VCP MET-ATM WorkshopO.R. Tambo International Airport (ORTIA), Johannesburg, South Africa

Morné Gijben

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8 to 10 October 2018, Hong Kong, China



Content

- O.R. Tambo International Airport
- Enabling technology
- Progress so far
- Future work



ORTIA Airport information

- O.R Tambo International Airport (ORTIA)
 Johannesburg, South Africa:
 - 26° 08′ 21″ S and 28° 14′ 46″ E
 - 20km east-north-east of the city of Johannesburg and 40km south of Pretoria,
 - situated almost on the plateau of South Africa with two runways, both above 5500ft (1694m) above MSL.
- The surrounding area consists of hilly country sloping gradually from southwest to north-east. The highest terrain within a radius of 40km is 1902m to the south of the airport. Most of the areas directly around the airport are built up areas.



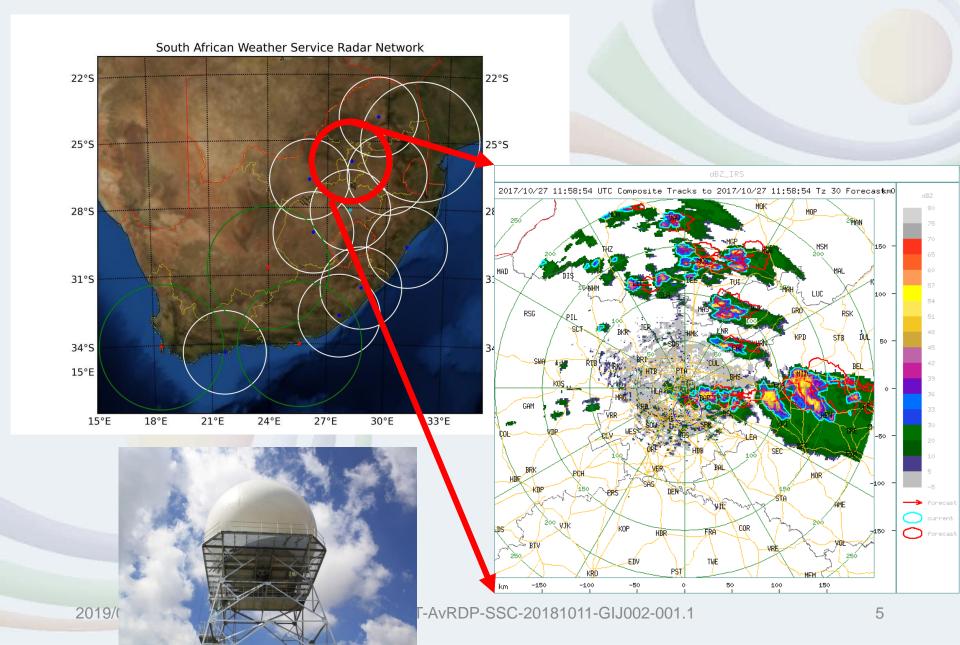


Airport local climatology

- Fog: radiation fog/advection from SE, mostly early am (2-3 days per month)
- Low clouds/poor visibility, early am
- Smog: temperature inversion, winter months, early am
- Precipitation: thunderstorms, summer, pm, early evening
- Hail: 5 days per year, Oct-Dec
- 70 days of lightning per year in vicinity of airport
- Rain: max in Dec/Jan (600-800 mm per year)
- Frost: winter, 30 days per year
- Wind direction: Mostly NW wind
- Wind speed: 3.3-4.6 m/s



