Surface kinematics in the Alpine-Carpathian-Dinaric and Balkan region inferred from a new multi-network GPS combination solution

The CEGRN – CERGOP 2 team

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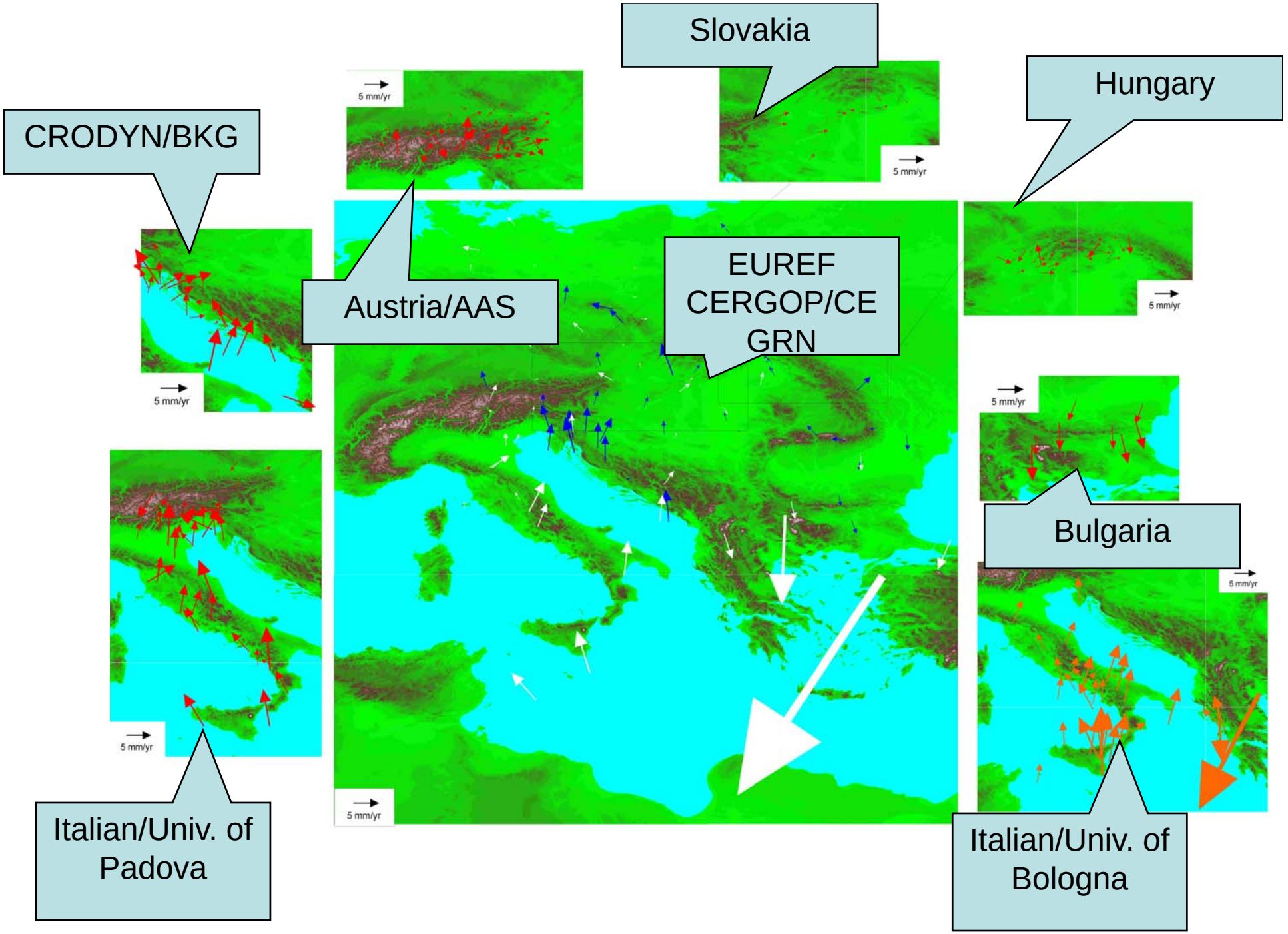
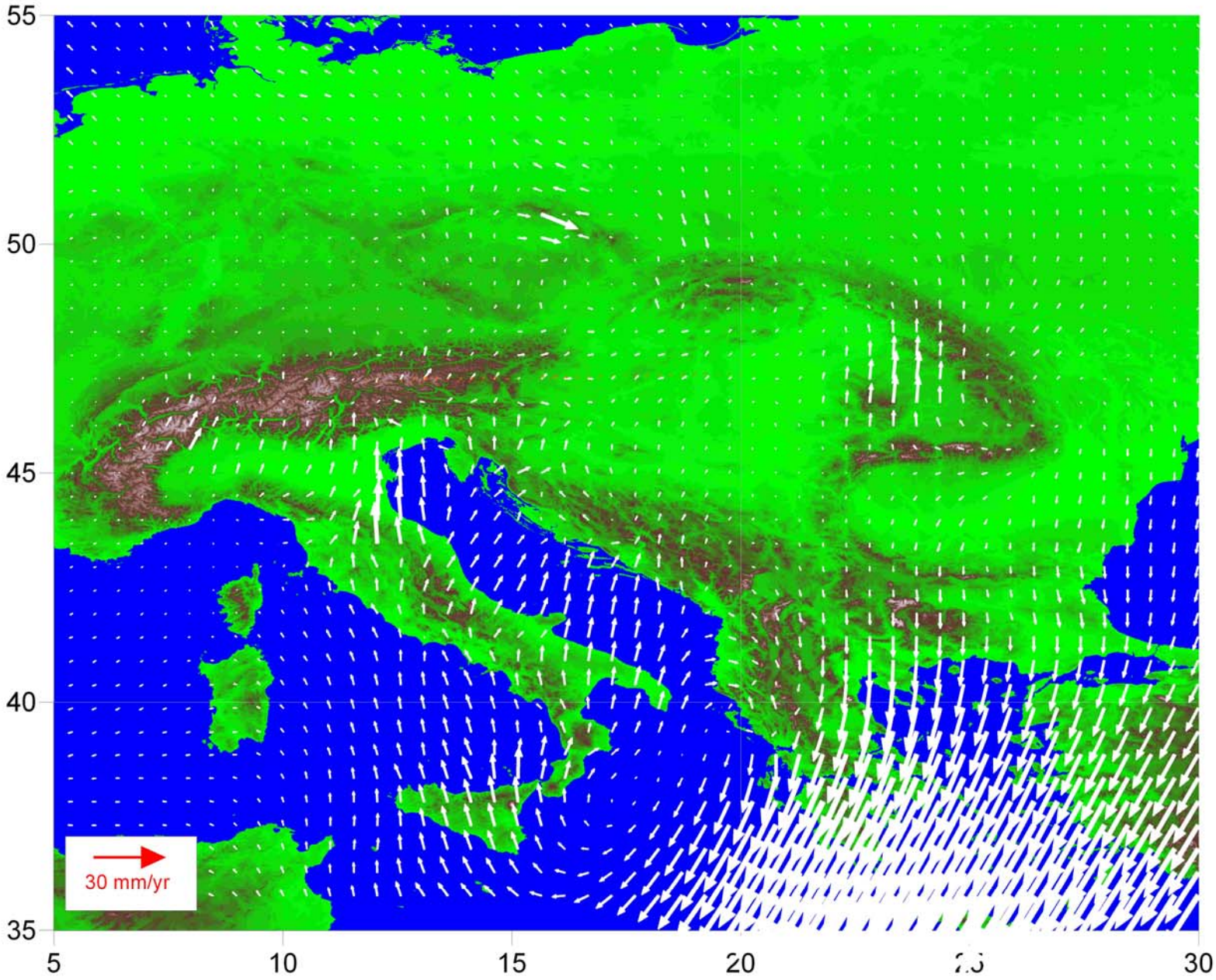
Open questions on the evolution of Central Europe

