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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Brief communication: The curious case of the large wood-laden flow event in the Pocuro stream (Chile)" *by* Diego Ravazzolo et al.

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General comments

Ravazzolo et al. have provided access to an informative and thought-provoking video for the ever-growing community of scientists, engineers, and ecologists interested in roles and movement of wood in rivers. This valuable resource and their interpretations of the phenomenon will hopefully stimulate more work on the topic. I am reminded of the flurry of sharing of videos and movies of debris flows several decades ago from sites around the world; perhaps this paper will prompt more sharing of videos of congested wood movement events, although they are much rarer. Many of the best

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Discussion paper

videos of debris flows were made in channels with repeated events (e.g., in cases fed by chronic landslide movement or runoff from tephra-mantled hillslopes), which made filming an event much more likely, but greatly reduced the potential to involve much wood, because the repeated flushing precluded substantial wood accumulation in the channel.

The authors present some interpretations of properties of the observed event, but admittedly fall short on description of conditions within the watershed that led to its occurrence. It is surprising to have so much wood in a runoff event from a watershed with such a small fraction of the area in forest and a recent wood-flushing event (reportedly in 2016). It seems that simple analysis of remote sensing imagery would reveal possible roles of landslides from hillslopes and/or entrainment of wood from riparian forests along the downstream flowpath.

Interpretation of the potential of such events as hazards would also be informed by more comment on the influence of the setting; the recent channelization of the study reach created a straight channel with a simple cross section, and possibly with constructed berms on both sides. All these factors can contribute to long runout. If such an event emerges from a steep, narrow channel onto an a natural alluvial fan, advance of the flow might thin, spread laterally, be retarded by vegetation, and dewater, causing it to quickly stop. Might channelization to facilitate water runoff exacerbate potential hazards posed by wood-rich flood waters?

Specific Comments

The leading front of the flow is referred to as a “rather dry mass of logs” and shown in Fig. 2 as having no interstitial water or coarse, inorganic sediment. However, might the flow front have contained a great deal of water and some sediment? The advancing front appears to be faster than the stream water it is overrunning, so it must have been ingesting water from the streambed. There appear to be splashes of water from the streambed, although the amount of water may be trivial compared to the volume of the

frontal phase of the flow.

In addition to the assumption that no water was in the leading front of the flow, it seems possible, if not probable, that a significant component of inorganic sediment was present within the advancing front. The inorganic material may have been a small enough fraction that it does not appear when viewed from the surface in the video. If landslides were a source of wood, one would expect a significant component of the flow to be gravel and boulders. However, no root systems with soil are observed in the video. Perhaps modeling of the physics of the flow will reveal the possible significance of water and sediment within the leading edge of the flow.

The term "mobile organic dam" and "dam-break floods" have been used for phenomena like this in the Pacific Northwest of the USA (https://www.ce.washington.edu/sites/cee/files/pdfs/research/hydrology/water-resources/WRS138.pdf). Are these useful terms for making the distinction with congested flow which has much higher water content?

The information on p 3, lines 18-20 is somewhat confusing as to what velocity estimates pertain to which phases of the flow. What is the significance of higher velocity of later phases of the event; what are the mechanisms that lead the phases to be separated and why has the later phase not caught up with the leading phase?

In reference to wood production at a rate of 0.3 m3 ha-1 on p. 3 line 21, what is the area referred to? Is it the entire watershed or only the forested portion or some other?

P. 4, lines 3-5: statements attributed to Johnson et al and Swanston and Swanson are not entirely clear. Johnsons et al found zones of severe disturbance to riparian vegetation downstream of confluences where debris flows from tributaries delivered batches of big wood, thereby creating a brief period of congested wood movement in the mainstem channel that could severely disturb riparian vegetation. Concerning reference to "debris torrent" in Swanston and Swanson, that was a case where the term had common use in the region, but without concise definition, and thereafter the

community moved to use the internationally accepted term debris flow.

Technical corrections

Although the manuscript is very readable, it would benefit by some editorial assistance by a native English speaker.

The name of the river is misspelled in the caption for Fig. 3.

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