

ICN Deicing Operations Analysis

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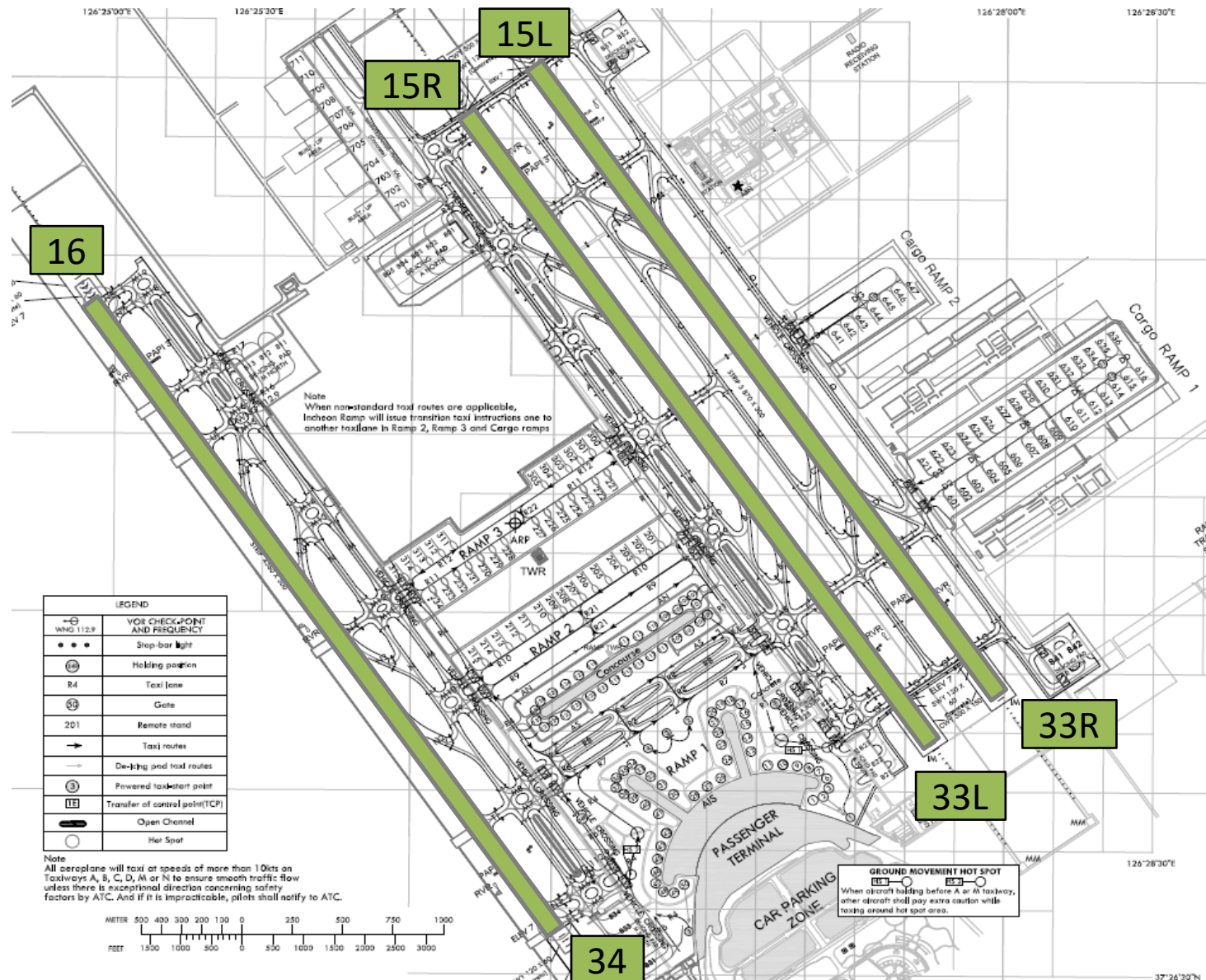
- Understand and characterize deicing operations and impacts in Incheon International Airport
- Develop a deicing modeling capability (in SOSS fast time simulation environment)

- ICN deicing operations concept
- Deicing operation data analysis
- Summary and next steps

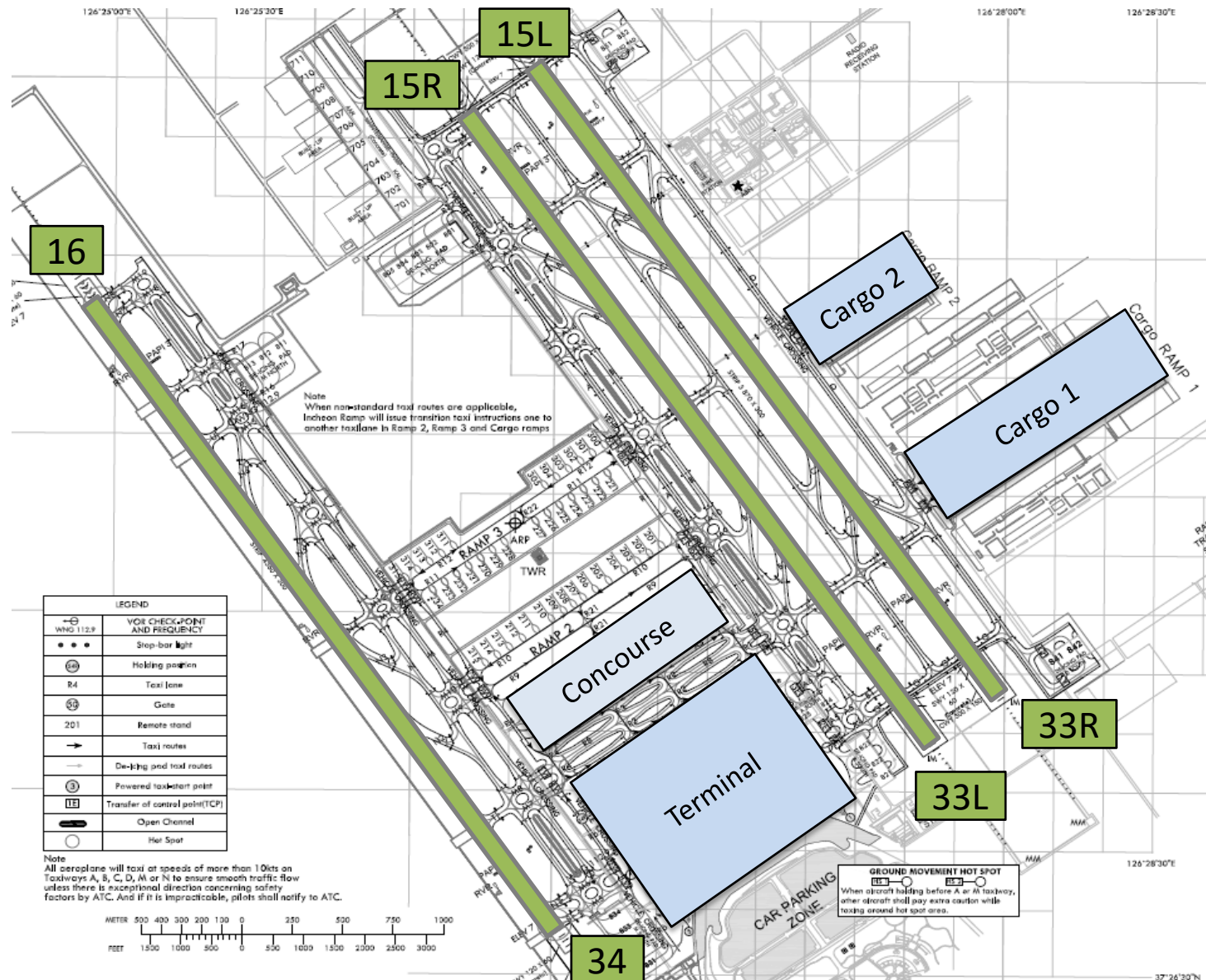
- Deicing -- A procedure to remove frost, ice, slush, or snow from aircraft
- Anti-icing -- A procedure to provide protection against the formation of frost or ice and accumulation of snow or slush on aircraft surface

References: FAA (AC120-60B), Association of European Airlines (Recommendations for De-Icing/Anti-Icing of Aircraft on the Ground, 23rd Edition)

