



A MEASURE OF INTENSE ACTIVE TECTONISM THROUGH MANIFESTATION OF RIVER BASIN MORPHOMETRY DEVELOPMENT ON QUATERNARY VOLCANIC DEPOSITS

Case study : at Ciremai and Slamet Volcanoes (4235)

by

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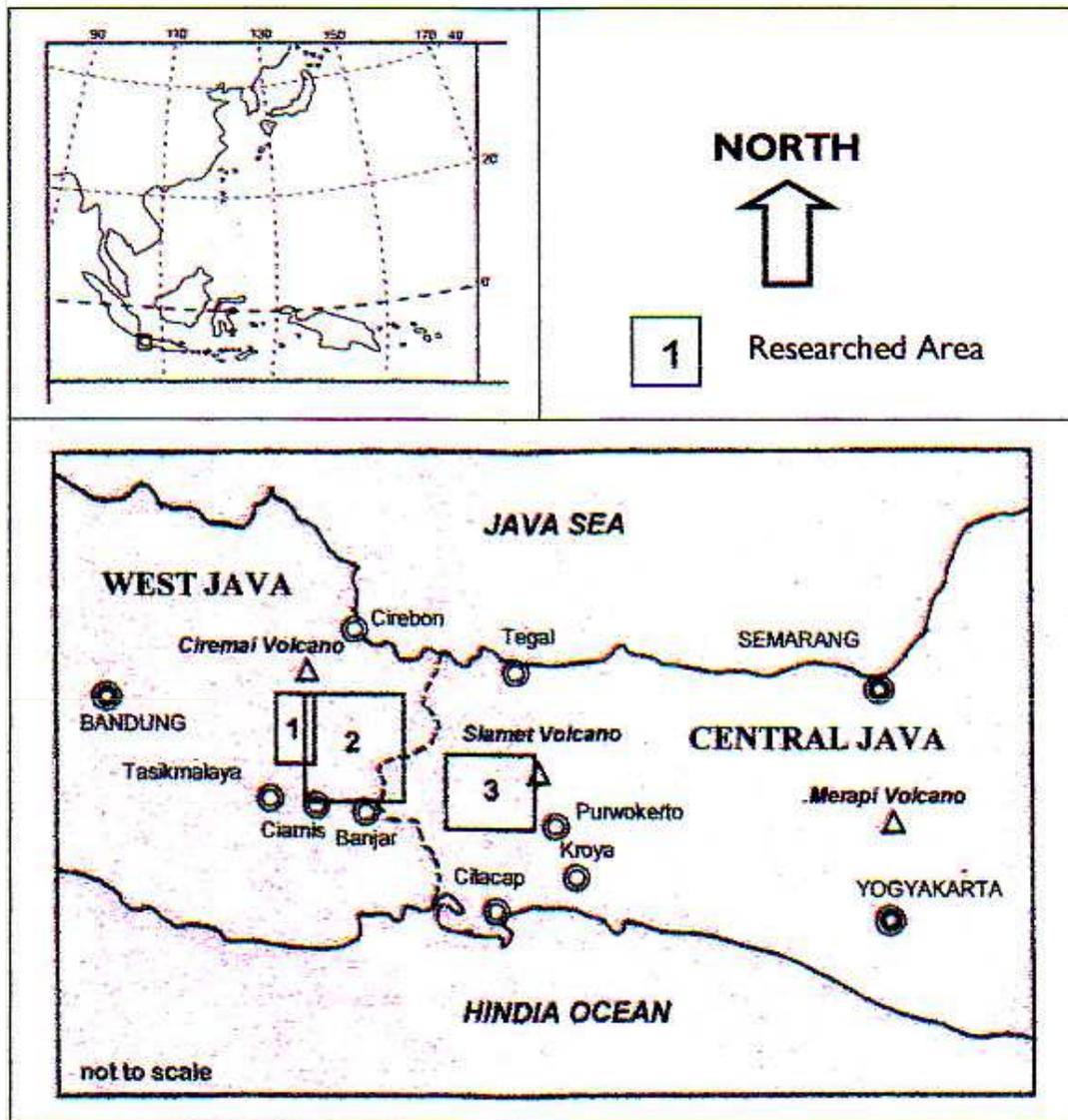
INTRODUCTION

Objective:

to measures the tectonic intensity based on manifestations of measurable and verifiable morphometry developments as the responses to the tectonism.

