

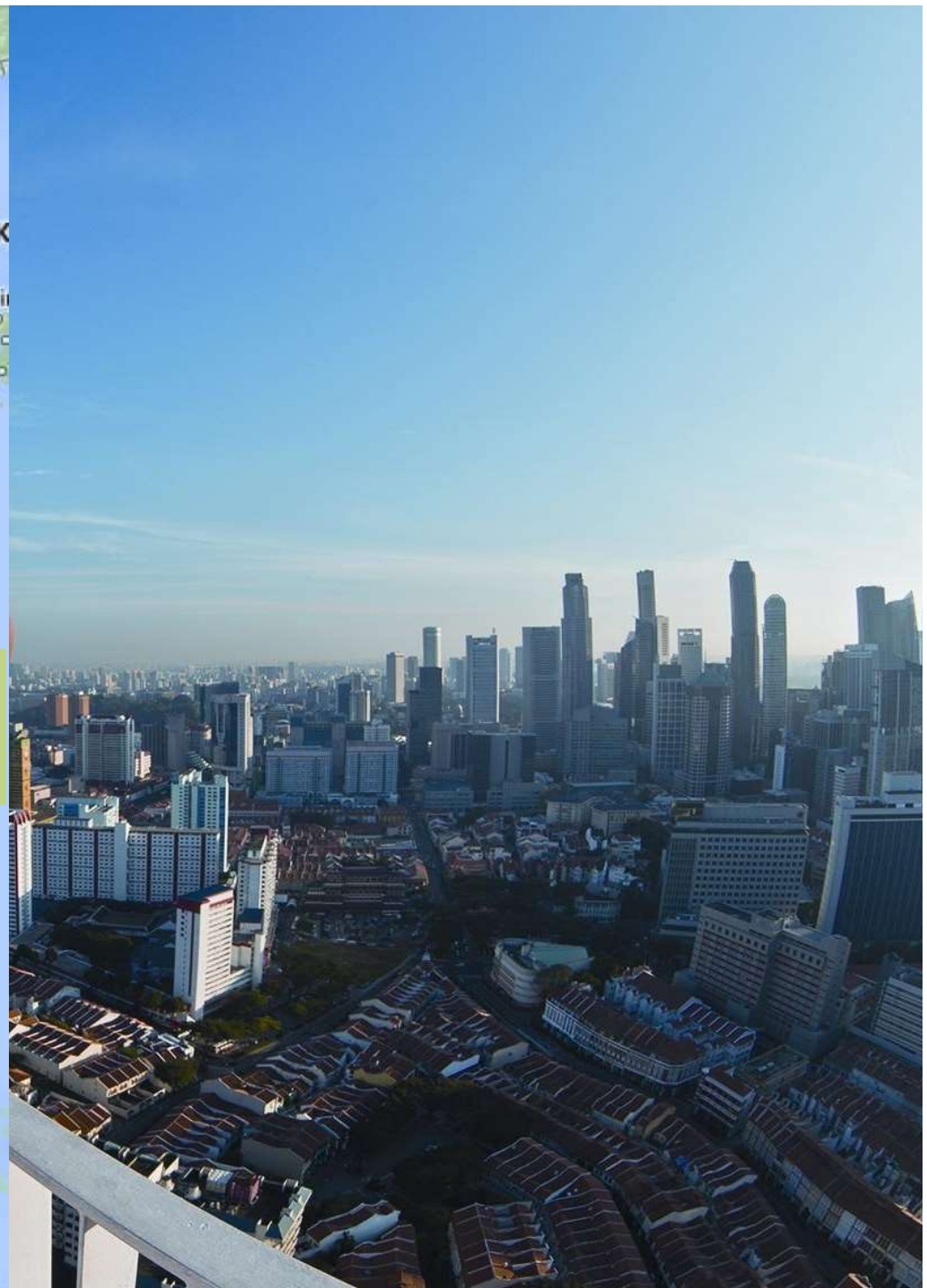
Upper Air Operations (Singapore)

