

2017

1. Date : 15 Feb 2017

Presenter : Thea Turkington and Kartika Lestari (CCRS)

Theme : Introduction about CCRS newsletter (Thea) and CCRS regular seminar (Kartika)

Abstract

We are going to introduce our new outreaches (newsletter and seminar) in CCRS. Any suggestions and comments are welcome.

2. Date : 16 Feb 2017

Presenter : Agnes Lim Huei Ni (Univ. of Wisconsin Madison)

Theme : Overview of SSEC Satellite Infrastructure and DA > NWP related activities

Abstract

Space Science and Engineering Center at the University of Wisconsin-Madison, home to the father of satellite meteorology, is a research and development center focusing on geophysical research and technology to enhance our understanding of the atmosphere of Earth, the other planets in our Solar System, and the cosmos. We develop and demonstrate new observing systems for spacecraft, aircraft, and ground-based platforms. We receive, manage and distribute significant amounts of geophysical data and develop software to process, visualize and manipulate these data to gain insight into weather and climate, as well as atmospheric processes and phenomena. This presentation will provide the audience with an overview on our satellite data center infrastructure and show case some of our latest research devoted to the board and optimal usage of satellite information for the advancement of numerical weather prediction.

3. Date : 22 Feb 2017
Presenter : R. Kartika Lestari (CCRS)
Theme : Drying projection in the western maritime continent during Southwest and Northeast monsoon seasons

Abstract

In the maritime continent, the precipitation variability is large and recently, this region experiences longer dry season and more number of severe drought events that are threatening the human life, such as, water supply for daily life and agriculture, and unhealthy air quality due to the increased number of wildfires. Global warming has been known to contribute to the rainfall anomalies around the world, and present study investigate the extent to which the drying conditions are going to be happened in 21st century over western part of the maritime continent (WMC), where the population is much larger than the eastern part, during both active Southwest (SW) and Northeast (NE) monsoon seasons. A future change in the precipitation over WMC is suggested from our analyses of the Coupled Model Intercomparison Project Phase 5 (CMIP5) models. In addition to CMIP5, we analyse the downscaled data of nine selected CMIP5 models to examine if there is modification in the drying projection when higher resolution data are used. While the north and south of equator show out of phase in the precipitation change, the region around equator shows decreased precipitation during both the SW monsoon in June-July-August-September (JJAS) and the peak of NE monsoon in February (FEB). The drying projection is robustly shown in FEB when Intertropical Convergence Zone (ITCZ) shift to the southern hemisphere, but the same robustness is not shown in JJAS when the monsoon over South China Sea is active. The detail results, including the mechanisms that drive the drying projection, and the possible reasons causing different degree in the robustness between two seasons, will be shown in the presentation.

4. Date : 2 Mar. 2017
Presenter : Hans X.-Y. Huang (CCRS)
Theme : An Introduction to Data Assimilation (DA)
Content

This lecture mainly to provide background information for them and for anyone who are interested in the NWP products which are based on data assimilation, e.g., SINGV DA and WRF DA...

After this lecture, we are expected to know the answers to some or all the questions below:

- What do people use DA for?
 - What is DA (in the simplest terms)?
 - What are the basic assumptions behind the modern DA formulations (and excuses when DA does not work)?
 - What are the most fundamental equations for DA? And how can they be derived in a simple way? (I know most people don't like equations – but we only have one set of equations for data assimilation. I hope you will find it easy to derive them.)
 - What are the popular research issues in DA?
-

5. Date : 8 Mar. 2017
Presenter : Peter Heng, (CCRS)
Theme : High resolution modelling for impact studies
Abstract

The value-add of high-resolution convection-permitting (CP) climate modelling for local impact studies was demonstrated in Singapore's Second National Climate Change Study. This presentation summarises the key findings of that study relating to CP climate modelling and showcases CCRS's follow-on investigation into the statistics of rainfall extremes over Singapore. A proposed study to address some of the outstanding questions relating to CP climate modelling for our region will also be outlined, with preliminary results presented.

