

AIRCRAFT, SCIENCE AND SEAC⁴RS

NASA's Studies of Emissions, Atmospheric Composition, Clouds and Climate Coupling by Regional Surveys (SEAC⁴RS) campaign used aircraft to provide in situ, targeted measurements of atmospheric convection, composition and chemistry that satellites and ground instruments alone could not.



National Aeronautics and Space Administration

HOW DO AEROSOLS, CLOUDS AND RADIATION INTERACT?

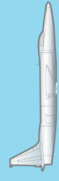
Aerosols are everywhere: from the air we breathe to the upper reaches of the stratosphere. They come from all sorts of things, like wildfires, pollution and even dirt on the ground. Despite their prevalence, we still don't completely understand why they're so widespread or how they affect our planet.

SEAC⁴RS used its aerial view to better understand the process-level changes between aerosols and the environment that satellites and ground instruments can't see.

Here are three things we wouldn't know without SEAC⁴RS aircraft data:

- CONVECTION CAN LAUNCH A PARTICLE FROM 0 TO 30,000 FEET:** During the SEAC⁴RS campaign, ER-2 chemical analyses taken at 30,000 feet were an identical match to those taken near Earth's surface, proving deep convection can shoot particles and gases directly into the lower stratosphere where they influence cloud formation, radiation and more.
- THERE'S MORE WATER VAPOR IN THE STRATOSPHERE THAN WE THOUGHT:** In situ data from the ER-2 not only showed an increased presence of supercooled liquid water (or water that stays in liquid state despite being below freezing) in high-altitude clouds, but also confirmed how it got there: from high-energy storms punching ice particles through the tropopause.
- WE'RE NOT VERY GOOD AT SEEING WILDFIRES AT NIGHT:** The DC-8 measured wildfire emissions during the SEAC⁴RS campaign, revealing models currently underestimate nighttime burn areas by a factor of 2 to 4!

PLATFORM: ER-2



SENSORS:

- AIRMSPi
- BBR
- CPL
- eMAS
- RSP
- H2OV
- JLH
- MTP
- O3
- PCRS
- SSFR
- WAS
- MMS

PLATFORM: Learjet



SENSORS:

- Cloud Liquid Water
- Cloud Total Water
- Optical Array Spectrometer
- FCDP
- FFSP
- HVPS
- FCDP-CPI
- NMASS
- PCASP

PLATFORM: DC-8



SENSORS:

- 4-STAR
- AOP
- APR-2
- AVOCET
- BBR
- CAFS
- CIT-CIMS
- NOyO3
- DACOM
- DASH SP
- DFGAS
- DIAL
- DLH
- GT-CIMS
- HD-SP2
- ISAF
- LARGE
- MMS
- PALMS
- PAN-CIGAR
- PTR-MS
- SAGA
- SPEC
- SSFR
- TD-LIF
- WAS
- RPI Polarimeter