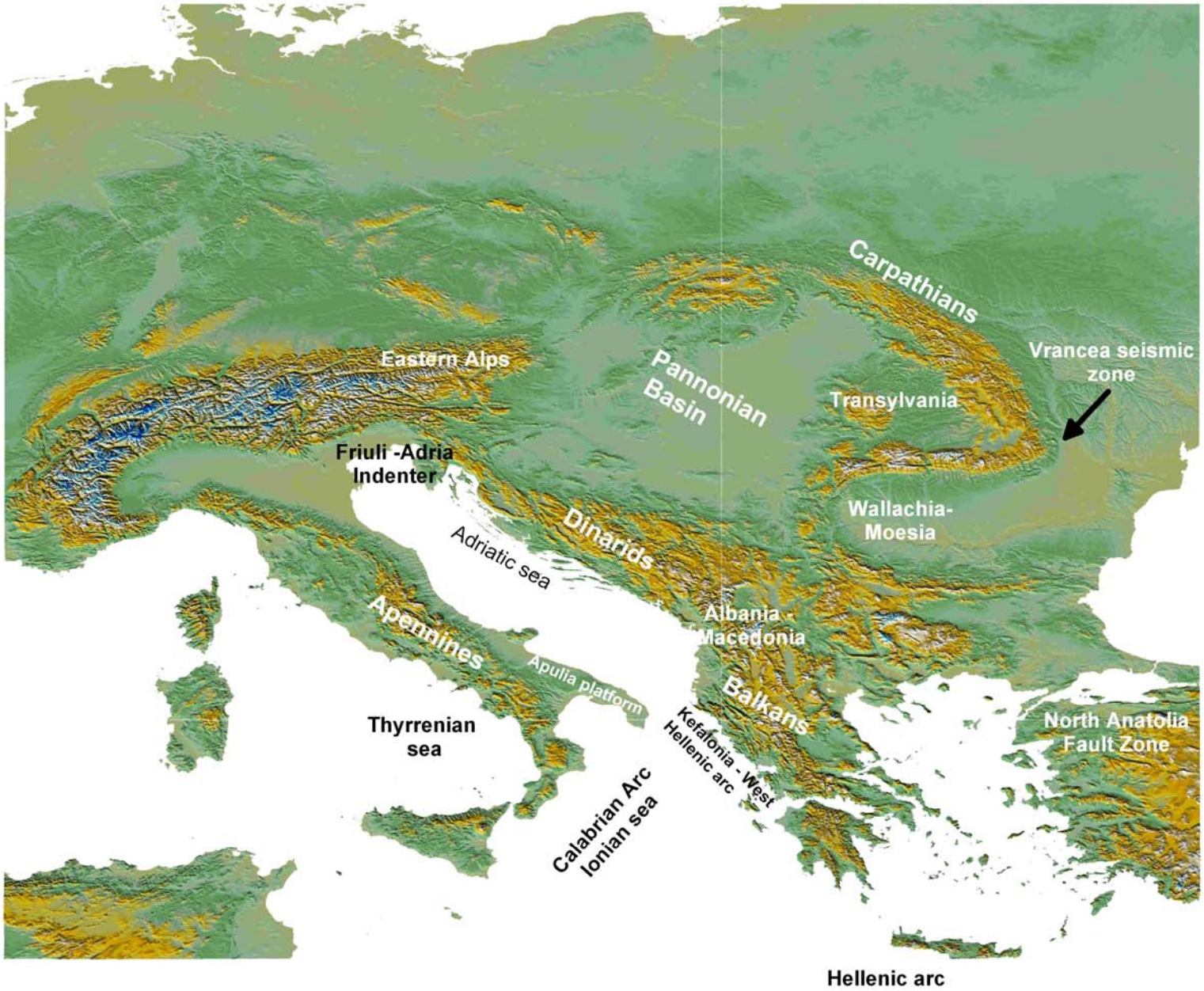
- how is stress transferred from the interaction of the Eurasian, Nubian and Anatolian plates to the Alpine, Carpathian, Pannonian and Dinaric regions?
- role played by additional stress sources such as volcanism and formation of oceanic crust in the Tyrrhenian or gravitational instabilities in the Vrancea seismic zone?
- can we benefit from the velocity information coming from existing GPS networks?


