



2–7 December 2019
Melbourne, Australia



10TH ASIA-OCEANIA METEOROLOGICAL SATELLITE USERS' CONFERENCE

Australian VLab Centre of Excellence

Accessing Aviation Forecasting Resources utilising Satellite Data on our
Regional Focus Group Meeting Archive

Bodo Zeschke

Bureau of Meteorology Training Centre
Australian VLab Centre of Excellence

How to access and answer the Socrative Questions

1 On your computer or smartphone open up a new window in your browser type in **b.socrative.com**
Choose "**LOGIN**" (top RHS)
choose "**Student Login**"
Then Room Name
"AOMSUC10"

#1

2

Have you

ANSWER

A I ha
sm

B I ha

C I ar

D I de

E I de

Socrative question 1: Have you attended Australian VLab CoE RFG meetings previously?

- A. Yes, more than 10 meetings
- B. Yes, a few (less than 10) meetings
- C. No, please tell me more
- D. Unsure, please tell me more

3

Answer the question

SUBMIT ANSWER

5



You've completed the current activity.
Waiting for the next activity to begin...

4

Finished!

Score: 0/1

Percent: 0%

OK

Socrative question 1: Have you used Australian VLab Centre of Excellence resources in your work?

- A. Yes, I am a teacher and the resources are useful for developing teaching resources
- B. Yes, I use the resources to educate myself
- C. I have used the resources to help my colleagues
- D. No I have not used the resources
- E. No I have not heard about these resources
- F. Other

Content of this session

The Australian VLab Centre of Excellence Regional Focus Group meetings

Aviation forecasting resources available at the Australian VLab Centre of Excellence Regional Focus Group meeting archive:

- Aviation turbulence case studies
- Aviation icing case studies
- Thunderstorm case studies with reference to aviation forecasting procedures and products

Content of this session

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This is the 75th Australian VLab Centre of Excellence Regional Focus Group meeting

The first Regional Focus Group meeting was conducted during Advanced Forecaster Course 2013, **just prior to the AOMSUC-4 Training Event**


Australian Government
Bureau of Meteorology

Melbourne VLab Centre Of Excellence


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Updates

- 8 Feb: First Announcement [PDF]

Science Week 2013 - Advanced Forecaster Course

22 - 26 July 2013, Melbourne, Australia

Online sessions pertaining to the latest developments in meteorological science with respect to operational forecasting. Hosted by the Australian Bureau of Meteorology Training Centre.

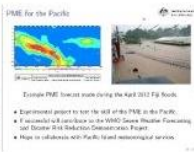
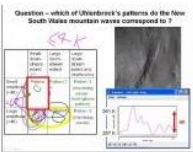
Course Overview

- Eumetsat Training Event Calendar announcement
- Timetable
- Abstracts
- Presenters Details

Course Information

- Contacts
- Webinar Online Conferencing Tool
- Join a Webinar
- Presentations

The course is complimentary to employees of International Government Meteorological Agencies.


Date created: Thu, 16 May 2013
Last modified: Thu, 16 May 2013 01:29:28 +0000
Maintained by: Bureau of Meteorology Training Centre

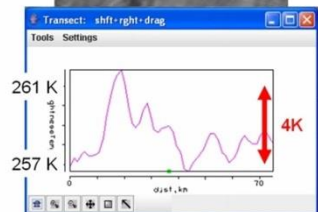
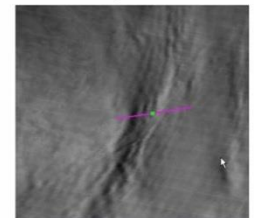
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Question – which of Uhlenbrock's patterns do the New South Wales mountain waves correspond to ?

≤ 7 K

	Small down-stream extent	Large down-stream extent	Large down-stream extent and interference
Small amplitude (<4K)	Pattern 1	Pattern 2	Pattern 3 (interfering waves - herringbone pattern)
Large amplitude (>4K)	Pattern 4	Pattern 5	Pattern 6 (interfering waves)



The past 6 years of Regional Focus Group meetings – statistics October 2013 to December 2019



Average number of remote participants per session by geographical location shown above

Total number of remote stakeholders attending the 74 sessions = 2274+
Average number of participants per session = 30.7+

Recordings of our Regional Focus Group Discussions

<http://www.virtuallab.bom.gov.au/archive/regional-focus-group-recordings/>



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Regional Focus Group Discussion Recordings

Recordings of Australian VLab Centre of Excellence Regional Focus Group (RFG) meetings are given below. Locations with limited Internet speed may wish to download the file before playing it (right mouse click on the link, then "Save Target As").

Recordings (file size)	Content of the Regional Focus Group meetings
	The next Joint Australia Korea VLab Centres of Excellence Regional Focus Group meeting is scheduled for late November / early December 2019 Additional information will be provided closer to time.
29th October 2019 Regional Focus Group meeting Topics of discussion included: Some applications of weather monitoring using GEO-KOMPSAT-2A meteorological products(facilitator Dr Sung-Rae Chung, Korea Meteorological Administration) 21 minutes duration (34Mb .wmvfile) (52Mb .mp4file) Three short case studies, including outflow from convection over Australia, 3D stereo satellite imagery over Japan and the sunglint phenomenon over Indonesia (facilitator Mr Bodo Zeschke BMTC) 26 minutes duration (84Mb .wmvfile) (102Mb .mp4file) Please download the following animations prior to the session	

Socrative question 2: Have you examined the archived recordings of the Regional Focus Group meetings?

- A. Yes I have examined a number of recordings and they are very useful to me
- B. Yes I have examined at least one recording
- C. No I have not examined the recordings
- D. I don't know about the recordings

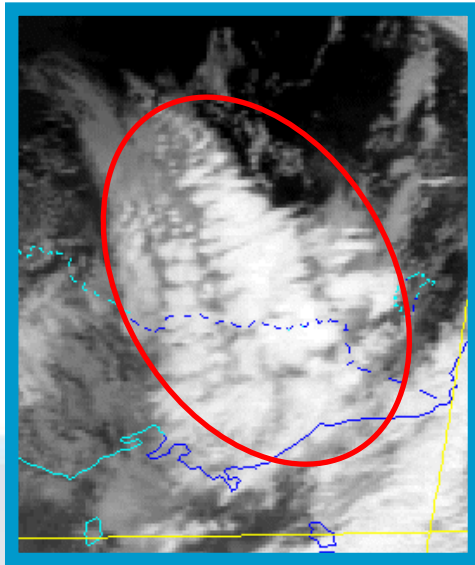
Content of this session

The Australian VLab Centre of Excellence Regional Focus Group meetings

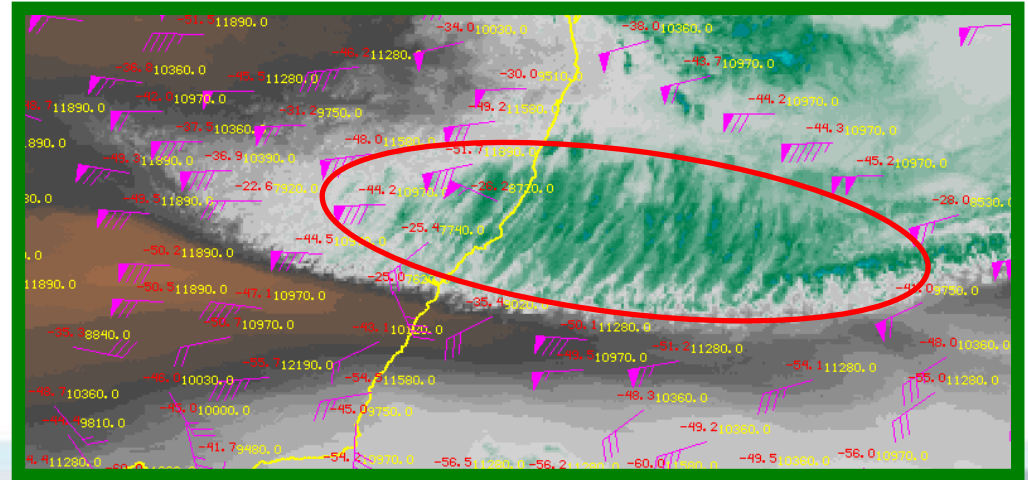
Aviation forecasting resources available at the Australian VLab Centre of Excellence Regional Focus Group meeting archive:

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- Aviation icing case studies
- Thunderstorm case studies with reference to aviation forecasting procedures and products

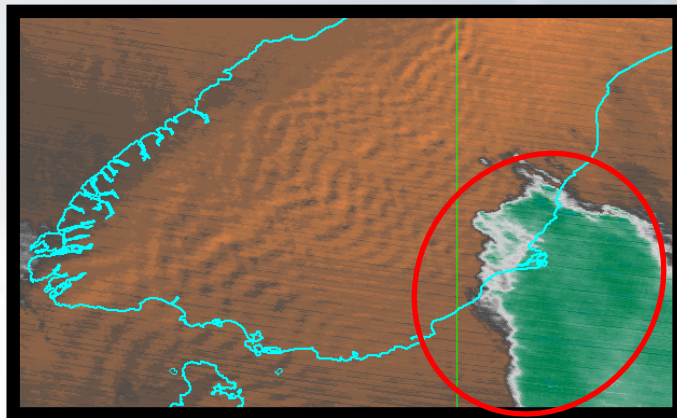
High level turbulence prone areas revealed in satellite imagery



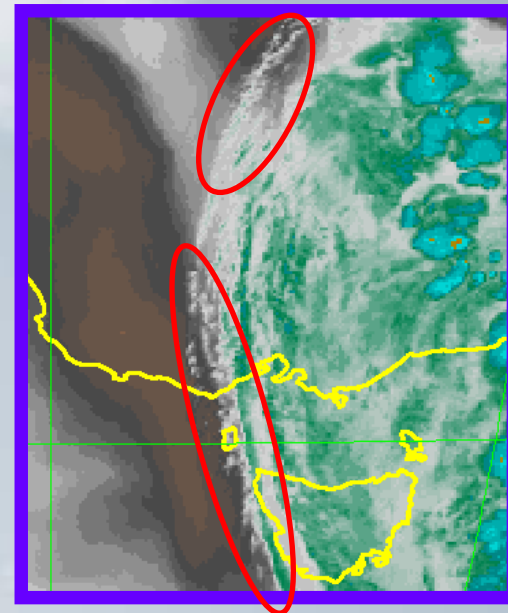
Striated delta cloud feature



Transverse banding in clouds



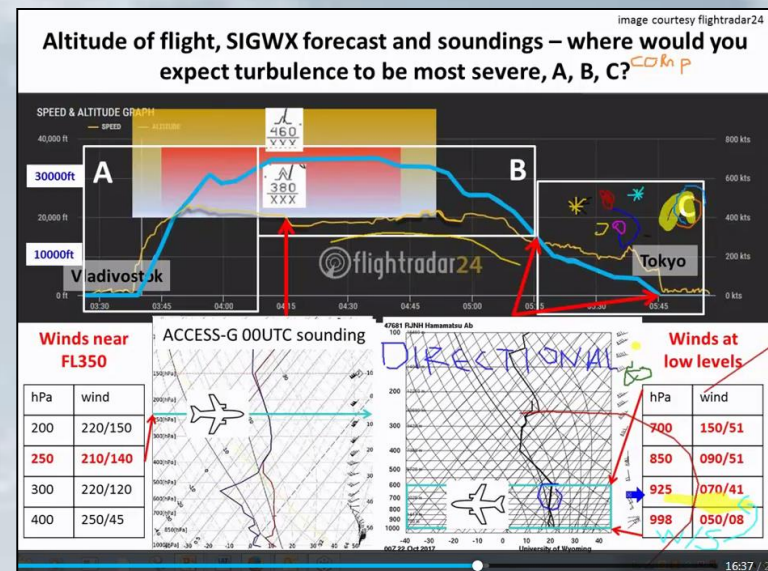
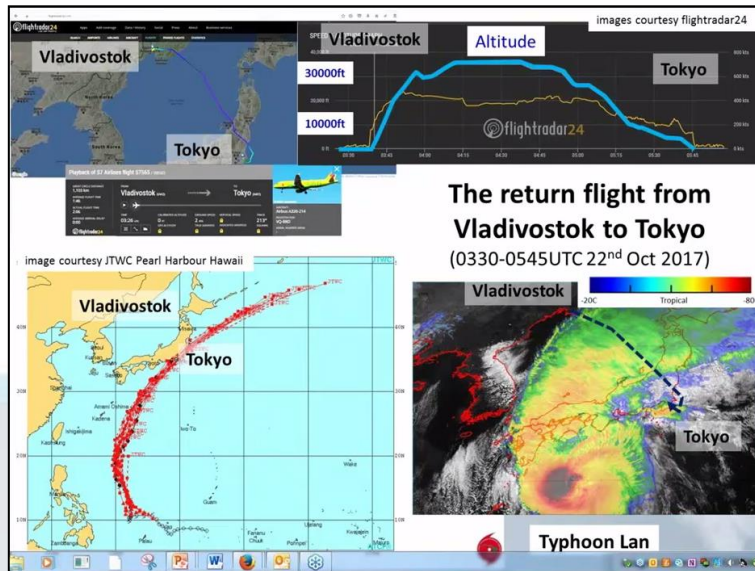
Plume clouds



