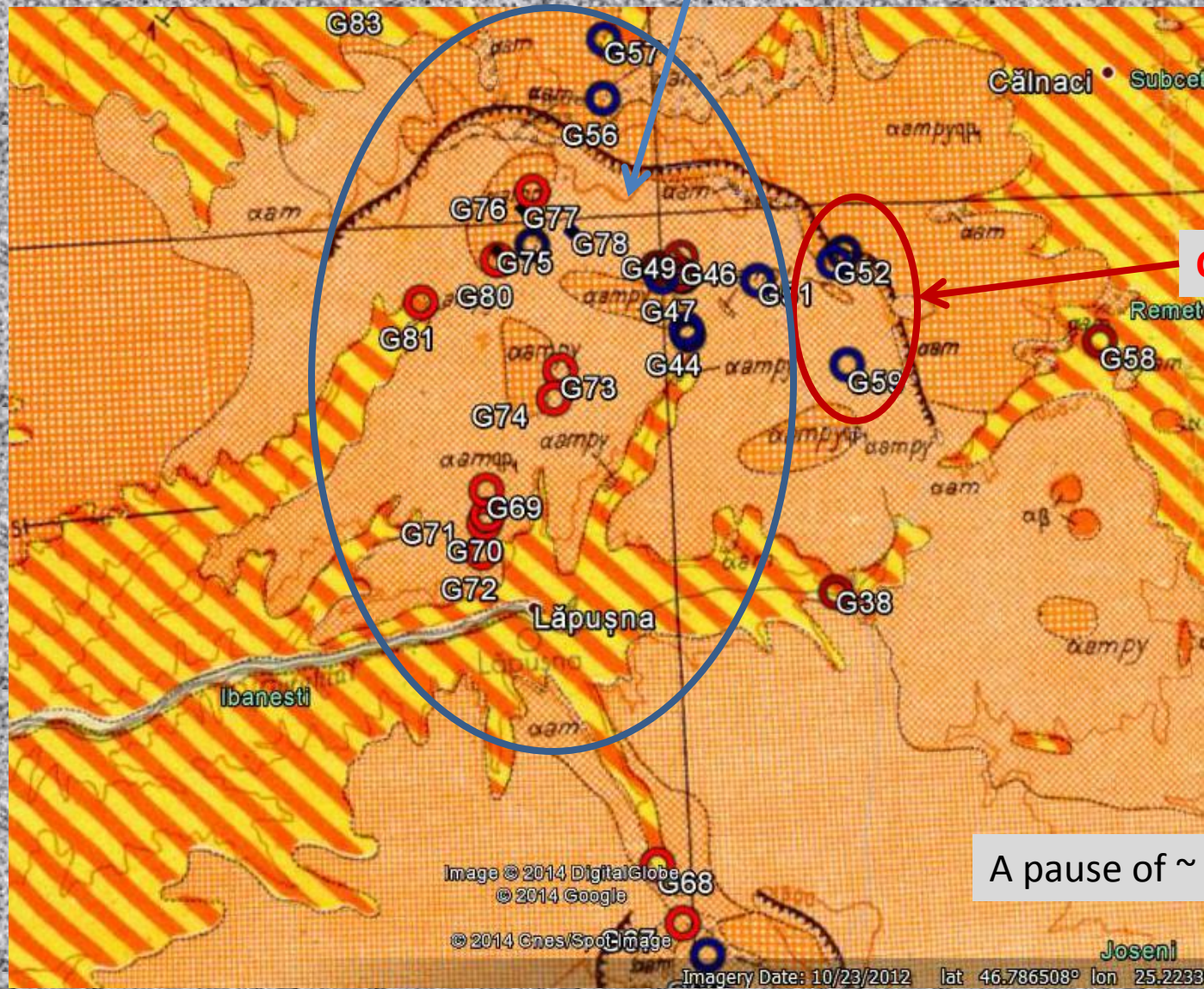
Jirca and Fancel-Lapusna volcanic structures



Jirca: dominant reversed polarity
 Fancel – Lapusna: mixt magnetic polarities

Jirca: C4r (8.1-8.7 Ma)
 Fancel-Lapusna: C4r – C4n (7.5-8.7 Ma)

C4r – C4n (7.5-8.7 Ma)