6. Date : 15 Mar. 2017
Presenter : Raizan Rahmat (CCRS)
Theme : Outcomes from the Subseasonal-to-Seasonal Predictions Workshop
Abstract

Meteorological Service Singapore (MSS) as host of the ASEAN Specialised Meteorological Centre (ASMC) organised the first workshop of a 4-part series Capability Building Programme on Subseasonal-to-Seasonal Predictions for Southeast Asia (S2S-SEA I) on 27 Feb – 3 Mar 2017. The S2S, which covers the timescale from 2 weeks to 2 months, is a relatively new field promoted by the scientific and applications communities of World Meteorological Organization (WMO) and has important applications in the areas of water resources, disaster-risk, and agricultural management and planning. The aim of the programme is to enhance the capacity of the regional meteorological services in S2S through joint analyses of model skill and exploring development of products for use by the various sectors. The presentation will provide an introduction to S2S and share the scientific results and discussions arising from the workshop, in particular the assessment of skill of the model in predicting rainfall and temperature conditions in the Southeast Asia region at different lead times.

7. Date : 15 Mar. 2017
Presenter : Thea Turkington (CCRS)
Theme : Regional Climate Centre web portal: demonstration and future plans
Abstract

The talk will cover the recent updates in the upcoming Regional Climate Centre web portal, as well as the future capabilities and plans for the portal.

8. Date : 5 Apr. 2017
Presenter : Hans X.-Y. Huang (CCRS)
Theme : Data assimilation: from equations to a real system
Abstract

I will review briefly what I presented last time (if you did not attend the first one, you can go through the ppt and come to my office to discuss the issues you may have with the ppt). Then I will go through the steps most DA developers take to turn a set of equations to a real DA system. In this process, I will touch a few important concepts and practical aspects of DA.

9. Date : 12 Apr. 2017
Presenter : Xiangming Sun (CCRS)
Theme : Fractions Skill Score
Abstract

1. The definition of FSS and how to calculate it
 2. Advantages, limitation and know issues using FSS to verify precipitation
 3. Current tools available in MSS
-

10. Date : 19 Apr. 2017
Presenter : Muhammad Eeqmal Hassim (CCRS)
Theme : Understanding the interplay between the MJO and the western Maritime Continent
Abstract

What happens when the 'sultry' MJO meets the 'stoic' western Maritime Continent (WMC)? Why does rainfall peak over land before it peaks over the sea as the MJO approaches and propagates over the region? In short, how does the MJO 'tango' with the WMC? In this study, we seek to 'answer' these intriguing questions by using 10-year regional climate simulations at 12 km and 4.5 km over the WMC for the boreal winters of 2000-2010. We highlight the relative importance of MJO-related anomalies in the large-scale environment and diurnal mesoscale circulations in governing convective rainfall, to suggest that scale interactions are an essential part to understanding the MJO effect on rainfall over the region.

11. Date : 3 May 2017
Presenter : Guiting Song (CCRS)
Theme : A briefing on SINGV ensemble development and its preliminary products
Abstract

Ensemble Prediction Systems (EPS) are numerical weather prediction (NWP) systems that allow us to estimate the uncertainty in a weather forecast as well as the most likely outcome. Instead of running

the NWP model once (a deterministic forecast), the model is run many times from very slightly different initial conditions.

SINGV ensemble 1.0 has been run in real-time testing at CCRS/MSS since March 2017. Its configuration and preliminary products will be introduced during this talk.

12.Date : 17 May 2017
Presenter : Anurag Dipankar (CCRS)
Theme : SINGV
Abstract

We all know that SINGV is the new Singapore NWP model under trials at CCRS. What some of us don't know is that SINGV is a special branch of the UK Unified Modelling (UM) system that is designed as a "unified" package for all tropical countries in the UM partnership. So in the seminar I would briefly cover the details of the model in terms of its different physical parameterization schemes and show how it has diverted from its parent UK model (UKV) to something that is more suitable for simulating atmosphere over tropics.

13.Date : 24 May 2017
Presenter : Bertrand Timbal (CCRS)
Theme : Statistical versus dynamical downscaling in the tropics: what are the challenges?
Abstract

The need to develop downscaling approaches to capture small-scale regional climate features of interest for climate impact and adaptation studies is well understood. The due process to develop, evaluate and establish the added value of the various technical options available to deliver on this challenge is not necessarily as well understood. As a cornerstone, resides the paradigm that small-scale climate features can be driven by large-scale forcing. The applicability of that paradigm to the Tropics is what we will discuss in that seminar.

