



# SPP - 1<sup>st</sup> Annual Meeting

November 9-10, 2017



Mountain-Building Processes in 4-Dimensions  
(4D-MB)

SPP 2017

# Today's Program



Thursday/Donnerstag, den 9. Nov. 2018

9:00-9:30      Coffee  
9:30-9:50      Greeting, Information  
9:50-11:20     *Session A - AlpArray Seismological Activities*  
11:20-11:40    Refreshments

Presentations of 4D-MB projects (see list)

11:40-12:30    *Session B - On slabs and subduction*

**Lunch: 12:30-13:30**

13:30-14:40    *Session C – From the surface to the mantle and back*  
14:40-15:10    Refreshments  
15:10-16:20    *Session D – Looking backwards and forewards in time – 4D*  
16:30-17:30    Steering Committee deliberates, 1<sup>st</sup> breakout session

**19:00**            **Dinner** in town at the *Wallhalla restaurant* (directions slide 8)

# Information



- Welcome this year's special guests:
    - Anne Paul (Grenoble), Jarka Plomerova & Helena Munzerova (Prag), György Hetenyi (Lausanne), Irene Molinari (ETH-Z), Götz Bokelmann (Vienna)
  - Welcome new members:
    - Post-doc, SPP coordination - Dr. Derya Gürer (FU-Berlin)
    - New postdocs & PhDs
  - Annual SPP events
    - Meetings – 2nd week of November, Th/Fr (8-10. November, 2018)
    - Workshops – last week of January, Th/Fr (Feb 1-2, 2018)
- => Meetings are required for participants in all funded projects!
- Lunch, 12.30-13:30 – GFZ-Mensa
  - Dinner, 19:00 – Restaurant Wallhalla, please examine Menu at the break

# AlpArray-related arrays



SPP SWATH -deployed (August 2017)  
SPP LOBSTER & FR -deployed (Jun 2017), collected (Feb 2018)  
EASI -finished (July 2014-July 2015)  
CASE -ongoing (ends 2017)  
LIZARD -deployed (2016-2018)  
IVREA -deployed (June 2017-2018)

Important! All SPP members who will use seismological data are required by agreement to announce their research plans (send report to **György Hetenyi**, [gyorgy.hetenyi@unil.ch](mailto:gyorgy.hetenyi@unil.ch))

# Information



## AlpArray activities

- Working groups & their meetings:
  - Surface Wave (Vienna, Nov 16-17, 2017)
  - Gravity (Bratislava, March 8-9, 2018)
  - Receiver Functions (Lausanne, Jan 29-30, 2018)
  - AlpArray science meeting, not yet scheduled
- Meetings/conferences in 2018\*
  - DGG Leoben Feb 12-15, 2018,
  - TSK Jena Mar 21-23, 2018
  - EGU Vienna Apr 8-13, 2018
  - DGGV Bonn Sept 2-6, 2018
- SPP workshop Feb 1-2, 2018 (see below)

\* Child-care during meetings is subsidized by the SPP provided that at least one child of an SPP member is present

# Session A

## *AlpArray seismological experiment*



**9:50-11:20      Presentations 15 min. each**

- 9:50      Friederich-Korn-Meier-Rümpker-Tilmann-Thomas-Wassermann: *The German seismological contribution to AlpArray* (UNIBRA / DSEBRA)
- 10:05      Paul: *The French seismological contribution to AlpArray*
- 10:20      Kopp-Lange-Grevemeyer: *Ligurian Ocean Bottom Seismology and Tectonics Research* (LOBSTER)
- 10:35      Hetenyi-Plomerova-Kissling-Bockelmann: *Eastern Alps Seismological Investigation (EASI) and AlpArray-IVREA*
- 10:50      Heith-Weber-Tilmann-Haberland: *Seismology of the Central-Eastern-Southern Alps Transition* (SWATH D)
- 11:05      Molinari: *Central Adriatic Seismological Experiment* (CASE)

