Pacific User Preferred Route Implementations

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ICAO APAC FRA Webinar
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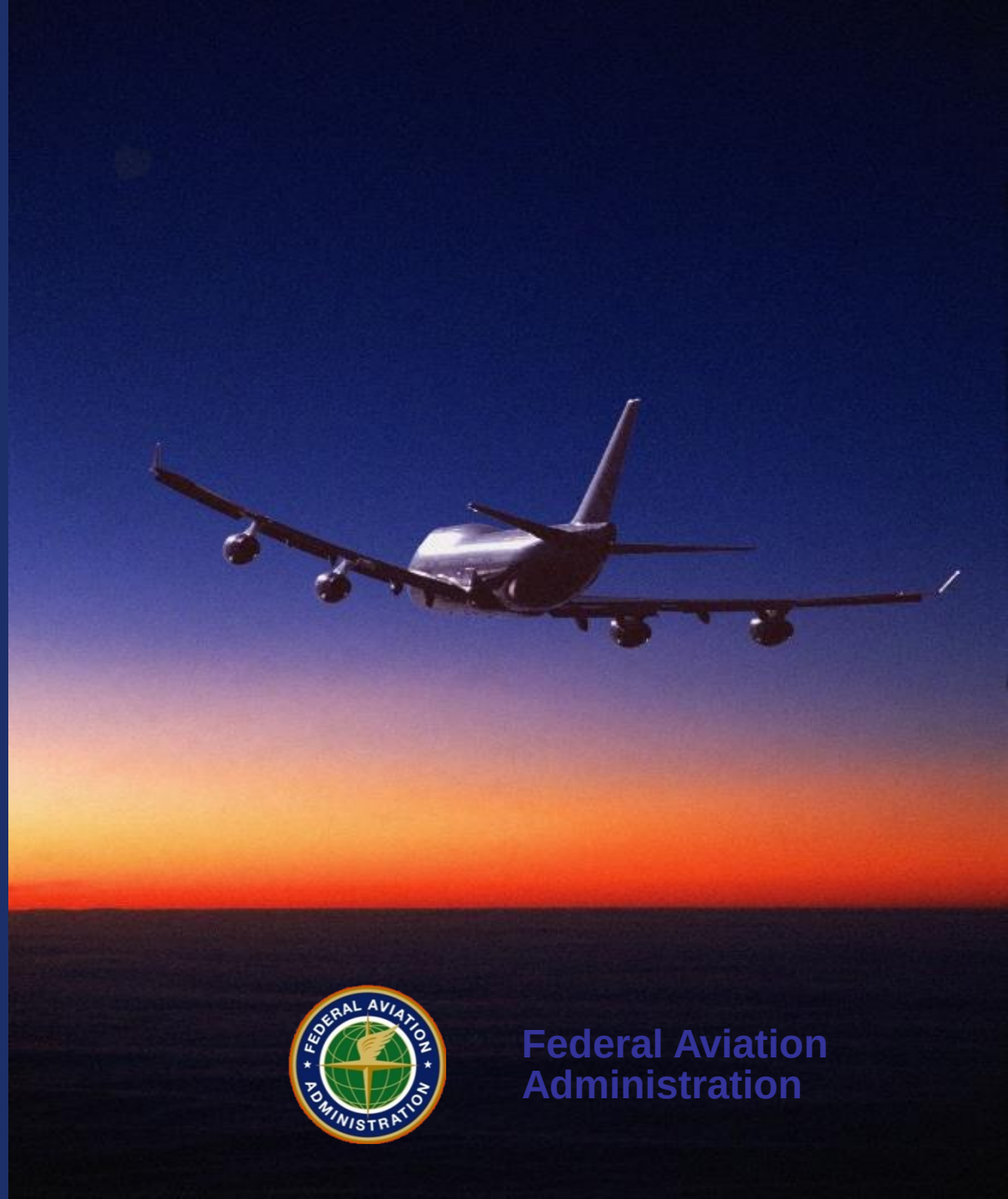
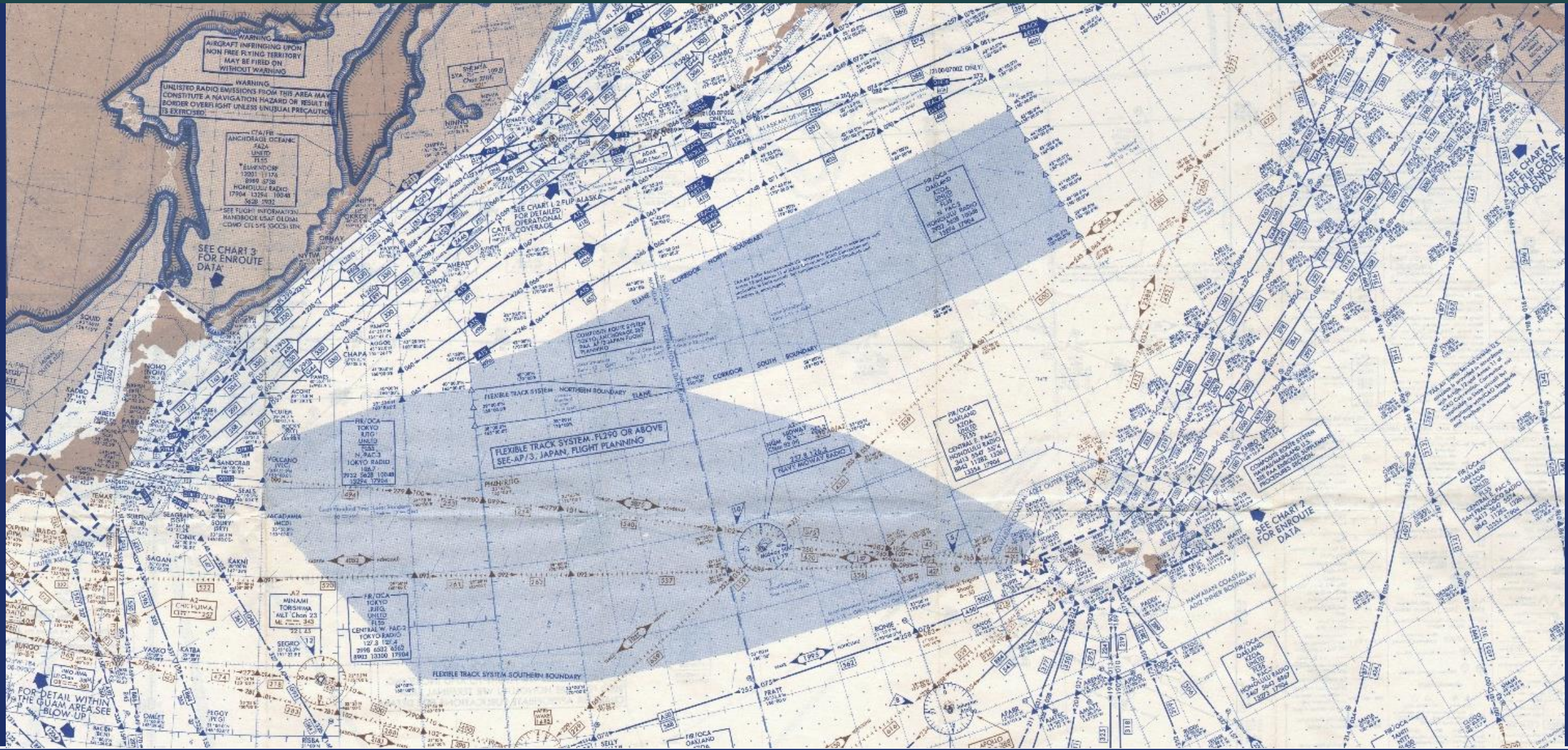


