The striking similarity between the variations in the inter-planetary magnetic field (IMF) and the ionospheric electric and magnetic field has been attributed to the prompt penetration of the inter-planetary electric field (IEF) to the equatorial ionosphere. Manoj et al. (2008) proposed a transfer function based model to predict equatorial ionospheric electric field (EEF) variations due to prompt penetration of the IEF. This model is driven by the solar-wind electric field data from the ACE satellite and is limited to the day-time. The model could account for around 30% of the variability found in the JULIA radar data. We propose two improvements to our model: 1) We estimate a transfer-function tensor between the interplanetary electric field vector and the equatorial electric field. Previously we considered only the dawn-dusk (Ey) component of the IEF. 2) We introduce a local-time dependency in our model following the empirical model proposed by Fejer and Scherliess (1997). We discuss the implications of these improvements in predicting the EEF.