**Break - 20 minutes**



# Session B

## *On slabs and subduction*



### **11:40-12:40    Presentations 10 min. each**

- 11:40      Froitzheim-Keppler: *Slab factory – ocean formation and subduction in the Western Alps*
- 11:50      Lange-Thorwart-Grevemeyer: *Generation and destruction of lithosphere of the Ligurian Sea*
- 12:00      Friederich-Meier-Kaus: *Imaging structure and geometry of Alpine slabs by full waveform inversion of teleseismic body waves*
- 12:10      Keppler-Stipp-Froitzheim: *Alpine subduction revisited – new structural and elastic wave velocity models for improved geophysical imaging towards greater depths*
- 12:20      Meier-Friederich-Ebbing: *Surface Wavefield Tomography of the Alpine Region to Constrain Slab Geometries, Lithospheric Deformation and Asthenospheric Flow in the Alpine Region*

**Lunch      12.30-13:30**

# Wissenschaftspark Albert Einstein Telegrafenberg Potsdam

- Helmholtz-Zentrum Potsdam - Deutsches GeoForschungsZentrum GFZ
- Alfred-Wegener-Institut für Polar- und Meeresforschung (AWI)
- Potsdam-Institut für Klimafolgenforschung (PIK)
- Leibniz-Institut für Astrophysik Potsdam (AIP)
- Deutscher Wetterdienst (DWD)
- Nutzergemeinschaft des Wissenschaftsparks

- 1 Informationstafeln
- Rundgang





# Session C

## *From the surface to the mantle and back*



### **13:30-14:40 Presentations 10 min. each**

- 13:30 Kaus-Friederich-Meier: *Constraining the dynamics of the present-day Alps with 3D geodynamic inverse models*
- 13:40 (Ehlers)-Glotzbach-Kley: *Constraining the near-surface response to lithospheric reorientation - Structural thermochronology along AlpArray geophysical transects*
- 13:50 Mulch-Ehlers-Methner-Mutz: *Neogene Paleo-elevation and Paleo-climate of the Central Alps – Linking Earth surface processes to lithospheric dynamics*
- 14:00 Pleuger-John-Tilmann-Yuan-Kaus-Handy-Mechie: *Understanding sub-duction by linking surface exposures of subducted and exhumed crust to geophysical images of slabs*
- 14:10 Scheck-Wenderoth - Ebbing-Sippel-Götze: *Integrated 3D structural, thermal, gravity and rheological modeling of the Alps and their forelands*

# Session C cont'd



## *From surface to mantle and back*

- 14:20 Handy-Haberland-Le Breton: *Linking surface kinematics to deep structure of the Adriatic indenter near a potential subduction-polarity switch – the Giudicarie Belt (Southern Alps)*
- 14:30 Gruetzner-Reicherter-von Blankenburg: *Earth surface response to Quaternary faulting and shallow crustal structure in the eastern Adria-Alpine collision zone and the Friulian plain*

**Break – 14:40-15:10**

# Session D

## *Looking back and ahead – 4D*

- 15:10 Rümpker-Schmeling-Kruse-Link: *Mantle deformation beneath the Alps and the physics of the subduction polarity switch - Constraints from thermomechanical modelling, seismic anisotropy and waveform modelling*
- 15:20 Petrunin: *Inverse and forward multiscale numerical modeling of the Alpine orogeny*

# Session D cont'd



## *Looking backwards and forwards in time – 4D*

- 15:30      Kind: *Seismic imaging of the newly discovered Sub-Lithospheric Discontinuity (SLD) in the larger Alpine region*
- 15:40      Kummerow-Cesca-Wassermann-Plenefisch-Schlömer: *From Top to Bottom- Seismicity, motion patterns & stress distribution in the Alpine Crust*
- 15:50      Reicherter-Ritter: *Stress transfer and Quaternary faulting in the northern Alpine foreland*
- 16:00      von Hagke-Luijendijk-Hindle-Kley: *Foreland basin evolution records the effects of plate reorganization, surface evolution and crustal deformation on mountain building*
- 16:10      Luijendijk-von Hagke: *Quantifying crustal fluid flow and its role in the thermal structure of the Alps*

