fractures. To find the source of this extra water, the geometrical properties and the permeability of the associated fault zone of the local Amui fault have been analyzed. The results show that the overall setting of this fault is a conduit-barrier fluid flow system with a uniform structure. The mentioned extra recharge occurs through the carbonate rocks in the eastern part of local Salbiz and Ghandil anticlines along the Kazerun fault zone. It then reaches the Sasan spring by the Amui fault and associated fractures.

## A climatic investigation of precipitation amount associated with 500-hpa cyclones which are affecting the Greek territory during warm period of the year

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An objective analysis of 500-hPa cyclones (500-hPa lows) is performed during the warm period (15 Apr-15 Oct) of the year for central and east Mediterranean regions. A 40-year (1958-1997) data basis of geopotential height values with a detailed (2.5°X2.5°) spatial and temporal (00, 06, 12, 18 UTC) resolution is used in the study. Lows are determined as local minima in each 3X3 matrix of geopotential height values for every grid point in the area of study. A gradient criterion between the central point and the surroundings is additionally applied to exclude weak lows, which probably originate from the assimilation procedure. A sub-area which consists of 36 grid points and includes the Greek peninsula is selected for the investigation of relationship between cyclone occurrence and precipitation amount. Cyclone occurrence is classified in nine groups consisting of four (4) grid points each. During the domination of these cyclones, daily precipitation amounts where determined from precipitation data collected at a 20-station network, which was operational during the same time period. In cases of multiple cyclone occurrences per day, the location of the deepest cyclone was selected. The spatial distribution of average precipitation amount in each of the nine cyclone groups is plotted and discussed. The comparison of these nine distributions revealed three major factors affecting the location of frequency maxima and minima. The first is low-level instability, the second is orography and the third is positive vorticity advection associated with 500-hPa cyclones.

## Cretaceous alkali basalts from the Pieniny Klippen Belt

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Occurrences of mafic alkaline volcanics are scattered all around Europe, being mostly related to anorogenic, extensional tectonic environments. While the widespread Cenozoic alkaline basalts have been intensively studied and are rather well known, their Cretaceous precursors are often involved in the Alpine-Carpathian orogenic zones, therefore their genesis and geodynamic setting are partially obscured by superimposed deformation and alteration. We describe a newly discovered body of alkaline basalts in the central part of the Pieniny Klippen Belt – Vršatec, then, farther to the east, dike bodies of Hanigovce and in the Ukrainian part of the klippen belt, alkaline basalts of Velikij Kamenec. The basalt at Vršatec is lying within the mid-Cretaceous deep-marine pelagic sediments of the Pieniny Klippen Belt in western Slovakia. The body consists of hyaloclastic lavas of basanitic composition. There is not revealed any direct contact of the Hanigovce bodies with the surrounding sediments; however, due to missing signs of contact metamorphosis in their close environment –

sediments of the Proč, and/or Proč-Jarmuta layers, we consider them olistoliths. Macroscopically they are homogenous very fine-grained rocks with visible phenocrysts of olivine, clinopyroxene and rarely amphibole. The matrix is made from devitrified glass, tiny albites, clinopyroxene and amphibole microliths and zeolites. Olivine is wholly altered and superimposed by a mixture of chlorite and serpentinite minerals. The basalts from Velikij Kamenec have similar mineral and chemical composition. The mineral composition (Cpx – high contents of Ti, Na, K; amphibole – kaersutite etc.) points to alkaline character of the rocks, which is also evidenced by the presence of partly resorbed leucite/analcime.

The chemical composition of volcanics is rather specific. Generally, these rocks are characterized by low $SiO_2$ contents (ca 41.0 weight %), enhanced contents of $TiO_2$ and $P_2O_5$ (3.3, and/or 1,5 weight %) and elevated contents of incompatible elements such as Ba (1300 ppm), Sr (1100 ppm) and LREE, as well as those of Nb (217 ppm), V (161 ppm) and Zr (1050 ppm). For various discrimination diagrams these volcanics correspond to OIA (oceanic island alkali basalts) or WPA (within-plate alkali basalts) fields. Similarly, the course of the normalized REE curve is clearly declined in the direction of low HREE contents without a considerable Eu-anomaly. Such a course of normalized curve is typical for ocean island (OIB), Cretaceous basalt from the Jarmuta Formation or continental alkaline volcanic suites of central and Western Europe, as well as for Mesozoic alkaline rocks from various parts of Europe.

Reconstruction of the geodynamic setting of the Cretaceous mafic alkaline volcanism in the Alpine-Carpathian-Pannonian realm infers the general extensional/rifting tectonic regime that ultimately led to the opening of Penninic oceanic rift arms. However, this rifting started as basically passive and non-volcanic. Only during the later, post-breakup extension phases the slow-spreading oceanic ridges developed, which are characterized by the MORB-type basaltic volcanism. Alkaline volcanic provinces have linear character and appear to follow passive continental margins of Penninic oceanic arms opened during the Jurassic and Early Cretaceous. We infer that alkaline volcanism resulted from heating and partial melting of the subcontinental mantle lithosphere on peripheries of asthenospheric upwellings confined to slow-spreading ridges of the Alpine Tethys. Consequently, regarding the debate about the plume vs. non-plume origin of the Cretaceous alkaline volcanism, the geological data from this area rather support the latter opportunity.

## Could geophysical modeling solve some of the Transylvanian Basin (Romania) structural problems?

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The Transylvanian Basin is composed of crystalline basement assigned either to the Internal Dacides/Median Dacides or to the Tisia/Dacia terrain, of Mesozoic deposits (belonging to the Vardar Ocean ?), sporadically of Paleogene deposits, of Upper Miocene deposits (7000-9000 m) formed in a fast subsidence regime and structurally of two pre-Miocene depressions (Puini Basin at west and Tarnave Basin at east) separated by a crystalline basement crest (Pogaceaua) with a maximum apex at 3500m. The Miocene subsidence depocenter with major development in the two basins preserving Jurassic (locally), Cretaceous and Paleogene deposits coincides with the presence of a supposed ophiolitic layer in the basement (seismic data), although the drillings revealed island-arc volcanics exclusively, similar to those outcropping in the Apuseni Mts. The thermal flux data (partially registered on the geothermal map of the Geological Institute of Romania, 1986) suggest a negative regime on areas with maximum Miocene subsidence. Maximum magnetic anomalies of (+250nT) and minimum gravimetric anomalies of (-64mgal) overlap the areas with increased subsidence. The interpretative variants which explain the starting of the Miocene subsidence summarize the generation of a back-arc basin (similar to the Tisian Basin of Pannonia) as a consequence of the Peninic slab subduction, as back-arc extension associated with an upwelling asthenospheric mantle. The major contradictory element of this