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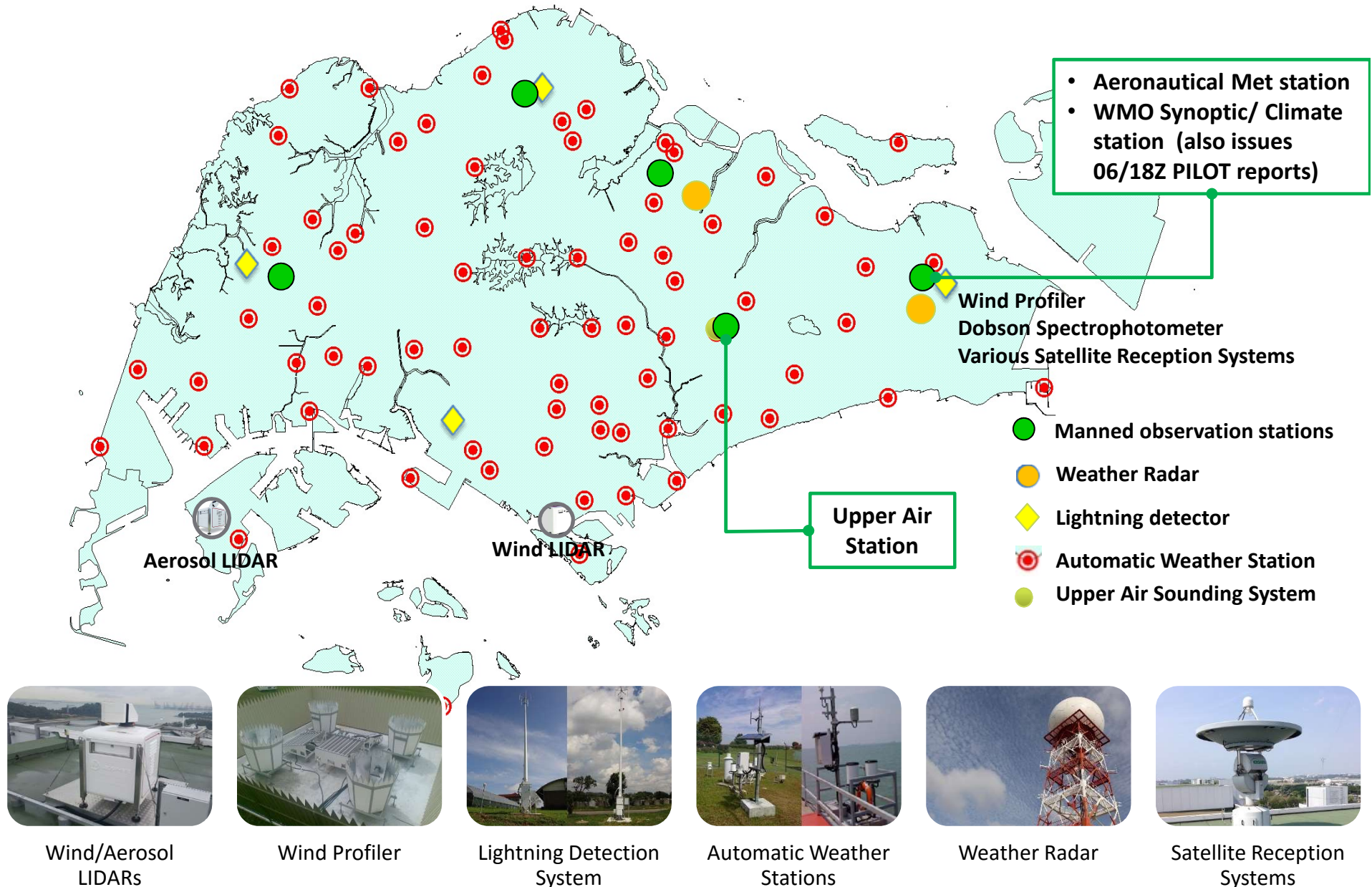
ICM-9

JUN 2017

Opening of
the Upper Air Observatory
World Meteorological Day 2012



Meteorological Sensor Network



Upper Air Measurements in Singapore

- Radiosonde soundings started in Singapore in 1952
- The location for balloon release has been unchanged, except for a move to a new building (across the road from previous location) in 2012
- Current soundings:
 - Twice daily radiosonde 00 / 12UTC soundings are carried out at about 2330 UTC and 1045 UTC respectively – approval for release/ exact timings are dependent on air traffic clearance
 - Ozonesonde soundings – once per month
 - 06 / 18 UTC PILOT soundings carried out at the Changi Airport Met Station; Fully replaced with wind profiler readings (for PILOT) since Oct 2013
- History of sondes deployed:
 - Vaisala RS80-15N (1991-1996)
 - Vaisala RS80 (1997-2008)
 - Vaisala RS92 (2008-2011)
 - Graw DFM-09 (2011-2015)
 - Vaisala RS41-SG (2015 onwards)



Existing Sounding Equipment

Equipment	Model used
Ground system	Vaisala DigiCORA Sounding System MW41
Radiosonde	RS41-SG RS41-SG SPC6A ECC Ozonesonde
Ground check tool	Vaisala Ground Check Device RI41 Standard Humidity Chamber SHC-1
Balloon	Totex TX1000 with internal parachute for Radiosondes; Totex TA1500 for Ozonesonde (external parachute) Helium is used as lifting gas
Parachute	160-05/ 160V-05 (for Ozonesondes)
Unwinder	RS41 Unwinder 55m

Upper Air Station (co-located with the Centre for Climate Research Singapore)



View to the south



View to the east



View to the north



View to the west



GRUAN implementation

- Daily RS41-SG data flow to GRUAN LC since Apr 2017; Implementation of ground checks using the Standard Humidity Chamber (April 2017)
- A 2 weeks on-site trial at proposed site was carried out for GNSS-PW measurements (April 2017) – trial was carried out as there was concern of blockage by the building to the east of the station. Analysis of the data quality by GFZ and GNSS-PW TT confirmed that the site is suitable.
- Procurement and operationalization of GNSS-PW instruments (targeted by end 2017)



Challenges

- Singapore is densely populated; Sondes have landed at the airports, private property etc
- Landings at the airport are problematic, as the airport operates 24 hours and experiences a high volume of traffic
- Air Traffic clearance is required for balloon releases; Difficulty introducing other balloon-borne sensors, apart from those already indicated in the Airport Information Publication
- Exploring the usage of tools for predicting drop locations – provide forewarning of drop locations; facilitate re-scheduling of non-routine launches (e.g., ozonesondes)



