



Qualitative Assessment of OTA Operations

**Oceanic Tailored Arrivals
CDA Workshop
June 6, 2007**

Nancy Smith
NASA Ames Research Center





Overview



- Procedure development, evaluation and revision process
- Assessment
 - Phraseology
 - Procedures
 - Coordination
 - Workload
- Recommendations





Process (what we did)

- Procedures, phraseology, support material were developed cooperatively
- Simulation walkthrough assessment conducted
- Phase 1 trials conducted in Aug/Sept 2006
- Profile and procedures revised based on pilot interviews and questionnaires, some facility observations and nightly reports; no walkthrough
- Phase 2 trials conducted in Dec/Jan 2007





Phraseology for Air-Ground Communication

Phraseology for Basic OTA:

"Descend at pilot's discretion, maintain 8000 feet."

Phraseology for OTA w/EDA:

"Cross BRINY at 11,000 feet and 240 knots, descend and maintain 8000 feet."

- Current-day clearance phraseology was workable for test, but may not be adequate for operational use
 - Increased radio communications were sometimes observed (e.g., because of mismatch between uplink altitude restriction and descent clearance to 8000')
 - Tailored Arrival is not a pilot's discretion descent
 - Mismatch between letter of agreement and OTA procedure
 - OTA status could not be formally stated by flight crew on check-in, requiring controller-to-controller communication to identify OTA flights.





Procedures

- Oceanic Controller
 - Event sequence timing adjusted during walkthrough and initial trials
 - Composing ATOP clearance entry:
 - ♦ multi-step process was not obvious; needed coaching or “cheat sheet” support
 - ♦ “cut and paste” scratchpad entry was error prone
 - ♦ Format for latitude / longitude entry was unspecified
 - With simpler process for selecting OTA uplink clearance (e.g., special ATOP menu), procedure would be straightforward
- Flight Crew
 - Energy management, MCP altitude, “load-before-accept”...(will be covered by Rick Shay and Brad Cornell)





Coordination

- Simple, but critical coordinations were needed:
 - Inter-facility coordination about test activities, active runway and approach procedures
 - Nightly check that scratchpad entry was correct for that night's OTA
 - Nightly check that all controllers on position were aware of OTA trials
- For example:
 - Intra-facility coordination:
 - ♦ clearance not always available in scratchpad
 - ♦ TRACON and Center radar controllers were occasionally unaware of OTA flight status
 - Inter-facility coordination:
 - ♦ active runway not communicated for uplink clearance
- Tailored Arrivals coordination procedures need to be standardized





Workload

- Oceanic Controller:
 - Workload increase associated with complicated, manual ATOP entries
 - With streamlined process, task would be acceptable
- Radar Controller:
 - Workload increased when needed to move other traffic; otherwise no issues.
- TRACON Controller:
 - Workload issues similar to Center Radar controller
- Flight Crew:
 - Modest but acceptable workload increase under nominal operations
 - However, non-nominal events (e.g., runway changes) were observed that caused unacceptable workload increases



Recommendations

- Walkthrough was useful.
- Coordination is critical. There need to be simple, unambiguous, standardized and routine procedures for:
 - Center-TRACON
 - ♦ Manager-to-manager coordination about runways, procedures, flight ID.
 - ♦ Controller-to-controller flight identification before radar handoff
 - Shift change briefings
 - Air-Ground communication
- ATOP clearance selection process must be simpler





Flight Crew Observations

Use of LNAV/VNAV

- No additional training was required, ops bulletin only
- Most crews were more comfortable after only the second operation
- Today automation features (LNAV/VNAV) are used at the pilots discretion
- Operational technique is not emphasized on same level as other systems
- Current airspace procedures and operations discourage use of automation

Procedures

- Voice clearances need to be aligned with uplinked path
- “Cleared per the uplink” clearance desired
- Longer term, a TA or RNAV data tag needed to enable cross centre coordination





Flight Crew Observations

Integrated data link benefits

- Flights were conducted early when there was little traffic related workload (that's why we did it)
- Pilots reported a slight increase in workload – expected
- The good news - TA procedures can enable reduced workload during increased traffic periods
 - Reduction in crew tasks, reduction in error points, voice clearances, crew task human factors test provide additional data
- Similar procedures can be used to deliver other complex clearances delivered by voice today
 - departure reroutes to the oceanic entry fix
 - reroutes around weather events with required entry times
- Integrated data link provides easy means to quickly, efficiently and safely deliver complex clearances to aircraft

