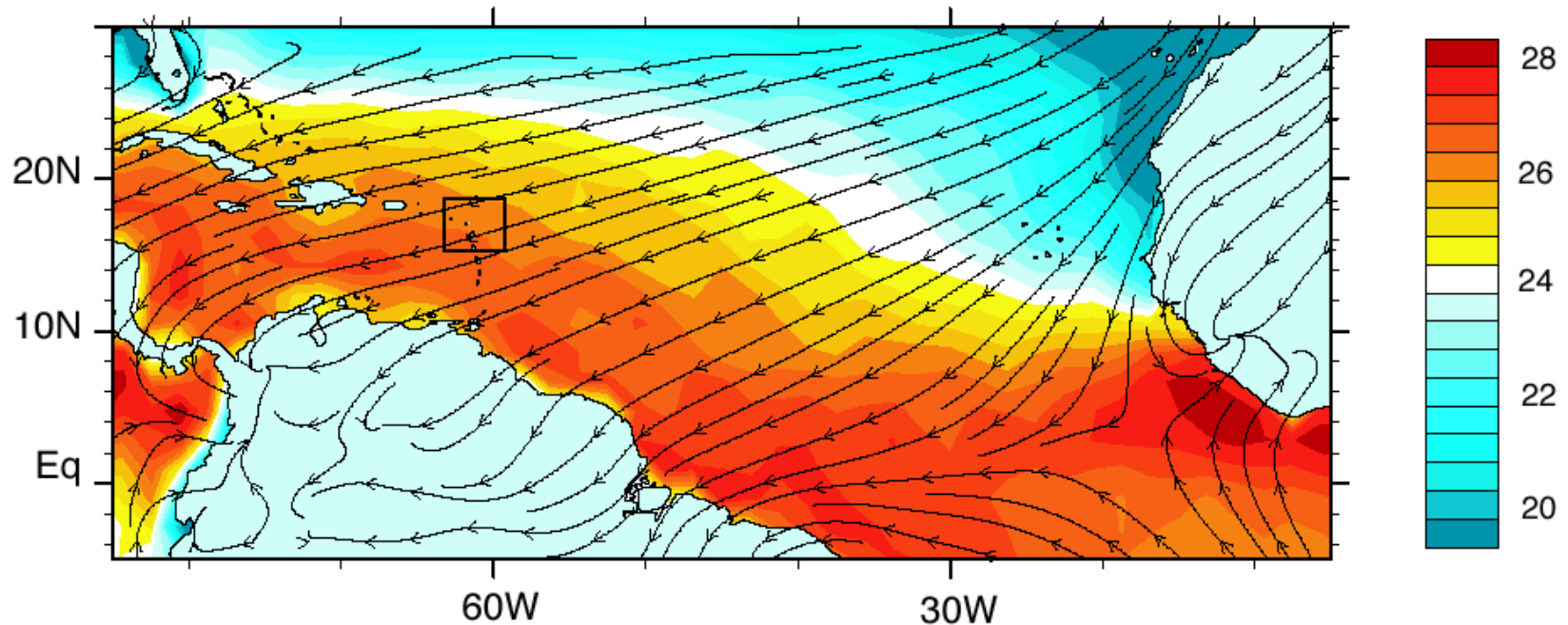


# **PROPOSED FLIGHT PATTERNS**

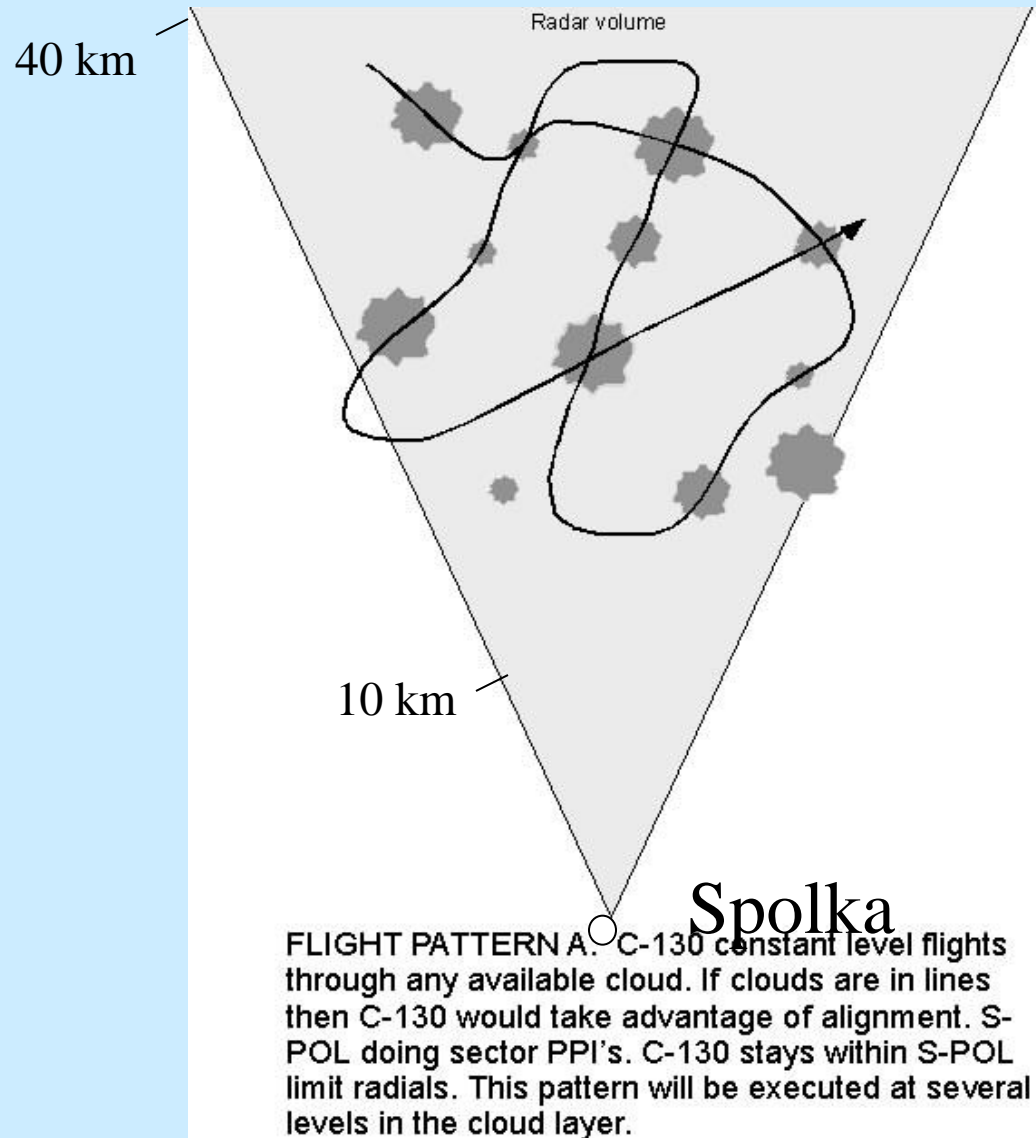
# Flow pattern and area of flight operations



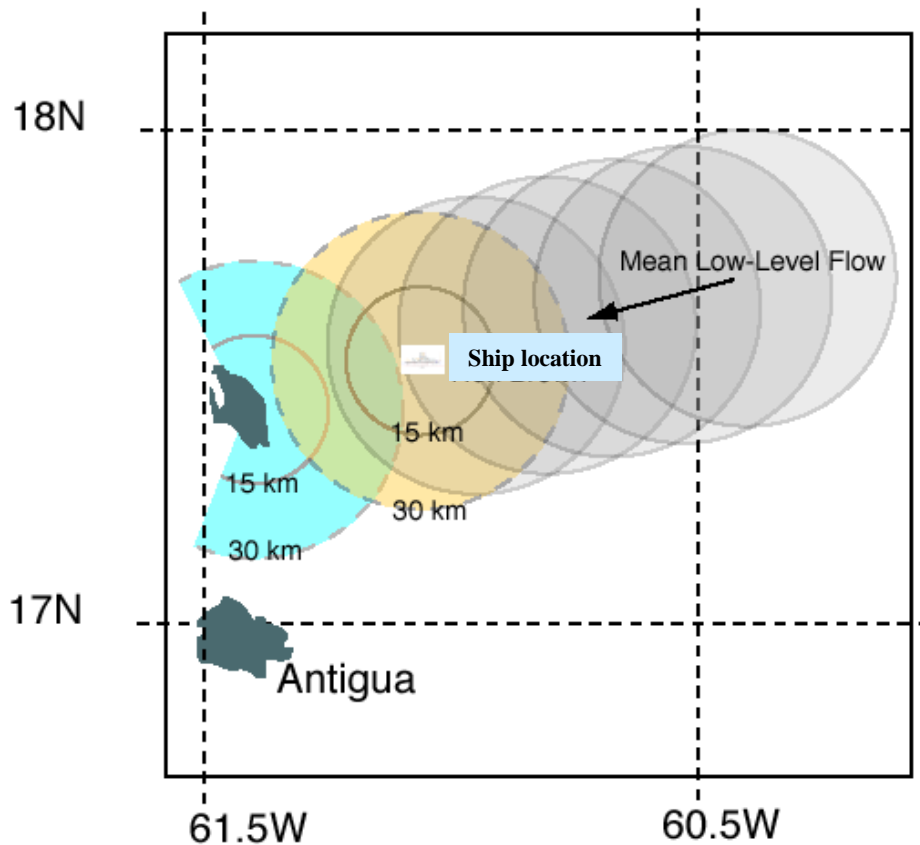
Mean Streamlines of 10m winds for January NCEP Climatology superimposed on Sea Surface Temperatures. RICO experimental area boxed and detailed in figure below.

