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# Australian ATFM Meteorological Information

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## Topics

- Australian ATFM
- MET CDM
- Case study
- Impacts of COVID-19



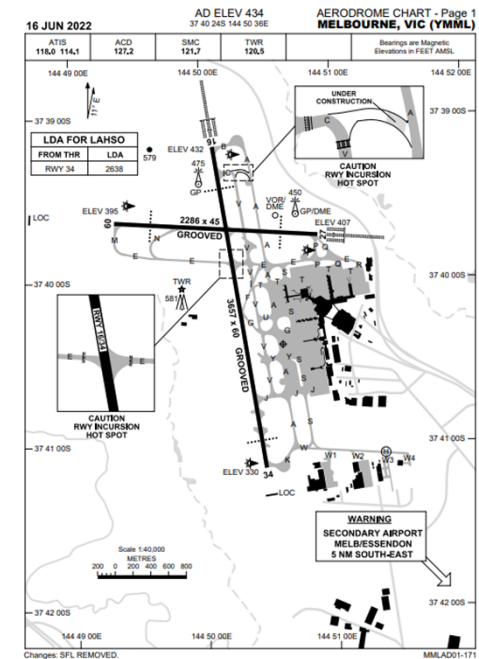
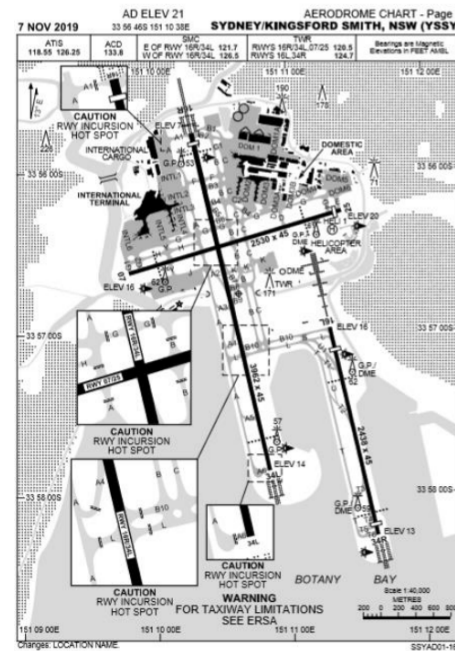


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# The need for MET-CDM



- Weather is the key driver of capacity reduction at Australia's major aerodromes
- Even in VMC, airports as Sydney KSA and Melbourne can experience up to 50% reductions in capacity due to unfavourable wind directions.
- These variations in capacity cause major disruptions and airlines like to plan and adjust schedules a day ahead to inform passengers of changed itineraries
- Strong need for ATFM decision making to be driven by detailed and accurate weather forecasts that are collaboratively established by key stakeholders
- No pre-existing product (e.g. TAF) meets these requirements





# What is MET-CDM?



- MET-CDM → Meteorological Collaborative Decision Making
- Collaborative weather decisions made with Bureau Forecasters and Airline Meteorologist (1)
- Collaborative weather forecast is translated into Airport Arrival Rate (AAR) using set of pre-agreed Business Rules
- ATC reviews MET-CDM proposed AAR and may further adjust for operational restrictions (2)
- NCC subsequently develops Network Plan for next day including proposed ATFM measures, e.g. Ground Delay Programs (3)
- Plan is reviewed (4), discussed if required (5) and then published (6) with GDPs run for the next day
- Process repeated throughout the day of operations as required



