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High-precision Gravity Measurements of the Superconducting Gravimeter 057 at Lhasa Station

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Among more than thirty superconducting gravimeters (SGs) all over the world, the superconducting gravimeter 057 (SG057) at Lhasa station is the unique one installed at the Tibetan Plateau, the highest plateau in the world. In the study, the new calibration factor of the SG057 is computed for the first time using gravity data recorded by LCR-ET20 gravimeter at the same station. The determined scale value of SG057 is -77.5585±0.0136 microgals / Volt, and the relative accuracy is about 5‰ . Because there are almost 1 year recordings of the LCR-ET20 gravimeter at Wuhan superconducting gravimeter station before it is installed at Lhasa station, the scale value of the LCR-ET20 gravimeter is recalibrated with the Wuhan international gravitational tidal benchmark values before it is used at Lhasa station. In this way, the gravity tidal observations recorded at Lhasa station can be unified to the Wuhan international gravitational tidal benchmark values. With the determined new scale value, the gravity tidal recordings of SG057 are calibrated and harmonic analysis is carried out with the calibrated data. Then, high-precision tidal parameters are obtained. Accurate tidal gravity correction is achieved in the Tibet area. After the gravity influence of the station air pressure is corrected, the gravity residual of SG057 is calculated. Further considering the absolute gravity measurements, the gravity residual of SG057 is expected to show the detailed behavior of the gravity variation caused by the uplift of the Tibetan plateau.