**Statistical studies  
of properties of trade wind cumulus  
(Daylight and Night Flights)**

**Pattern A: (both daytime and nighttime)** Sampling of clouds at various stages of life cycles at constant altitude. This pattern will be flown entirely within the volume swept by the S-POL radar. Several altitudes will be flown. Targeting will be done visually or, at nighttime, with the weather avoidance radar if echoes can be identified.

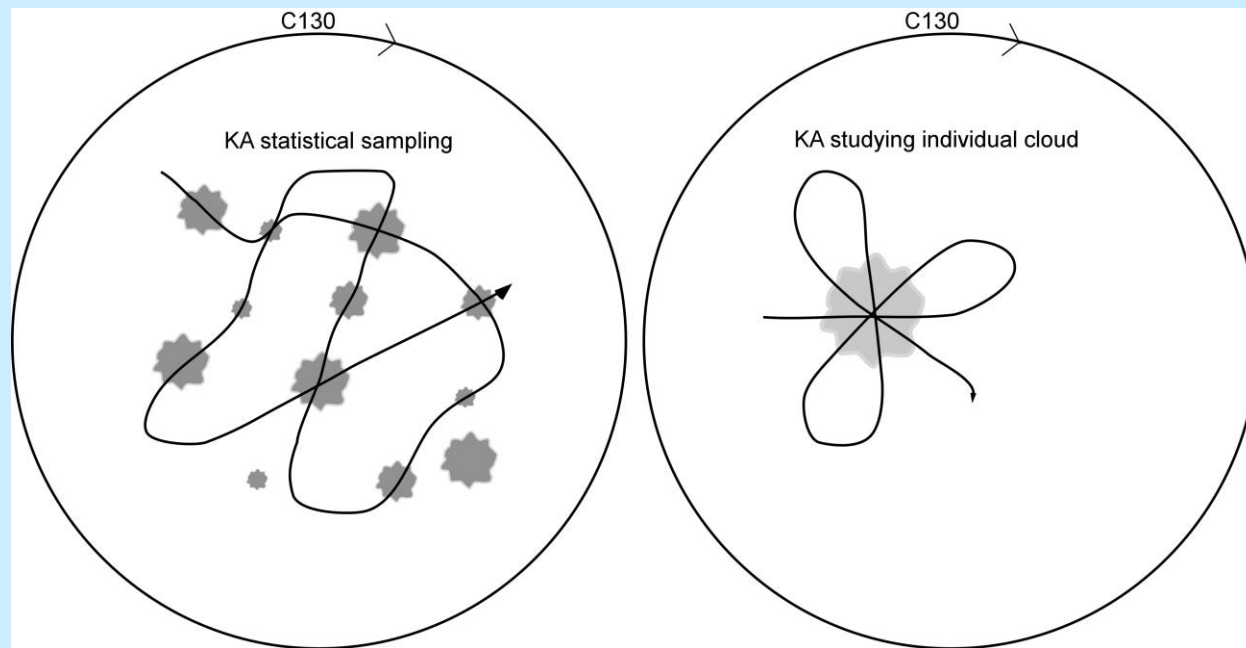
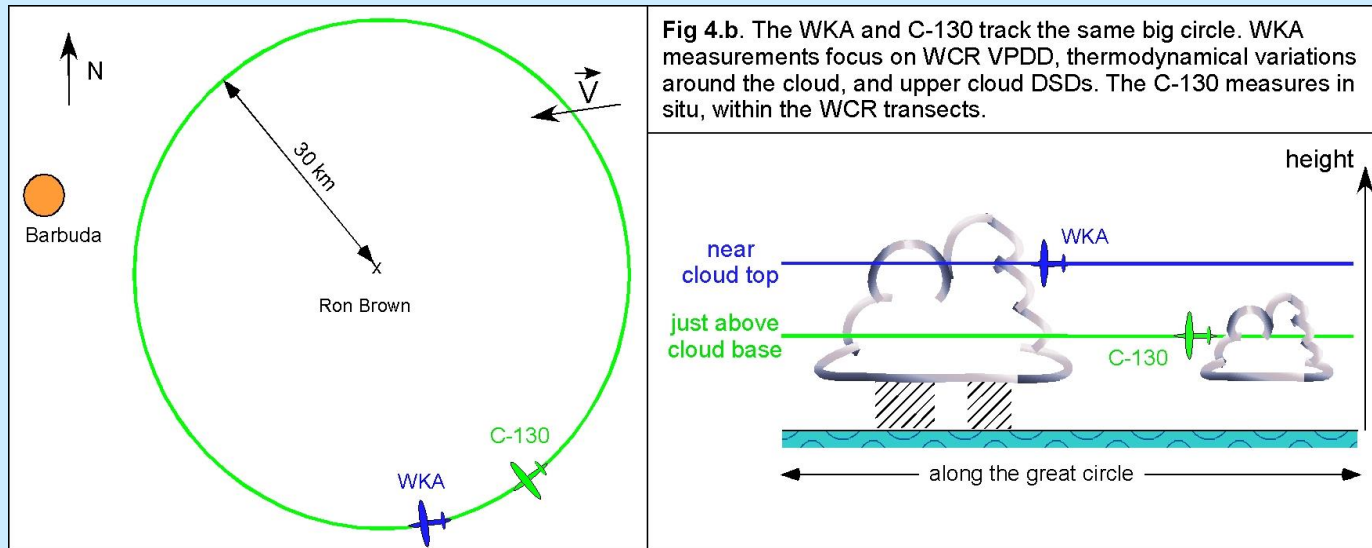


**Pattern B: (Both daytime and nighttime)** Wide ( $D = 60$  km) circles moving with the mean trade wind flow. Each loop pattern is at different level and the direction reverses after each loop. Flight levels are one loop below cloud base, two loops in the cloud layer and one loop above the cloud layer. During flights coordinated with the King Air, the King air will fly Pattern A (daylight) or Pattern G (daylight) within the circle, but at a different altitude.

