Muon detection can be affected by environmental factors at the time of measure, like temperature and atmospheric pressure. The latter factor is one of the most relevant, and shows inversely proportional exponential relation to muon counting. In order to avoid the influence of barometric pressure, it was applied on every directional channel in the Multi-directional Muon Detector (MMD), operated at the Southern Space Observatory - SSO/CRS/INPE-MCT, in São Martinho da Serra, Brazil, a different correction factor to the observed raw muon counts. These values are so far calculated using a non-systematic semi-manual procedure, that may provide good estimatives, but does not guarantee the best possible values are obtained. In this work we propose an algorithm to automatically estimate the best possible values for barometric coefficients on every directional channel of a MMD. The proposed method discards muon data measured on high solar activity days and groups the remaining counts by temperature step. For each of these groups, the variance of muon counts related to barometric pressure is first calculated, the linear least squares method is applied and the angular coefficient from the best linear fit is calculated. At this moment, an angular coefficient equals to zero would indicate independence of muon counts due to atmospheric pressure variation. The raw muon counts are then calibrated using initially an arbitrary value of beta, which varies towards angular coefficient reduction. This algorithm was implemented computationally using relational database, and Java programming language. It showed interesting differences when compared to the non-systematic procedure.