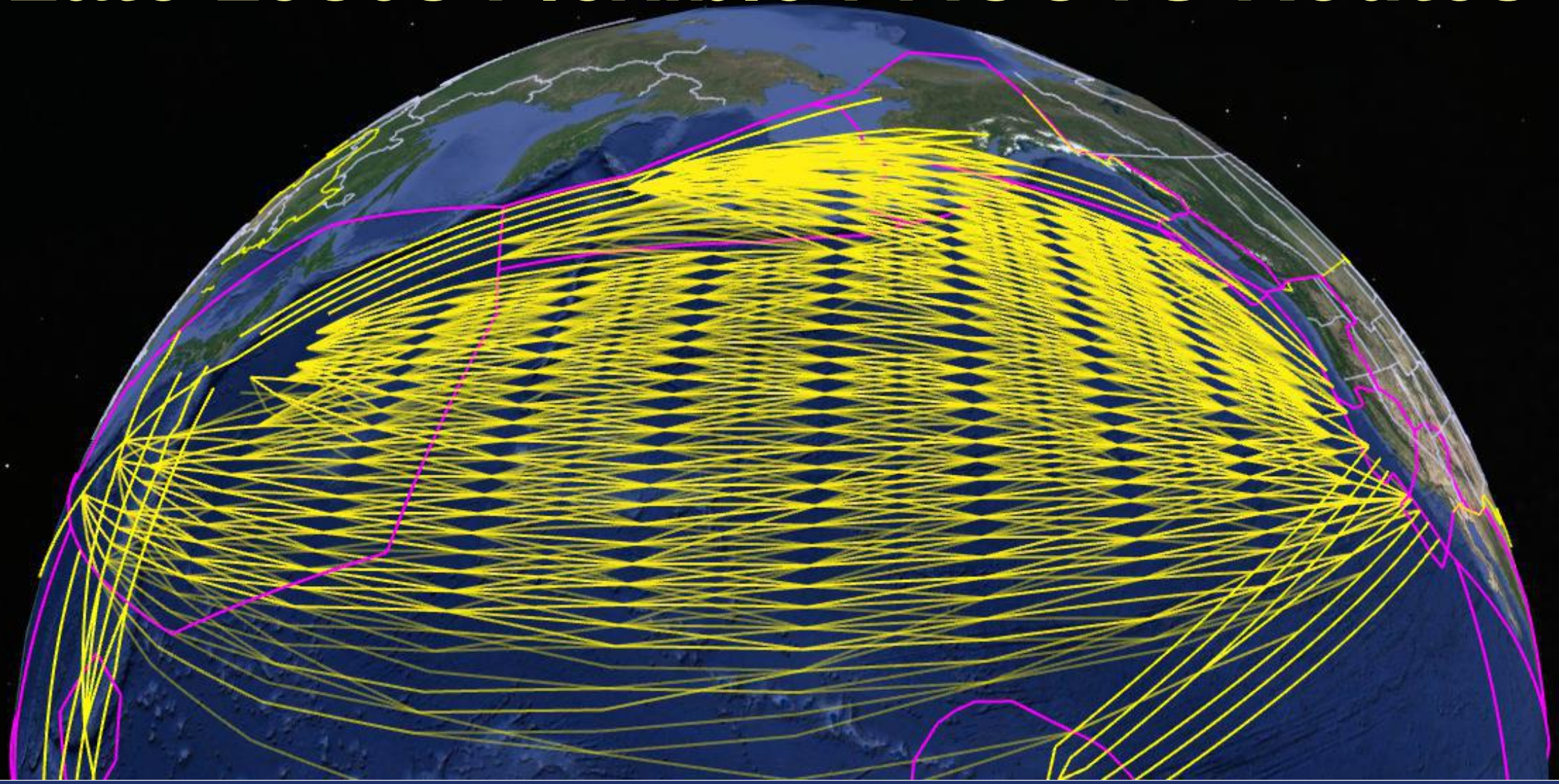
Federal Aviation Administration

- In the 1980s Oceanic ATC was accomplished via paper Flight Progress Strips
- Oceanic Separation Minima were very large (100 NM lateral and 20 minutes Long.)
- User Preferred Routes were very difficult with busy traffic

