Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

MIS29-P01 会場:コンベンションホール 時間:5 月 24 日 17:15-18:30

Solar activity and latitude dependence of plasma bubble occurrence in South-East Asia

Solar activity and latitude dependence of plasma bubble occurrence in South-East Asia

Kornyanat Watthanasangmechai[1*], Takuya Tsugawa[2], Michi Nishioka[2], Akinori Saito[3], Mamoru Yamamoto[1]
WATTHANASANGMECHAI, Kornyanat[1*], Takuya Tsugawa[2], NISHIOKA, Michi[2], SAITO, Akinori[3], YAMAMOTO, Mamoru[1]

[1]Research Institute for Sustainable Humanosphere (RISH), Kyoto University, Japan, [2]National Institute of Information and Communications Technology (NICT), Japan, [3]Department of Geophysics, Graduate School of Science, Kyoto University, Japan
[1]Research Institute for Sustainable Humanosphere (RISH), Kyoto University, Japan, [2]National Institute of Information and Communications Technology (NICT), Japan, [3]Department of Geophysics, Graduate School of Science, Kyoto University, Japan

To reveal the solar activity and latitude dependence of plasma bubble occurrence, a statistical study of the rate of TEC change index (ROTI) and the radio wave scintillation was made by using GPS and beacon receiver networks in the South-East Asia (SEA) region. It is known that the growth rate of plasma bubble is large if the ionosphere is high in altitude. The more it grows the more small-scale fluctuations inside the plasma bubble affects radio signal from satellites to ground-based receivers. To clarify the altitudinal structure of the plasma bubble, and its solar activity dependence, the plasma bubble height on the dip equator (HODE) was studied using GPS and beacon receiver networks. The receivers were distributed from 20N to 10S and 98E to 109E in the geographic coordinates. The data from 2008 to 2011 are used. During this period, the solar activity increased gradually. Plasma bubble was frequently observed during the equinox seasons. In 2010 and 2011, which is in relatively high solar activity period, plasma bubble was detected at all stations from 20N to 10S. In 2009, it was detected at latitudes lower than 12N. It was the case in the September equinox in 2008. No plasma bubble was observed in the March equinox in 2008. These results indicate that the height of the plasma bubble on the dip equator depends on the solar activity. During the low solar activity period, plasma bubble cannot raise up to high altitude. In addition to these radio receivers' data, ionosondes were used to detect the occurrence of the equatorial spread-F, and the Equatorial Atmospheric Radar was used to capture the shape of the plasma bubble.

キーワード: Plasma bubble, TEC, ROTI, South-East Asia, Digital Beacon Receiver (DGBR), Equatorial Atmosphere Radar (EAR)
Keywords: Plasma bubble, TEC, ROTI, South-East Asia, Digital Beacon Receiver (DGBR), Equatorial Atmosphere Radar (EAR)

Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

MIS29-P02 会場:コンベンションホール 時間:5 月 24 日 17:15-18:30

赤道域対流圏界面領域オゾンのライダーによる高分解能観測
High-resolution lidar measurements of ozone profiles in the equatorial tropopause region

長澤 親生 [1], 阿保 真 [1*], 柴田 泰邦 [1]
NAGASAWA, Chikao[1], ABO, Makoto[1*], SHIBATA, Yasukuni[1]

[1] 首都大学東京
[1]Tokyo Metropolitan University

成層圏オゾンのグローバル分布や子午面循環の概要は、衛星観測により明らかになりつつあるが、衛星観測により得られるものは時間的・空間的に平均されたものである。しかし、地球上でもっともオゾン生成量が多く、かつ子午面循環の起点であり、また対流圏からの積雲対流による物質輸送が大きい、赤道上空の対流圏界面付近のオゾン濃度微細構造を捉えるには鉛直分解能が足りない。このため, オゾンゾンデによる観測がキャンペーン的に行われているが、その頻度は少ない。成層圏オゾン濃度観測用のライダーは中緯度から高緯度にかけて複数設置されており、高分解能・高精度の観測を行っているが、低緯度では観測例に乏しい。

