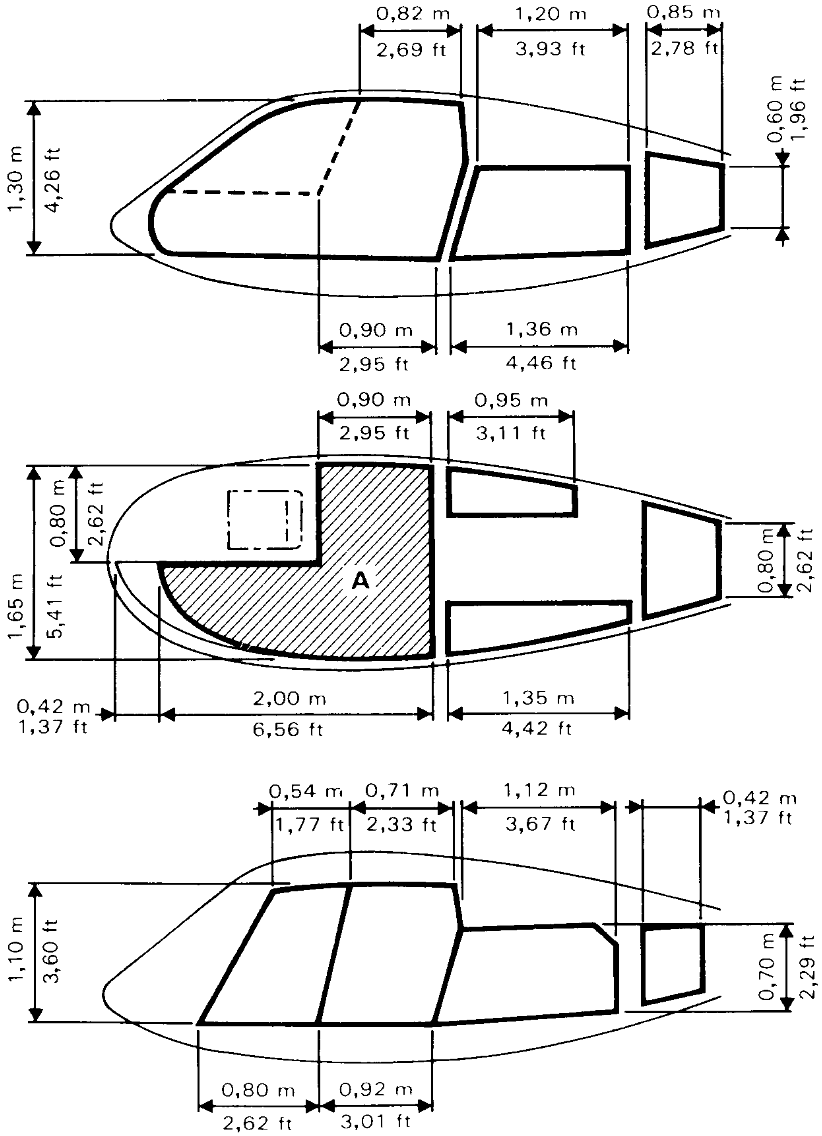
The University of Miami
Helicopter Observation Platform (HOP)

