Geophysical Research Abstracts, Vol. 7, 03201, 2005
SRef-ID: 1607-7962/gra/EGU05-A-03201


# Oligocene/Miocene age of aridity in the Atacama Desert revealed by exposure dating of erosion sensitive landforms

T.J. DUNAI(1), G.A.GÓNZALEZ-LÓPEZ(2), J. JUEZ-LARRÉ(1) AND D. CARRIZO(2)

(1) Faculty of Earth and Life Sciences, Vrije Universiteit, Amsterdam, The Netherlands, (2) Departamento de Ciencias Geológicas, Facultad de Ingeniería y Ciencias Geológicas, Universidad Católica del Norte, Antafogasta, Chile

(dunt@geo.vu.nl; juej@geo.vu.nl; ggonzale@ucn.cl)

Depositional surfaces of early Miocene sediments surfaces are preserved in the Coastal Cordillera, Atacama Desert, northern Chile. Measurement of cosmogenic $^{21}$Ne in clasts from erosion-sensitive sediment surfaces show that these surfaces have been barely affected by erosion since 25 Ma (Dunai et al., in press). Predominantly hyperarid conditions since 25 Ma are required to create and preserve these oldest continuously exposed surfaces on Earth. The next oldest continuously exposed surfaces, in the Dry Valleys region, Antarctica, have about half this age (Schäfer et al., 1999; van der Wateren et al., 1999). Occurrence of younger exposure ages indicate that brief pluvial episodes occurred since the Early Miocene did occur, which caused limited, localized erosion and material transport, only marginally affecting the large scale landscape.

We present new data from other, similarly old surfaces, from the coastal portion of the Atacama Desert. These data demonstrate that the exceptional landscape stability in this coastal desert is widespread, as would expected from the large scale regional factors controlling climatic conditions in this area.

The dominantly hyper-arid conditions we infer for the Coastal Cordillera since $\sim$25 Ma ago are compatible with the hypothesis that the onset of aridity in the Atacama Desert is the cause, rather than the result of the uplift of the high Andes (Lamb and Davis, 2003).

Only exceptional global climatic disturbances have occasionally permitted humidity transfer across the Andes into the driest regions of this Coastal Desert since ~25 Ma.

**References:**

Dunai T.J., González López G.A. and Juez-Larré J., (in press), Oligocene/Miocene age of aridity in the Atacama Desert revealed by exposure dating of erosion sensitive landforms, Geology.

Lamb, S., and Davis, P. (2003), Cenozoic climate change as a possible cause for the rise of the Andes: Nature, v. 425, p. 792-797.

Schäfer, J.M., Ivy-Ochs, S., Wieler, R., Leya, I., Baur, H., Denton, G.H., and Schlüchter, C.(1999), Cosmogenic noble gas studies in the oldest landscape on Earth: surface exposure ages of the Dry Valleys, Antarctica: Earth and Planetary Science Letters, v. 167, p. 215-226

Van der Wateren, F.M., Dunai, T.J., Van Balen, R.T., Klas, W., Verbers, A.L.L.M., Passchier, S., and Herpers, U. (1999), Contrasting neogene denudation histories of different structural regions in the Transantarctic Mountains rift flank constrained by cosmogenic isotope measurements: Global Planetary Change, v. 23, p. 145-172.