Abstract: We study three-flavor collective neutrino transformations in the dense-neutrino region above the neutrino sphere of a supernova core. We find that two-flavor conversions driven by the atmospheric mass difference and the 13-mixing angle capture the full effect if one neglects the second-order difference between the $\nu_\mu$ and $\nu_\tau$ refractive index. Including this “mu–tau matter term” provides a resonance at a approximate density of $3 \times 10^7$ g cm$^{-3}$ that typically causes significant modifications of the overall electron neutrino and antineutrino survival probabilities. This effect is surprisingly sensitive to deviations from maximal 23-mixing, being different for each octant.