Roni Avissar

ROSENSTIEL SCHOOL OF MARINE AND ATMOSPHERIC SCIENCE

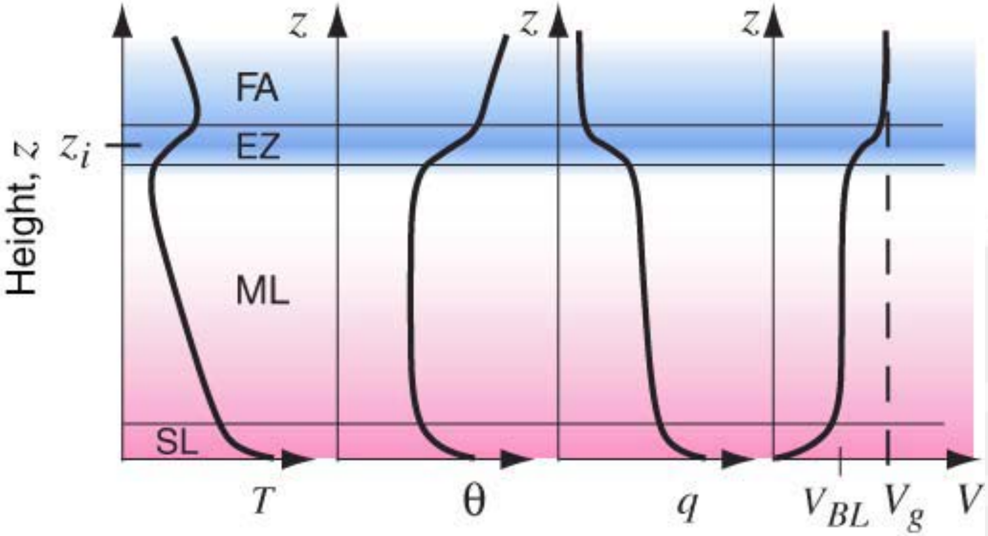
Airbus Helicopter H125 - Performance at Max. GROSS WEIGHT, ISA, SL

Maximum speed (Vne)	155 kts / 287 km/hr
Fast cruise speed	140 kts / 259 km/hr
Range (@127 kts)	345 nm / 638 km
Max Endurance	4’23” (no reserve) – 4 hrs for science mission
Rate of climb	1,959 ft per min / 10 m/s
Service ceiling	16,550 ft / 5,044 m
Hover ceiling IGE	13,200 ft / 4,023 m
Hover ceiling OGE	11,100 ft / 3,383 m
Maximum Altitude	23,000 ft / 7,010 m (landed on Mt Everest!)
Maximum takeoff weight	5,225 lb / 2,370 kg
Maximum with external load	6,172 lb / 2,800 kg (+950 lb for Payload)
Maximum cargo-swing load	3,086 lb / 1,400 kg
Maximum Scientific Payload	1,000/3000 lb (fully fueled with 2 pilots)

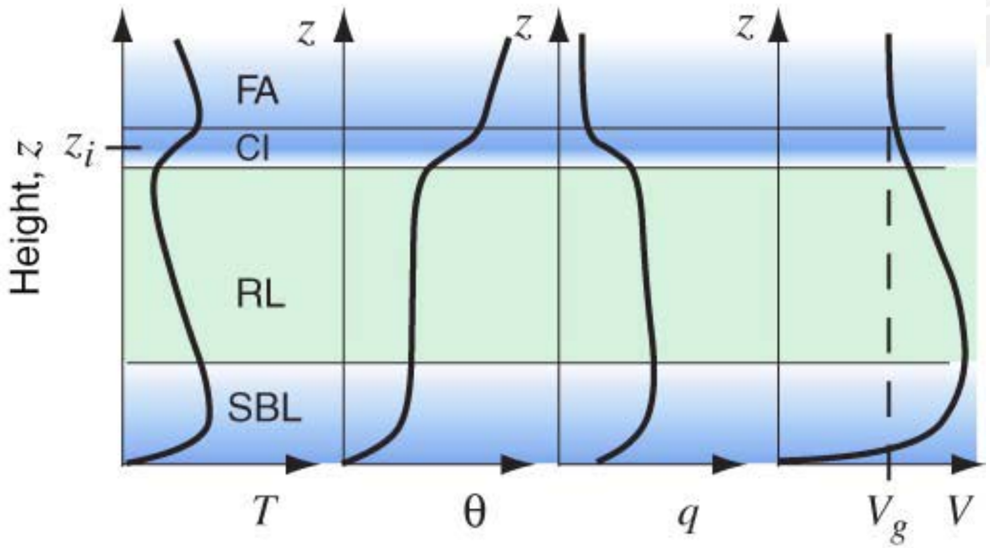


Cabin main dimensions

CABIN	
Surface A	2.60 m² 27.98 ft²
Volume	3.000 m³ 105.94 ft³
LH HOLD	
Surface	0.43 m² 4.62 ft²
Volume	0.235 m³ 8.29 ft³
RH HOLD	
Surface	0.35 m² 3.76 ft²
Volume	0.200 m³ 7.06 ft³
REAR HOLD	
Surface	0.55 m² 5.92 ft²
Volume	0.565 m³ 19.95 ft³
TOTAL HOLDS	
Surface	1.33 m² 14.3 ft²
Volume	1.000 m³ 35.30 ft³