## 1. Meteorological Assessment



## 2. Operational Assessment



## 3. Network Plan Development



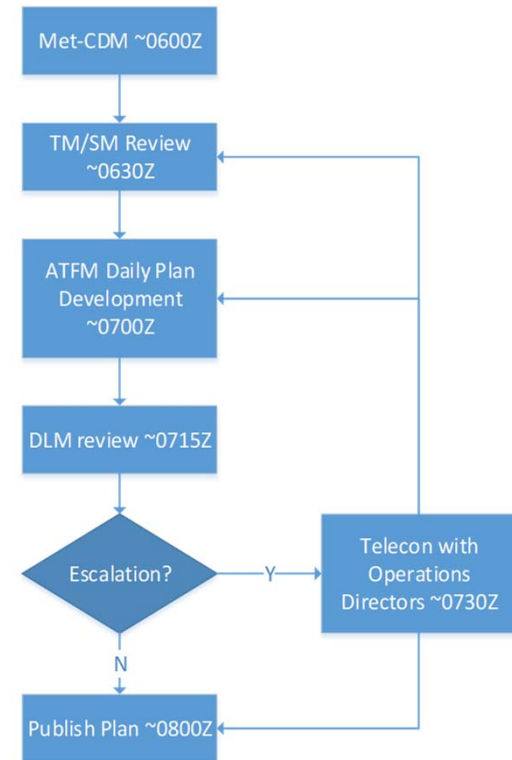
## 4. Plan Review



## 5. Escalation



## 6. Publication



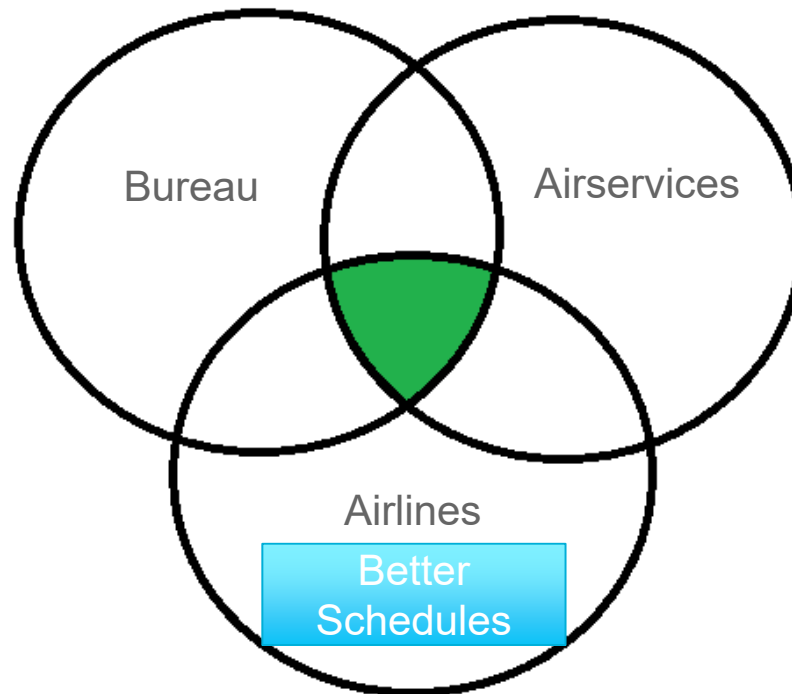
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# MET CDM

## Understanding each others business

NCC MET dedicated to ATFM

Flexible and adapting products to solve the problem



Fully transparent process

AVMET units collaborate

Transparency and better certainty



# MET-CDM Reference Cards



- Process requires people with combined expertise in meteorology and ATFM.
- Reference cards developed to date reflect the known parameters that affect traffic flows at the airports.
- They are a reflection of documentation and discussions with Airservices traffic management.
- Cards managed jointly.
- NCC MET and AV MET Units need to know the cards.



## YSSY Air Traffic Operations

Sydney is the busiest international airport in Australia consisting of twin moderately spaced parallel runways in the direction 16/34 magnetic, and a single cross runway of 07/25 magnetic.



**Curfew**  
Curfew regulates aircraft taking off and landing between the hours of 11 p.m. to 6 a.m. A limited number of specially approved take-offs and landings are permitted respectively in the 'two periods' of 1 pm to midnight and 5am, by Section 12 of the Sydney Curfew Act 1995.

**Aircraft Arrival Rates (AAR)**  
Sydney Airport has a legislated 60 aircraft movements per hour which cannot be exceeded. For arrivals Sydney Airport has the capacity 1 rate of 45 or 50 on the parallel run and 24 on the cross runway.



## YMML Air Traffic Operations

Melbourne is the second busiest international airport in Australia consisting of two intersecting runways in the direction 16/34 magnetic and 09/27 magnetic.



**Noise Abatement**  
There is no curfew at Melbourne airport. However, noise abatement procedures apply. These procedures include a preference to use runway 16 for noise abatement, particularly in the overnight

**Terminal Area (TMA)**  
This term is used to describe the designated area of controlled airspace surrounding a major airport where there is a high volume of traffic. The Terminal Area (TMA) is a 30km radial area

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# Example Use Case (Sydney KSA)