我々は赤道直下のインドネシア・コトタバンに高機能ライダーを設置し、対流圏から中間圏界面までの広い高度領域の観測を現在まで継続して行っている。このライダーによる観測から赤道域成層圏に関しては、成層圏エアロゾルの準２年変動（QBO）などの観測に成功している [1] 。対流圏に関しては雲と温度プロファイル、並びに赤道大気レーダーの鉛直風データから雲物理に関する議論ができるが、成層圏では定量的な議論ができていない。ライダーによるオゾン濃度の測定には、オゾンの吸収を利用した、差分吸収法（DIAL）が用いられている。DIAL による中緯度対流圏のオゾン連続観測結果では対流圏界面を通り成層圏から対流圏へオゾンが輸送されている様子がはっきりと見られる [2] 。赤道域ではこれとは逆に対流圏から成層圏への輸送があると考えられているが、直接的な観測は未だ無い。

そこで我々は、赤道直下インドネシア・コトタバンに既設の高機能ライダーをベースに、新たに下部成層圏オゾン濃度の高度分布が観測可能な DIAL 機能を付加することにより、世界で初めてとなる、赤道域下部成層圏のオゾン濃度高度分布の、高時間・高度分解能測定を行い、赤道成層圏オゾン層の詳細な解析を試みる研究をスタートした。現在インドネシア・コトタバンへの新たな観測コンテナの設置、並びに国内での試験観測の準備を行っている。

本研究は科学研究費補助金（基盤研究 (Ｂ) 233401043）により行われている。

参考文献

(1) 阿保他, 日本リモートセンシング学会誌, Vol.26, No.1, pp.45-51, 2006.
(2) M. Nakazato et al., Appl. Opt. 46, 2269-2279, 2007.

キーワード: オゾン, ライダー, 赤道域, 対流圏界面
Keywords: ozone, lidar, equatorial region, trpopause

Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

MIS29-P03 会場:コンベンションホール 時間:5 月 24 日 17:15-18:30

インドネシアにおける E 領域沿磁力線不規則構造の VHF レーダー観測
Seasonal and local time variations of E-region field-aligned irregularities observed with 30.8-MHz radar in Indonesia

大塚 雄一[1*]
OTSUKA, Yuichi[1*]

[1] 名古屋大学太陽地球環境研究所
[1]Solar-Terrestrial Environment Laboratory, Nagoya University

A VHF backscatter radar with operating frequency 30.8 MHz has been operated at Kototabang, Indonesia, since February 2006. We analyzed E-region field-aligned irregularities (FAIs) observed by this radar through a year of 2007, and found that the E-region FAI observed at Kototabang can be classified into two groups. One is ”descending FAI”. Altitude of the FAI echo region descends with time from 102 km to 98 km altitude during 0700-1000 and 1900-0000 LT in June solstice season. The other is ”low-altitude FAI”, which is observed in an altitude range from 88 to 94 km mainly during nighttime. The observed Doppler velocity show distinct local time and altitude dependence. The seasonally-averaged zonal velocity above (below) approximately 94 km altitude is westward (eastward) during daytime and eastward (westward) during nighttime. Meridional/vertical velocity perpendicular to the geomagnetic fields is upward during daytime and downward during nighttime. The direction of the FAI velocity above approximately 94 km altitude is consistent with that of the background ExB plasma drifts reported previously.

キーワード: 沿磁力線不規則構造, 電離圏, VHF レーダー, インドネシア
Keywords: FAI, ionosphere, VHF radar, Indonesia

Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

MIS29-P04 会場:コンベンションホール 時間:5 月 24 日 17:15-18:30

赤道大気レーダーによる熱帯大気のレンジイメージング観測
Range imaging observation of the equatorial atmosphere by the Equatorial Atmosphere Radar

山本 真之 [1*], 橋口 浩之 [1], 山本 衛 [1], 深尾 昌一郎 [2]
YAMAMOTO, Masayuki[1*], HASHIGUCHI, Hiroyuki[1], YAMAMOTO, Mamoru[1], FUKAO, Shoichiro[2]

[1] 京都大学生存圏研究所, [2] 福井工業大学
[1]RISH, Kyoto University, [2]Fukui University of Technology