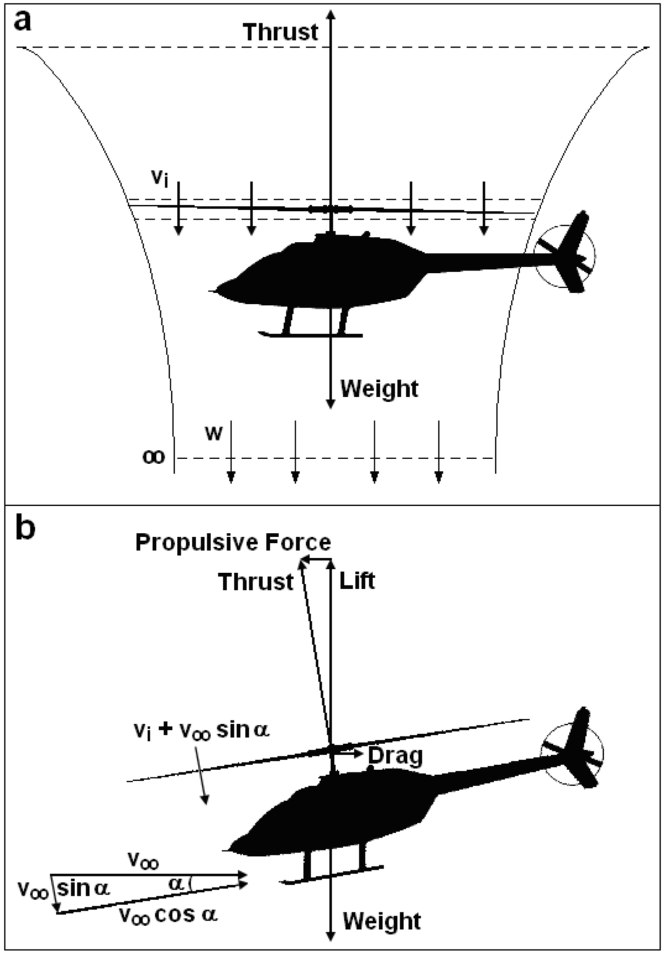
(a) DAY

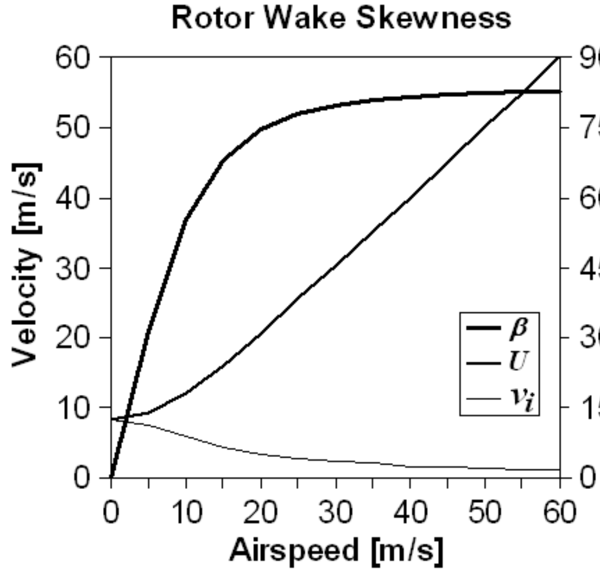


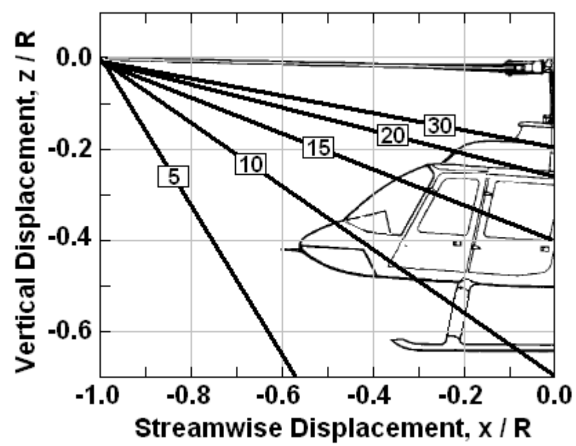
(b) NIGHT

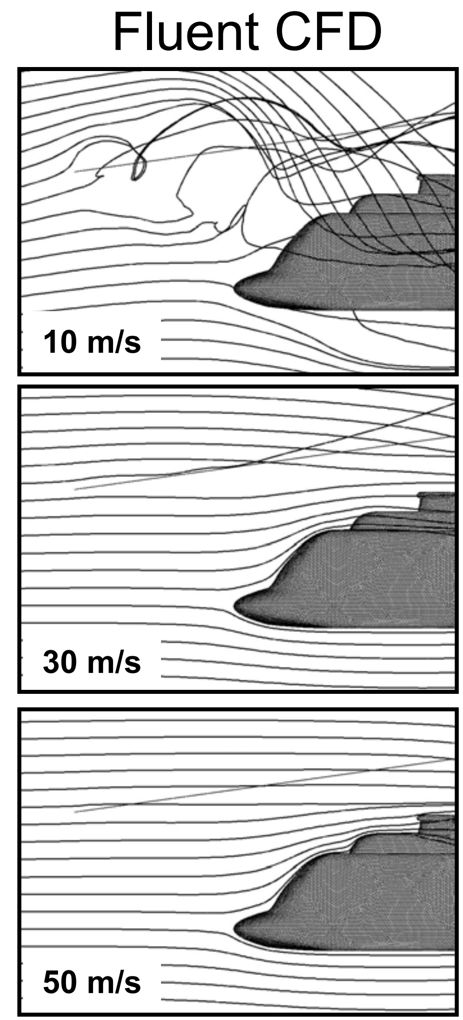
Why a helicopter?

1. Various environmental observations require low altitude, very-high frequency of sampling, and/or slow speed of sampling (e.g., aerosols, which have a key impact on climate and health; fluxes – water, carbon, others)
2. Maneuverability (complex terrain, urban areas, quick turns for flight tracks)
3. Time at station (with a fuel truck on the ground, no need to commute to an airport)
4. Remote location (e.g., operation from a ship)