16:30-17:30    **Steering Committee (SC) deliberates, 1<sup>st</sup> breakout session**





★★★ HOTEL WALHALLA - POTSDAM

Dinner

Dortustrasse 5  
14467 Potsdam  
0331-748-1678

# Meeting Program



Friday / Freitag, den 10. November 2017

- |             |  |
|-------------|--|
| 9:00-9:45   | Intro of new members of the SPP<br>Steering Committee makes recommendations <ul style="list-style-type: none"><li>• Next SPP meeting</li><li>• Data management</li><li>• Structure and aims of breakout sessions</li></ul> |
| 9:45-11:00  | Breakout sessions (with refreshments)  |
| 11:00-11:50 | Reports of breakout sessions   |
| 11:50-12:00 | Final remarks  |



# New SPP Members



Meeting Program

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## Meeting Program

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# Recommendations of Steering Committee

Next SPP Meeting (Nov. 8-10, 2018)



- Probably in Frankfurt at the Senckenberg Museum (A. Mulch), possibly in Hofgeismar (near Kassel)
- Required for SPP members; we will also invited speakers from international AlpArray partners, as well as others in AlpArray + DFG panel experts
- 3 days, oral sessions and poster sessions grouped around SPP themes, activity fields and AlpArray working groups.
- Workshop for early career scientists in the SPP (possible topic: proposal writing)

# SPP data management



The DFG requires SPPs to make metadata from project available during or after publication of papers

## What we seek:

- To collect data and make it available to SPP members
- To render the collected data citeable in publications
- To make published data accessible to a broader geoscience community after publication

**Challenge:** no SPP data manager was funded, so we will fund a temporary technician position from SPP coordination funds to set up a database

# SPP data management

## Data to be stored:

- Seismological - waveforms stored in GEOFON which provides standardised, archived DOIs for seismic networks
- Geological - structural measurements, thermochronological data, geomorphological data, etc.

## Data products:

- Seismological data products => e.g., tomographic slices
- Geological data products => data plotted on 3-4 standardized maps of the Alps, possibly also cross sections, data tables

## Potential platforms to be discussed with K. Elger, GFZ:

- MEDUSA, PANGAEA

# SPP data management

The colleagues listed below come from different disciplines and will develop a concept for data management along the lines presented above.

- |                                      |                                      |
|--------------------------------------|--------------------------------------|
| • Surface processes/thermochronology | Christoph von Hagke                  |
| • Thermomechanical modelling         | Boris Kaus                           |
| • Tectonics                          | Derya Güerer, Mark Handy             |
| • Geophysics (Seismology, Gravity)   | Michael Weber, Leni Scheck-Wenderoth |

We will make an appointment within the next 2 months with K. Elger (GFZ-Potsdam) to meet and discuss GFZ data platforms.

# Structure & aims of the breakout sessions

Breakout sessions today (9:30-10:45)



- |  |                           |
|--|---------------------------|
| 1. On slabs and subduction                 | M. Handy & W. Friederich  |
| 2. From the surface to the mantle and back | T. Ehlers & B. Kaus       |
| 3. Looking backwards & forwards in time    | Ch. von Hagke & J. Ritter |

## What to do:

- Pose basic questions and hypotheses (see SPP proposal)
- Specify how and where to test them
- Identify where (and with which groups) collaboration is desirable/necessary, also where disciplinary research is required
- Develop a schedule for collaboration within coming year, e.g., meetings

# Summary of Breakout Sessions



- Participants are referred to files enclosed with this PPT file and to SPP website for the reports of the 3 groups' deliberations during the breakout session.
- It was agreed that representatives of each project will submit a short (maximum 2-page) **summary of its hypotheses, goals and envisioned collaboration** to the coordinator ([mark.handy@fu-berlin](mailto:mark.handy@fu-berlin), [juliane.rohlmann@fu-berlin.de](mailto:juliane.rohlmann@fu-berlin.de)) by 30. Nov. 2017. These will be sent to other SPP members and posted on the SPP website. The summaries can have 1-2 figures.
- **Small meetings** of SPP project members should take place before July 2018 to ensure positive feedback in time for the next SPP meeting in Nov 8-10, 2018. Meetings with 8 or more SPP members can obtain a financial contribution from SPP coordination funds. After their meetings, groups must submit a written summary (1 page) to the coordinator for placement on the SPP website.