14.Date: 31 May 2017
Presenter : Liong Shie-Yui (TMSI)
Theme : Impact of Climate Change on Extreme Rainfall and Drainage Design – A Comparative Study
Abstract

The talk will first briefly revisit the "the impact of climate change on extreme rainfall and drainage design" project which was jointly conducted by PUB-CCRS-Monash-TMSI. In that study the projected climate data resulting from dynamical downscaling, conducted by CCRS, were used as the input to a HiDRUS-2 model to further downscale them stochastically to much higher spatial and temporal resolutions (1km and 5 min respectively). Projected extreme rainfall were the focus of the study as

they were used to construct the Intensity-Duration-Frequency curves, crucial for drainage design. The project was officially completed in Nov 2016.

The talk will then proceed to describe a similar study conducted by TMSI. The main differences are: (1) TMSI applies WRF at 20 km spatial and 6-hourly temporal resolutions (instead of HadGEM3 at 12 km); (2) TMSI employs the rainfall library, of HiDRUS-2, of up to 2-time cloning (instead of 4-time cloning); (3) TMSI considers only the projected data at the 611 grid points on the mainland of Singapore (instead of data at the entire grid points of the whole study domain); and (4) TMSI considers the 95th percentile Annual Maximum Rainfall (instead of mean AMR) in the construction of IDF curves. Delta Change will also be shown.

15. Date : 7 June 2017

Presenter : Madeline Ang (RRD)

Theme : A Wobbly World, Prolific Plants and Massive Mountains: The Interplay of Ice Ages and Biodiversity

Abstract

The impact of permanent glaciation - and its potential loss - is very much alive in the scientific and public consciousness due to Climate Change. This talk investigates examples of the interplay between Earth's humans and Earth's climate before stepping back in time to investigate the role plants played in the Late Palaeozoic Ice Age (340 million years ago) as well as the possible impact of Snowball Earth (600 million years ago) on the dawn of complex life.

There will also be a short session after the talk where audience members can handle geological specimens such as a meteorite, fossils and a portion of an earthquake fault plane.

16.Date : 14 June 2017

Presenter : Wee Kiong Cheong, (CFO, MSS)

Theme : Research findings into operational forecasting – some examples

Abstract

It is well recognised on the limited capability for numerical weather prediction models in capturing the rainfall condition over Singapore. In this talk, some research findings, particularly the relationships between larger scale meteorological conditions and rainfall over Singapore on a monthly time scale, that could potentially provide useful guidance in interpreting and translating the dynamical models' outputs into operational products, will be discussed. The approaches discussed here are likely to be applicable in generating forecasts to most of the other meteorological parameters and time scales as well. A brief discussion on WSD's operational requirements and the performance of EC-Global, EC-WRF and SINGV in short-range rainfall predictions over Singapore will also be provided in this talk.

17. Date : 28 June 2017

Presenter : Chien Wang (MIT/SMART/CENSAM)

Theme : Impact of aerosols on precipitation

Abstract

Aerosol remains one of the most uncertain factors in climate projection. Aerosol can affect the radiative balance of the climate system by directly scattering or absorbing sunlight, or by acting as cloud condensation nuclei and ice nuclei and thus modifying the optical properties as well as lifetimes of clouds. It has been known for long that such effects contribute to the variation of Earth's surface temperature. On the other hand, aerosol can influence precipitation by either modifying cloud microphysical processes through aerosol activation, or by modifying local thermodynamical profile, facilitating an on-site impact on clouds overlapping with aerosol population. In addition, recent studies have also suggested that the direct and indirect radiative effects of aerosols can perturb the large-scale circulation and cause significant changes in cloud cover and precipitation in places often distant from aerosol laden regions, i.e., facilitating a remote impact. Understanding and quantifying the impact of aerosol on precipitation is a more challenging task than doing so on temperature because the former impact involves many sophisticated feedbacks that are still difficult to measure or model. Recent progress to include interactive aerosol features in many climate or Earth system models besides process models has made it possible to study aerosol-cloud-precipitation mechanism through long climate integrations, by considering the inhomogeneous distribution of aerosol forcing and feedback, or by combining with or separating from other anthropogenic forcings. For instance, recent results of models with above-mentioned improvements suggest that aerosol has played a dominant role over greenhouse gases in causing pattern changes of many precipitation systems in past decades. I will use research findings to discuss the current understanding alongside major challenges of both on-site and remote impacts of aerosol on precipitation.

18. Date : 5 July 2017

Presenter : Grace Chan (SPMS, NTU)

Theme : Internship Experience with CCRS

Abstract

Sharing of experience interning at CCRS and the work that I have done during the duration of my internship. Internship scope covers Python Programming for data processing and algorithm development for radar calibration using regression.

