GSA Data Repository 2020094
Miramontes, E., et al., 2020, Channel-levee evolution in combined contour current–turbidity current flows from flume-tank experiments: Geology, v. 48, https://doi.org/10.1130/G47111.1

ADDITIONAL DETAILS ON THE EXPERIMENTAL SETUP

1. SCALING APPROACH

In the experiments, turbidity currents are scaled down to experimental size using Shields scaling. The application of Shields scaling on experimental turbidity currents has successfully been used in recent studies (de Leeuw et al., 2016; 2018a,b; Fernandes et al., 2018; Pohl et al., 2019a,b). The basic concept of the Shields scaling is to keep the ratio between the settling velocity of the suspended grains and the flow shear-stress close to natural values. In order to achieve this, the non-dimensional Shields parameter (that describes the sediment mobility of particles in the flow) and the particle Reynolds number (that describes the sediment transport regime) are kept close to values encountered in natural systems. Both parameters can, in principle, be modulated by the flow velocity and the grain size of the sediment. Shield scaled turbidity currents are able to keep all transported sediment in suspension and to erode or deposit in response to morphological controls. More detailed information on the Shields scaling approach can be found in Pohl et al. (2019b) and references therein.

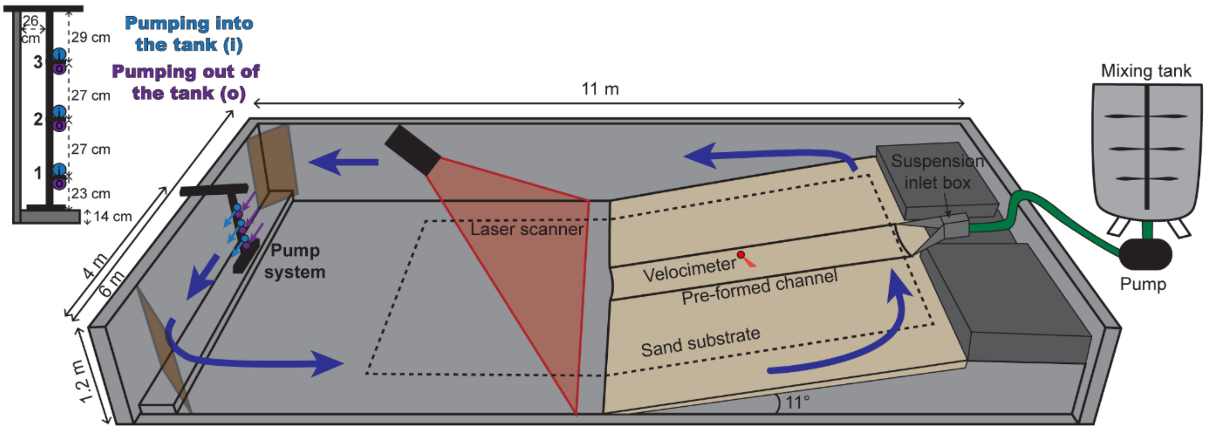

Figure DR1. Schematic drawing of the experiment setup, showing the array of three pumps that generates the water circulation in the tank, i.e. the contour currents. The rectangle with dashed line represents the zone shown in Fig. 4 of the main manuscript.

2. VELOCITY MEASUREMENTS

The 3D velocity measurements were acquired using a UDOP 4000 velocimeter (Fig. DR2), an Ultrasonic Doppler velocimeter developed by Signal Processing SA. We used four TR0110 1 MHz probes for the 3D velocity acquisition: one probe was used as emitter, and three other probes were used as receivers, and were located around the emitter, separated 6 cm from it with an angle of 120° between emitters and 15° respect to the vertical (Fig. DR3). The measurements were carried out down to a maximum distance of 31 cm above the bed with a resolution of 0.893 mm. The first 5 cm near the emitter were not recorded because the data quality in this zone is usually poor.