レンジイメージングは、多周波送信によりレーダーのレンジ分解能を向上させる技術である。赤道大気レーダーにおけるレンジイメージング観測では、46.50, 46.75, 47.00. 47.25, 47.50 MHz の 5 つの搬送周波数を送信毎に切り替える。オフライン信号処理では、送信パルス幅で決定されるレンジ分解能より短いレンジ間隔を持つサブレンジゲートのそれぞれにおいて、搬送周波数毎に得られた受信信号時系列を適応信号処理により重み付け加算する。この重み付け加算により、従来は EAR の送信パルス幅（通常は 1us：150m のレンジ分解能）で決定されていたレンジ分解能を、最大で数 10m 程度にまで高めることが可能である。適応信号処理としては、反復がない簡潔な計算と高い精度を両立する Capon 法を用いている。レンジ分解能の向上により、大気乱流の薄層構造・大気不安定波の詳細構造を解像することが可能となる。講演では、EAR のレンジイメージング処理の概要を述べるとともに、熱帯対流圏界層におけるケルビン－ヘルムホルツ不安定の観測結果を示す。

キーワード: 赤道大気レーダー, 大気乱流, レンジイメージング, 熱帯大気
Keywords: Equatorial Atmosphere Radar, atmospheric turbulence, range imaging, equatorial atmosphere

Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

MIS29-P05 会場:コンベンションホール 時間:5 月 24 日 17:15-18:30

小スケール乱流検出用 UHF 帯大気レーダーにおける信号処理ソフトウェアの開発
Development of Signal Processing Software for New Turbulence Profiler Radar

Noor Hafizah Binti Abdul Aziz[1], 山本 真之 [1], 藤田 俊之 [1], 橋口 浩之 [1], 山本 衛 [1*]
NOOR HAFIZAH, Binti Abdul Aziz[1], YAMAMOTO, Masayuki[1], FUJITA, Toshiyuki[1], HASHIGUCHI, Hiroyuki[1], YAMAMOTO, Mamoru[1*]

[1] 京都大学生存圏研究所
[1]RISH, Kyoto University

Radar wind profiler is a useful means to measure altitude profiles of vertical and horizontal wind velocities with high time and vertical resolutions. Range imaging (RIM) is a technique that improves range resolution down to several ten meters by using frequency diversity and adaptive signal processing. RIM is useful for resolving fine-scale structure of atmospheric instability such as Kelvin-Helmholtz billows. Therefore RIM can be used for realizing new turbulence profiler radar. Further, oversampling capability is necessary to avoid the range weighting effects caused by finite transmitted pulse width. In order to develop an algorithm that detects small-scale turbulence automatically, we are developing a software using Python with SciPy and NumPy libraries.

Data collected by USRP2 (Universal Software Radio Peripheral 2) and LQ7 transmission system will get through the online signal processing which executes ranging, pulse decoding and coherent integration. In offline signal processing, clutter signal is removed using DC removal (using scipy.fftshift and scipy.fftpack) and high-pass filtering by running mean (using numpy.mean). In spectral parameter estimation, the following procedures are taken. (i) Noise level calculation, (ii) 5 points running mean to the Doppler spectra, (iii) peak search, (iv) determination of continuous Doppler velocity range where received power is greater than threshold, and (v) spectral parameter estimation using the moment method. In the all procedures, numpy.where and numpy.max are used. In the presentation, we show detailed measurement results.

This research is supported by Adaptable and Seamless Technology Transfer Program through Target-Driven R&D (A-STEP) Exploratory Research (Research No. AS232Z00186A).

キーワード: レーダー, 大気乱流
Keywords: radar, turbulence

Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

MIS29-P06 会場:コンベンションホール 時間:5 月 24 日 17:15-18:30

1.3-GHz ウィンドプロファイラネットワーク観測に基づくインドネシア海洋大陸における降水日変化の特徴
Characteristics of diurnal precipitation cycle over Indonesia using 1.3-GHz wind profiling radar network

橋口 浩之 [1*], 田畑悦和 [1], 山本 真之 [1], 山本 衛 [1], 山中 大学 [2], 森 修一 [2], 柴垣佳明 [3], 下舞豊志 [4], Fadli Syamsudin[5], Timbul Manik[6], Wahid Heryanto[6], Moch Ichsan[6], Ahmad Mudjahidin[7]
HASHIGUCHI, Hiroyuki[1*], Yoshikazu Tabata[1], YAMAMOTO, Masayuki[1], YAMAMOTO, Mamoru[1], YAMANAKA, Manabu D.[2], MORI, Shuichi[2], Yoshiaki Shibagaki[3], Toyoshi Shomomai[4], Fadli Syamsudin[5], Timbul Manik[6], Wahid Heryanto[6], Moch Ichsan[6], Ahmad Mudjahidin[7]