C3An: 6.0-6.7 Ma

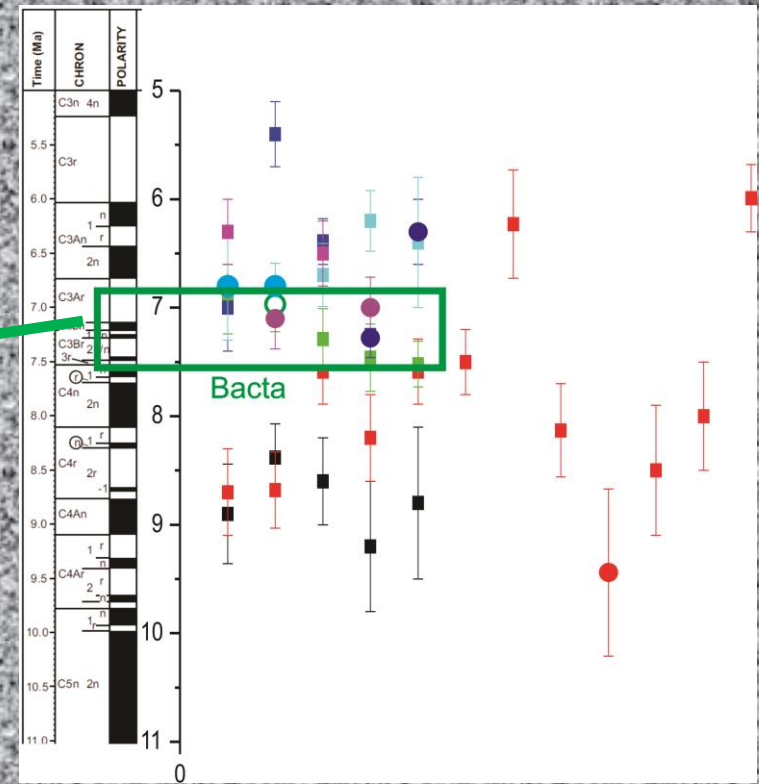
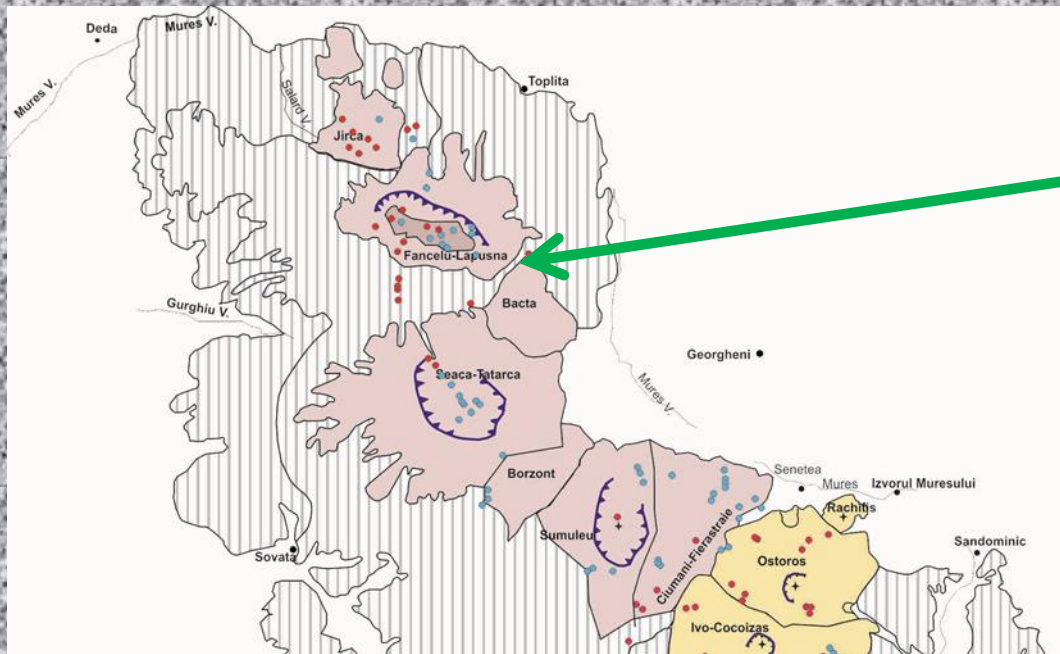
A pause of ~ 0.8 Ma ?

Image © 2014 DigitalGlobe
© 2014 Google
© 2014 Cnes/Spot Image

Imagery Date: 10/23/2012 lat 46.786508° lon 25.2233

Gurghiu

Bacta volcanic structures



Jirca: C4r (8.1-8.7 Ma)

Fancel-Lapusna: C4r – C4n (7.5-8.7 Ma)

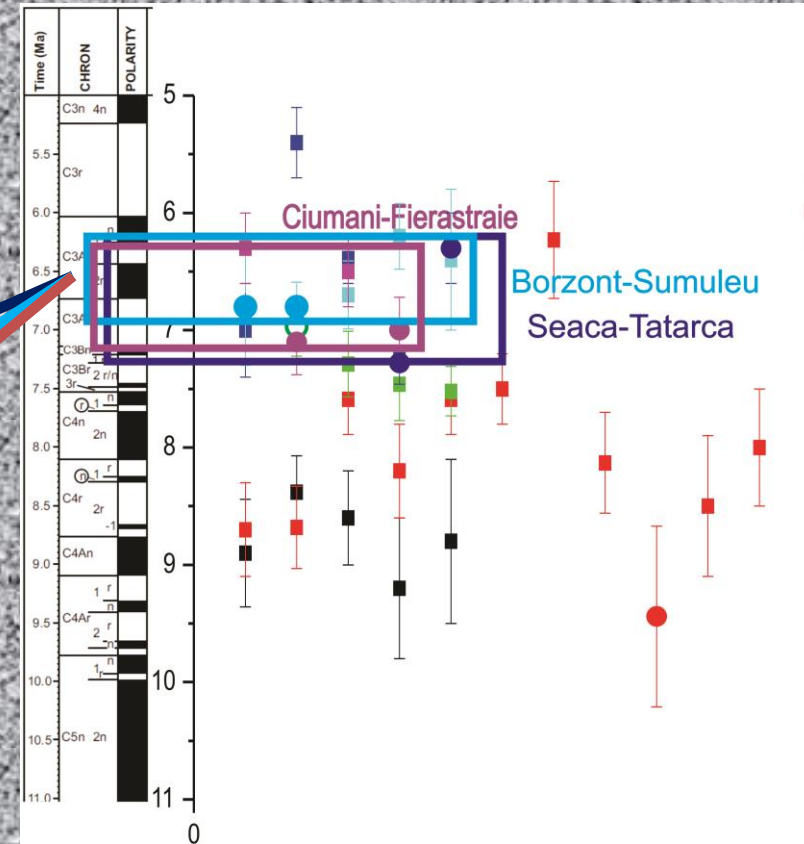
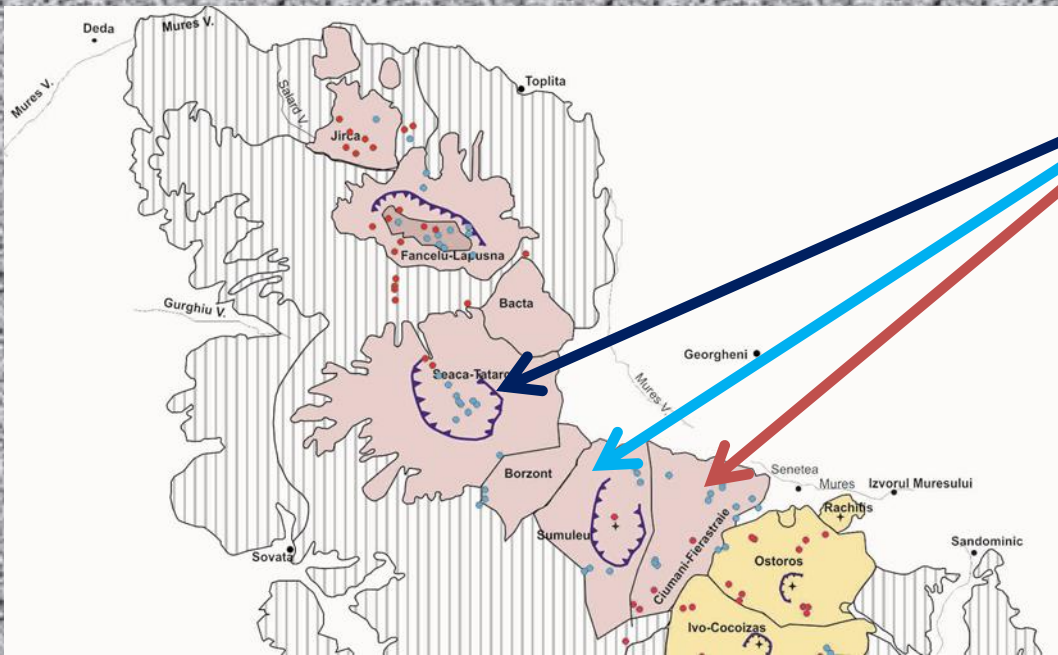
Bacta: C3Ar – C3B (6.7 – 7.5 Ma)

