



Figure 3. Comparison of the infrared albedo (IRA) parameter, OLINDEX, and OLINDEX2. CRISM image HRL00006247 of Púnsk Crater is used in an example. The location of the numerator spectra for sites A, B, and C are labeled as A(n), B(n), and C(n), respectively, while the location of the denominator spectra for sites A, B, and C are labeled as A(d), B(d), and C(d), respectively. The acquired spectra for each site are presented at the bottom. This example illustrates that OLINDEX2 correctly shows the distribution of olivine throughout the scene, while OLINDEX is incorrectly influenced by the spectral slope and variations in albedo. The solar illumination angle is shown to the left of the IRA parameter map (gray arrow).

adequate for laboratory measurements of olivine and olivine mixtures where the spectral slope is not significant. In regions exhibiting a spectral slope, however, this parameter fails to accurately measure olivine's $1.0 \mu\text{m}$ band depth, making it difficult to compare regions within the same CRISM scene. Figure 2a shows that the depth of olivine's broad $1 \mu\text{m}$ absorption feature is not accurately measured in regions with a strong spectral slope. To mitigate this problem, we developed a modified olivine parameter, OLINDEX2, to measure olivine's $1.0 \mu\text{m}$ band depth in the presence of spectral slopes (Figure 2b). For OLINDEX2, a line is fit to a spectrum using the reflectance values at 2.404 and $1.750 \mu\text{m}$. This line is then used to determine the expected values at 1.050 , 1.210 , 1.330 , and $1.470 \mu\text{m}$, the same wavelengths utilized in the original OLINDEX. The difference between the expected reflectance values and the actual reflectance values are then multiplied by the same weights as the

original OLINDEX (Table 2). The result is an olivine parameter that is not sensitive to spectral slope or variations in observed albedo. Figure 3 compares the OLINDEX and OLINDEX2 parameters calculated for the same CRISM targeted image. Region A is shown to have no olivine present in OLINDEX, while OLINDEX2 shows that olivine is present. In this instance, the spectral slope complicates the identification of olivine when using OLINDEX and the OLINDEX2 parameter correctly verifies the mineralogy. Region B is accurately shown as containing olivine in both the OLINDEX and OLINDEX2 parameters due to the prominent $1 \mu\text{m}$ absorption feature seen in the numerator spectrum and the relatively weak spectral slope. Olivine is falsely identified by OLINDEX in Region C, but this region is shown not to contain olivine using OLINDEX2. This false positive in OLINDEX is due to an increase in albedo shown in the infrared albedo (IRA) albedo parameter. This elevated