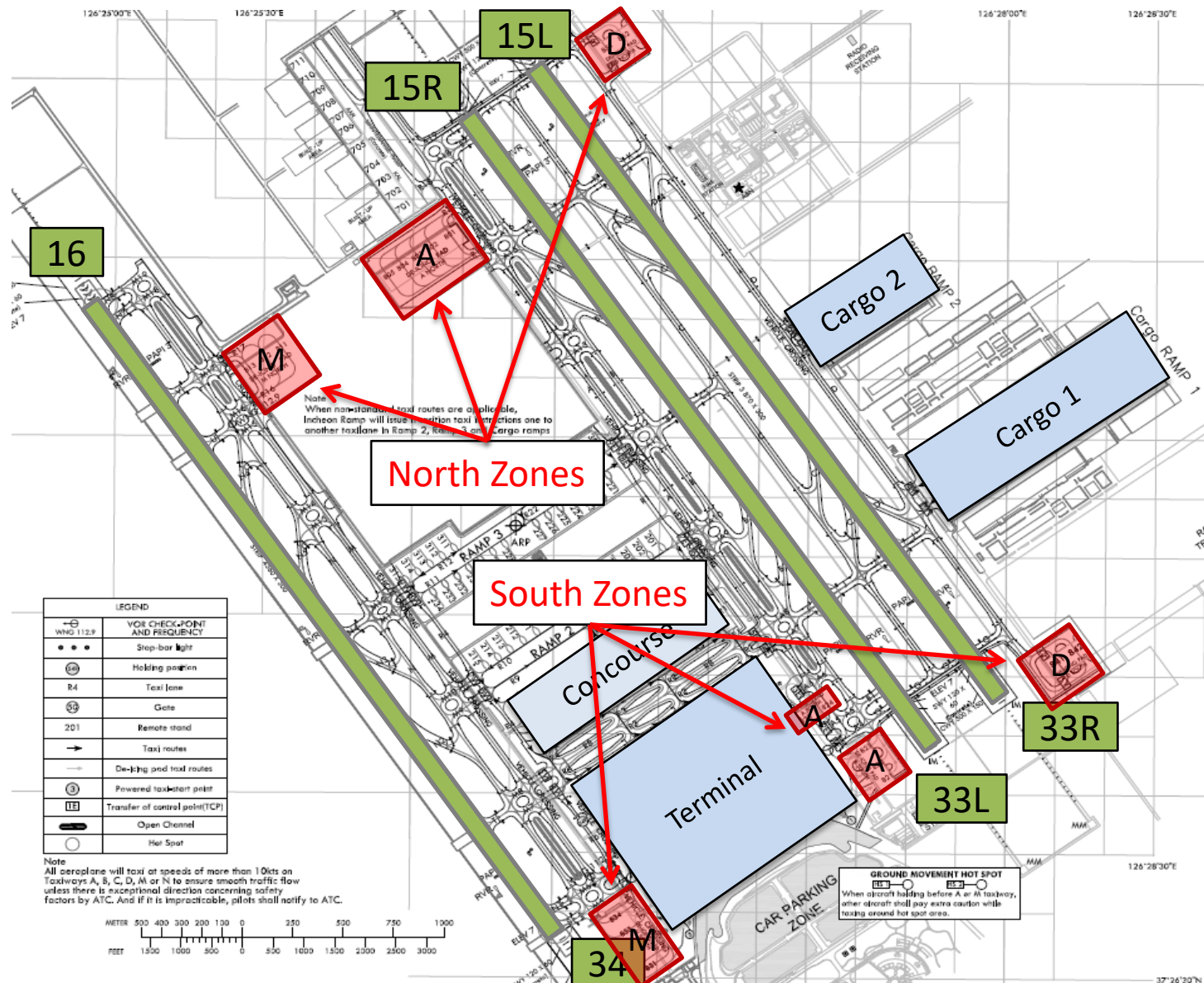
Deicing Zones & Pads



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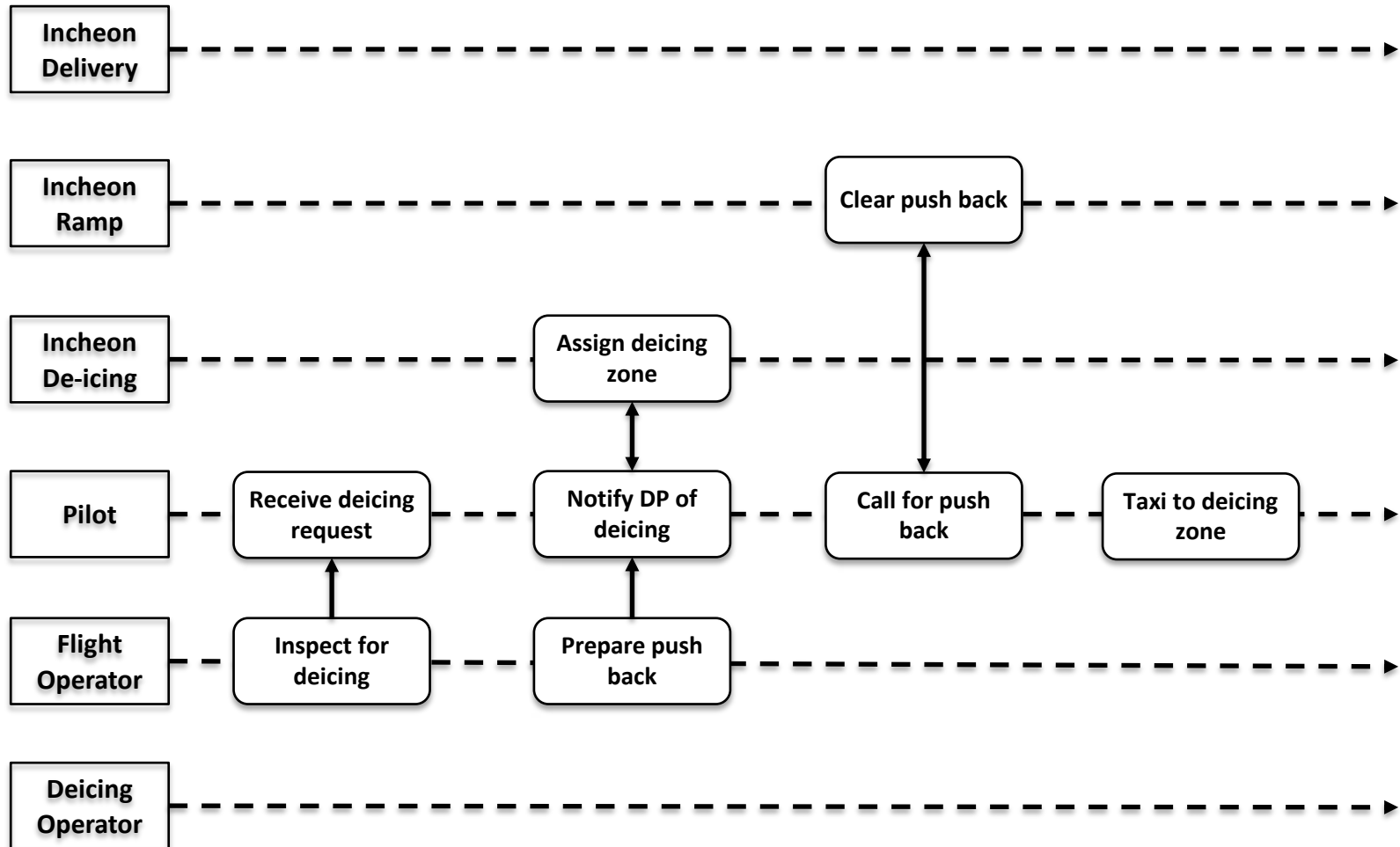
Stakeholder	Responsibilities & Concerns
IIAC (airport)	Prepare deicing zones and pads, acknowledge Ice Phase by ATIS
Flight operator	Inspect aircraft at gate for advise deicing operation to pilot
Deicing position (Incheon De-icing)	Assign deicing zone, control aircraft taxi in and out of deicing facility
Ramp control (Incheon Ramp)	Issue push back clearance
Pilot	Call Deicing Position with deicing request, taxi to deicing facility
Airline	Manage boarding, inform passengers of delay
Deicing operator (ground handler)	Provide deicing services (remove frost, ice or snow and apply anti-icing fluid)
Incheon Delivery (ATC)	Departure clearance after deicing
Ground and local control	Departure clearance and taxiway and runway crossing control

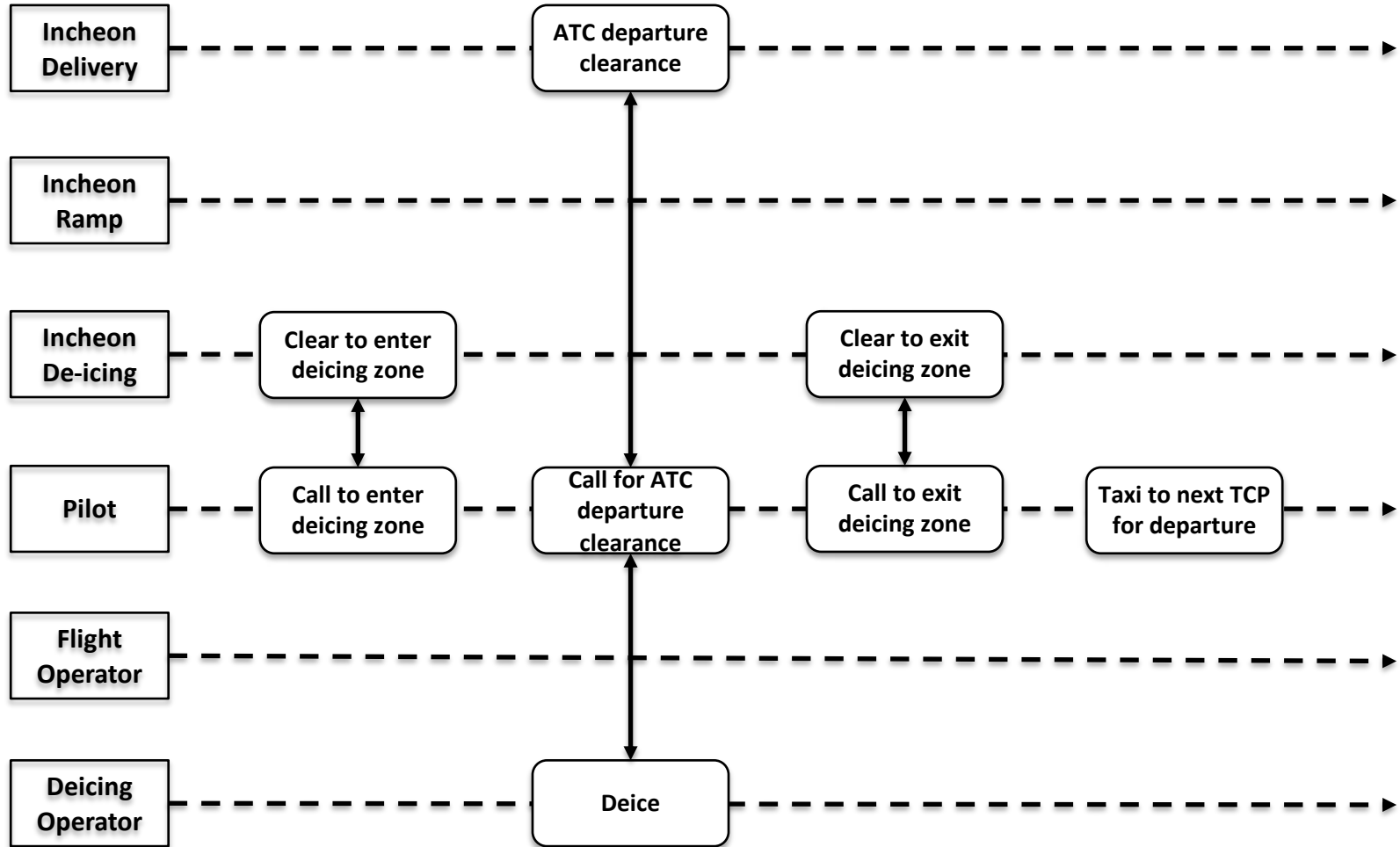
- **Prepare** for deicing requests & operations
- **Decide** deicing need
- **Assign** deicing facility

- **Prepare** for deicing requests & operations
 - Check deicing facility condition and readiness
 - Check deicing operators readiness and capacity
 - Prepare to add Deicing Position at ramp control
 - Prepare deicing delay information sharing
- **Decide** deicing need
- **Assign** deicing facility

- **Prepare** for deicing requests & operations
- **Decide** deicing need
 - Inspect aircraft for deicing request
 - Notify pilot of the request
- **Assign** deicing facility

