Recent studies have shown that the ionospheric plasma structure is modulated by upward propagating tides of troposphere origins and effects from planetary waves generated by the stratospheric sudden warming (SSW) event. These lower atmospheric effects modify the ionospheric dynamo and result in longitudinal, latitudinal, and altitudinal variations of the equatorial ionization anomaly. In this study, three-dimensional electron density observations derived from GPS radio occultation sounding of FORMOSAT-3/COSMIC and ground-based GPS-TEC are utilized to study the tidal signatures in the ionosphere. Additionally, this study also investigates the annual variation of the tidal and SSW effects to the ionosphere. According to the stratospheric temperature observation of FORMOSAT-3/COSMIC, the SSW occurs every year during 2006-2011 but the appearance months and durations are different. The ionosphere response to the SSW effect is expected to vary due to these annual differences.