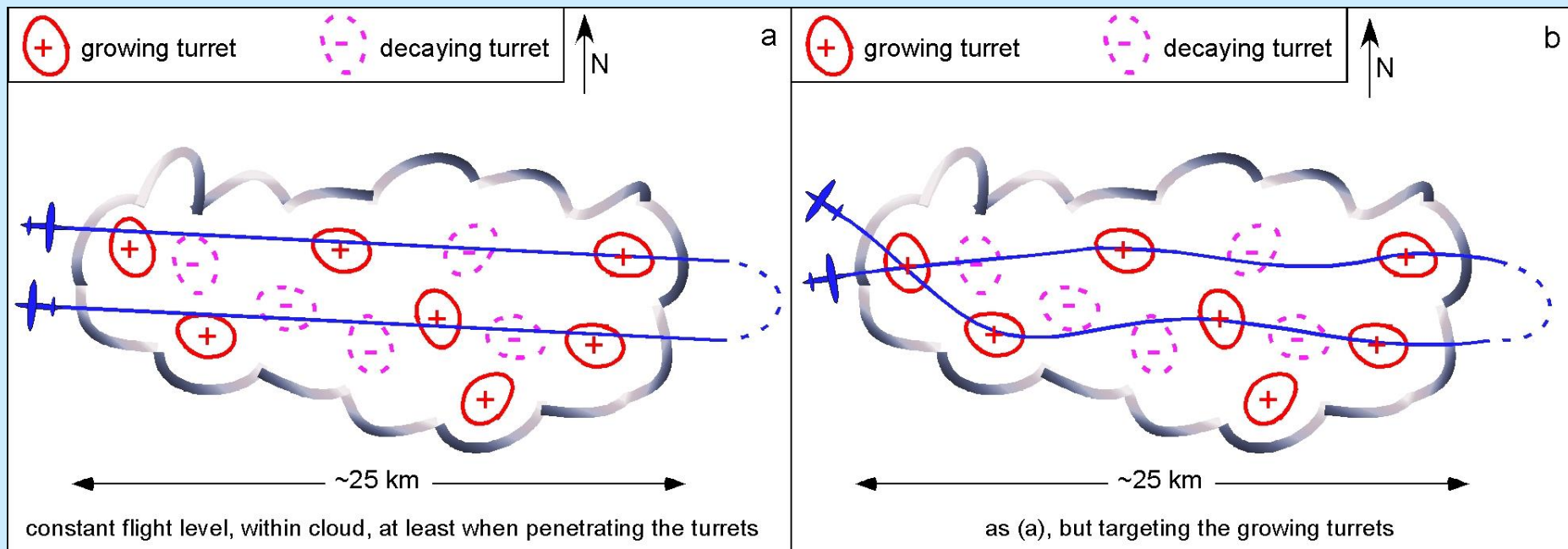


Overview of RICO large-scale strategy. S-Pol operations centered at Barbuda with associated radar study area indicated in blue. **Research ship** (if available) study area indicated by orange shaded area. 60km flight circles drifting with mean low level flow indicated by shaded grey circles. The overlap between the orange and blue area defines the mesoscale study region and the preferred location of radar calibration flights.

# King Air and BAE-146 options during Pattern B with C-130

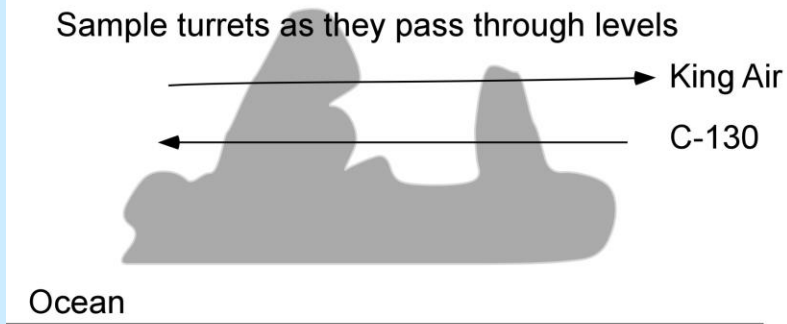
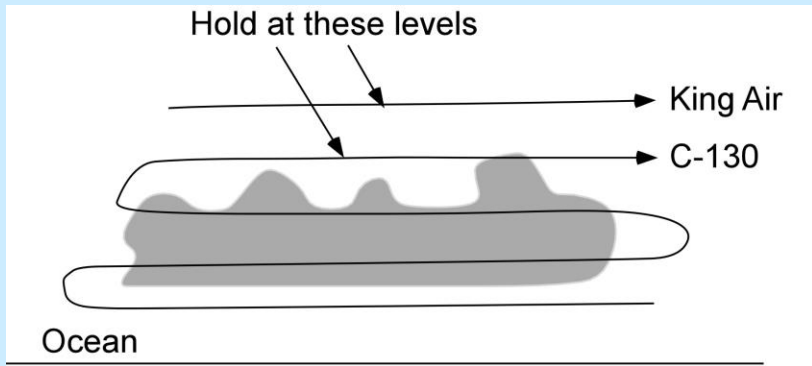


**Pattern C: (daytime):** Sampling of cumulus towers emerging from cloud patches. The top panels show example strategies for one aircraft. The bottom shows a cross section with two aircraft (left) or one aircraft (right). The lowest level track would be at the lowest safe altitude above the ocean surface. A pass below cloud base and within the low level cloud deck would occur, followed by continuous passes through the turrets. With two aircraft, the C-130 would do the low level passes up to the lower turret level, while the King Air would sample the turrets continually at a higher altitude.