In the early 1980s Flights mostly followed Fixed Routes



Late 1980s Flexible PACOTS Routes



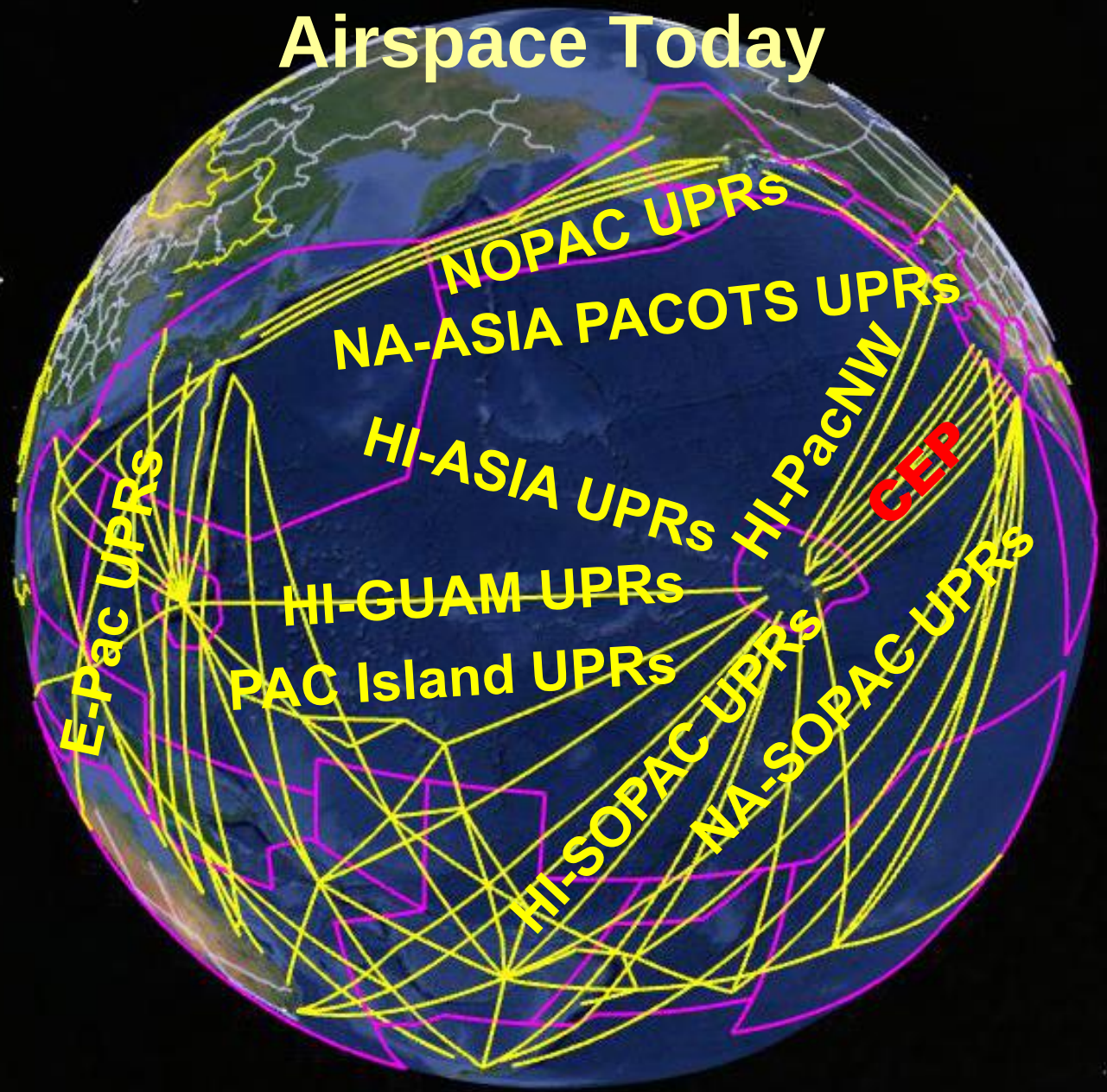
Oakland ATOP October 2005

ATOP Enhancements

- 24/7 Architecture
- Certified Conflict Probe
- Electronic Flight Progress Strips
- AIDC
- Reduced separations:
  - 50 NM Lateral Sep.
  - 50 NM Long. Sep.
  - 30/30 Separation

