CHARACTERIZATION OF MELTING LEVEL CLOUDS OVER THE TROPICAL WESTERN PACIFIC WARM POOL

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1. OBJECTIVES

- Define the frequency of occurrence of thin cloud layers at the melting level at the Manus and Nauru ARM sites
- Define the characteristics of these cloud systems including their diurnal cycle, extent, phase and radiative forcing

2. SELECTION CRITERIA

- Maximum of 3 hours of missing data from the MMCR or MPL on a given day.
- ARSCL cloud base height between 4 and 6 km
- ARSCL cloud thickness less than 1 km

3. DATA AVAILABILITY

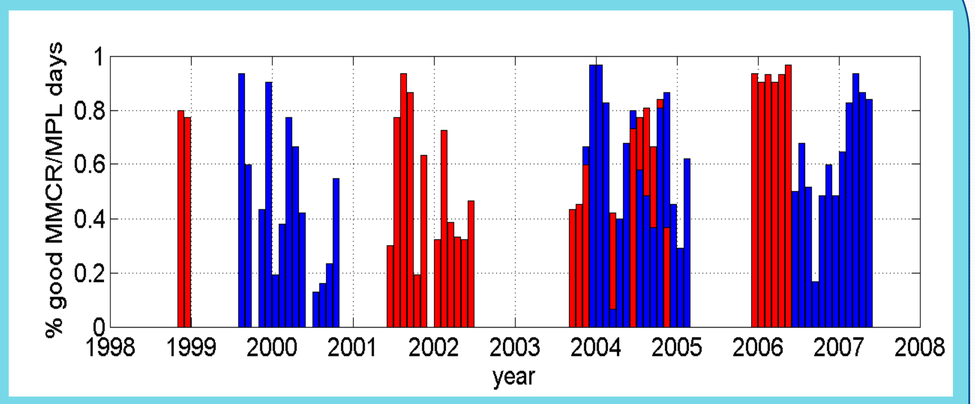


Figure 1 – Fraction of days where ARSCL data is available (less than 3 hours missing data per day) per month.
Blue = Manus, Red = Nauru

4. FREQUENCY OF OCCURRENCE

Total frequency of occurrence at Manus = 10.5 %
Total frequency of occurrence at Nauru = 7.1 %

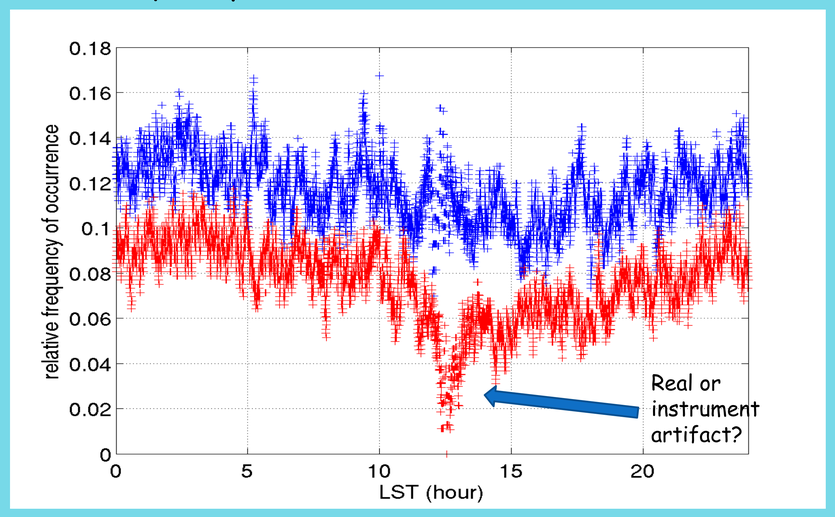


Figure 2 – Diurnal cycle of the frequency of occurrence of thin clouds at the melting layer.
Blue = Manus, Red = Nauru