[1] 京都大学生存圏研究所, [2] 海洋研究開発機構, [3] 大阪電気通信大学, [4] 島根大学総合理工学部, [5]Agency for the Assessment and Application of Technology (BPPT), Indonesia, [6]National Institute of Aeronautics and Space (LAPAN), Indonesia, [7]Meteorological, Climatological and Geophysical Agency (BMKG), Indonesia
[1]Research Institute for Sustainable Humanosphere (RISH), Kyoto University, [2]Japan Agency for Marine-Earth Science and Technology (JAMSTEC), [3]Osaka Electro-Communication University, [4]Faculty of Science and Engineering, Shimane University, [5]Agency for the Assessment and Application of Technology (BPPT), Indonesia, [6]National Institute of Aeronautics and Space (LAPAN), Indonesia, [7]Meteorological, Climatological and Geophysical Agency (BMKG), Indonesia

海洋大陸における降水は日変化が卓越することが知られているが、海洋大陸は複雑な地形をしており、降水日変化は地域ごとに多種多様である。また、降水日変化の中で対流性/層状性の分類は潜熱加熱の鉛直プロファイルを知るためにも重要である。従来観測網の整備が遅れていた海洋大陸において地球観測システム構築推進プラン「海大陸レーダーネットワーク構築」により、カリマンタン島の西海岸の平原地帯にあるポンティアナ (109.37E, 0.00S)、スラウェシ島の北東に伸びる半島の先端に位置するマナド (124.92E, 1.55N)、パプア島の 100-200km ほど北方沖にあるビアク島 (136.10E, 1.18S) の、それぞれ異なった地理的特徴を持つ場所に 1.3-GHz ウィンドプロファイラ (WPR) が設置され、連続観測が行われている。また、各サイトには地上雨量計も整備され降雨をモニタリングしている。

WPR 等による 3 年強 (マナドのみ 2 年弱) の観測データから、各地点における降水日変化及びそれに関連する諸現象の特徴について調べた。WPR で観測された降水粒子の落下速度の鉛直プロファイルから、Williams et al.(1995, JTech) によって提案されたアルゴリズムを用いて、降水雲タイプの分類を行った。WPR・雨量計観測に基づいた降水日変化の特徴について、午後の早い時間帯における深い対流性降雨に伴う降水ピークの特徴は 3 地点で共通しているが、ポンティアナでのみ対流性降雨の後に層状性降雨への移行が見られ、またビアクでは午前中に降水頻度が高い特徴があった。午後の降水について、気象衛星による雲頂分布観測から、マナドとビアクは水平スケール数 10km の雲システムによりもたらされているのに対して、ポンティアナは数 100km の雲システムによってもたらされていた。1998-2008 年の 11 年間分の TRMM 降雨レーダーデータを 0.1 度・1 時間の分解能で処理し、マナドとビアクでの午後の降水ピークは半島の陸域や島での特有の現象であった。また、ポンティアナにおける午後の降水についてより詳細に調べたところ、個々の雲システムは対流圏中層の風によって移動しており、プルームによって下層の水蒸気が上方に輸送されていた。

各地点における降水日変化の特徴をもたらす原因について考察した。WPR で観測された水平風から、ポンティアナ、マナド、ビアクではそれぞれ下層ではカリマンタン島、スラウェシ島、ニューギニア島の海陸風が卓越し、特にビアクでは陸風が午前中の降水に重要な役割を果たしていた。ビアクでは混合層の発達は弱いが、マナドではポンティアナと同程度の発達が見られ、3 地点とも強い上昇流の頻度は日中に高く、この上昇流が午後の降水に影響を及ぼしている可能性がある。降水日変化の季節内変動による影響について、3 地点とも午後の降水ピークは季節内変動に依らず、季節内変動活発期に層状性降雨、特にビアクの午前中の降雨が卓越する。本研究の結果と先行研究の結果を総合すると、熱帯の降水日変化において陸塊の大きさが午後の降水ピークに影響を及ぼしていると考えられる。すなわち陸塊の水平スケールが数 km 以下では降水ピークは明瞭でない、数 10km スケールでは降水ピークは明瞭であるもののその後組織化されない、数 100km スケールでは降水ピークも明瞭で組織化されてメソスケール対流システムを構成すると考えられる。

