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Reassessment of hydrostatic zenith delays for radio space geodetic techniques determined from surface pressure values

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For space geodetic techniques using radio wavelengths, it is recommended to use the formula of Saastamoinen (1972) as given by Davis et al. (1985) for the determination of the hydrostatic zenith delays from surface pressure values. However, recent developments make an adaptation worthwhile: Rüeger (2002) revised the empirical coefficients that relate refractivity and meteorological parameters, and the height of the center of mass of the vertical column of air can nowadays be derived more accurately from numerical weather models. We use Legendre polynomials up to degree five with an annual variation of the coefficients for the representation of the height of the center of mass and find that the corresponding change in the hydrostatic zenith delay can be as large as 0.5 mm.