Kündig and Schlamminger Reply: It was suggested in the preceding Comment [1] that the data of Fig. 2 in our Letter [2] contain evidence for a 20 ppm variation of the local g with a period of 30 d (i.e., a Sun-Moon tidal effect). It was also questioned whether the estimated error for the data points of Fig. 2 had taken account of tidal effects.

Before giving our arguments related to the Comment, it will be helpful to recall why a beam balance is inherently insensitive to tidal forces. This is due to the fact that, except for force gradients and the difference between the suspension of the test mass and the counter weight, a tidal force influences the weight of both masses similarly. In our balance, approximately 0.4 g of the 1.1 kg test mass was compensated by an electromagnet and thus was not influenced by tidal forces. This results in the sensitivity factor for tidal forces being a factor of 2700 less than would be obtained with a spring balance. Furthermore, the flexure-strip suspension of the balance arm and the approximately 2 m long wire suspension of the test mass result in essentially only vertical forces being measured.

Figure 1 of the Comment does indeed appear to show a 30-day effect with an amplitude of 20 ppm but with only marginal statistical accuracy. No discussion of the statistical significance for such an amplitude is presented in the Comment. We have made a four-parameter (amplitude, phase, period, and average value) least-squares fit to these data and find a χ^2 value of 0.5 with a best fit amplitude of 23 ± 10 ppm and a period of 24 ± 3 days. The χ^2 is much lower than the expected value for 4 degrees of freedom but is not too improbable for a fit with so few degrees of freedom. This value of χ^2 is to be compared with 7.7 for 7 degrees of freedom obtained for the single parameter fit given in our Letter. The value χ^2 in this case is only slightly larger than the expected value. Although the four-parameter fit has a lower ratio of χ^2 to degrees of freedom than the one-parameter fit, both are statistically acceptable.

The above statistical arguments are valid only if the individual statistical errors of our Fig. 2 have not been overestimated as would have been the case had there been a large diurnal tidal variation which was wrongly assumed to be a statistical variation. We have looked for diurnal variations in our fine mesh data involving the difference between two test masses as well in data for a single test mass. We have found no evidence for such variations. This indicates that the tidal variations in these data are small relative to other fluctuations, namely, the statistical variations. It is also to be noted that the expected amplitude of diurnal variation is of the order of 0.1 ppm [3], whereas the amplitude of the sinusoidal function shown in Fig. 1 of the Comment is 20 ppm (i.e., the expected amplitude is a factor of 200 smaller than the assumed value of the Comment). Therefore, there can be no large discrepancy in the errors assigned to our data due to tidal variations.

From the above arguments, we conclude that the data of Fig. 2 in the Letter represent a possible, perhaps somewhat unusual statistical distribution, but that they show no evidence for tidal effects of the magnitude suggested in the Comment.

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