Using RTMA Analysis to Substitute for Missing Airport Observations

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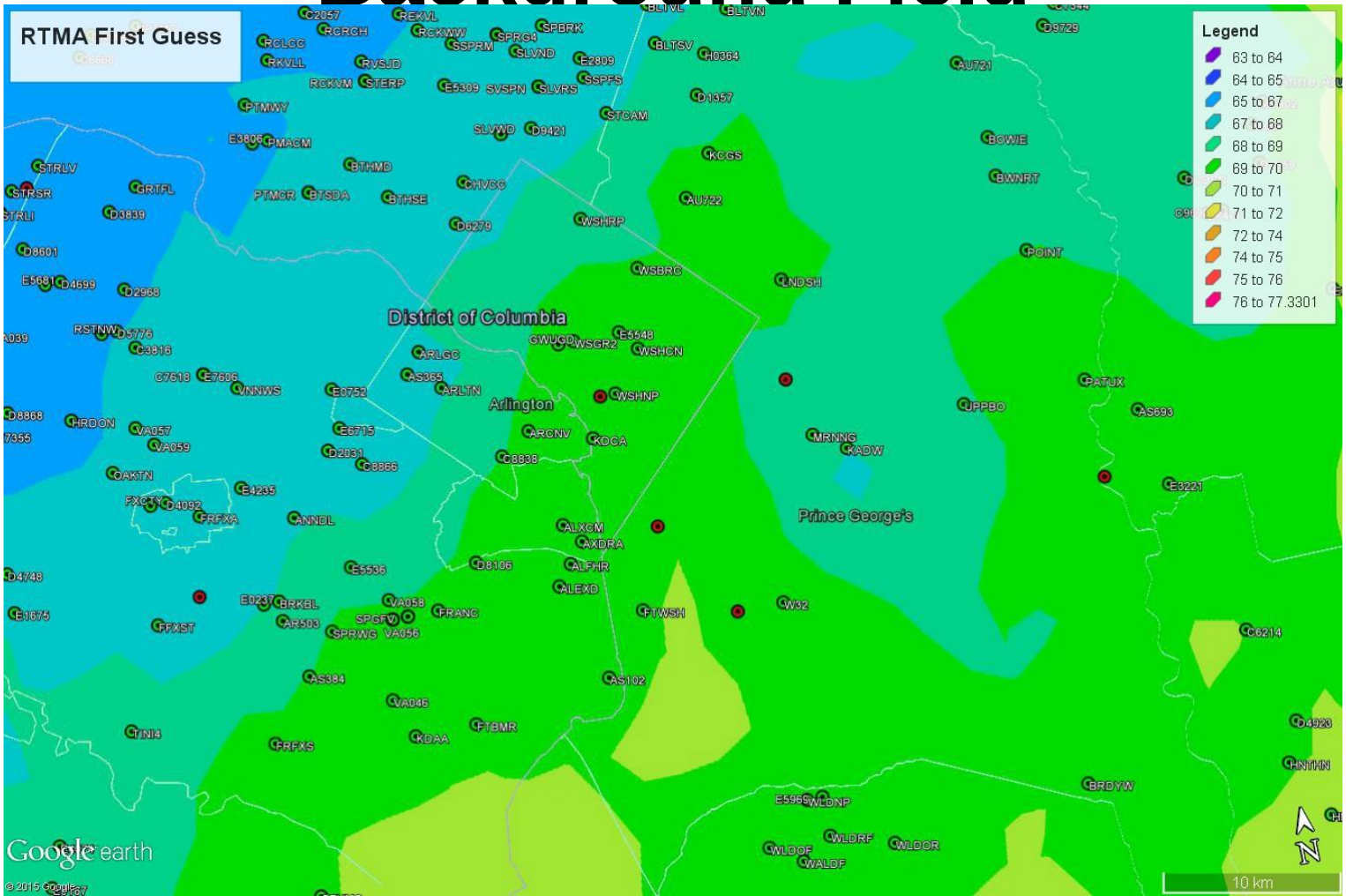
Real Time Mesoscale Analysis