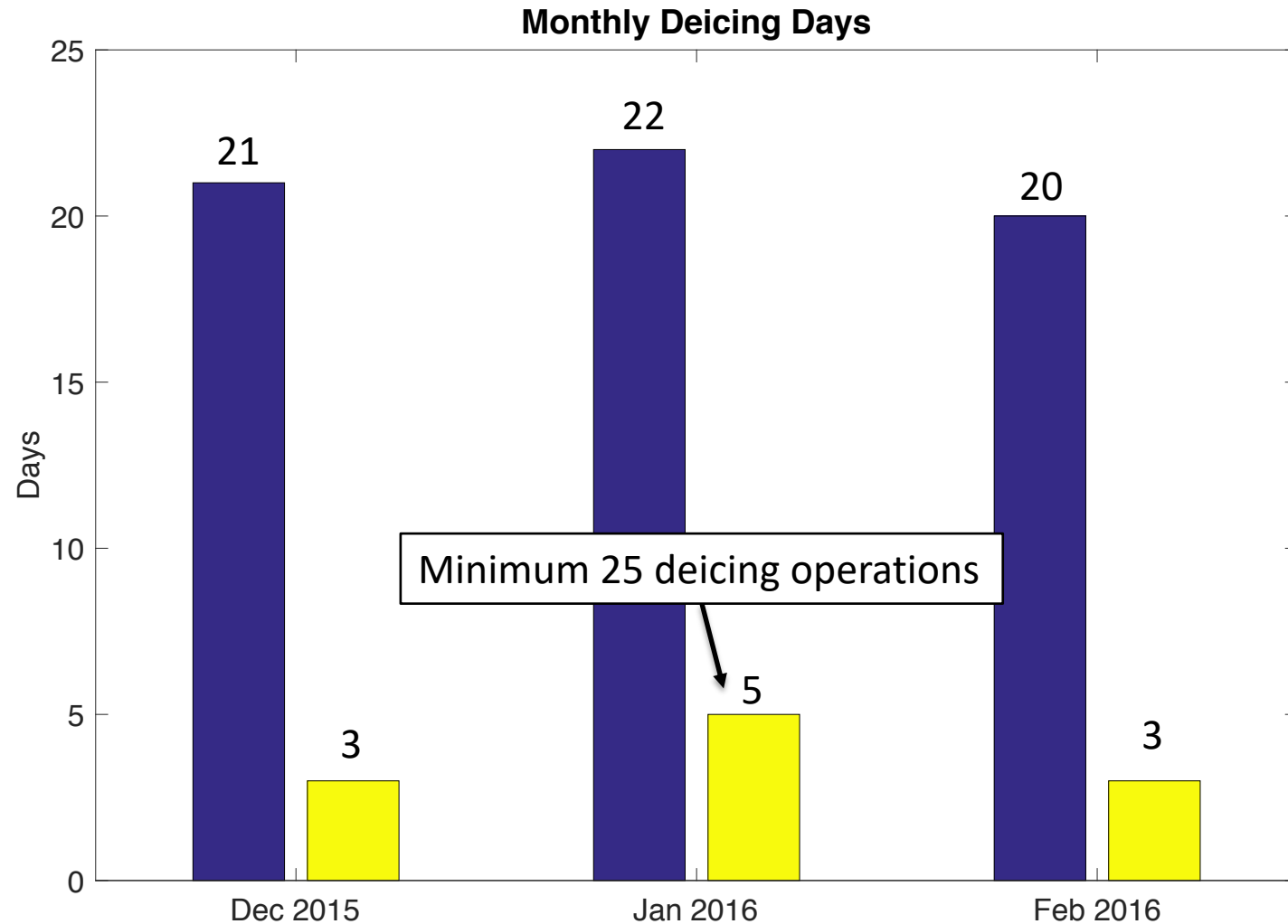
- **Prepare** for deicing requests & operations
- **Decide** deicing need
- **Assign** deicing facility
 - Service contract between airline and service operator
 - Deicing facility load
 - Taxi distance to deicing zone and to departure runway



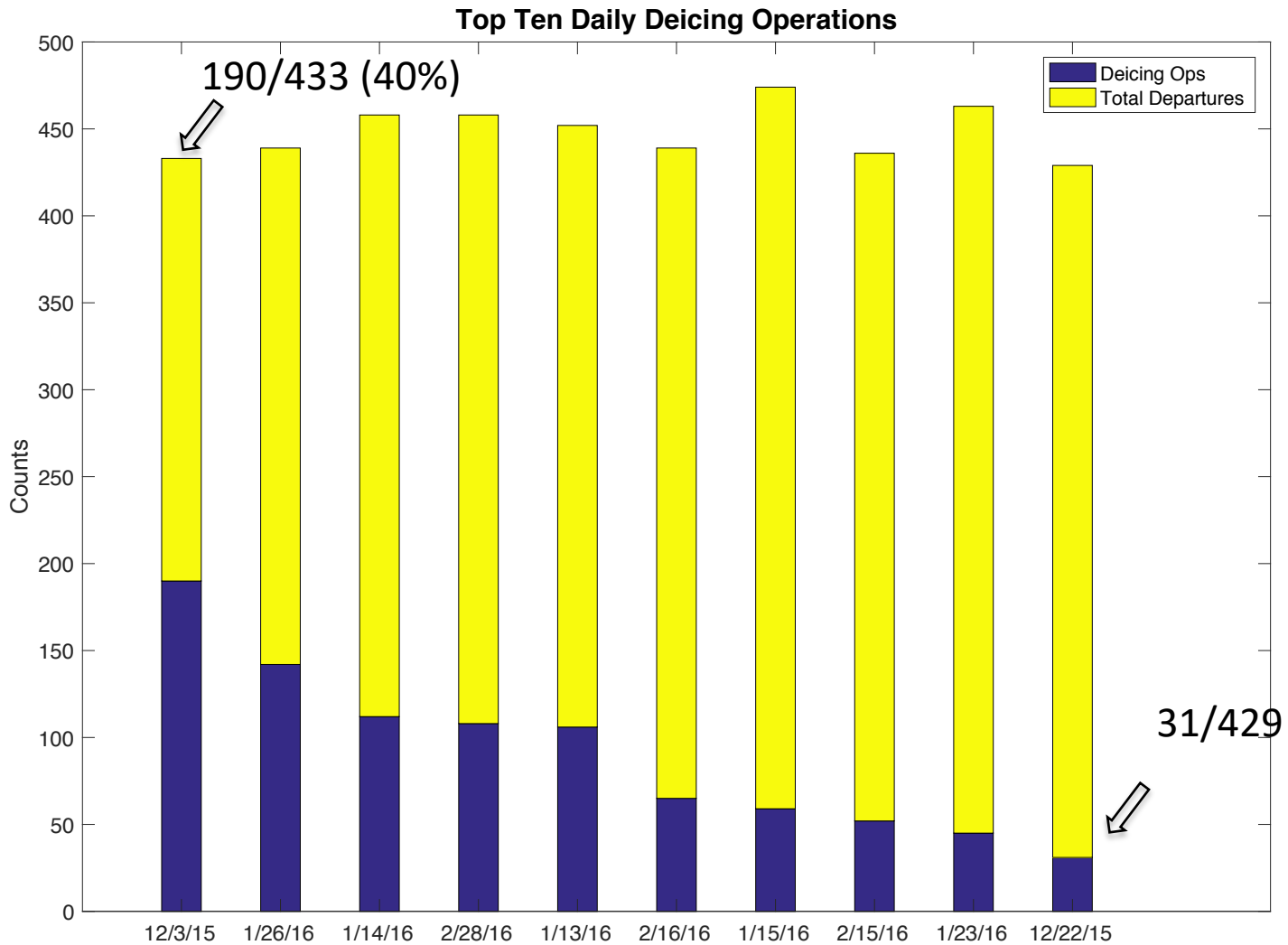


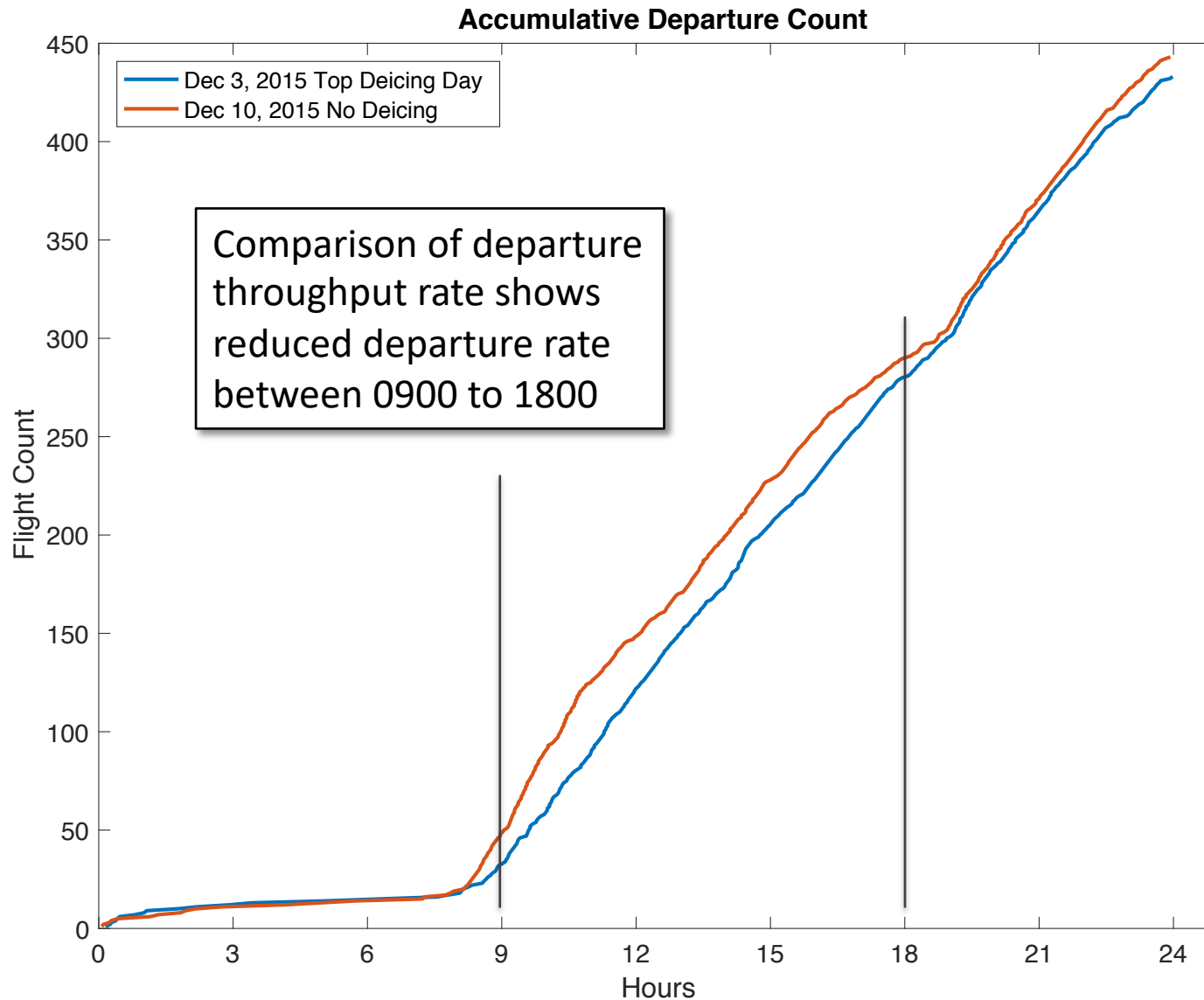
- Data source
 - Reports
 - Tracks
- Metrics
 - Deicing days
 - Zone distribution
 - Queue length
 - Deicing stage times

