

Chemical data and stable isotope ($\delta^{18}\text{O}$, $\delta^2\text{H}$) results are presented for monsoon rains for several years during the 1990s from northern Nigeria in the Sahel region of Africa. The isotopic data from Garin Alkali (Nigeria) are related by a line $\delta^2\text{H} = 6.33\delta^{18}\text{O} + 9.9$ with a weighted mean value of -3.6‰ for $\delta^{18}\text{O}$. The heaviest rains have the lightest isotopic compositions; the lighter rains' enrichment is as a result of convection. The mean 1992 concentrations of Cl in rain ranged from 1.3 to 2.8 mg l⁻¹ for the two stations in Nigeria. The early rains have higher Cl than the later events although Cl accumulations are in general directly related to rainfall amount. The Br/Cl ratios of all rains are enriched above marine values, which may in part be attributed to a preferential concentration of Br in smaller size particles, although more likely, is related to release from the biomass as the air masses pass over vegetated areas. The high Br/Cl ratios rule out dust from halite sources during the monsoon. The ratios of Na and Cl are similar to those in sea water, although all other elements (especially Ca, SO₄, NO₃ and K) are enriched relative to marine aerosols and indicate continental sources. The element ratios (Ca/SO₄); K/Mg; K/Na) are remarkably similar to those in ash leachates from tropical vegetation and this is proposed as the main solute source in the present day monsoon rains, reinforcing the evidence of Br/Cl ratios. The chemical results show the considerable terrestrial influence and are in line with isotopic evidence, which demonstrates considerable modification by convective circulation and continental influence as the monsoon air masses track northwards over the Sahel.