Abstract --- Experiments are presented in which electrical-impedance tomography (EIT) and gamma-densitometry tomography (GDT) measurements were combined to simultaneously measure the solid, liquid, and gas radial distributions in a vertical three-phase flow. The experimental testbed was a 19.05-cm diameter bubble column in which gas is injected at the bottom and exits out the top while the liquid and solid phases recirculate. The gas phase was air and the liquid phase was deionized water with added electrolytes. Four different particle classes were investigated for the solid phase: 40-100 μm and 120-200 μm glass beads (2.41 g/cm^3), and 170-260 μm and 200-700 μm polystyrene beads (1.04 g/cm^3). Superficial gas velocities of 3 to 30 cm/s and solid volume fractions up to 0.30 were examined. For all experimental conditions investigated, the gas distribution showed only a weak dependence on both particle size and density. Average gas volume fraction as a function of superficial gas velocity can be described to within ±0.04 by a curve passing through the center of the data. For most cases the solid particles appeared to be radially uniformly dispersed in the liquid.

Key Words: gamma-densitometry tomography, electrical-impedance tomography, bubble column, gas volume fraction, multiphase flow