Supplementary Information: Acceleration Profiles and Processing Methods for Parabolic Flight

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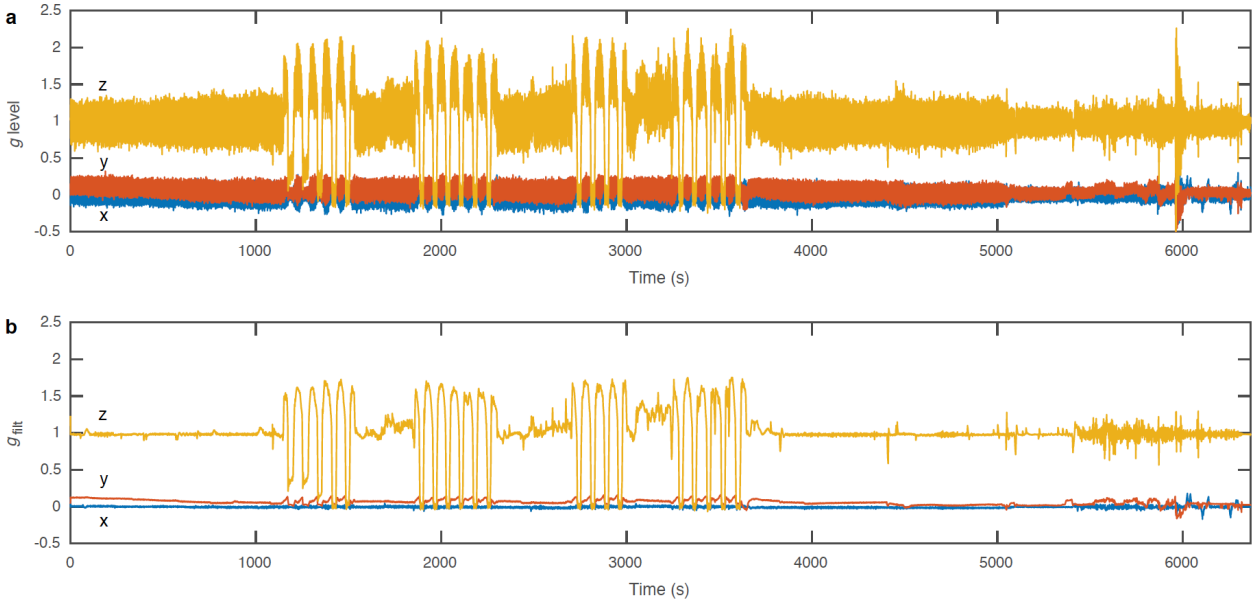
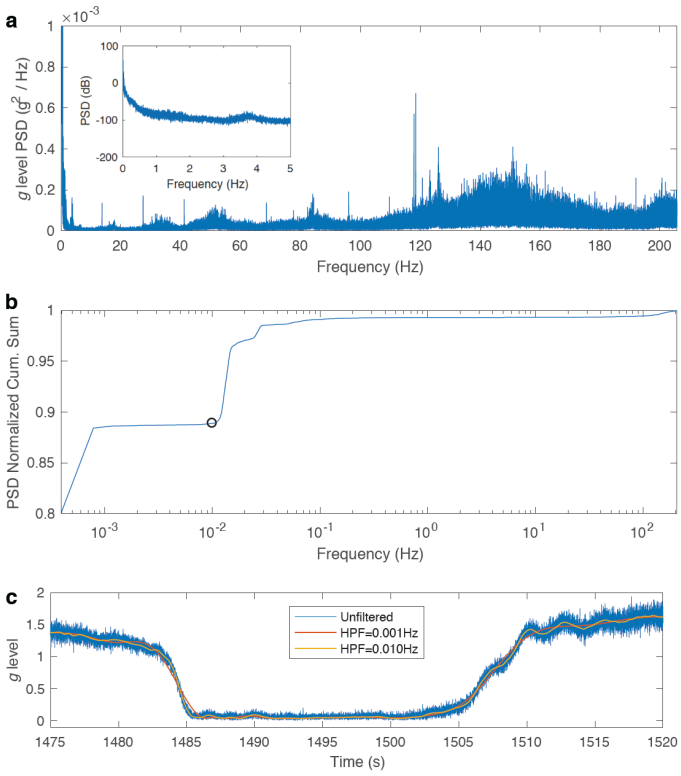
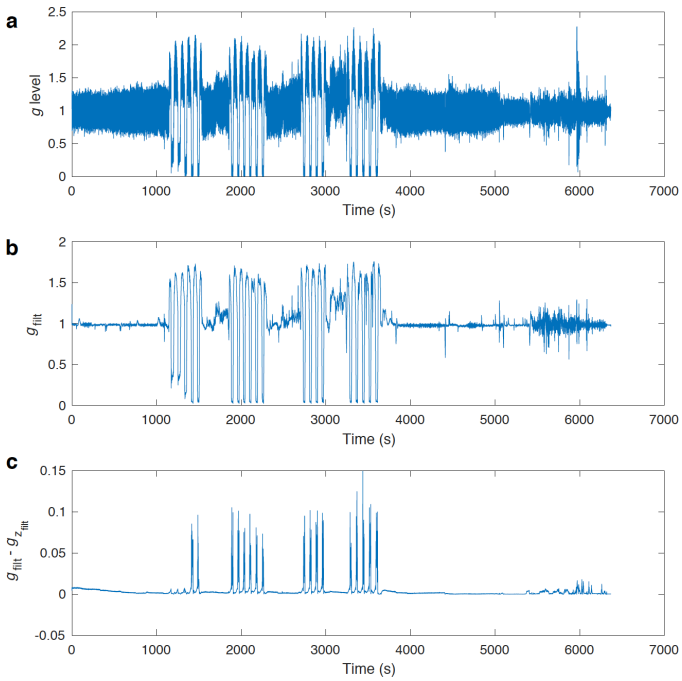
Here we provide supplementary figures (8).



