Geophysical Research Abstracts,
Vol. 10, EGU2008-A-06905, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-06905
EGU General Assembly 2008

Prediction of sediment fluxes in South America at an intra-continental scale

C. Tote (1), G. Govers (1), F. Licciardello (2)

(1) Physical and Regional Geography Research Group, Katholieke Universiteit Leuven, Belgium (carolien.tote@geo.kuleuven.be), (2) Department of Agricultural Engineering, University of Catania, Italy (flicciar@unict.it)

Understanding the spatial and temporal controls on sediment fluxes is important as sediment fluxes provide important information on geomorphic activity in a basin and are related to important biogeochemical cycles such as C and P. The Area Relief Temperature (ART) and Discharge Relief Temperature (QRT) models (Syvitsky *et al.*, 2003) were developed based on a large global dataset (340 observations), with the aim of prediction of long-term sediment flux from river basins to the coastal oceans using a small number of basin parameters (drainage basing, discharge, basin relief and climate). In this paper, the applicability of these models on the South American continent was tested, using not only sediment data near river mouths, but also information from intra-continental, smaller river basins. The database consists of observed sediment load, average discharge, drainage basin area, minimum and maximum elevation, basin averaged temperature and number of years of sediment measurements for 294 stations in Argentina, Bolivia, Brazil, Colombia and Ecuador. The ART and QRT models with original coefficients performed badly, resulting in very large underestimations of intra-continental sediment fluxes. However, when applied to basins comparable in size to those used by Syvitsky *et al*. ($> 120{\cdot}10^3$ km^2) a good agreement was obtained, indicating the importance of scale. In order to assess intra-continental sediment fluxes more accurately, new coefficients were determined for the ART and QRT models using multiple linear regression. This resulted in R^2 values of 0.73 and 0.76 for ART and QRT respectively. Almost 50% of the predicted values were within a factor 2 of the observations. Still, the modified models strongly underestimated sed-

iment fluxes in the Andes region. We attribute this to the fact that ART en QRT-type models do not allow to account for the effects of tectonic uplift. The introduction of a binary factor to discriminate the Andes drainage basins from the rest of the dataset led to a considerable improvement with R^2 values: 0.78 (ART) and 0.83 (QRT). We were not able to detect any additional significant impact of land use/cover. Despite considerable uncertainties about data quality, the modified ART and QRT models have a high predictive power across 4 orders of magnitude of catchment size, provided that basins located in the tectonically active Andes region are separately accounted for.

Ref.: J. P. M. Syvitsky et al., Sedimentary Geology 162, 5 (2003)