PECAN platforms

- **scanning radars:**
  - > **fixed**: S-Pol, plus WSR-88D and ARM SGP radars
  - > **mobile**: 6 X-band + 2 C-band radars

- **aircraft:**
  - > **clear-air:**
    - UW King Air with WCL (up) and Tq Raman lidar (down)
    - NASA DC-8 with LASE + interferometer
  - > **storm-penetrating:**
    - NOAA P-3 with X-band fore/aft scanning tail radar

- **PECAN Integrated Sounding Array (PISA)**
  - > **concept:**
    a PISA unit *profiles the kinematic, thermodynamic, and moisture structure of the lower troposphere*.
  - > **components**: each unit has
    - surface meteorology
    - a radiosonde
    - wind profiler (radar/sodar/lidar)
    - moisture and/or temperature profiler (DIAL, Raman lidar, microwave radiometer, AERI …)
  - > **array:**
    - 10 complete units enabled by 15 participating institutions, of which
    - 6 fixed
    - 4 mobile

- Key challenge: deployment of mobile facilities at night ahead of the target.
- Solutions:
  - Inter-IOP radar & PISA mobility only (no intra-IOP relocations);
  - Advance selection & characterization of potential sites;
  - Dedicated forecast & nowcast guidance.

ID	lead PI	instrument source	instruments
fixed profiling units (FP): stationary during the duration of PECAN, operating continuously			
FP1	David Turner	ARM CART Central Facility	wind lidar, Raman lidar, AERI, MR, sfc met and sfc fluxes, radiosonde unit, four 915 MHz WPs with a typical spacing of 10 km
FP2	Belay Demoz	Howard Univ. and NASA/GSFC	ALVICE Raman lidar GLOW and/or Leosphere wind lidars RS92 radiosonde unit and sfc met, MR, mini-DIAL
FP3	David Parsons + Volker Wulfmeyer + Rich Clark	NCAR EOL	**ISS-449**
		University of Hohenheim, Germany	scanning DIAL (water vapor) and scanning rotational Raman lidar (temperature)
		Millersville University	1000 m tethersonde profiles of met variables/ turbulence, sfc met and sfc fluxes, backscatter lidar, sodar, and radiosonde unit
		DOE	AERI
FP4	Tammy Weckwerth	NCAR EOL	**ISS with 915 MHz WP, mini DIAL, GAUS**
		University of Manitoba	MR and wind lidar
		Naval Postgrad School	flux tower, sodar, and tethersonde
FP5	David Parsons + Tammy Weckwerth	NCAR EOL	**ISS with 915 MHz WP, sodar, GAUS, sfc met**
		University of Colorado	MR
FP6	John Hanesiak	University of Manitoba	MR, wind lidar, AERI
		DOE	radiosonde unit & sfc met (ARM SPG EF site)
mobile profiling units (MP): operate during IOPs only			
MP1	Petra Klein + David Turner	University of Oklahoma, NSSL	CLAMPS: AERI, MR, and scanning Doppler lidar
		University of Oklahoma	radiosonde & sfc met
MP2	Kevin Knupp	University of Alabama Huntsville MIPS truck	scanning Doppler lidar, 915 MHz WP, MR, sodar, ceilometer, sfc met, radiosonde unit
MP3	Howard Bluestein + Wayne Feltz	Naval Postgraduate School /OU	TWOLF Doppler lidar & FM-CW radar (both truck-mounted) + sfc met
		University of Wisconsin	AERI + multi-spectral aerosol lidar + radiosonde unit
MP4	Tammy Weckwerth	NCAR EOL	**Mobile ISS with 915 MHz WP, MGAUS, sfc met**