19. Date : 12 July 2017

Presenter : Jerry Liu (CCRS)

Theme : HPC Usage - User Environment

Abstract

Most of common problems of HPC usage were caused by inconsistent environment settings while working with different shell interface. In this talk, first it will give a brief discussion on certain Linux fundamental concepts, such as environment variables, shell interface, initialization, etc., then follow

by certain suggestions of good practice for setting user environment, last certain particulars of CCRS HPC also will be covered.

20.Date : 19 July 2017
Presenter : Douglas Boyd (UKMO)
Theme : RMED: Regional Model Development and Evaluation across the UM Partnership
Abstract

The UM Partnership is developing a coordinated process to understand and improve convective-scale model forecast performance for all geographical regions of interest to partners. In this talk, I'll present an overview of recent developments relating to RMED, along with future plans and aims.

21.Date : 14 August 2017
Presenter : Yu Kosaka, (University of Tokyo)
Theme : Tropical Pacific variability as a key pacemaker of the global warming "staircase"
Abstract

Annual global-mean surface temperature (GMST) has risen since the late 19th century due to anthropogenic forcing. This temperature increase is not monotonic but accompanied by notable decadal modulations, resembling a rising staircase, whose last step is the so-called global warming "hiatus" or slowdown. Tropical Pacific decadal variability has been suggested as a major pacemaker of this staircase-like warming. We evaluate GMST change associated with the tropical Pacific sea surface temperature (SST) anomalies with pre-industrial control experiments of CMIP5 together with the Pacific Ocean-Global Atmosphere (POGA) pacemaker experiments with a climate model where the tropical Pacific SST anomalies are forced to follow observations. The tropical Pacific effect on GMST is systematically larger in decadal than interannual variability in all models. The extratropical oceans and sea ice accumulate influence from the tropical Pacific, amplifying decadal than interannual response.

However, this decadal tropical Pacific influence on GMST shows large intermodel diversity among CMIP5 models due to diverse extratropical sensitivity, in contrast to interannual impact which is constrained well. The intermodel diversity implies that in multimodel pacemaker experiments planned for CMIP6, model performance in reproducing the staircase-like global warming and the recent hiatus will vary substantially among models.

22.Date : 23 August 2017
Presenter : Teo Chee-Kiat (SUSS)
Theme : Diurnal rainfall in the maritime continent
Abstract

Diurnal weather patterns are perhaps the most important short-term weather variability in the Maritime Continent. The juxtaposition of the complex coastlines and steep topographies potentially create a spectrum interesting mesoscale diurnal weather features in the regions – one of which of interest is the nocturnal squalls propagating away from the region's coastlines. These weather system dominates the mean observed and modeled diurnal variability of the weather in the MC. Understanding these diurnal mesoscale features are important because besides their impact on the day-to-day weather, these short-time scale weather systems are increasingly recognized as an important component in the intra-seasonal variability of the tropical atmosphere (e.g. the Madden-Julian Oscillation). In this talk, I will present some analysis of these diurnal weather patterns from observations, and show how well numerical model are able to replicate these diurnal variabilities. The potential mechanism underlying these systems will be also briefly discussed.

23.Date : 11 October 2017
Presenter : Junhua Yang & Peter Heng (CCRS)
Theme : Introduction to Urban Meteorology
Abstract

Part 1: Observations and Measurements (Junhua Yang)

In Part 1, topics such as the structure and scales of the urban boundary layer will be briefly discussed. Then, general notions of urban observations and instrument siting in an urban setting will be introduced. The urban heat island effect, the concept of urban energy balance and urban radiation flux exchange will also be discussed. Examples will be drawn from both studies conducted in other countries as well as in Singapore.

Part 2: Modelling and Services (Peter Heng)

In Part 2, I talk will touch on the characterisation and modelling of the urban land surface, and the integration of weather, climate and environment services for an urban population.

24.Date : 25 October 2017
Presenter : Song Guiting, Tony (CCRS)
Theme : SINGV Development
Abstract

SINGV Ensemble Prediction System (EPS) has been run at MSS since April this year. The basics of SINGV EPS and its preliminary products were introduced in my previous talk on 3rd May 2017. For this talk, how SINGV EPS calculates its probability will be discussed in detail and the latest SINGV EPS developments after May 2017 will also be introduced.

