THE MEASUREMENT OF PLUME RISE AND DISPERSION BY YAG LASER

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ABSTRACT

A YAG lidar is designed to perform scanning techniques. The measurements of plume rise and dispersion have been made on smoke plume from a 150 meters stack of a steam power station. The lidar was set at a distance of about 850 meters from the stack and directed to the plume. The figures of "bent-over" were observed with a series of the lidar vertical scan, from which the plume rise heights, Δh, were measured. The data are compared with some existing formulae. The comparison of the measured values with Bosanquet's (1957) and Holland's (1953) are shown in Figs. 1 and 2. It seems that either of the two formulae overestimate the Δh. Briggs (1970) shows that a plume rise will be in proportion to the two-thirds power, while the measurements show the powers distribute between 0.34 and 0.61. The mean vertical spread of the plume, σ_z, can be estimated with segment vertical scans at constant horizontal direction.

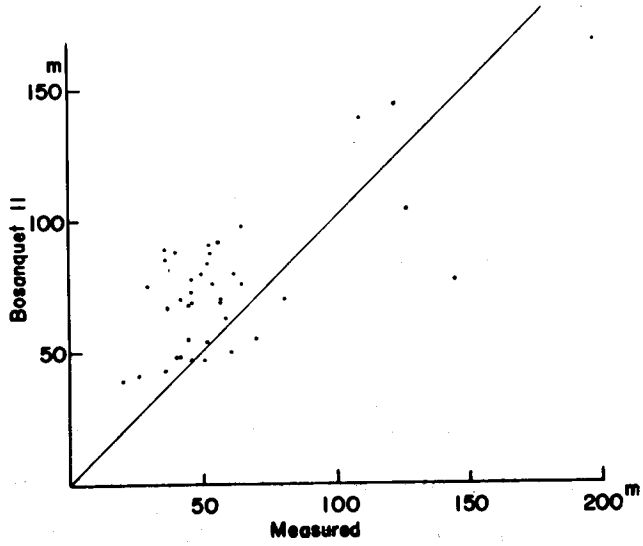

Fig. 1, The comparison of measured with calculated values after Bosanquet.

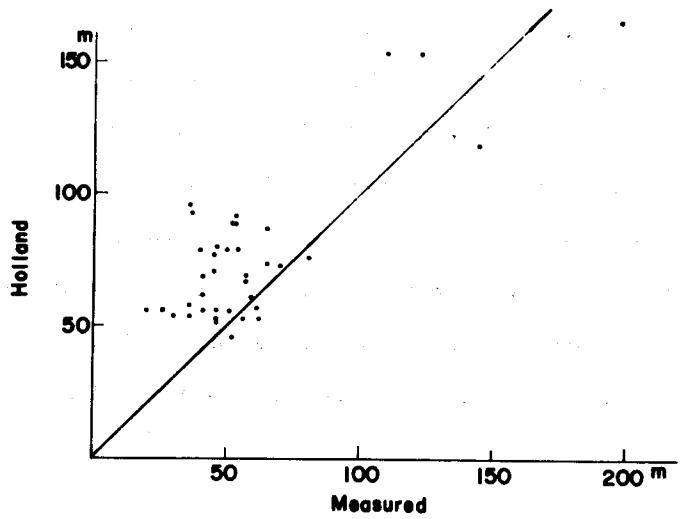

Fig. 2, The comparison of measured with calculated values after Holland.