# Combining riverine and satellite data for monitoring the climate effect on the carbon cycle in NE Iceland

M.I. KARDJILOV[1], S.R. GISLASON[2] AND G. GISLADOTTIR[1]

[1]Department of Geology and Geography, University of Iceland, Askja, Sturlugata 7, IS-101 Reykjavik, Iceland (marin@hi.is, ggisla@hi.is)

[2]Institute of Earth Sciences, University of Iceland, Askja, Sturlugata 7, IS-101 Reykjavik, Iceland (sigrg@raunvis.hi.is)

The objective of this study is to measure and compare the $CO_2$ sequestration rates of vegetation and weathering of rocks in 8 (glacial and direct runoff) river catchments in NE Iceland over the years 1998-2003. Furthermore to test if increase in $CO_2$ fixation of vegetation translates into more $CO_2$ fixation by chemical weathering on this time scales and finally to measure the response of vegetation and chemical weathering to an extreme climate change. The annual area weighted average temperature in the river catchments of this study rose by 2 °C over the 6 years period (1998-2003). The study period includes 3 of the warmest measured years in Iceland and the world. The 8 river catchments are mostly basaltic, they differ in age (from present to 15 Myr), elevation, temperature, runoff, glacier- and vegetation cover (from desert to woodland) and they are unpolluted.

Riverine discharge was continuously monitored but river carbon concentrations were measured at the end of each of 50 expeditions. Dissolved inorganic carbon flux (DIC), particulate organic carbon flux (POC), dissolved organic carbon flux (DOC) were calculated from correlations between the concentrations and the discharge at the time of sampling for each catchment (Kardjilov *et al*. 2006a, 2006b). Satellite remotely sensed gross primary production (GPP) and net primary production (NPP) are based on MODIS GPP and NPP products.

DIC, POC and DOC fluxes of the glacial feed rivers are dependent on temperature, while for the direct runoff rivers they are precipitation dependent. The gross primary production of the vegetation is temperature dependent for all of the river catchments, while the net primary production of the vegetation shows fluctuations. There is a strong feedback between the vegetation NPP fixation of carbon and the riverine fluxes in the coldest catchments indicating that the effect of climate change for the carbon cycle is more severe for the coldest, driest and least vegetated catchments.

## References

Kardjilov M.I., Gisladottir G. and Gislason S. R., (2006a), *Land Degradation and Development* **17**, 401-417. DOI: 10.1002/ldr.746

Kardjilov M.I., Gislason S.R. and Gisladottir G., (2006b), *Journal of Geochemical Exploration* **88**, 292-295. DOI: 10.1016/j.gexplo.2005.08.059

# Petrogenesis of the most-recent Quaternary volcanism with implications for post-collisional lithospheric thinning of Eastern Turkey, Erzincan

O. KARSLI[1], B. CHEN[2], I. UYSAL[1], J.R. WIJBRANS[3], F. AYDIN[1] AND R. KANDEMIR[1]

[1]Karadeniz Technical University, Trabzon-Turkey
[2]Peking University, Beijing-China
[3]Vrije University, Amsterdam-Netherlands

Geochemical and Sr, Nd and Pb isotope data are presented for a representative suite of the Quaternary Erzincan Volcanics (QEV) along the North Anatolian Fault Zone in order to understand the origin of the most recent volcanism in Eastern Turkey. Unspiked K-Ar and $^{40}Ar/^{39}Ar$ dating of lavas from the QEVs yielded ages of 102 ± 2 to 1060.7 ± 87.9 ka. The QEVs range from high-K low silica trachy-andesite to rhyolite in composition, with rhyolite volumetrically the most abundant. All rocks show high K-calc-alkaline affinity, a geochemical signature common to many post-collisional magmas. They display the following geochemical signatures: (i) enrichment in large ion lithophile elements (LILE) (Rb, Ba, K, Th), light rare-earth elements (LREE) $(La/Yb)_{CN}$= 3-33), and depletion in high field strength elements (HFSE) (Ta, Nb, Hf, Sm, Y, Yb), (ii) pronounced negative Nb and Ti anomalies, and (iii) small negative Eu anomalies in andesitic to dacitic and significant Eu anomalies in rhyolitic samples. These rocks have homogeneous and relatively low $^{87}Sr/^{86}Sr$ =0.70404-0.70587 and slightly depleted Nd isotopic compositions ($\varepsilon_{Nd}$ from -0.9 to 2.8), with significantly varied Mg# ranging from 1.7 to 53. However, Pb isotopic compositions [($^{206}Pb/^{204}Pb$) = 18.90-19.02, ($^{207}Pb/^{204}Pb$) = 15.64-15.70, ($^{208}Pb/^{204}Pb$) = 38.91-39.97] reveal a profound enriched source signature (EM II), which implies that some portion of metasomatized lithospheric mantle could have contributed to their genesis. Compositional and textural disequilibrium and the negatively correlated of Sr and Nd isotopic ratios suggest that mixing of basic and acid magmas played an important role in magma genesis. A possible scenario for the genesis of these volcanic rocks is: basaltic magma formed as a result of partial melting of a subcontinental lithospheric mantle (SCLM) source responding to a possible upwelling of astenospheric mantle; underplating of these high-temperature basaltic magmas sparked melting of a juvenile lower continental crust producing rhyolitic melts; then magma mixing between basaltic and the rhyolitic magmas followed. Fractional crystallization (FC) coupled with contamination by upper continental crust could have played an important role in the evolution of mixed magma. Modelling based on Sr and Nd isotope data suggest that less than 10% of an isotopically depleted basic magma, which was chemically enriched in LILEs and LREEs due to metasomatism by fluids released from a subducting slab, was involved in the generation, but a juvenile lower continental crustal reservoir contributed about 90% of the source material for the QEVs.