Jet fibres

Turbulence experienced on the flight Vladivostok to Tokyo

Regional Focus Group meeting 31st October 2017

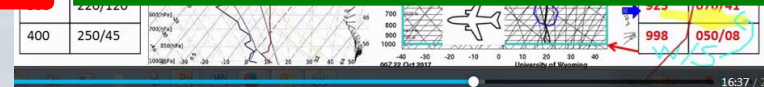
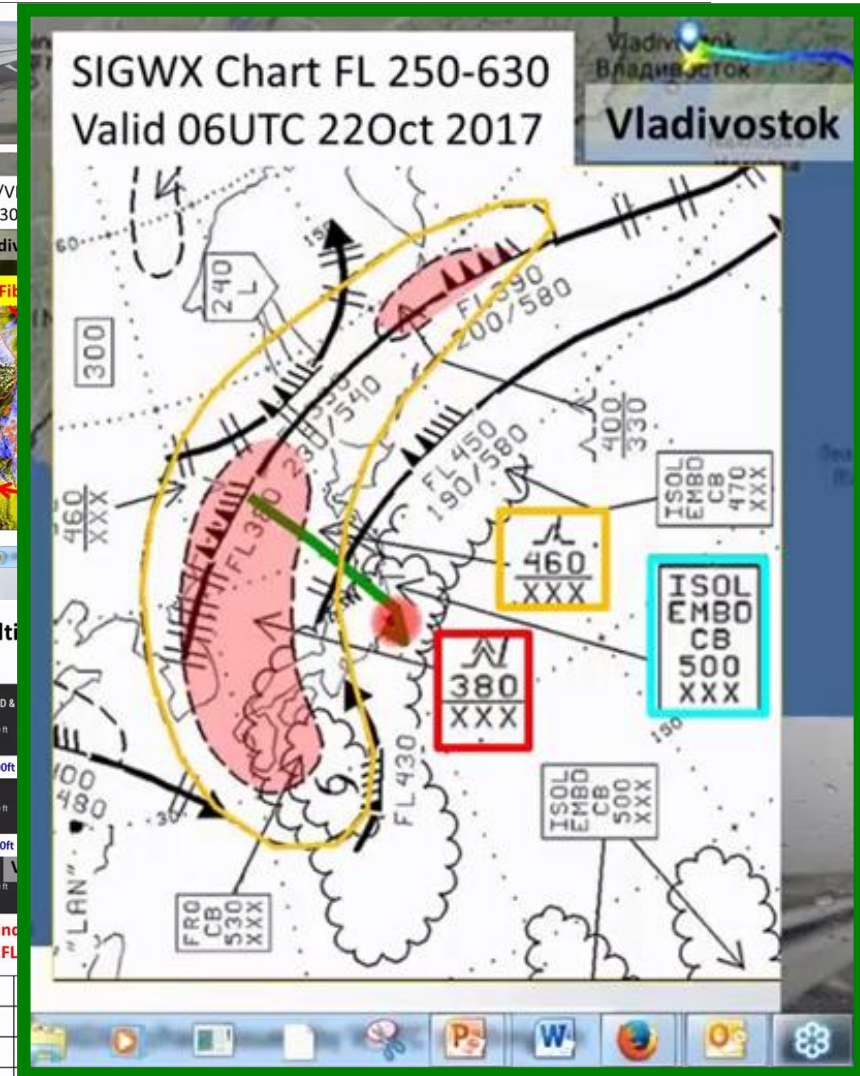
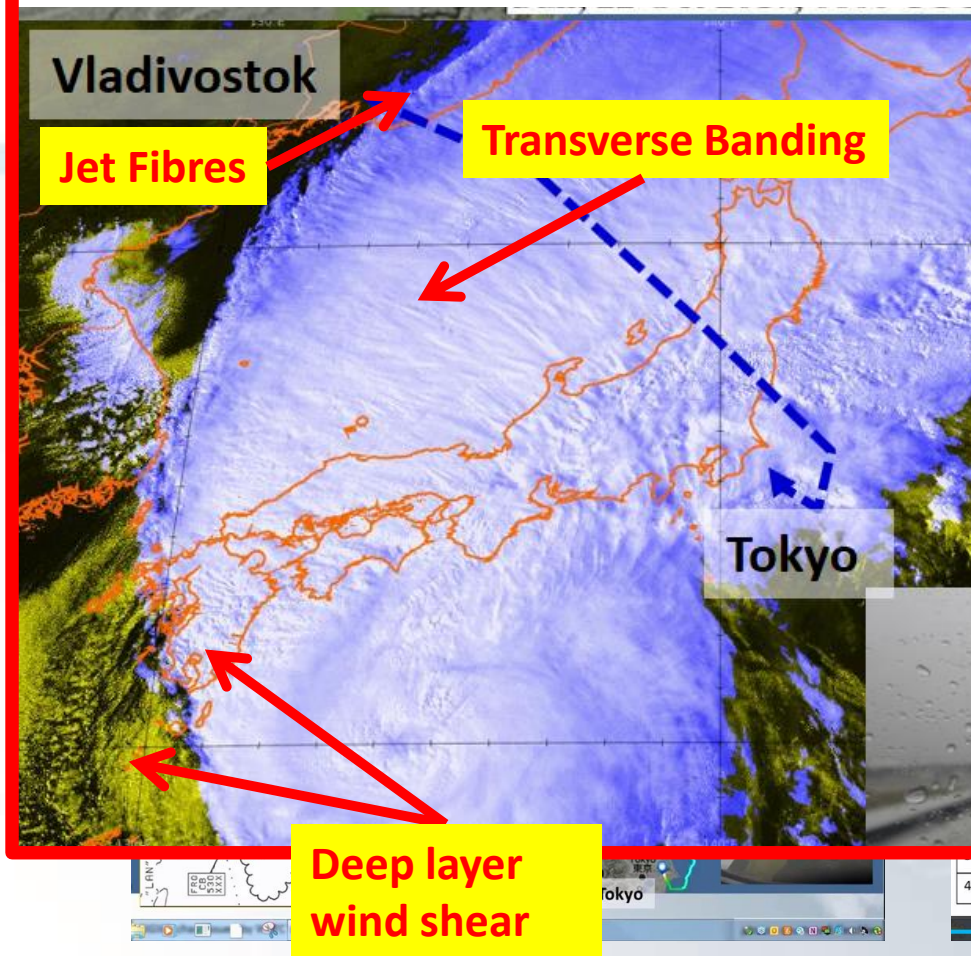


Turbulence experienced on the flight Vladivostok to Tokyo

Regional Focus Group meeting 31st October 2017

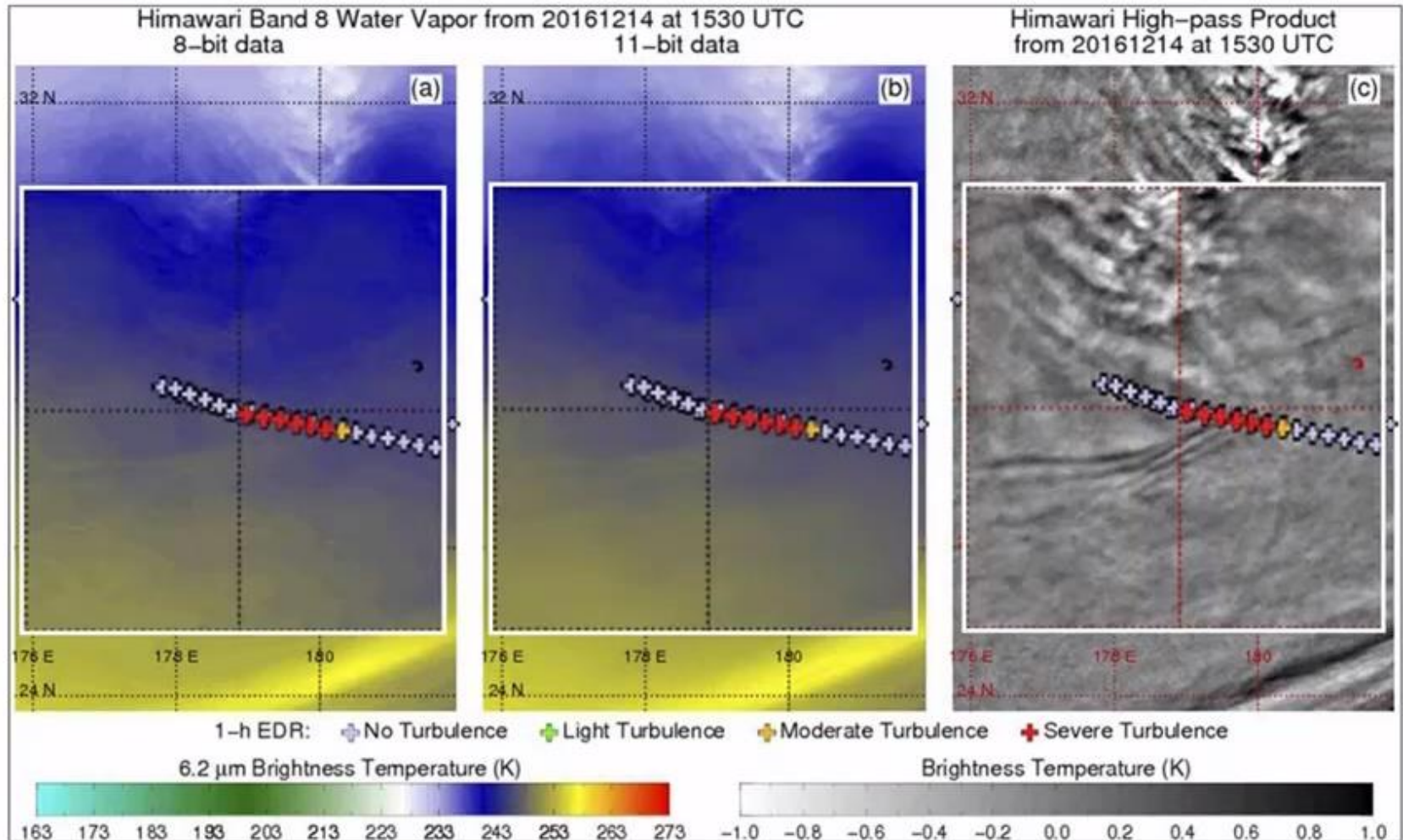


VIS/VIS/IR RGB product 03-06UTC 22Oct 2017



An approach for identifying turbulence signatures in Himawari-8 and GOES-16 water vapour imagery

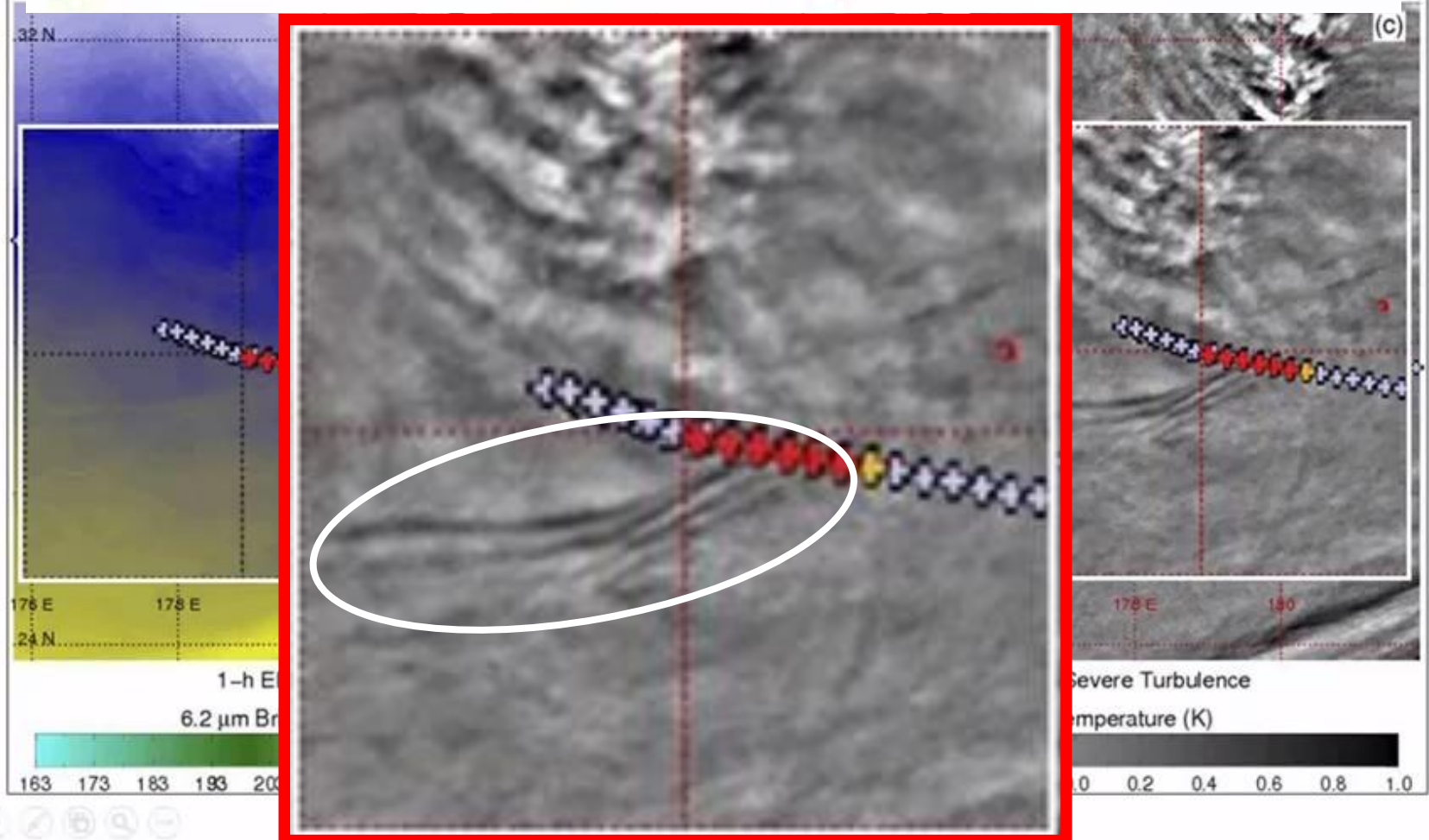
(Dr Anthony Wimmers, NOAA affiliated)



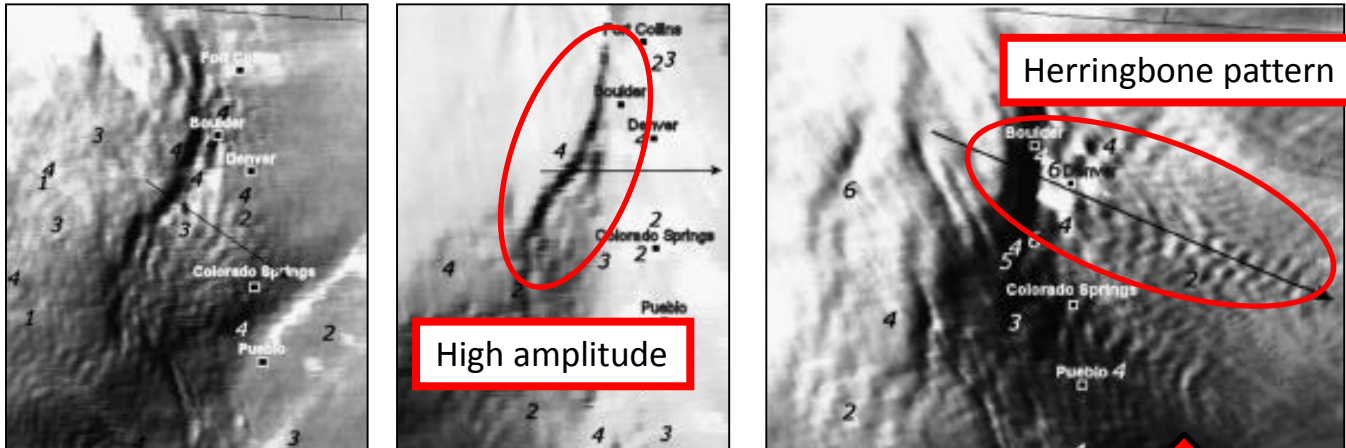
An approach for identifying turbulence signatures in Himawari-8 and GOES-16 water vapour imagery

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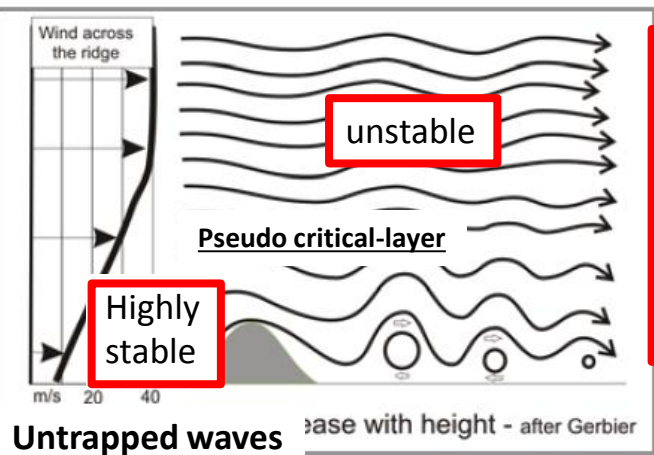
 Moderate Turbulence  Severe Turbulence