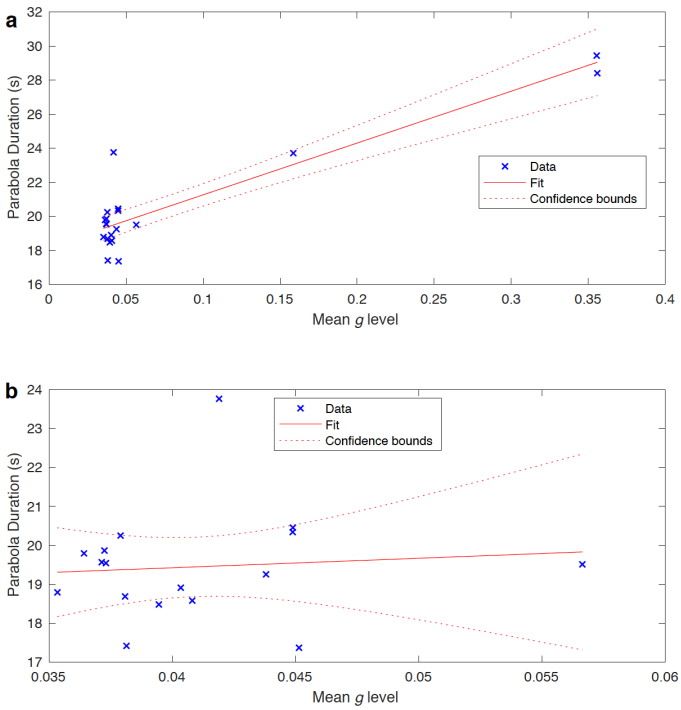
Supplementary Fig. 1. Acceleration profile of a parabolic flight. a Calibrated DC accelerometer data. **b** After low-pass filtering.