Enabling Technology: Radar

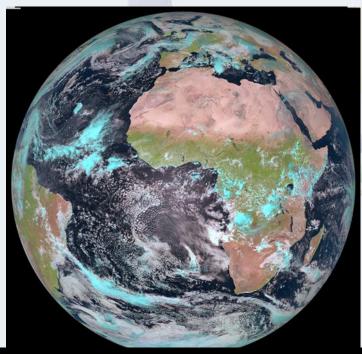


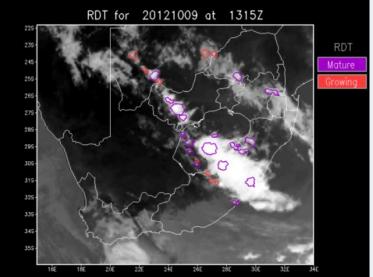
Lightning + Satellite



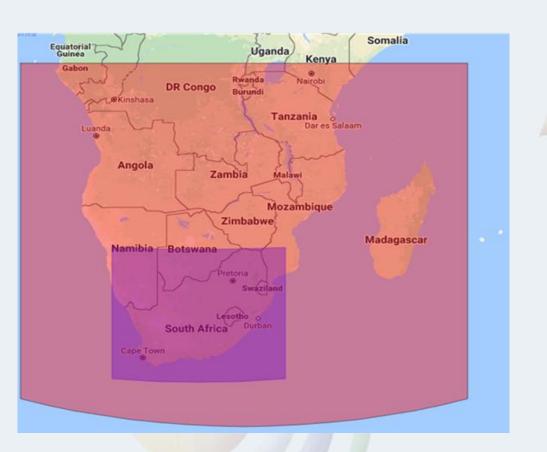


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NWP models

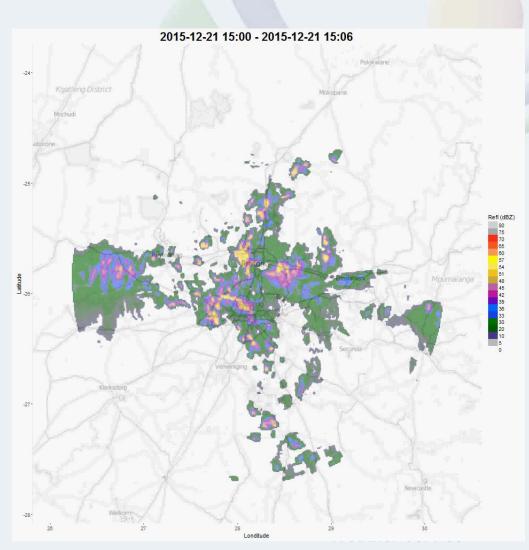


- Local Version of UK Met Office Unified Model (SA4.4 & SA1.5)
- Vertical resolution of 70 levels; model top at 38.5 km
- Initialized at 00, 06, 12 and 18 UTC



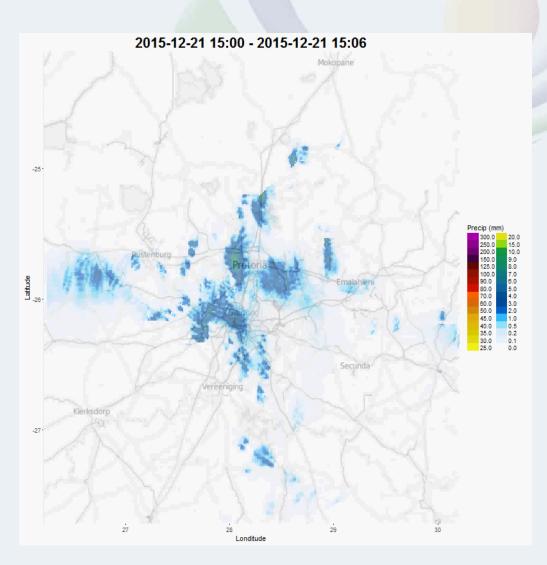
Community- Short-range Warning of Intense Rainstorms in Localized Systems (Com-SWIRLS)

- Produces extrapolated nowcasts from CAPPI reflectivity data
- Extrapolation is based on Optical Flow vector calculation using consecutive time steps.
- Growth and Decay not taken into consideration.
- SWIRLS installed over:
 - Irene Radar domain 200km range.
 - 400x400 pixels (1kmx1km)
 - 9hr extrapolation (possible)