キーワード: 海洋大陸, 降水, 日変化, ウィンドプロファイラ
Keywords: Maritime Continent, Precipitation, Diurnal variation, Wind Profiler

Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

MIS29-P07 会場:コンベンションホール 時間:5 月 24 日 17:15-18:30

Xバンドドップラーレーダー観測で得られたインドネシア山岳域の降雨に関する研究
Study on mountainous enhancement to the precipitation systems in Indonesia by using an X-band Doppler radar

ハルジュパ ウェンディ[1*], 下舞 豊志[2], 古津年章[2]
HARJUPA, Wendi[1*], SHIMOMAI, Toyoshi[2], Toshiaki Kozu[2]

[1] 島根大学大学院総合理工学研究科, [2] 島根大学総合理工学部
[1]Inderdisciplinary graduate school of science and engineering, Shimane University, [2]Inderdisciplinary faculty of science and engineering, Shimane University

West Sumatera is located in the western part of Sumatera Island. This region is facing directly to the Indian Ocean. West Sumatera has a complex topography which is including mountainous areas, particularly in the area near Bukit Barisan. Heavy rain occurs frequently in this region. Some studies have suggested this extreme event was caused by orographic rain, the amount of precipitation that forced to deposit due to mountain blockage.

The purpose of this study is to figure out the behavior of orographic precipitation in West Sumatera. The data of X band doppler (XDR) radar will be employed. The XDR was installed at Sungai Puar (0.36_S, 100.41_E, 1121 m above mean sea level), located 20 km to the south-southeast of the EAR site at Kototabang (0.20_S, 100.32_E). The XDR collected three-dimensional reflectivity and Doppler velocity data every 4 min, through a series of conical scans with antenna elevation angles from 0.6 degree to 40 degree. The observation range of the XDR is 83 km in radius (Kawashima et al., 2006).

The data obtained during 10-22 April, 2004, was chosen for this study. The results shows that strong precipitation occurred at some high altitude areas. The temporal variability of precipitation shows that heavy rainfall occurs frequently in the afernoon.

キーワード: レーダー, 地形性, 降雨
Keywords: radar, orographic, precipitation, enhancement

Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

MIS29-P08 会場:コンベンションホール 時間:5 月 24 日 17:15-18:30

下部対流圏レーダーで観測された大気境界層の平均像と季節変動について
Averaged images and seasonal variation of atmospheric boundary layer observed by Lower Troposphere Radar

中城 智之 [1*], 橋口 浩之 [2], 山本 真之 [2], 山中 大学 [3], 深尾 昌一郎 [1]
NAKAJO, Tomoyuki[1*], HASHIGUCHI, Hiroyuki[2], YAMAMOTO, Masayuki[2], YAMANAKA, Manabu D.[3], FUKAO, Shoichiro[1]

[1] 福井工業大学　電気電子情報工学科, [2] 京都大学生存圏研究所, [3] 海洋研究開発機構地球環境観測研究センター／神戸大学大学院理学研究科
[1]Department of Erectrical, Electronic and Computer Engineering, Fukui University of Technology, [2]Research Institute for Sustainable Humanosphere, Kyoto University, [3]Institute of Observational Research for Global Change, Japan Agency for Marine-Earth Science and Tec

The atmospheric boundary layer (ABL) is defined as an atmospheric layer in which the turbulence flow generated by the effects of friction of the ground dominates. ABL is one of the most important atmospheric layers that has direct influence on our life, and has the different feature in each region by topographic effects. Therefore, it is very important to measure the atmospheric motion of ABL in each region, however, the atmospheric motion of ABL has not been fully investigated because of its immense complexity.

