Storm-time equivalent currents derived from a meridional magnetometer chain and the investigation of associated dynamics

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There is a need for modeling ionospheric sheet currents locally, over a certain region using ground based and/or satellite observations to help us better understand the physics of changes happening during geomagnetic storms. Our goal is to investigate storm-time changes in the low-latitude ionosphere, by taking into account the coupling between high- and low-latitudes. We use magnetic data from the 210degree meridian chain and calculate the ionospheric(˜120km) sheet currents for geomagnetic storms of varying intensities, spanning different seasons and solar cycle. Many factors contribute differently to the observed H component variations and one needs to address them using case-based arguments, since quantifying them is a difficult task. An effort has been made towards addressing this. We separate the observed H-component into external and internal parts and then continue the external component towards the source to arrive at the ionospheric equivalent currents. The algorithm can be applied to any meridional chain of magnetometers, accounting for the interpretation of conductivity (magnetotellurics) and wavelength in the spatial domain. It is also planned to discuss the storm-time dynamics and the associated changes in the low-latitude ionosphere using the derived electrodynamic parameters (conductivities, electric fields) which will be used together with an existing numerical model of the ionosphere.