Slovakia
Hungary
CRODYN/BKG
Austria/AAS
EUREF
CERGOP/CE
GRN
Bulgaria
Italian/Univ. of
Padova
Italian/Univ. of
Bologna
5 mm/yr

Combining velocities of overalpping networks

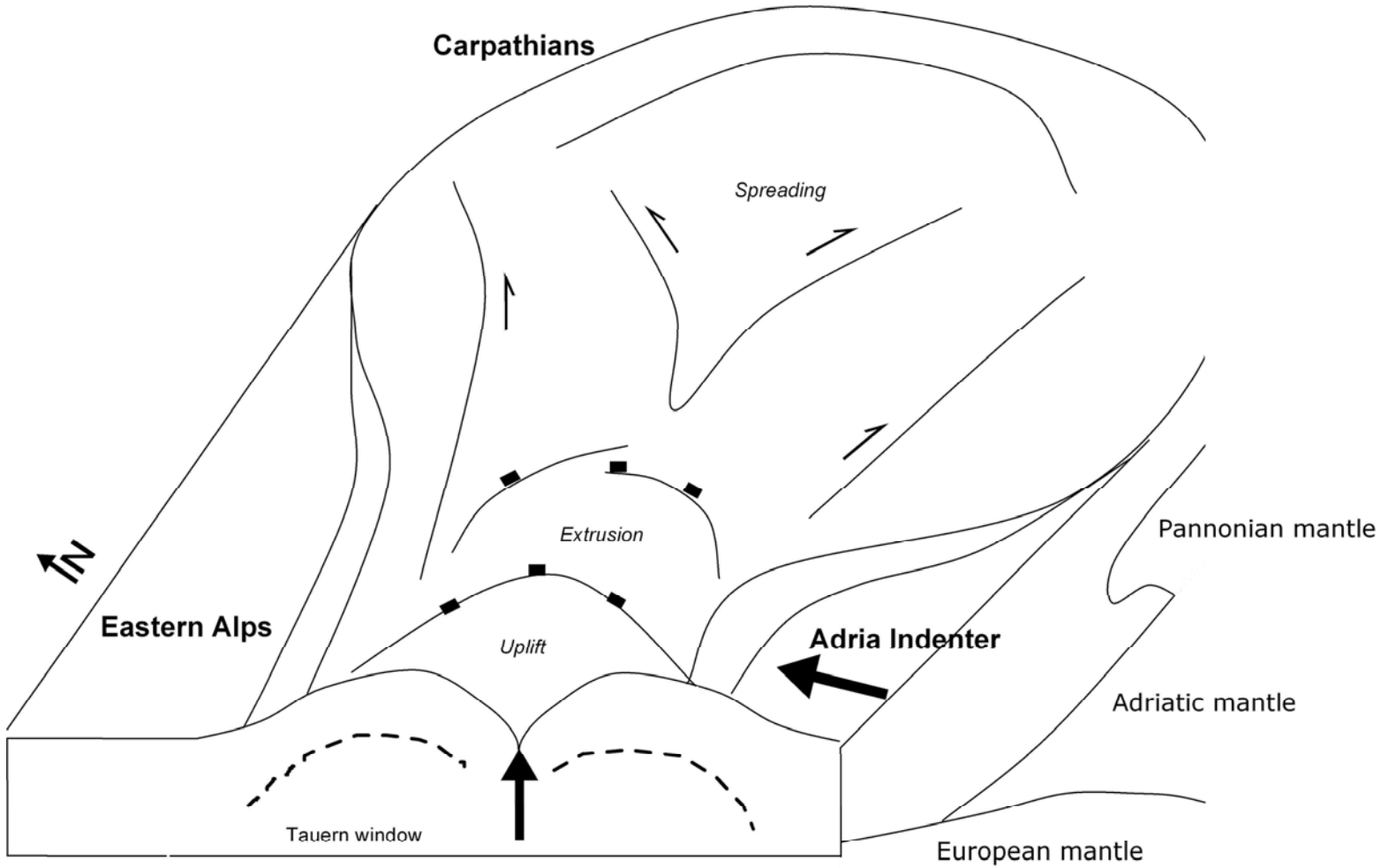
- Can be done rigorously
  - Combining sinex XV files from multi year analyses of individual networks (good strategy for campaign networks)
  - Combining Normal Equations files of same epoch and building time series with combined (e.g. weekly) NEQ files (good strategy for permanent networks)
- Eventually, velocities at common sites should differ negligibly across different solutions
- ITRF00 velocities of the selected networks do agree within 1 mm/yr in most cases for common sites
- Combined velocities can be gridded


