Michal KUSÁK (*, **), Jan KROPÁČEK (**), Vit VILÍMEK (*)
& Calogero SCHILLACI (***)

ANALYSIS OF THE INFLUENCE OF TECTONICS
ON THE EVOLUTION OF VALLEY NETWORKS BASED
ON SRTM DEM, JEMMA RIVER BASIN, ETHIOPIA

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The Ethiopian Highlands are a good example of a high plateau
landscape formed by a combination of tectonic uplift and episodic
volcanism. Deeply incised gorges indicate active fluvial erosion, which
leads to instabilities of over-steepened slopes. In this study we focus on the
Jemma River basin, which is a left bank tributary of the Abay - Blue Nile
in order to assess the influence of neotectonics on the evolution of its
river and valley network. Tectonic lineaments, shape of valley networks,
direction of river courses and intensity of fluvial erosion were compared
in six subregions, which were delineate beforehand by means of mor-
phometric analysis. The influence of tectonics on the valley network is
low in the older deep and wide canyons and on the high plateau covered
with Tertiary lava flows, whilst in the younger upper part of the canyons
it is high. Furthermore, the coincidence of the valley network with the
tectonic lineaments differs in the subregions. The direction of the fluv-
ial erosion along the main tectonic zones (NE-SW) made it possible
for backward erosion to reach far distant areas in the east. This tectonic
zone also separates older areas in the west from the youngest landscape
evolution subregions in the east, next to the Rift Valley.

Key words: Valley network, Tectonic Lineaments, Jemma River ba-

1. INTRODUCTION

Morphostructural analysis is a tool of structural geo-
morphology, which aims at clarifying the direct and indirect
linkage between shapes of the Earth’s current surface and
the structure of the Earth’s crust, whose development and
character are currently dependent on the development of
the mantle and core (Fairbridge, 1968; Demek, 1987). The
observed manifestations of active tectonics and the geolog-
ical structure can then be used to define basic elementary
morphostructures that form a morphologically compact
unit. The various methods of morphostructural analysis
are based either on field research or a set of morphometric

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(*) Katedra fyzické geografie a geologorie, Prírodovedec fakulta Uni-
verzity karlovy v Praze, Albertov 6, 128 43, Praha 2 - Department of Phys-
ical Geography and Geology, Faculty of Science, Charles University in
Prague, Albertov 6, Prague 2, Czech Republic
(**) Ústav struktury a mechaniky hornin, Akademie ved České Repub-
liky, v.v.i., V Holesovickách 94/41, 182 09, Praha 8. Česká republika
- Department of Engineering Geology, Institute of Rock Structure and Me-
derics, Czech Academy of Sciences, p. r. i., V Holeovickách 94/41, 182 09,
Prague 8, Czech Republic
(***): Fachbereich Geowissenschaften, Universität Tübingen, Deutsch-
land - Department of Geosciences, University of Tübingen, Rue-
melinstr. 19-23, 72070 Tübingen, Germany

Corresponding author: kusak-michal@centrum.cz

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