



IAG Newsletter

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- I General information
- II Reports of IAG symposia
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- IV Symposia announcements
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General announcements

The disturbing gravity potential at four IHRF stations in São Paulo state

In order to collaborate with the establishment of the International Height Reference Frame (IHRF), the Polytechnic School of the University of São Paulo, Department of Engineering Transportation (EPUSP-PTR), addressed an effort to estimate the disturbing and the gravity potential at four stations in the São Paulo state.

The study was performed considering the radius of 110 and 210 km around the computation point, aiming to evaluate the convergence of the results for both cases. The residual terrain model (RTM) technique has been applied for the estimation of the short-wavelength component.

The selected stations (Fig. 1) have a good gravity coverage, and they are part of the Brazilian Network for Continuous GNSS Monitoring (RBMC). Absolute gravity values were also measured at the points with A-10 Micro-g LaCoste absolute gravimeter. Then, station of Presidente Prudente (PPTE) is proposed for the global network, and the other three, Botucatu (SOBO), São Carlos (EESC) and São José do Rio Preto (SJR), are part of a local network.

The computation has been carried out solving the second geodetic boundary value problem using numerical integration. The program, developed at EPUSP, named HOTINE_5MIN, uses the modified Hotine integral to compute the short-wavelength component of the disturbing potential (T_P).

The geopotential model GOCO05S was used as the reference field with degree and order 100 and 200, according to the integration radius. For the RTM, the version SRTM15_PLUS was used. The disturbing potential values are shown in Table 1.

The results, as expected, have shown a high dependence on the long-wavelength components of the disturbing potential, but not homogeneously. The MGG T_P values used in the restore procedure have a difference between order and degree 100 and 200 of 4.98 and $-3.82 \text{ m}^2 \text{ s}^{-2}$ in Presidente Prudente and São Carlos stations, respectively, while at Botucatu and São José do Rio Preto this difference is -1.50 and $0.54 \text{ m}^2 \text{ s}^{-2}$. On the other hand, the T_P values of the São José do Rio Preto station (line 5 of Table 1) showed the proximity of the results of T_P with n_{\max} 100 and 200. The values for gravity potential are shown in Table 2.

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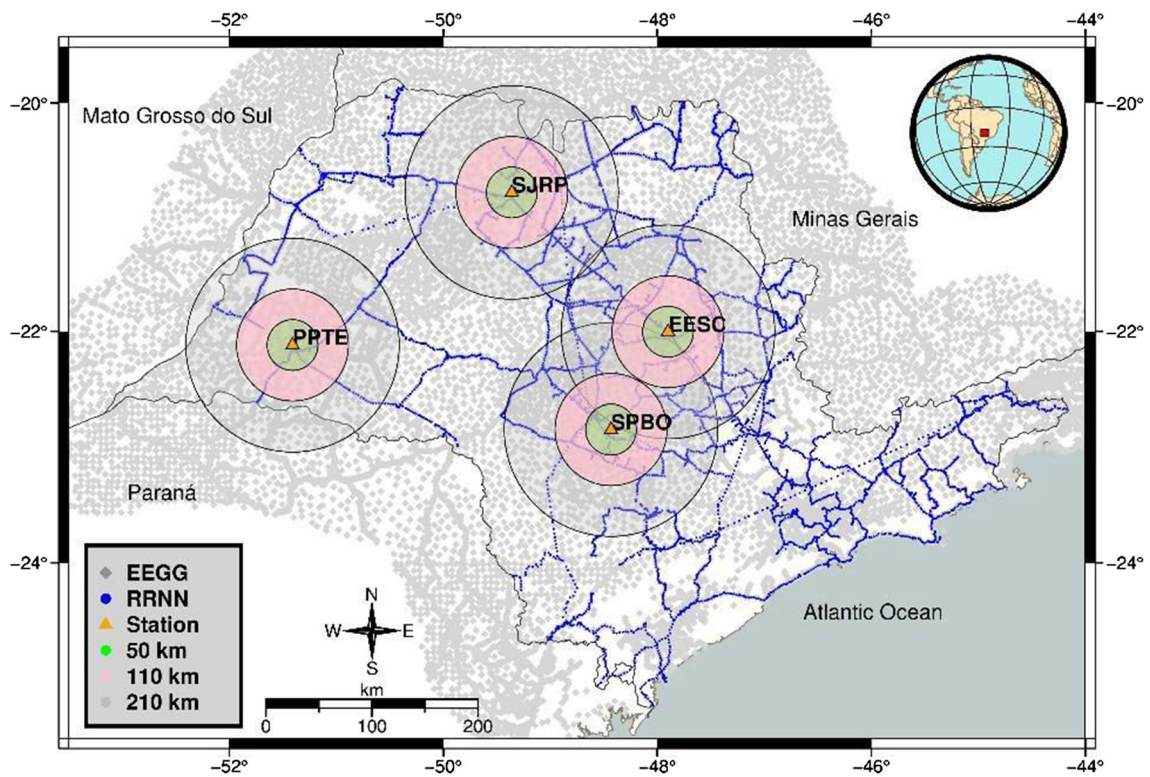


Fig. 1 São Paulo IHRF stations

Table 1 T_P computed ($m^2 s^{-2}$)

| GOCO05S | <i>nmax</i> : 100 | <i>nmax</i> : 200 |
|-----------------------|-------------------|-------------------|
| Botucatu | - 48.60 | - 49.83 |
| Presidente Prudente | - 52.05 | - 47.04 |
| São Carlos | - 56.31 | - 60.57 |
| São José do Rio Preto | - 65.30 | - 65.28 |

Table 2 Gravity potential of IHRF stations ($m^2 s^{-2}$)

| GOCO05S | <i>nmax</i> : 100 | <i>nmax</i> : 200 |
|---------|-------------------|-------------------|
| SPBO | 62,628,902.20 | 62,628,900.98 |
| EESC | 62,628,676.70 | 62,628,672.44 |
| PPTe | 62,632,537.93 | 62,632,542.94 |
| SJRP | 62,631,486.70 | 62,631,486.72 |