2021 NOAA/AOML/HRD Hurricane Field Program - APHEX

SATELLITE VALIDATION EXPERIMENT
Flight Pattern Description

Experiment/Module: TROPICS Satellite Validation Module

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Requirements: No requirements: flown at any stage of the TC lifecycle

P-3 Pattern #1

What to Target: Coordinated underflights of the TROPICS Pathfinder satellite in the TC inner core (R ≤ 150 km), near environment (R = 150-300 km), and far environment (R > 300 km).

When to Target: P-3 flight patterns will be adjusted to coordinate temporal and spatial overlap with overpasses by the TROPICS Pathfinder satellite. GPS dropsonde and P-3 tail Doppler radar (TDR) sampling should be timed to be ≤30 min and ≤400 n mi (750 km) of satellite nadir. TROPICS crosses the equator at 1330 LTAN.

Pattern: This is a breakaway pattern that involves a straight-line leg that underflies the TROPICS Pathfinder satellite. The full satellite swath width is ~2000 km, but the highest priority is coverage of nadir and the area within +/- 750 km of nadir. The P-3 leg should ideally begin ~10-15 min before and continue for ~10-15 min after the satellite passes "overhead". This will equate to a P-3 leg length of ~90-135 n mi (165-250 km). P-3 ferries to and from the storm can also be used to target satellite underflights in the far environment. NASA's MTS aircraft software should be used to coordinate the underflight.

Flight altitude: 10-12 kft (5 kft is minimum altitude for dropsonde launches) in the TC inner core and near environment and 20+ kft in the TC far environment

Leg length or radii: N/A

Estimated in-pattern flight duration: ~20-30 min

Expendable distribution: During the TROPICS Pathfinder underflight, GPS dropsonde spacing should generally be 10 n mi (20 km), which will require ~10-14 dropsondes.

Instrumentation Notes: Use TDR defaults. Use straight flight legs as safety permits. All GPS dropsonde data should be transmitted to the Global Telecommunication System (GTS) in real-time to ensure availability for assimilation into forecast models.

G-IV Pattern #1

What to Target: Coordinated underflights of the TROPICS Pathfinder satellite in the TC inner core (R ≤ 150 km), near environment (R = 150-300 km), and far environment (R > 300 km).

When to Target: G-IV flight patterns will be adjusted to coordinate temporal and spatial overlap with overpasses by the TROPICS Pathfinder satellite. GPS dropsonde and P-3 tail Doppler radar (TDR) sampling should be timed to be ≤30 min and ≤400 n mi (750 km) of satellite collocated TROPICS

Pathfinder nadir temperature, and moisture, and precipitation retrievals and will depend on the area of operation (determined on a case-by-case basis). TROPICS crosses the equator at 1330 LTAN.

Pattern: This is a breakaway pattern that involves a straight-line leg that underflies the TROPICS Pathfinder satellite. The full satellite swath width is ~2000 km, but the highest priority is coverage of nadir and the area within +/- 750 km of nadir. The G-IV leg should ideally begin ~10-15 min before and continue for ~10-15 min after the satellite passes "overhead". This will equate to a G-IV leg length of ~140-210 n mi (~260-390 km). G-IV ferries to and from the storm can also be used to target satellite underflights in the far environment. NASA's MTS aircraft software should be used to coordinate the underflight.

Flight altitude: 40–45 kft or as high as possible to provide better vertical sampling by dropsondes that are deployed.

Leg length or radii: N/A

Estimated in-pattern flight duration: ~20-30 min

Expendable distribution: During the TROPICS Pathfinder underflight, GPS dropsonde spacing should generally be ~10 n mi (20 km), which will require ~14-21 dropsondes.

Instrumentation Notes: Use TDR defaults (though not a requirement for this experiment). Use straight flight legs as safety permits. All GPS dropsonde data should be transmitted to the Global Telecommunication System (GTS) in real-time to ensure availability for assimilation into forecast models.