The global $Pc5$ pulsations at the recovery phase of strong magnetic storm are considered using the ground magnetometer data and EISCAT radar data from the tri-static Tromso-Kiruna-Sodankyla system. To identify the physical nature of $Pc5$ pulsations and to determine relative contributions of different MHD modes into their structure, we applied the method of apparent impedance. An approximate analytical relationship from the theory of ULF wave transmission through the thin ionosphere has been compared with the measured ratio between the simultaneous ionospheric electric and ground magnetic fields. The impedances of Alfven and compressional modes are to be essentially distinct. From these observations we conclude that the global $Pc5$ pulsations above the ionosphere are predominantly composed from Alfven waves with a small contribution of fast compressional mode. The comparison of magnetometer data with the ionospheric parameters shows a significant (up to 100%) modulation of the electron density, ionospheric height-integrated conductance, and ion temperature by $Pc5$ pulsations, even in the absence of quasi-periodic electron precipitation. The mechanisms underlying the ULF modulation effects comprise the Joule ion heating by electric field, and feeding/depleting of the ionospheric electrons by field-aligned current. The impact of ULF waves on the ionosphere results in a non-linear distortion of ULF wave forms, as revealed by the phase portrait method.