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REVIEW

Chemical releases in the ionosphere

T N Davis 1979 *Rep. Prog. Phys.* **42** 1565-1604 doi: 10.1088/0034-4885/42/9/003 Help

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T N Davis
Geophys. Inst., Univ. of Alaska, Fairbanks, AK, USA

Abstract. Made possible by the availability of rockets for research purposes in the late 1950s, ionospheric releases of chemicals and high-speed charged particles to form tracers or perturbations have contributed much information on the ionosphere, thermosphere and magnetosphere. Trail releases of sodium, lithium, aluminium and nitric oxide have enabled detailed observation of neutral mass motions at altitudes above 50 km. Development of the thermite barium release technique enabled observation of both neutral and ion motions, the latter leading rather directly to determination of ionospheric electric fields. Use of shaped charges detonated at altitudes above 400 km has allowed ejection of barium vapour at speeds greater than the Earth's escape velocity to permit tracing of magnetic-field lines, the effects of field-aligned currents and simultaneous observation of electric field at different altitudes on a geomagnetic field line. Ejection of electrons of energy 1-40 keV from rockets has been useful for studying the propagation of particle beams, for tracing magnetic-field lines and examining the effects of electron impact upon the high atmosphere.

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