A Survey of the Chemistry & Kinematics of High-Mass Star-Forming Clumps

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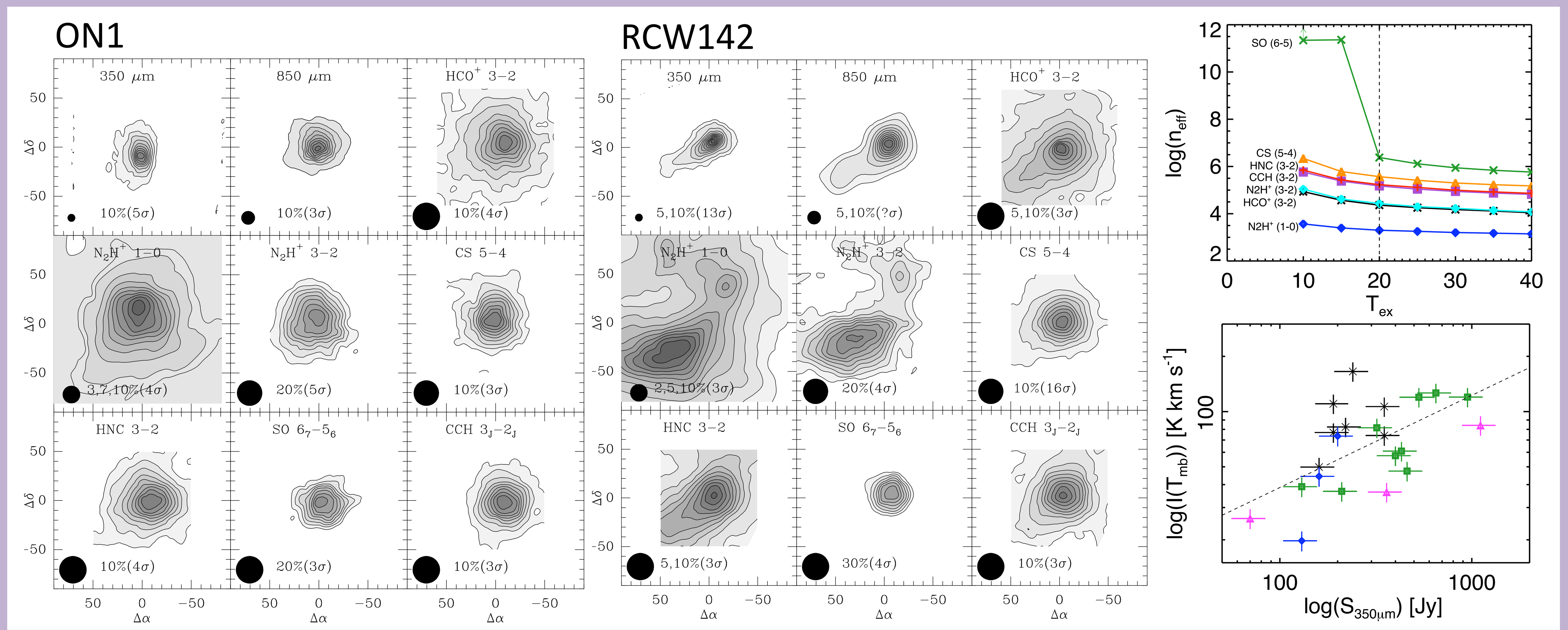
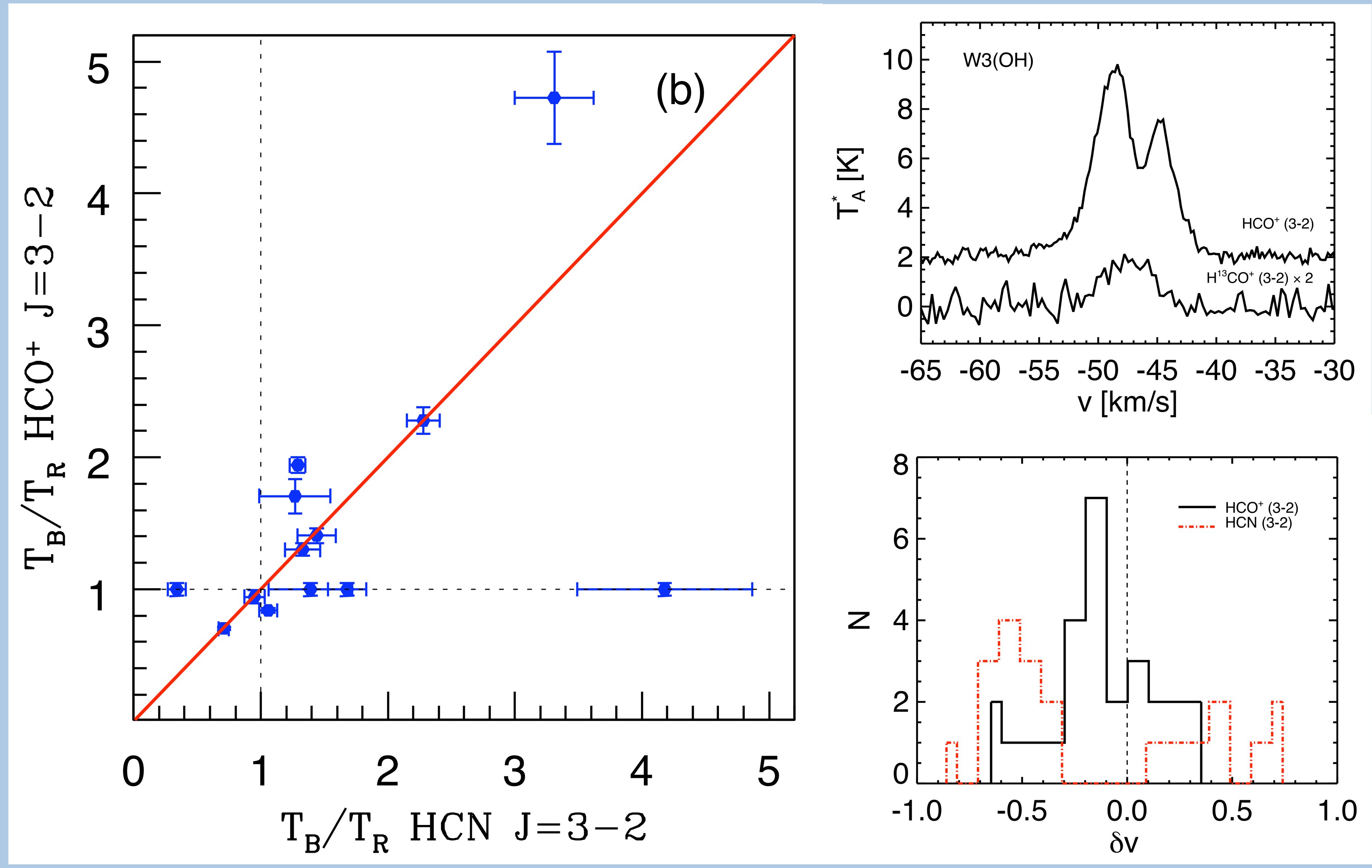
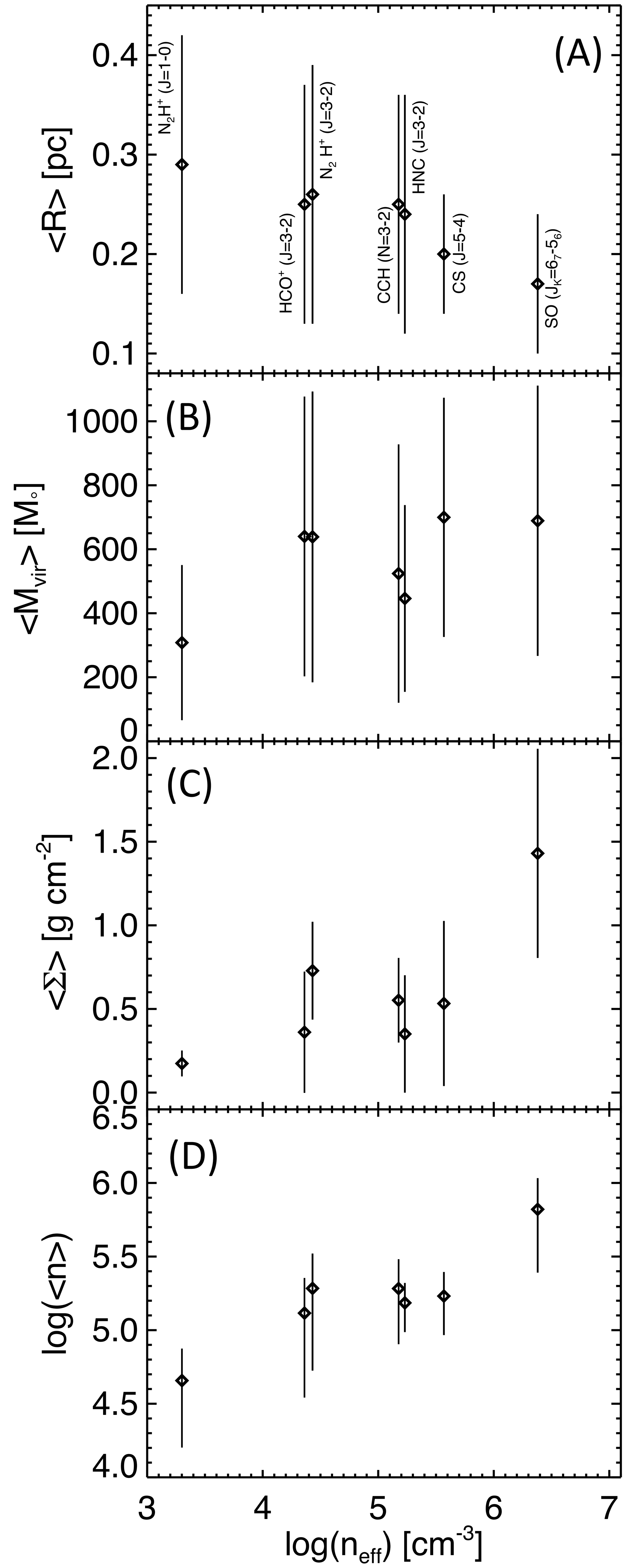