Research Questions:

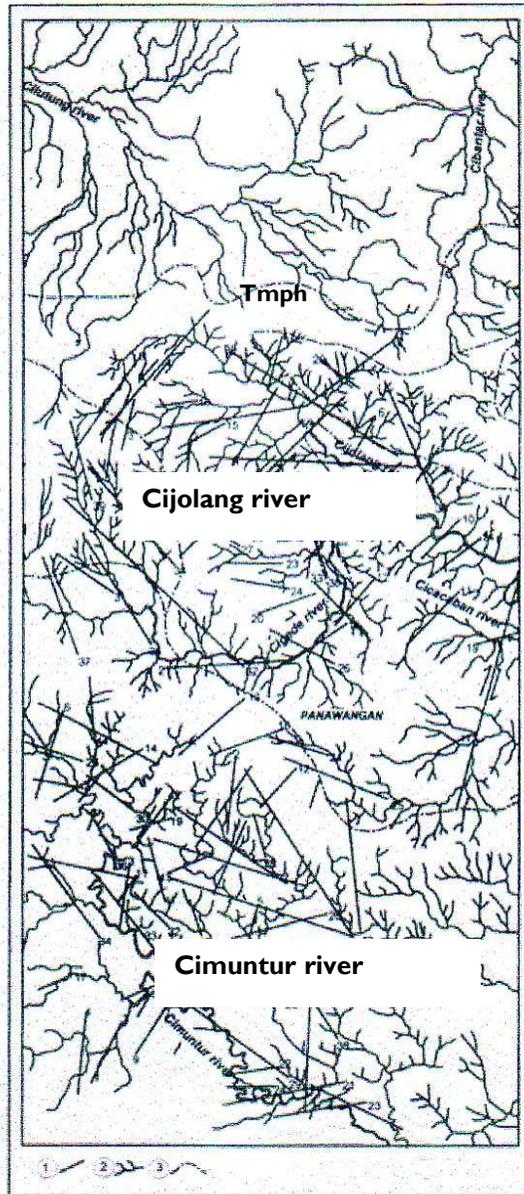
- 1) how far has the recent tectonic activity been controlling river segments development (pattern of drainage network) ?
- 2) how far has the tectonic activity generated deformation configuration in terms of lineament pattern and density that facilitated the river basin morphometry developments on both Quaternary and Tertiary rock deposits ?



Research Areas between Ciremai and Slamet volcanoes: 1) Panawangan ; 2) Rancah; 3) Bumiayu

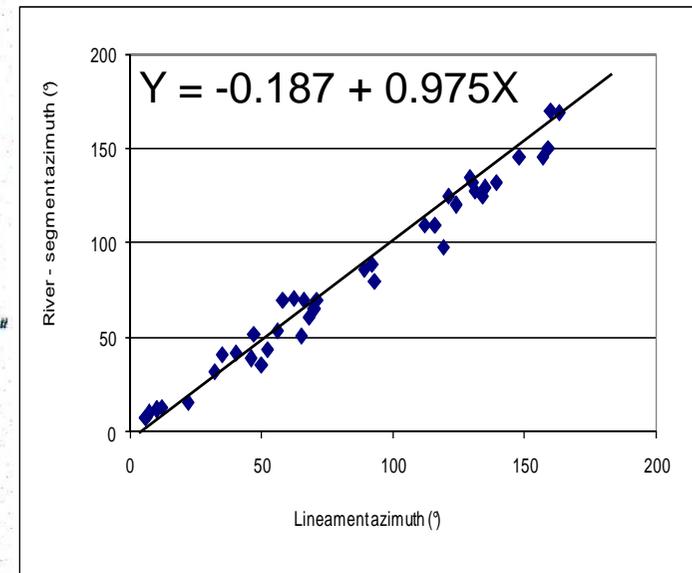
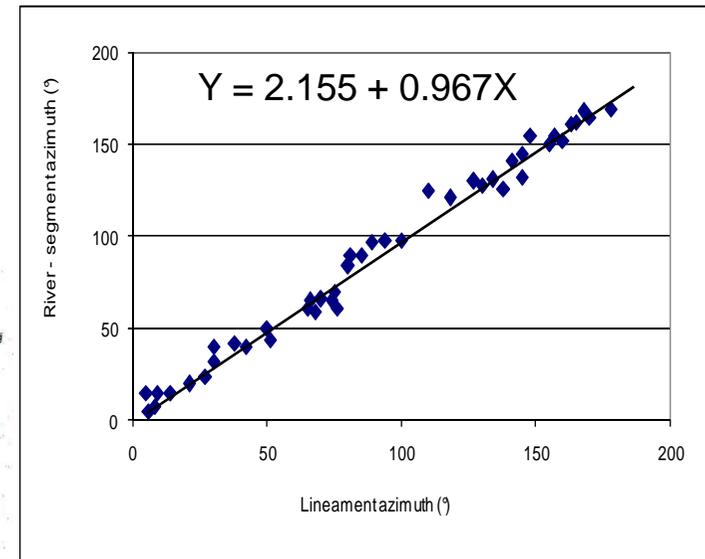
METHODOLOGY

