Tailored Arrivals

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Oceanic Tailored Arrival

• Tailored arrival — key features:
  – Continuous descent from cruise altitude to touchdown
  – Tailored for traffic, environment, …
  – Controller-to-aircraft datalink*
  – Definition of flight path in both time and space (4D)
  – Cleared flight path through multiple centers
  – Currently available a/c capabilities

• Benefits:
  – less fuel per flight
  – Noise reduction
  – Emissions reduction
  – Flight duration reduced several min
  – Dramatically reduced VHF voice communication
  – Overall efficiency improved
  – Important step toward modernization of ATM
SFO Tailored Arrivals

1. CTAS/EDA
   Ground automation generates TA trajectory clearance

2. TA clearance coordinated across ATC domains/systems

3. CPDLC
   TA clearance delivered to aircraft over data-link

4. TA trajectory received and loaded into FMS upon pilot concurrence

5. TA trajectory flown with FMS

6. Aircraft downlinks ETA info (at waypoints) along with other useful parameters for ATC trajectory confirmation/tuning

7. TA procedure broken off if trajectory can’t be continued for any reason
SFO Trials
SFO Tailored Arrival

Fuel Flow
(kg/hr)

- < 2500
- 2500-5000
- 5000-7500
- >7500
Deployed portable noise monitors

Permanent noise monitor sites

12

KSFO

CEPIN

AXMUL

MENLO

OSI

Courtesy SFO

Noise Abatement Office
SEL Noise Contours for Representative Daily Oceanic Arrivals into SFO - 20 747/777 flights
## Emissions Reduction

<table>
<thead>
<tr>
<th>Emissions from CREAN to SFO</th>
<th>CO (lbs)</th>
<th>NO\textsubscript{x} (lbs)</th>
<th>C\textsubscript{x}H\textsubscript{x} (lbs)</th>
<th>CO\textsubscript{2} (lbs)</th>
<th>CO\textsubscript{2} Savings (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tailored Arrivals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light</td>
<td>19.1</td>
<td>135.6</td>
<td>0.82</td>
<td>24,333</td>
<td>715</td>
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<tr>
<td>Med</td>
<td>19.3</td>
<td>138.1</td>
<td>0.84</td>
<td>24,746</td>
<td>1,128</td>
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<tr>
<td>Heavy</td>
<td>19.7</td>
<td>238.6</td>
<td>0.95</td>
<td>36,782</td>
<td>13,164</td>
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<tr>
<td>Baseline</td>
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<tr>
<td></td>
<td>777-200/GE90-85B</td>
<td>747-400/PW4056</td>
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<tr>
<td>Full TA</td>
<td>1,303 lbs</td>
<td>2,291 lbs</td>
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<tr>
<td>Partial TA</td>
<td>379 lbs</td>
<td>1,100 lbs</td>
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</table>
Secondary Improvements

Non-OTA: Level Segment at 8,000 For 19 Miles Due to Noise Abatement
LAX Trials
LAX Arrival and Departure
UAL840, March 2009
UAL840

Note: 267 flights total
Questions?