Bacta : 1 site with reversed polarity

Gurghiu

Seaca-Tatarca, Borzont, Sumuleu, Ciumani-Fierastraie volcanic structures

Dominant normal polarity



Jirca: C4r (8.1-8.7 Ma)

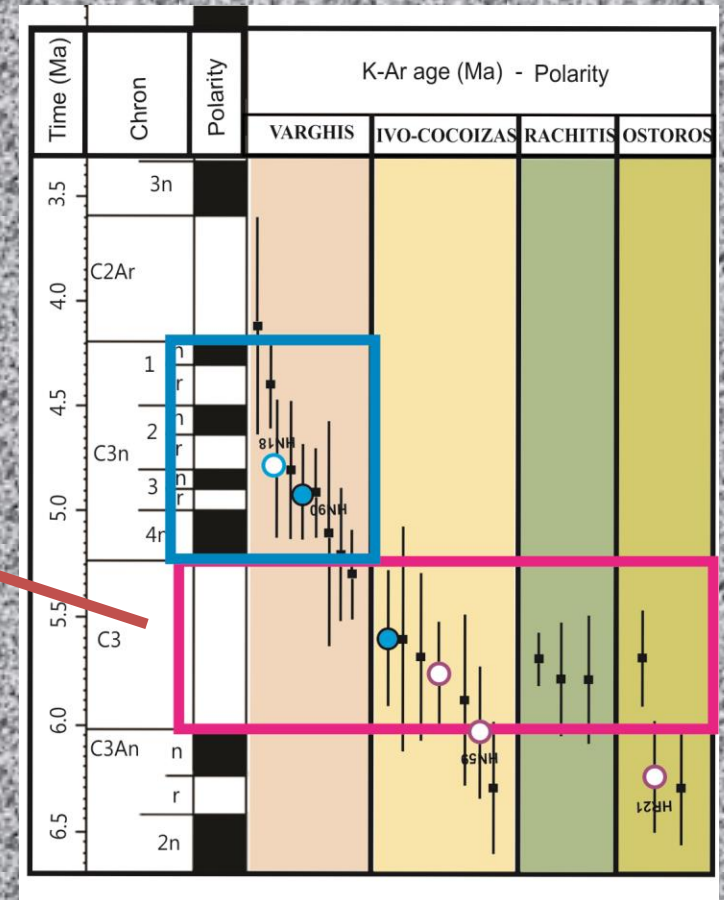
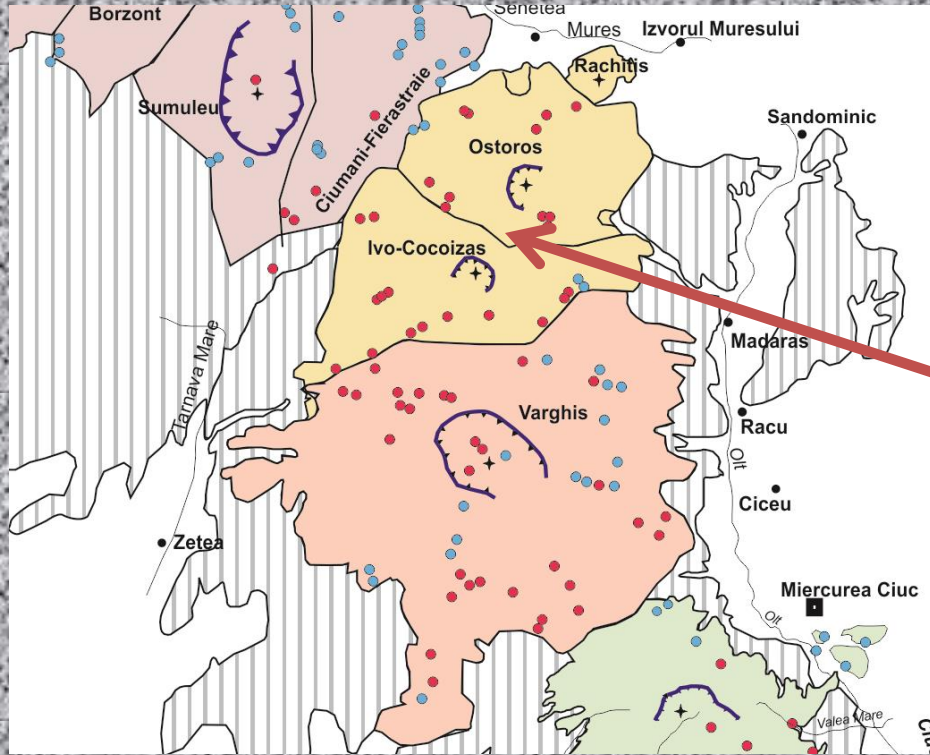
Fancel-Lapusna: C4r – C4n (7.5-8.7 Ma)