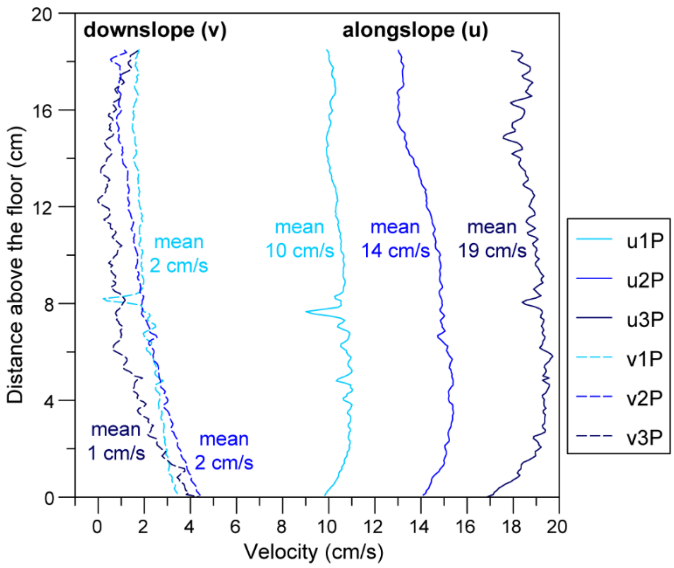

Figure DR2. Velocity profiles (v – downslope and u – alongslope) of the contour currents with 1, 2 and 3 pumps (P) time averaged over 5 min.

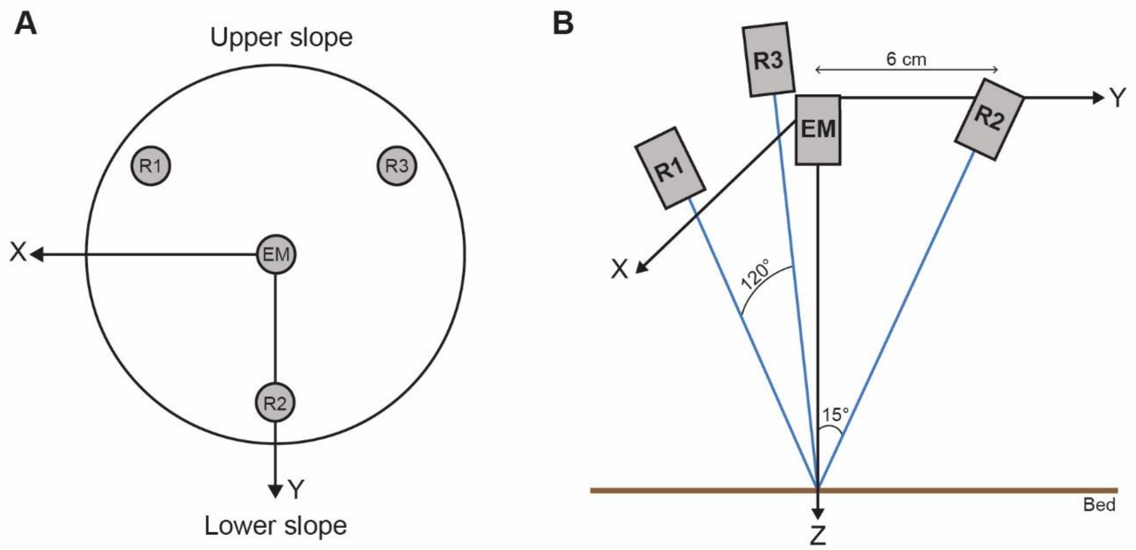

Figure DR3. Configuration of the UDOP 4000 probes for 3D flow measurements, (A) plan view and (B) vertical view. EM: Emitter probe; R1-3: Receiver probes 1-3.