We have mapped a statistical sample of 27 sources in 6 different transitions to study the chemical and kinematic structure of high-mass clumps. We find the N_2H^+ is differentiated towards a very few luminous cores and the N_2H^+ integrated intensity is not well correlated with the dust continuum flux. . Effective density (n_{eff}) is defined as the density required to excite a 1K line for a column density log(N) = 13.5. We use n_{eff} for T = 20 K.



We observe an excess of blue profiles for HCO^+ 3-2. Every clump with a HCO^+ blue asymmetry also displays an asymmetry in HCN even though n_{eff} for these tracers is different by more than an order of magnitude. This may signify large scale inflow in these clumps.



Because beam sizes are roughly the same for all transitions, we can compare size, mass, surface density and volume density as a function of n_{eff}. Our sources represent a diverse sample of 27 high-mass star-forming clumps, leading to considerable uncertainty in the median values of those physical properties. That trends with n_{eff} persist despite the diversity of sources is remarkable.

(A) observed size R is smaller for larger n_{eff}

(B) virial mass M_{vir} is not sensitive to n_{eff}

(C) surface density Σ is higher for larger n_{eff}

(D) volume density <n> is higher for larger n_{eff}

References: [1]Shirley et al. 2003, [2] Evans 1999, [3] Wu et al. 2010