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Elements patterns of soil and river sediments as a tracer of sediment migration

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Iceland is the small island on the mid Atlantic ridge, with strong natural catastrophes, such as floods, droughts, landslides, storms and volcanic eruptions that can have devastating impacts on natural and build environment. Rangárvellir area next to Mt Hekla and the glacier Tindfjallajökul has impacted by severe erosion processes but also rich of surface water that play a crucial role in sediment transport processes in the watersheds of the two rivers Eystri-Rangá and Ytri-Rangá. Their sediments consist of various materials originating from volcanoes ash and lava. Difference of contents of various chemical components in sediments and surrounding soil could be bases for identification of erosion processes and watersheds connectivity. River sediment is accumulator of chemical constituents from water in water-sediment interaction, making it as an important material for investigation their migration routes. In order to develop of methods for investigating of sediment migration using their chemical patterns the STSM of Connecteur COST Action ES1306-34336 have been approved. Samples of river sediments and surrounding soils of the Eystri-Rangá and Ytri-Rangá rivers in watersheds of Rangárvellir area as well as primarily volcanic ash from Eyafjallajökull were taken. Sequential extraction of heavy metals and trace elements from collected samples has been applied using the optimized procedure proposed by European Community Bureau of reference (BCR) in the next fractions: 1) soluble in acid – metals that are exchangeable or associated with carbonates; 2) reducible fraction – metals associated with oxides of Fe and Mn; 3) oxidizable fraction – metals associated with organic matter and sulfides and 4) residual fraction – metals strongly associated with the crystalline structure of minerals. Extracted solutions have analyzed by ICP/OES on next elements: Al, As, B, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Li, Mg, Mn, Na, Ni, P, Pb, S, Sb, Si, Sr, V, Zn. Distributions of Si is the same in all investigated samples of soils, river sediments and volcanic ash pointing to the same their geochemical basis. Some elements like Li and partly B exist in the first phase of volcanic ash and river sediments but no in the first phases of soils as if they were already washed from them and adsorbed on the river sediments surfaces. In the first phase of volcanic ash P was found but no exists in the first phase of soil and river sediments. Total content of Bi is found only in silicate matrix while total contents of As is found only in organic/sulphide form in all investigated samples.