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Columnar resistance changes and cosmic ray ionisation

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The columnar resistance is the electrical resistance of a unit-area column of atmosphere, extending between the surface and the ionosphere. Its value varies with the mobility and number concentration of the ions contained within the column. Ion number concentrations depend on the balance between ion production (mostly from cosmic rays above the continental boundary layer) and ion removal, either to aerosols or through self-recombination. Columnar resistance determinations are rare, but new values have been found by combining ionospheric potential soundings from Weissenau, Germany (1959-1971) with recently-recovered air-earth current density measurements made at the extensively instrumented Kew Observatory, near London. Variations in the columnar resistance in the urban air can be explained by growth of the ions present. Coincident surface measurements of the diffuse and direct solar radiation suggest that the ion growth leads to particles sufficiently large to affect the solar radiation received at the surface.