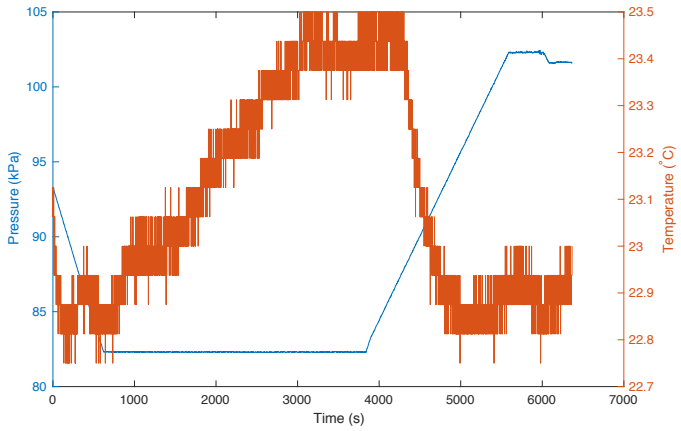
Supplementary Fig. 2. Power Spectral Density (PSD) of *g* level enables rational selection of filter Half Power Frequency. a PSD estimated using Welch's method. Near DC frequencies hold much of the spectral power (inset). **b** Cumulative sum of PSD normalized to unity with selected filter HPF of 0.01 Hz (circle). **c** The *g* level filtered with HPF (0.01 Hz, orange) better matches the unfiltered *g* level (blue) than does a 10x lower frequency HPF (0.001 Hz, red).



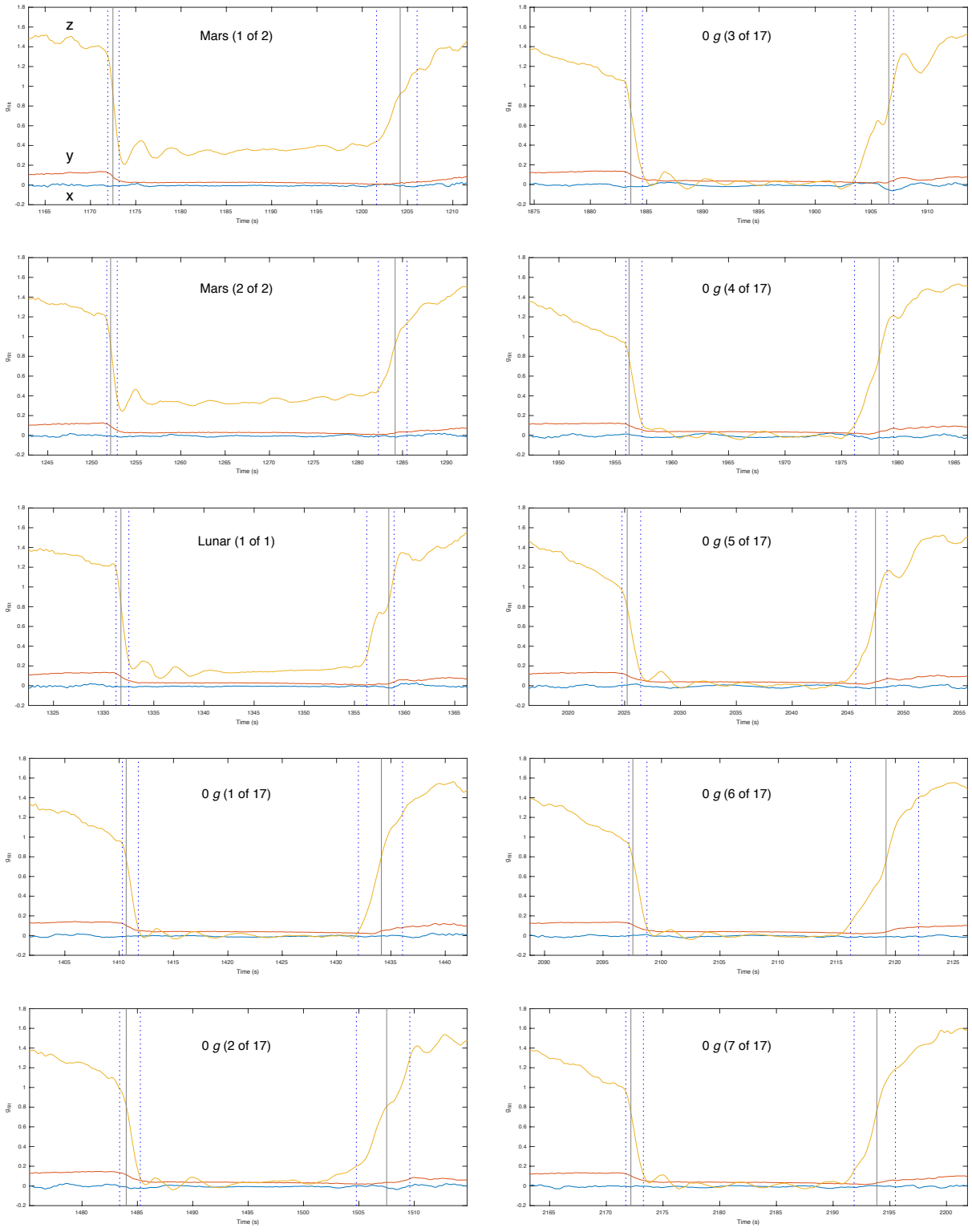
Supplementary Fig. 3. Acceleration profile as measured by *g* level, the norm of the gravity vector. a Unfiltered *g* level. **b** Low-pass filtered *g* level. **c** Difference between *g* level and magnitude of z-axis acceleration g_z. This difference is appreciable during 0 *g* parabolas but not Mars or lunar *g* parabolas, suggesting significant contributions to *g* from x and y axes during zero *g* parabolas. Accelerometer axes are as described in **Fig. 1c**.



