The Aristarchus Region: The Aristarchus Plateau on the lunar nearside is characterized by a variety of interesting geological features. The plateau itself is surrounded by flood basalts of Oceanus Procellarum, is oddly shaped, and has extreme high and low reflectance areas (e.g., Figure 1A). The rille, Vallis Schröter, cuts through the plateau, which is also nearly covered by a large pyroclastic deposit thought to be between 20-30m thick [1] and dominated by low-Ti glass spheroids [e.g., 2-3] (Figure 1D). A set of streaks, which are generally radial to Aristarchus crater, have been observed in multiple wavelengths (e.g., optical, radar) across the plateau. Aristarchus, Prinz, and Herodotus craters are all clearly visible in Lunar Reconnaissance Orbiter Camera (LROC) imagery and topographic data (Figure 1A, 1D). The incomplete rim of Herodotus E can be partially identified in LROC imagery (Fig. 1A) under favorable lighting conditions. This eroded rim, however, is not as apparent in thermal and topographic data (Fig. 1B, 1C), and can be difficult to identify in visible imagery at high incidence angles or in geologic maps of the region (Fig. 1A, 1D). Because radar is sensitive to roughness, and can also probe beneath the surface, Mini-RF data can provide a different view of, and potentially other insights into, the geology of the region. As an example of newly re-processed Mini-RF data, we examine the Aristarchus region, which was originally collected by the Mini-RF radar on October 30, 2012. Improved data quality resulting from new processing techniques reveals additional features in the Aristarchus region that are less apparent in other data sets (e.g., Fig. 2).

Seeing Beneath the Surface: Radar data can be used to identify features not easily seen in visible images. For example, the crater Herodotus E is clearly visible in Mini-RF CPR (roughness) data (Figure 2A), though it is not easily discernible in high phase LROC optical imagery (Figure 1A). Other intriguing features are present on the Aristarchus plateau, including streaks that are clearly visible in optical images and Earth-based radar data, and that show up as bright in the Mini-RF image (Fig. 2B,C). These streaks, though still present, are less defined in the CPR image (Fig. 2A).


Figure 1. A) LROC WAC image of the Aristarchus Plateau; B) Diviner Christiansen Feature (CF) map of the Aristarchus Plateau [4]. Lower CF values correspond to more silicic material; C) Geologic map of the Aristarchus Plateau, showing an updated version of the I-0703 Wilhelms Geologic map of the nearside at 1:5,000,000 [5]; D) Topography of the Aristarchus Plateau from the SLDEM2015 DEM [6].

Figure 2. A) Mini-RF CPR (roughness) (λ=12.6 cm) image of the Aristarchus Plateau and Herodotus crater, overlain on the LROC WAC image. Black arrows show the rim of the ancient crater Herodotus E (48 km dia.), while blue arrows indicate streaks radial to Aristarchus crater. B) Total power returned to the Mini-RF radar from backscattered energy overlain on the LDEM256 radar shaded topography. C) Close-up of (B) indicated by a red box: Mini-RF data for a portion of the Aristarchus Plateau. Blue arrows indicate radar bright streaks approximately radial to Aristarchus crater.