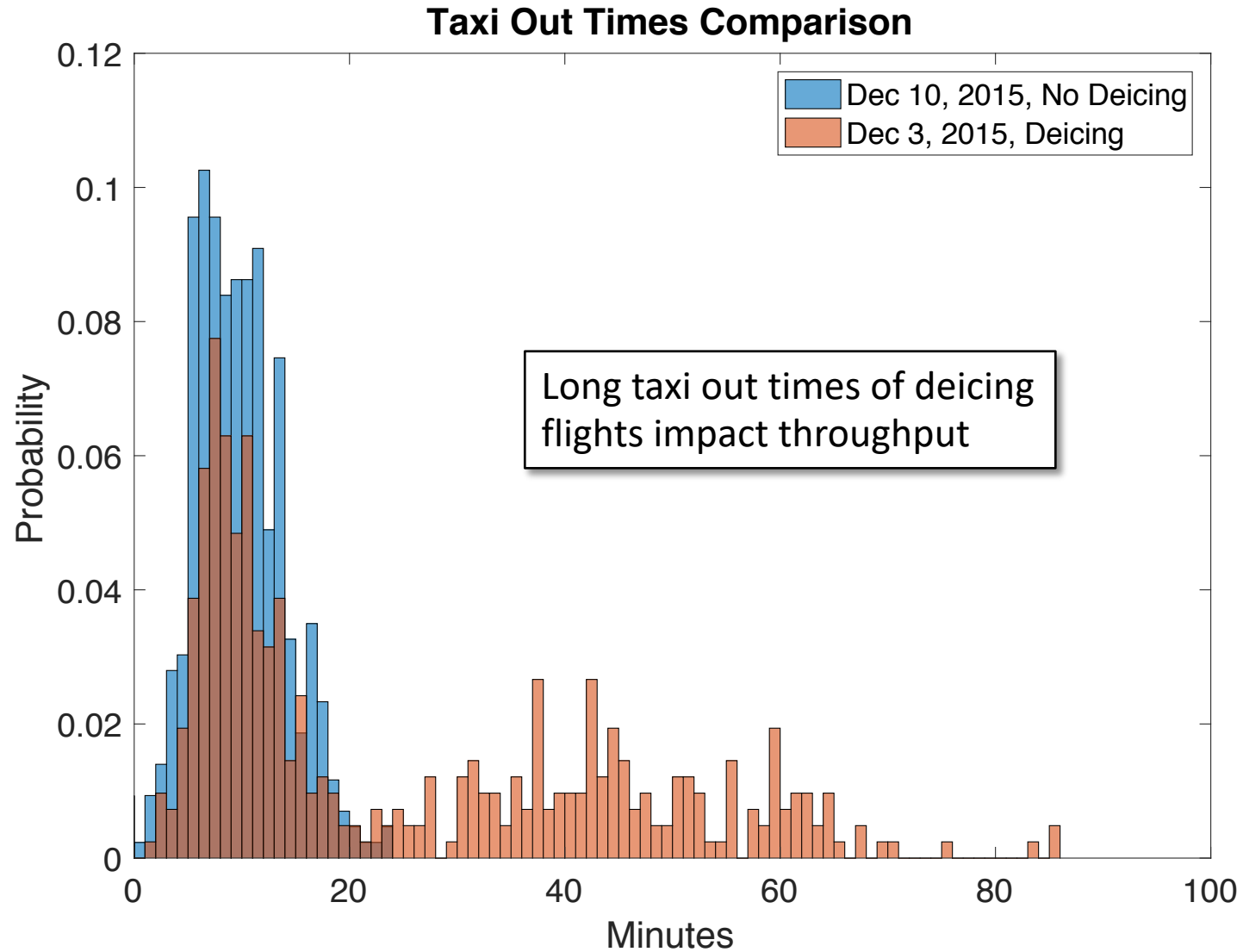
- Three-month surface operation data from Dec 2015 to Feb 2016
- Total 40,792 departures and 40,833 arrivals
 - 65,841/15,784 North/South Flow departures
 - Average daily flights ~450 (departure or arrival)
- Each flight record consists of
 - Reported data from FIMS (Flight Information Management System)
 - Track positions from ASDE-X



