

HEIGHTS OF TOPS OF CUMULONIMBUS
CLOUDS OVER SOUTHEAST ASIA

Puniah (1973) has presented an analysis of the frequency with which aircraft captains have reported cumulonimbus tops reaching various levels over Southeast Asia. He reports that only 2 per cent of tops exceeded 45,000 feet during the monsoon season and none during the pre-monsoon season.

As Puniah states, aircraft captains' reports may ^{not} be reliable when the cloud top is more than about 10,000 ft above the aircraft. Consequently

some tops estimated as being within 10,000 ft of the aircraft's height may in fact have been very much higher. Secondly, to use "more than 45,000 ft" as the highest class interval may mean the class is not recognized explicitly as including storms as high as 65,000 to 70,000 ft: measurements by other means show that such very tall storms are not uncommon over Southeast Asia.

For example, Mukherjee, Rakshit and Chaudhury (1972) have measured individual tops at heights upto 19 to 20 km (62,000-65,000 feet) using the radar at Dum Dum Airport, Calcutta and rightly point out that visible tops would be somewhat higher. Cornford and Spavins

(1973) have reported that over Northeast India during the pre-monsoon season of 1969 the highest cumulonimbus tops exceeded 60,000 ft on most days when measurements were made and that some tops exceeded 65,000 ft. These are believed to be reliable measurements: the size of their probable errors is discussed in some detail in the paper. Hill and Lewis (1974) have reported radar tops upto 21.4 km (70,000 ft) near Singapore and have given the frequencies of tops at various levels in that part of Southeast Asia.

Moore and Lewis (1973) have reported a top exceeding 17 km (56,000 ft) over the Indian Ocean near Gan, in the south of the Maldivic Islands.

It is important that forecasters and aircraft operators recognize that there is now no reasonable doubt that a few of the cumulonimbus over Southeast Asia penetrate the lower stratosphere and extend well above the flight levels of the first generation of supersonic airlines.

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