- NWS' official real-time surface analysis, 2.5 km resolution over CONUS
- Current variables: temperature, moisture, surface pressure, visibility, wind, gust, cloud cover percentage, and soon ceiling
  - Currently run hourly, will soon run every 15 minutes as part of HEMS project
  - Similar systems (3 km) run for AK/HI/PR/GU
- Combine short term forecast from NAM/HRRR and all available surface obs
  - Includes METAR, buoy, and mesonets (includes public networks, state DOT networks, etc.)
  - Up to ~150,000 obs/hour
- Observations 'adjust' the background/model forecast to generate surface analysis
- UnRestricted Mesoscale Analysis (URMA) runs 6 hours later for verification
- Gridded (GRIB2) output available at: http://ftpprd.ncep.noaa.gov/data/nccf/com/rtma/prod/rtma2p5.YYYYMMDD
- Visual form: http://www.emc.ncep.noaa.gov/mmb/jcarley/rtma_urma/RTMA

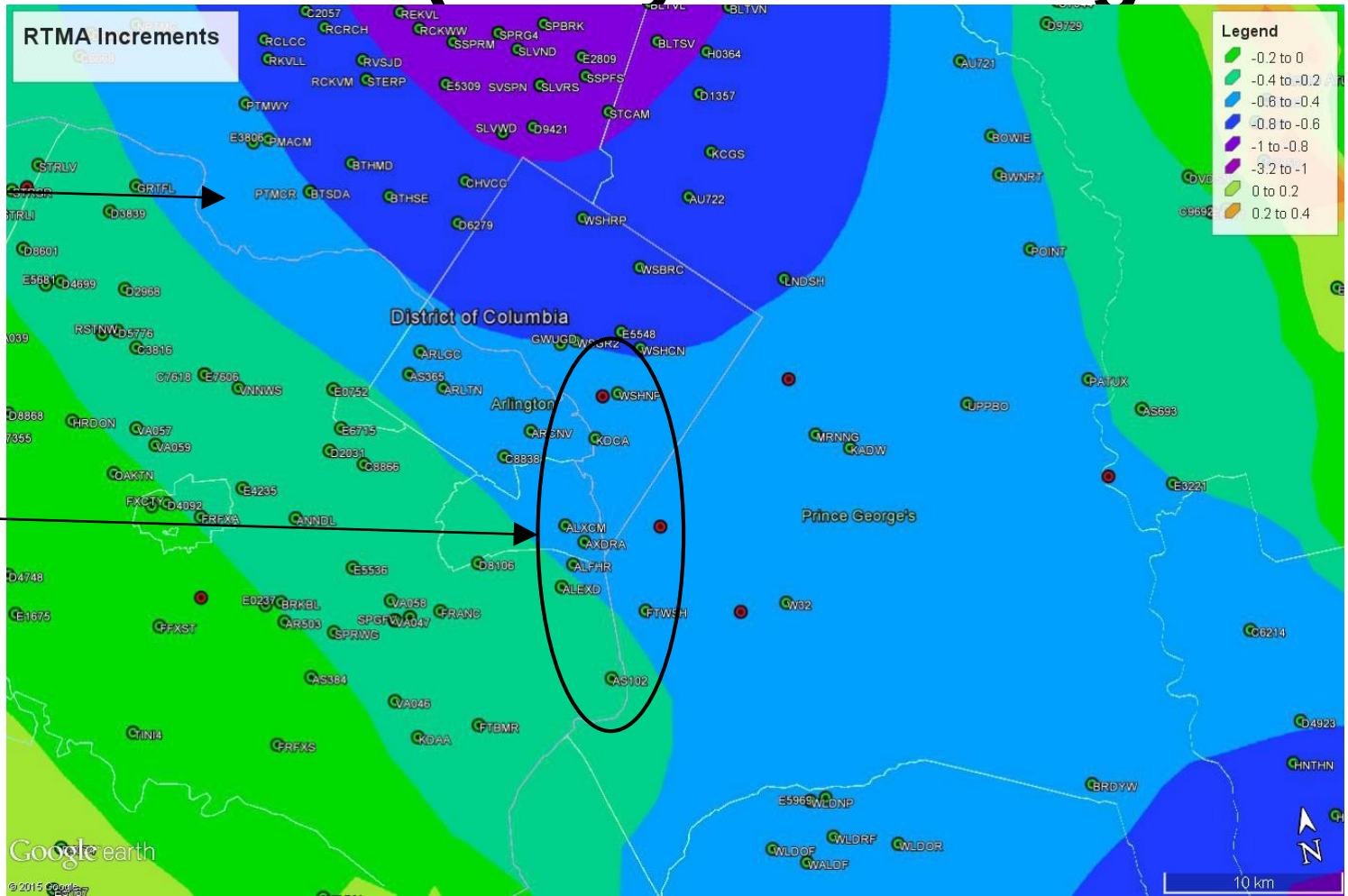
Background Field



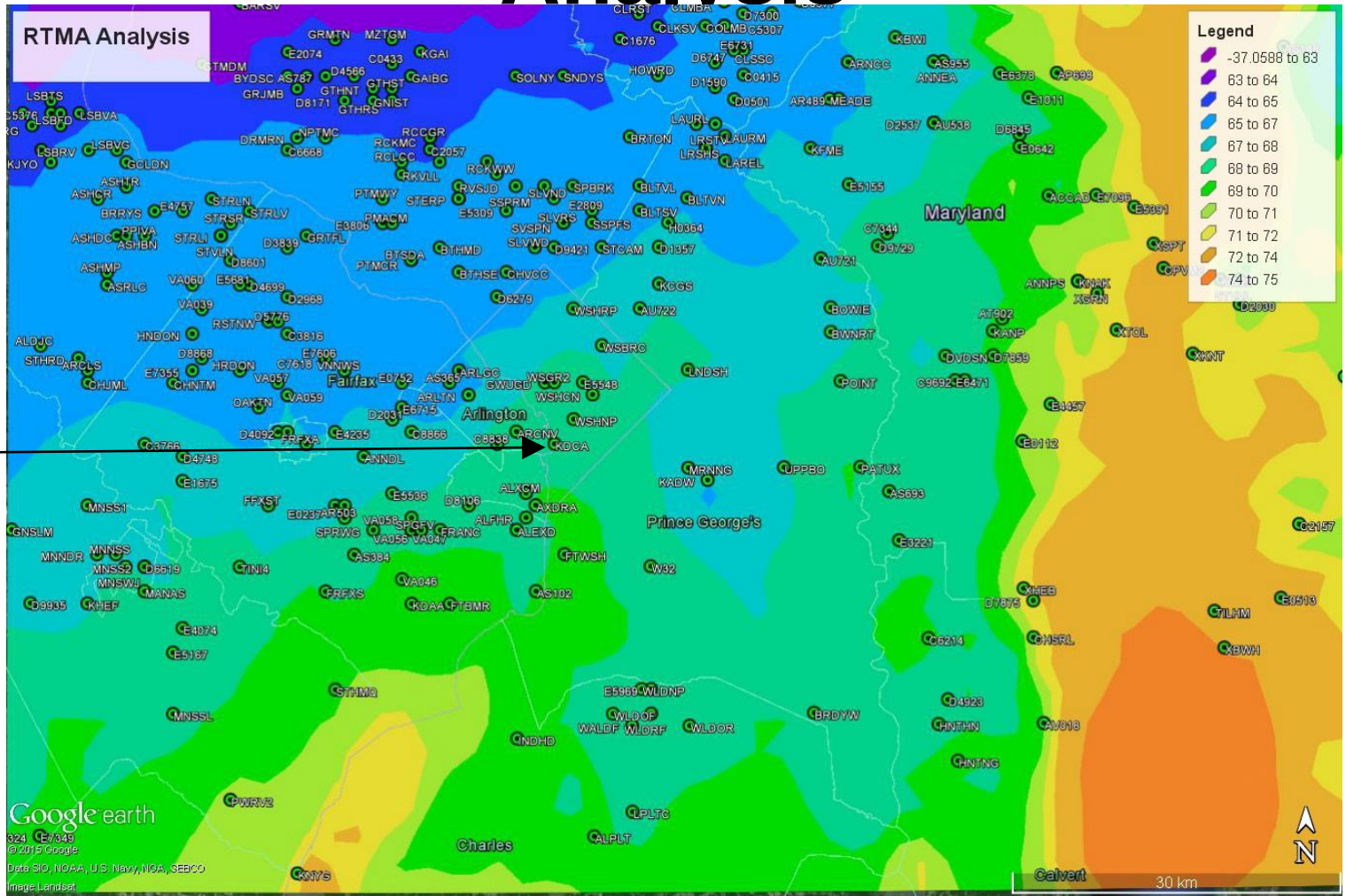
Increments (Analysis - Background)

