

remaining differences were highly correlated, locally, due to both correlated geoid error and the state-by-state nature of each GPS adjustment (i.e. HARNs). An empirical covariance model (variance:  $18.2^2 \text{ cm}^2$ , correlation length: 400 km) was used in a least squares collocation adjustment to model the long wavelength features of these differences on a grid. This grid, along with the bias, trend and ITRF97/NAD 83 transformation were used to compute a conversion surface which when removed from G99SSS yields GEOID99. GEOID99 undulations have a 4.6 cm RMS difference when compared to the GPS on Bench Mark data, which represents 16% improvement over the GEOID96 model.

## DEFLEC99

The DEFLEC99 deflection of the vertical model is based upon GEOID99. A two-step procedure was used to compute DEFLEC99:

- ☐ Compute slopes of GEOID99 using bicubic splines to yield deflections of the vertical at the surface of the geoid.
- ☐ Use simple Bouguer anomalies to compute a plumb-line curvature correction to change the geoid-surface deflections into deflections of the vertical at the Earth's surface.

Because DEFLEC99 is based on GEOID99, it will include both gravimetric information and (in the Conterminous United States) GPS on leveled bench mark information.

## REFERENCES

Fei, Z. and M. Sideris, 1999: A new method for computing the ellipsoidal correction for Stokes's formula, accepted for publication in *Journal of Geodesy*.