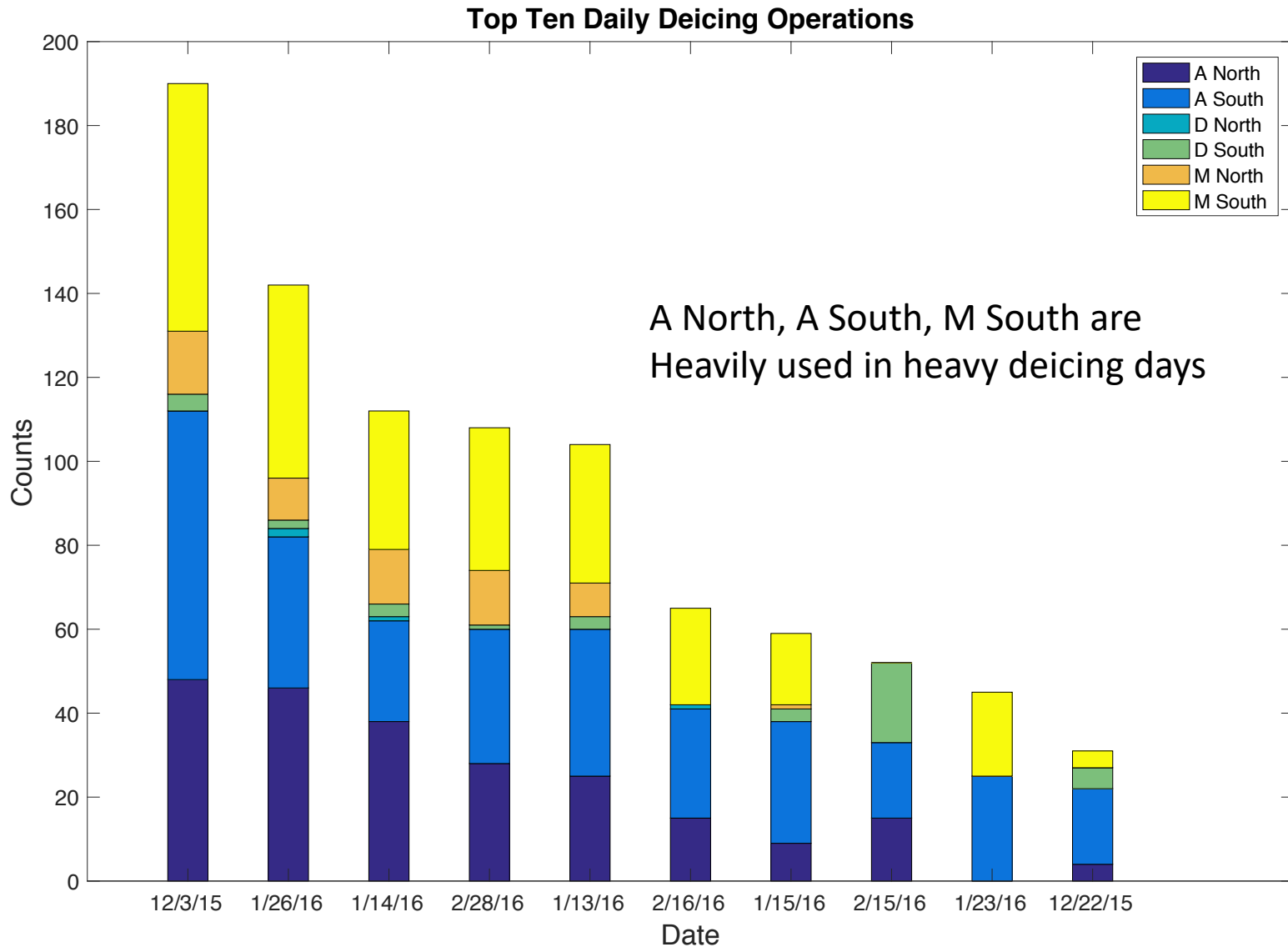
Top Ten Deicing Days



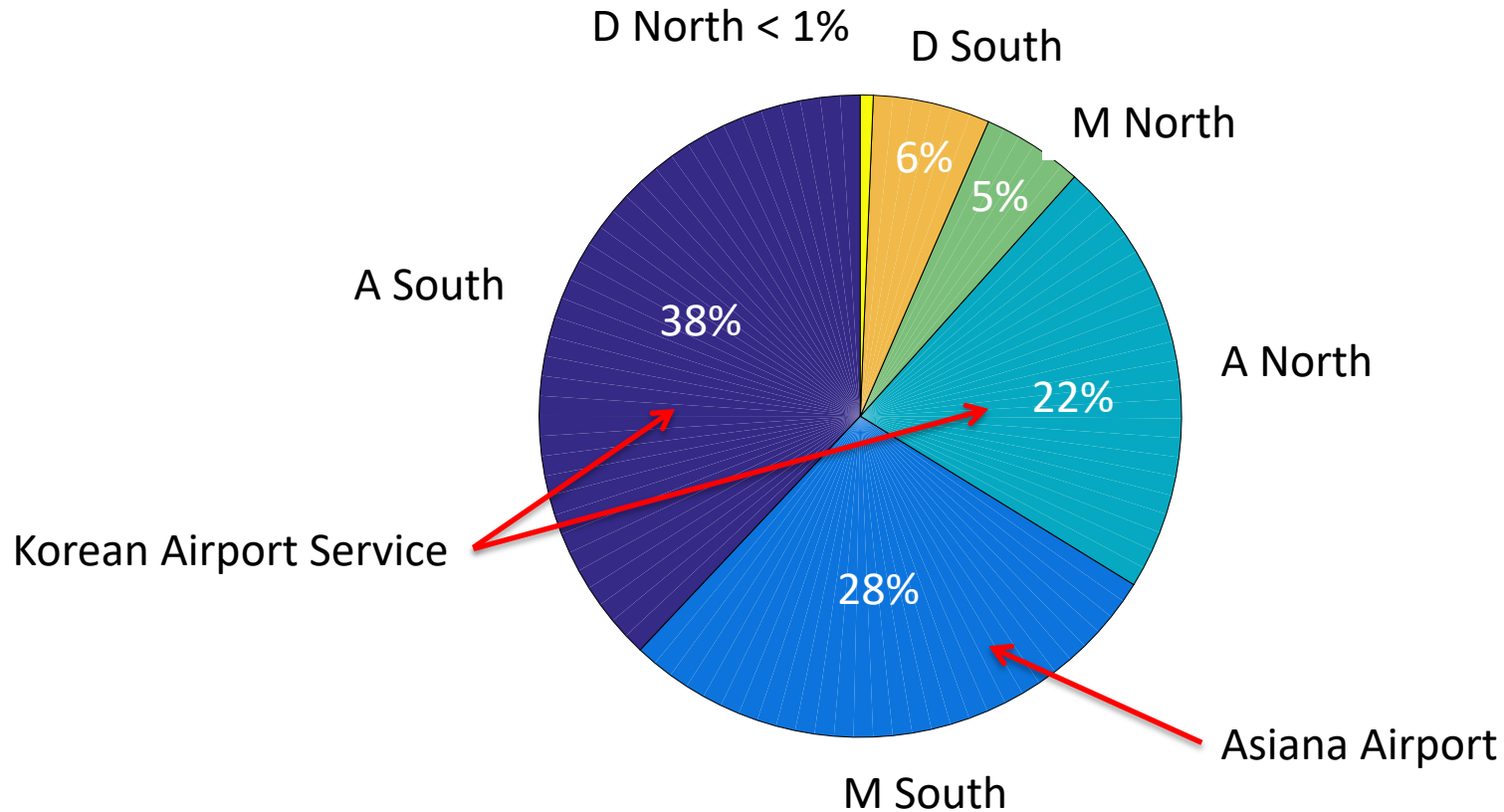




Top Ten Deicing Days



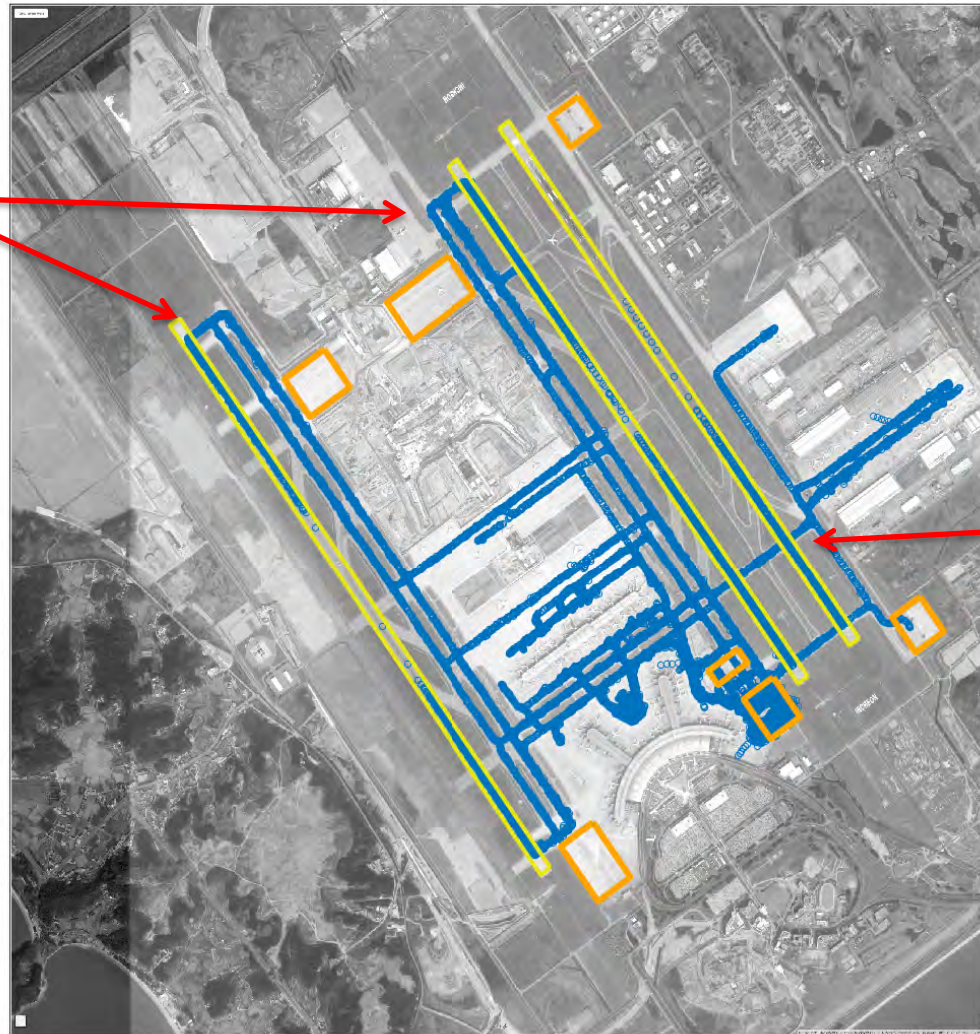
Zone Usages



Departure Taxi Tracks

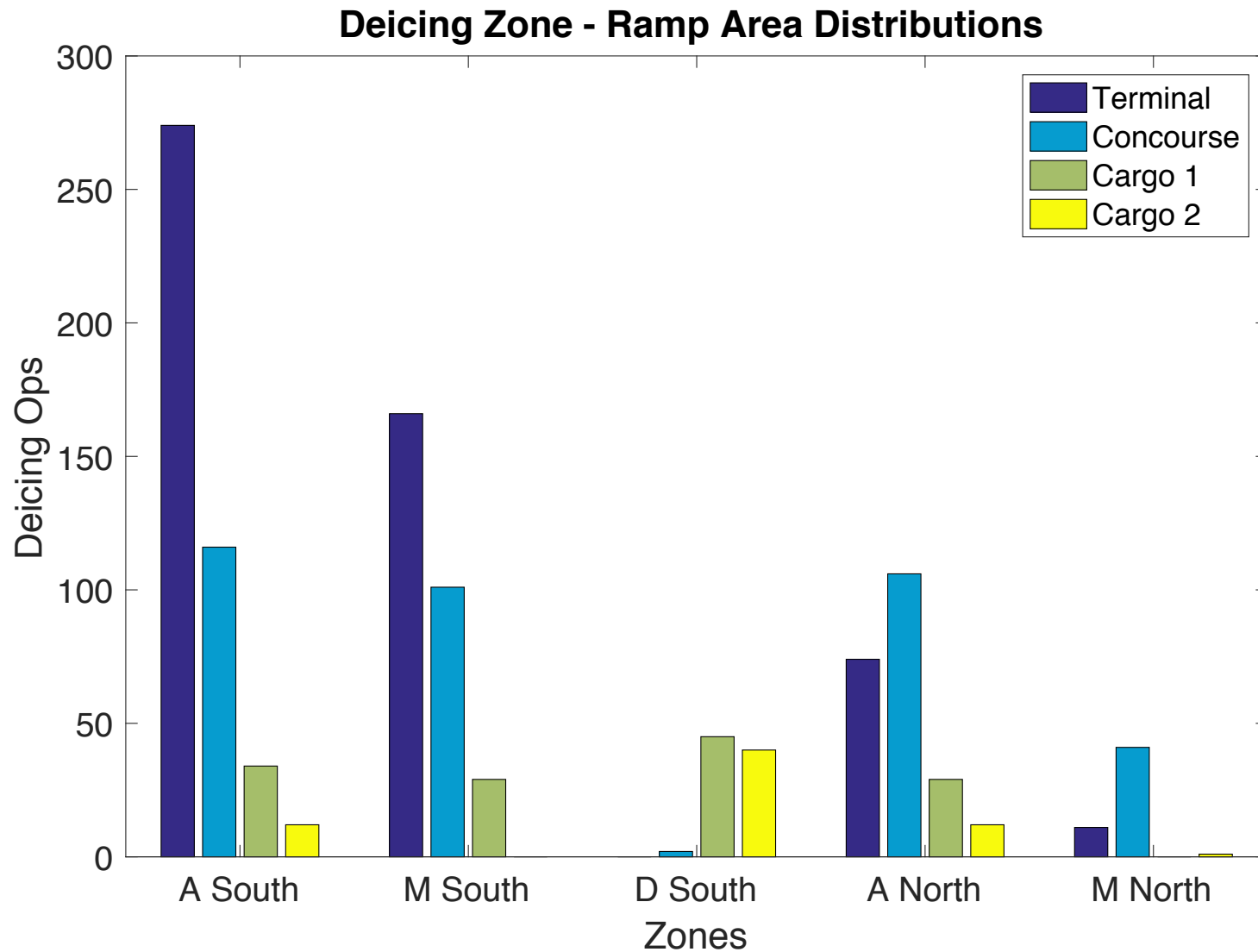