1F increment intervals 8-10 km wide

Increments between obs are 'washed out'



Analysis



Reagan Nat'l Airport (ASOS)

RTMA to Replace Missing Temperature Obs

- FAA request to NWS for RTMA solution to missing temperature obs (3/20/15)
- RTMA enhancement to output printed values at part 139 airports (5/19/15)
  - Values are RTMA analysis interpolated to airport point
- Request to add stations in AK without weather station (7/7/15)
- Stations can be added/removed fairly easily
- Text output: ICAO ID, latitude, longitude, value
- http://nomads.ncep.noaa.gov/pub/data/nccf/com/rtma/prod/airport_temps/
- EMC cross-validation statistics show long-term accuracy at most airports over CONUS is +/- 2°F, but this can vary depending on location, terrain, weather situation
- Exact match is rare even when ob is available
- If no ob is available, analysis ‘defaults’ to background field and/or other nearby obs

Uncertainty Issues When Observation is Missing

Accuracy of background model

HRRR/NAM blend (3/4 km) for temperature/moisture/pressure, HRRR (3 km) for other variables

Number of observations around airport

More obs = more certainty (usually)

Type of observations around airport

Anyone can set up a CWOP or Weatherbug station

State DOT RWIS stations, university-run mesonets, private mesonets

Environment (terrain, water bodies) around airport

Any observation's influence is a function of terrain

Land/water interface can be challenging to deal with (mapping issues)

This all still needs to be analyzed, especially for new variables (ceiling, visibility, winds)

Local/regional NWS offices are also involved in this process

Future Issues/Plans

Can this be expanded to other variables safely?

How accurate/uncertain is system with ceiling and visibility?

- What about when dealing with IFR vs VFR situation? Low Altitude Remote Ops?
- Uncertainty values being added on 'experimental' basis
  - http://ftp.emc.ncep.noaa.gov/mmb/rtma2/faa_interp_test/
  - Uncertainty often gets *pattern* right, but not the *magnitude* of error
  - Uncertainty may be reworked some time in 2017/18

New obs to incorporate?

- Visibility observations from RWIS stations - viability still being studied

Major improvements to ceiling and visibility analyses

- Should start seeing results in early 2017

System upgrade to take place August 23rd! (includes HRRRv2/RAPv3)

Upgrades to system roughly every 6 months

Acknowledgements and Feedback

Feedback: aor-rtma@infolist.nws.noaa.gov (email to sign up)

New NOAA VLab page (ask questions, provide feedback)

EMC collaborators: Jacob Carley, Manuel Pondeca, Geoff DiMego

NCO collaborators: Becky Cosgrove, Steven Earle, Carissa Klemmer

FAA collaborators: Kevin Johnson, Gordon Rother, Theodora Kessaris, Patrick O'Connell, Steve Abelman

Further questions: steven.levine@noaa.gov

Thank You!