Laboratory models of river pattern evolution over a deforming template - Application to the Southern Alps, New Zealand

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Reference


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Abstract Text:

Under the action of climate and tectonics, mountainous areas are continuously reworked. However, reliable markers of the tectonic activity are not always straightforward to identify on the field. Here we propose that in oblique collision context, the regional-scale morphology of rivers can be used to track back tectonic deformation. We use the specific example of New Zealand, where the morphology of the Southern Alps is characterized on one side by short rivers generally perpendicular to the main divide, whereas on the other side, the rivers are large and rotated. It has been suggested that this specific pattern could result from the oblique collision that affects the South Island. To go further, we develop a laboratory experimental setup to investigate river pattern evolution over a doubly-vergent orogenic wedge growing in a context of oblique convergence. We use a rain-fall system to introduce erosion, sediment transport and river development. The evolution of this prism is fully recorded though space and time and we are able to follow the drainage deformation. The first results are in good agreement with previous models of river pattern deformation in New Zealand and suggest that in places where such deformation is observed, either modern active or ancient systems, landscape morphology may be inverted to unravel regional tectonic deformation field.

Session Selection: Oblique Deformation: The 3D Challenge

Title: Laboratory Models of River Pattern Evolution over a Deforming Template - Application to the Southern Alps, New Zealand

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