Comment on esurf-2022-20

O. Adrian Pfiffner (Referee)

Referee comment on "Geophysical evidence of massive hyperconcentrated Bonaduz push waves with embedded Toma hills exerted by the Flims rockslide" by Sibylle Knapp et al., Earth Surf. Dynam. Discuss., https://doi.org/10.5194/esurf-2022-20-RC2, 2022

Review report

Knapp, Schwenk & Krautblatter

Geophysical evidence of consecutive evolution of Tamins rockslide and lake formation, Flims rockslide, and Bonaduz push wave gravels with embedded Toma hills

The manuscript is well structured, the text is well written and the figures are attractive. The authors present a short review of the work done so far in the area, then present data obtained by electrical resistivity tomography, ERT, and discuss the interpretation of these data in the light of the geometry of the rockslides and the gravels around Bonaduz. The authors then go on to interpret the formation of the landforms mainly based on published data and the observations made in three case studies. The conclusions they draw are far reaching and as such require much more discussion on other localities where observations of rock avalanche deposits and mobilized substratum can be made.
There are some shortcomings:

- In some instances, the text is vague leaving the reader wonder what exactly is meant. For example, in line 158 it is not clear what is meant with “the Toma.”
- The geographic locations are given in very general terms. It is difficult to place location names to the ERT lines or the map. A more detailed map than the one shown in Fig. 1 would be helpful.
- The description of the lithologies is very crude. For example, it is stated that the composition of Bot Dagatg and Tuma Padrusa are more or less the same. However, Bot Dagatg is composed of Cretaceous limestone, Tuma Padrusa of Jurassic limestone (Quinten and Tros limestone). The description in lines 125-134 are interpretations and do not reflect the actual situation. In fact, the authors do not present data for the interpretations (sound descriptions of field observations by the authors or by previous workers).
- In section 4.4 the authors reiterate what Calhoun & Clague said and one wonders why they put a question mark behind the title.
- Outburst floods/fluvial deposits: these are very specific terms. You don’t say what they actually look like in the field. Please note that there are two outbursts: the one caused by the Flims rock avalanche impact (Bonaduz Formation), one caused by the outburst of Lake Ilanz dammed by the Flims rock avalanche, and finally fluvial deposits related to the incision of the Ruinaulta gorge and the Bonaduz formation by the Vorder- and Hinterrhein. These all are recognized in the Rhine Valley downstream of Reichenau, and their map pattern is complex as suggested by the well data. You use specific names without giving a reason. Instead it would be more appropriate to use a very general term for the layer with lower resistivity than the limestones of the rock avalanche deposit.
- The Bonaduz “gravel” are now defined as Bonaduz Formation (e.g. Wyss & Wiederkehr 2017*). Gravel is the main composition, but there are rip-up clasts of siltstone, sandstone on top and rock avalanche blocks contained within and “on top”.
- Onlap: I am surprised you use this term which denotes something very specific in stratigraphy, requiring higher resolution than what you see on the EFT profiles.
- Abstract: Sounds like a summary of what others have done. Your new data from ERT are drowned in that. And in line 16 you claim that you have new field evidence that the Bonaduz Formation rests on Tamins rock avalanche deposit. The latter is true, but you don’t present field evidence. There is field evidence: Tamins RA deposits encountered in the Reichenau gravel pit during excavation (now covered) and Tamins RA deposits covered by Bonaduz Formation along the Hinterrhein (see e.g. Nabholz 1975**).
- There is a general problem with nomenclature. The hills in the study area are denoted with a local name plus either Tuma (like Tuma Padrusa), Bot (like Bot Dagatg) or Crest (like Crest'Aulta). These three words are the romanish equivalent of hill. Toma was introduced by Alb. Heim who transcribed the correct term of Tuma respecting the pronunciation of the “u” in Tuma as “open u”. In any case it is a pleonasm to speak of Cresta/Toma hills. The signification of the three terms reflects the morphology: crest is an elongate hill, bot is a hill with a prominent steep slope and tuma is a hill with a rounded shape sticking out of the flat valley floor.
- The title is too farfetched: it promises evidence for evolution. A more modest title emphasizing the geometry of the various lithologies that can be derived from the ERT lines would be more adequate.
- 1: it would be better to concentrate this map on the study area (ERT lines); the head
scarp on Flimserstein is wrong in any case.

- 2: annotation of b and c would be helpful. And the vertical lines in a are not Pavoni pipes, they are recent erosional features.
- 3: What is the horizontal scale? Give vertical exaggeration ratio. And add N, S etc for each profile.
- 4: What is the reason why the Bonaduz Formation extends very deep down beneath the Reichenau gravel pit? And to form such a V-shaped body? What does the pattern of blue and green beneath Tuma Padrusa represent? And I suppose that the numbers 1 to 4 denote the phases you mention. Please say that in the caption.
- 5: Why should the lake-level of lake Bonaduz correspond to the highest point at Ils Aults? Even if the diagrams are schematic it would be good to indicate the level of the lake and the basal contact of the Bonaduz Formation.

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