The present authors' comment, referring to the discussion paper with the title "3-D-numerical approach to simulate an avalanche impact into a reservoir" (doi: 10.5194/nhessd-3-4121-2015), is aimed at comment of the **anonymous referee #1** (C1709 and C1713), published on 17 September 2015.

The authors want to thank the referee for her/his very detailed comments. We highly appreciate the suggested remarks, which are very valuable for the actual paper and will be helpful for our further research in this field.

General comments:

The first **general comment** is focused on the complete system of the numerical simulation. The authors agree with the referee that the detailed code of the commercial software FLOW-3D is not open source and the documentation, provided by the developer, is sometimes a little bit fragmentary. But not only we in Innsbruck work with this software very successfully and did different validation experiments. Hence, we believe that FLOW-3D is a good solution for flow problems and the software has some significant advantages in comparison to other codes – to highlight only one: the modelling concept of the free surface of water, as presented in the paper. We believe that the simulation of such problems with FLOW-3D can bring benefits for special problems (for example inclusions of spillways), but it's only another tool and can not replace existing methods.

The good agreement of the numerical results with the literature equations can be explained with the fact that the numerical results before the impact are used as input values for these equations. We do not compare an actual avalanche impact with those two methods (numerical and literature equations), for which the mentioned higher accuracy is absolutely true. The main research question is: We have a concept, which we want to present to a wider community, and we test it with a very simple geometry in nature scale (having at the back of ones mind a project we already investigated) to compare the results with the equations. Therefore, we limited the possibilities for uncertainties and also used the numerical values as input for the equation. We use the equations to prove that the numerical simulation is accurate for such problems and don't stand in contrast to the existing and highly reviewed equations. It is a first prove of concept and hopefully inspires further research activities not only at the University of Innsbruck.

The referee suggested to compare the results of physical scale models. We absolutely agree with her/him, that this is the best way to validate the simulations, especially because of the lack of natural data. In Gabl et al. (2010,2014) such a comparison is presented. Therefore, we also used FLOW-3D, but with two different approaches to generate the avalanche. The limitation was in this case that a simplified and straight chute was used to accelerate the model avalanche. Recently, we had a third-party funded research project for which this assumption would have be an improper simplification and we searched for a different concept. The water avalanche was one possible solution, but we are aware that each model concept has its limitations. The main interest of our client was the impact on the dam and therefore, we focused on these critical areas and on the overtopping volume. This focus was further used for the simplified investigations, which are presented in the paper. We absolutely agree with the referee, that not only the result at the dam, but the generation and the movement of the wave should be investigated in detail, to be sure that the complete process is accurately simulated. Therefore, different test cases are available in literature. By using such a test case, further validations would be available. In our particular case we used a natural scale simplified set-up. We see this as a first prove of the concept and further research can concentrate on the more detailed processes. In the paper this fact is now highlighted in the conclusion of the paper and we hope that the value of the gained results is now presented in a better way.

Both referees commented on the reduced slide thickness s and we agree with them, that this disadvantage or source of uncertainty in a real case is present. In the actual work s is taken from the numerical simulation but for a real problem this change has to be considered. We rewrote this section to make this point clearer.

The referee mentions a second step of the investigation, which should focus on the wave height H and wave length L of the impulse wave. We agree with her/him and think that this is a very good suggestion. This will be added into our further research on this topic, which will focus on the 1:1 simulation of actual scale model tests, which provide this data. We hope that based on the conclusion the reader recognises that this research is not finished and there are various possibilities (especially in the variation of parameter) for further investigations.

The authors tried to give only an overview of existing methods to model, simulate and calculate avalanche impacts, which should help the reader to get in touch with this research field. We understand, that this might not be interesting for a researcher, who is dealing with impulse waves and knows the cited work. We nevertheless hope that the comparable long introduction/literature review is valuable for a wide range of readers.

Specific comments:

The first **specific comment** of the referee #1 suggests a clarification of the title, as well as the referee #2. The authors agree with this aspect and propose to change or clarify the title as follows:
"3-D-numerical approach to simulate the overtopping volume caused by an impulse wave comparable to an avalanche impact into a reservoir".

At page 4123 the lines 5-8 are changes as suggested by the referee #2. We also changed the used expressions as mentioned in the complete review.

We added more information to the separated and unseparated flow conditions at the impact as well as on the 3D case (in Chapter 4.2.3, where the comparison the 2D- and 3D- approach in connection with the variation of the width of the reservoir is investigated) for the equations based on the suggestions of the referee.

The statement of the Heller (2008) is clarified, Müller (1995) didn't use the mentioned prismatic wave channel and we also corrected the statement on the run-up height R, which was also a topic in the comment of the referee #2.

The suggested literature Fuchs et al. (2013) is now included in the paper and we thank the referee for this remark. We tried to extend the literature review on the research field of the overtopping process is more included, by adding two further literature references (but could not add more, in order not to extend the length of the paper too much).

The description of the steps (especially of the last one) is redesigned and we hope that it is now clearer. We also added a comment to the melting of the avalanche (we use liquid water and hence this process can not be implemented) and the definition of the z-axis.

Yes, the cell size was varied for an exemplary case as part of the common quality standards. The difference between the 1 m and the 0.5 m mesh was absolutely negligible. We experienced this independence of the water level to the used mesh size (in an imitated range) with FLOW-3D very often. This is an effect of the used surface tracking, which allows to use far less cells in the definition of the free surface.

We clarified the statements on the different velocities and a detailed statement on the impact velocity is part of the comment on the questions of the referee #2. An additional statement to the reflected wave is added as well as the need for further research, which should focus on the impact and the wave propagation in detail as suggested in the answers to the general comments.

An additional table with the input and output values of the parameter variation is added to the paper. In response to the remarks on the figures made by the referee #1, we added two detailed figures, which focus only on the variation with a fixed f and h based on the comment of referee #2. The suggestions to the figures are implemented.

All in all, we hope that we could improve the paper significantly and that the referees can approve all changes. The authors want to thank the referee #1 for her/his excellent work and the time.