Q12a Extinction Map of the Large Magellanic Cloud Based on 2MASS

○ K. Dobashi (Tokyo Gakugei Univ.), J. -Ph. Bernard, D. Paradis (CESR), A. Kawamura (Nagoya Univ.), A. Hughes (ATNF), and W. Reach (IPAC)

We have developed a new method to measure the color excess by dark clouds to derive a visual extinction ($A_{\rm V}$) map of the Large Magellanic Cloud (LMC) using the near infrared database 2 Micron All Sky Survey (2MASS). The well-known Near Infrared Color Excess (NICE) method to measure the color excess has disadvantage to underestimate the true color excess by dark clouds, if the clouds are significantly contaminated by unreddened foreground stars like in the case of the LMC. This is because the method generally uses the simple mean or median color of stars found in a cell set over the cloud surface. On the other hand, our new method utilizes the color of the X percentile reddest star in the cell, and it is therefore robust against such contamination at high X values. It is also noteworthy that out new method can infer the cloud position relative to the star distribution in the LMC by comparing the observed color excess as a function of X and that predicted by a model calculation. Using the resulting $A_{\rm V}$ map and data of gas in the literature (i.e., H I and CO data obtained by ATCA and NANTEN) resampled onto the same grid $1'$ and the same angular resolution $2\farcm7$, we performed a correlation study for ~ 10 selected clouds in the LMC. Assuming similar IR absorption properties of the dust in the atomic and molecular phases, we derived the absorption to column density ratio ($A_{\rm V}/N[H]$) and the $X_{\rm CO}$ factor. Results of the correlation study indicate that both of the $A_{\rm V}/N[H]$ and $X_{\rm CO}$ values in the LMC are significantly lower than those in our Galaxy.