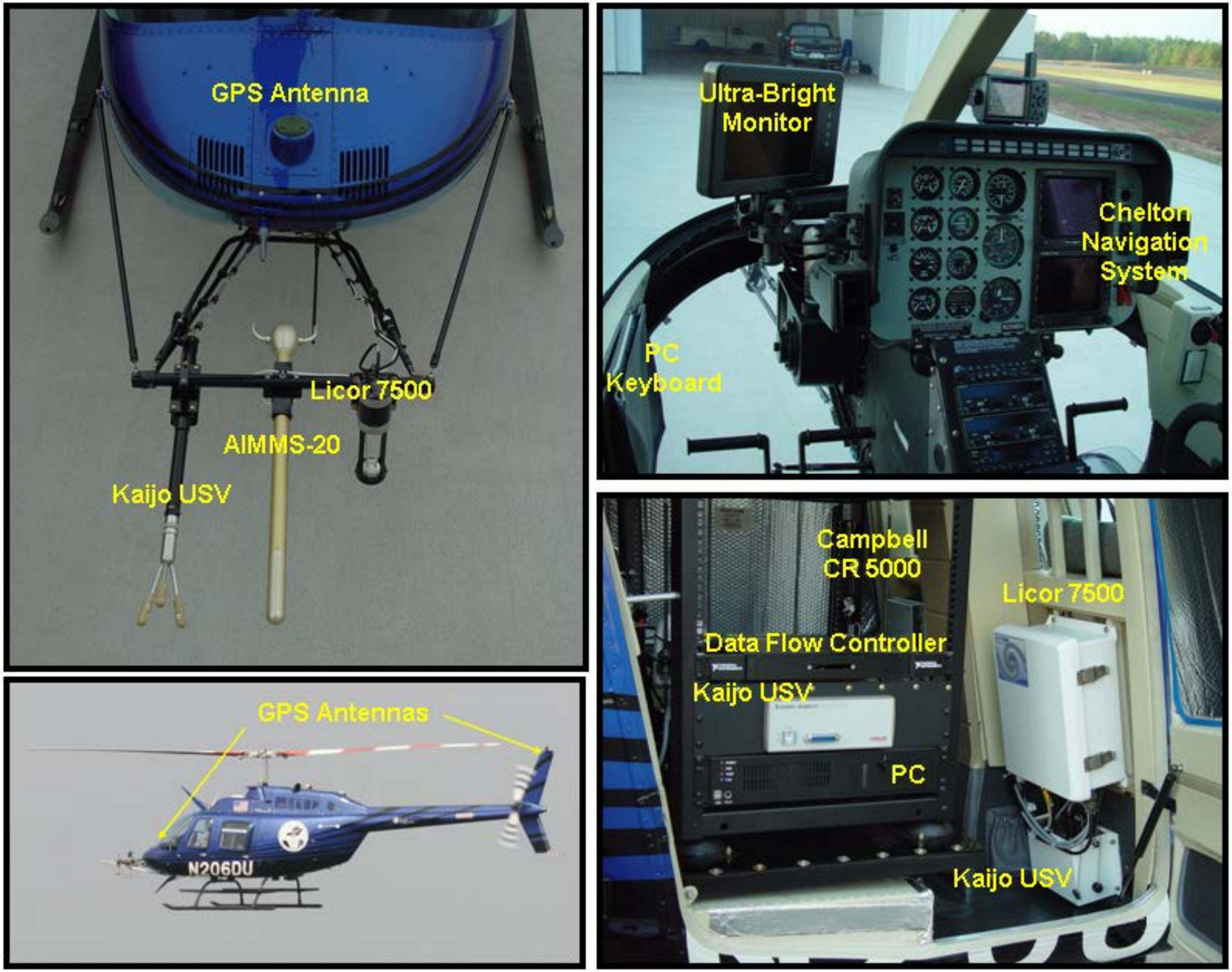


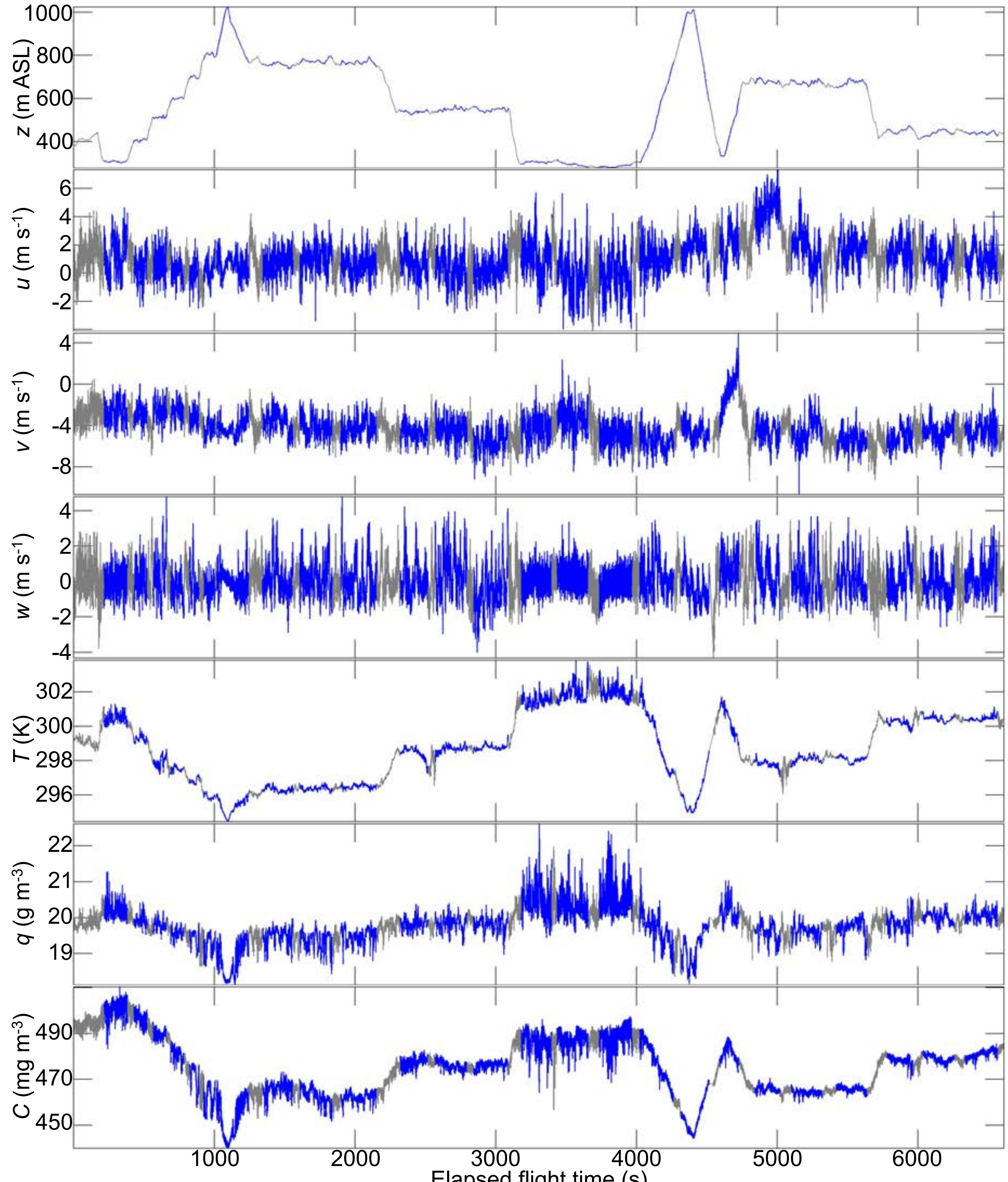






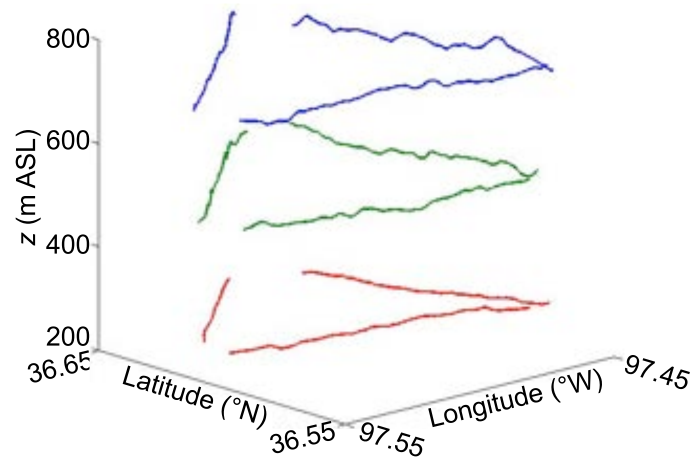
Glauert's (1935) rotor-wake model: $U = \sqrt{(v_\infty \cos\alpha)^2 + (v_\infty \sin\alpha + v_i)^2}$