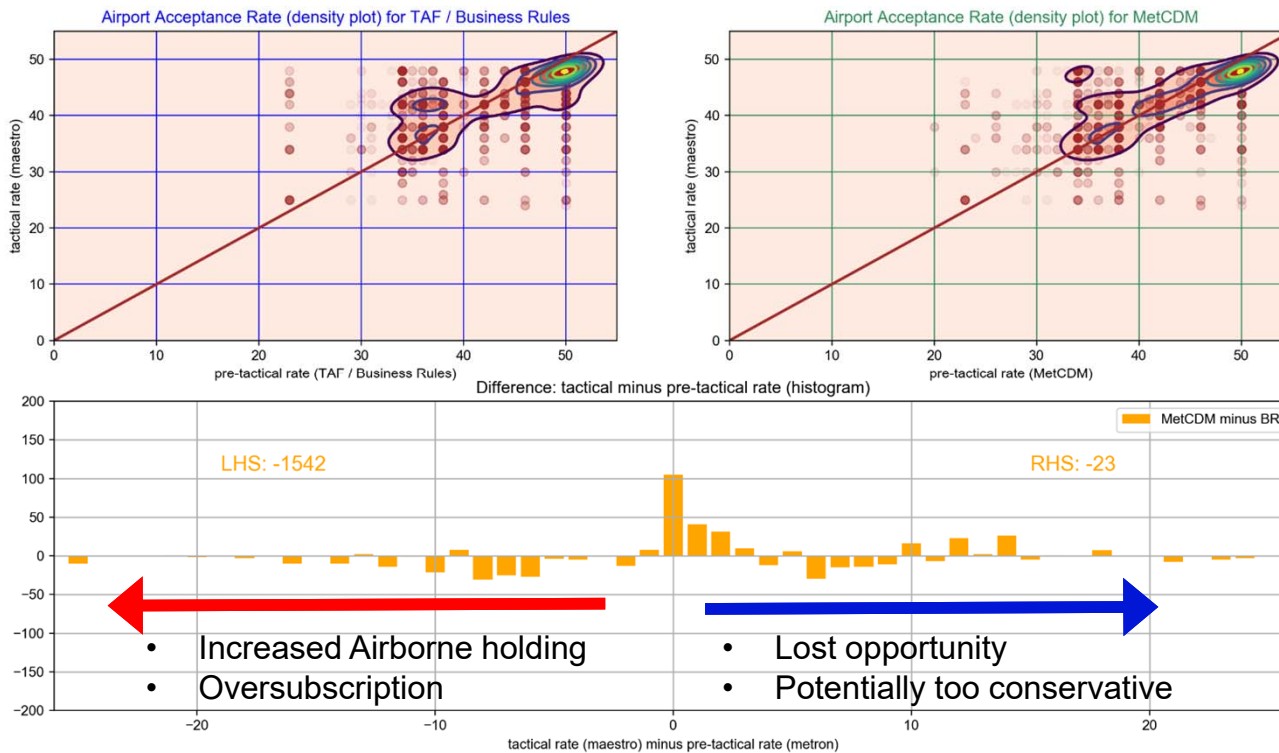


YSSY		Thursday, 31 Mar 2022 - Run 2 - Final														First Light: 1942	Last Light: 0917		
		BUSINESS RULES RATES FROM TAF														SHOW / HIDE CALCULATIONS			
DATE/TIME		301900	302000	302100	302200	302300	310000	310100	310200	310300	310400	310600	310800	310900	310700	310800	310900	311000	311100
<b>BUSINESS RULES SUMMARY</b>																			
BR RWY		16	16	16	16	16	16*	16*	16*	16*	16*	16*	16*	16*	16	16	16	16	16
Tailwind (Worst)		-29.7	-29.7	-29.7	-29.7	-29.7	-39.1	-39.1	-39.1	-44.0	-44.0	-44.0	-44.0	-44.0	-44.0	-35.2	-35.2	-35.2	-35.2
Crosswind (Worst)		18.6	18.6	18.6	18.6	18.6	8.3	8.3	8.3	10.4	10.4	10.4	10.4	10.4	9.4	14.2	14.2	14.2	14.2
BR Approach Mode		ILSB	ILSB	ILSB	ILSB	ILSB	DVAB*	DVAB*	DVAB*	DVAA*	DVAA*	DVAA*	DVAA*	DVAA*	DVAA	DVAA	DVAA	DVAA	DVAA
BR Rate		34	34	34	34	34	36	36	36	38	38	38	38	38	42	42	42	42	33
<b>MET CDM RATE</b>																			
Wind *True		210	210	200	200	190	180	180	180	180	180	180	180	180	190	190	190	190	200
Significant Wind Speed		29	29	32	32	32	35	35	35	35	35	35	35	35	32	32	32	30	30
Anticipated RWY		16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
Tailwind (Main RWY)		-29.7	-29.7	-29.7	-29.7	-29.7	-34.2	-34.2	-34.2	-34.2	-34.2	-34.2	-34.2	-34.2	-29.7	-29.7	-29.7	-29.7	-29.7
Crosswind (Main RWY)		18.7	18.7	17.0	17.0	12.0	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	13.1	12.0	12.0	11.2	16.8
Tailwind (Cross RWY)																			
Crosswind (Cross RWY)																			
Anticipated Approach		ILSA	ILSA	ILSA	ILSA	ILSB	ILSB	ILSA	ILSA	ILSA	DVAB	DVAB	DVAB	DVAB	DVAB	DVAB	DVAB	DVAB	DVAB
MET CDM Initial Rate		34	36	36	36	34	34	34	36	36	36	38	38	38	38	38	38	38	31
MET CDM Notes		1	1	1	1	2	2	2	2	2	2.83	2.83	3	3	3	3	3	3	3
MET CDM X-Factor		-2	-2	-2	-2	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4	-4
MET CDM Final Rate		32	34	34	34	30	30	30	32	32	32	30	30	30	34	34	34	34	27
<b>TCU SM/TM ADJUSTMENT</b>																			
SM/TM Notes												1	1	1	1				
SM/TM X-Factor												-4	-4	-4	-4				
Adjusted Arrival Rate		32	34	34	34	30	30	30	32	32	32	30	30	30	30	34	34	34	27
<b>ATFM PLAN APPROVAL</b>																			
DLM Notes																			
DLM X-Factor																			
ATFM Plan Segmentation		1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
Final Arrival Rate		32	34	34	34	30	30	30	32	32	32	30	30	30	30	34	34	34	27
<b>SHOW / HIDE CDM</b>																			
DATE/TIME		301900	302000	302100	302200	302300	310000	310100	310200	310300	310400	310600	310800	310900	310700	310800	310900	311000	311100
Previous Arrival Rate		32	34	34	34	30	30	30	30	30	32	32	34	34	34	34	34	34	28
Programmed Rates																			
