SUPPLEMENT

AEROSOL–CLOUD–METEOROLOGY INTERACTION AIRBORNE FIELD INVESTIGATIONS

Using Lessons Learned from the U.S. West Coast in the Design of ACTIVATE off the U.S. East Coast

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TABLE ES1. Summary of instrument payload during the Center for Interdisciplinary Remotely-Piloted Aircraft Studies (CIRPAS) Twin Otter campaigns relative to the two aircraft being deployed during the Aerosol Cloud meTeorology Interactions oVer the western ATlantic Experiment (ACTIVATE). Acronyms: CPC = Condensation Particle Counter; SMPS = Scanning Mobility Particle Sizer; PCASP = Passive Cavity Aerosol Spectrometer Probe; SP2 = Single Particle Soot Photometer; WIBS = Wideband Integrated Bioaerosol Sensor; CAPS = Cloud, Aerosol, and Precipitation Spectrometer; FSSP = Forward Scattering Spectrometer Probe; CDP = Cloud Droplet Probe; CIP = Cloud Imaging Probe; AC3 = Axial Cyclone Cloud Water Collector; LAS = Laser Aerosol Spectrometer; PILS = Particle-Into-Liquid Sampler; LWP = Liquid Water Path; WVP = Water Vapor Path; HSRL = High Spectral Resolution Lidar; RSP = Research Scanning Polarimeter; PAMR = Profiling Airborne Microwave Radiometer; TSI = TSI, Incorporated; DMT = Droplet Measurement Technologies; BMI = Brechtel Manufacturing Incorporated; LGR = Los Gatos Research; 2B Tech = 2B Technologies.

| California campaigns | | ACTIVATE | | | |
| Twin Otter | | HU-25 Falcon | | B-200 King Air | |
Measured parameter	Instrument	Measured parameter	Instrument	Retrieved parameter	Instrument
Aerosols				**Remote sensing**	
Total particle concentration	3010 CPC, 3025 CPC (TSI)	Total particle concentration	3776 CPC, 3010 CPC (TSI)	Particulate backscatter profiles (355, 532, 1,064 nm)	HSRL-2
Total dry aerosol size distributions	PCASP (PMS/DMT), SMPS (TSI)	Nonvolatile (350°C) particle concentration	3010 CPC (TSI), thermal denuder	Particulate extinction profiles (355, 532 nm)	
Black carbon	SP2 (DMT)	Total and nonvolatile dry aerosol size distributions	SMPS, LAS (TSI)	Particle depolarization (355, 532, 1,064 nm)	
Nonrefractory chemically resolved mass concentration	HR-ToF-AMS (Aerodyne)	Dry scattering coefficient (450, 550, 700 nm)	3563 Nephelometer (TSI)	Aerosol optical depth (355, 532 nm)	
Water-soluble aerosol chemical composition	PILS (BMI) collection coupled to offline chemistry	f(RH) for scattering (450, 550, 700 nm)	3563 Nephelometer (TSI), 80% humidification	Mixed-layer height	
CCN concentration and spectra	CCN spectrometer (DMT)	Aerosol absorption (467, 530, 660 nm)	Tricolor Absorption Photometer (BMI)	Qualitative aerosol type	
Primary biological aerosol particles	WIBS-4 (DMT)	Nonrefractory chemically resolved mass concentration	HR-ToF-AMS (Aerodyne)	Effective radius, number/surface/volume concentration	
		Water-soluble aerosol chemical composition	PILS (BMI) collection coupled to offline chemistry	Cloud-top height and extinction	
		CCN concentration and spectra	CCN spectrometer (DMT)	Cloud-top lidar ratio (extinction-to-backscatter)	
Clouds				Aerosol optical depth for each mode of a bimodal distribution (column)	RSP
Cloud droplet size and liquid water content (LWC)	CAPS/FSSP/CDP (DMT), Gerber PVM-100A	Cloud droplet size and liquid water content (LWC)	CDP and CAS (DMT)	Aerosol size: effective radius (column)	
Precipitation concentration and size distribution	CIP (DMT)	Precipitation concentration and size distribution	CIP (DMT)	Aerosol size: effective variance (column)	
Cloud water chemical composition	Modified Mohnen Collector and AC3 (NASA LaRC) with offline chemistry	Cloud water chemical composition	AC3 (NASA LaRC) with offline chemistry	Aerosol single-scattering albedo (column)	
Isolation of droplet residual particles	Counterflow Virtual Impactor (BMI)	Isolation of droplet residual particles	Counterflow Virtual Impactor (BMI)	Aerosol refractive index (column)	
Meteorological state parameters and trace gases				Cloud-top effective radius and variance	
3D winds	5-port pressure system	3D winds	5-port pressure system	Cloud mean effective radius	
Temperature	Rosemount 102	Temperature	Rosemount 102	Cloud optical depth	
Water vapor	Edgetech hygrometer	Water vapor	Diode Laser Hygrometer	Liquid water path	
Skin surface temperature	Infrared radiation pyrometer (Heitronics)		Licor 7200	Cloud thickness	
NO_x	LGR NO_2 Analyzer		Edgetech hygrometer	Cloud droplet number concentration	
CO and CO_2	LGR cavity-enhanced laser absorption	CO and CO_2	LGR cavity-enhanced laser absorption	LWP, WVP	PAMR
O_3	2B Tech. absorption monitor	O_3	2B Tech, absorption		
		Pressure, temperature, relative humidity, horizontal wind	NRD41 Dropsonde		