One of powerful tools for exploring ABL is Lower Troposphere Radar (LTR) developed by Kyoto University. LTR radiates the pulse-modulated radio wave with the center frequency of 1.35GHz and can detect the turbulence with spatial scale of about 10 cm. Based on the information of echo power and Doppler shift of received signal, we can know the turbulence structure constant and back ground 3 dimensions wind velocity from a few hundred meters to about 10 km in altitude, respectively. In addition, the spectral width of received signals gives us the information of intensity of vorticity. The range resolution which is decided by the pulse width of radio wave is a few hundred meters and the temporal resolution is a few minutes. There is no other observing tool which can realize so highly resolved observation of ABL.

We analyzed LTR data obtained at Shigaraki MU observatory in Japan from 2000 to 2006. In order to investigate the averaged images of ABL under clear air condition, the daily average of wind velocity, echo power and spectral width were calculated by using the data obtained in the case of clear sky. As the results, it is clarified that the altitude of top of ABL reaches 1 km in winter and more than 2 km in the condition of summer. In daytime, the obtained averaged images show the turbulence structure constant is strongest at around the top of ABL and a region where large spectral width is observed exists under the region where the strong turbulence structure constant is observed. In addition, we found that the downward flow with the velocity of a few 10 cm/s grew up and was maintained in daytime ABL. This downward flow was observed in all seasons, however, seemed to be strongest in summer. Moreover, we also found that upward flow was almost always observed after ABL dissipated at sunset.

In order to explore the relationship between the information obtained by LTR and physical state of atmosphere, we compared the LTR data with radiosonde data which was obtained at Shigaraki MU observatory. As the results, it was shown that there are a lot of cases showing the altitude dependency of turbulence structure constant agrees roughly with that of mixing ratio. In the result obtained at about 11:45 (JST) on August 15 in 2001, the turbulence structure constant and mixing ratio had peaks at around the top of ABL (~2km), in addition, the potential temperature became high locally at this altitude. The downward and upward flows seemed to be generated at the altitude, which implies the downward flow observed in daytime ABL is generated by condensation of water vapor.

キーワード: レーダー, 大気境界層, 対流圏
Keywords: radar, atmospheric boundary layer, troposphere

Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

MIS29-P09 会場:コンベンションホール 時間:5 月 24 日 17:15-18:30

EAR-RASS、x 帯降雨レーダー、降雨量データを用いた西スマトラ域の降雨雲形成に関する研究
Rain Formation observed with EAR-RASS, X-band meteorological radar and other instruments over west Sumatera

Ina Juaeni[1], 古本 淳一 [2*], 津田敏隆 [2], Bambang Siswanto[1], Martono[1], Nurzaman[1], Farid Lasmono[1], Eddy Hermawan[1]
Ina Juaeni[1], FURUMOTO, Jun-ichi[2*], Toshitaka Tsuda[2], Bambang Siswanto[1], Martono[1], Nurzaman[1], Farid Lasmono[1], Eddy Hermawan[1]

[1] インドネシア航空宇宙庁, [2] 京都大学生存圏研究所
[1]National Institute of Aeronautics and Space (LAPAN), [2]Research Institute for Sustainable Humanosphere, Kyoto University

The high-temporal-resolution measurement of three dimensional wind velocities, temperature and rain intensity is very important to unveil mechanism of convective activity in the Equatorial region. Kototabang (KTB) in West Sumatera, Indonesia is one of the most ideal observational location to study these phenomena, because various atmospheric instruments to measure such parameter are installed almost over one of the most convective region. This study focuses on clarifying the behavior of convective activity statistically, and to elucidate the effect of meso-scale convective activity on the generation of localized rain at KTB.

In three EAR-RASS campaign periods (2 to 28 November 2002, 10 April to 5 May 2004 and 10 November to December 9, 2005), EAR was continuously operated in RASS mode to measure virtual temperature and three dimensional wind velocities with the temporal and height resolution of a few minutes and 150 m, respectively. From the data of precipitation echo and wind velocity, the effect of the localized circulation due to the topography of KTB on the convection is very small, and most of rainfall event are due to meso-scale convective activities. Meso-scale rain clouds were firstly formed windward from KTB, and the decaying rain cloud, which brings rainfall over ˜30 mm/hour, frequently passed over KTB. From the EAR-RASS data it is found that the passage of raincloud was well correlated with the variance of virtual temperature, although the correlation with the zonal and meridional wind velocities is not recognized. The weather radar reflectivity at 2 km did not well correspond to the rainfall data on the ground. This result suggests that the strong clouds exists below the height of 2 km.

