CONTRAST Project Debrief

March 24, 2014

Project period: January – February 2014

EOL
NCAR Earth Observing Laboratory

CONTRAST was a highly successful project with some challenges, primarily for flight operations

Preparation and Upload

11/5/2013

Upload schedule for CONTRAST, Jan-Feb 2014

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
11/3	11/4 Install wing stores Install cabin infrastructure	11/5	11/6 Install AMAX-DOAS fiber	11/7	11/8	11/9 Cabin ready for racks
11/10	11/11	11/12	11/13 Install L6 AMAX-DOAS	11/14	11/15	11/16
11/17	11/18 Install R5 HARP Install L5 Hanisco	11/19	11/20 Install i-beams	11/21	11/22	11/23
11/24	11/25 Install L3 NO-NO2 Install L2 Fast O3	11/26	11/27	11/28 Thanksgiving	11/29 Thanksgiving	11/30
12/1	12/2 Install R3 AWAS	12/3	12/4 Install R1 TOGA	12/5	12/6	12/7
12/8	12/9 Install L1 GT-CIMS	12/10	12/11	12/12	12/13	12/14 All racks installed
12/15	12/16 Install R1 TOGA Calibrations Configure and prepare all instruments	12/17	12/18	12/19	12/20	12/21
12/22	12/23	12/24 EMI if ready	12/25	12/26	12/27	12/28 Payload flight ready
12/29	12/30 SAR	12/31	1/1	1/2 Weigh GV Safety brief EMI, FRR	1/3 TF01	1/4

Schedule

2/28/2014

Deployment schedule for CONTRAST, Jan-Feb 2014

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1/1	1/2 Weigh GV Safety brief FRR	1/3 TF01	1/4
1/5 Down	1/6	1/7 TF02	1/8	1/9 TF03	1/10	1/11 RF01 KBJC-PHNL
1/12 Down	1/13 RF02 PHNL-PGUM	1/14 Arrive PGUM Day lost	1/15	1/16	1/17 RF03	1/18
1/19 RF04	1/20 Down	1/21	1/22 RF05	1/23	1/24	1/25 RF06
1/26	1/27 Down	1/28	1/29 RF07	1/30	1/31	2/1 RF08 sunset
2/2	2/3 HDD; CAST mtg	2/4	2/5 RF09	2/6	2/7	2/8 RF10
2/9	2/10 Down	2/11	2/12	2/13 RF11	2/14	2/15
2/16 Down	2/17 RF12	2/18	2/19	2/20 RF13	2/21	2/22 RF14
2/23 Down	2/24	2/25 RF15	2/26 Pre-pack	2/27	2/28 PGUM-PHNL PHNL-KBJC Day gained	3/1
3/2	3/3	3/4	3/5	3/6	3/7	3/8

Flight Hours

CONTRAST project flight hour report 3/5/2014

Flight	Date	Hours	Research objective	Remaining
TF01	01/03/14	1.5	Test Flight	136.5
TF02	01/07/14	4.3	Test Flight	132.2
TF03	01/09/14	3.2	Test Flight	129.0
RF01	1/11/2014	9.4	Research-Ferry, w/dips	119.6
RF02	1/13/2014	9.0	Research-Ferry, w/dips	110.6
RF03	1/17/2014	7.0	Southbound survey	103.6
RF04	1/19/2014	7.2	Westbound survey	96.4
RF05	1/22/2014	7.8	Convection N of Guam	88.6
RF06	1/25/2014	7.4	Fukuoka / N. jet study	81.2
RF07	1/29/2014	6.6	Southern survey	74.6
RF08	2/1/2014	8.0	Sunset flight – E of Guam	66.6
RF09	2/5/2014	7.6	S-bound high alt + outflow	59.0
RF10	2/8/2014	7.1	CO River & ITCZ	51.9
RF11	2/13/2014	6.6	Convection near Palau	45.3
RF12	2/17/2014	5.7	Convection SE of Guam	39.6
RF13	2/20/2014	7.5	Sunrise flight into anticycl	32.1
RF14	2/22/2104	9.8	Southern Hemisphere	22.3
RF15	2/25/2014	8.6	Northern Hemisphere Jet	13.7
RF16	2/28/2014	7.5	Research-Ferry, w/dips	6.2
RF17	2/28/2014	6.2	Limited research-Ferry	0.0
	Total:	138.0		

Allocated	
Research:	96
Test:	10
Ferry:	32
Total:	138

Remaining:	0.0
Rem. Outlook:	0.0
Actually flown:	138

Data System

- DSM-303 serial card timing issues
- Wireless access to GV worked very well
- RAR SE support at FBO was excellent
- RT data feeds used on ground, two way communication used to guide GV
- Mission Coordinator Display widely used; satellite products had long delays (1 hour +)
- Satcom coverage very good

- RAF will use all of the above in reliability program

Instrumentation

- Dewpointers work poorly for vertical profiling
- HARP, VCSEL, HSRL, TOGA – performed well
- Omnistar GPS – worked well
- Picarro: cabin air contamination; resolved
- AWAS – leak at inlet, ferrules; RAF will work with investigators to clarify approach and procedures
- AMAX-DOAS used instrument control from ground
- 2D-C occasional EDV decrease – condensation?
- Nadir pyranometer – flooded, destroyed; replaced
- RICE square wave - repair

Communications

- Chat from aircraft – essential tool
- ReadyTalk for meetings: poor quality at times
- FTP data uploads to CONUS worked well
- FTP server on site worked well for data exchange
- EOL project web site was used for communication and documenting the project
- E-Mail services worked well
- Cell coverage: good on Guam

Flight Operations

- GV performance 100% (Rainex, landing lights)
- Morning flight planning: little time for pilots to plan flight
- Flight profiles accomplished objectives; ATC delays were encountered as expected
- Dip clearances and ATC support, success varied:
  - Philippines, was in place but not known to PM
  - Japan, PNG: approved shortly before it was needed
  - Nauru, Solomon Islands: never received
  - Oakland Oceanic: excellent support, ATC patience wearing thin
- Operational lessons learned: performance expectations

Ground Support

- Ramp access unusually complicated with controlled access cards; FBO support addressed this
- LN2 and dry ice – available, no issues
- Sea containers and GSE on site in time and ready
- Access to GSE on ramp – problem free
- FBO space sharing with BAe-146 was unexpected, introduced confusion at the beginning and required regular coordination with the FBO (repositioning, power cart, air conditioning, etc.)

Who helped make CONTRAST happen

- Aviation Concepts, Guam: Mr. Edward Esteban
- Oakland Oceanic ATC
- Dip clearances: Bernard Grant and Embassies

Who was in the way?

- Convection
- Other airplanes in RVSM airspace
- Island time in Nauru and Honiara

Lessons learned

- **Flight Operations:**
  - **Profiling through RVSM is a problem, and all expected delays were encountered**
  - **MC onboard is useful for more than convection proximity – RT coordination in complex airspace**
  - **Some FIRs are very restrictive re. RVSM and low altitudes**
  - **ADS-B may cause more issues below 5,500 ft**
- **Inlet configuration and assembly, leak testing: need to communicate better and develop procedures**

Questions and Comments?