Bacta: C3Ar – C3B (6.7 – 7.5 Ma)

Seaca-Tatarca, Borzont, Sumuleu, Ciumani-Fierastraie : C3An (6.0-6.7 Ma)

North Harghita

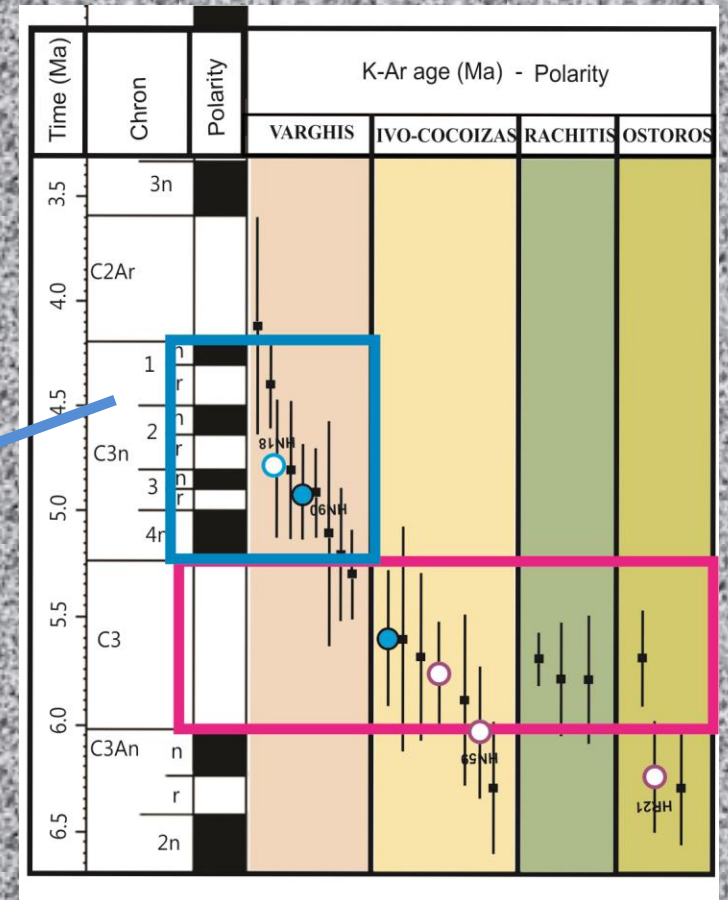
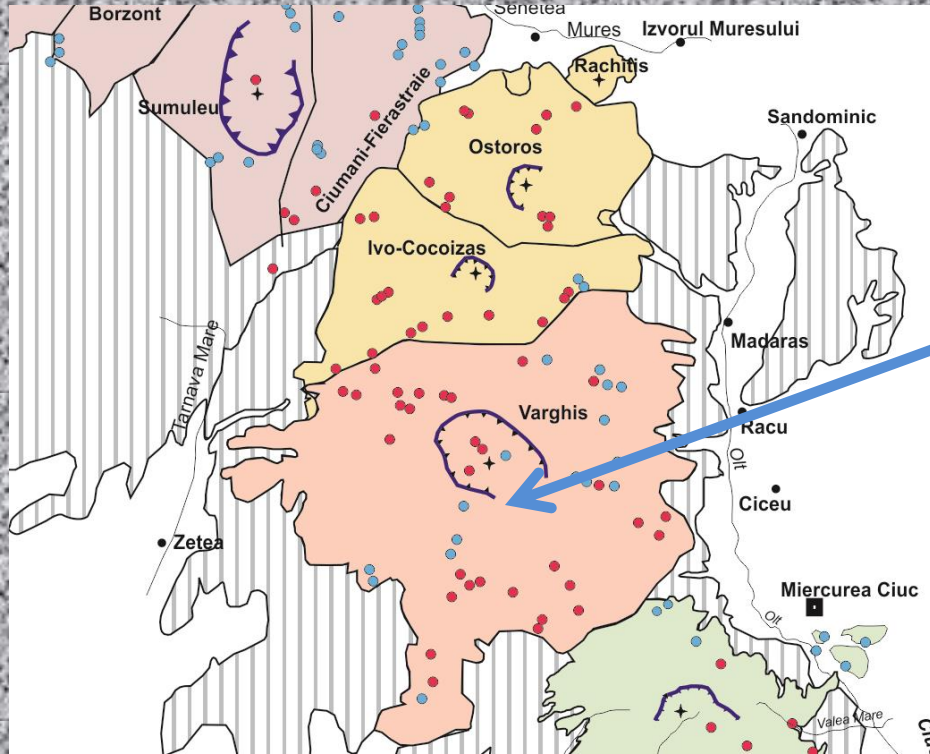
Ostoros and Ivo-Cocoizas volcanic structures



