Eckl et al. (2001) demonstrated that the coordinates computed with OPUS-S (static) are independent of the CORS geometry and the distances from the rover to the CORS control stations. The only variable affecting OPUS-S results is the time span of the observations (see also Soler et al., 2006). On the contrary, coordinates computed with OPUS-RS (rapid-static) depend on the geometry of the CORS control stations used in the solution as well as the distances from these stations to the rover. The reason for this dependence is that the atmospheric conditions (troposphere and ionosphere) at the CORS control stations are interpolated and/or extrapolated to predict the atmospheric conditions at the rover.

The OPUS-RS maps show the standard errors for the horizontal and vertical (up) components as a function of the geographic location of the rover as based on the current distribution of stations in the CORS network.

The standard errors zones colored in the maps were computed on a grid of 0.2° × 0.2° according to the equation:

$$\sigma(IDOP, RMSD) = \sqrt{(\alpha \cdot IDOP)^2 + (\beta \cdot RMSD)^2 + \gamma^2} \qquad (1)$$

where:

IDOP = Interpolative Dilution of Precision (a variable quantifying the geometry of the CORS being used as control stations).

RMSD = Root Mean Square Distance (variable quantifying the collection of distances from the rover to the CORS control stations).

Schwarz et al. (2009) provides rigorous definitions for IDOP and RMSD including specific equations to compute them. Equation (1) is an updated version of the one originally published that only depends on α and β. The parameter γ has been added after further investigations showed that the new equation better fits the data. OPUS-RS limits distances from the rover to the CORS control stations to be less than 250 km. A maximum of nine and a minimum of three CORS control stations may be involved in any OPUS-RS solution.

For data spans of 15 minutes and 1 hour the values of α, β, and γ are as follows

	α (cm)	β (ppm)	γ (cm)	Weighted RMS residual (cm)
15-minute vertical	6.10 (0.80)	0.132 (0.028)	1.76 (0.43)	0.54
15-minute horizontal	1.80 (0.24)	0.048 (0.008)	0.19 (0.13)	0.20
1-hour vertical	2.83 (0.56)	0.113 (0.018)	1.26 (0.28)	0.33
1-hour horizontal	0.50 (0.13)	0.023 (0.004)	0.55 (0.07)	0.09

The values of α, β, and γ were determined by fitting Eq. (1) to the results for σ (and corresponding IDOP, and RMSD) computed from the residuals of a comparison between "true" coordinates of all available CORS stations and estimates of the same coordinates obtained through OPUS-RS. GPS data from a sample of seven days (Oct. 10, 2007; Nov. 10, 2007; Dec. 10, 2007; Jan. 10, 2008; Feb. 10, 2008; Mar. 10, 2008; Apr. 10, 2008) were used in the investigation. See Schwarz et al. (2009) for more details.

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