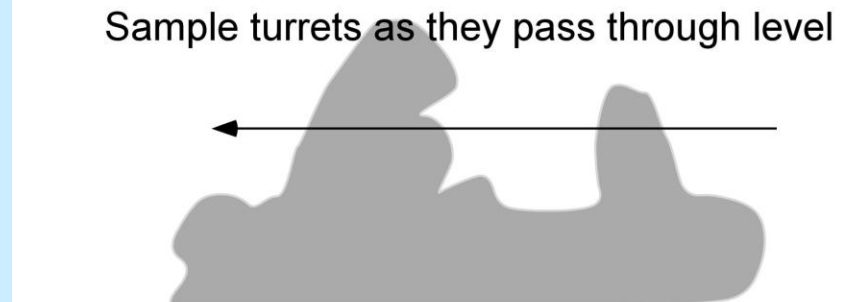
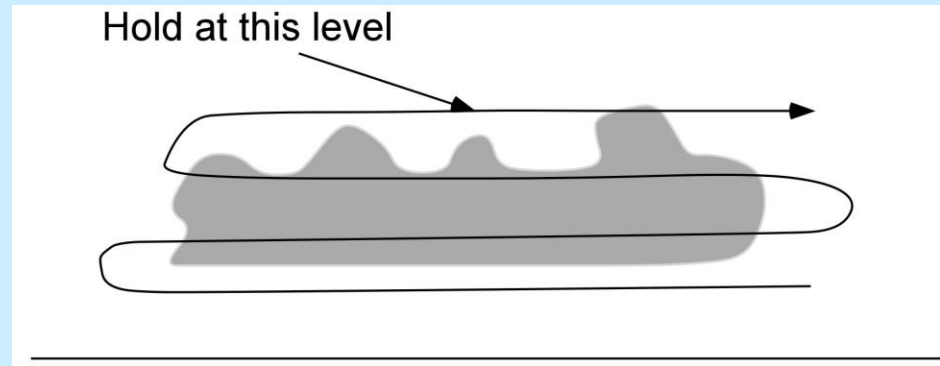