Only reversed polarity

Ostoros, Ivo-Cocoizas and southern tip of Gurghiu: C3 (5.2 – 6.0 Ma)

North Harghita Varghis volcanic structures

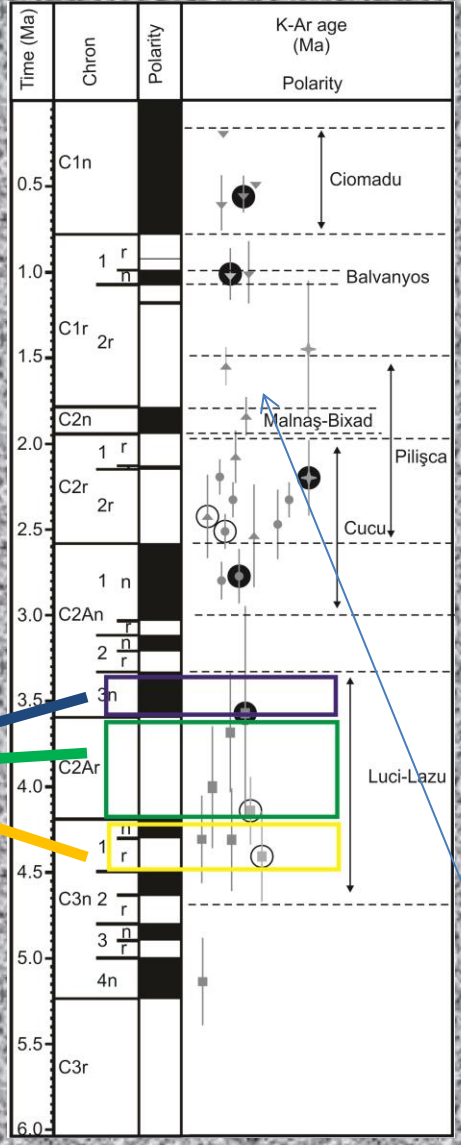
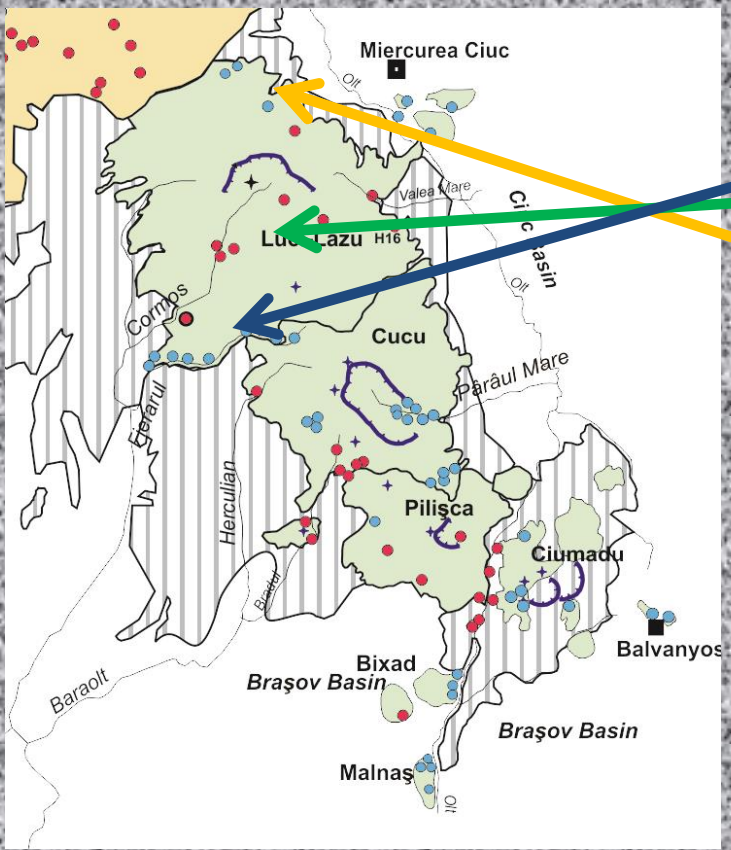


Mixt polarities

Ostoros, Ivo-Cocoizas and southern tip of Gurghiu: C3 (5.2 – 6.0 Ma)
Varghis and northern part of South Harghita: C3n (4.1 – 5.2 Ma)

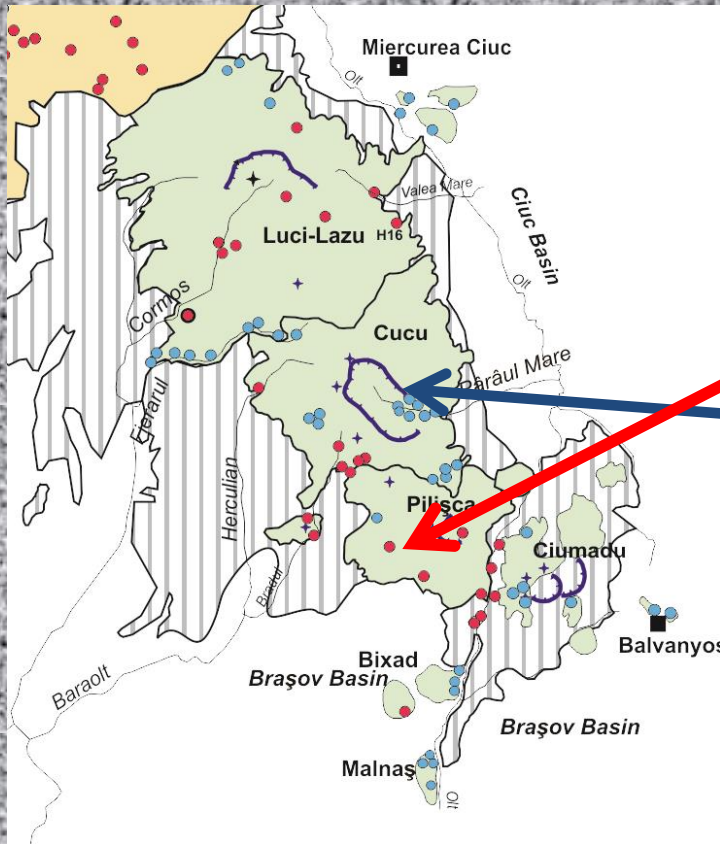
South Harghita
Luci-Lazu volcanic structures