Zone A South

South flow
departures

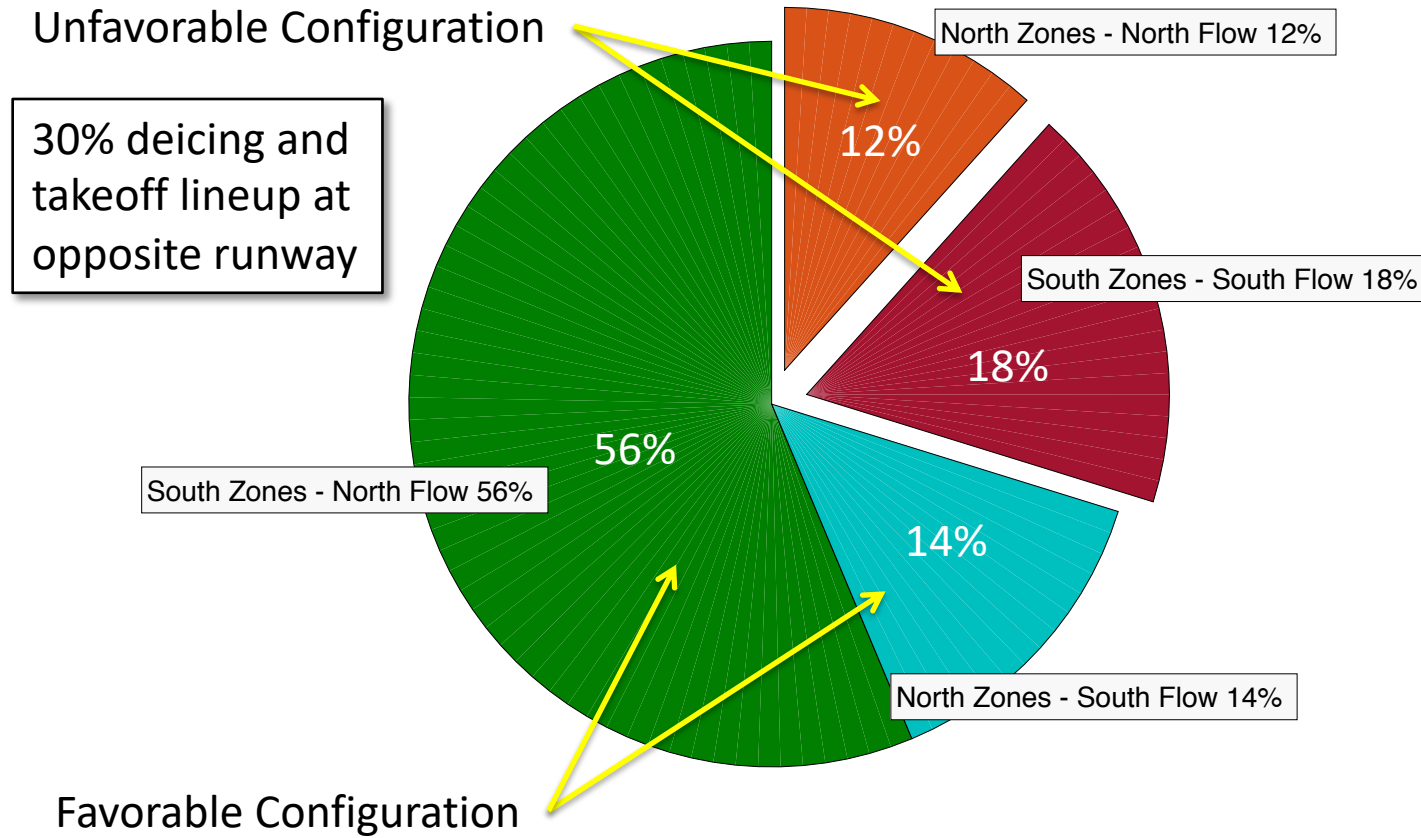


Cargo flights
cross runways

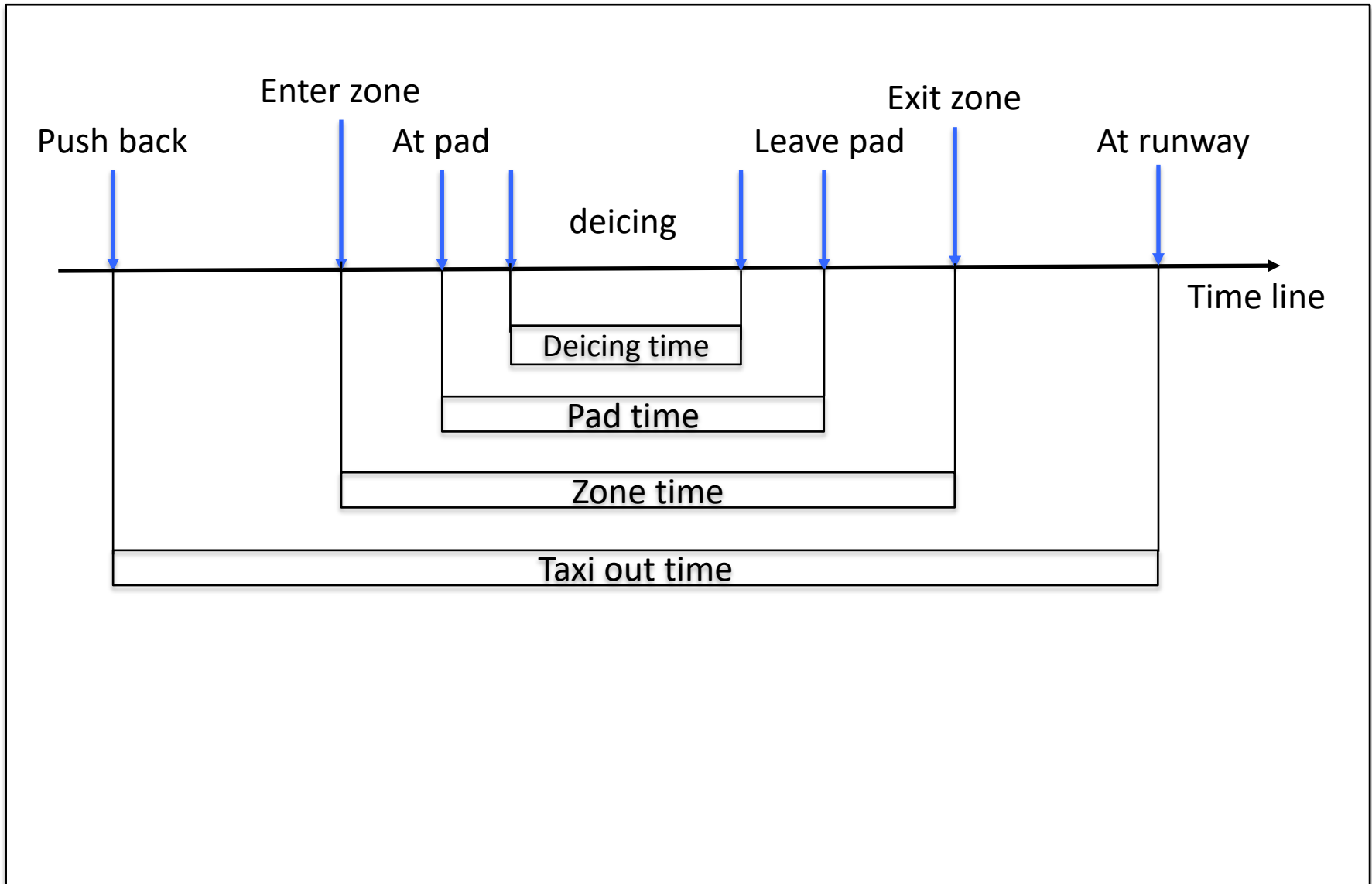
Map data: Google, SK telecom



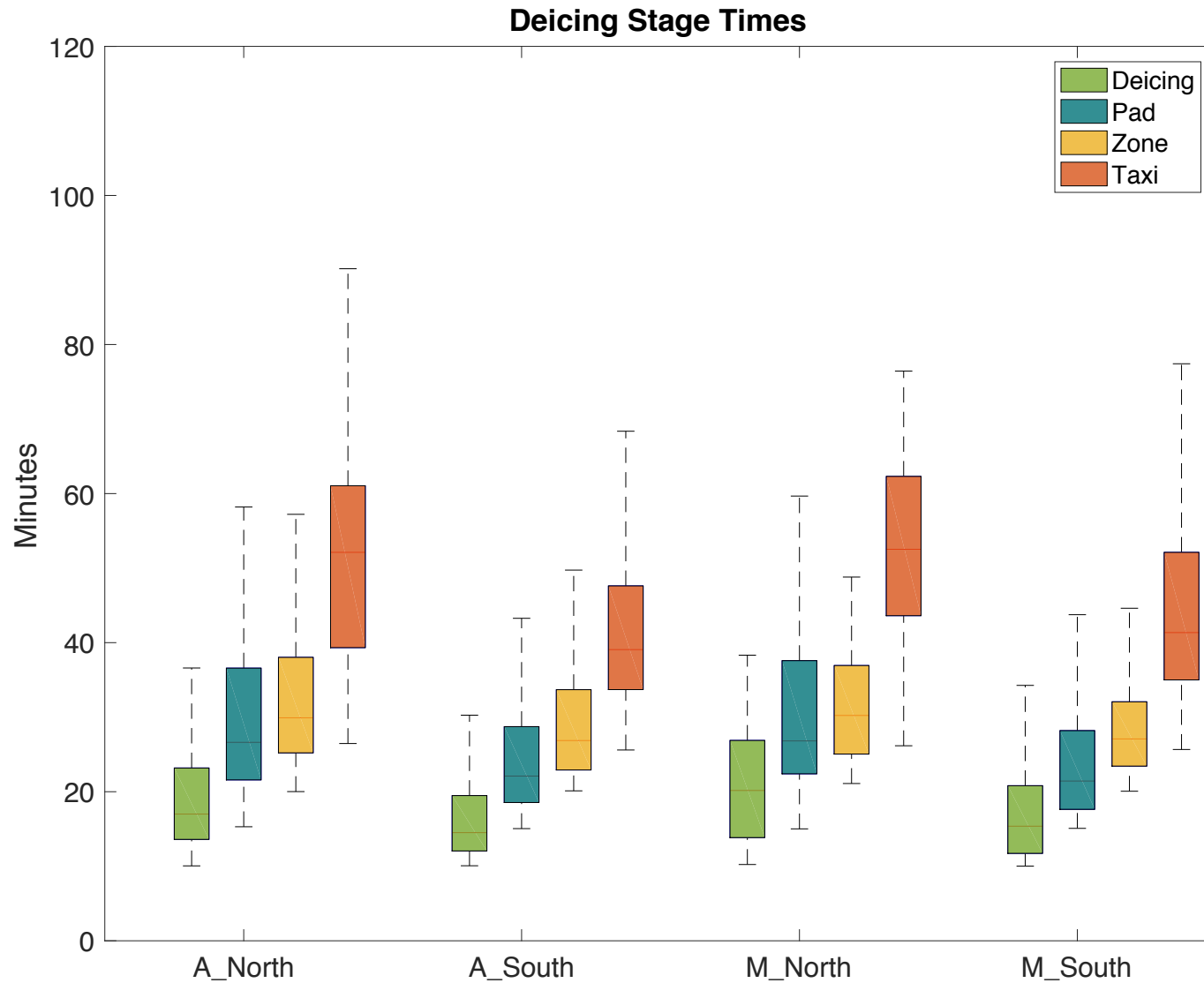
Zones - Flows Distributions



