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VERTICAL CHARACTERISTICS OF OCIANIC BOUNDARY LAYER OVER PALAU

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Abstract:

The Atmospheric Boundary Layer (ABL) above ground and sea is quite a cry because of the various powerful and changing signs of the state. The structure and characteristics of ABL above sea level, commonly referred to as the Marine Boundary Layer (MBL) play an important role in controlling surface energy, humidity fluxes and in controlling the convective transfer of energy moisture of the free atmosphere. It is imperative for coupled ocean-atmosphere modelling and numerical weather prediction. PALAU (Pacific Area Long-term Atmospheric observation for the Understanding of climate change) over Aimeliik state of Babeldaob Island (7.45 ° N; 134.47 ° E) of the Republic of Palau field study can advances our knowledge of marine stratocumulus by providing information on the surface layer and cloud structure, well their diurnal cycle.

An important parameter of the MBL is the height of the MBL which is controlled by the location constraints and the placement on the top of the MBL and the advertising areas. The height of the MBL has gradually become known as playing an important role in tense air structure, as well as the integration of processes into different spatial and temporal scales.The MBL height and its dynamics, which governs ocean-atmosphere interaction, has been the main subject for coupled acean-atmosphere modelling and numerical weather prediction. Further, the MBL dynamics influence move, long times and diurnal and seasonal cycles of aerosols and particulate matters. The marine aerosol particles affect radiation budget and cloud process in a complicated manner because of their complex vertical variability. Therefore, a detailed view of the MBL variability is important in improving the modeling and simulation of navigation processes, cloud development and precipitation.

Profiler Radar has proven to be an excellent tool for studying the structures that reflect and the depth of the maritime layer with a good temporal and vertical resolution. A new algorithm for determining the height of the MBL has been developed and tested for its effectiveness using Radiosonde, ceilometers and WRR views on the islands of Palau in the Tropical Western Pacific Ocean. The viewing results obtained from our algorithm show a good agreement with the MBL measured in the standard order of height. Using a new algorithm to detect MBL heights, evolving evolution and its seasonal variations have been investigated. The height of the MBL indicates the variability of the shift and its magnitude in the afternoon and a slight decrease to reach the night. The seasonal variation of the MBL peak is large in April and smaller in September. The impact of the sun's rays and low air pressure on the BML is being investigated. Clearly, the upper rays of the sun are responsible for the high elevation of the MBL in the eastern rainy season and the release of cold air from the surrounding ocean atmosphere overlooking the MBL heights during the western rainy season.

Introduction

The surface layer of the atmosphere (ABL) above land and sea is very different due to the different dynamic and changing signals of both places. The structure and characteristics of ABL above sea level, commonly referred to as the Marine Boundary Layer (MBL) play an important role in controlling surface energy, humidity and in controlling the convective transfer of energy moisture to the free atmosphere. It is imperative for coupled ocean- atmosphere modeling and numerical weather prediction. Research on MBL dynamics, structure and cloudradioactive processes has long been hampered by a lack of suitable observing systems for the oceans. Moreover, the open ocean measurements of MBL structure are generally difficult due to unavailability of a stable platform over the oceanic surface.