3. ADDITIONAL DETAILS ON LEVEE ASYMMETRY

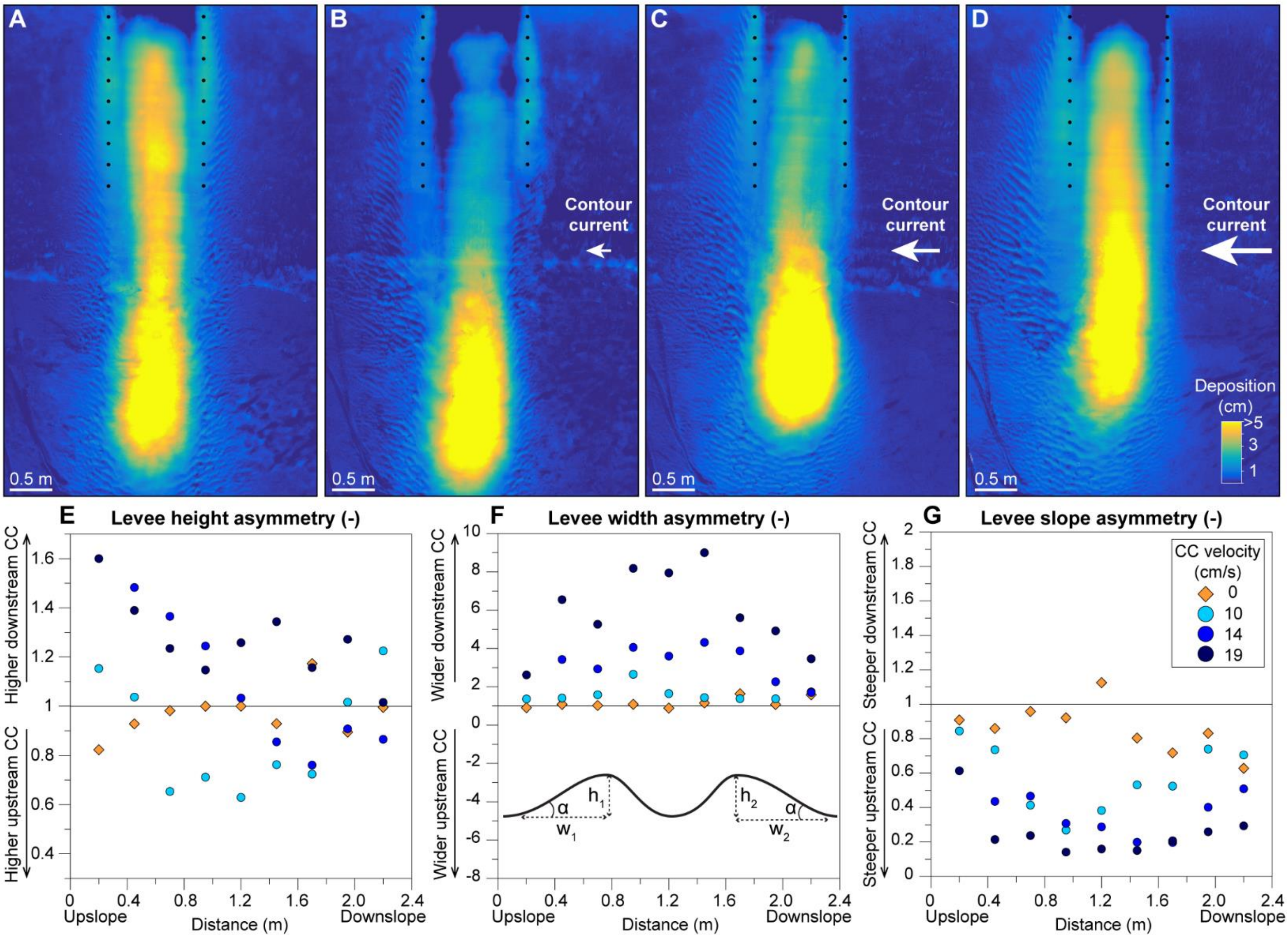

Figure DR4. Deposition maps and cross-sections during the experiments of turbidity currents with no contour current interaction (A), and interacting with a contour current of 10 cm s^{-1} (B), 14 cm s^{-1} (C) and 19 cm s^{-1} (D). The small black dots indicate the points where the size of the levees was measured. Analysis of levee asymmetry across the slope for all the experiments: (E) levee height asymmetry (h1/h2); (F) levee width asymmetry (w1/w2) with a schematic representation of the morphometric parameters; and (G) levee slope asymmetry (α1/α2). CC: contour current.

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Underwater Video of the Experiments

2020094_VideoDR1.mp4