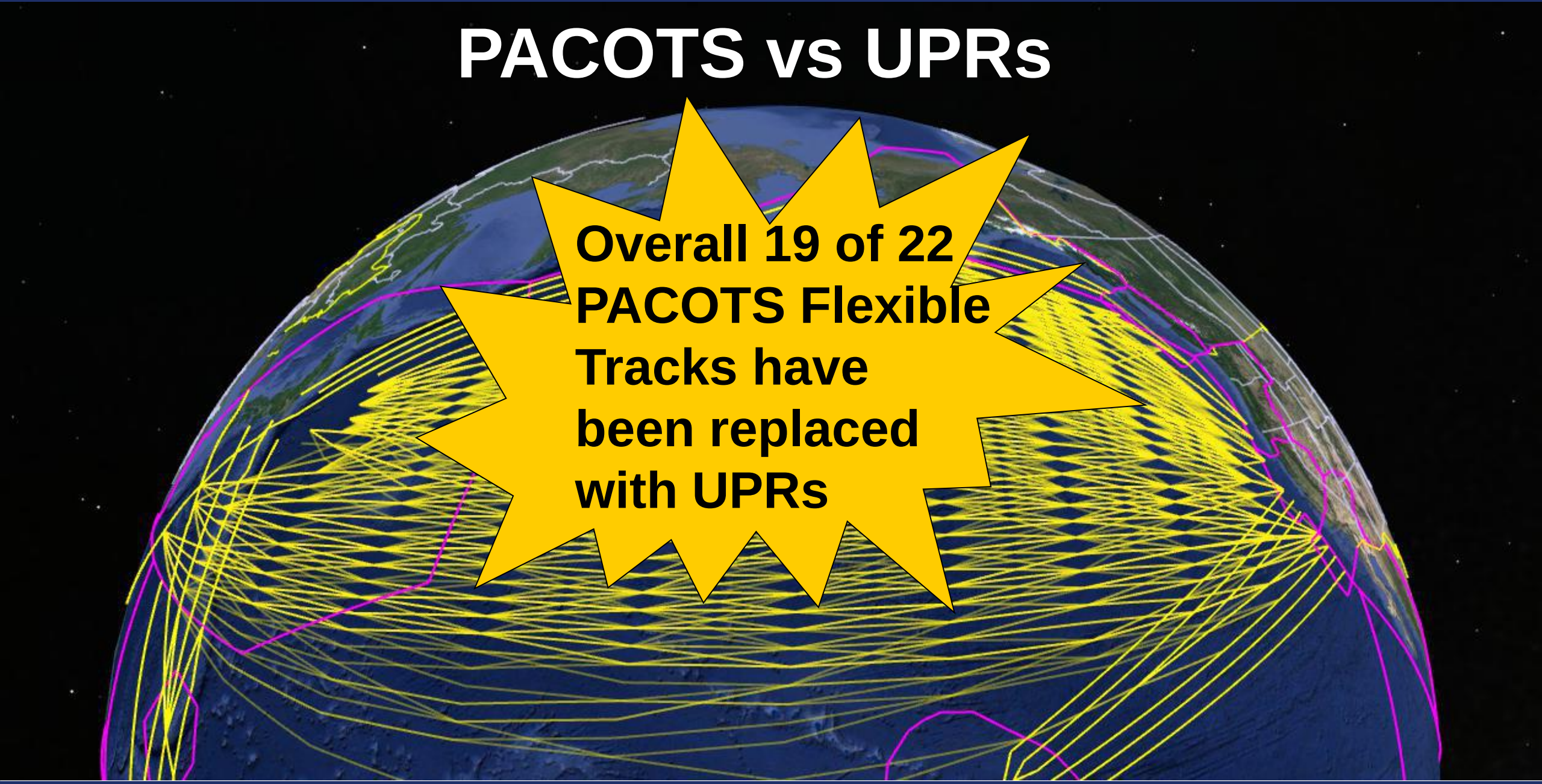
Airspace Today

- Automation Enhancements and Smaller Oceanic Separations have enabled the use of UPRs in many traffic flows