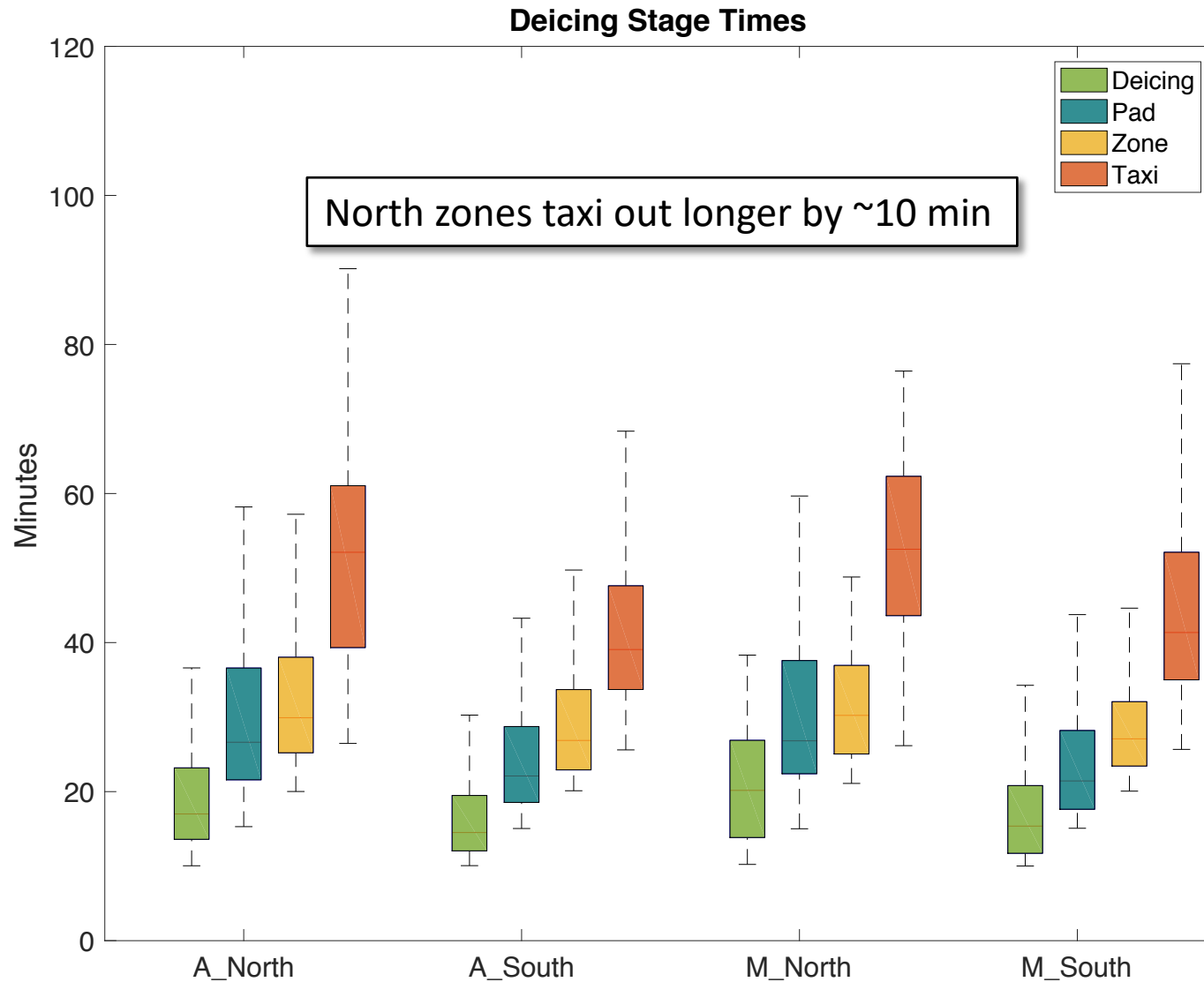
Deicing Stage Times

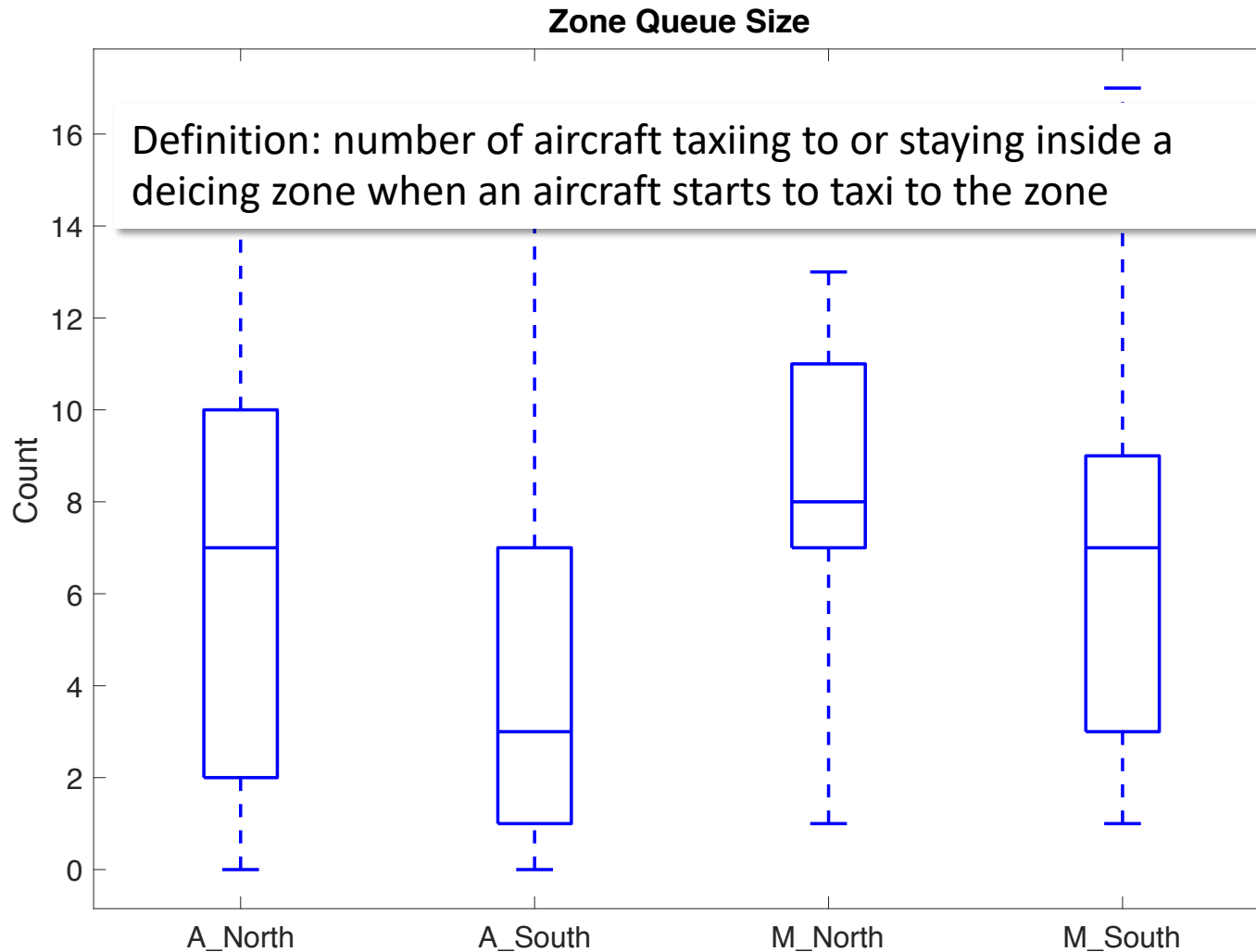


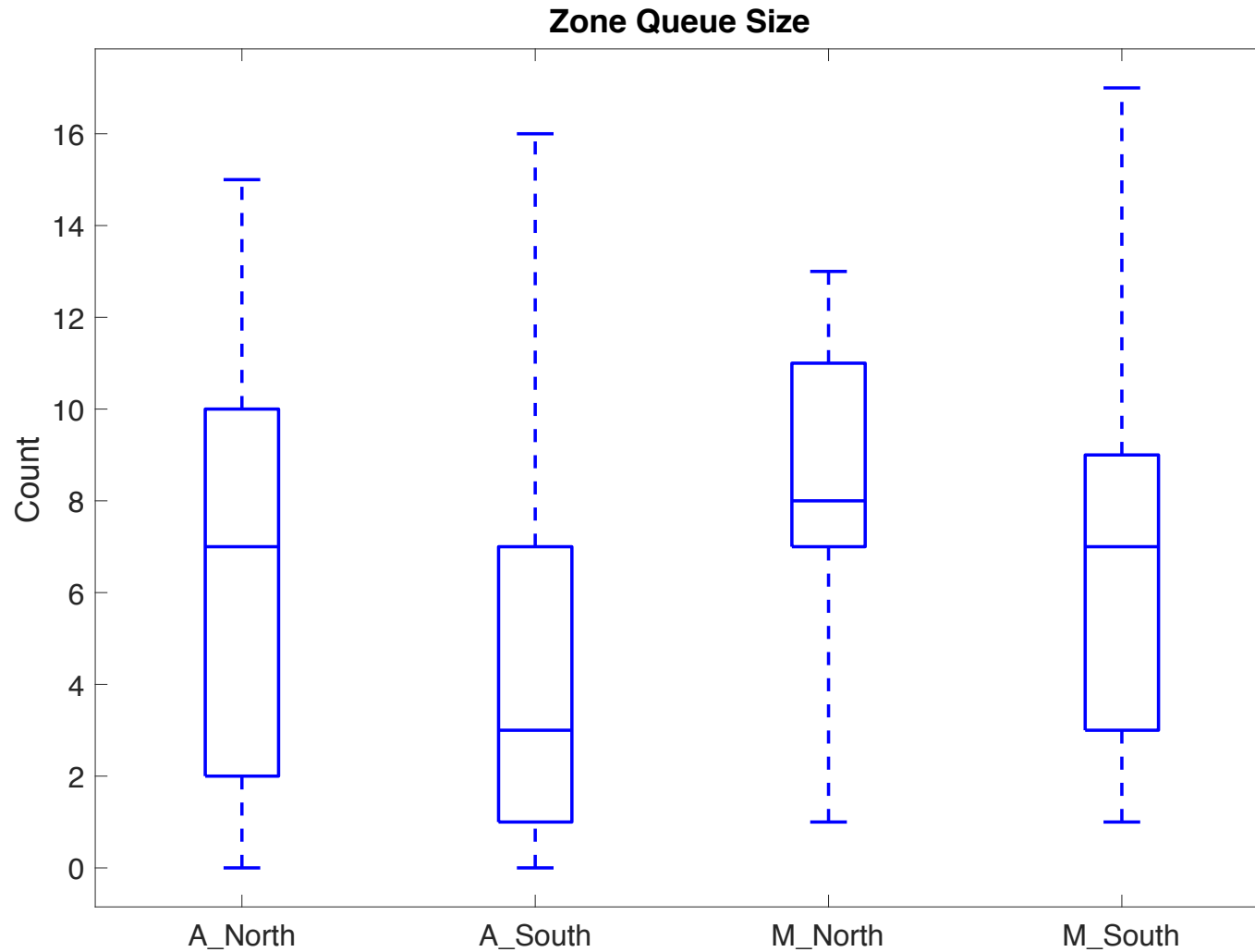
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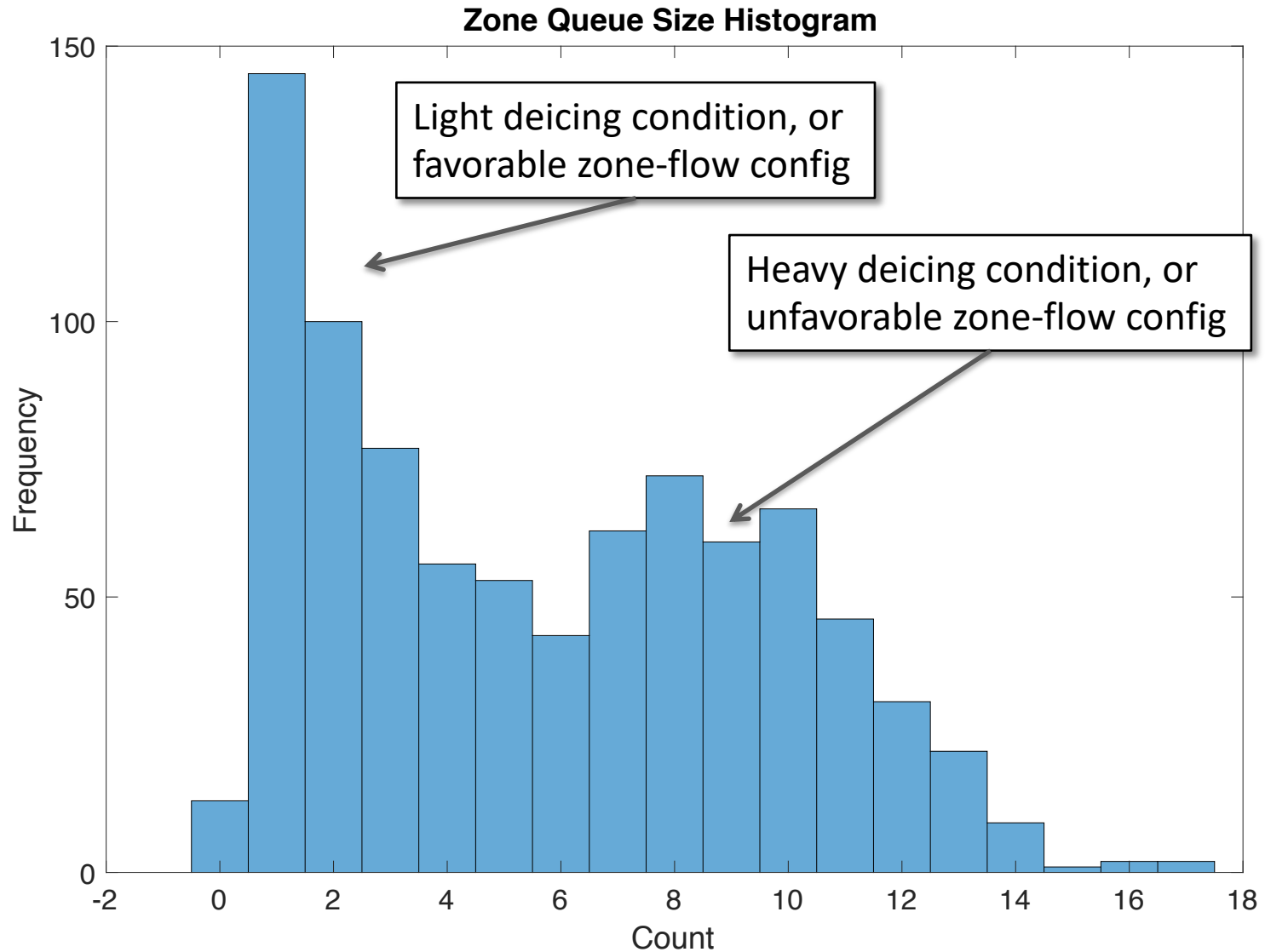


