



Phase reddening on near-Earth asteroids: Implications for mineralogical analysis, taxonomic classification and space weathering

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Phase reddening is an effect caused when objects are observed at high phase angles, which produce an increase of the spectral slope and variations in the strength of the absorption bands. In order to understand its effect on spectroscopic observations of asteroids, we have analyzed the visible and near-infrared spectra ($0.45\text{--}2.5\ \mu\text{m}$) of 12 near-Earth asteroids observed at different phase angles. All these asteroids are classified as either S-complex or Q-type asteroids. In addition, we have acquired laboratory spectra of three different types of ordinary chondrites at phase angles ranging from 13° to 120° . We have found that both, asteroid and meteorite spectra show an increase in band depths with increasing phase angle. The spectral slope of the ordinary chondrites spectra shows a significant increase with increasing phase angle for $g > 30^\circ$. Variations on band centers and BAR values were also found, however they seems to have no significant impact on the mineralogical analysis. Our study showed that under some circumstances the phase reddening could lead to an ambiguous taxonomic classification of asteroids. Furthermore, the increase in spectral slope caused by the phase reddening is comparable to certain degree of space weathering.