# Final remarks / List of “to do-s”



1. Pls should send to the SPP coordinator\* the **names and addresses of funded PhDs and Postdocs** in their SPP projects, as well as the dates of the beginning and prospective end of their employment with the SPP.
2. **Short (2-page) summaries of all funded SPP projects** should be sent to the SPP coordinator\* no later than Nov. 30, 2018 (see previous slide).
3. All SPP members who will use seismological data are required by agreement to **report their research plans** (send report to Prof. **György Hetenyi**, [gyorgy.hetenyi@unil.ch](mailto:gyorgy.hetenyi@unil.ch)). This will foster international cooperation within AlpArray and help avoid unnecessary overlap. Please send a copy to the coordinator\*.
4. SPP members are asked to present their results in one of more of the meetings listed in slide 5. **Copies of abstracts and publications** should be sent as PDFs to the coordinator\*.

\* Mark Handy ([mark.handy@fu-berlin.de](mailto:mark.handy@fu-berlin.de)) and Juliane Rohlmann ([juliane.rohlmann@fu-berlin.de](mailto:juliane.rohlmann@fu-berlin.de)),

# Appendix



- SPP structure – themes, activities & committees
- Schedule of SPP activities
- SPP projects funded
- Location and number of funded SPP projects
- Work sites of SPP projects at the surface

# SPP Structure

## Coordination

M. Handy (SPP), M. Weber (seismology)

## Research Themes

**1** Reorgan. of  
lithosphere

M. Handy

**2** Surface response

T. Ehlers

**3** Deform. of  
crust & mantle

L. Scheck-Wenderoth

**4** Motion patterns  
& seismicity

K. Reicherter

## Data management

Christoph von Hagke

Boris Kaus

Derya Güerer, Mark Handy

Michael Weber, Leni Scheck-Wenderoth

## Steering Committee \*absent at this meeting

W. Friederich

M. Handy

T. John

B. Kaus

H. Kopp

K. Reicherter

L. Scheck-W.

T. Ehlers

M. Weber

Bochum

Berlin

Berlin

Mainz

Kiel/GEOMAR

Aachen

Aachen/GFZ

Tübingen

GFZ-Potsdam

Seismology

Tectonics

Petrology

Modelling

Marine Geophys

Neotectonics

Basin dynamics

Surface, Thermochron

Seismology

## Activity Fields

Geological  
activities

T. John

DSEBRA

W. Friederich, G. Rümpker

LOBSTER

H. Kopp

Thermomechanical  
modeling

B. Kaus

Swath

M. Weber

# Schedule for 4D-MB - 1<sup>st</sup> Phase

We are here

Seismology

Geodynamics

Activity Field	Activity	Preparation		1 <sup>st</sup> Funding Phase	Research Theme
A	Deployment & data acquire Model results		UNIBRAS	DSEBRA	1, 2, 3, 4
B	Deployment & data acquire Model results		LOBSTER		
D	Deployment & data acquire Model results		SWATH		
E	Structural & thermo-chronological analysis of active & fossil fault Petrophysical studies of high-P rock Determine burial, denudation & uplift rates		field field field		2, 3, 4 1, 3 1, 2, 4
F	Develop lithospheric model of the Eastern Alps Thermo-mechanical modelling of crust & mantle		develop develop		1, 3, 4 1, 2, 3, 4
	<b>Synthesis &amp; Publication</b>				

