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The raised ramparts around Titan's northern lakes

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We investigate the spectral and microwave properties of the raised ramparts of five liquid-filled lakes [e.g. 1;2;3] in Titan's North pole using both Cassini Visual and Infrared Mapping Spectrometer (VIMS) and RADAR data. Ramparts are radar-bright mounds that extend from the shores of some lakes out for up to tens of kilometers and are distinct features from the raised rims. Dedicated methods have been developed to extract their infrared properties from a high-resolution VIMS cube [4;5] and their 2.2-cm emissivity from radiometry observations [6;7]. Analysis of these combined and co-registered data provides new constraints for the formation mechanisms of raised ramparts that are seen around a subset of Titan's northern lakes. VIMS and emissivity results show that the raised ramparts are made of materials very similar to that of the empty lake floors, which are also part of our investigation. In addition the emissivity of the raised ramparts is close to that of Titan's labyrinthic terrains. This suggests that the ramparts, the floors of the lakes, and the labyrinth terrains are made from or are covered by a similar material. In addition, two out of the eight lakes with raised ramparts show spectral differences at three specific wavelengths, 1.6, 2.0, and 5.0 μm, between the ramparts and the surrounding terrain. We hypothesize that this could be due to some component, or mixture of components in the ramparts that is less absorbent at these specific wavelengths, or it could be an effect of different grain sizes. A number of theories for the formation of the raised ramparts are discussed.
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