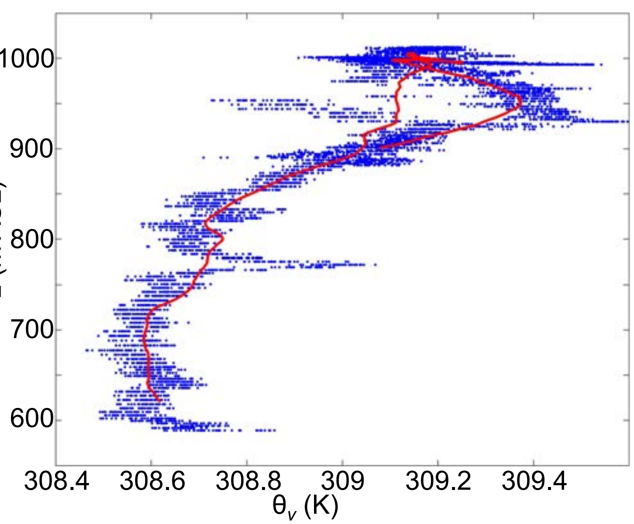

GPS Antenna
Licor 7500
AIMMS-20
Kaijo USV
Ultra-Bright
Monitor
Chelton
Navigation
System
PC
Keyboard
GPS Antennas
N206DU
Campbell
CR 5000
Licor 7500
Data Flow Controller
Kaijo USV
PC
Kaijo USV



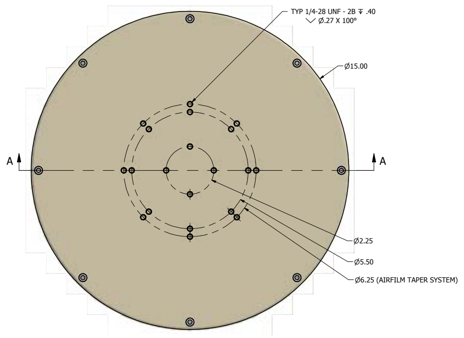
HOP Data

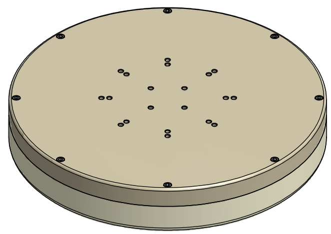
19 June 2007 CLASIC HOP flight

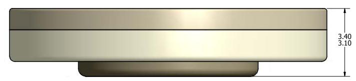


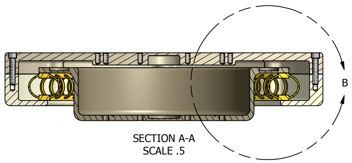



N350UM

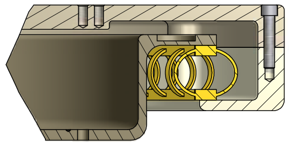




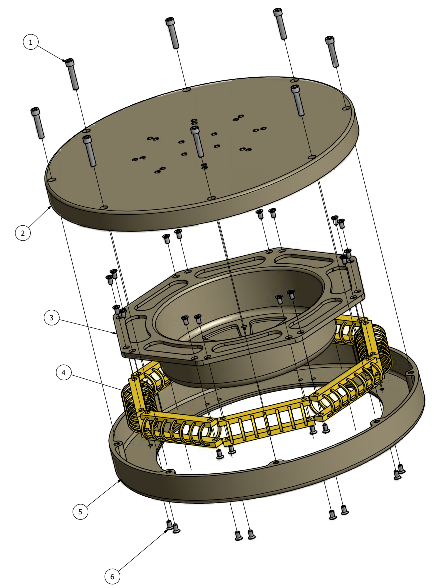




SECTION A-A
SCALE .5



VIEW B



PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	8	MS169998-48	CAP SCREW
2	1	-10	TOP COVER
3	1	-11	STEP RING
4	8	WR3-600-10D	WIRE ROPE ISO
5	1	-12	LOWER RING
6	32	MS24694-S55	MACHINE SCRTEW

UNLESS OTHERWISE NOTED ALL DIMENSIONS ARE INCH TOLERANCES DECIMALS .X +/- 0.1 .XX +/- 0.03 .XXX +/- 0.005 ANGULAR +/- 0.5 DEG BREAK ALL SHARP EDGES	ASSY DRAWING	AirFilm Camera Systems Georgetown, Ca 530-333-0193 www.airfilm.com
	DRAWN S.P. Herring 2/6/2009	TITLE 15 INCH DIA, VIBRATION REDUCER
	CHECKED	SIZE D
	APPROVED	DWG NO V15-1
	THIS DRAWING AND SPECIFICATION IS THE PROPERTY OF AIRFILM CAMERA SYSTEMS, AND SHALL NOT BE COPIED OR DIVULGED IN WHILE OR IN PART AS THE BASIS FOR MANUFACTURING OR SALE OF THE ITEM OR ITEMS DISCLOSED.	REV N/C
		SCALE
		SHEET 1 OF 2

Conclusions

We demonstrated that HOP is a valuable addition to the research aircraft fleet, especially for land-atmosphere and air-sea interactions. An operational version of the Duke prototype was rebuilt at the University of Miami Rosenstiel School based on the knowledge gained with this prototype. The platform is on schedule to be available for research in Spring 2015.

