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The growth process of river dunes

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Dunes dominate the bed of sandy rivers and they are of central importance in predicting sediment transport and flow resistance. Using a novel acoustic instrument over migrating dunes in a laboratory setting, we quantify a number of dynamical properties that are crucial in our understanding and modeling of dune response to changes in flow and sediment transport. Measured sediment transport distribution during the initial stage of dune growth reveals a negative spatial lag between dune crest and maximum sediment transport rate. In absence of this spatial lag, the dune field is observed to grow by merging of smaller, faster migrating dunes.