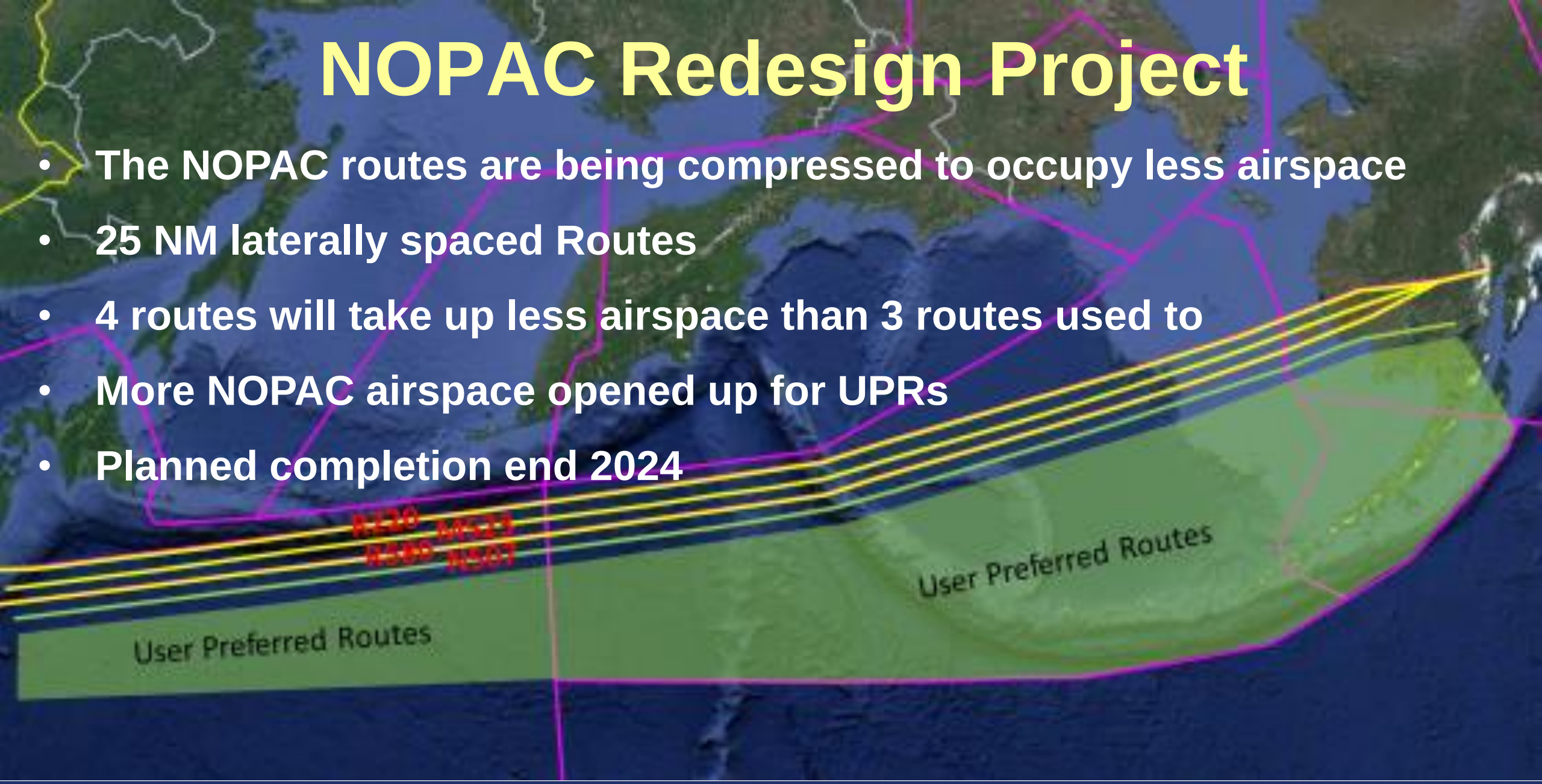

UPRs
Over 32.8 Mil Kg Fuel 2012 Savings Annually
???? Kg An.
2.88M. Kg An.
1.09 Kg An.
.266M. Kg An.
2.88M. Kg An.
2.09M. Kg An.
???? Kg An.
9.61M Kg An
1017Kg Flight
10M. Kg An.
1.09M. Kg An.
Vancouver
Brisbane