Turbulence conditions for mountain waves

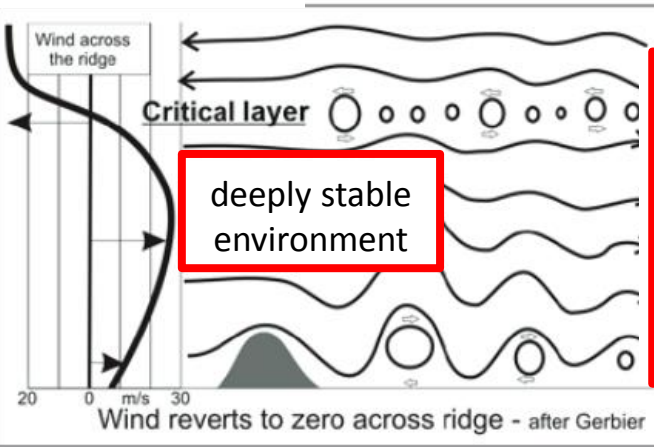


Trapped waves



Wind speed increases with height above ridge

- US study by Uhlenbrock et al 2007: **1**
- Two characteristics were most coincident with the most turbulent waves.
- Mountain waves with higher amplitudes (>5K)
 - Mountain waves that displayed interference (Herringbone) patterns



3

Wind speed decreases with height above ridge

Wind near normal to range (within +/-30 degrees)

Wind speed at ridge top **2**

> 25kts (MOD)
> 40-50kts (SEV)

Example: potential turbulence, Flinders Ranges, South Australia

South Australia case study 9th May 2016, **Regional Focus Group meeting May 2016**

image courtesy BOM/JMA

Himawari-8 vis image 00UTC

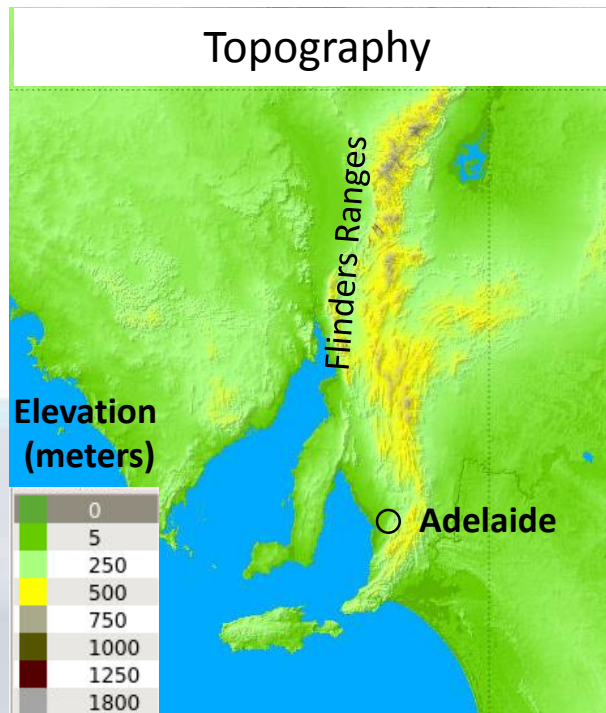
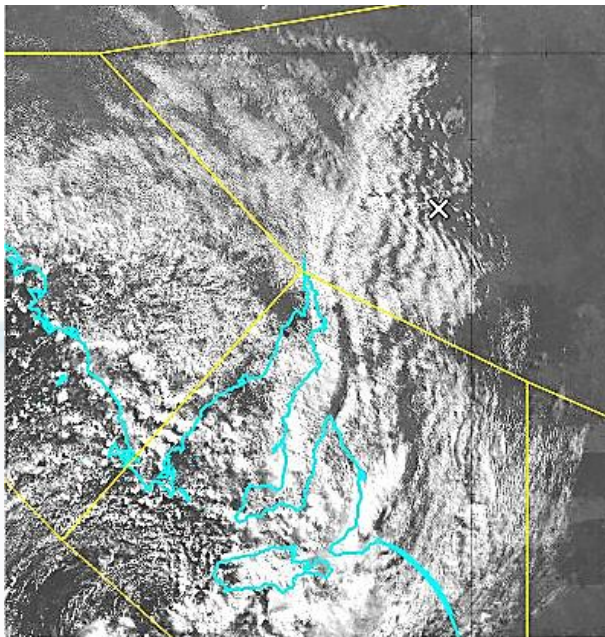


image courtesy BOM

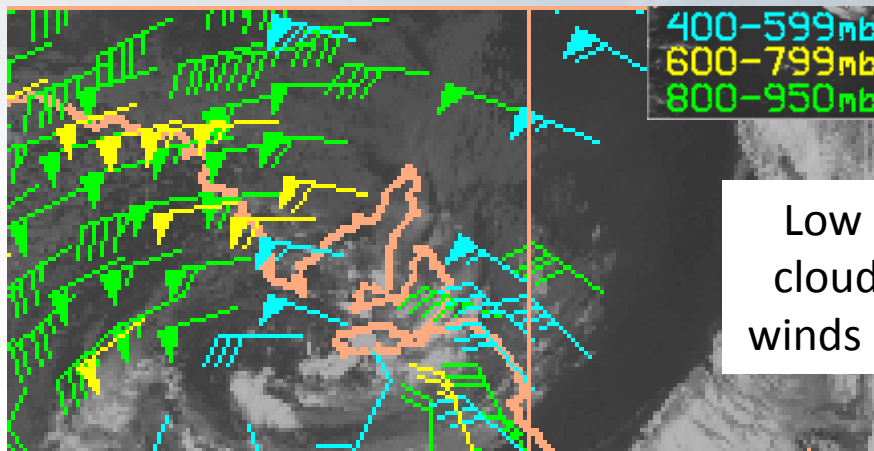
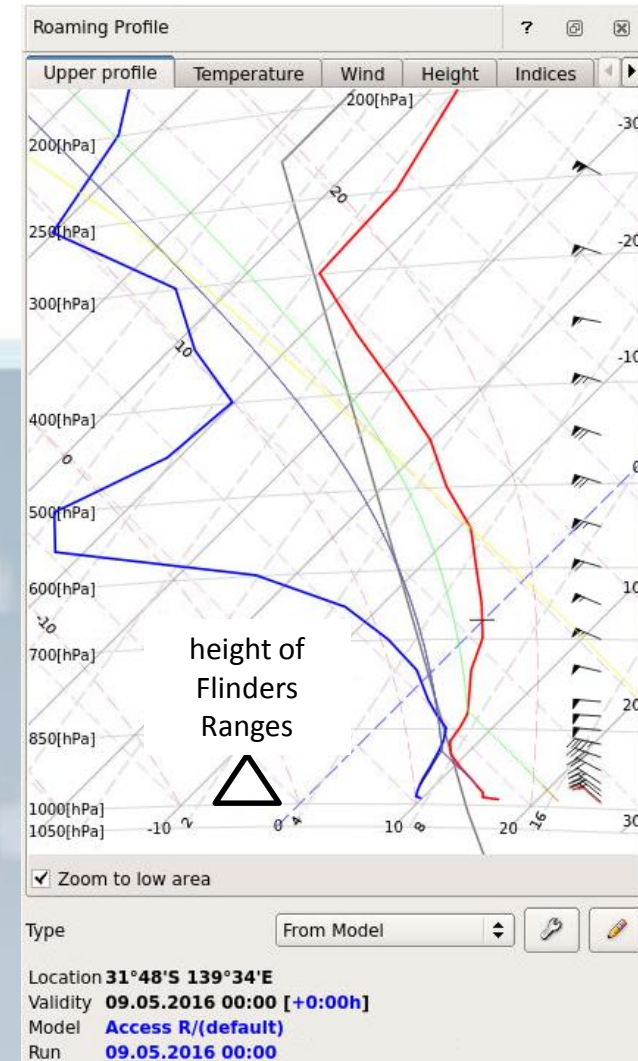


image courtesy University of Wisconsin – CIMSS

Flinders Range satellite imagery and sounding

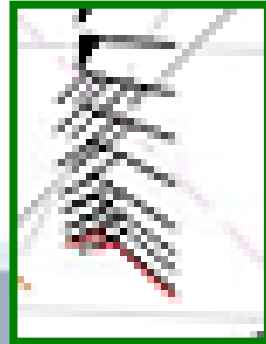
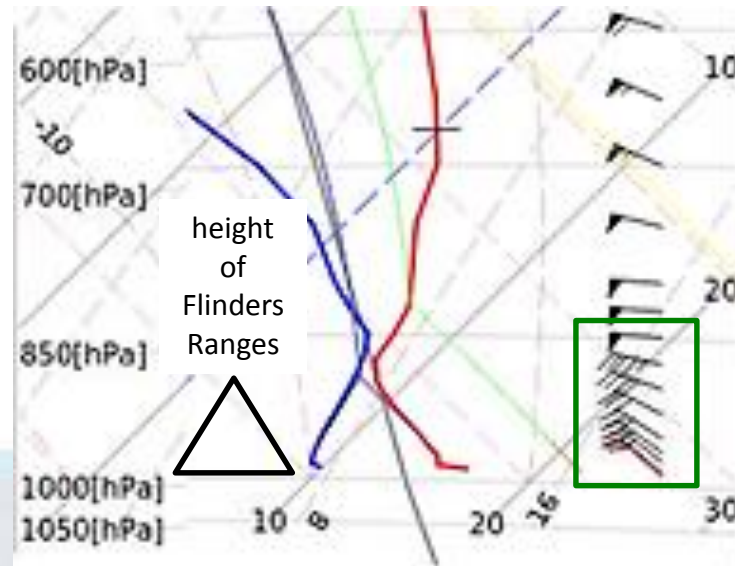
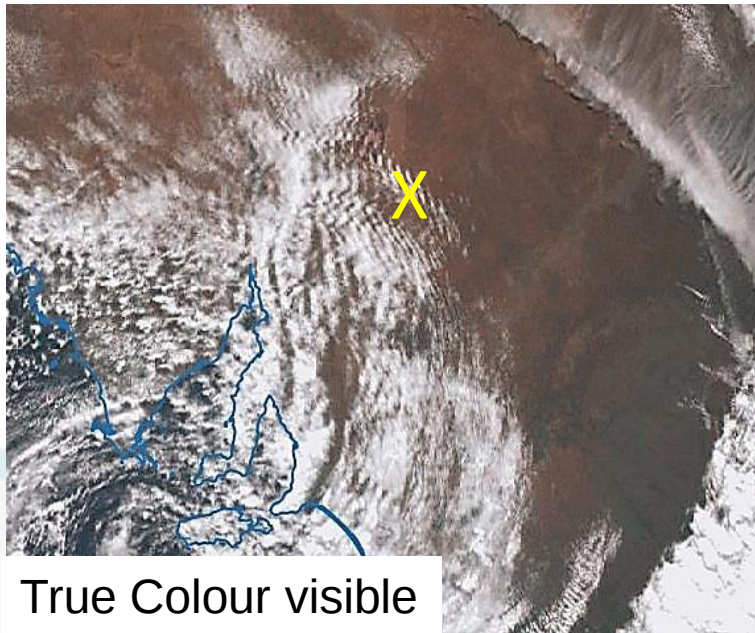


image courtesy BOM

Examine the satellite images and the sounding at location X of the 06UTC 9th May 2016

Answer Socrative Question 4

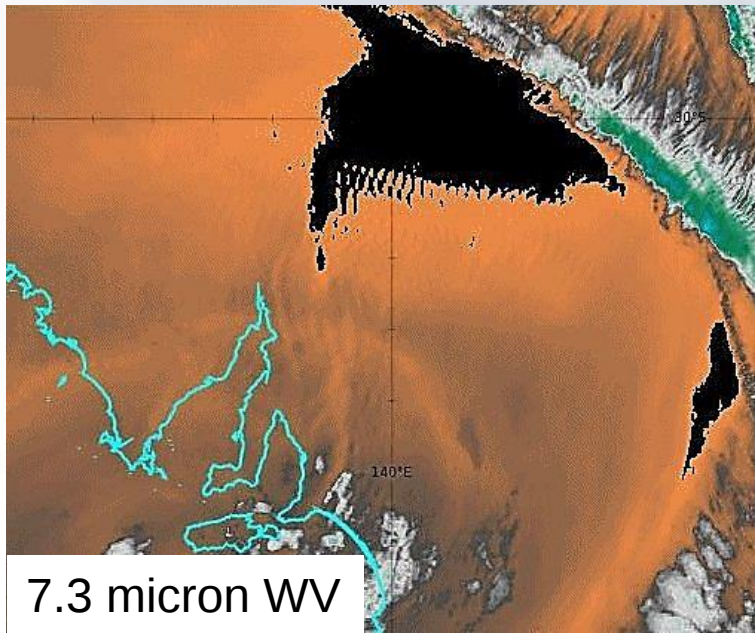


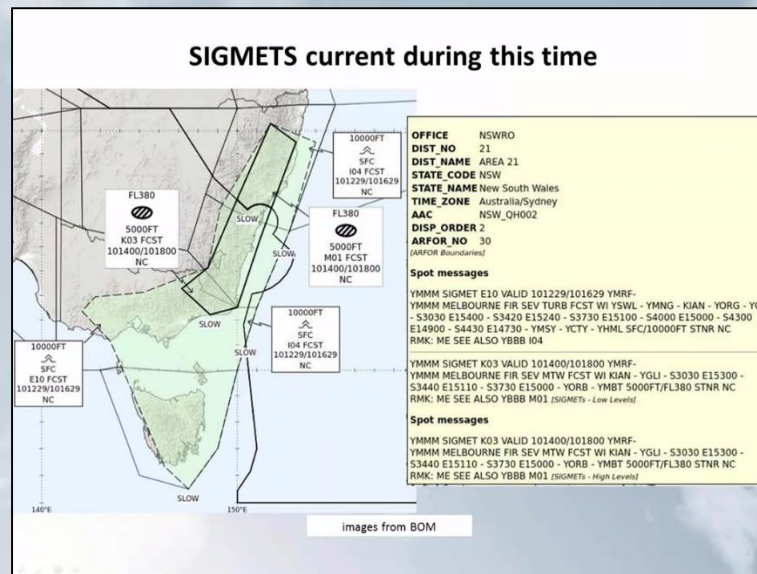
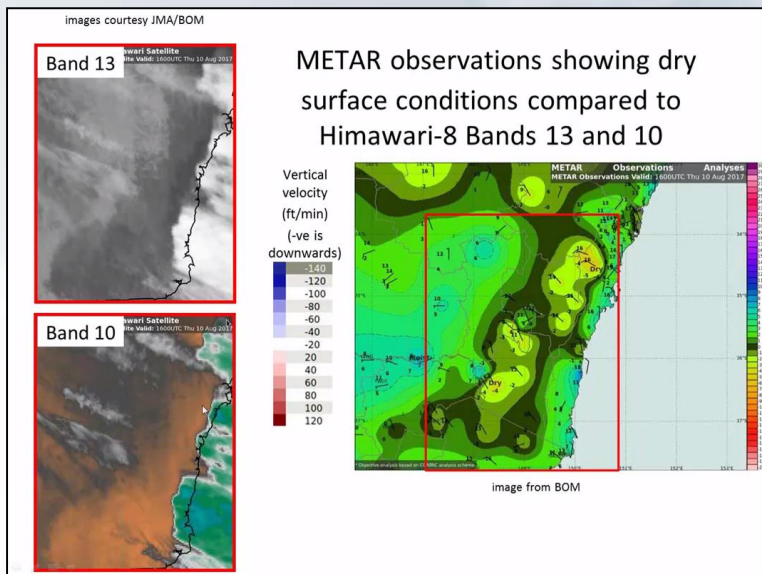
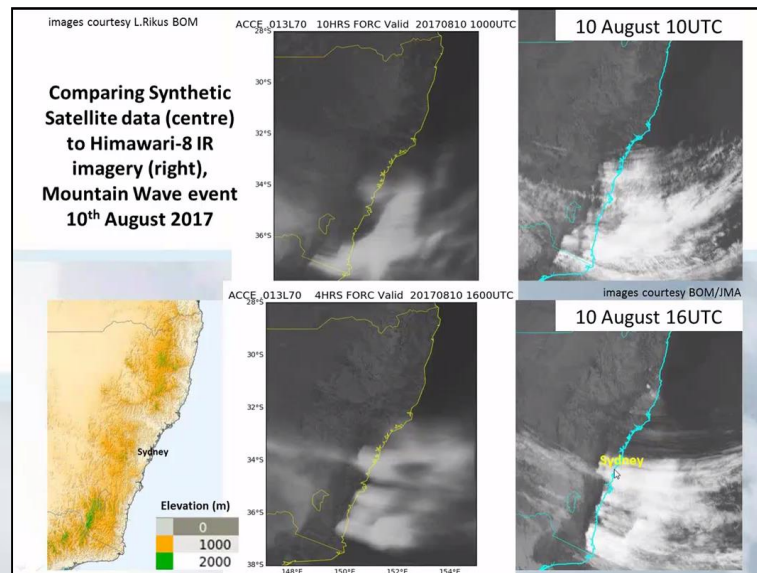
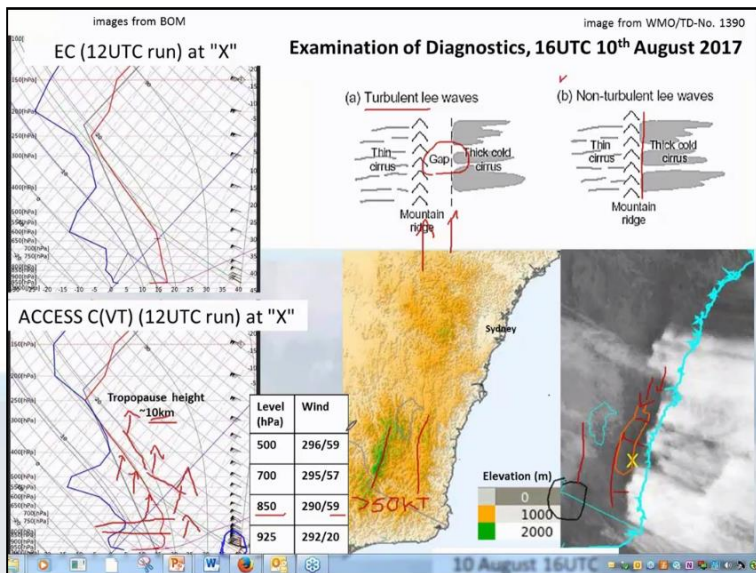
image courtesy BOM/JMA

