Overview

Flights that transit the Polar and Russia Far East theaters have unique planning and operational considerations due to the remote terrain, extreme temperatures, areas of magnetic unreliability, space weather, availability of ETOPS alternates and communication issues. Planning and operating in the Polar/Russia far East areas can be quite different than other areas of the world.
Regulatory Requirements

Operations Specifications

- North Polar Operations
  - Authorized aircraft and equipment.
  - Polar recovery plan.
  - Communications capability.
  - Diversion alternate airports.
  - Cold weather anti-exposure suits.
  - Expanded medical kit to include AED’s.

- Operations in Areas of Magnetic Unreliability
  - Required navigation and approach capabilities.
  - Approved crew training program; equipment and special procedures

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Planning Elements

Fuel freeze prevention

Determine the lowest projected fuel temperature during flight or maximum En-route time at cruise flight level.

Boeing: fuel temperature prediction model

Airbus: fuel temperature degradation model to determine maximum time en-route

(The A350 is exempt from fuel freeze program)

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Fuel testing

Fuel samples are taken plane side during fueling for flights that transit Polar or RFE airspace to Asia from U.S. gateway cities.

The fuel samples are frozen and the actual fuel freeze temperature is used to determine the lowest fuel temperature en-route, (Boeing), or maximum en-route time, (airbus).
Planning Elements

Fuel testing

If the actual fuel freeze temperature is warmer than the lowest projected en-route fuel temperature or if the maximum en-route time is exceeded, mitigation is necessary. Mitigation may be any or all of the following:

• Route change
• Flight level change
• Speed change
Planning Elements

Space Weather

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Planning Elements

Space Weather
Space weather must be assessed prior to planning flights through the Polar and RFE regions. The assessment includes the effects of solar radiation storms, geomagnetic storms, ionospheric storms, and solar flares. These events can cause harm to humans, affect communications and navigation systems. Delta Meteorology provides a simplified summary for use in flight planning.

![Delta Meteorology Space Weather Activity and Forecast]

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### Space Weather

The space weather forecast is based on a scale of one to five for geomagnetic Storms, solar radiation Storms and the potential for Radio blackouts.

<table>
<thead>
<tr>
<th>Storm Scale</th>
<th>TP</th>
<th>Solar Radiation Storm Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1</td>
<td>No TP Issued</td>
<td>Communications: No Effect</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Satellite navigation: No Effect</td>
</tr>
<tr>
<td>G2</td>
<td>No TP Issued</td>
<td>Communications: Possible HF radio outages</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Satellite navigation: No Effect</td>
</tr>
<tr>
<td>G3</td>
<td>Alert Issued (Required)</td>
<td>Communications: Possible intermittent HF radio outages</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Satellite navigation: Possible intermittent satellite navigation problems</td>
</tr>
<tr>
<td>G4</td>
<td>Alert Issued (Required)</td>
<td>Communications: Possible sporadic HF radio outages</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Satellite navigation: Possible satellite navigation degraded for hours</td>
</tr>
<tr>
<td>G5</td>
<td>Alert Issued (Required)</td>
<td>Communications: Possible HF radio outages for 3-4 days</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Satellite navigation: Possible satellite navigation degraded for days</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Storm Scale</th>
<th>TP</th>
<th>Solar Flare - Radio Blackout Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>No TP Issued</td>
<td>Communications: Possible minor degradation to HF radio on or near auroral activity</td>
</tr>
<tr>
<td>R2</td>
<td>No TP Issued</td>
<td>Communications: Possible blackout to HF radio for minutes on auroral activity</td>
</tr>
<tr>
<td>R3</td>
<td>Advisory Issued (If needed)</td>
<td>Communications: Possible blackout to HF radio for hours on auroral activity</td>
</tr>
<tr>
<td>R4</td>
<td>Advisory Issued (If needed)</td>
<td>Communications: Possible blackout to HF radio for days on auroral activity</td>
</tr>
<tr>
<td>R5</td>
<td>Advisory Issued (If needed)</td>
<td>Communications: Possible blackout to HF radio for several days</td>
</tr>
</tbody>
</table>

**Legend**
- Avoid Polar Routes N of 82N (over ABERI, DEVID, RAMEL)
- **S3, S4 or S5 Avoid All Polar Routes**
- Fly Polar Routes

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[Delta Logo]
Planning Elements

Slot Reservation Request
Slot reservation requests are sent through the Dynamic Ocean Track System, (DOTS+)

DOTS+ Online
Home  Manage Reservation Requests  Manage Request Lists  Gateway Reservation List  Tracks  User Preferences  Help

Gateway Reservation List (ZAN)

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Communications equipment requirements can be more stringent than in other theaters. The requirements at Delta Air Lines for Polar flights are as follows:

For dispatch: (2) HF radios and (1) SATCOM unit are required

Continuing flight: (2) HF radios
Regional Improvements. RNAV GNSS Approaches

RNAV GNSS Approaches

KHV/UHHH, UUS/UHSS and DYR/UHMA currently have only ILS Approaches or ILS and NDB approaches. If the ILS is out of service, These airports are unusable as diversion airports and may affect our ability to plan flights over RFE airspace. Are there plans to Implement RNAV GNSS approaches at these airports?
There are currently limitations on entry/exit points in Northern China
Regional Improvements. Entry/Exit Points China

Additional Waypoints and airways would reduce carbon emissions By allowing more economic flight planning. What are the next steps?