In this study the ionospheric plasma structures at mid- and low-latitude are investigated by using the airglow observation of FORMOSAT-2/ISUAL and radio occultation measurement of FORMOSAT-3/COSMIC. The FORMOSAT-2/ISUAL provides limb scan observation of the O1D airglow emission, which is proportional to the electron density and neutral composition variations between 120 and 250 km altitude range. Meanwhile the radio occultation soundings measured by the FOMOSAT-3/COSMIC constellation, consisting of six microsatellites, provide global observations of the electron density profiles. Combining both satellite observations of the airglow and electron density, we study variations of the low-latitude equatorial ionization anomaly modulated by forcing from lower atmosphere and/or magnetospheric space weather events as well as the recent discovered mid-latitude summer nighttime anomaly (MSNA). The results are also compared with other existing satellite observations, such as TIMED/GUVI.