キーワード: RASS, 降雨レーダー, 赤道域対流活動
Keywords: RASS, X-band meteorological radar, Convective activity in the Equatorial region

Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

MIS29-P10 会場:コンベンションホール 時間:5 月 24 日 17:15-18:30

Large scale influence on precipitation propagation over Indonesia
Large scale influence on precipitation propagation over Indonesia

Marzuki Marzuki[1*], Hiroyuki Hashiguchi[1], Masayuki Yamamoto[1], Manabu D. Yamanaka[2], Shuichi Mori[2]
MARZUKI, Marzuki[1*], HASHIGUCHI, Hiroyuki[1], YAMAMOTO, Masayuki[1], YAMANAKA, Manabu D.[2], MORI, Shuichi[2]

[1]Research Institute for Sustainable Humanosphere, Kyoto University, Japan, [2]2Japan Agency for Marine-Earth Science and Technology (JAMSTEC), [3]3Department of Physics, Andalas University, Indonesia
[1]Research Institute for Sustainable Humanosphere, Kyoto University, Japan, [2]2Japan Agency for Marine-Earth Science and Technology (JAMSTEC), [3]3Department of Physics, Andalas University, Indonesia

Mechanism of organization of cloud clusters (CCs) over Indonesian Maritime Continent (IMC) is linkage between its complex geographical variation and large-scale atmospheric structure/circulation. Super cloud cluster (SCC), which is recognized as eastward-propagating envelopes of convection, composed of westward-propagating CCs in mesoscale [1]. In this study, the relationship between statistical properties (zonal span, duration, and propagation speed) of cloud episodes/streaks in Hovmoller space and vertical shear of horizontal wind, convectively coupled Kelvin waves and Madden-Julian oscillation (MJO) is investigated.

Ten years of hourly infrared (IR) brightness temperature (T_b) are used to study the cloud episodes/streaks over the IMC. To estimate the statistics of cloud streak, a 2D-autocorrelation function is applied to the data in the Hovmoller space [2]. Daily interpolated OLR data are used to diagnose the MJO and Kelvin wave during the interest period. The MJO is diagnosed using a 30-96 days bandpass Lanczos filter on daily OLR anomalies following [3]. The Kelvin wave filtering retains eastward-propagating OLR signals within the 2.5-20 day period and wave numbers 1-14 [4].

Table 1 shows a summary of all streak characteristics in the 10ˆo S- 10ˆo N band for four classified months. In general, westward moving streaks are dominant, longer span and move faster than eastward moving streaks. Seasonal variation is also observed. The relationship between statistical properties of cloud episodes and large scale influence (e.g., MJO, Kelvin wave) will be presented in the meeting.

[1] T. Nakazawa, Tropical super cloud clusters within intraseasonal variations over the western Pacific. J. Meteor. Soc. Japan, 62, 823-839, 1988.

[2] Carbone, R. E., J. D. Tuttle, D. A. Ahijevych, S. B. Trier, Inferences of Predictability Associated with Warm Season Precipitation Episodes, J. Atmos. Sci., 59, 2002.

[3] Kiladis, G. N., K. H. Straub, P. T. Haertel, Zonal and Vertical Structure of the Madden-Julian Oscillation. J. Atmos. Sci., 62, 2790-2809, 2005.

[4] Wheeler, M. C., and G. N. Kiladis, Convectively coupled equatorial waves: Analysis of clouds in the wavenumber-frequency domain. J. Atmos. Sci., 56, 374-399, 1999.

キーワード: Precipitation propagation, Large scale, Indonesia
Keywords: Precipitation propagation, Large scale, Indonesia

Table 1: Summary of all streak characteristics in the 10^{o}S-10^{o}N band for four classified months.