PECAN domain

PECAN domain
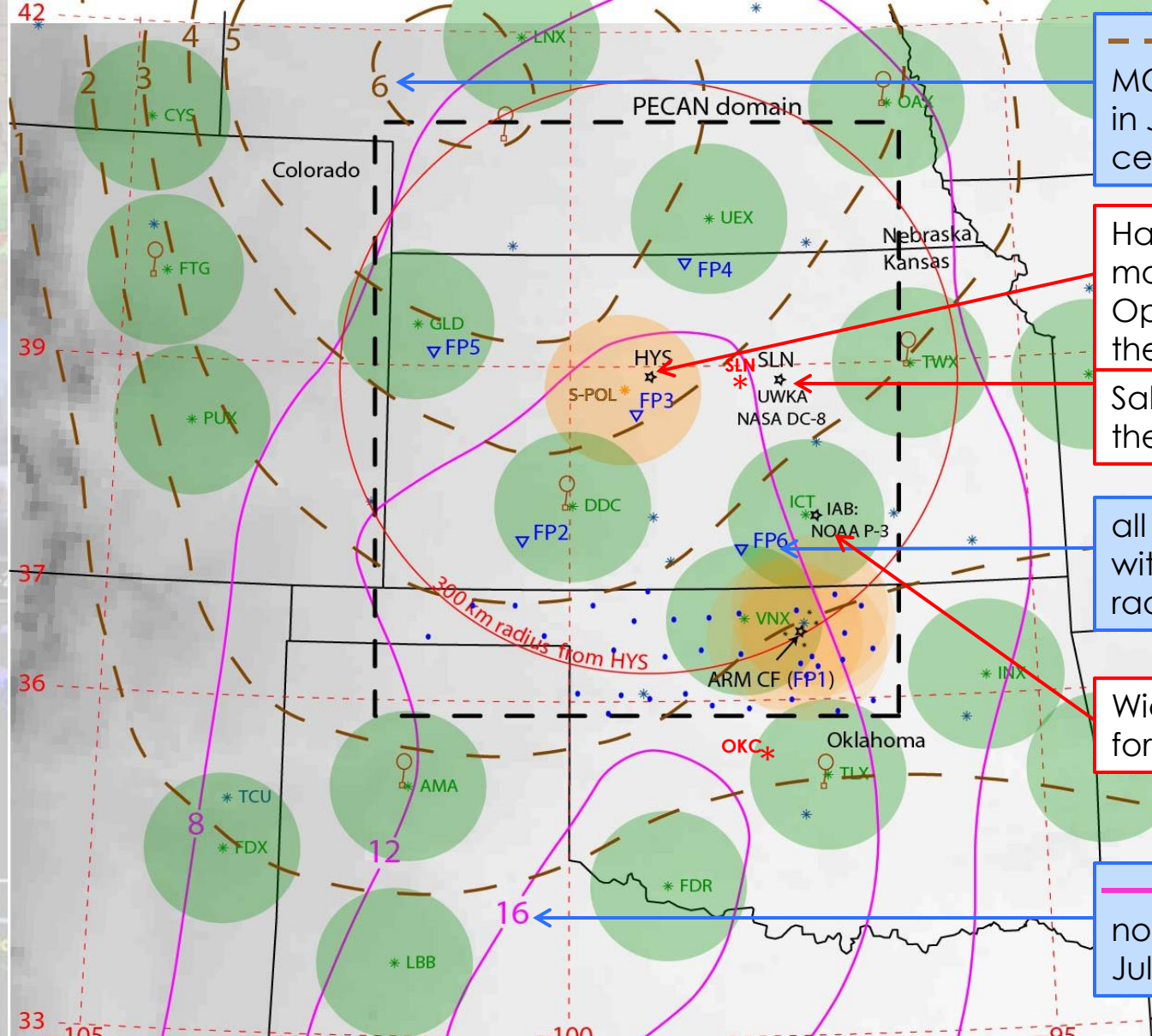
- - - - # of nocturnal MCS initiations per month in July (within 350 km of centroid)

