smoke may be explained by the decrease of the surface tension of water.

Detailed experiments were carried out by one of us (K. Itô) regarding the effects of the rate of discharge, as well as the size and shape of the nozzle, upon the form of the jets, and the results will be published later in the Report of the Aeronautical Research Institute.

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Upper Air Temperatures and Humidities in the Indian Peninsula

SINCE October 1928, more or less regular ascents of sounding balloons have been carried out from Poona and Hyderabad (Deccan) with meteorographs of the Dines type manufactured at the Upper Air Observatory, Agra. The ascents at Hyderabad were made from

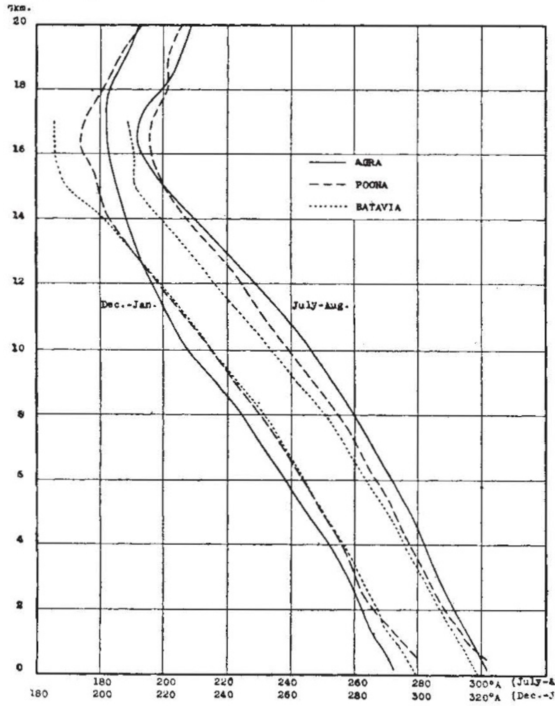

FIG. 1.—Upper air temperature over Agra, Poona, and Batavia.

the Nizamiah Observatory, Hyderabad, with the kind co-operation of its director. It may be of interest to summarise here some results of outstanding importance obtained as a result of these soundings.

(1) During the monsoon months, July and August, the atmosphere over the Deccan is invariably colder than that over Agra in northern India, up to a level of about 14 geodynamic kilometres—the maximum mean difference of temperature being 7° C. at a level of 10 gkm. Temperatures over Batavia in these months are lower still. The level of the tropopause in this season is about the same, or slightly lower, and its temperature higher in the Deccan than in northern India (Fig. 1). Considering the troposphere as a whole, the thermal equator over Indian longitudes lies over northern India at a latitude of about 25° N.

These results are specially interesting in view of the westerly to north-westerly movement of monsoon depressions. The normal upper winds are consistent with the temperature distribution.

During the months July-September, the relative humidity in the air over the Deccan generally shows a maximum (saturation) between 1·5 gkm. and 3·5 gkm., and is followed by a more or less rapid fall, extending over one or two kilometres, and at still higher levels by a rise. In about half the number of available records, the humidity falls off above 6-8 km., the fall being gradual. The decrease of humidity above the lower level of maximum humidity is sharper and larger during times of weak monsoon. It may be mentioned that the westerly winds of the monsoon give place to the easterlies of the inter-tropical circulation normally between 6 km. and 8 km.

(2) Conditions are markedly in contrast in the winter. In the period November-February, temperatures over northern India are lower than those over Poona up to 13 gkm., and above that level higher. Between 4 gkm. and 14 gkm., there is little difference between the temperatures over Batavia and Poona, but the tropopause is higher nearer the equator, and colder.

(3) The semi-permanent anticyclone in the upper air over the central parts of India during the months November-January shows itself in the temperatures over Poona as a well-marked region of small lapse-rate extending over 0·5-1 km., and starting at a level ranging from 2·5 km. to 3·5 km. The trajectories of air movement in the upper air show that the air below the inversion usually comes from the Punjab and northern Rajputana through east Central India and the Central Provinces; while above the inversion, the air supply is from a direction varying from north to west, and has, in general, a higher velocity. The air below the inversion is surface-heated continental air from higher latitudes, and has a high lapse-rate. As may be expected, there is a maximum of humidity at the top of the lower convective layer.

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Errors in Thermal Measurements

IN some recent investigations on adsorption [1] it seems to have been established that erroneous conclusions have been reached on account of errors unsuspected by the experimenters and arising from the time lag of thermometric apparatus. Workers with experience in thermal measurements are well aware of the possibility of such errors, and in particular the extreme care which must be exercised in the use of platinum resistance thermometers, more particularly when these are wound on insulating supports and enclosed in tubes. The application of such thermometers requires not only extreme care in avoiding thermometric forces in the circuit, but also in making certain that the very appreciable thermal lag is eliminated. Generally speaking, such thermometers are quite unsuitable for use when fairly rapid changes of temperature are involved, and in any case are best avoided, except by experienced workers. For practically all purposes, a properly chosen mercury thermometer is much more trustworthy.

Another source of error in such work, fully investigated by Prof. R. A. Millikan and by myself many years ago, is the impossibility of making any kind of cooling or heating corrections with time in the case of fine metal wire thermometers suspended in a gas in the proximity of large masses of metal or other conductors. The large interference in the temperature measurements with such apparatus, owing to radiation and conduction, cannot be eliminated by any method of extrapolation, even when a very rapid galvanometer,