CHEMICAL DIFFERENTIATION IN NEARBY STARBURST NUCLEI

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The BIMA and OVRO millimeter interferometers are used to map at high spatial resolution ($4'' - 7''$), a selection of nearby star forming nuclei in rotational transitions of several astrochemical important species (including C_2H, HNCO, HC_3N, N_2H^+, $C^{34}S$, CH_3OH, CN, CH_3C_2H and C_3H_2). Our previous observations of the moderate starbursts, IC 342 and Maffei II, have demonstrated that significant chemical differentiation survives to scales larger than GMCs ($>$ 50 pc). The morphology demonstrates that the observed chemical differentiation is most strongly influenced by two nuclear phenomena, shocks associated with gas dynamics and UV radiation from star formation.

We extend this discussion to cover the galaxies M 51, M82 and NGC 1068. These galaxies represent a continuum of star formation rates from normal to strongly starbursting, as well as introduces the influences of active galactic nuclei. We will discuss the correlation between molecular abundances and the local star formation rate. Particular attention is paid to the spatial extent over which star formation and active galactic nuclei influence the chemistry of their surroundings. Maps of PDR traces (chemical descendents of C^+ such as C_2H, CH_3C_2H and C_3H_2) are used to trace the ionizing radiation from star formation. The radial extent of the ionization is used to evaluate the relative importance of UV photons versus cosmic ray and hard X-ray ionization. Evidence is found that galaxies with little internal chemical differentiation (eg. M 82) tend to have the stronger absolute abundances variations, suggesting that differentiation mechanisms similar to those occurring locally in IC 342 and Maffei II are operating uniformly over the entire nuclei.