MET CDM Notes		<ol style="list-style-type: none"> <li>1 A slow moving high pressure system west of Tasmania combined with a low off the north coast of NSW results in a strong pressure gradient over the TMA, thus strong to very strong and gusty S to SW winds are expected. 35 to 45 knots S'y winds are expected below 3000ft with risk of occasional gusts up to 35 knots at the surface. Cloud 1500-2000ft lifting to 2000-3000ft late morning. Showers, potentially heavy, over sea and along the coastline. X-factor of -2 has been applied for head wind, with heavy showers less likely to impact the aerodrome or northern approaches. Risk of turbulence.</li> <li>2 Winds aloft increasing to 40 to 50 knots, with gusts in excess of 40 knots possible. Showers moving onshore, with occasional heavy falls possible. Isolated thunderstorms are possible in the south and east of the TMA moving to northern parts from 02Z. X-factor has been applied for both the strong winds and the high risk of showers impacting arrivals. Risk of turbulence.</li> <li>3 Cloud 2000-3000ft. Light showers continuing in the area, though less likely to have significant impact to operations. X-factor for strong head winds applied.</li> <li>4</li> <li>5</li> </ol>																	
SM/TM NOTES		<ol style="list-style-type: none"> <li>1 due 45kts on final</li> <li>2</li> <li>3</li> </ol>																	

- Weather impact can be extremely challenging due to combination of low clouds, heavy showers and strong winds (45-50kts)
- MET-CDM (NCCMET and AV MET) proposed reduction of rates below business rules due to extreme weather.
- ATC proposed further rate reduction in the afternoon due to 45 knots headwind on final.

# Quantitative Benefits of MET-CDM

MetCDM Verification --- Sydney Airport - 2018



Total number of hours displayed: 2894; Tactical rates taken from Terminal OPS

- Validation focusses on difference between ATFM rates established from MET-CDM and from TAF plus Business Rules (BR)
- Negative sum on left hand side of bar plot means that overall MET-CDM correctly estimated lower capacity and therefore reduced risk of oversubscription
- Negative sum on right hand side means that overall MET-CDM may be more conservative than TAF + BR
- In this example for Sydney, the MET-CDM removed 1542 'bad' slots at the cost of '23' good slots.

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## Qualitative Benefits of MET-CDM

- MET-CDM provides transparency of ATFM rate setting to external (non ANSP) stakeholders
- Collaboration from airline AV MET increases airline ‘buy in’ into plan of operation, increasing shared responsibility and more constructive dialogue at times of disruptions

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## Impacts of COVID-19 and Outlook



- All GDPs initially suspended in April 2020
- Perth GDP reinstated in July 2020 due to sustained demand from mining operations
- East Coast GDP reinstated from late 2021
- After more than 18 months suspension of CDM (on the East Coast), the key challenge is to get all stakeholders once again familiar with CDM processes

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A high-angle, front-facing view of a white commercial airplane with two engines, flying over a vast expanse of white, fluffy clouds under a clear blue sky. The aircraft is positioned in the lower right quadrant of the frame.

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# Discussion

**KNOW YOUR WEATHER.**  
**KNOW YOUR RISK.**