2017

2018

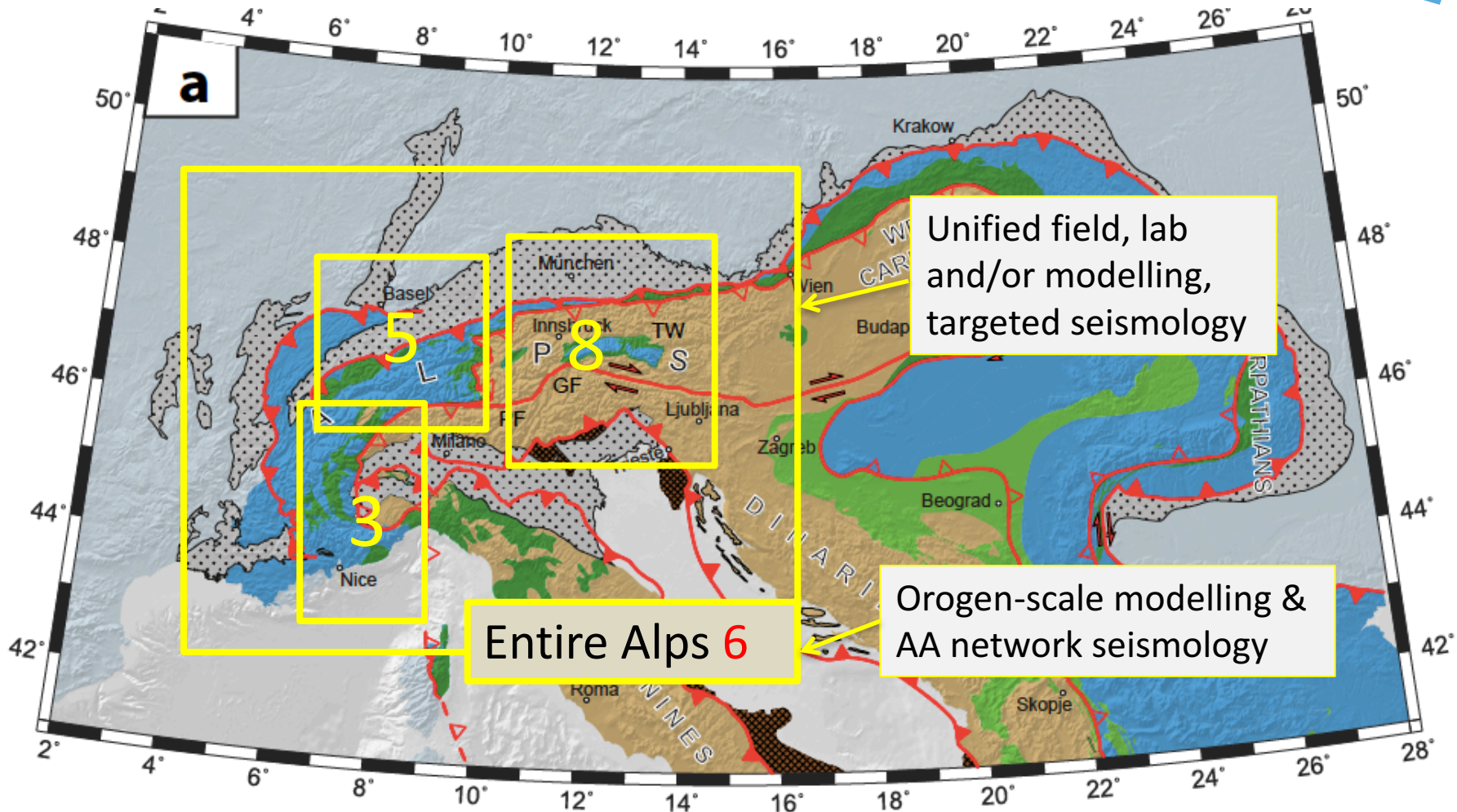
2019

2020

# Projects funded



NR	Pis	Title
<b>CORE SPP ACTIVITIES (SEISMOLOGY, COORDINATION)</b>		
1	Friederich-Korn-Meier-Rümpker-Tilmann-Thomas-Wassermann	Activity Field A - UNIBRA / DSEBRA: the German seismological contribution to AlpArray
2	Kopp-Lange-Grevemeyer	Activity Field B - LOBSTER: Ligurian Ocean Bottom Seismology and Tectonics Research
4	Weber-Tilmann-Haberland	Activity Field D – SWATH D: Providing seismological data for the SPP 4D-MB,
5	Handy	Coordination of SPP
<b>ALL OTHER PROPOSALS</b>		
6	Friederich-Meier-Kaus	Imaging structure and geometry of Alpine slabs by full waveform inversion of teleseismic body waves
7	Froitzheim-Keppler	Slab factory – ocean formation and subduction in the Western Alps
8	Glotzbach-Kley	Constraining the near-surface response to lithospheric reorientation - Structural thermochronology along AlpArray geophysical transects
9	Gruetznert*-Reicherter-von Blankenburg	Earth surface response to Quaternary faulting and shallow crustal structure in the eastern Adria-Alpine collision zone and the Friulian plain
10	Handy-Haberland-Le Breton	Linking surface kinematics to deep structure of the Adriatic indenter near a potential subduction-polarity switch – the Giudicarie Belt (Southern Alps)
11	Kaus-Friederich-Meier	Constraining the dynamics of the present-day Alps with 3D geodynamic inverse models
12	Keppler-Stipp-Froitzheim	Alpine subduction revisited – new structural and elastic wave velocity models for improved geophysical imaging towards greater depths
13	Kind	Seismic imaging of the newly discovered Sub-Lithospheric Discontinuity (SLD) in the larger Alpine region