Socrative question 3: Which of the following statements are true for this case study? Choose all that apply

- A. The herringbone pattern in the waves indicates a good chance of moderate/severe turbulence.
- B. The herringbone pattern in the waves indicate that there is only light turbulence.
- C. Winds are at a nearly normal direction to ridgetop level. They are also 40-45 knots in strength, indicating potential severe turbulence
- D. The water vapour channel shows mountain waves in areas not evident in the True Colour visible image.
- E. The waves are likely to be untrapped
- F. The waves are likely to be trapped

Turbulent lee waves case study

Regional Focus Group meeting 17th August 2017



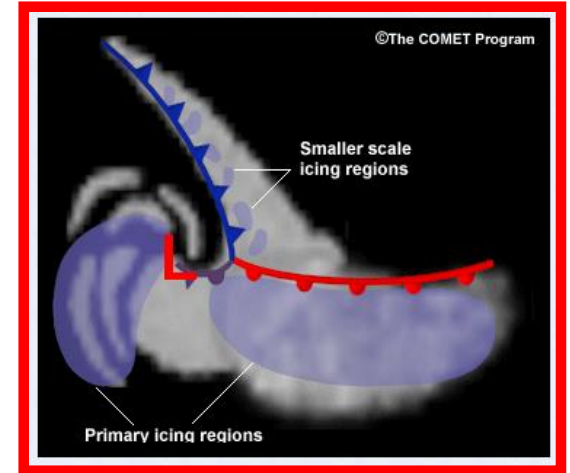
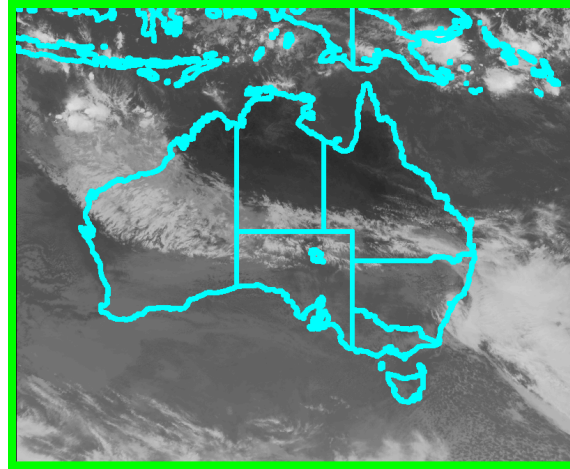
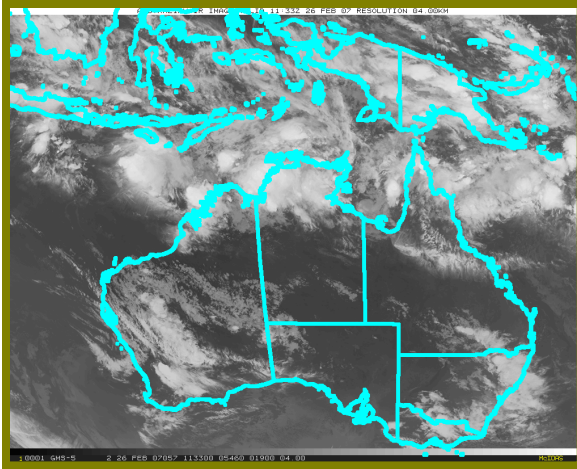
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Areas of increased icing threat are common with:



Troughs **Upslide flow** **Frontal Boundaries**
Lows / TC's **Thunderstorms**
Orographic uplift **Airmass blocking**

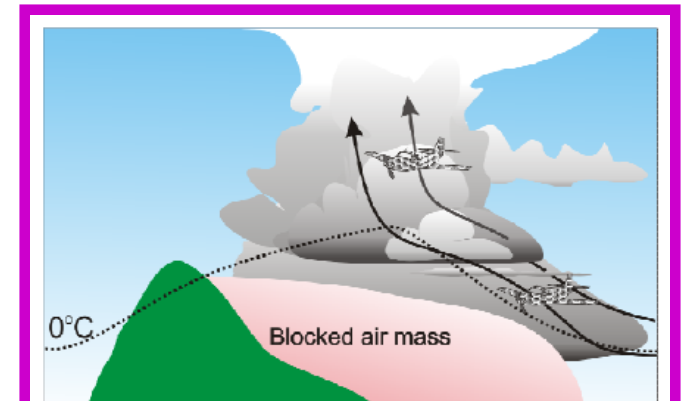
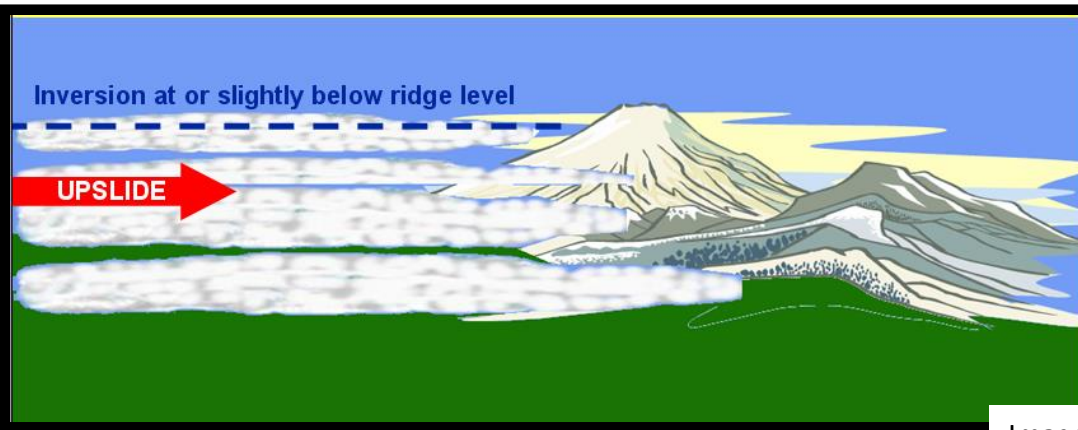
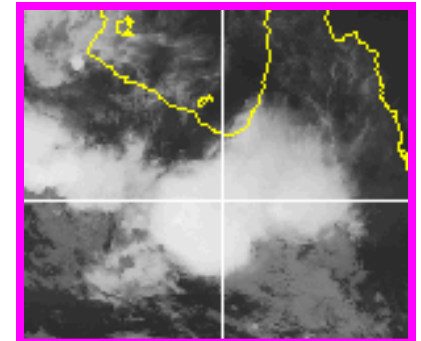
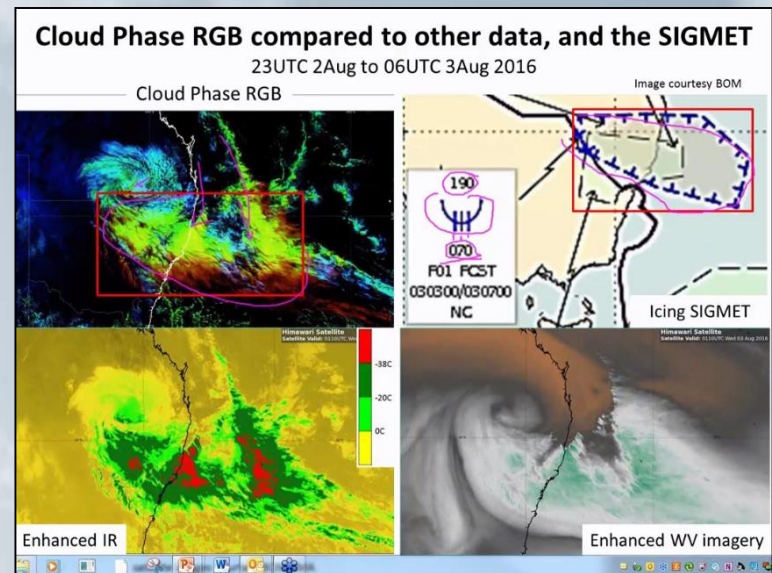
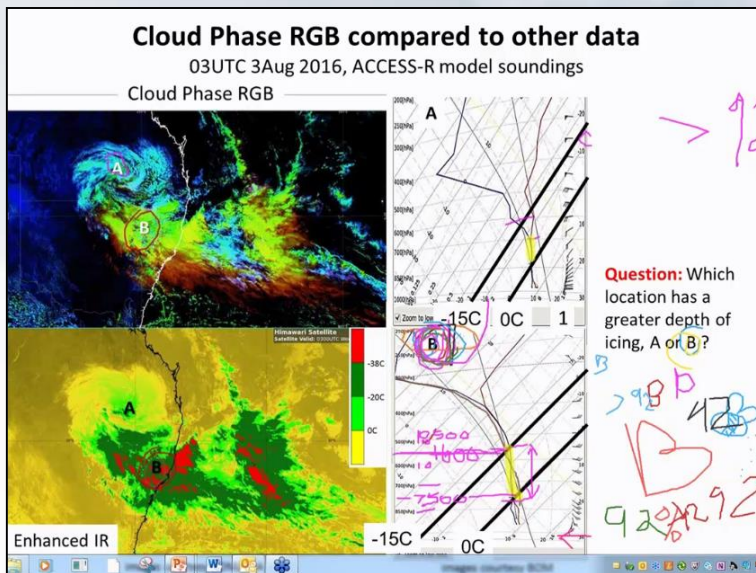
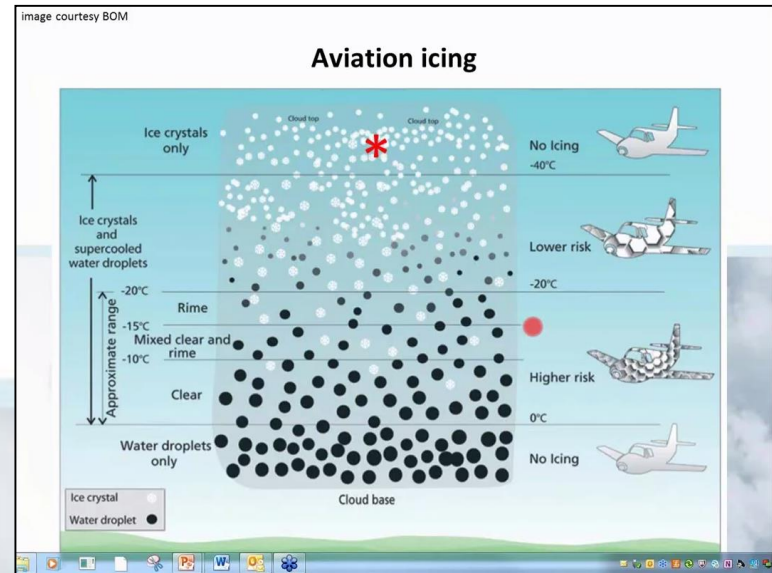
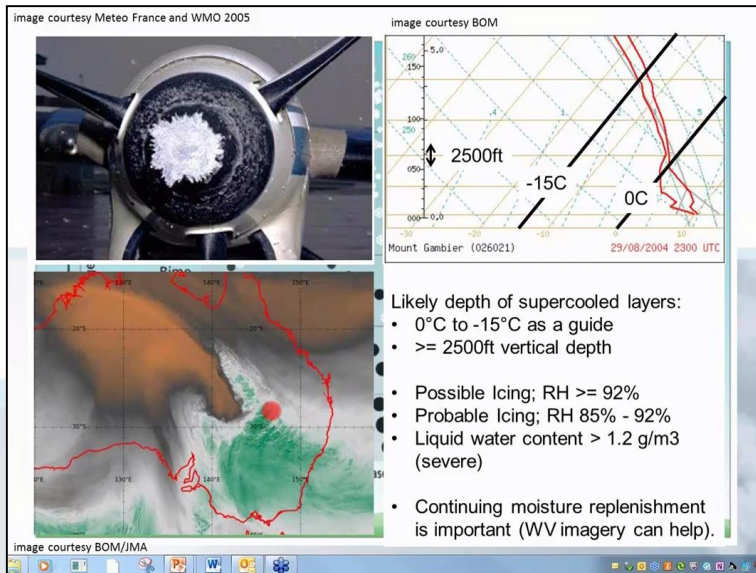


