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Braided rivers and the question of sufficient physics

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This paper uses a combined remote sensing and hydrodynamic dataset to ask the simple question: how much complexity is necessary in a reduced complexity model of a braided river? It begins by demonstrating *a priori* that the current physical description of flow and sediment transport in reduced complexity braided river models is not correct (it cannot be derived from the basic equations of motion). It then uses a depth-averaged hydrodynamic treatment applied to high resolution DEMs of a large, gravel-bed, braided river (1.0 km wide, 3.0 km long) to identify which of the terms in the momentum balance are significant, where and when. This is coupled to a consideration of the spatial patterns of erosion and deposition also estimated from remote sensing to identify the level of complexity that will ultimately be required. The results show that the level of physics required is intermediate between sophisticated depth-averaged solution of the full hydrodynamic equations and that represented in existing reduced complexity models of braided rivers