



Evidence for the inherent unsteadiness of a river plume: Satellite observations of the Niagara River discharge

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ABSTRACT: We present satellite data from the Niagara River plume showing that a large eddy, or bulge, forms and grows in the plume near the mouth of the river. The plume consists of a semicircular bulge region immediately offshore of the mouth and a narrow current that propagates east along the shoreline. During the low-wind period from 27 to 29 May 1999, the width of the bulge more than doubled and the current width increased only slightly. Approximately one-third of the Niagara River water accumulated in the bulge near the mouth during this period, implying that the transport rate in the shore-parallel current was reduced to two-thirds of the river discharge rate. The effective radius and the growth rate of the bulge computed from the satellite images was in good agreement with previous laboratory results and a numerical model of the Niagara River plume. This is the first field evidence of the unsteadiness of the bulge.

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