Mixt polarities

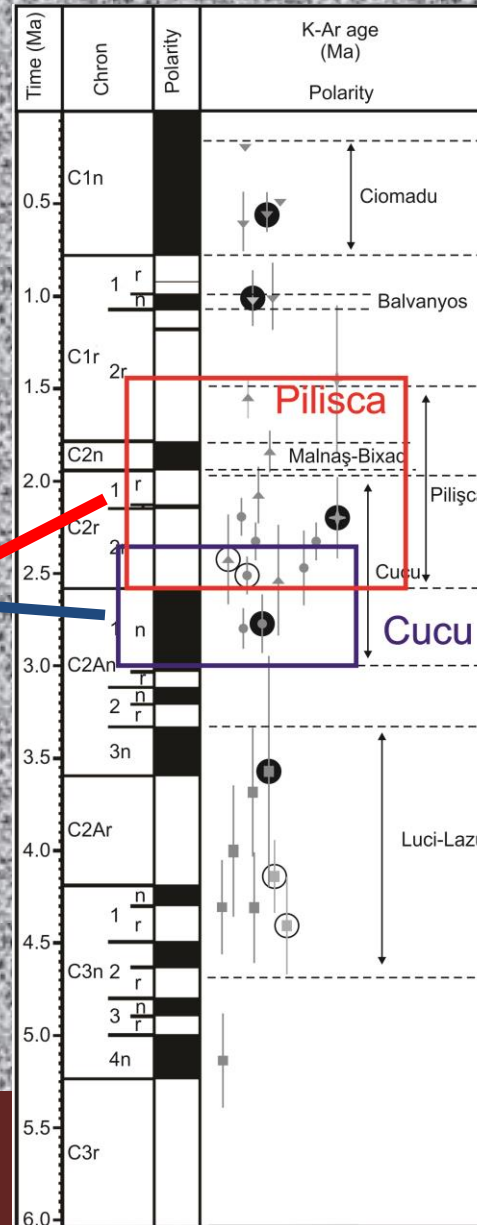


- Main phases Luci-Lazu:
1. End of C3n
 2. C2Ar
 3. Beginning of C2An
- ~ 3.5 – 4.5 Ma

South Harghita Cucu and Pilișca volcanic structures



Cucu: dominant normal polarities
Pilișca: dominant reversed polarities

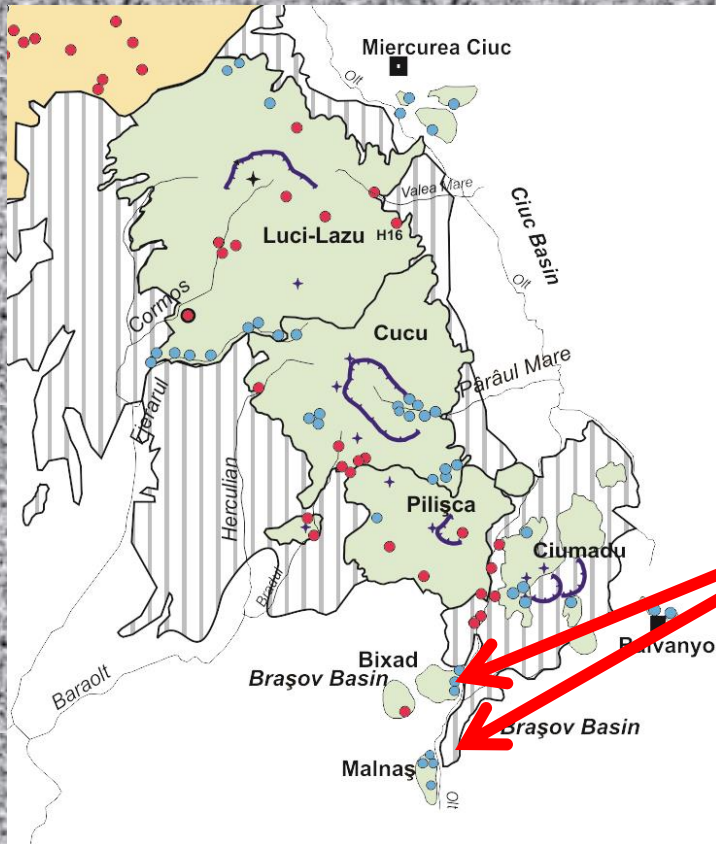


Main phases:

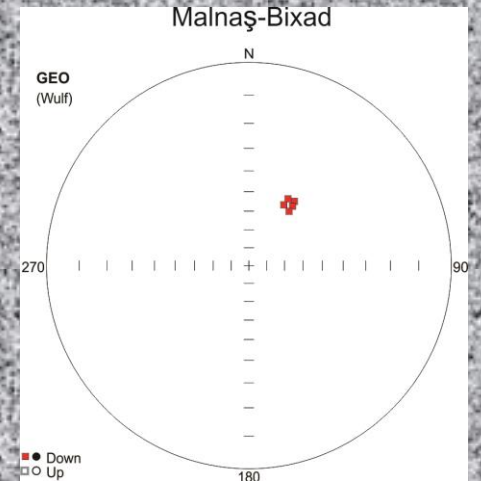
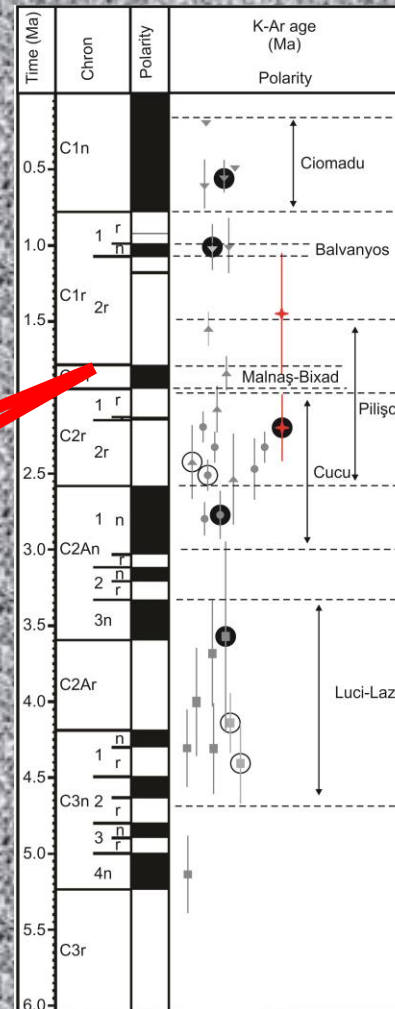
Cucu:
End of C2An (1n)
Beginning of C2r
~ 2.5 - 3.0 Ma

Pilișca:
C2r - C1r
~ 1.5 - 2.6 Ma

South Harghita Malnas and Bixad domes



Malnas : normal polarity
Bixad: normal polarity



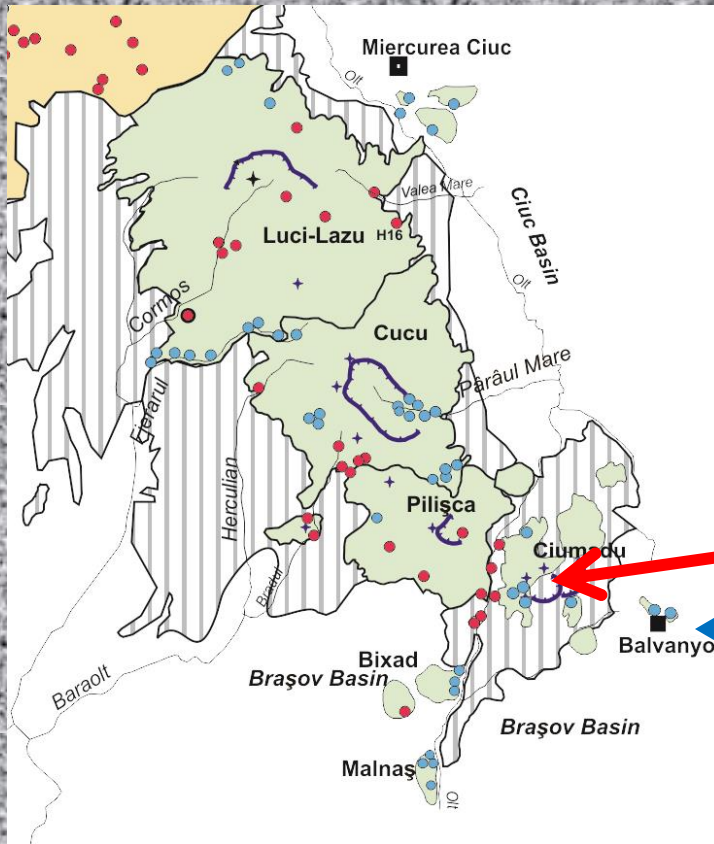
Both domes have identical directions:
1. Contemporaneous
2. Short time interval

Malnas and Bixad
C2n ~ 1.8 Ma

Is this the correct solution ?
New ages !