55
50
45
40
35
5
10
15
20
30
30 mm/yr

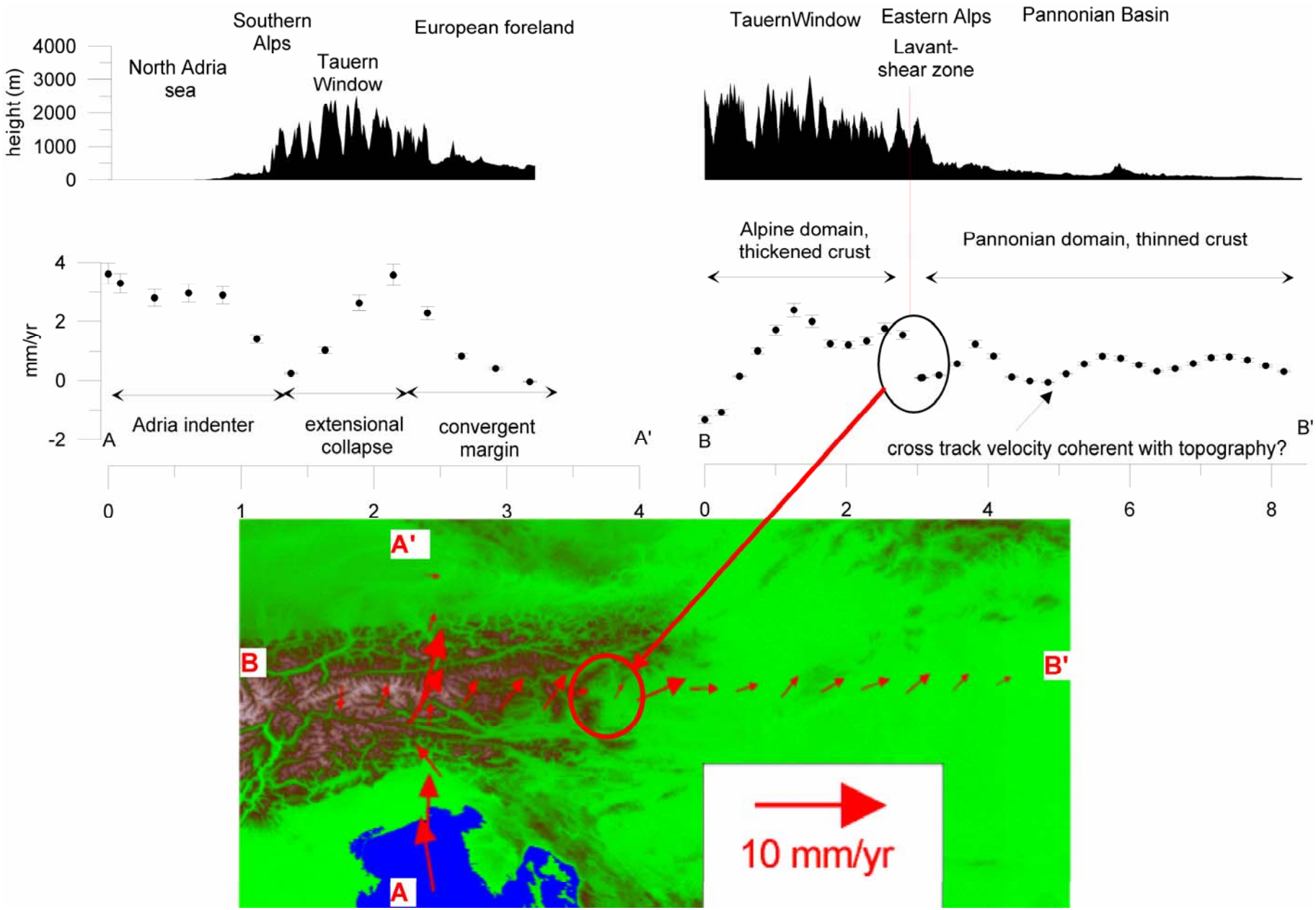

Carpathians
Eastern Alps
Pannonian Basin
Vrancea seismic zone
Transylvania
Friuli -Adria Indenter
Wallachia-Moesia
Dinarids
Adriatic sea
Albania - Macedonia
Apennines
Apulia platform
Balkans
Thyrrenian sea
Kefalonia - West Hellenic arc
North Anatolia Fault Zone
Calabrian Arc Ionian sea
Hellenic arc