**Pattern C: (daytime): Sampling of cumulus towers emerging from cloud patches-**  
**Two aircraft** **One aircraft**



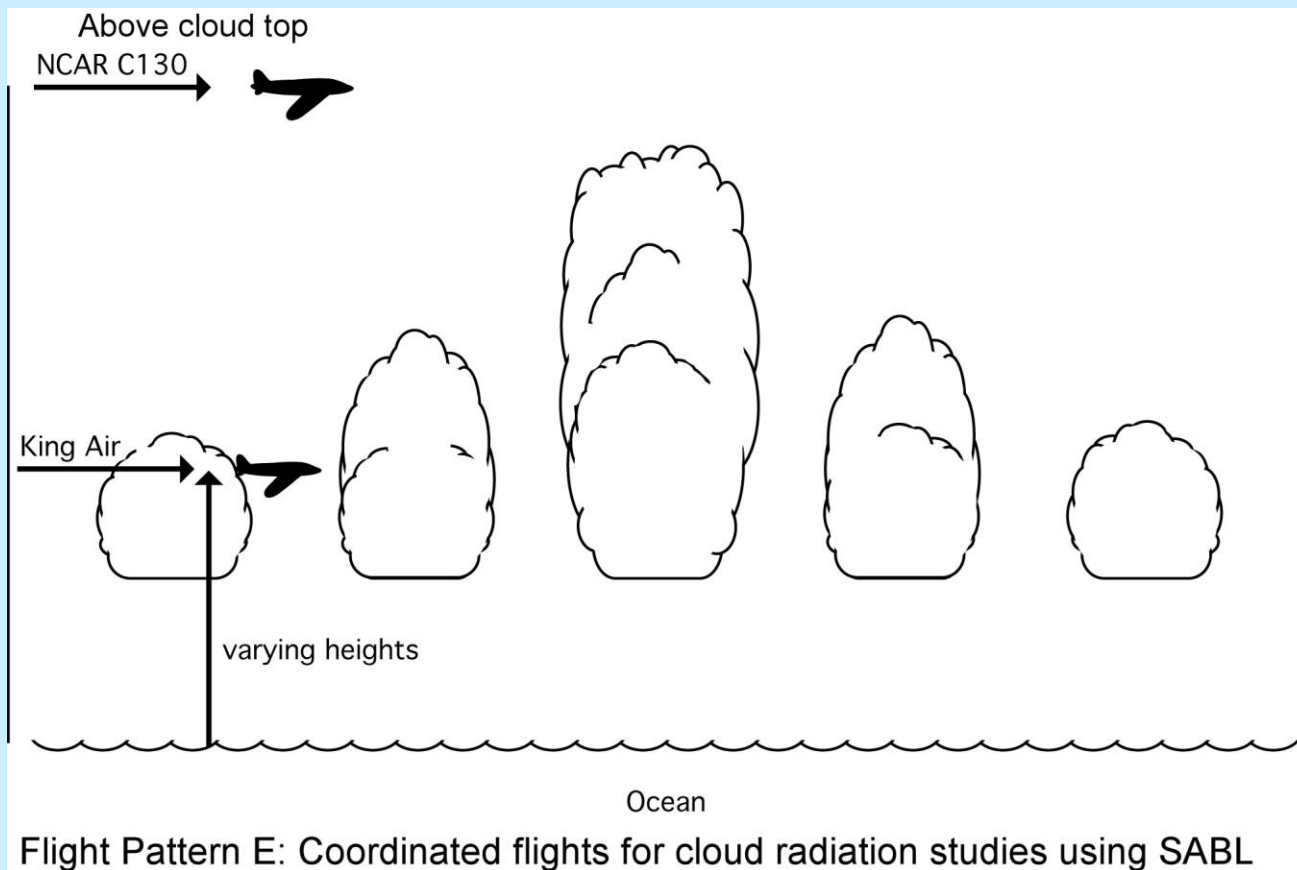
Pattern H: Multiple Aircraft Track through turrets emerging from cloud patches. C-130 first samples below shallow cloud patch, then within cloud patch and then flies holding pattern just above cloud patch. As cumulus tower emerges from patch C-130 samples tower with multiple penetrations. King Air penetrates at higher levels. Pattern will be flown multiple times at various in tower levels to develop microphysical picture of typical evolving cumulus tower.



Pattern C. Single Aircraft C-130 Track. C-130 first samples below shallow cloud patch, within cloud patch and then flies holding pattern just above cloud patch. As cumulus tower emerges from patch C-130 samples tower at single level. Pattern will be flown multiple times at various levels in tower to develop microphysical picture of typical evolving cumulus tower.