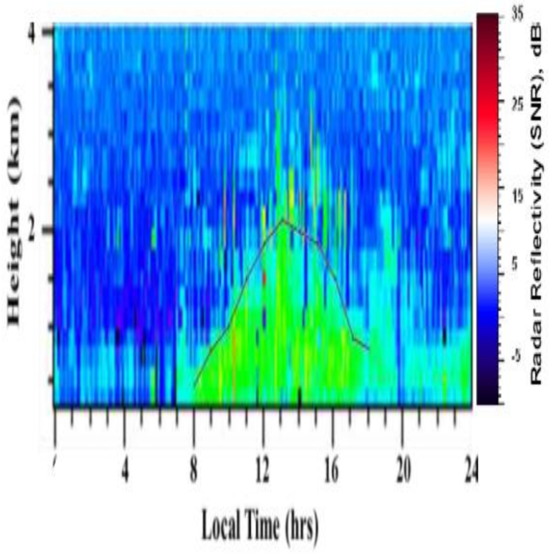
Data-base and Methodology

Data-base and Methodology in this study, observations from wind profile Rader, Ceilometer, Disdrometer/Micro Rain Rader, Radiosonde and surface meteorological data collected during four years 2003 to 2007 at Aimeliik, Palau are used to explore the variability of the oceanic boundary layer characteristics over Palau in the Pacific Ocean during Eastern and Western monsoon. Due to the focus on describing the vertical atmospheric structure of MBL in the context of aerosol (Ventilation Confficient), clouds and precipitation, aforesaid instrumentation is used deduce the statistics.

Vertical structure of oceanic boundary layer during dry convective days

an important parameter of the MBL is the height of the MBL which is controlled by the local constraint and the maximum placement of the MBL and advertising areas (Klein and Harmann 1993; Stevens et. 2003). The height of the MBL has gradually become known as an important role in the formation of the turbulence surface, and the interaction of processes in different spatial and temporal scales (Klosel and Albrecht 1989; Sempreviva and Gryning, 2000; Larsen and Sempreviva 2008). The MABL height and its dynamics, which governs ocean-atmosphere interaction, the main subject for coupled ocean-atmosphere modelling and statistical weather prediction (Hong and Pan 1996; Beljaars, Viterbo 1998). In addition, the strength of the MBL influences transportation, life expectancy, and death cycles of aerosols and certain issues.

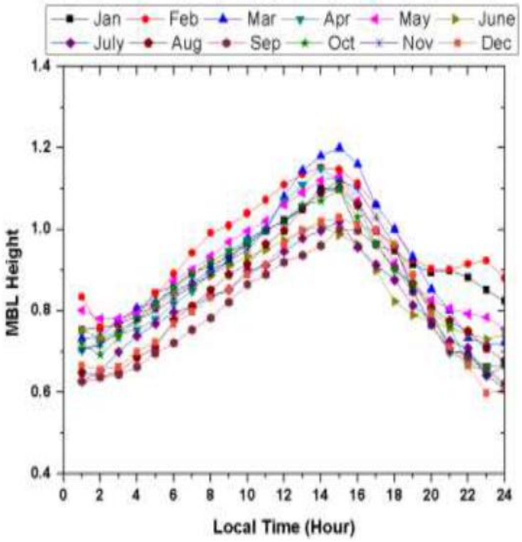
Sailors on this study show an example of a time radar reflectivity at July 2, 2003. The solid line represents an average MBL hour length based on radar display during local time from 0800 to 1800 on the same day. When the amount of incoming sunlight increases in the morning hours, then the height of the MBL also increases and reaches the peak in the afternoon. When the sun rises, the available energy is small, so the heat dissipation is driven by heat and the direct mixing is reduced and therefore the MBL length is reduced.



Time height profile of radar reflectivity during 02nd July 2003over Palau. The solid line represents the hourly averaged MBL height derived from radar reflectivity.

Monthly and Annual average Variability of Oceanic Boundary Layer height

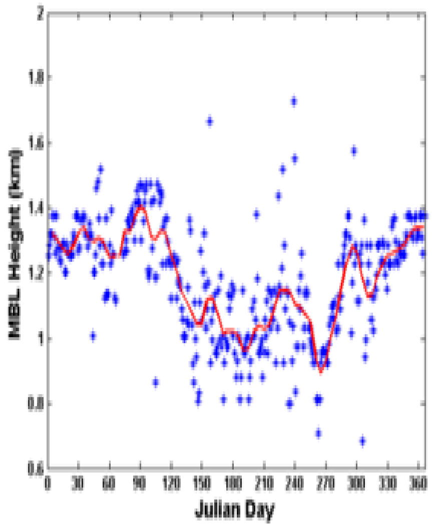
This figure shows the variability of the monthly change in the MBL elevation for 2003 to 2007. The months of February, March to April show the longest, highest MBL heights during in which average morning hours are more and the months August and September the lowest MBL height, corresponding to the lowest average sunshine hours.



