Effect of intrinsic magnetic field decrease on the low-to-middle latitude ionosphere-thermosphere dynamics simulated by GAIA

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Effect of decreasing intrinsic magnetic field on the upper atmospheric dynamics at low-to-middle latitude is investigated using a Ground-to-Topside Model of Atmosphere and Ionosphere for Aeronomy (GAIA). GAIA inputs the empirical atmospheric reanalysis data set at the low altitude (<30 km), which enables us to investigate the atmospheric response to the various waves, under dynamic and chemical interactions with the ionosphere. We set magnetic field strength reduced up to 10% of the current value. The averaged neutral velocity, density, and temperature at the low-to-middle latitude at 300 km altitude show small change with magnetic field variation, while the dynamo field ($\propto B^{1}$), current density ($\propto B^{-1}$), and the ionospheric conductivities ($\propto B^{-3\sim-2}$) are modified significantly. Wind velocity and tidal wave amplitude in the thermosphere are kept large due to smaller constrains of plasma motion for smaller field case. On the other hand, the super-rotation feature at the dip equator is weaken because the increase of ion drag for the smaller magnetic field prevails the super-rotation against pressure gradient acceleration effect.