14	Kummerow-Cesca-Wassermann-Plenefisch	From Top to Bottom- Seismicity, motion patterns & stress distribution in the Alpine Crust
15	Lange-Thorwart-Grevemeyer	Generation, destruction and of lithosphere of the Ligurian Sea
16	Luijendijk-von Hagke	Quantifying crustal fluid flow and its role in the thermal structure of the Alps
17	Meier-Friederich-Ebbing	Surface Wavefield Tomography of the Alpine Region to Constrain Slab Geometries, Lithospheric Deformation and Asthenospheric Flow in the Alpine Region
18	Mulch-Ehlers-Methner-Mutz	Neogene Paleoelevation and Paleoclimate of the Central Alps – Linking Earth surface processes to lithospheric dynamics
19	Petrinin*	Inverse and forward multiscale numerical modeling of the Alpine orogeny (IFMMALPO)
20	Pleuger-John-Tilmann-Yuan-Kaus-Handy-Mechie	Understanding subduction by linking surface exposures of subducted and exhumed crust to geophysical images of slabs
21	Reicherter-Ritter	Stress transfer and Quaternary faulting in the northern Alpine foreland
22	Rümpker-Schmeling	Mantle deformation beneath the Alps and the physics of the subduction polarity switch - Constraints from thermomechanical modelling, seismic anisotropy
23	Scheck-Wenderoth - Ebbing-Sippel-Götze	Integrated 3D structural, thermal, gravity and rheological modeling of
24	von Hagke-Luijendijk-Hindle-Kley	FB-4D - Foreland basin evolution records the effects of plate reorganization, surface evolution and crustal deformation on mountain building



## Main tectonic units

continental	flexural foredeep and graben fill	
	accreted units	
	autochthonous foreland	
	<b>Europe</b>	<b>Adria</b>

