Junction angles of river channels in uplifted basins and the effect of contributing area: Model experiments and comparison with natural cases

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The previous study pointed out that the most likely junction angle of river channels are roughly affected by the climate of the basin and/or the closeness between surface processes and a groundwater aquifer (Devauchelle et al., 2012; Seybold et al., 2013; Kirchner et al., 2017). However, the previous statistics did not take accounts into the scale of converging rivers. In this study, we discuss the relationship between the difference in contributing areas of merging channels and the junction angles, based on physical model experiments simulating uplifted river basins that drain artificial rainwater, along with the comparison to natural cases. The experimental results showed that the junction angle tended to be large as time passed during which the uplift continued, although further investigation is needed because the number of junctions in the experimental basins were small. Despite of such tendency, the angle of each junction seemed to fluctuate with time randomly, so we combine the data of different time as different basins to enlarge the population for statistics. After such treatment, there was a tendency that the larger the difference in contributing area was, the more restrictive around 90° the junction angle was. Besides, analysis of two natural river basins, Yakushima and Mt. Aso, showed a similar relationship between the river scale and the range of junction angle. These are thought to be caused by the effect of the valley slope formed by the larger river.

Keywords: Confluence angle, uplift, Contributing area