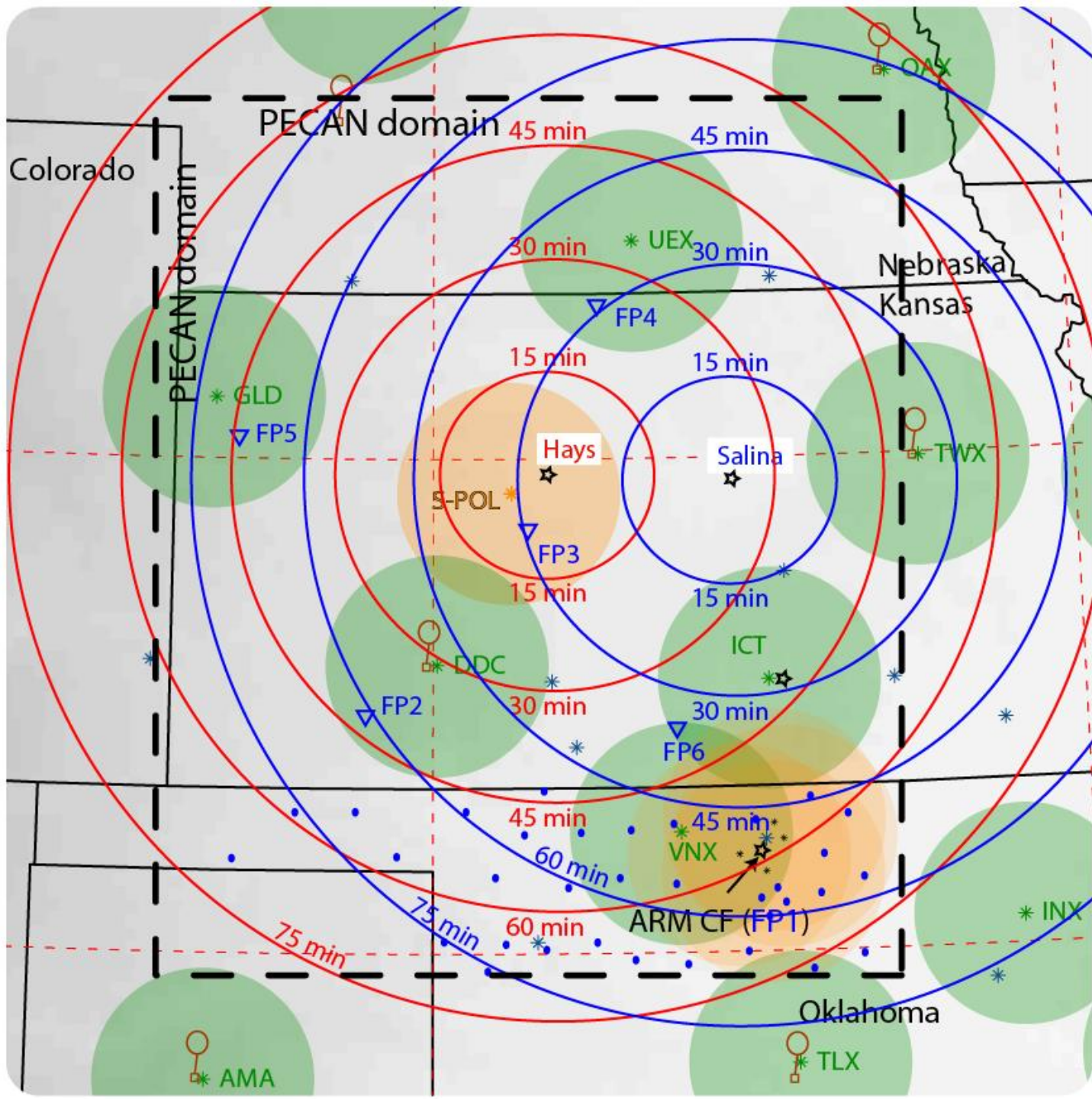Hays: preferred base for mobile ground units and Operations Center and the UWKA

Salina: preferred base for the NASA DC-8

all fixed PISA (FP) units are within 75 km of a S-band radar (filled circle)

Wichita: preferred base for the NOAA P-3

———— frequency of the nocturnal low level jet in July (# nights/ m)

Colorado
Nebraska
Kansas
Oklahoma

LNX CYS UEX FP4 OAX
GLD FP5 HYS SLN SLN TWX
PUX S-POL FP3 UWKA
NASA DC-8
DDC ICT IAB:
FP2 NOAA P-3
FP6
VNX
ARM CF (FP1) INX
OKC
AMA TLX
TCU
FDX
8 12
LBB FDR
16

300 km radius from HYS

Legend:

- *LNX WSR-88D radar (with 75 km radius circle)
- S-POL and ARM SGP radars
- * NOAA 404 MHz wind profilers (mostly decommisioned)
- NWS radiosonde   • OK mesonet site within PECAN domain

0 100 200 300 km

LLJ frequency in July (# nights per month)

NSSL MCS climatology (July - initiation)