- Data of 3 locations are lineaments, river segment azimuths, drainage density (D_d) and bifurcation ratio (R_b) of river basin.
- Probabilistic approach is used to sample a group of n-sized individual data representing a population.
- Hypothesis 1 is tested using one-grouped sample of lineaments and river segment azimuths taken from either a Tertiary or a Quaternary rock formation to verify their relationship.
- Hypothesis 2 is tested using two-grouped sample for verifying the difference between two means of the samples.



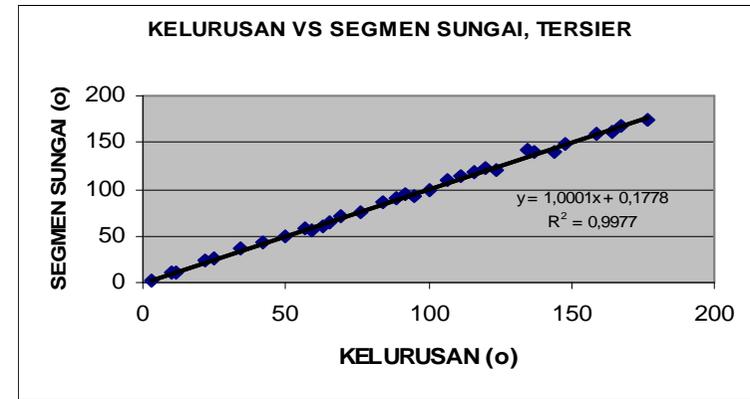
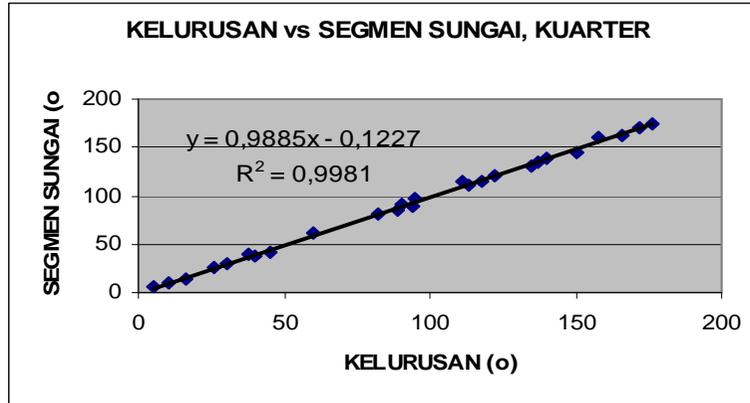
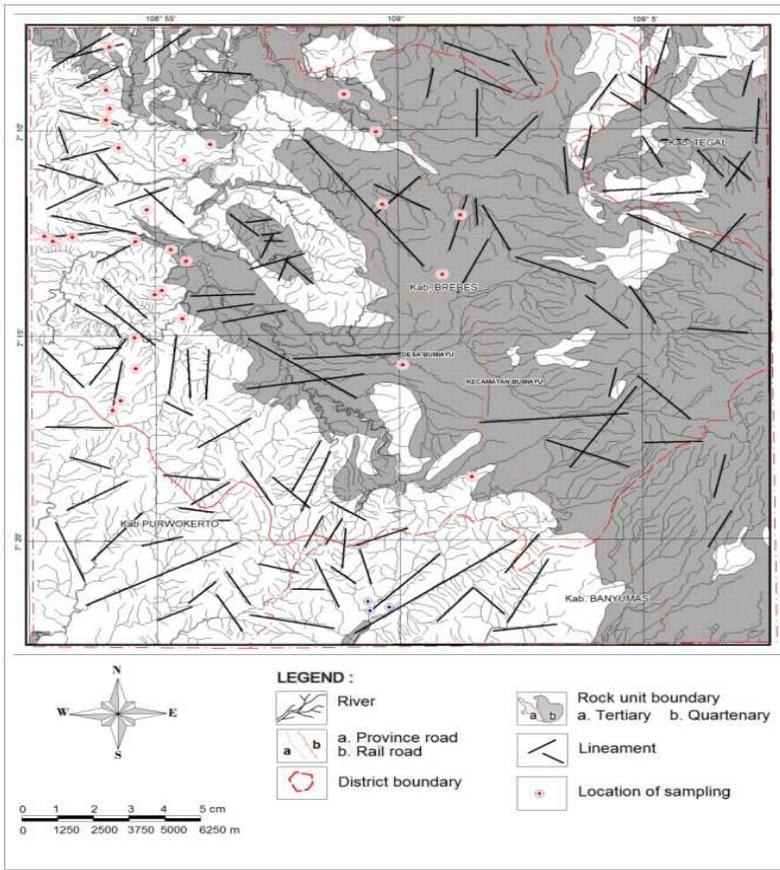
AP I

