Abstract: Modelling the interface region between the solar photosphere and corona is challenging because the relative importance of magnetic and plasma forces change by several orders of magnitude. While the solar corona is modeled by the force-free assumption, we need to take plasma forces into account (pressure gradient and gravity) in photosphere and chromosphere, here within the magnetohydrostatic (MHS) extrapolation. In this talk, we will present the newly developed MHS extrapolation, as well as the two strict tests and the 1st application to a SUNRISE/IMaX vector magnetogram. We find from the tests that the MHS extrapolation is able to improve the magnetic field solution (compare with the NLFFF) and to recover the main structure of plasma in the lower solar atmosphere. The application to IMaX magnetogram shows strong depletion of pressure and density in the active region, which is consistent with the observation. The loop-like structures of plasma indicate the plasma distribute along the magnetic field lines. We also find a few regions of high pressure and density at the edges of the active region, which is remarkable and needs to be studied further. The MHS extrapolation provides an opportunity to study not only the magnetic field, but also the plasma in the lower solar atmosphere.