Technical corrections:

Abstract:

l8: for the analysis six statistical variables and their uncertainties are used: …
l9: clarify the sentence
l11: Afterwards → Subsequently,
l12: for solve the problem → in order to solve the problem/as countermeasure.
l13: of duration of dam break →damn break duration/volume/ ?
l13/14: sentence is unclear: A possible lower limit for the damn elevation is calculated?
l14: highly recommending on-site measurements/damn elevation monitoring ??
→ rephrase and make it more concise and clear.
l15: A methodology based on what? → end the abstract with a powerful statement and not with a generic one.

1. Introduction

l18 higher flood compared to what? Highest ever? Higher than normal, higher by how much?
L19: a landslide took place … .
l20 made a dam → created a dam
l21 The landslide thickness amounted to 80(space) m covering an area of 800 m length and 300 m width.
l22 fell over? → covered the river bed, covered the slope areas?
l24 in view that was not possible → because the water drainage of the last reservoir was impossible (due to debris ?)
l25 completing → completely
l26 The imminent failure of the naturally created dam posed a severe threat ?
would it impose hydrological consequences? Would it take out the Hydroelectric Power House ?
What are the severe consequences? → you state it in l27-31, so maybe just delete this sentence here.
l31 amounting to 77% of hydroelectrically used water runoff in Mexico? Or is ist 77% of the total water flow in Mexico? Clarify for reader unfamiliar with local geography.
l32-35: If you want a detailed introduction of Grijalva river, place it at l19, where you introduce the water catchment system.

2. Landslide

l37 a landslide happened
l38-39 units are bold, keep it uniform and not bold text
l39. Malpaso dam. Initial mass movement was the detachment of a rock block of 1300 m length and 75 thickness consisting of limestone and sandstone rocks covering the river slope.
l43 produced a natural dam ow 80 m height, 800 m length and 300 width.
→ indicate the lenghtscales in Fig. 1b and reference to it in the text.

3. **Where is Paragraph 3.?**
4. **Geological framework**

l46: The landlside …
l45: … base, a stratigraphic formation prone to act as a lubricant if subjected to heavy rainfalls as they occured during the end of October until beginning of November 2007.
l51 8° to 11°
l50ff: (1) was it the lubricated layer? (3) Why highy local stress/pressure relief in the beginning? (5) high water table (water level) ? clarify?

4.1 Geological Model of the failure mechanism

If there is no Section 4.2 it does not make much sense to have a Sec. 4.1. Streamline.

l58 according to the scale Carson and Kirkby
l60 initiated a slow movement
l61 occasioned → yielded
l62 diminished shear resistance
l64 lower portion, lower section? Unclear formulation of the entire sentence.
The lower section of the sliding rock mass turned into a heavy viscous mass consisting of debris and rock boulders producing a 50 m high debris wave (?). This wave buried a small village killing 25 people and completely obstructing the river path. ???

5. **Basis of the Study**

l102 used for water supply
l103 the various safety level (?), limited to what extent?
l108 clear understanding of embankment failure processes *or* a accurate prediction of embankment failure processes
l117-121 citation should read as followingly: *"failure algorithms of low levels of complexity are still needed when detailed simulations are not required or are not possible to apply easily or conveniently. For these reasons, a simple empirical model that considers a breach to form in a presupposed way, usually growing in the shape of a trapezoid is applied often in practice"*
l126 as can be their implications on measures to minimize flood hazards.
L128 predicted dam outflow hydrographs, peak flow levels and flow rates at downstream location of interest

6. **Approach to the Problem**

L131 the overtopping analysis is performed in the following sequence:
1) the flood routing over Penitas dam is defined under the development of an explicit analytical description leading to estimations of water masses flowing through the spillway (?)

2) empirical methods are deployed for peak flood estimation
3) behaviour function (?) → flow regime description is obtained used for risk assessment (of what)
→ please itemize correctly with correct structure: noun (with adverbs/adjective), verb and then the rest of the sentence
l135 the methodology is applied to different excavation conditions → this is not belonging to the initial analysis sequence but is an application of it.
l136 5) is also an application → Subsequently the methodology is applied as well for the upper elevation (what do you mean with that: upstream dam, Malpaso dam failure scenario? Clarify.

6.1 Flood routing

l140 Eq (1): Q_I and Q_f are incoming fluxes, Q_S outgoing flux. Correct? Indication with the correspondent sign would clarify the situation.
l144 t is the the time, dt is the time derivative. Maybe just introduce dS/dt as the temporal change of stored water.

6.2 Storage Capacity Curve

l148 Subscript of S_0
l149 S_F is the storage corresponding to elevation Z_F
l152 Taking the time derivative of Eq 2 yields
6.3. Hydrograph produced by the landslide
l162 why is that not the case for a different shape of hydrograph?