- Avissar et al, 2009, *Bull. Amer. Met. Soc.*, ., **90**, 939-954.
- Holder, Bolch and Avissar, 2010, *J. Atmos. Ocean Tech.*, **8**, 671-683.

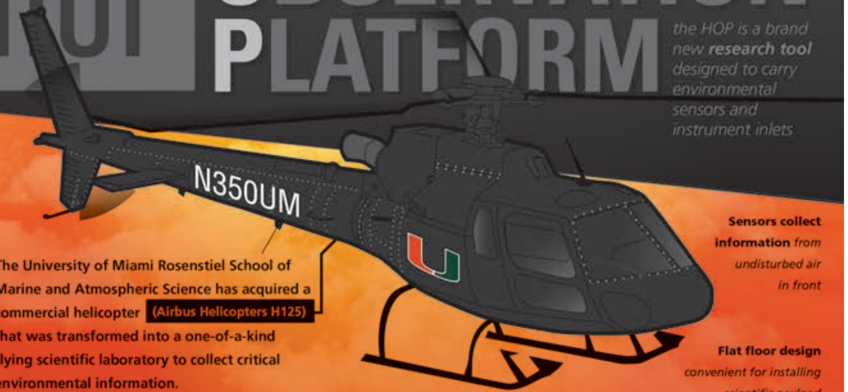
Cost of Operation…

Rate is $1,995/hr (including ALL costs: insurance, hangar, maintenance and inspections, operation, pilot, fuel, parts and labors). A typical intensive field campaign lasts about 10-12 days. Flying 5 hr/day on average results in 50-60 hours of data collection (plus transportation to the site) and costs about $150K. Typical field campaign budgets are in millions of $ and, therefore, the cost of the HOP is typically minor, especially given the uniqueness that it brings to the table…

INTRODUCING THE HOP

HELICOPTER OBSERVATION PLATFORM

*the HOP is a brand new **research tool** designed to carry environmental sensors and instrument inlets*



Sensors collect information *from undisturbed air in front*

Flat floor design *convenient for installing scientific payload*

The University of Miami Rosenstiel School of Marine and Atmospheric Science has acquired a commercial helicopter **(Airbus Helicopters H125)** that was transformed into a one-of-a-kind flying scientific laboratory to collect critical environmental information.

The HOP fills critical gaps in physical, chemical and biological observations of the environment.

HOP OPERATIONAL DETAILS

Scientific payload *(Up to)*
1,000 LBS internally
3,000 LBS externally

Flight time
4 HOURS without refueling at airspeed of 65 knots

Fast cruising speed
140 KNOTS

Range
350 NAUTICAL MILES at top cruising speed

Altitude
from a **few feet** above the Earth's surface, to the **mid troposphere**

works at various altitudes
Ideal to access remote areas and conduct airborne sea-surface measurements.

Capability to hover is
IDEAL FOR REMOTE-SENSING OBSERVATIONS

Capable of
HIGH-ALTITUDE FLIGHTS

Easily transported
ANYWHERE IN THE WORLD

Can be operated from an
OCEANOGRAPHIC RESEARCH SHIP AT SEA

Ideal to
ACCESS REMOTE AREAS AND CONDUCT AIRBORNE SEA-SURFACE MEASUREMENTS

Available to the
ENTIRE SCIENTIFIC COMMUNITY

@UMiamiRSMAS #UMHOP

Media Contact:
Diana Udel - *Director of Communications*
305-421-4704 - dudel@rsmas.miami.edu
www.rsmas.miami.edu

UNIVERSITY OF MIAMI
ROSENSTIEL SCHOOL of MARINE & ATMOSPHERIC SCIENCE