Image courtesy BOM, satellite images courtesy BOM/JMA

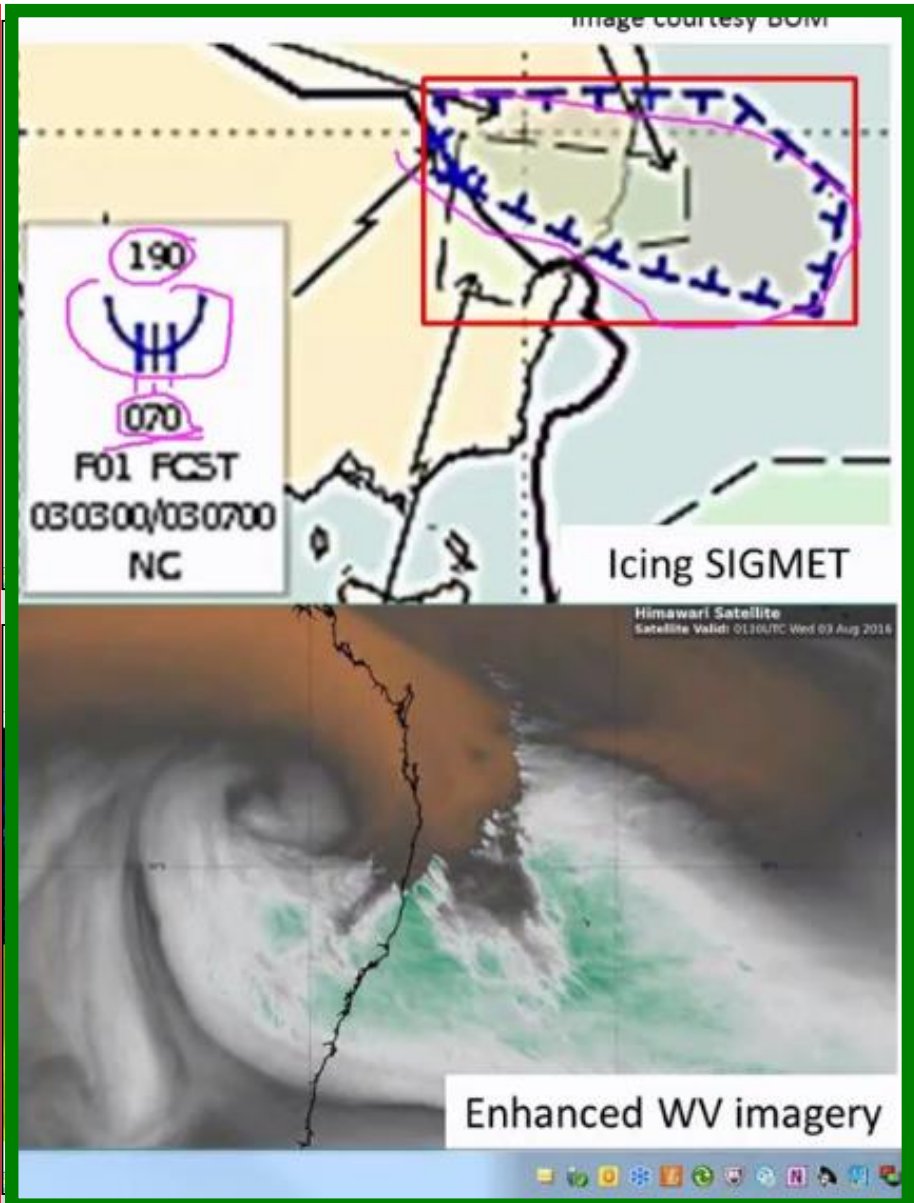
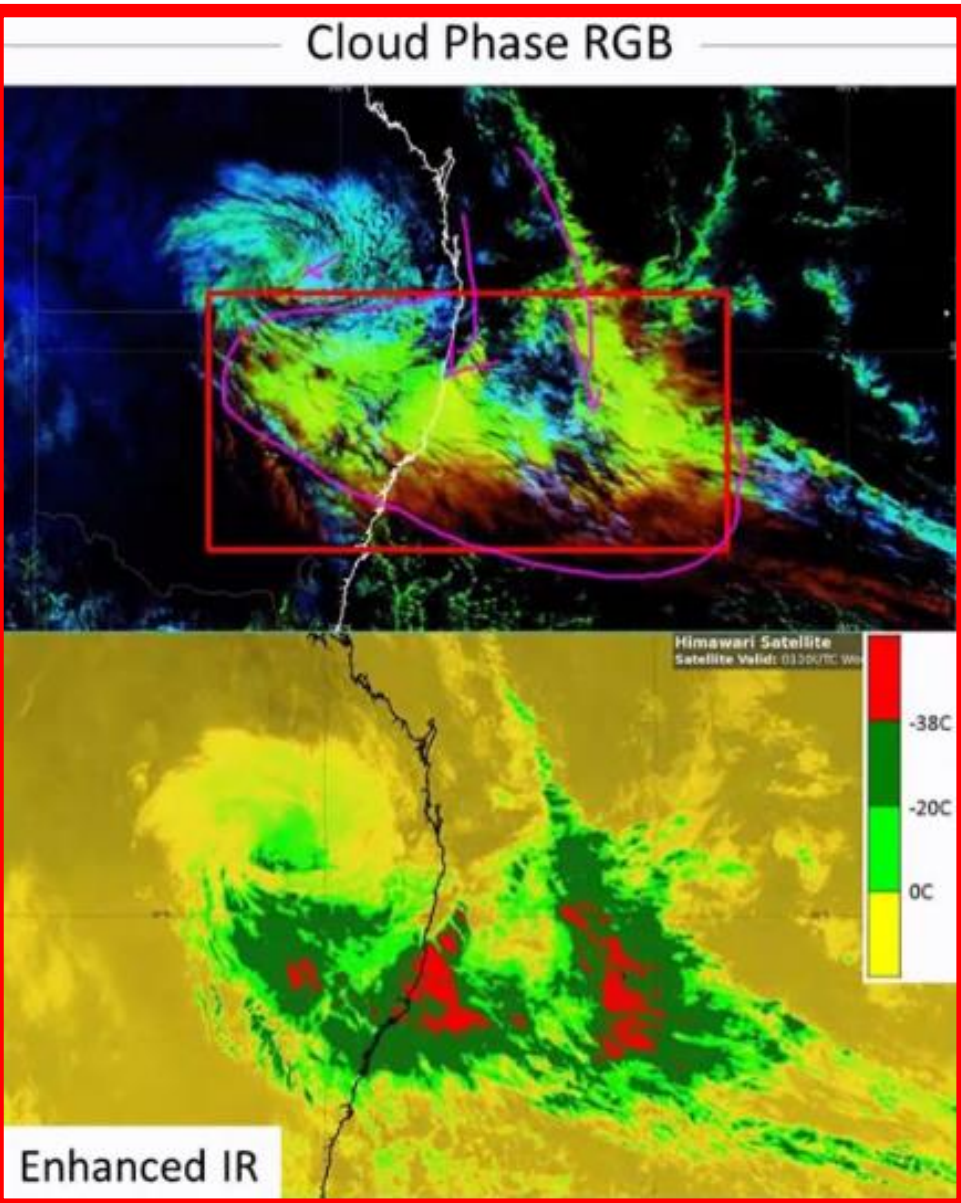
Icing case study

Regional Focus Group meeting 6th September 2016



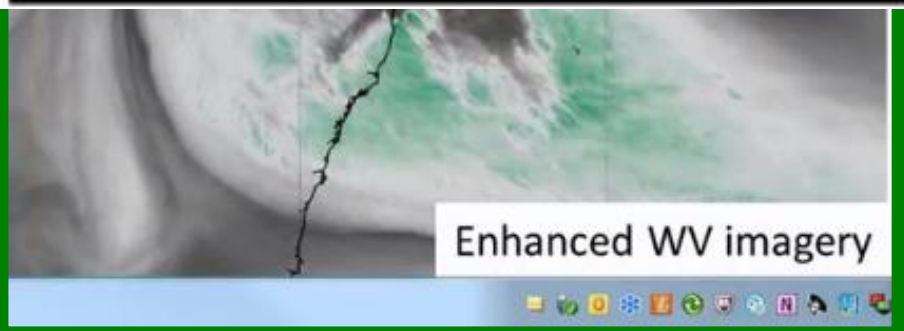
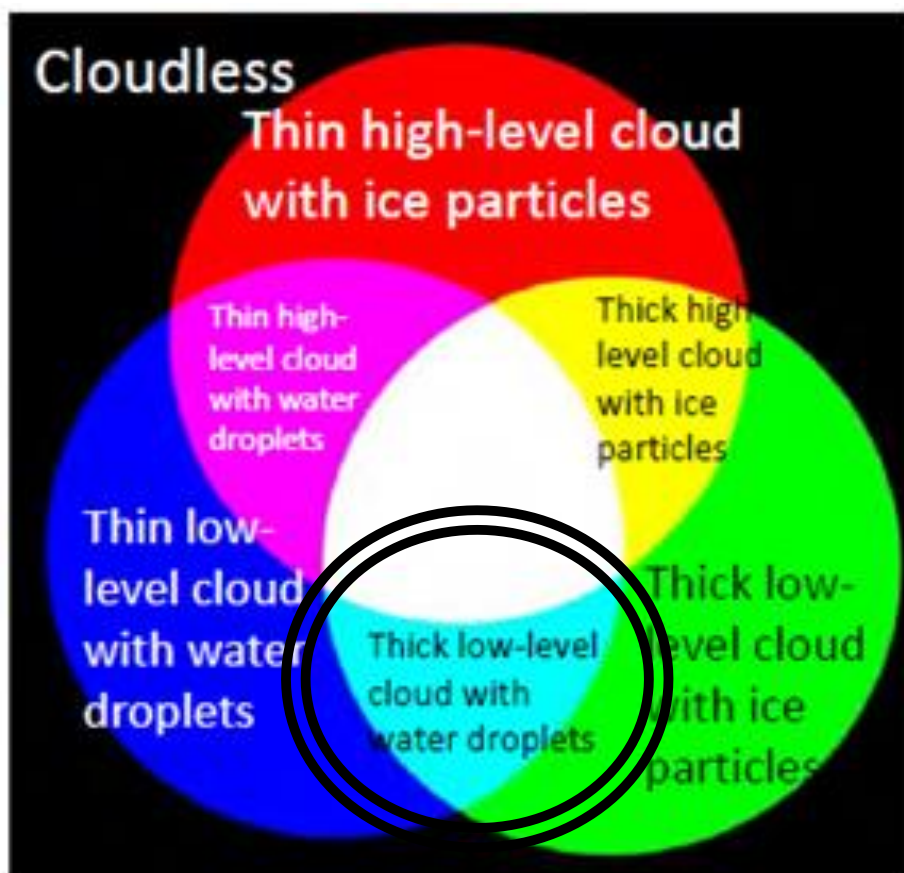
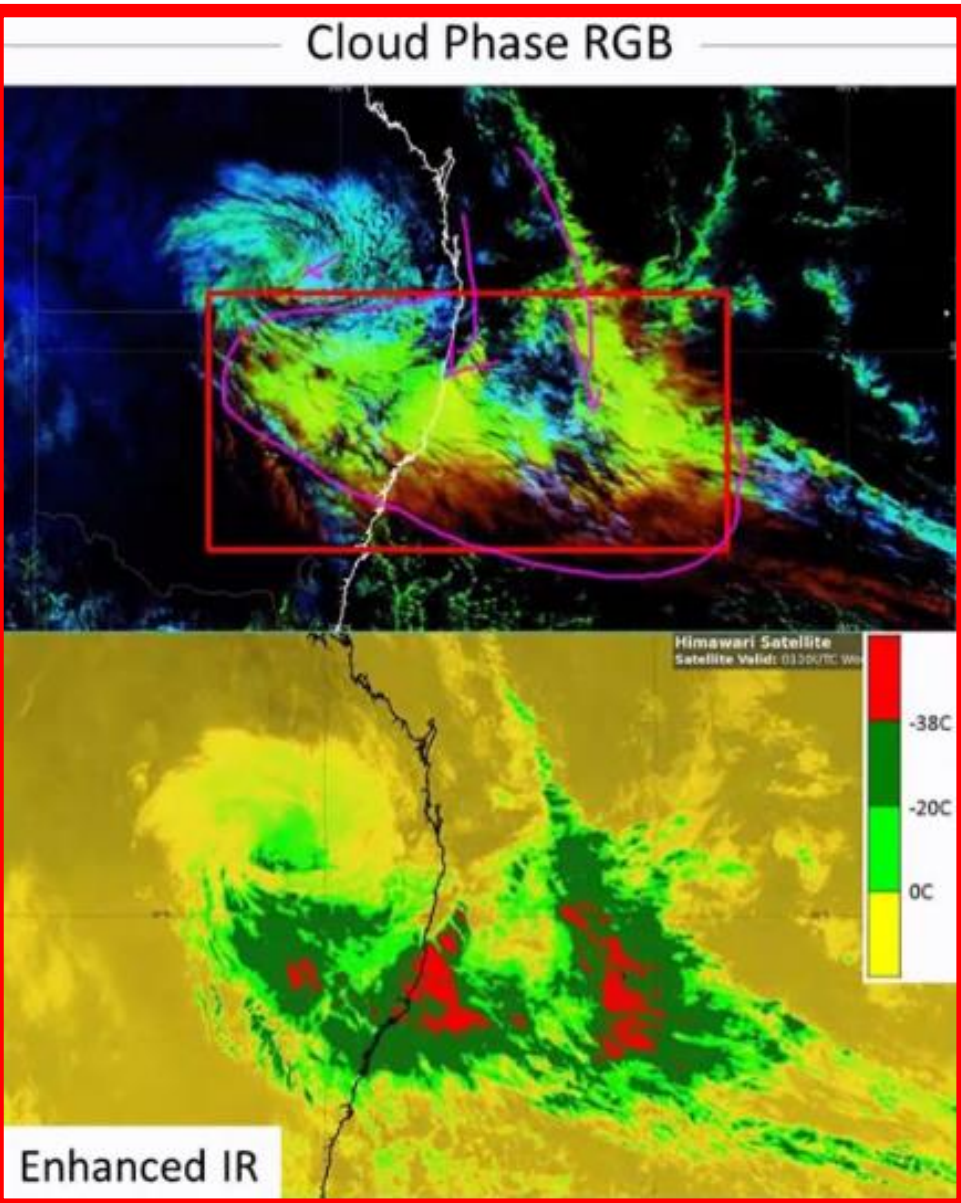
Satellite data compared to SIGMET – trialling a new RGB composite

Regional Focus Group meeting 6th September 2016



Satellite data compared to SIGMET – trialling a new RGB composite

Regional Focus Group meeting 6th September 2016



Additional Aviation Icing case studies

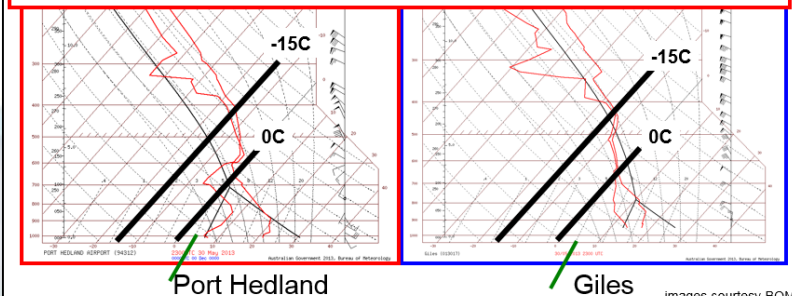
<http://www.virtuallab.bom.gov.au/archive/science-week-2013/subjectsandcomments/>

