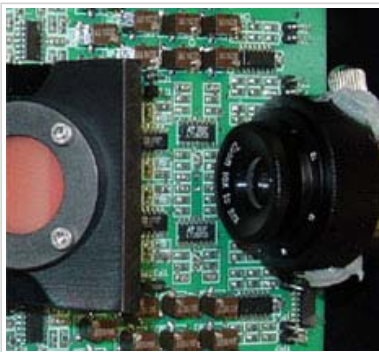


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Measurement capabilities

Many instruments on the Cheyenne II are provided, maintained, and operated by SOAR. In addition, collaborative investigations with scientists from other research organizations greatly expand the measurement capabilities of the SOAR research aircraft.

The research instrumentation available on the SOAR Cheyenne II is listed in the table of measurement capabilities. Typically, the equipment carried on a research project will be a subset of this list. The installation of instruments provided by other investigators can be accommodated, subject to space, weight and electrical power requirements. Access to collaborative instruments must be individually arranged for each mission.

REAL-TIME PARTICLES

CODE	VARIABLE	INSTRUMENT	RANGE	ACCURACY	RESOLUTION	FREQUENCY
AER1	Isokinetic aerosol inlet	Brechtel double diffuser inlet	100 m/s TAS	--	--	--
AER2*	Aerosol spectrometer	PMS PCASP SPP-200	0.1 to 3 µm	--	0.02 µm, 30 bins	1 Hz
AER3*	Condensation Particle Concentration	TSI 3010	>7 nm	--	0-105 /cm ³	1 Hz
AER4*	Condensation Particle Concentration	TSI 3025A	>3 nm	--	0-105 /cm ³	1 Hz
AER5*	Fast Mobility Particle Sizer	TSI 3091	5.6 to 560 nm	--	32 channels	1 size distrib/sec
AER6*	Tandem Differential Mobility Analyzer	TAMU TDMA	0.015 to 0.6 µm	--	61 bins	--

* Collaborative investigations with scientists from other research organizations

REAL-TIME GASES

CODE	VARIABLE	INSTRUMENT	RANGE	ACCURACY	RESOLUTION	FREQUENCY
GAS1*	SF ₆ trace level (ppt)	WSU HP5890 gas chromatograph	0 to 1 volt	--	--	1 Hz
GAS2*	O ₃ U.V. Photometric Analyzer	TEC 49C	5-500 ppb	--	--	1 Hz
GAS3*	SO ₂ Pulsed Fluorescence Analyzer	TEC 43C	0.3-200 ppb	--	--	1 Hz
GAS4*	CO Gas Filter Correlation Analyzer	TEC 48C	20 ppb @10s	--	--	--
GAS5*	NO/NO ₂ /NO _x Chemiluminescent Analyzer	TEC 42C	NO ~10 ppt @ 10 s NO ₂ ~50 ppt @10 s NO _y ~100 ppt @10 s	--	--	--

* Collaborative investigations with scientists from other research organizations

METEOROLOGY

CODE	VARIABLE	INSTRUMENT	RANGE	ACCURACY	RESOLUTION	FREQUENCY

MET1	Air temperature (reverse flow)	0.038" DIA. Bead Thermistor	-30°C to +50°C	0.05°C/ 0.3°C incl DHC	0.01°C	< 1 s TC
MET2	Relative humidity (reverse flow)	Thermoset Polymer RH Sensor	0 to 100%	2% RH	0.1% RH	5 s TC @ 20°C
MET3	Barometric pressure	MEMS Pressure Sensor	0 to 110000 Pa	100 Pa	10 Pa	20 Hz
MET4	u wind component (+ North)	Extended Kalman Filter (EKF)	--	0.50 m/s @ 75 m/s TAS	0.01 m/s	5 Hz
MET5	v wind component (+ East)	Extended Kalman Filter (EKF)	--	0.50 m/s @ 75 m/s TAS	0.01 m/s	5 Hz
MET6	w wind component (+ Down)	Extended Kalman Filter (EKF)	--	0.50 m/s @ 75 m/s TAS	0.01 m/s	5 Hz

CLOUD PHYSICS						
CODE	VARIABLE	INSTRUMENT	RANGE	ACCURACY	RESOLUTION	FREQUENCY
CU1	Cloud droplet spectra	DMT CDP	2 to 50 µm	--	1 to 2 µm, 30 bins	1 Hz
CU2*	Cloud droplet spectra	PMS FSSP SPP-100	2 to 47 µm	--	1 to 2 µm, 30 bins	1 Hz
CU3	Cloud particle spectra	DMT CIP	25 to 1550 µm	--	25 µm, 62 bins	1 Hz
CU4	Cloud particle image	DMT CIP	25 to 1550 µm	--	25 µm	up to 10,000 images/sec
CU5	Liquid water content	DMT LWC-100	0 to 3 g/m ³	0.05 g/m ³	0.01 g/m ³	1 Hz
		CDP calculated	> 3 g/m ³	--	--	1 Hz

* Collaborative investigations with scientists from other research organizations

AIRCRAFT VARIABLES						
CODE	VARIABLE	INSTRUMENT	RANGE	ACCURACY	RESOLUTION	FREQUENCY
AC1	Position (Latitude/Longitude)	WAAS DGPS	--	2 m (2 σ)	< 1 m	5 Hz
AC2	Altitude	WAAS DGPS	-300 to 18000 m	5 m (2 σ)	< 1 m	5 Hz
AC3	Geometric Altitude	King KRA 405 Radar Altimeter	0 to 2000 ft	3% < 500 ft 5% > 500 ft	0.48 ft (0.15 m)	--
AC4	Roll Attitude (□)	MEMS IMU/GPS/EKF	-60 to +60°	0.1°	0.01°	5 Hz
AC5	Pitch Attitude (□)	MEMS IMU/GPS/EKF	-60 to +60°	0.2°	0.01°	5 Hz
AC6	Yaw Attitude (□)/ Heading	MEMS IMU/GPS/EKF	0 to 360°	0.1°	0.01°	5 Hz
AC7	Angle of attack (□)	MEMS Pressure Sensor	-15 to +15°	0.03° @ 150 m/s	0.001° @ 150 m/s	20 Hz
AC8	Side-slip (□)	MEMS Pressure Sensor	-15 to +15°	0.03° @ 150 m/s	0.001° @ 150 m/s	20 Hz
AC9	True Air Speed	MEMS Pressure Sensor	0 to 150 m/s	0.1 m/s	0.01 m/s	20 Hz

OTHER						
CODE	VARIABLE	INSTRUMENT	RANGE	ACCURACY	RESOLUTION	FREQUENCY
X1	Position & velocity	Garmin 530	--	--	--	--
X2	Terrain awareness	Garmin 530 TAWS	1000 ft	--	30 arc-second	--
X3	Traffic collision avoidance	Garmin 530 TCAS	--	--	--	--
X4	Area precipitation	RCA Weather radar	-15 to +15°	--	--	--
X5	Video record	Sony DCR-DVD 201	--	--	--	--
X6	Telemetry position, velocity, & event markers	ESD DTS (GPS)	--	--	--	1 Hz