Early observations of comet Churyumov-Gerasimenko with the Rosetta MIRO submillimeter instrument

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The Rosetta spacecraft is now approaching comet 67P/Churyumov- Gerasimenko, preparing to enter orbit in August 2014 and place a lander on the nucleus in November. The Microwave Instrument on the Rosetta Orbiter (MIRO) is designed to study the coma and immediate sub-surface of the nucleus. It has two broad-band continuum channels (center frequencies near 560 and 190 GHz, or wavelengths near 0.5 and 1.6 mm) which probe the thermal and dielectric properties of the upper $\sim$ centimeters of the nucleus. It also contains a high spectral resolution (44 kHz) spectrometer working in the submillimeter band to study the abundance, velocity, temperature, and three-dimensional structure of select species in the coma. Those species are H_2O, $H_2^{17}O$, $H_2^{18}O$, CO, NH_3, and CH_3OH.

Scientific observations with the MIRO instrument were started in early May 2014, when the comet-spacecraft separation distance was 1.8 million kilometers. Initial observations were designed to search for H_2O and CO in the coma and for thermal emission from the nucleus. Early detection of the coma is expected only if gas production rates are relatively high ($\sim 1 \times 10^{26}$ water molecules/second at a heliocentric distance near 4 au). We will present the results of our initial measurements, describe the detailed mapping of the coma and nucleus we plan to do over the coming months.

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