Recent observations of the 18-cm OH lines in bright comets with the Arecibo ALFA receiver

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We have observed the 18-cm OH lines in 2P/Encke, C/LINEAR (2002 T7), C/NEAT (2001 Q4), and C/LINEAR (2003 K4) at Arecibo Observatory. These observations can provide the total number of OH molecules, the gas velocity in the coma, and the rate and distribution of sublimating water ice from the comet nucleus. Comet 2P/Encke was observed on 11 days in November 2003. Comet C/LINEAR (2002 T7) was observed on 7 days in April and May 2004. These observations included days of strong inversion, and anti-inversion as well as days of predicted zero-crossing. The new 7-pixel ALFA receiver is well-suited to comet observations, and has good response at the 18-cm OH wavelengths, despite being designed for 21-cm HI observing. Initial observations resulted in more extensive spatial mapping than was previously possible. We observed C/NEAT (2001 Q4) on 11–15 May 2004, which included the first test observations with the ALFA receiver. Three additional days with ALFA to observe C/LINEAR (2003 K4) were obtained in late July 2004, followed by 5 more days using the single-pixel L-wide receiver. We detected the OH lines at least 10 arcmin from the nucleus in both sunward and tailward directions. More extensive spatial maps will help us understand the deviations from predicted line strengths and zero-crossing velocities in order to determine the importance of quenching in the inner coma. Asymmetric gas outflow is often seen, and in some cases significant outgassing from the night side of the nucleus is required to match the observations. Modeling efforts to understand these results are in progress, and will be presented.

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