Interstellar chemistry is largely driven by reactions of unstable molecules that serve as reaction intermediates in terrestrial chemistry. One such class of compounds are weakly-bound clusters. These clusters could form in interstellar environments through radiative association reactions, but their identification and characterization in interstellar environments is limited by a lack of rotational spectral information. One such species is HO$_3$, which could be formed in the interstellar medium from O$_2$ and OH. HO$_3$ has been studied extensively in the infrared, and there are a few microwave spectral studies that have also been reported. However, no millimeter or submillimeter spectral information is available to guide astronomical observations. In this talk, we will present the laboratory characterization of trans-HO$_3$ and trans-DO$_3$ from 70 to 450 GHz using our newly developed fast sweeping technique. The molecular constants have been significantly refined, and additional higher order centrifugal distortion constants have been determined. We will also present an initial observational search for HO$_3$ in 32 star forming regions. Although no HO$_3$ lines have been detected thus far, strict upper limits can be placed on the HO$_3$ column density in these sources based on this analysis.

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