

# UAS-based Weather Observations



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# Key Points

## UAS Operations

- VLOS: focus primarily on local domain & short duration flights
  - mostly adhoc weather support for planning & execution
- BVLOS: focus shifting to regional/larger domain & longer duration flights
  - need up-to-date weather information along flight path for duration of mission
  - rapidly-changing & near-limiting conditions particularly challenging

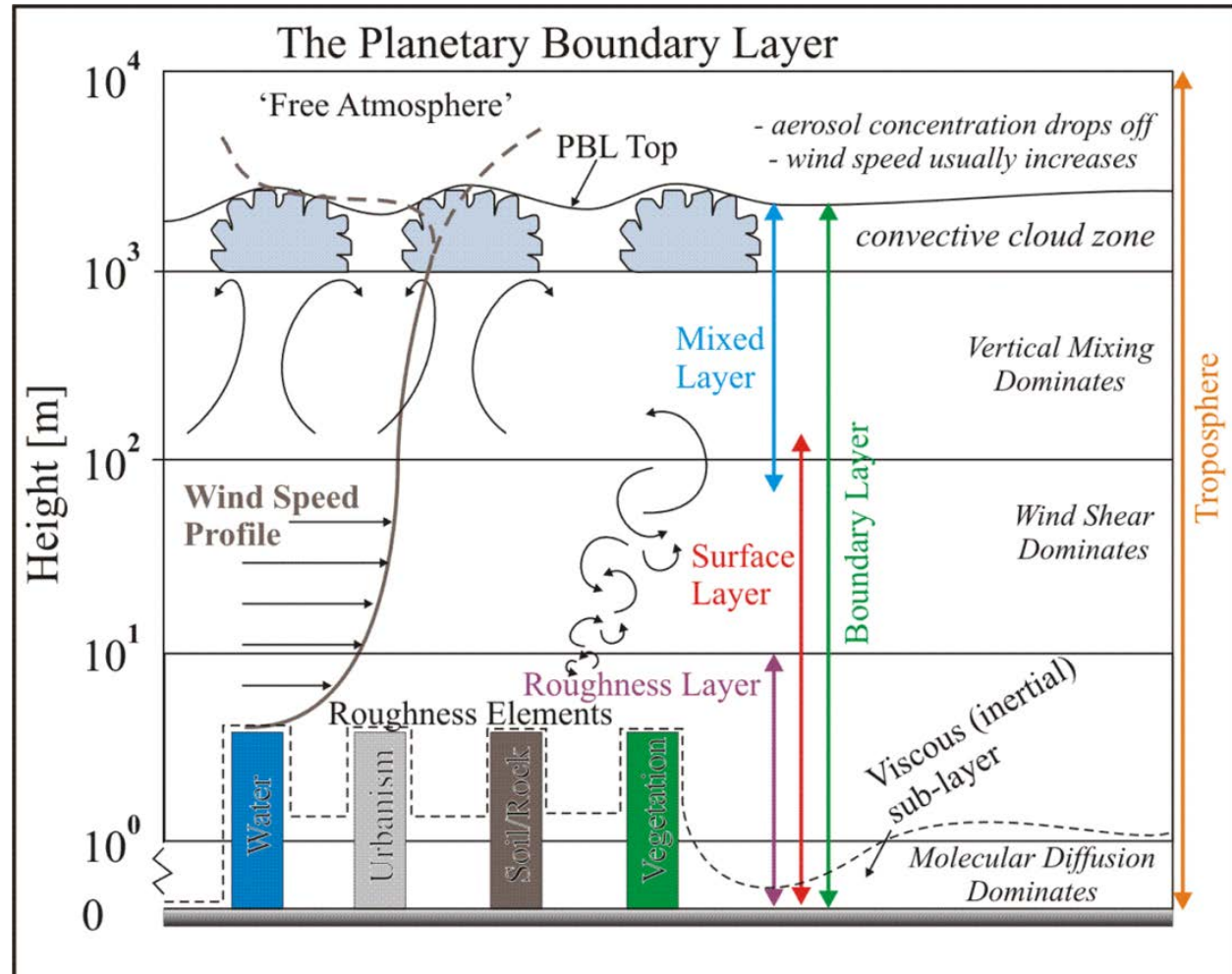
## Atmosphere

- wide range of processes & scales
  - particularly dynamic in lower levels of atmosphere
  - weather less predictable/deterministic at high resolution & specific locations
- limited observations above surface, yet needed for analysis & forecasting

