

Review by Ludger Timmen with responses to the comments

Summary of the article:

The authors present a time series of absolute gravimetric observations for the station Shom in the coastal city Brest. These 20 g-values have been measured over a period of 24 years, and are made available now for research application like investigations in sea level change or land uplift. The measured data have been prepared carefully (applying reductions for ocean and Earth's tides, atmospheric fluctuation, polar motion, etc., and editing) to obtain a homogeneous best data set for interdisciplinary research. Meta data and explaining descriptions are provided for future users. Due to the significance of the Brest station for the worldwide tide gauge network, the independent gravimetric series is of crucial importance w.r.t. the ongoing climate change.

Remarks:

I was a little unsure at the beginning because to the partly old references like Carter et al. (1989) or Baker (1993). But I know these old papers partly very well. They are in some way fundamental papers and worth to name them and refer to them. Overall, the reference list is a very good and proper list.

It is encouraging to see that the inclusion of these foundational works is recognized and valued. Thanks for this and the thoughtful remark on the reference list.

Starting from the beginning:

Line 71: Neilan et al., 1997. In References, I find 1998 and not 1997.

Indeed, the workshop took place in 1997, but the proceedings were published in 1998. We have corrected the citation year to 1998 accordingly.

Line 82: I cannot find Lambert et al., 2006, in the references.

Thank you for spotting this. We have now added the missing reference to the list.

Line 159 and 160: It seems that the 700 kg are referred to the 2 FG5s. A single instrument has about half the weight. I would prefer here something like "One FG5 gravimeter weighed about 350 kg" to avoid any confusion.

Thank you for the suggestion. We checked the weight from one of the transporter's invoices and confirmed that one FG5 gravimeter, packaged in its transport crates, weighed 247 kg. The manuscript is revised to read: "One FG5 gravimeter, packaged in its transport crates, weighed about 250 kg" to improve clarity.

Line 190, Table 1: I checked in the supplement the data for 01/08/2007, and I found the No sets with 188, but the drops per set are 50 and not 100. I have not checked all the other epochs.

Thank you for pointing this out. We have double-checked the supplementary project files and updated the statistics in Table 1 to ensure accuracy. In doing so, we identified and corrected four additional mistakes. The Excel supplementary file is also corrected accordingly.

Line 186: “microgal”, not “microGal”.

Thank you for spotting this. We have corrected it to use the lowercase “g” as recommended.

Line 186: “top-of-the-drop height”. Some clear explanation would be helpful here. The top-of-the-drop is the resting position of the testmass at the vertical position $z=0$ (coordinate system of the data evaluation, positive downwards). The $z=0$ is important because when you shift the origin of the coordinate system to any other position, you will obtain different g -values. I often used the position of the first data pair (z,t) of the postprocessing as $z=0$ to avoid other problems.”.

Thank you for pointing this out; it is indeed an important issue. The original sentence was too long and included multiple ideas, which reduced clarity. The updated text is inspired by your comment, as well as your related remark at Line 219 regarding the best one-day values. The revised version now reads:

“The gravity value of each observation campaign is also provided in Table 1 (col. 6) in microgal or μGal ($1\mu\text{Gal} = 10^{-8} \text{ m} \cdot \text{s}^{-2}$) at the top-of-the-drop height above the floor marker (g_0 in Figure 3). In the FG5, this height corresponds to the resting position of the test mass (Figure 1 in Wziontek et al., 2021). Each gravity value in Table 1 (col. 6) is the average of the set gravity values over the given day (col. 1), with each set value itself being the average of the individual drops within that set.”

Line 213: Hinderer and Luck 2005 ?

Thank you for noting this. We have added the publication year “2005” to the citation.

Line 218/219: “we edited the data . . .”. What means “edited”? Elimination of gross errors?

By “edited,” we mean that the data were carefully reviewed and, in cases where measurements extended over multiple days (two campaigns in 1999 and 2005), we retained the single full day of highest quality. Primarily, the discarded days were affected by poor weather conditions, which resulted in noticeably larger set scatter compared to the calmest day.

Line 219: “best one-day gravity value (Table 1)”. As I understand, Table 1 shows the mean g -values of the sets observed over more than one day, which corresponds with the supplement. Do you say here, that the g -values in Table 1 are the best one-day values? This here is confusing.

As mentioned above, when data were collected over multiple days, we retained the highest-quality single full day of measurements. The g -values reported in Table 1 correspond to these one-day values, rather than to an average over all measurement days, which were affected by weather conditions. The text has been revised to clarify this. See some complementary information in our response to a similar comment from reviewer 2 with an illustration for the 2005 multi-day observation campaign.

Line 256: Applying the evaluation software from the FG5 manufacturer, the gravity value from an FG5 is determined

Thank you for the suggestion. We agree and have adopted the proposed wording in the revised manuscript.

Line 272: “The transfer of each absolute gravity value from the effective instrumental height (top-of-the-drop) to the common reference height . . .”. The effective instrumental height is not the top-of-the-drop position. Here is the explaining extract from the paper of Wziontek et al. (2021):

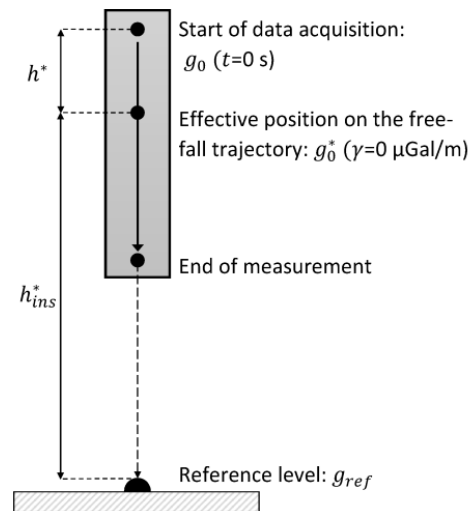


Fig. 1 Schematic representation of the effective position on the free-fall trajectory, where the determined g is independent of the constant VGG γ used within the observation equation of corner-cube gravimeters. The effective measurement height h^* has its origin within the gravimeter itself (start of data acquisition) and depends on the processed section of the zero-crossings. The effective instrumental height h_{ins}^* depends also on the setup of the gravimeter and has to be known to transfer the gravity value to a reference level (usually top of the benchmark) by using a VGG that can differ from γ .

Please read the caption of the figure above. Effec. Instr. Height is close to the 1/3 of the falling distance.

Thank you for this clarification and for pointing us to the relevant explanation in Wziontek et al. (2021). We agree that the effective instrumental height is not equivalent to the top-of-the-drop height. We have revised the sentence accordingly to avoid this confusion. The updated text now reads:

“The transfer of each absolute gravity value from the top-of-the-drop height (h_{instr} in Figure 3) to the common reference height (h_{ref} in Figure 3) was achieved using the actual vertical gravity gradients determined from measurements of relative gravity using a Scintrex CG3M or CG5.”

In References, I found 3 references not named in the text: line 488 (Boy and Hinderer2005, line 500 (De Linage 2003), line 574 (Van Camp and Vauterin, 2004).

Thank you for pointing this out. These references were included in an earlier draft of the manuscript but are no longer relevant to the current content. We have removed them from the reference list.

Line 558: the year of Pugh and Woodworth? 2014?

Thank you for noting this. We have added the publication year “2014” to the reference.

My recommendation:

After small changes, the article will be ready for publication. The paper ensures sustainability for future investigations. Very good!

We sincerely thank the reviewer for his time and the positive feedback on our work. We appreciate the thoughtful suggestions and are glad that the contribution is seen as a valuable step toward supporting future investigations.