Melting and mixing processes in mantle wedges

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Partial melting of mantle and subducting slab material is one of the crucial mechanisms of mass transfer in subduction zones. To study the dynamics of this phenomenon we used 2-D coupled petrological-thermomechanical model with different tectonic setups (i.e. intra-oceanic subduction and active continental margin). To simulate water propagation and magmatic processes we implemented slab dehydration, partial melting and hydration of mantle wedge. We studied mantle wedge processes in various resolutions (form 0.5 million to 10 billion markers) to resolve complexity of theses processes.

Hydrated and partially molten material (plumes) rise through the mantle wedge along trajectories determined by the balance between buoyancy force and mantle flow. Their geometries differ depending on physical properties of mantle and diapir as well the dynamics of the system. Variations in plume development have influence on surface processes like slab retreat and speed of back-arc opening or rotation of fore-arc.

Slab plumes material can be homogenous (only mantle material) or heterogeneous (mantle and slab material). In case of heterogeneous plume during its growth materials mix chaotically resulting in attenuation and duplication of the original layering on scales of 1–1000 m. This process may verify marble cake theory and explain existence of complex peridotitic structures exhumed to the surface.

The use of overbank sediments data for geochemical mapping and contamination assessment: Results from selected floodplains of Serbia

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Introduction

Profiles made from the data of the overbank sediments from the flood plains of Serbia contain the geochemical inscription of the depositional milieu of the preindustrial era. Taking into consideration that they represent wider drainage areas together with the stream sediments, they were used to create regional geochemical map. Contents of the certain chemical elements from the overbank and stream sediments along with anthropogenic influence on the certain localities were represented on the map.

Discussion and results

Geochemical prospecting and mapping were done in accordance with the criteria of the West European Geochemical Surveys (WEGS). The area of the East Serbia drained by the river Timok with its tributaries was selected for investigations. Differences in Pb, Zn, Cu, Au, Sb, As, Cd, Cr, Ni, Co, V and other elements were noted in overbank and stream sediments of the main flow and its tributaries. The contents of certain elements are presented in the table below:

Values (ppm)		**Pb**	**Zn**	**Cu**	**Au**	**Sb**
River Timok	OB	12	62	28	0.02	<1
	STR	18	190	38	0.02	<1
Borska River	OB	34	60	300	0.04	15
	STR	80	75	6222	5.54	5
Crni Timok	OB	41	59	84	0.12	2
	STR	50	348	139	0.05	20
Values (ppm)			**As**	**Cd**	**Cr**	**V**
River Timok	OB		-	<0.1	91	66
	STR		-	<0.1	93	190
Borska River	OB		20	1.2	40	10
	STR		7	0.8	35	90
Crni Timok	OB		2	1.5	130	100
	STR		40	1.5	50	40

OB= overbank sediments; STR = stream sediments

Conclusion

Obtained results are presented on the geochemical maps of the Eastern Serbia, on the diagrams, tables and geological cross sections. Obvious differences in concentrations of certain elements from overbank and stream sediments reflect anthropogenic influence on the environment.

References

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