

SABRE 2023 Flight summary

Flight #	Date	General description	Notes	Aged air	Vortex air	Arctic survey	Upper trop	Polar intrusion	Midlat survey	Tropical survey	Rocket plume	Sunset chemistry
RF01	9-Feb-2023	Abbreviated flight over Gulf	Compressor stall at 1-hour point necessitated RTB. Max pressure alt: 59 kft				X					
RF02	14-Feb-2023	Midlat UTLS sampling; sunset chemistry transition	Profiling between 38 kft and max alt; highest point: 63.3 kft; dry tropical air sampled at 48 kft						X			X
RF03	16-Feb-2023	Southern sortie for troical UTLS sampling	Very high tropical tropopause (above 61 kft); limited stratospheric sampling; profile to 63 kft before final descent into KEFD				X			X		
RF04	18-Feb-2023	Rocket plume sampling; subtropical UTLS survey	Several plume samples evident in CN, H ₂ O, Noy, and SO ₂ (some from rocket, some from WB-57); sampling along subtropical tropopause break; zoom climb to 63.7 kft over Gulf								X	
RF05	21-Feb-2023	Transit from KEFD to Beale AFB; midlat UTLS survey	Extensive sampling of transition from upper troposphere to lower stratosphere aerosol properties				X		X			
RF06	22-Feb-2023	Transit from Beale to Eielson AFB; polar ozone streamer sampling	Filament of aged, stratospheric air sampled at 45 and 55 kft; high-latitude lower stratosphere survey	X		X			X			
RF07	28-Feb-2023	Sampling intrusion of tropospheric air into lowermost stratosphere; sampling aged stratospheric air	Layer with ultrafine particles and carbonaceous aerosols sampled in lowermost stratosphere south of Eielson; high-O ₃ air over northern Alaska; dips into upper troposphere	X		X	X	X				
RF08	3-Mar-2023	Aged stratospheric air	Sampling extensive region of aged stratospheric air northwest of Eielson; high temperatures limited aircraft ceiling	X		X						
RF09	5-Mar-2023	Intrusion of Asian air in UTLS; aged stratospheric air	Layers of enhanced aerosols and SO ₂ near the tropopause; extremely clean (aerosol-free) layers; filament of aged air with N ₂ O as low as 175 ppbv	X		X	X	X				
RF10	8-Mar-2023	Filament of aged stratospheric air west of Alaska; midlatitude intrusion into Arctic	Survey of midlatitude airmass between 45 and 61 kft; Aged air filament with N ₂ O mixing ratios as low as 150 ppbv	X		X		X				
RF11	11-Mar-2023	Filament of aged stratospheric air; photochemistry in day-night transition	Sampling narrow filament of aged stratospheric air running north-south near Eielson; examining stratospheric chemistry transition at sunset	X		X						X
RF12	13-Mar-2023	Sample vortex air north of Eielson	Flight shortened by aircraft icing and avionics issues; northern half of flight sampled vortex air in lower stratosphere	X	X	X						
RF13	14-Mar-2023	Sample vortex air north of Eielson	Sampled core vortex air for most of the flight; N ₂ O as low as 118 ppbv	X	X	X						
RF14	15-Mar-2023	Sample vortex air north of Eielson	Sampled core vortex air for most of the flight; N ₂ O as low as 99 ppbv	X	X	X						
RF15	17-Mar-2023	Sample vortex air north of Eielson	Sampled core vortex air for most of the flight; longer legs at max alt for statistical sampling	X	X	X						
RF16	20-Mar-2023	Sample two lobes of vortex air and filament of midlatitude air between them over Alaska	Additional sampling of core vortex air; sampling of contrast between midlatitude intrusion and vortex aerosols and trace gases; sampled mixing zones at multiple vertical levels	X	X	X		X				
RF17	22-Mar-2023	Sunset flight; sample diluted vortex air northwest of Eielson; sample dusty intrusion from midlatitudes	Measurements across day-to-night boundary for evaluation of CIMS measurements; sampling mixed vortices/midlatitude air masses; vertical profiling into dusty intrusion	X	X	X		X				X
RF18	23-Mar-2023	Survey flight south of Eielson	Sampled aerosols and trace gases in air masses with intermediate ages at latitudes from 48 to 64° latitude. Profiling down to near the tropopause.	X		X			X			
RF19	26-Mar-2023	Transit/survey flight from Eielson to Travis AFB	Sampled aerosols and trace gases in air masses with intermediate ages at latitudes from 38 to 64° latitude. Profiling between about 51 and 57 kft.	X					X			
RF19	27-Mar-2023	Transit/survey flight from Travis AFB to Ellington airfield	Sampled lower stratospheric aerosols and trace gases over CONUS. Sampled tropical upper tropospheric air mass over Texas with elevated aerosol abundance.	X					X			

SABRE Flight Objectives	
Aged air	Sampling of air that has been in the stratosphere for many months or years providing time for aerosol evolution due to condensation of sulfuric acid and coagulation
Vortex air	Sampling of air that has descended through the polar vortex where new particle formation and interaction with meteor smoke particles occurs
Arctic survey	Survey of aerosol properties and trace gas concentrations in Arctic lower stratosphere
Upper trop	Sampling of aerosol properties and trace gas concentrations in upper troposphere
Polar intrusion	Sampling of aerosols and trace gases in air that has been transported isentropically from the midlatitude upper troposphere into the polar lower stratosphere
Midlat survey	Survey of aerosol properties and trace gas concentrations in midlatitude lower stratosphere
Tropical survey	Survey of aerosol properties and trace gas concentrations in tropical lower stratosphere
Rocket plume	Sampling of aerosol properties in rocket plumes
Sunset chemistry	Investigating stratospheric chemistry across sunset transition from daylight to darkness