Altitude [m]

## Particular Challenges

- near marked land surface contrasts (land/sea)
- near thunderstorms (strong winds, hail, lightning, etc.)
- in complex terrain
- in urban environments



Altitude [m]

100000

10000

1000

100

10

1



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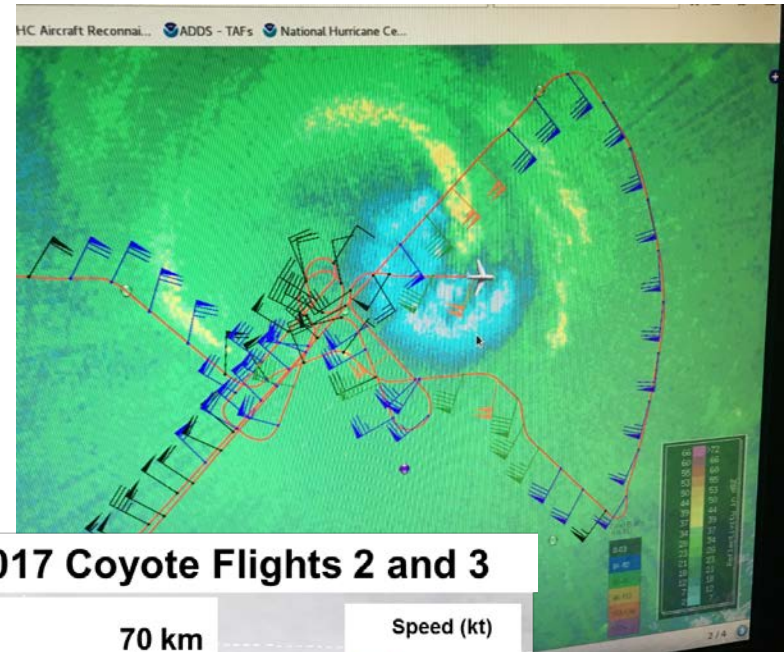
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## Needs & Opportunities

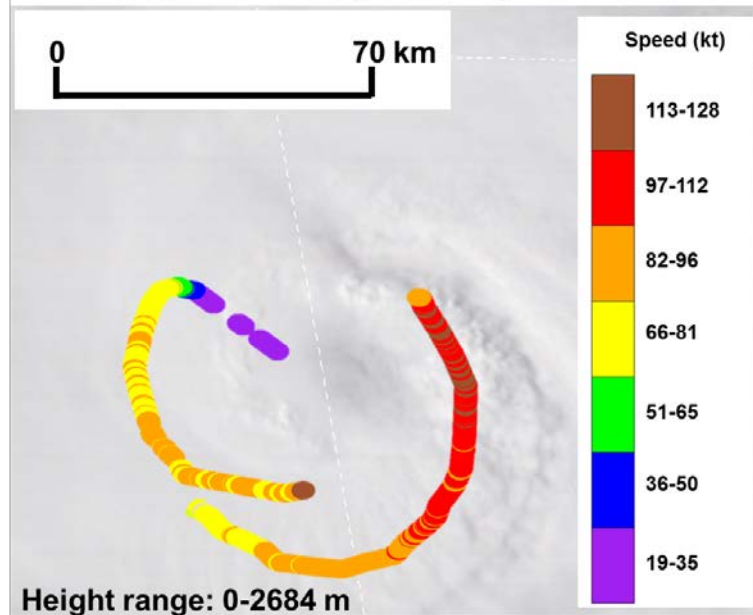
- enhanced situational awareness
  - PIREPs replaced by automated reporting using UAS in situ observations
- scientific understanding of atmospheric processes (e.g., boundary layer)
- weather forecast improvements (e.g., hurricanes, severe storms)

# UAS Coyote Flights in Hurricane Maria

- ConOps for targeted observations
  - looking for maximum winds
- situational awareness for forecasters
  - access to observations in real time



23 Sep 2017 Coyote Flights 2 and 3



Courtesy of Joe Cione, NOAA/HRD

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## Concerns

- limitations on size, weight & power consumption
- amount of data & aging off of information