



Pressure systems in southern Africa and the tropospheric air flow over northern Zimbabwe

D. Nyanganyura (1,3), A. Makarau (1,2), M.M. Mathuthu (1), F.X. Meixner (1,3)

(1) Department of Physics, University of Zimbabwe, Harare, Zimbabwe, (2) Department of Meteorological Services, Harare, Zimbabwe, (3) Max Planck Institute for Chemistry, Biogeochemistry Department, Mainz, Germany (nganyura@mpch-mainz.mpg.de / Fax: ++49 6131 305 542)

Tropospheric air masses that pass over Northern Zimbabwe from January 1994 to December 1999 are described in terms of (a) directions of origin, (b) wind speed, (c) inter- and intra-annual period of predominant flow. Major pressure systems controlling these flows were explained. There are five possible pathways of air mass over northern Zimbabwe; (i) an easterly flow that brings in air from northern Madagascar and Mozambique with two wind components which differ in their wind speed; (ii) a south-easterly pathway which contributes to air masses from the Indian ocean south of Madagascar that also comprises of fast and slow wind speed components; (iii) a southerly pathway that sends in speedy air masses from the Atlantic oceans round the tip of southern Africa; (iv) a northerly-north-easterly flow with air masses that originate from Zambia, Angola and the Congo basin (Congo air); and (v) the recirculation air masses which seem not to portray any season characteristics and changes year-by-year. The driving force behind these flows is attributed to the dynamics, size and intensity of the anticyclones associated with the sub-tropical high pressure belt, and the relatively low pressure systems over southern Africa (over south-east Angola and over the Mozambique Channel) reinforced by the low pressure belt associated with the Inter tropical convergence zone (ITCZ). The migration eastwards of the Atlantic Ocean and Indian Ocean high pressure systems is often accompanied by a “bud off” anticyclone from the Atlantic Ocean anticyclone than moves round the coast of southern Africa and sits over land. This development stirs the south-easterly and the fast southerly winds over Zimbabwe. A dipole of the Mozambique channel and the south-east Angola low pressure systems draws in the Congo air to northern Zimbabwe that

is an appendage of the ITCZ. The pressure patterns are sometimes distorted relatively low pressure over continental areas such that the air flow is mainly driven by differential heating giving rise to the recirculation air masses. In some case extensive surface heating of land masses produce extremely well developed heat low and a tropical easterly jet arises feeding an easterly air in northern Zimbabwe.