6.4 Spillway discharge …

l169 eq (6). Why is the spillway law like that, why is it $H^{3/2}$. For a general public reader as NHESS is aiming for, explain in more detail.

6.5 Flood routing reviewed

l186 here $CLH^{3/2}$ has a minus sign, so QS in equation (1) should have one too.
l188 … of the hydraulic head of the spillway H.

6.6 Flood Routing Discretization

l194 F_D(Hm, Hj+1; \Delta t …) ≡ α […]
l207: if t0 = 0, Eq. (19) yields:
l212 the equation of differences…
l213 that if it is possible to build a twice differentiable continuum function around it is fair to assume (?)
l216 I don't think "differences equation" the right term. Please check Numerical Method books for the correct English word.
l218 Please explain for reader not that familiar with numerical methods. We can build lots of stuff with a cubic spline…
l220 please specify the page of your reference. An entire book as reference is not so useful to check the made statement. Could you explain the reasoning behind the

truncated error as NHESS is not a numerical method paper per se.
l221 is not linear
l223 a similar strategy as proposed by
l242 the order of magnitude of the truncated error
l252 The truncated error is given by Eq (27):
l264 what do you mean with time design flood? Which two outflow must happen at the same time?

6.7 Oridnary Risk Case

l287-321 To be honest, I did not check every single equation here as I thinkt such a detailed presentation is not useful in a NHESS paper.
l321: Give in plain words the meaning and the leading influences for the maximum head equation, such that the interested reader can grasp the essence of it without spending dissecting the equation.

7. Case Study

7.1 Water Level Upstream Elevations of Landslide

l325 are as proposed in Fig. 6.
l340-345 clarify the formulation: what was excavated?
l345 the spillway has the capacity of discharge of which level with no risk? Elev 92?
7.2 Empirical Peak flow Estimations of Dam Failure
l348 dam break
l352 in the table: failure dams → dam failures
l359 equation, it can be seen that
l363 why are the largest values chosen? For a worst case scenario? Why are the lower ones not accurate/too optimistic? Can you explain?

7.2 Landslide Duration

l367/368 very reduced → heavily reduced/suppressed/diminished
l369 the water height/level was similar as the one presented in our case study/in the Penitas dam failure.

Generally: what is the link of the literature findings to the presented Penitas case? In a chapter “Landslide Duration” within a paper of a specific case study, an estimation /back-calculation/comparison with different case studies is preferable.

7.4 Analysis of Statistical Variables

l382 maybe put the standard deviation again into context with the actual upstream reservoir capacity (in numbers) such that the reader does not have to flip back and forth and recheck the numbers.
l380-394/Table 3 Again: As NHESS is not a journal solely devoted to hydraulic processes,

where do the standard deviations originate from, are the COV coefficients accepted best practice in this field. Please elaborate for a broader readership.

7.5 Analysis Considerations

→ an entire subsection just for one sentence is a bit overkill

7.7 Dam Overtopping Risk analysis

l430 and the Advanced Firs… (AFOSM) is applied.

7.7. Reliability

l431 → show how the AFOSM method has been used for dam overtopping, **AFSOM cite relevant work 8** Ganji, A. & Jowkarshorijeh, L. Stoch Environ Res Risk Assess (2012) 26: 33. https://doi.org/10.1007/s00477-011-0517-1

l441 independent of each other

8. Results and Discussion

l463 in discharge flow values

Table 4: make sure the legend is close by, label the variable names for easier readability

l466-507 clarify the nomenclature: 70k m/s → 70'000 m^3/s, ordinary decimal point 0.0254%) etc → readability increases if only decimal points are on the lower line IMHO.

l496 the emergency state was amended, until the reach of an/reaching an elevation of

l500 it is important to mention, zone → area

l501 force? Retired?

l503 to release the routing through the excavated channel on Dec…

8.1 Sensitivity analysis

→ where is 8.1.1?

l511 repeat the variable. Only the title does not count as introducing the variable

l511-513 rephrase, unclear.

l516 volume V = 1.0769×10^9 m^3

Ll518 legend of table should be next to the table

l527 emphatically? Delete that.; scenario analysis

l531 is there no literature out there trying to do that?

L536 what are director cosines? What are you observing in them? How are they telling us, that the downstream reservoir is more significant?

L557 permit to conclude

9. Application t similar situations

l563 Engineering interventions are limited to certain variables.

l564 when it is certain that

l567 Table 9 shows failure probabilities, return periods and …

l578 the increase

Conclusions
l583 for downstream population.
l585 the risk analysis of such a complex phenomenon.
l587-590 generic comment. What are the advantages and uncertainties in this presented study.
l595 compare to other solutions possible?

L599-611 Do not itemize. The conclusion section should be written in a coherent, concise way.
l602-605 Might be interesting, however, the general reader of NHESS needs short comparison of the methods. To generic statement as a NHESS conclusion.