 Melbourne VLab Centre Of Excellence 						
Home Subjects Products Events Training Blog News Archive Links Contact Us						
Science Week 2013 - Subjects & Comments						
Time (E ST)	Time (UTC)	Monday 22nd July	Tuesday 23rd July	Wed. 24th July	Thursday 25th July	Friday 26th July
0930	2330	Welcome and Introduction Duncan Tipkins	70/20/10: What does it mean for me? Duncan Tipkins	Oklahoma Tornadoes of 2013 Jim Ladue	Preparations for Himawari 8/9 Bodo Zeschke	Tips on conducting effective briefings to Emergency Managers Joe Courtney
-	-	QUESTION 8, COMMENTS AND FEEDBACK HERE	QUESTION 8, COMMENTS AND FEEDBACK HERE	QUESTION 8, COMMENTS AND FEEDBACK HERE	QUESTION 8, COMMENTS AND FEEDBACK HERE	QUESTION 8, COMMENTS AND FEEDBACK HERE
1030	0000				Resources RCCA_Heat_Thunderstorm.gif	
1100	0100	Current trends in Fog and Low Cloud detection Bodo Zeschke	Forecast Demonstration Project 2014 Peter Steinle	Water Vapour Imagery and Aviation Hazards Bodo Zeschke	Latest OOF Developments Phil Riley/ Tim Hume	ACCES 8-TC and CAWCR TC research Noel Davidson
-	-	QUESTION 8, COMMENTS AND FEEDBACK HERE	QUESTION 8, COMMENTS AND FEEDBACK HERE	QUESTION 8, COMMENTS AND FEEDBACK HERE	QUESTION 8, COMMENTS AND FEEDBACK HERE	QUESTION 8, COMMENTS AND FEEDBACK HERE
1200	0200					
1330	0330	Tsunami forecasting and warning: recent developments and future plans Stewart Allen	Rainfields2 (quantitative radar based rainfall estimates) - quality control and verification Alan Seed	Volcanic Ash and dusting monitoring with Geostationary satellites (filesize 4 Mo) Yukio Kurihara (JMA) Resources (please download these movies prior to the session) movie1_bdt_shinmo.gif movie1_bdt_shinmo.avi movie2_shinmo.gif movie2_shinmo.avi movie3_jmerapi.gif movie3_jmerapi.avi	ACCES 8 AP 81 model - an operational focus Jim Fraser	Surface wind estimation using rapid scan AMVs. (filesize 36 Mo) Masahiro Hayashi (JMA) Resources (please download these movies prior to the session) R8vsOpe.gif R8vsOpe.avi AINV.gif AINV.avi AINVsASCAT.gif AINVsASCAT.avi
-	-	QUESTION 8, COMMENTS AND FEEDBACK HERE	QUESTION 8, COMMENTS AND FEEDBACK HERE	QUESTION 8, COMMENTS AND FEEDBACK HERE	QUESTION 8, COMMENTS AND FEEDBACK HERE	QUESTION 8, COMMENTS AND FEEDBACK HERE
1430	0430					

Port Hedland and Giles balloon soundings

Western Australia

Question – does the Giles sounding show worse icing conditions than Port Hedland ?
Worse icing Same icing Less icing



images courtesy BOM

Comparison with SIGWX prognosis chart

Indonesia

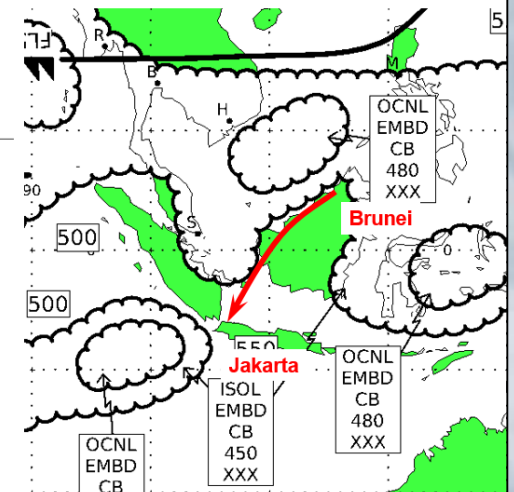
ISSUED BY WMO LONDON
C LONDON
SYNOPTIC CHART
SIGWX
30
VALID 00 UTC 06 JUL 2013

QUESTION – what would you do ?

A: issue a SIGMET for Icing for the identified area.

B: issue a SIGMET for embedded Cb for the identified area.

C: Don't worry. The forecast is close enough !



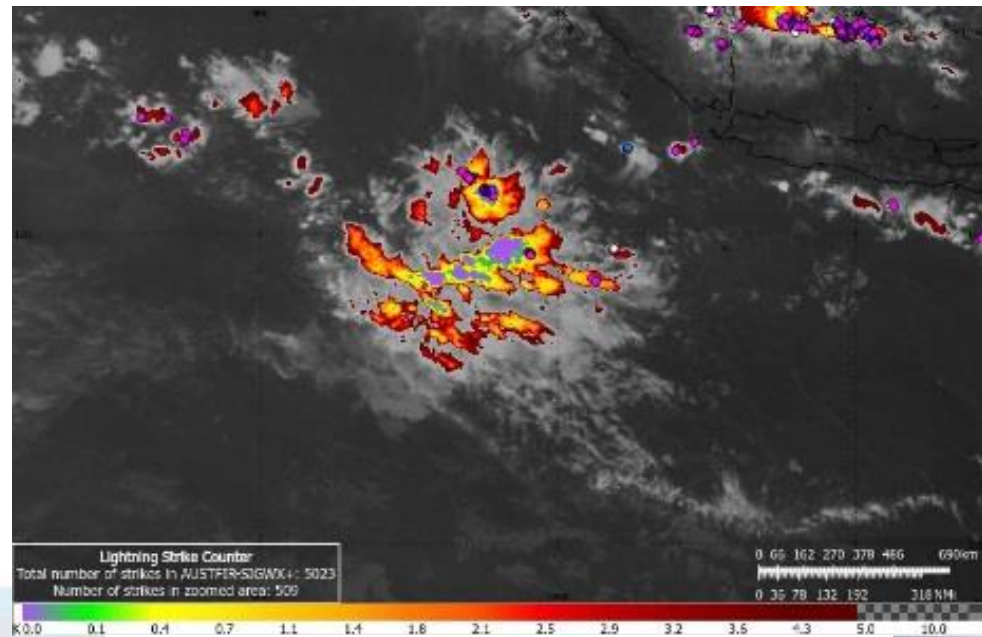
Content of this session

The Australian VLab Centre of Excellence Regional Focus Group meetings

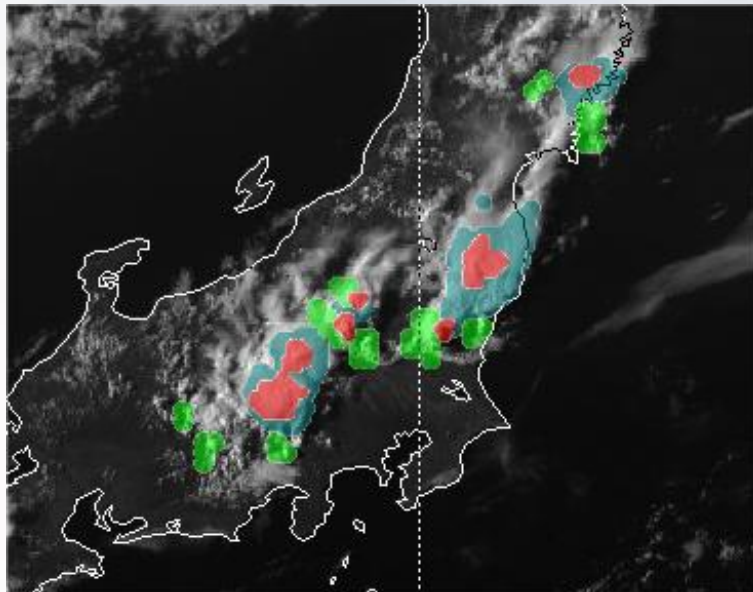
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- **Thunderstorm case studies with reference to aviation forecasting procedures and products**

Using Himawari-8 data to analyse convective development significant to aviation by BNOC and others



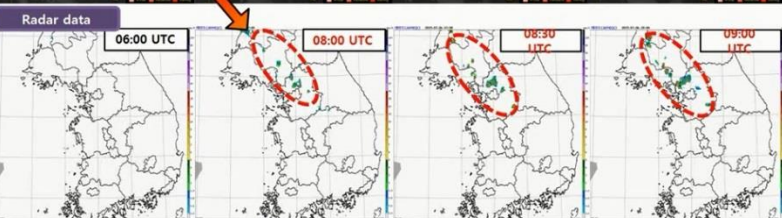
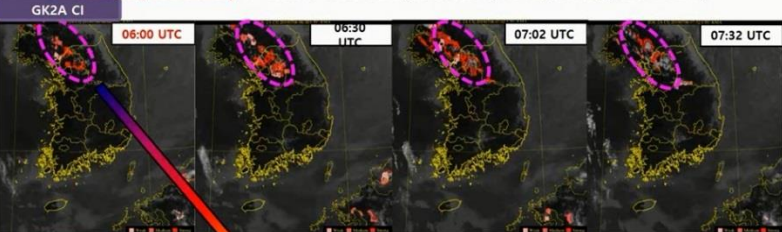
Monitoring tool (IR-WV) BNOC



Convective Initiation (CI)

6 July 2019

■ CI Forecast (06:00 UTC) → Radar ≥ 35 dBZ (07:50 UTC) → Lightning (09:10 UTC)



National Meteorological Satellite Center

20

KMA Convection Initiation algorithm

Storm-Top Features identified in high resolution satellite data

Australian Vlab CoE Regional Focus Group meeting of January 2016

<http://www.virtuallab.bom.gov.au/archive/regional-focus-group-recordings/>

21 January 2016 Regional Focus Group meeting

Some highlights of the EUMETSAT-CHMI Course on the use of Rapid Scan data for monitoring and nowcasting of High Impact Weather. Resources adapted to Himawari-8 data.

- Introduction, different speeds of rapid scan, satellite image products. Working through exercises 1-3 26 minutes duration (59Mb .wmv file) (75Mb .mp4 file)
- **Types of stormtop features and associated severe weather. Working through exercises 4 and 5 24 minutes duration (54Mb .wmv file) (79Mb .mp4 file)**
- **Overshooting Top detection / Convection Initiation algorithm resources. Summary. 4 minutes duration (4Mb .wmv file) (8Mb .mp4 file)**

Please download the following animations prior to

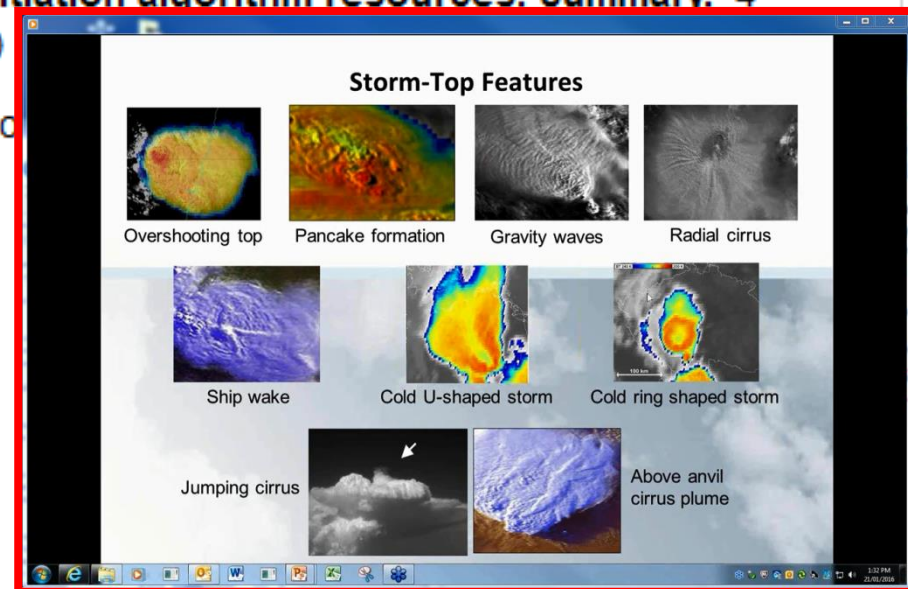
Animation 1 (11Mb)

Animation 2 (14Mb)

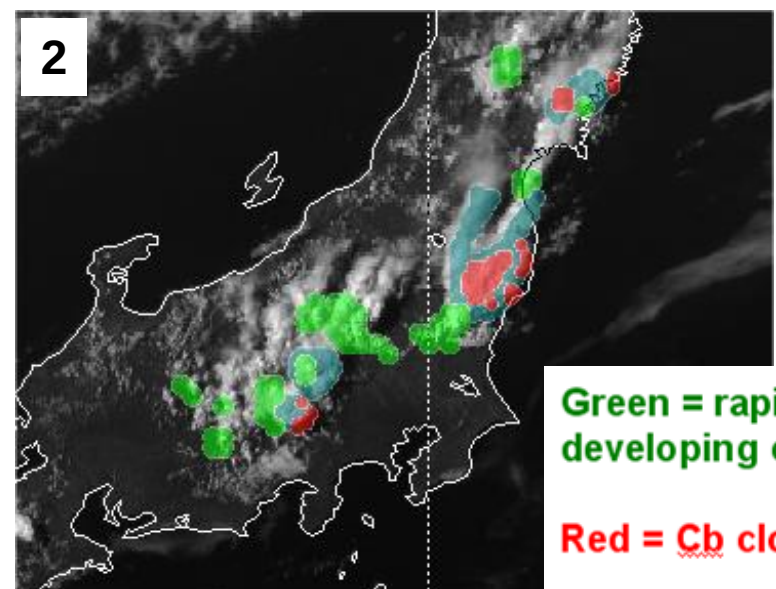
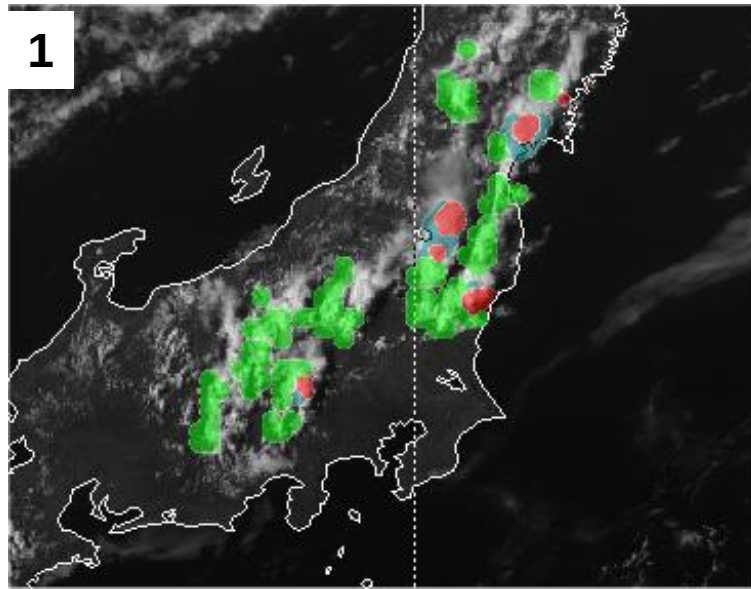
Animation 3 (15Mb)

Animation 4 (14Mb)

Animation 5 (12Mb)

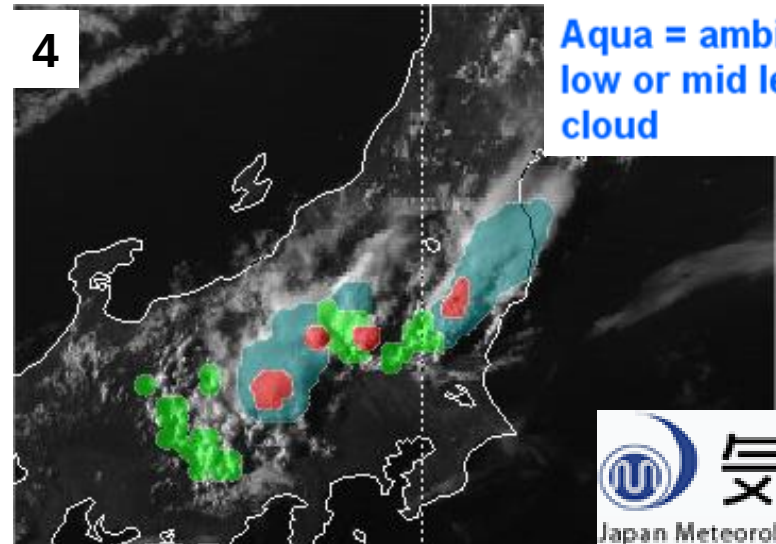
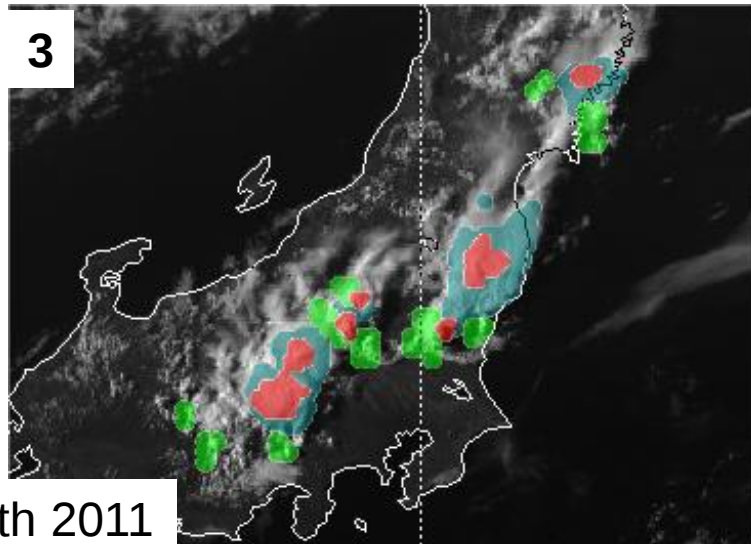


RDCA convective cloud detection algorithm (JMA)



Green = rapidly
developing cloud.