25.Date : 1 November 2017

Presenter : Jeff Lo (CCRS)

Theme : A new dynamical weather downscaling approach for the tropics

Abstract

Limited area models (LAMs) are widely used in numerical weather prediction, as a downscaler, to obtain high-resolution results that would be too expensive to be obtained with a global model. To run LAMs, traditionally, requires lateral boundary conditions (LBCs) which are obtained from a global model. This seminar will discuss a new approach to running LAMs, by increasing the utilization rate of low-resolution global model forecasts to improve the NWP downscaler performance. Results show that the new approach outperforms the traditional LBCs approach, not only improve the forecasts of primary NWP parameters (e.g. winds) but also the diagnostic parameters (e.g. precipitation) in the tropical region.

26.Date : 8 November 2017

Presenter : Ben Horton (EOS, NTU)

Theme : Future Sea-Level Rise

Abstract

Common Era (last 2000 years) sea-level reconstructions capture climate and sea-level variability over a wide range of spatial and temporal scales. Our database reveals multiple phases of coherent regional and global change, indicative of both natural and forced variability that provide a pre-anthropogenic background against which to compare recent trends. These records offer a unique opportunity to evaluate the representation of climate and sea-level variability in climate models from the last millennium through the 21st century.

We have developed Common Era sea-level reconstructions from Newfoundland, Canada to Tampa Bay, Florida. These reconstructions from the Atlantic and Gulf coasts of North America reveal two distinct patterns in sea-level variability during the Common Era. Firstly, south of Cape Hatteras, North Carolina, to Florida, sea-level rise is essentially flat, with the record dominated by long-term geological processes until the onset of historic rates of rise in the late 19th century. Secondly, north of Cape Hatteras to Connecticut, sea level rises to a maximum around 1000 CE, falls to a sea-level minimum around 1500 CE, before further long-term sea-level rise through the second half of the second millennium prior to the late 19th century acceleration. The northern-intensified sea-level fall beginning ~1000 is coincident with shifts toward persistent positive NAO-like atmospheric state inferred from other proxy records.

To reveal global mean sea-level variability, we collate high resolution proxies from coasts of the northern and southern hemispheres that are tectonically stable. We apply a spatio-temporal modeling framework, which identifies a long-term falling global mean sea level during the last millennia. The trend was interrupted in the middle of the 19th century by an acceleration, which yielded a 20th century rate of rise that was faster (probability $P = 0.95$) than any previous century in the Common Era.

27.Date : 6 December 2017
Presenter : Benjamin Grandey
Theme : Aerosols in the climate system: another reason to care about the haze
Abstract

Aerosols, the particles that make up the haze, play an important role in the Earth's climate system. We have used the Community Earth System Model (CESM), a state-of-the-art global climate model, to investigate some of the possible effects of aerosol emissions on the climate system. I will briefly introduce some of our modelling results, including a study suggesting that fuel usage in Asia may impact water resources locally in Asia and also remotely in other parts of the world.

28.Date : 20 December 2017
Presenter : Hsiang-He Lee
Theme : Haze and its impacts on Southeast Asia
Abstract

Severe haze events in Southeast Asia have attracted the attention of governments and the general public in recent years, due to their impact on local economies, air quality and public health. Widespread biomass burning activities are a major source of severe haze events in Southeast Asia. On the other hand, particulate pollutants from human activities other than biomass burning also play an important role in degrading air quality in Southeast Asia. These pollutants can be locally produced or brought in from neighboring regions by long-range transport. A better understanding of the respective contributions of fossil fuel and biomass burning aerosols to air quality degradation becomes an urgent task in forming effective air pollution mitigation policies in Southeast Asia.

In this study, to examine and quantify the contributions of fossil fuel and biomass burning aerosols to air quality and visibility degradation over Southeast Asia, we conducted three numerical simulations using the Weather Research and Forecasting (WRF) model coupled with a chemistry component (WRF-Chem). These simulations were driven by different aerosol emissions from: (a) fossil fuel burning only, (b) biomass burning only, and (c) both fossil fuel and biomass burning. By comparing the simulation results, we examined the corresponding impacts of fossil fuel and biomass burning emissions, separately and combined, on the air quality and visibility of the region. The results also showed that the major contributors to low visibility days (LVDs) among 50 ASEAN cities are fossil fuel burning aerosols (59%), while biomass burning aerosols provided an additional 13% of LVDs in Southeast Asia. In addition, the number of premature mortalities among ASEAN cities has increased from ~4110 in 2002 to ~6540 in 2008, caused primarily by fossil fuel burning aerosols. This study suggests that reductions in both fossil fuel and biomass burning emissions are necessary to improve the air quality in Southeast Asia.