Monthly-averaged diurnal MBL cycle for the period April, 2003 to March, 2007.

Monthly and Annual average Variability of Oceanic Boundary Layer height

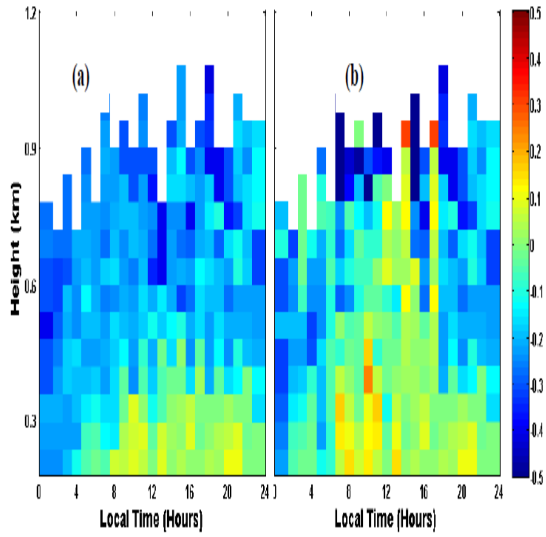
Time the full daily MBL height, such as the Julian day job of the year, reflects individual daily values and a 5 day running smoother description. The slowdown of the MBL is near or near its peak in April, before the onset of the western rainy season and then decline later until July, rising sharply and declining and reaching its lowest prices in September. The height of the MBL returns slightly to the second but lower level at the end of the western rainy season, and then increases again.



Time series of maximum daily boundary-layer depths (km) as a function of the Julian day of the year (blue stars). The red line is the smoothed interpolation of the data.

Monday means solar radiation (maximum number) and multi-hour solar radiation

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean SR	194.9	206.3	212.3	232.2	178	198.3	186.9	213.4	214	210.1	198.9	189.5
Max SR	832.9	814.7	804.3	860.2	684.6	745.7	743	797.2	814.1	845.4	796.6	710.5



Diurnal mean time-height cross section of virtual temperature advection for (a) Easterly (b) Westerly monsoon period.

Seasonal variation of MBL elevation above Palau between 2003 to 2007

Sl. No.	Season/Climate	Months	Mean noon time MBL height (km)
1.	Easterly monsoon	Late December to April	1.28 ± 0.26
2.	Easterly to Westerly monsoon Transition	May and June	1.11 ± 0.17
3.	Westerly monsoon	July to October	1.19 ± 0.21
4.	Westerly to Easterly monsoon Transition	November to Early December	0.97 ± 0.16

Results and conclusion

Profiler Rader proved to be an excellent tool for studying the associated structures and maritime spectrum (MBL)) depth with good interval (~ 10 min) and direct adjustment (60 m). A new algorithm for determining the height of the MBL has been developed and tested for its performance using Radiosonde, ceilometers and WPR views over the Palau islands in the Tropical Western Pacific Ocean. The viewing results obtained from our algorithm show a good agreement with the MBL measured in the standard order of height. Using a new algorithm for finding high MBL, evolving evolution and its seasonal variability has been investigated. The height of the MBL indicates a variation in its change in size in the afternoon and a slight decrease reaching its minimum at night. MBL Height seasonal variations show peak in April and low in September. The impact of solar radiation and the promotion of low air temperature over MBL lengths are being investigated. Clearly, the upper rays of the sun are responsible for the high elevation of the MBL during the eastern rainy season and the cooling of the air from the surrounding ocean atmosphere toward the shallow MBL length during the western rainy season.

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