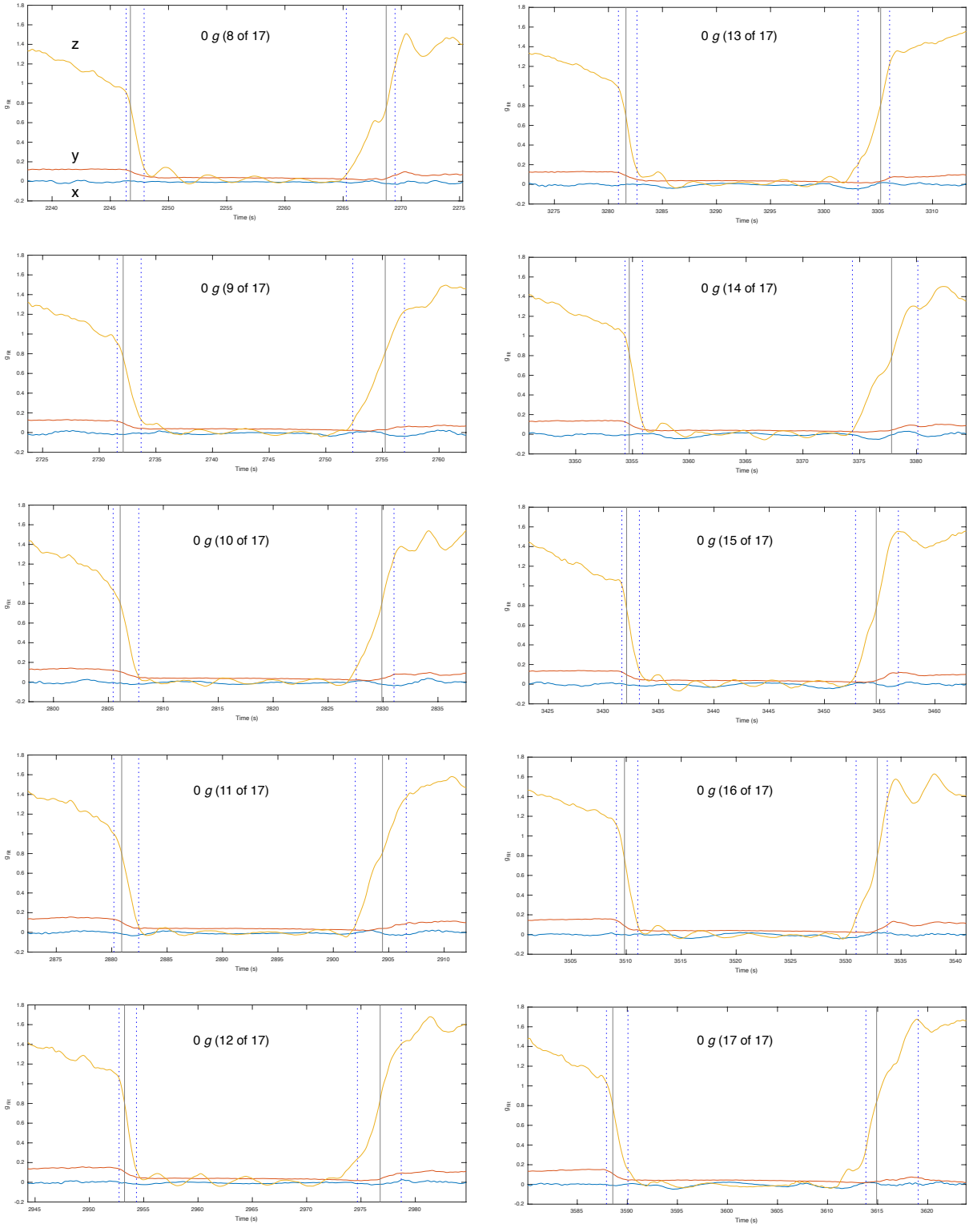
Supplementary Fig. 4. Parabola duration as a function of *g* level. a Regression of *g* level on parabola duration (*N*=20) yielded a highly significant relationship (F=91.3, dof=18, $p<10^{-7}$, one-sided by definition). **b** However, a regression without the limited Lunar *g* (*N*=1) and Mars *g* (*N*=2) data was insignificant (F=0.117, dof=15, *p*=0.737). Thus, care should be taken not to over-interpret the measured relationship.



