

Home

Online Library

- Recent Papers
- Volumes
- Library Search
- Title and Author Search

RSS Feeds

General Information

Submission

Review

Production

Subscription



Volumes Contents of Volume 13

Adv. Geosci., 13, 17-23, 2007  
www.adv-geosci.net/13/17/2007/  
© Author(s) 2007. This work is licensed  
under a Creative Commons License.

## Multi-station synthesis of early twentieth century surface atmospheric electricity measurements for upper tropospheric properties

R. G. Harrison and A. J. Bennett

Department of Meteorology, University of Reading, P.O. Box 243, Earley Gate,  
Reading RG6 6BB, UK

**Abstract.** The vertical columnar current density in the global atmospheric electrical circuit depends on the local columnar resistance. A simple model for the columnar resistance is suggested, which separates the local boundary layer component from the upper troposphere cosmic ray component, and calculates the boundary layer component from a surface measurement of air conductivity. This theory is shown to provide reasonable agreement with observations. One application of the simple columnar model theory is to provide a basis for the synthesis of surface atmospheric electrical measurements made simultaneously at several European sites. Assuming the ionospheric potential to be common above all the sites, the theoretical air-earth current density present in the absence of a boundary layer columnar resistance can be found by extrapolation. This is denoted the free troposphere limit air-earth current density,  $J_0$ . Using early surface data from 1909 when no ionospheric potential data are available for corroboration,  $J_0$  is found to be  $\sim 6 \text{ pA m}^{-2}$ , although this is subject to uncertainties in the data and limitations in the theory. Later (1966–1971) European balloon and surface data give  $J_0 = 2.4 \text{ pA m}^{-2}$ .

Full Article in PDF (PDF, 459 KB)

Citation: Harrison, R. G. and Bennett, A. J.: Multi-station synthesis of early twentieth century surface atmospheric electricity measurements for upper tropospheric properties, Adv. Geosci., 13, 17-23, 2007. Bibtex EndNote Reference Manager



Search ADGEO

Library Search

Author Search

News

New Tax Regulation for Service Charges

Recent Papers

01 | ADGEO, 27 Jan 2010:  
Recent variation of the Las Vacas Glacier Mt. Aconcagua region, Central Andes, Argentina, based on ASTER stereoscopic images

02 | ADGEO, 17 Dec 2009:  
First insights on Lake General Carrera/Buenos Aires/Chelénko water balance

03 | ADGEO, 17 Dec 2009:  
A Terrestrial Reference Frame (TRF), coordinates and velocities for South American stations: contributions to Central Andes geodynamics