

# Drainage networks and the Brownian web

Rahul Roy

April 12, 2016

## **Abstract**

River basin geomorphology is a very old subject of study initiated by Horton (1945). Various statistical models of drainage networks have been proposed. Each such model is a random directed graph with its own nuances.

In recent years physicists have been interested in these models because of the commonality of such branching networks in many areas of statistical physics (see Rodríguez-Iturbe and Rinaldo (1997) for a detailed survey).

We discuss the geometric features of one such model and also its scaling limit. The scaling limit of this model is the Brownian web, which has lately been the focus of extensive study among probabilists. In particular, from this scaling limit we establish rigorously the empirical observed relation, Hack's law, between the length of a stream upto a divide and the area of the drainage region till the divide.