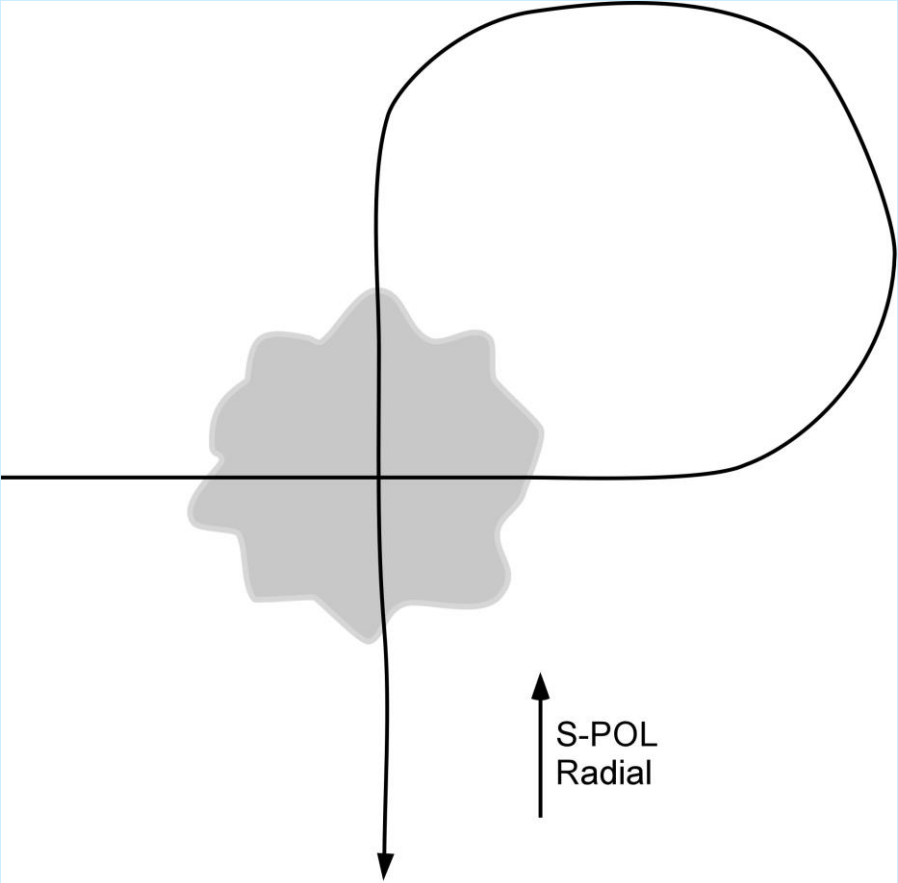


**Pattern E: (daylight)** Cloud entrainment and halo studies using SABL. The C-130 will fly above the cloud layer and the King Air will fly at different altitudes in the cloud layer. For eye safety, the C-130 will maintain at least a 6000 ft altitude separation above the King Air.



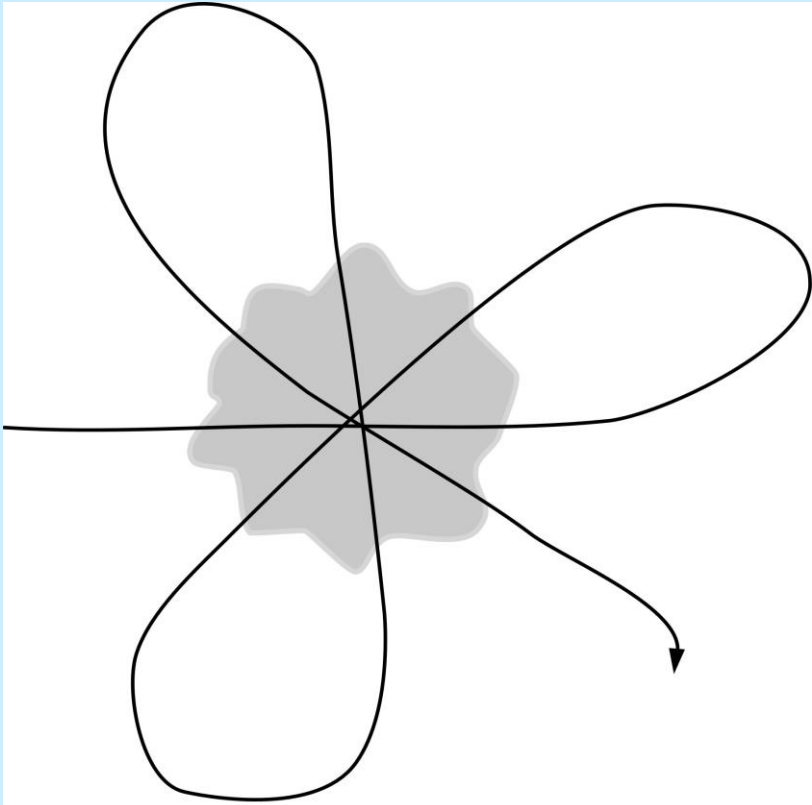
**Process studies  
of trade wind cumulus  
(all in daylight hours)**

Pattern F: Cross pattern through a single trade wind cloud. These will be done at cloud altitudes ranging from cloud base to cloud top.



Flight Pattern F: C-130 flights at various levels in cloud. Penetrations are parallel and perpendicular to S-POL radar radial. Clouds at various distances from radar.

Pattern G: Cross pattern through a single trade wind cloud. These patterns will be done at various altitudes between cloud base and cloud top.



Flight Pattern G: C-130 constant level single cloud penetrations coordinated with King Air. This pattern would be flown at cloud base, mid cloud or cloud top as needed. Cloud is nearly directly upwind of the radar. C-130 would start pattern offshore and follow cloud toward shore.

Pattern H: When a persistent line of cumulus convection is present, characterization of the microphysical evolution of the clouds from the initial aerosol near the sea surface, through cloud base, into the cloud detrainment region is possible. This is the scenario most amenable to cloud age studies using chemical tracers.