background greyscale: terrain elevation, ranging from 60 to 3200 m MSL

▽ Fixed PISA (FP) unit

42
4 5
2 3
6
1
39
37
36
33 -105
-100
-95
200
150
0
-50
-100
Cold
Bore m

PECAN deployment strategy
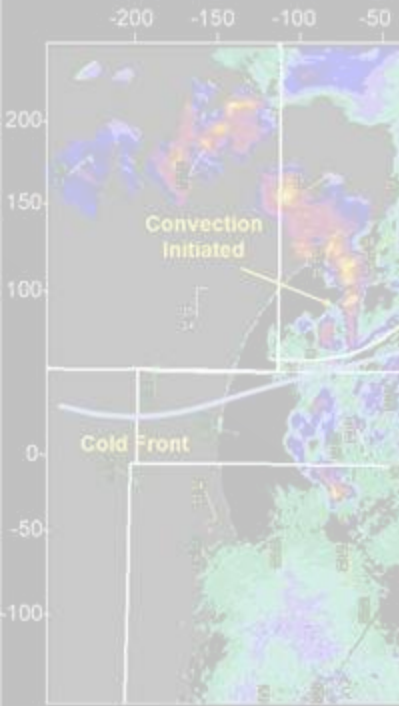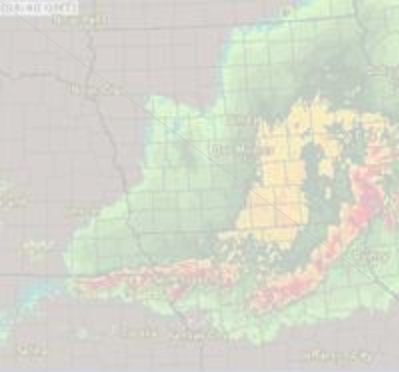## example: MCS mission

mission type	target # IOPs
convection initiation	5
MCS dynamics &microphysics	10
bores	5
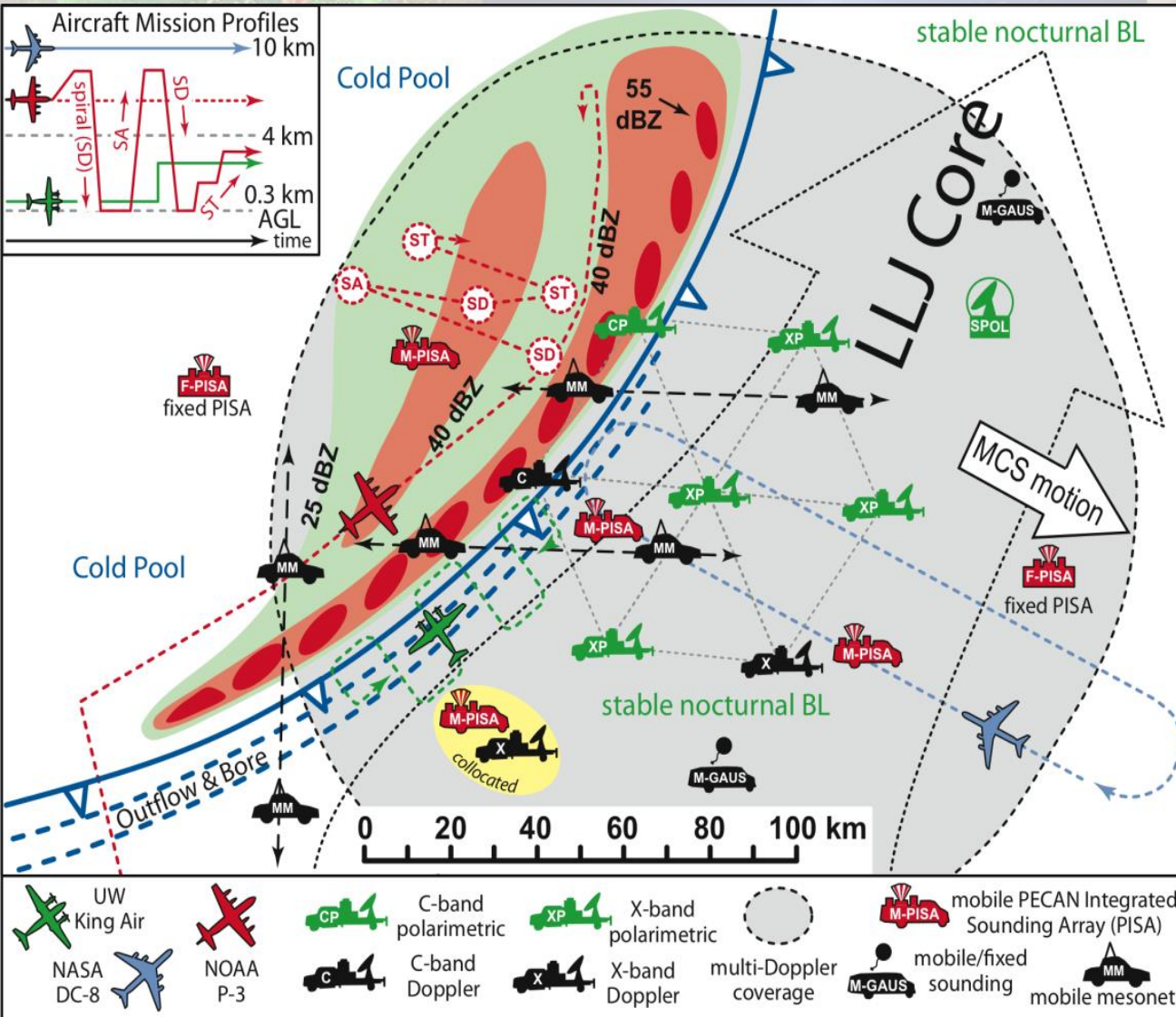
Mobile platforms are deployed ahead of target MCS.

