E1-03: Characteristics of the waves in the Easterlies over Sri Lanka

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Local weather prediction is still largely based on ground weather maps, but the interest of meteorologists has shifted to the weather maps of the middle and upper tropopause. At these altitudes the vast meander waves which play an important part in surface weather processes are generated. Most of them are shallow waves travelling from east to west within the tropical easterly current appearing fairly regularly but especially in the undisturbed region above the sea; these are called "Easterly waves". Among the weather systems which bring weather, rain in particular, to the tropical areas, Easterly waves play an important role. Characteristics of such waves should be known for short and long range weather predictions based on them.

Daily rainfall and upper wind (radar and pilot) data for 9 Winter (North-East) monsoon periods (about 30 months) were studied. Time series analyses of upper wind data at Colombo were carried out to detect the instances with crests of waves in the easterlies over Colombo. Wind data up to 6000 m observed at Colombo were analysed to find the wave lengths and the time taken by them to pass over Sri Lanka. The daily rainfall figures recorded at 10 meteorological stations during the same durations were studied. The rainfall figures on, one day after and 2 days after the days with wave crests over Colombo were checked to see whether the significant rainfall was caused by the easterly waves. Only rainfall figures which were more than the seasonal average daily rainfall were taken into consideration. The correlation of the significant daily rainfall on, one day after and 2 days after the day with wave crests at each level 1500, 2100, 3000, 4000, 5000 and 6000 m above sea level were checked.

The significant rainfall during the winter monsoon season was related to the passage of waves of the easterlies over Sri Lanka. The easterly waves at atmospheric levels below 5000m seem to be very important in producing rains. The probability of producing rain on the same day by easterly waves at about 1500, 2100 and 4000 m is high. The probabilities of producing rain on the following day by easterly waves at about 1500 2100, 3000 and 5000 m and producing rain 2 days after by easterly waves at about 1500, 3000, and 4000 m are high.

The speed of passage of waves in the easterlies over Sri Lanka seems to be a little faster. Easterly waves at many levels below 6000 m pass over Sri Lanka in one day. The periodicity of the waves is about 14 days at 1500 m, 8 days at 2100 m, 6 days at 3000 m, 8 days at 4000 m, 6 days at 5000 m and 6 days at 6000 m.

The upper wind analyses can be effectively used as tools in preparation of short and medium range weather forecasts during the Winter monsoon seasons. In particular, pilot and radar wind observations below 5000 m will be helpful in forecasting significant rainfall caused by the waves in the easterlies.

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