Magnetic properties of soils reflect, to large extent, all soil-forming factors including pedogenesis. In this study, six laterite soil profiles from three different sites from Pomalaa, Southeast Sulawesi were studied for their pedogenic and magnetic characteristics. The magnetic minerals observed by X-ray diffraction analyses on extracted grains are magnetite, hematite and goethite. Morin transition of hematite was observed in all samples during low temperature magnetic susceptibility measurements. The same measurements, however, do not show Verwey transition implying that the magnetite in the soils is fine grained. The values of low-frequency magnetic susceptibility and frequency-dependent susceptibility varies with depth but controlled by the soil horizons confirming that the changes in magnetic properties are related to pedogenic processes. Changes in magnetic parameters are mainly controlled by enhancement of superparamagnetic (SP) particles. New method is introduced to predict the mass fraction of SP from frequency dependent susceptibility. With this information, the contributions of SP and NSP (non superparamagnetic) in magnetic susceptibility data could be identified. The data for the soils from Pomalaa shows that pedogenic development is predominant in the top layer of the soil profiles. In one site, the pedogenic development, marked by SP contribution, remain dominant all the way to the base of the profiles, but in two other sites the lithogenic contribution is stronger at a depth of about 60-80 cm. This study confirms that rock magnetic methods can be useful in soil studies.