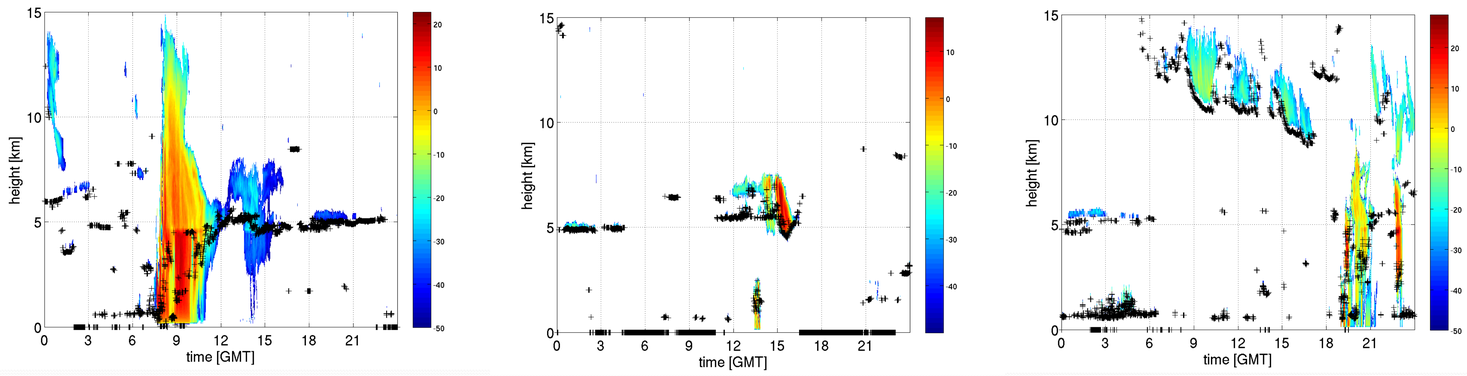
SUMMARY

• Thin clouds occur near the freezing level at a frequency of 10.5% at Manus and 7.1% at Nauru
• These clouds may have horizontal extents on the order of 1^0x1^0 and larger.
• These clouds may be liquid, ice or mixed-phase.
• These clouds often have a noticeable impact on surface radiative forcing.

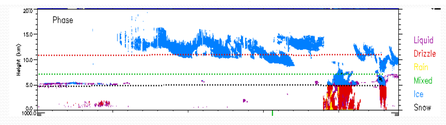
5. "GOLDEN" CASES

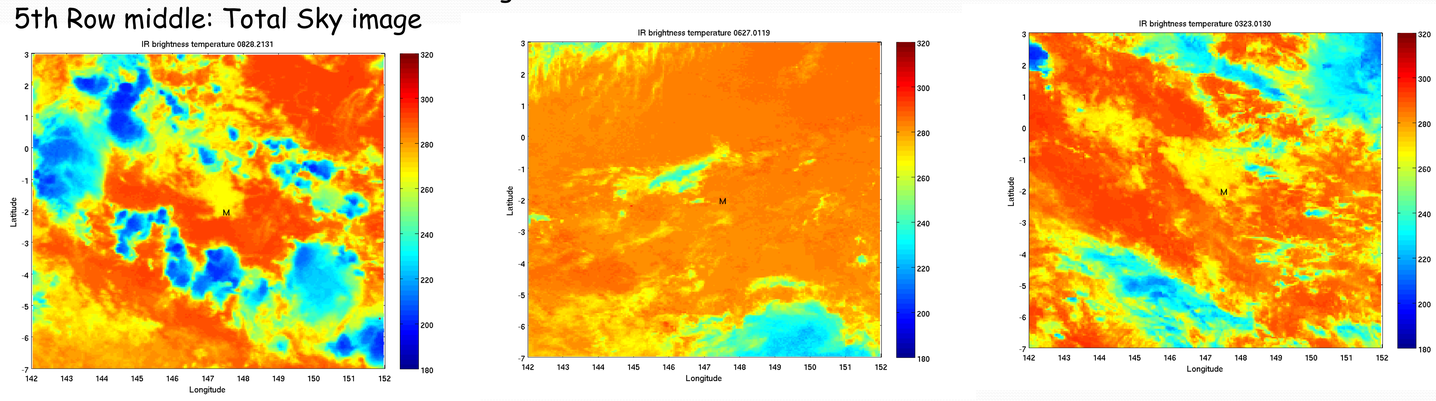
•. Thin clouds may be liquid, mixed or ice phase.
• Horizontal extent is often greater than 1^0X1^0
• Radiative forcing is not insignificant

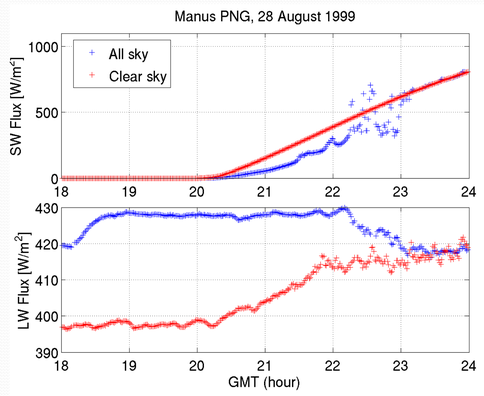
28 August 1999 | 27 June 2004 | 23 March 2007



Top Row: ARSCL Best Estimate Reflectivity
2nd Row: Cloud phase based on Shupe et al. algorithm
3rd Row: Satellite observed IR brightness temperature
4th Row: Surface radiative cloud forcing
5th Row middle: Total Sky image







23 March 2007 0140 GMT