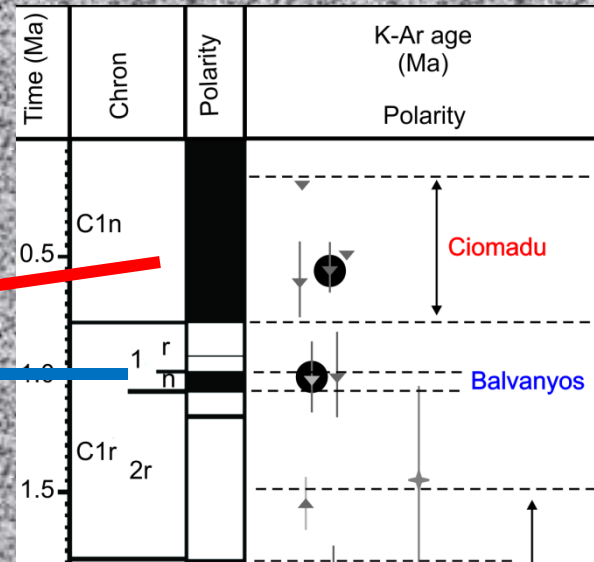
South Harghita

Balvanyos and Ciomadu volcanic structures



Balvanyos: C1r1n ~ 1 Ma

Puturosu and Ciomadu: C1n

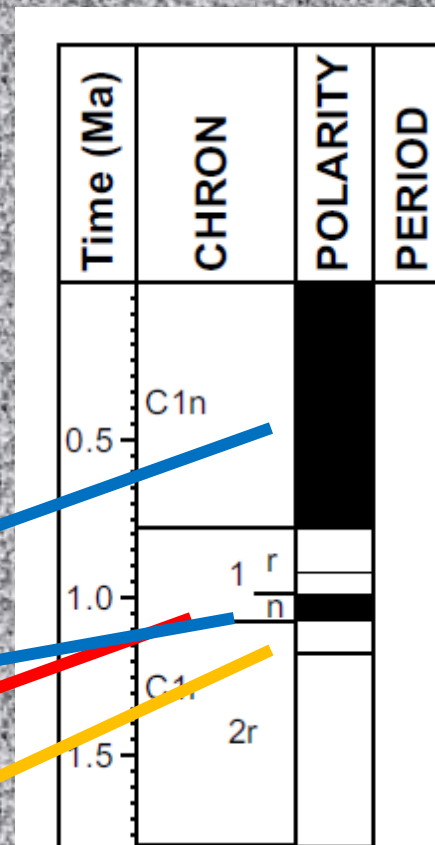
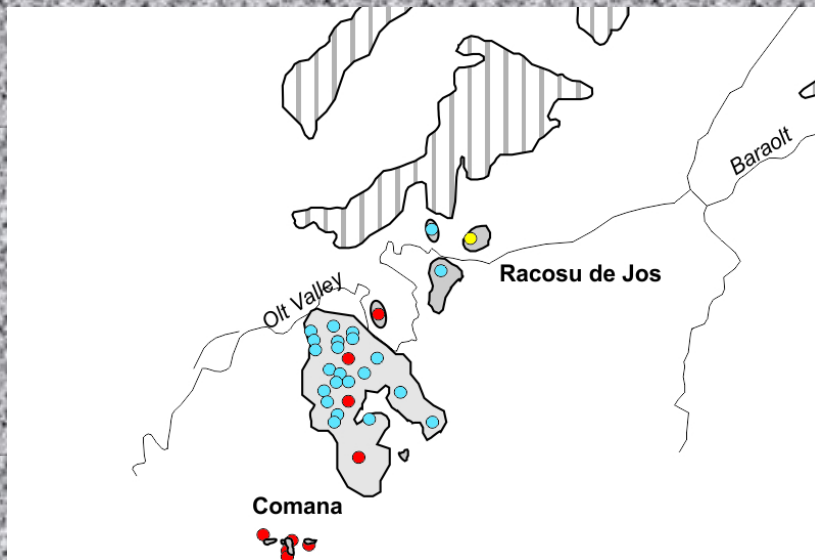


Balvanyos: normal polarity
Ciomadu: normal polarity

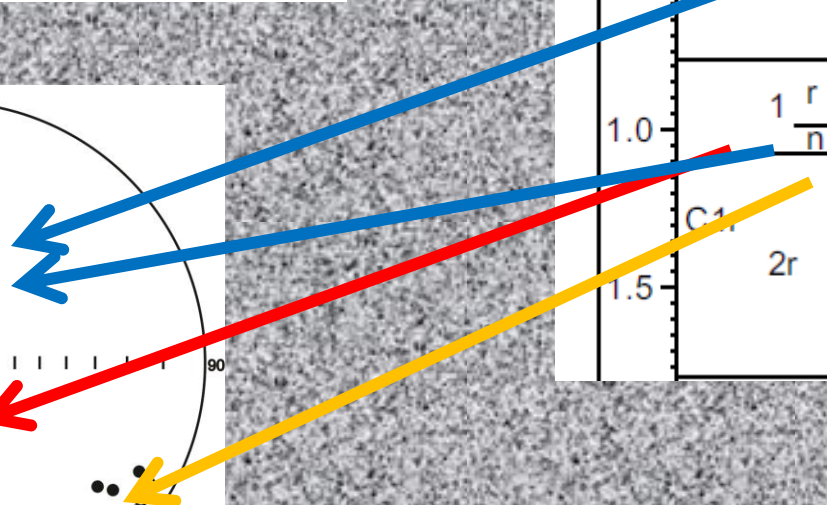
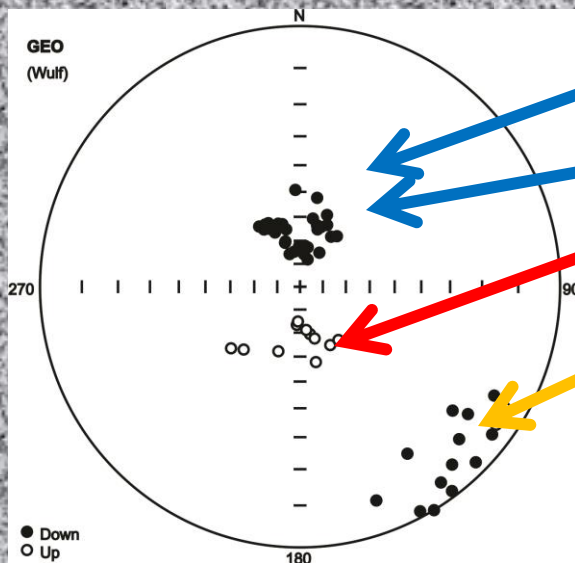
Alternativ
solution only C1n

Persani volcanic structures

Ar-Ar ages from Panaiotu et al., 2013)



Cobb Mountain subchron ~1,2 Ma



CONCLUSIONS



1. The paleomagnetic results are consistent with the currently accepted model of a progressive migration of the main volcanic activity from North to South.

2. The migration took place in time steps of around 1 Ma or less according to the magnetic polarity data. However inside each step the volcanism can be episodic.

To be continued in the Calimani Mountains.

The truth is out there !



Acknowledgements: This is a contribution of the CNCS – UEFISCDI project number PN-II-ID-PCE-2012-4-0177