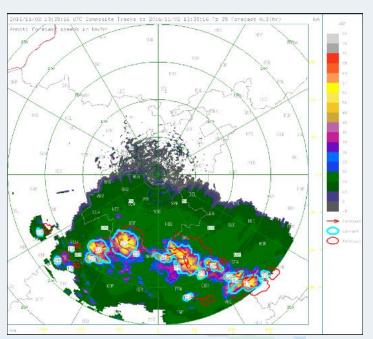


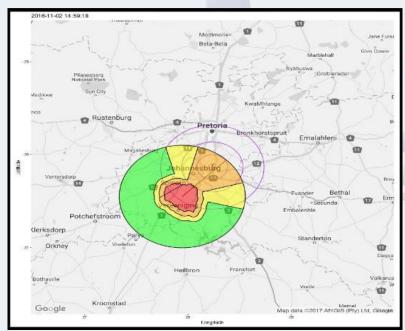
Radar QPF (1hr accumulation)

Com-SWIRLS running for QPF.



Thunderstorm Table





Risk Matrix Table

	High		2	6	10
poor	Medium		1	5	9
Likelihood	Low			4	8
	Very Low			3	7
		Minimal	Minor	Significant	Severe

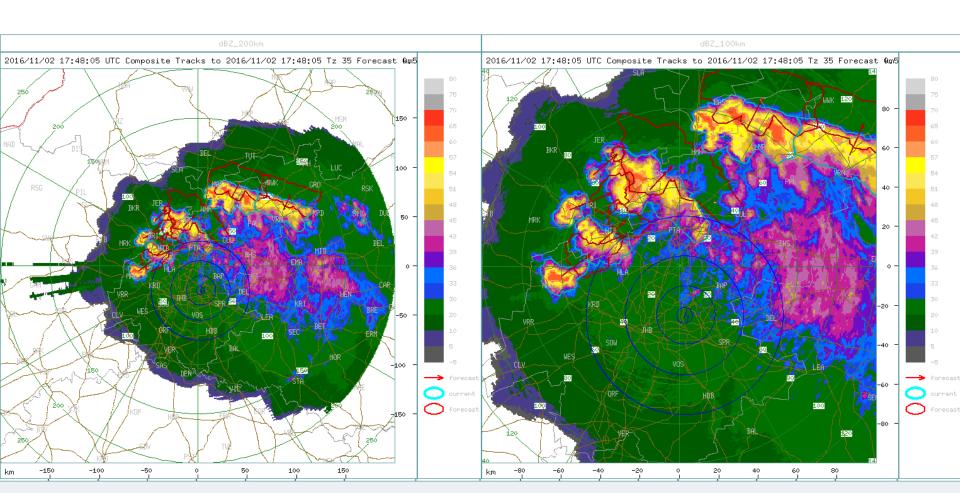
Impact





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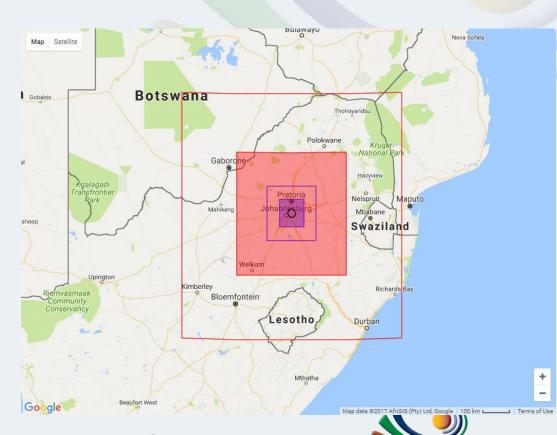