Red = Cb cloud.



Aqua = ambiguous
low or mid level
cloud

July 10th 2011

References for the Rapidly Developing Cumulus Areas (RDCA) product of JMA

<http://www.virtuallab.bom.gov.au/events/science-week-2014/>



Australian Government
Bureau of Meteorology

Melbourne VLab Centre Of Excellence



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Home > Events > Science Week 2014 > Science Week Session Recordings

Science Week 2014 - Session Recordings

Recordings of selected sessions of "Science Week 2014" are given below. These recordings are available for download. Please download the file before playing it (right mouse click on the link, then "Save Target As...").

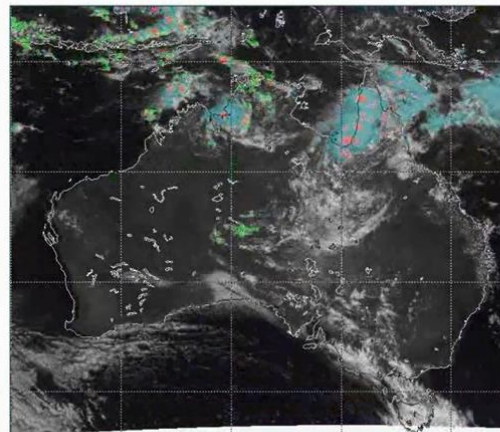
Tuesday 29th July (52 MB)	Welcome and Introduction (Mr Du) Himawari 8/9 and the Forecaster (BMTc) A broad overview including data and Derived Products
Tuesday 29th July (56 MB)	Status of future satellite programs Japan Meteorological Agency, JMA - Data and data dissemination. Current status of Himawari 8/9 products - Planned Satellite Products for - Baseline cloud products, RDCA products, Dust products, RGB products
Tuesday 29th July (77 MB)	First Practical Session - Using Rapid Scan Imagery (Facilitator: Mr. Bodo Zeschke, BMTc) - Forecaster feedback pertaining to - Two rapid scan case studies (- Alerts
Tuesday 29th July (88 MB) Mountain Waves in MODIS imagery (Uhlenbrock et al. 2007)	Second Practical Session - Exploring Himawari 8/9 water vapour channels (Facilitator: Mr. Bodo Zeschke, BMTc) - Utilising the three water vapour channels on Himawari 8/9 for detecting mountain wave turbulence - Case study using MODIS water vapour channels - Case study using rapid scan imagery to monitor mountain waves.
Tuesday 29th July (88 MB)	Third Practical Session - Red-Green-Blue (RGB) products (Facilitator: Mr. Bodo Zeschke, BMTc)

Meteorological Satellite Center (MSC) of JMA

Rapidly Developing Cumulus Area (RDCA)



February 3, 2014 Two cyclones in Australia



2014/07/29 Current status of Himawari-8/9 products development

- RDCA product detects area of rapid developing cumulus with thunder or area of disturbance to occur in near future.
- RDCA detection
 - 0.1 degree grid
 - Only daytime (Sun zenith angle < 75°)
 - 10min interval

■ Cumulonimbus

■ Rapidly Developing Cumulus

■ Mid/Low cloud unknown

■ Evening / night

CI and RDT methods of KMA, for use by Aviation

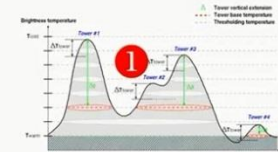
Regional Focus Group meetings
May 2017, October 2019

May 2017

Process of RDT

STEP1: Detection (in order to detect cells)

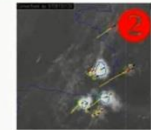
- Using vertical profile of 10.8 μ m BT
- Cells (towers) are detected at each slot
- Vertical extension: at least 6°C



STEP2: Tracking (in order to recognize each cell in the previous slot)

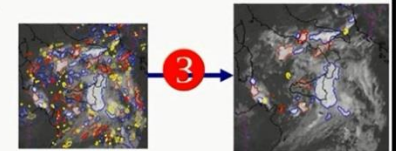
- Analysis of cloud cells overlap: each cell of the previous slot is advected
- Merges and splits are taken into account
- Trends of various parameters are calculated

6.	Max_TxTmin15
7.	Max_TxTmin30
8.	Max_TxTmin45
9.	Max_TxTmin60

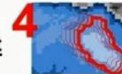


STEP3: Discrimination (in order to identify convective cells). Statistical process

- Made complex by the unbalanced populations, the wide variety of scales and evolution-phases of systems
- Highly improved by the use of a set of 5 IR-channels as predictors, by the use of NWP data
- Very highly improved by the use of lightning data



STEP4: Forecast

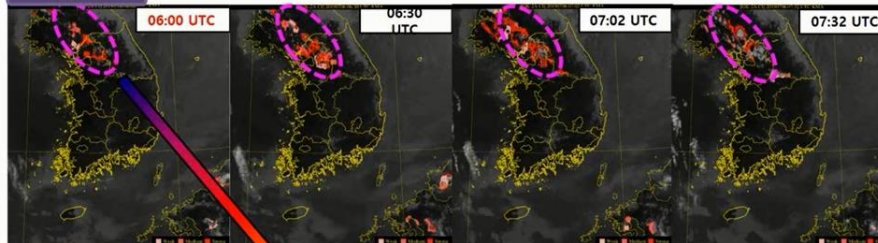


Convective Initiation (CI)

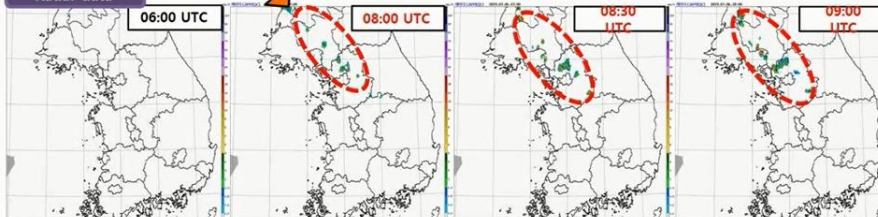
6 July 2019

■ CI Forecast (06:00 UTC) → Radar ≥ 35 dBZ (07:50 UTC) → Lightning (09:10 UTC)

GK2A CI



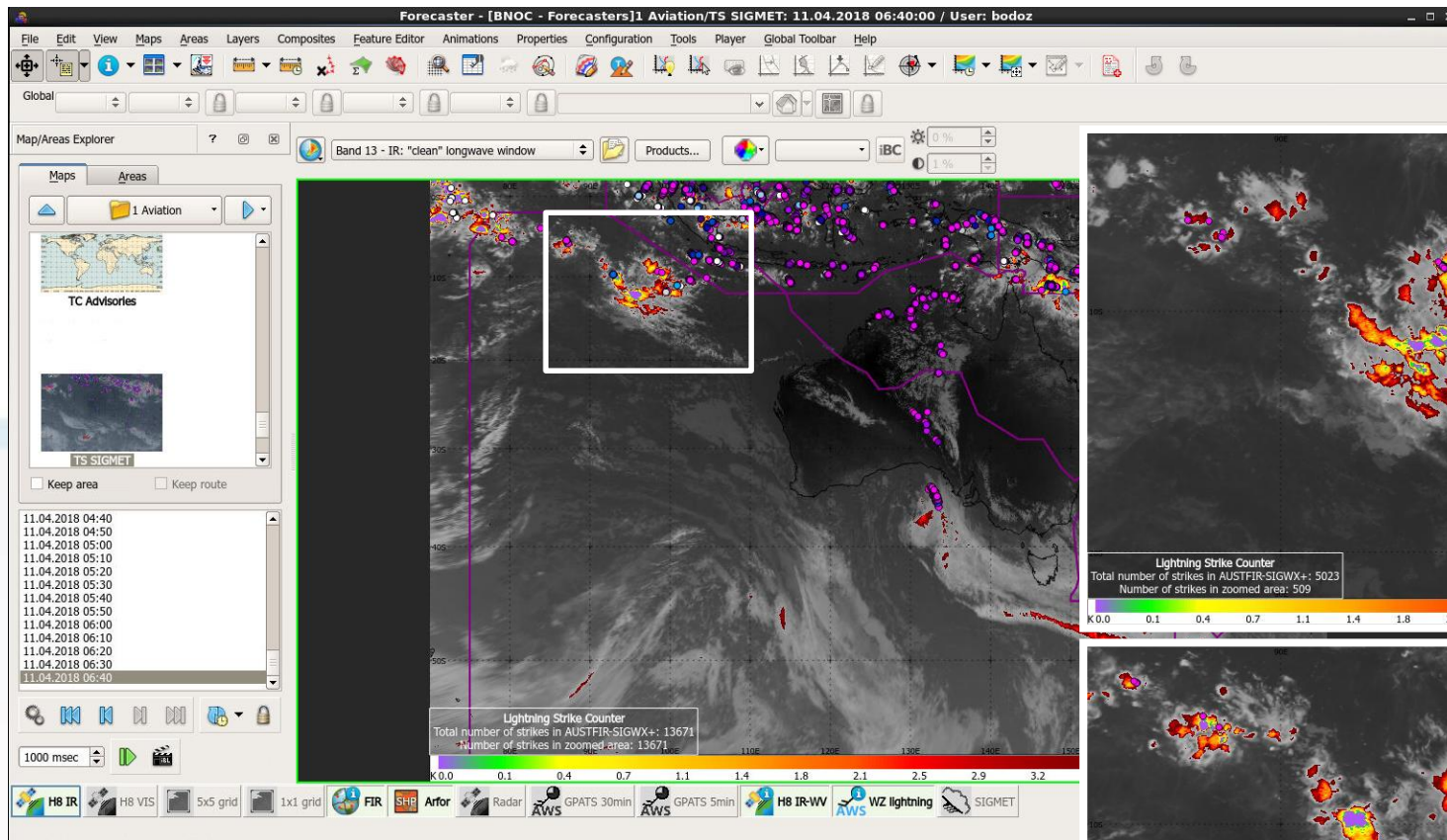
Radar data



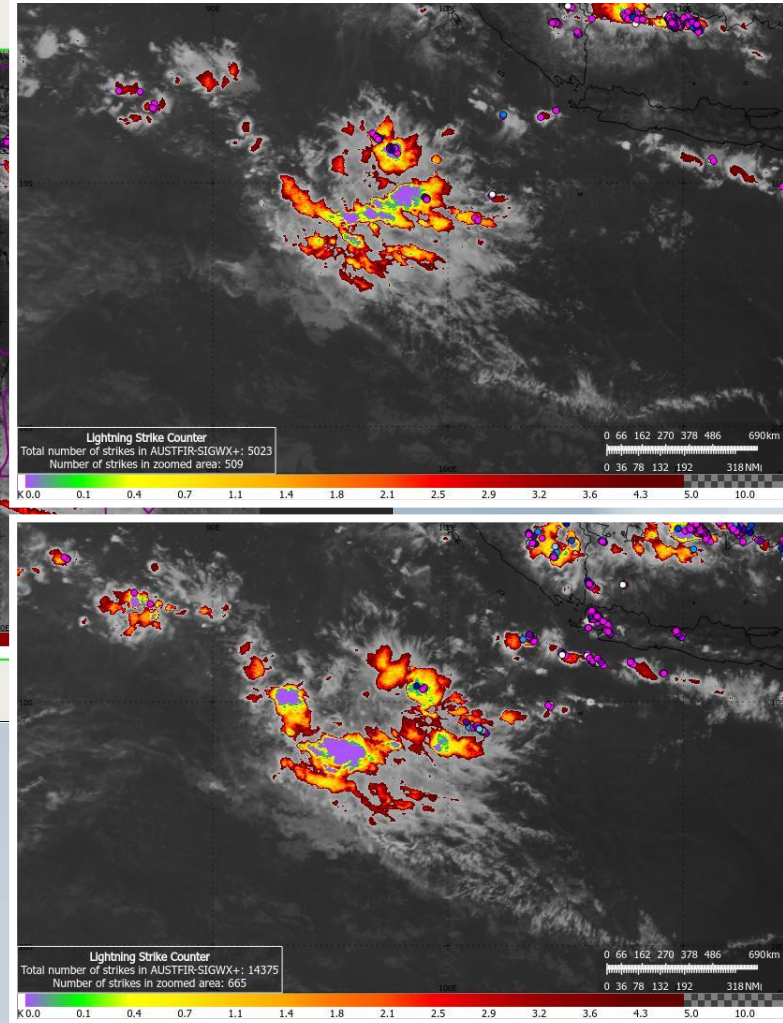
October 2019

BNOC monitoring of severe weather for SIGMET

(utilising Himawari-8 IR (Ch 13) – WV (CH 8))

