622

FORCING OF CLOUDS AND CLIMATE BY THE GLOBAL ELECTRIC CIRCUIT

B. A. Tinsley

University of Texas at Dallas, Richardson, Texas, United States

There are at least five independent inputs into the global atmospheric electric circuit, due to different types of solar wind or space particle fluxes, which affect the ionosphere-earth current density J_z. These inputs maximize at polar or sub-auroral latitudes, and each of them is associated with an independent meteorological response, and some with responses observed in several parameters and in different time periods.

The associations imply that J_z is a necessary and sufficient driver for short-term cloud changes that affect atmospheric temperature and dynamics. Most of the J_z changes do not involve changes in ion production in the troposphere, and thus the meteorological responses cannot be due to changes in ion-induced nucleation. But all of the meteorological responses are consistent with electrically induced changes in the scavenging of condensation nuclei and ice-forming nuclei, at the boundaries of cloud and aerosol layers.

The independent inputs and the responses will be reviewed, together with some aspects of the cloud physics, and implications for the effects on J_z and climate of long-term changes in the global circuit generators and the cosmic ray flux.