Sub-kilometer model

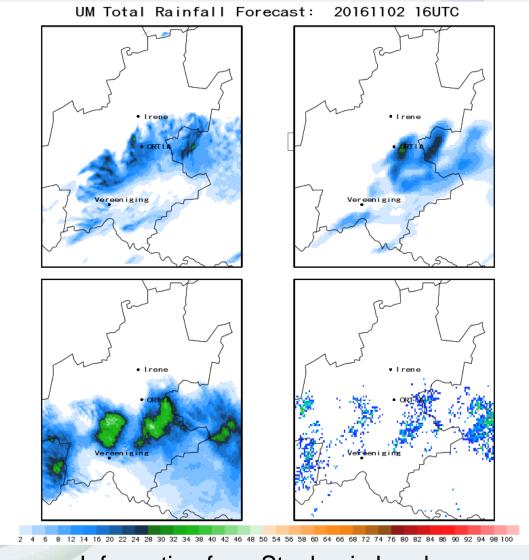
Convective scale model (300 m) using the UK Met Office Unified Model

- ORTIA nested domain
- 300 m resolution
- Vertical resolution of 70 levels
- Lead-time 36-hours but initialized at 00, 06, 12 and 18 UTC
- Red (1,5 km) & Purple (300 m)
- 300x300 (shaded) & 600x600 (non-shaded)
- Black circle ORTIA aerodrome



Information from Stephanie Landman

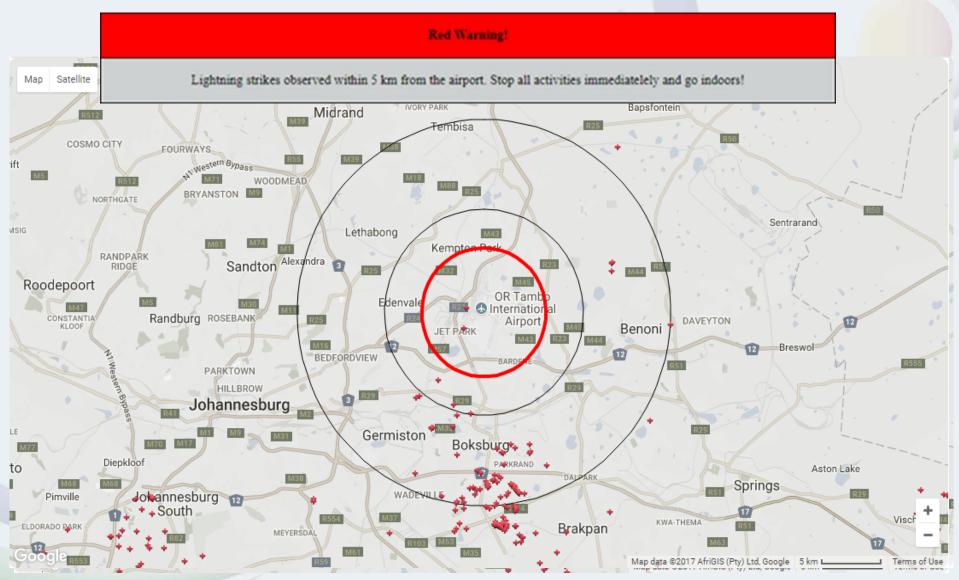
Sub-kilometer model





Information from Stephanie Landman

Lightning Alert System



Information from ATM

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Adverse weather type	Thunderstorm
Airport	JNB
Date of event	2018/09/28
Delays	Yes
No. of flights delayed	46
Delay minutes	1669
Diversions	Yes
No. of flights diverted	1
Cancellations	No
No. of cancelled flights	none
Safety Incidents	No

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Information from ATM





Central Airs

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Central Airenaco Managoment Unit

Central Airenaco Management Unit Domand Forecast for 28 Sentember 2018

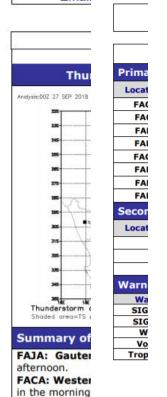
Central Airspace Management Unit

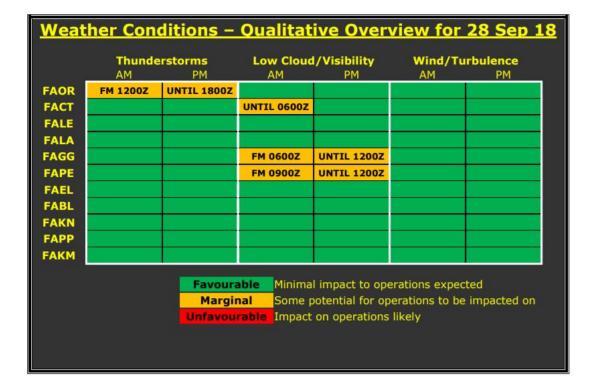
Demand Forecast for 28 September 2018



Telephone Number: 011 928 6433 Email: camuhelpdesk@atns.co.za

Last Update: Thursday, 27 September 2018 16:44 South African local time Teleconference commences at 0630UTC daily





