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Cenozoic fluid-magmatic centers and corresponding natural hazards and risks in Northern Caucasus

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In Northern Caucasus the Cenozoic fluid-magmatic centers are known to be scattered all over the region. They are known as the Elbrus volcano-plutonic center, the Kazbek volcano-plutonic center, Kislovodsk volcano-plutonic center, Cenozoic vulcanites in Tersk-Sunejeskaya tectonic area, the Nalchik deep ring structure, and the Derbent depression by the Caspian sea. Mentioned structures are outlined by the results of geological and geophysical studies, and also confirmed by existence of springs of carbonic acid waters enriched with nitrogen and hydrogen. The Cenozoic fluid-magmatic centers spatially coincide with deep ring structures, the nodes of intersection of transregional tectonic faults of different orientation. Deep fluid transport is one of the most dynamic yet unstable and chemically active component of the heat and matter flow from the Earth's core and they are also related to initial formation of magmatic structures. One of the largest of fluid-magmatic centers in Northern Caucasus is the Elbrus volcanic center located within the homonymous ˜70 km in diameter ring structure and featuring the active volcano (mount Elbrus). Here one may observe a variety of thermal carbonic acid waters along with spontaneous emanations of methane, nitrogen, hydrogen, hydrogen sulphide, radon, thoron and helium gases. The ratio of 3He/4He in mineral springs reaches 0.9*10ˆ(-5). In 2005 - 2007 there have been carried out experimental geophysical observations and geological surveys in this area. The position and size of the magmatic chamber and the deep magmatic source of the Elbrus volcano have been determined as well as possible pathways of migration of fluids of

deep origin. The concept of seismoactive fluid-magmatic systems of Northern Caucasus is being developed with respect to the problem of possible scenarios of future earthquakes, volcanic eruptions and other catastrophic events in the region. Based on results of long-term continuous measurements of concentrations of helium in spring waters there has been created the map of fluid permeability of the Earth's crust. A number of deep ring structures has been determined in the orogen of the Greater Caucasus, Ciscaucasian regional flexture and the Derbent depression. Natural risk issues for several territories of Northern Caucasus are considered.