AP II

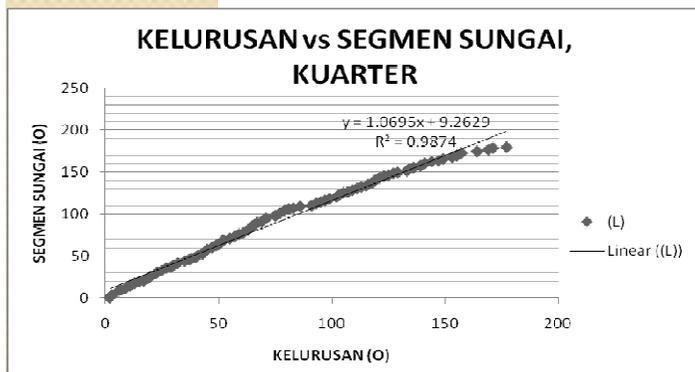


AP I & II = Aerial Photograph

Aerial photos of Cijolang river basin on Tertiary Halang Formation (Tmph) and Cimuntur on Quaternary volcanic deposits (Qva) and the drainage pattern with lineaments (b) linear relationships with $r > 0.9$ between river segment and the lineament between 2 rivers, suggesting active tectonism determined the river morphometry development in Panawangan area (Location #1)



Lineaments from satellite imagery on Quaternary volcanic deposits (Qbx) and Tertiary sediments (Tmph); b) Diagram exhibits large coeff. of correl. between river segment and lineament of Pemali river basin on Qbx; c) ditto of the same river basin on Tmph (Location # 3)



Relationship between river segment and lineament in Quaternary volcanic deposits in Rancah (Location # 2)

DISCUSSION & CONCLUSION

The results have proven that the recent tectonism is active in the study areas. This neotectonic activity (e.g. frequent earthquakes, active faults, landslides, etc.,) enables us to measure its intensity through the similarity of morphometry development of river basins on Quaternary and Tertiary deposits. This is the continuation of former tectonic period generating deformation pattern in Quaternary volcanic deposits similar to the Tertiary formations.

Manifestations of drainage morphometry (controlled by deformation pattern) in Quaternary deposits, similar to that in Tertiary formation due to neotectonism are as follows :

- Correlation coefficients r of no less than 0,9 between river segments and lineaments on Quaternary deposits are very significant,
- Differences between means of bifurcation ratio of river basins on Quaternary deposits and those on Tertiary rock are not significant, and
- Differences between means of drainage density of river basins on Quaternary deposits and those on Tertiary rock are not significant, except in some areas, where the differences are significant.

The manifestations of the active tectonic movements mentioned above suggest the following conclusions :

- River segment development on Quaternary deposits are merely determined by lineament due to active tectonic movements.
- Drainage network on Quaternary deposits is similar to that on Tertiary rock formations due to active tectonic movements.
- Fracture density as the basic factor determining the drainage density on Quaternary deposits is similar to that on Tertiary rock formations. This phenomenon measuring the intense degree of tectonic activity is verified, except in areas, where the tectonic effect is less intense.



Thank you very much
有難う御座います

Danke Well

Muchas gracias

Terima kasih