ATNS/ 2018

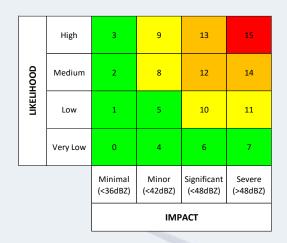
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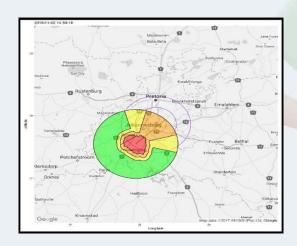
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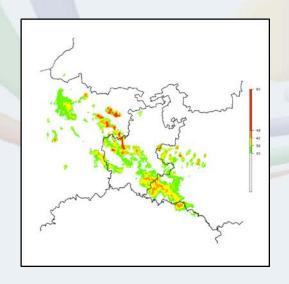
- Testing of sub-kilometre model
- Finalize the blending of sub-kilometre model with SWIRLS to extend thunderstorm table to 6-hours ahead (or even 9-hours).
- Extending thunderstorm tables to 36 hours with subkilometre input.
- Linking of meteorological data with data received from airport management centre to translate the thunderstorm table into an impact table.



Impact Forecasts

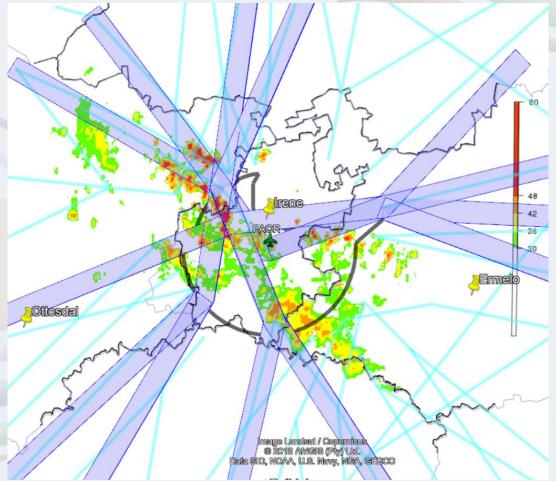






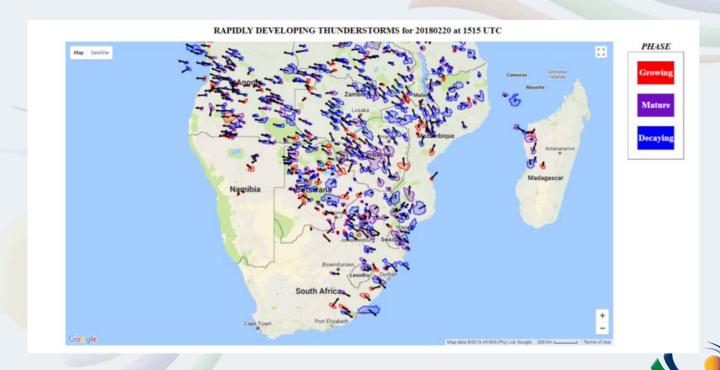
	Risk level	Impact	Possible adverse weather
15	High likelihood of severe disruptions at aerodrome.	There is a high likelihood of reduced rates, delays, and stoppages. Diversions or cancellations also possible.	Frequent lightning, heavy rainfall, strong winds, reduced visibility, and hail.
14	Medium likelihood of severe disruptions at aerodrome	There is a medium likelihood of reduced rates, delays, and stoppages. Diversions or cancellations also possible.	Frequent lightning, heavy rainfall, strong winds, reduced visibility, and hail.
13	High likelihood of significant disruptions at aerodrome	There is a high likelihood of reduced rates and/or stoppages and/or delays. Diversions or cancellations not impossible.	Moderate to heavy rainfall, moderate winds, reduced visibility, moderate lightning activity.
12	Medium likelihood of significant disruptions at aerodrome	There is a medium likelihood of reduced rates and/or stoppages and/or delays. Diversions or cancellations not impossible.	Moderate to heavy rainfall, moderate winds, reduced visibility, moderate lightning activity.
11	Low likelihood of severe disruptions at aerodrome	There is a low likelihood of reduced rates, delays, and stoppages. Diversions or cancellations also possible.	Frequent lightning, heavy rainfall, strong winds, reduced visibility, and hail.
10	Low likelihood of significant disruptions at aerodrome	There is a low likelihood of reduced rates and/or stoppages and/or delays. Diversions or cancellations not impossible.	Moderate to heavy rainfall, moderate winds, reduced visibility, moderate lightning activity.
9	High likelihood of minor disruptions at aerodrome	There is a high likelihood of reduced rates and/or delays. Stoppages also not impossible. Diversion or cancellations not expected.	Moderate rainfall, reduction in visibility, moderate winds, occasional lightning strikes
8	Medium likelihood of minor disruptions at aerodrome	There is a medium likelihood of reduced rates and/or delays. Stoppages also not impossible. Diversion or cancellations not expected.	Moderate rainfall, reduction in visibility, moderate winds, occasional lightning strikes