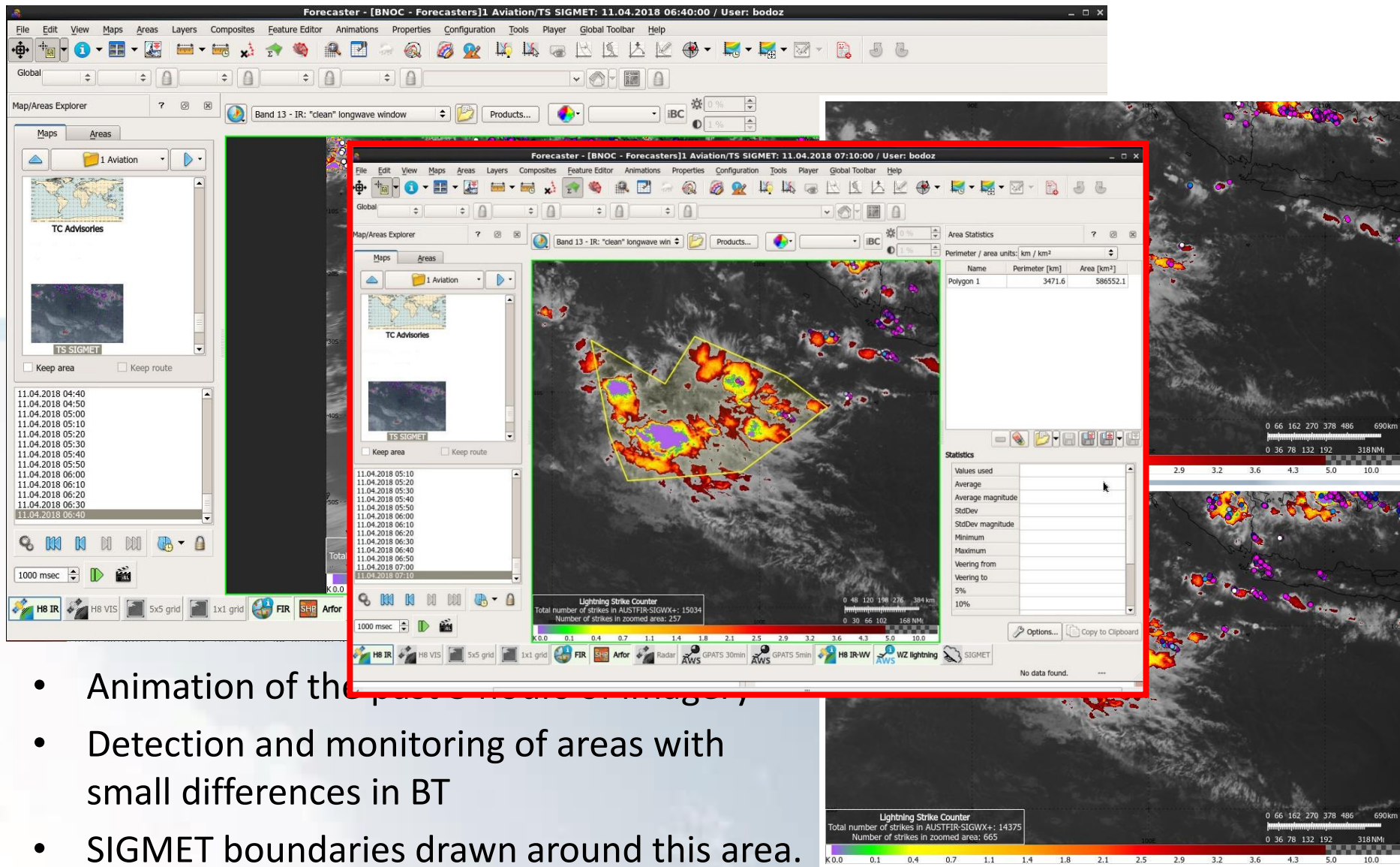


- Animation of the past 3 hours of imagery
- Detection and monitoring of areas with small differences in BT
- SIGMET boundaries drawn around this area.



BNOC monitoring of severe weather for SIGMET

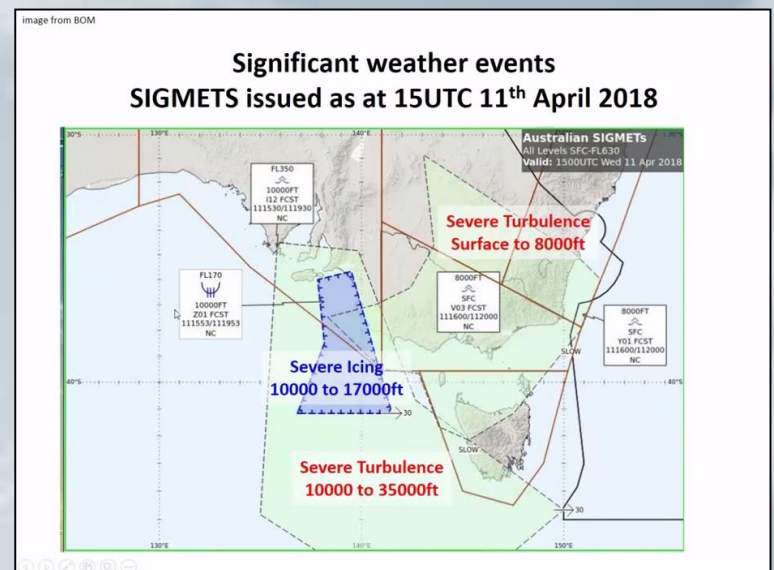
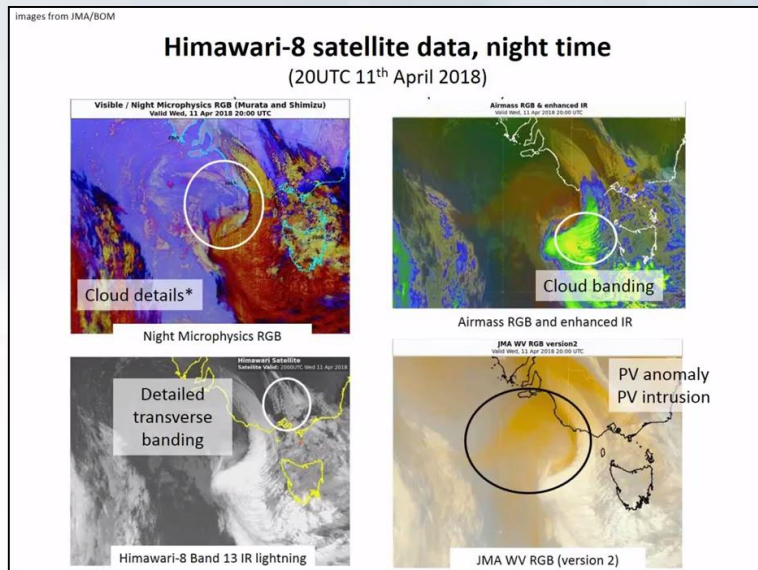
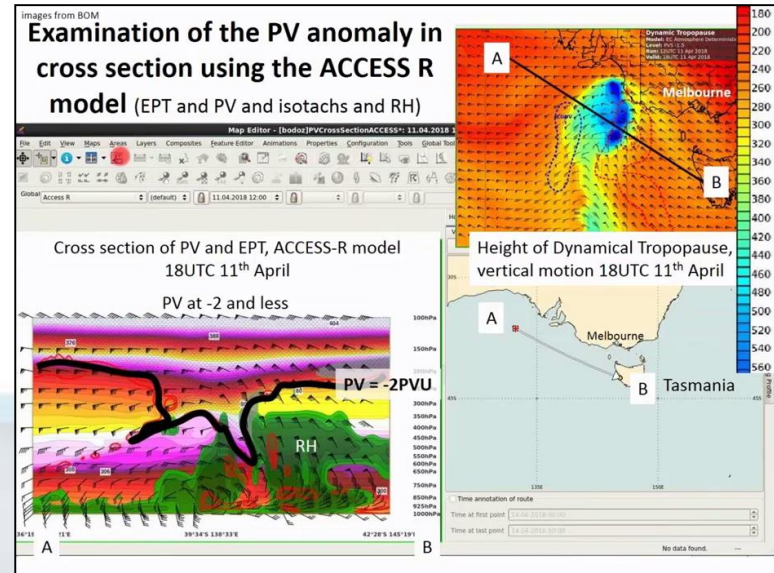
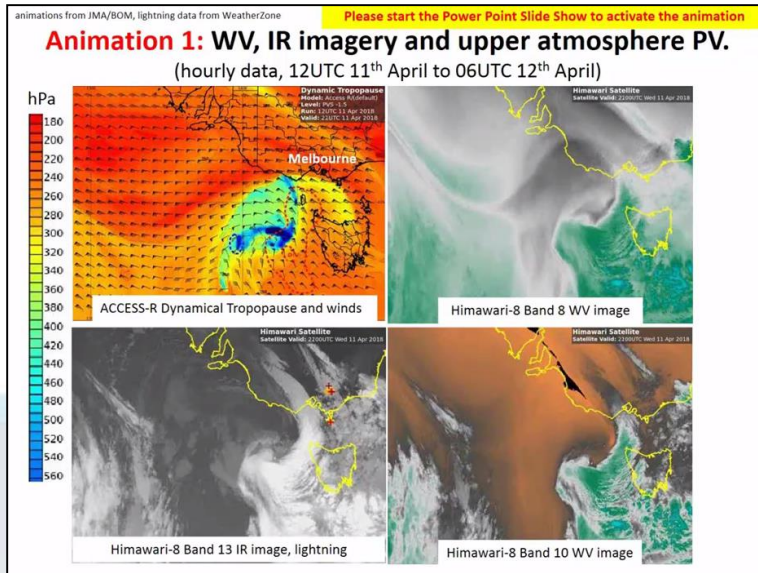
(utilising Himawari-8 IR (Ch 13) – WV (CH 8))



- Animation of the severe weather system
- Detection and monitoring of areas with small differences in BT
- SIGMET boundaries drawn around this area.

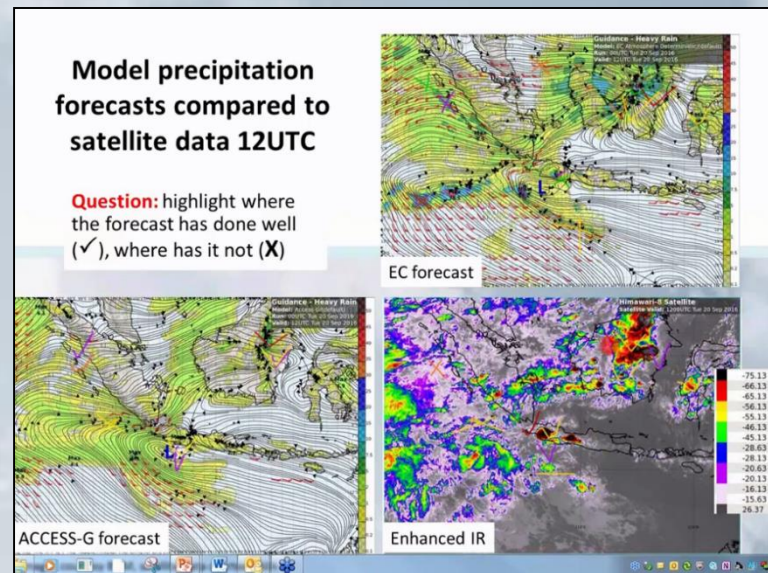
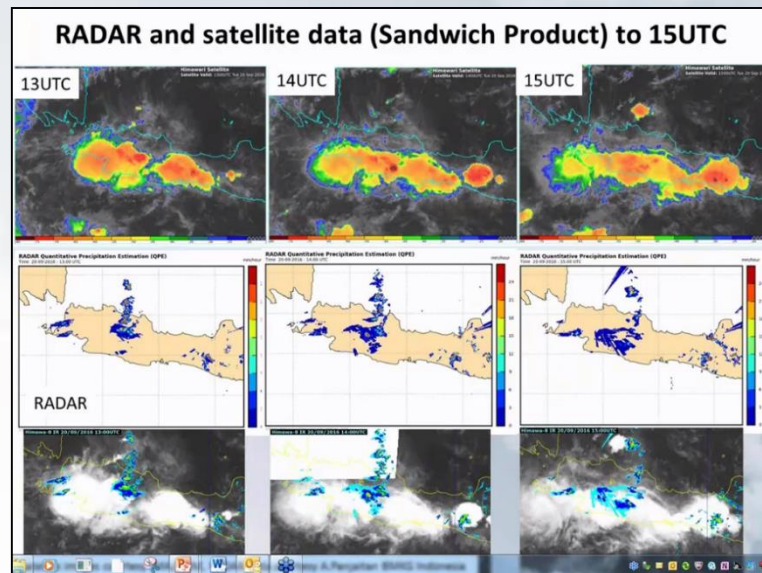
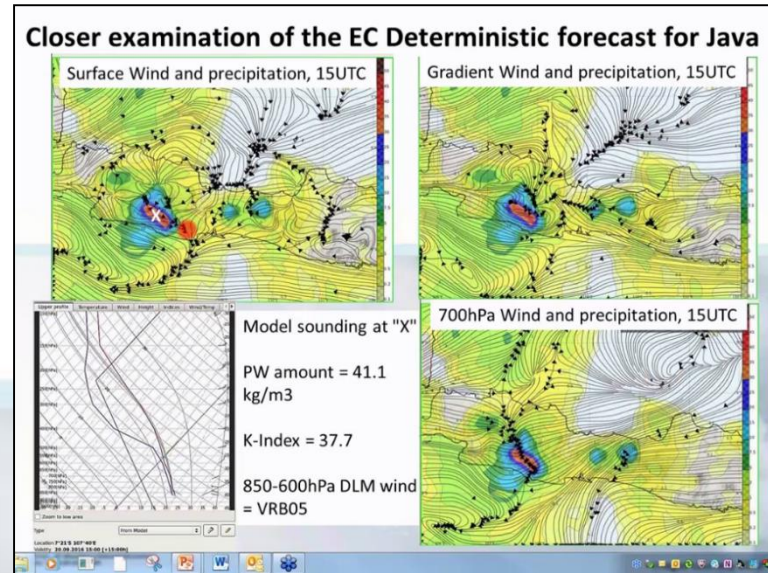
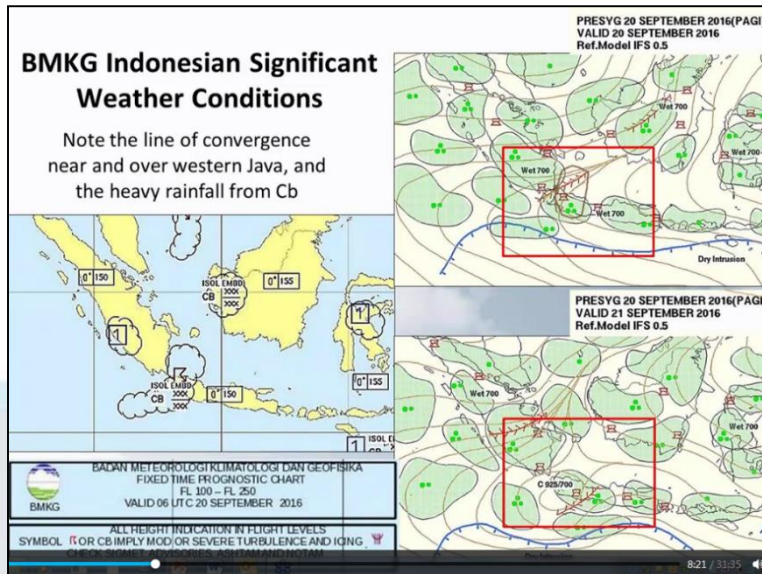
PV anomaly and associated convection, turbulence, icing

Regional Focus Group meeting 28th June 2018



Deep convection and heavy precipitation study

Regional Focus Group meeting October 2016



Socrative question 4: Do you think these VLab resources would be useful to you? Give reasons

Write your answer into the space provided

Summary

The 6 years of Australian VLab Centre of Excellence Regional Focus Group meetings

Recordings of 75 Regional Focus Group meetings as a resource.

We have examined resources pertaining to:

- Aviation turbulence case studies
- Aviation icing case studies
- Thunderstorm case studies with reference to aviation forecasting procedures and products