Mobile radars and PISA units remain fixed during IOPs not just for safety, but also to sample both the storm and the broader environment (LLJ, BL evolution).
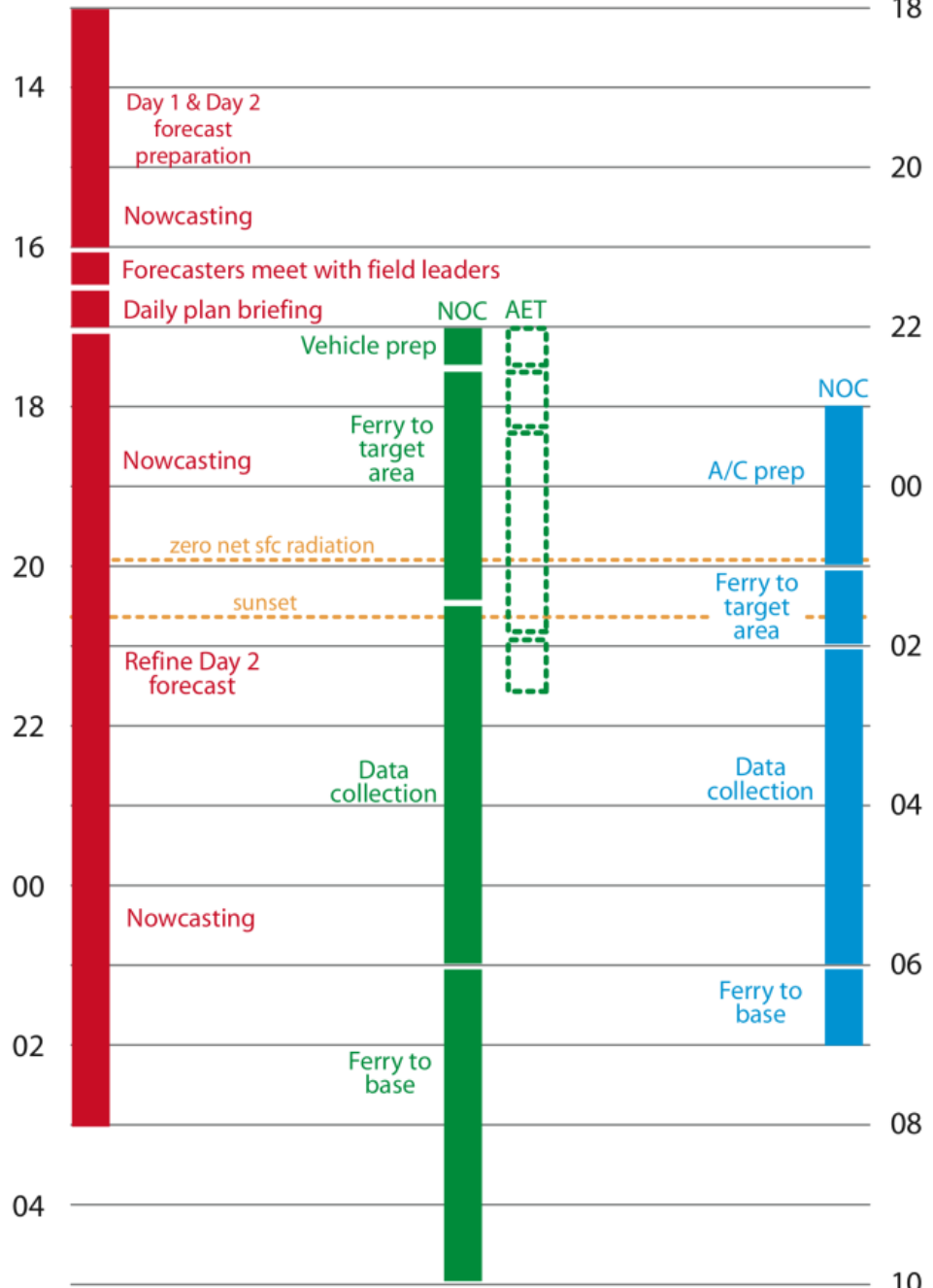
Aircraft move with the MCS or bore.