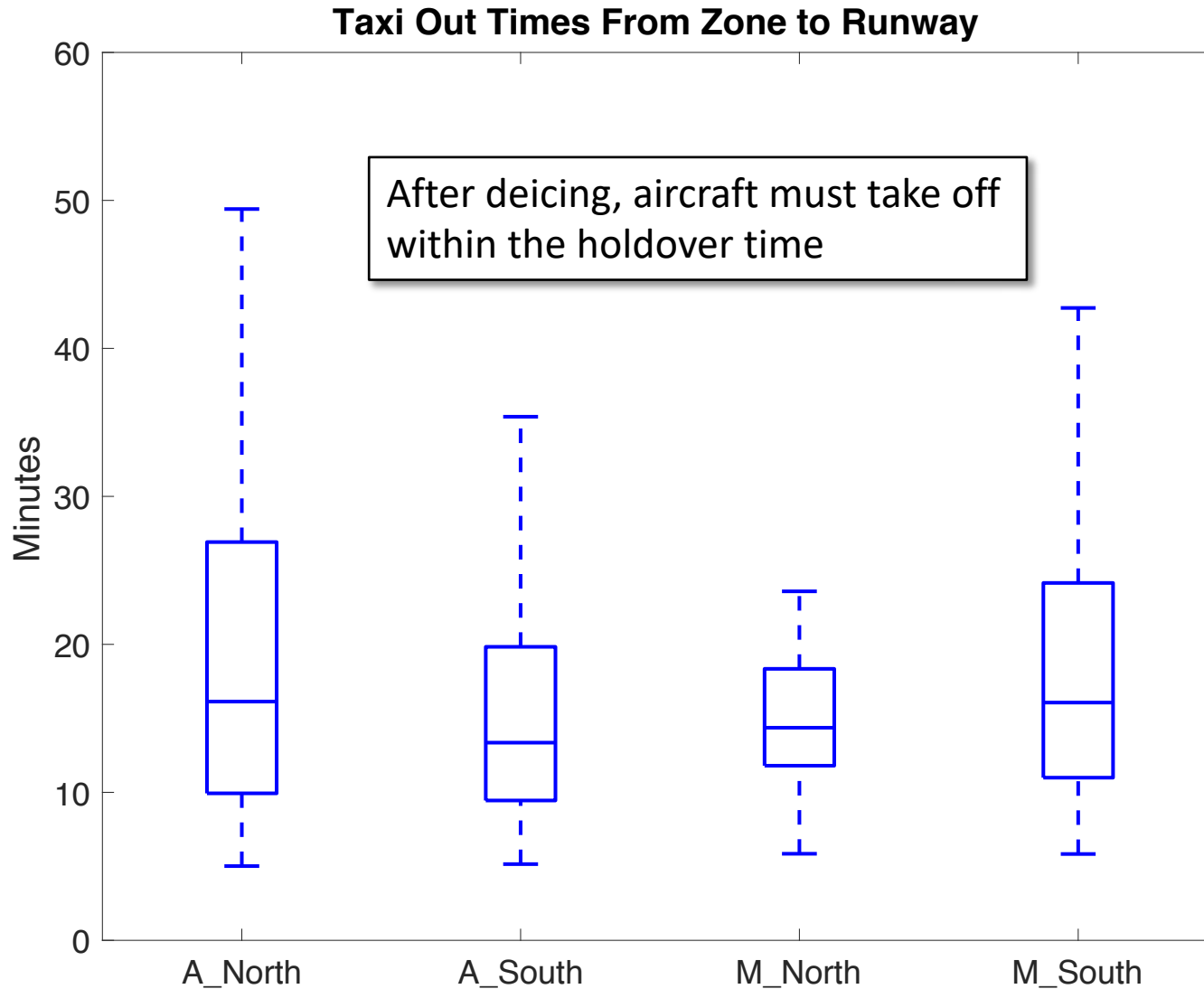
Deicing Stage Times





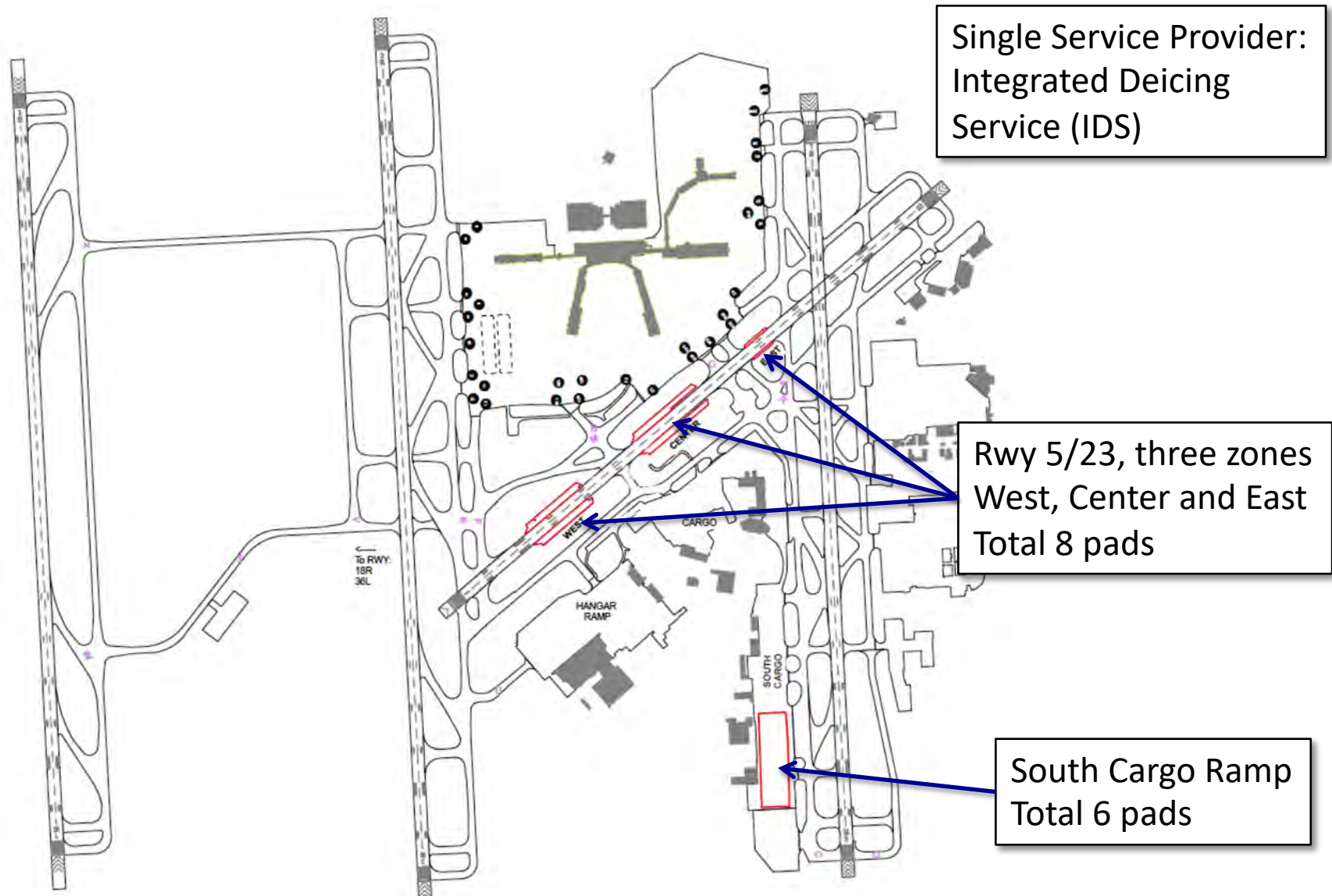






- Deicing service at dedicated deicing facilities under the ramp control
- ~20 monthly deicing days in 2016-2016 winter months
- Deicing requests up to 40% departure flights at a single day
- Two thirds of deicing at A South and M South
- Deicing impacts
 - Extra controller workload
 - Longer taxi time → departure delays
- Decision making constraints
 - Service contracts between airlines and operators
 - Equipment setups

- Finalize analysis
 - SME verification
 - Constraints and impact analysis
 - Weather data correlation
 - Compare CLT deicing operation
- Develop model concept
 - Benefit analysis
 - Model concept development and validation



- Single deicing service provider
- Runway 5/23 used as deicing pads
- Three deicing 'zones' – West, Center and East on Rwy 5/23, total 5 pads in series configuration
- Ramp assigns (in coordination with IDS) first 5 deicing flights to Rwy 5/23
- When all Rwy 5/23 pads in use, FAA assigns pads for flight at spot
- Aerobahn is used in deicing operation