Characteristics	DJF	MAM	JJA	SON
Westwarad				
No.	2839	2576	2383	3033
Mean speed (m/s)	-16.8	-16.4	-17.1	-16.6
Mean duration (h)	9.3	9.0	9.6	10.1
Mean span (km)	507.8	482.5	538.5	546.5
Eastward				
No.	1147	1058	635	733
Mean speed (m/s)	16.0	14.8	16.1	15.3
Mean duration (h)	7.4	7.9	7.4	7.3
Mean span (km)	381.6	373.4	396.5	365.3
Ratio	2.5	2.4	3.8	4.1

Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

MIS29-P11 会場:コンベンションホール 時間:5 月 24 日 17:15-18:30

梅雨後期の近畿地方における線状降水帯形成に見られるマルチスケール的様相
Multiscale Features of Line-Shaped Precipitation System Generation in Central Japan during Late Baiu Season

東 邦昭[1*], 清原 康友[2], 山中大学[2], 柴垣 佳明[3], 楠田 雅紀[4], 藤井健[5]
HIGASHI, Kuniaki[1*], YASUTOMO, Kiyohara[2], MANABU, Yamanaka D.[2], YOSHIAKI, Shibagaki[3], MASANORI, Kusuda[4], TAKESHI, Fujii[5]

[1] 京都大学生存圏研究所, [2] 神戸大学理学研究科, [3] 大阪電気通信大学, [4] 気象庁, [5] 京都産業大学
[1]Research Institute for Sustainable Humanosphere, Kyoto University, [2]Graduate School of Science, Kobe University, [3]Osaka Electro-Communication University, [4]Japan Meteorological Agency, [5]Kyoto Sangyo University

2006 年 7 月 2 日と 5 日に大阪湾周辺で形成された線状降水帯のマルチスケール構造を明らかにした．線状降水帯の両ケースとも，日本海を東進するメソαスケール低気圧から延びた寒冷前線が近畿地方に接近する際に，メソβスケール低気圧（「徳島小低気圧」と名付ける）がメソαスケールの暖域である四国東部に表れた．この徳島小低気圧の東側では 900hPa 以下で暖域の南西風が強まり (˜15 m s?1)，寒冷前線の西側（寒気側）の西風と収束を強めていた．また 700hPa の西南西の風である梅雨ジェット (20?30 m s?1) との間に時計回りの顕著な鉛直シアが生みだされ，大阪湾では強まった南西風によって輸送される暖湿空気 (950hPa 面の相当温位 > 345 K) により条件付不安定が増大した．このような徳島低気圧の効果に加え、寒冷前線西側の西風によって淡路島もしくは六甲山で形成されたメソγスケールの山岳波によって風下側の雲水量が増大し，メソγスケールの線状降水帯の強化に寄与していた．以上の線状降水帯に関わるマルチスケール構造のすべてを満たす状況は, 5 年間（2003〜2007 年）の梅雨後半（7 月）に通過するメソαスケールの寒冷前線の 15 ケースの中で徳島小低気圧が生じた 4 ケースのうちの 2 ケースだけに見られた．

Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

MIS29-P12 会場:コンベンションホール 時間:5 月 24 日 17:15-18:30

傾斜型 1.3GH z ウインドプロファイラーを用いた接地境界層の面的観測
Measurements of wind variation in surface boundary layer with tilted 1.3GHz wind profiler

東 邦昭 [1*], 古本淳一 [1], 橋口浩之 [1]
HIGASHI, Kuniaki[1*], FURUMOTO, Jun-ichi[1], HASHIGUCHI, Hiroyuki[1]

[1] 京都大学生存圏研究所
[1]Research Institute for Sustainable Humanosphere, Kyoto University

This study aims to elucidate the effects of local wind field in the surface boundary layer. In this study, tilted 1.3 GHz wind profiler and fine mesh numerical model are used to investigate behavior of wind field and large eddy in the layer. The wind and large eddy are changed in a short time, and warm or cold air is mixed near surface. These are important parameter to understand lower troposphere phenomena. Many studies depend on tower observations; therefore it is not understand widely distribution of changing wind in surface boundary layer.

In this study, to reduce the minimum height of observation, the antenna of the wind profiler is tilted from the ground surface. Three radar beams are used to observe radial wind in the boundary layer. It is appear to non-uniform system.

We also use the fine mesh numerical model called Large Eddy Simulation. The domain of this numerical model is from several meters to several kilometers, and can predict the airflow over complex terrain with high precision. Model domain used 50 m resolution topography data. This topography data was provided from Geospatial Information Authority of Japan. We compared simulation and observation result to appear the phenomena of the surface boundary layer.