oceanic

Alpine Tethys  
Neotethys

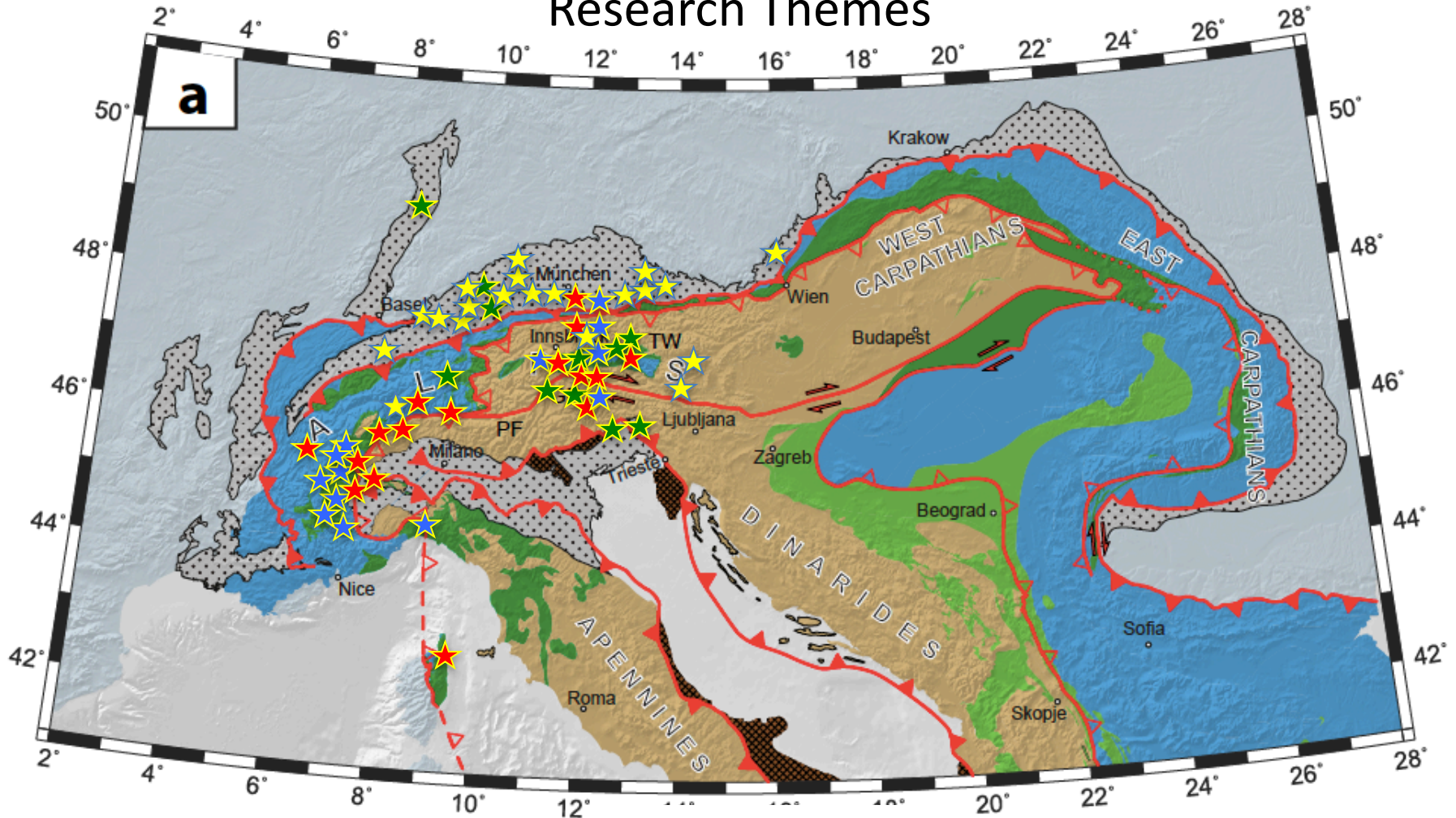


## Main tectonic boundaries

former plate boundary	
present thrust front	
strike-slip fault	



# Work sites of SPP projects at the surface, marked according to Research Themes



## Main tectonic units

continental	{	flexural foredeep and graben fill		Adria
		accreted units		
	{	autochthonous foreland		



- 1 - Reorg. of the lithosphere
- 2 - Surface response to deep processes
- 3 - Deform. of crust & mantle
- 4 - Motion patterns & seismicity

Research Themes