Eastern – Southern Alps

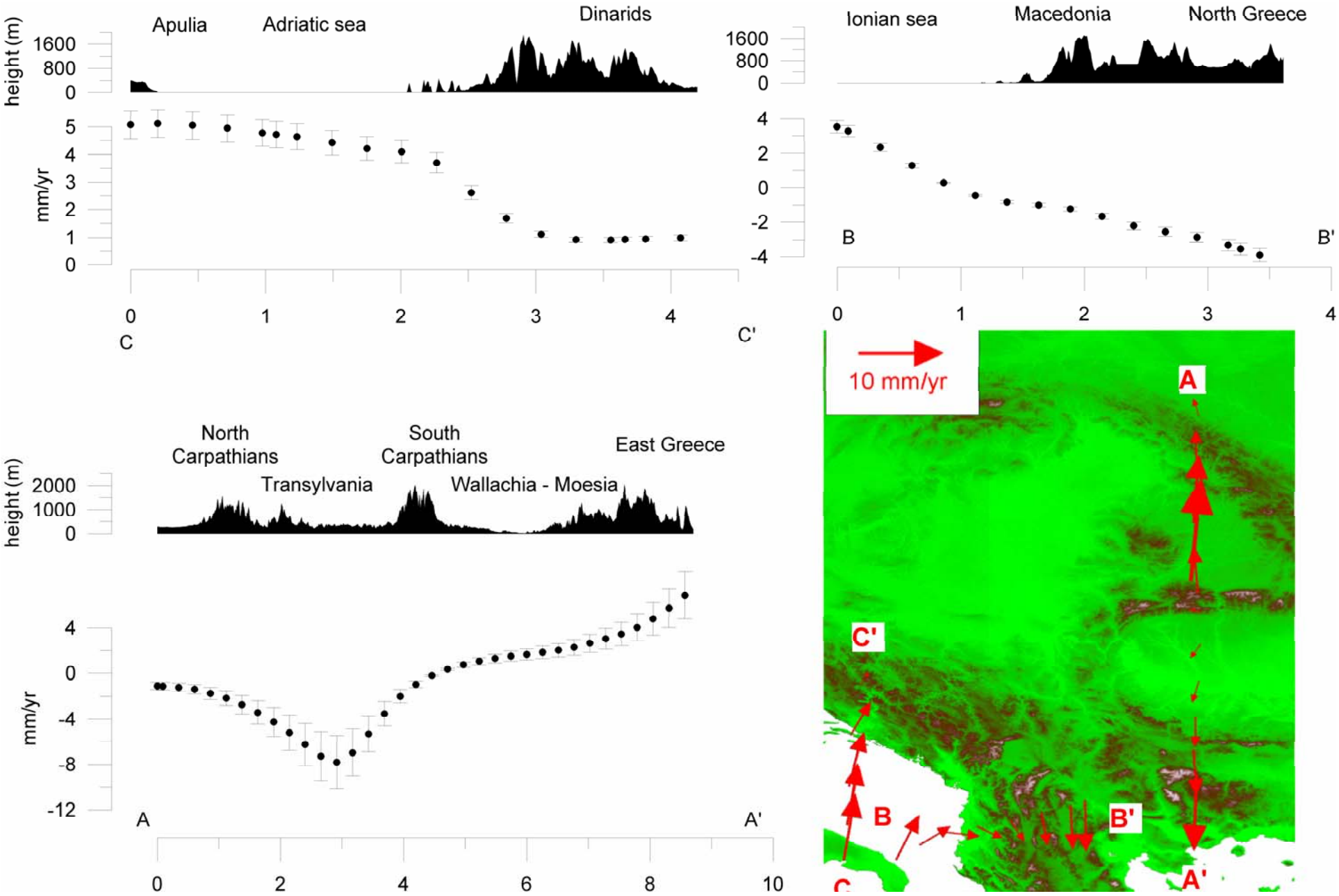
Squeeze and extrude model



Selected profiles 1



Selected profiles 2



Summary

- More detail in the strain pattern associated with Adria/Alps indentation
- North and East kinematics separated by the Lavant line: independent Pannonian unit?
- Large dextral shear in the Balkans
- Compression in Transylvania?
- Extension in the Rumanian Bulgarian crust