Correction to DISCOVER-AQ BEHR Products

Josh Laughner

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The ghost column is a correction factor that attempts to account for the fact that a UV/Vis satellite instrument will have nearly zero sensitivity to, in this case, NO_2 below heavy clouds. To correct for this, a multiplicative factor is calculated as:

$$g = \frac{V_{\text{gnd}}}{(1-f)V_{\text{gnd}} + fV_{\text{cld}}} \tag{1}$$

where f is the geometric cloud fraction, V_{gnd} is a modeled NO_2 column integrated from the ground to the tropopause, and V_{cld} is similarly a modeled NO_2 column integrated from the cloud to the tropopause. Therefore, this factor is a best guess at the ratio of the total column to the visible column.

In the current operational BEHR algorithm, this factor is calculated but not applied; the BEHRColumnAmountNO2Trop and BEHR_R_ColumnAmountNO2Trop fields are to represent the visible column only. The user may apply the correction as

$$V_{\text{total}} = V_{\text{obs}} \times g \tag{2}$$

where V_{obs} is the column density given in the BEHR product. g is given in the **BEHRGhostFraction** field.

In the version of the specialized DISCOVER BEHR product release around 18 Aug 2015, a bug existed where the value provided in the BEHRColumnAmountNO2 variable already had the ghost correction applied, and because of where in the code the correction was applied, it was applied incorrectly, as $V_{\text{total}} = V_{\text{obs}}/g$. If you downloaded DISCOVER BEHR data labeled as "InSitu" prior to **date**, both the **BEHRColumnAmountNO2Trop** and **BEHRAMFTrop** fields will be incorrect due to this bug. The **InSitu** fields and **BEHR_R_ColumnAmountNO2Trop** fields were unaffected.