7	Very low likelihood of severe disruptions at aerodrome	There is a very low likelihood of reduced rates, delays, and stoppages. Diversions or cancellations also possible.	Frequent lightning, heavy rainfall, strong winds, reduced visibility, and hail.
6	Very low likelihood of significant disruptions at aerodrome	There is a very low likelihood of reduced rates and/or stoppages and/or delays. Diversions or cancellations not impossible.	Moderate to heavy rainfall, moderate winds, reduced visibility, moderate lightning activity.
5	Low likelihood of minor disruptions at aerodrome	There is a low likelihood of reduced rates and/or delays. Stoppages also not impossible. Diversion or cancellations not expected.	Moderate rainfall, reduction in visibility, moderate winds, occasional lightning strikes
4	Very low likelihood of minor disruptions at aerodrome	There is a very low likelihood of reduced rates and/or delays. Stoppages also not impossible. Diversion or cancellations not expected.	Moderate rainfall, reduction in visibility, moderate winds, occasional lightning strikes
3	High likelihood of minimal disruptions at aerodrome	There is a high likelihood that minimal distruptions can occur. Reduced rates or delays not impossible. Stoppages, diversions and cancellations not expected.	Light rain, reduction in visibility, low to moderate winds.
2	Medium likelihood of minimimal disruptions at aerodrome	There is a medium likelihood that minimal distruptions can occur. Reduced rates or delays not impossible. Stoppages, diversions and cancellations not expected.	Light rain, reduction in visibility, low to moderate winds.
1	Low likelihood of minimal disruptions at aerodrome	There is a low likelihood that minimal distruptions can occur. Reduced rates or delays not impossible. Stoppages, diversions and cancellations not expected.	Light rain, reduction in visibility, low to moderate winds.
0	Very low likelihood of minimal disruptions at aerodrome	There is a very low likelihood that minimal distruptions can occur. Reduced rates or delays not impossible. Stoppages, diversions and cancellations not expected.	Light rain, reduction in visibility, low to moderate winds.

Extending products to flight corridors on approach and departures





 Extending impact tables to flight corridors far beyond aerodrome.



South African
Weather Service

- Investigate other weather conditions such as fog, high temperatures, winds and frost and create separate impact tables.
- Evaluating all products together with aviation forecasters and Airport Management Centre.
- Incorporate new ideas from MET-ATM workshop.



Thank You

