Interferometric Views of Star Formation

R.L. Plambeck and M.C.H. Wright (U.C. Berkeley Radio Astronomy Lab)

Many studies of molecular clouds require quantitative comparisons of images at widely different wavelengths. For example, one may map dust spectral index variations to search for evidence of grain growth in protostellar cores, or use 3–2/2–1/1–0 $C^{18}O$ line ratios to derive gas kinetic temperatures, or search for chemical abundance anomalies caused by shocks or MHD waves. ALMA will dramatically improve the accuracy of these measurements because it will provide almost complete sampling of visibilities across the u, v plane, allowing one to synthesize mathematically perfect, matched beams at different wavelengths.

The reliability of such comparisons will be limited by the difficulty in measuring the flux from extended structures. For a homogeneous array such as ALMA, visibilities on spacings smaller than the antenna diameter are recovered by mosaicing. Pointing and surface errors lead to errors in these data, limiting the image fidelity (Cornwell, Holdaway, & Uson 1993), particularly at submillimeter wavelengths. One could improve the image fidelity by measuring the short spacing visibilities directly with an auxiliary array of smaller antennas.

Cornwell, T.J., Holdaway, M.A., & Uson, J.M. 1993, AA, 271,697

Abstract submitted for Science with the Atacama Large Millimeter Array, 6 – 8 October 1999, Washington, D. C.