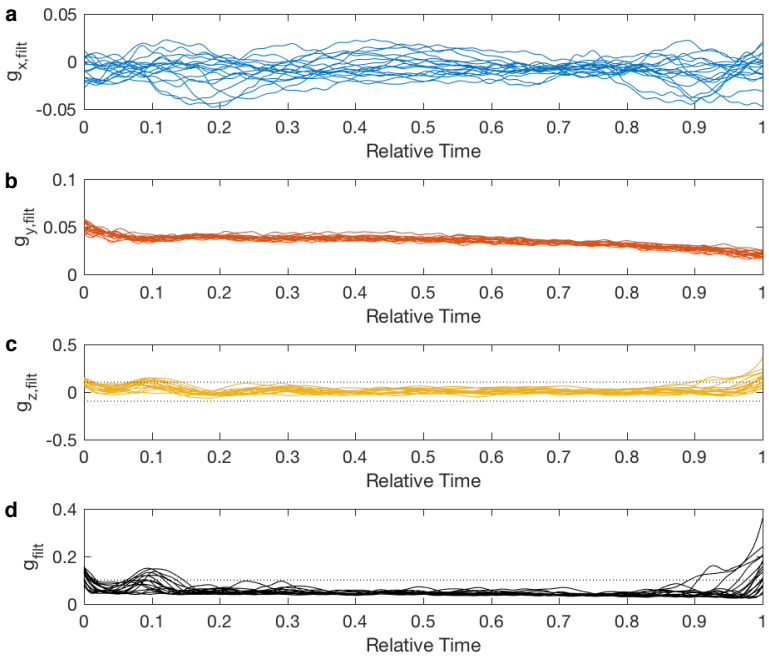
Supplementary Fig. 5. Pressure and temperature during flight. Pressure profile (blue line) reflects pressure altitude of ~1720 m established during flight until completion of parabolas. Measured temperature varied within a tight range around 23˚C.



Supplementary Fig. 6. Low-pass filtered accelerations during the first ten parabolas.



Supplementary Fig. 7. Low-pass filtered accelerations during the second ten parabolas.



Supplementary Fig. 8. Low-pass filtered accelerations across 0 *g* parabolas. a x-axis. **b** y-axis. **c** z-axis. **d** *g* level (norm).