PACOTS vs UPRs

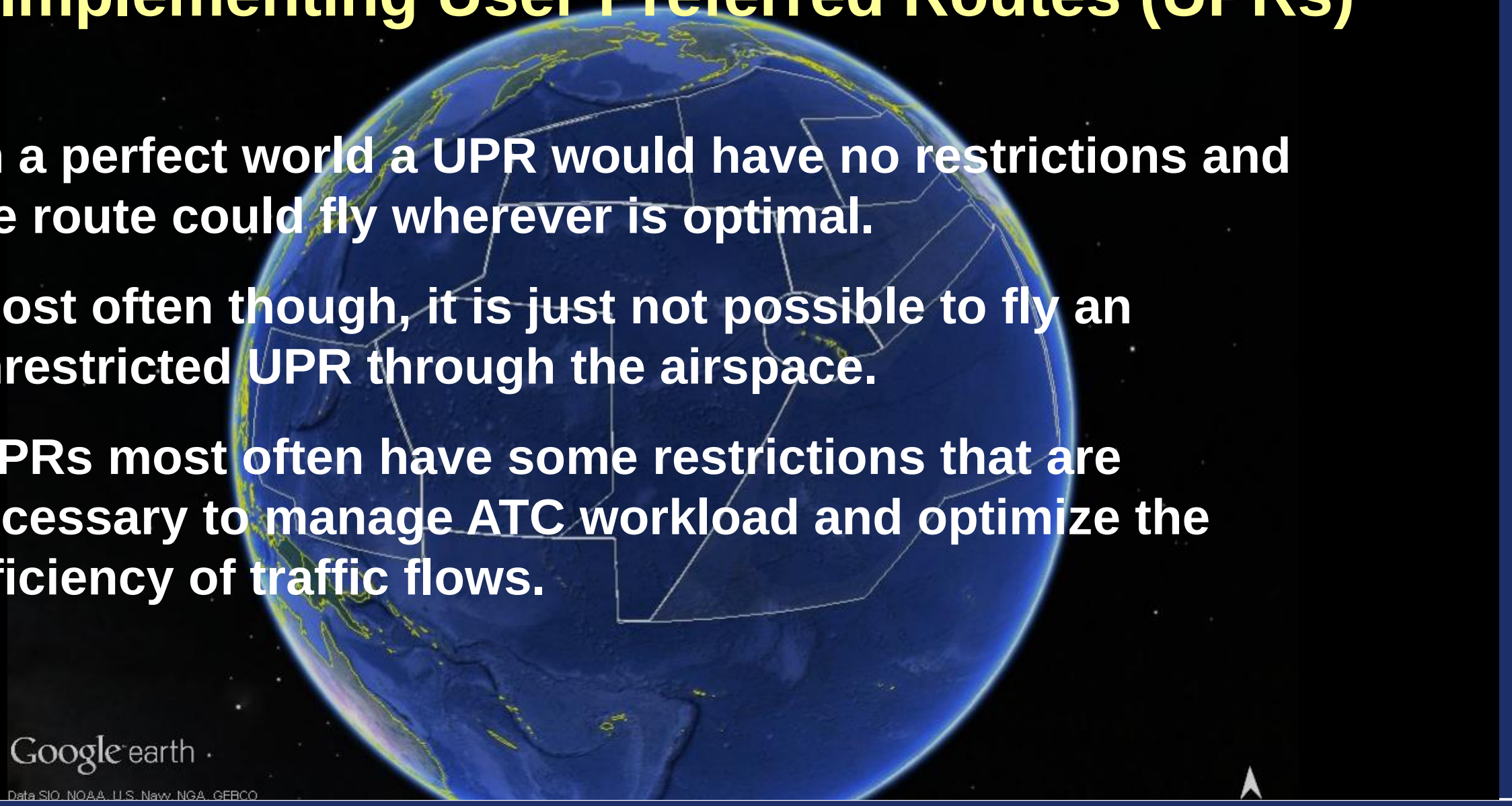


NOPAC Redesign Project

- The NOPAC routes are being compressed to occupy less airspace
- 25 NM laterally spaced Routes
- 4 routes will take up less airspace than 3 routes used to
- More NOPAC airspace opened up for UPRs
- Planned completion end 2024



Implementing User Preferred Routes (UPRs)

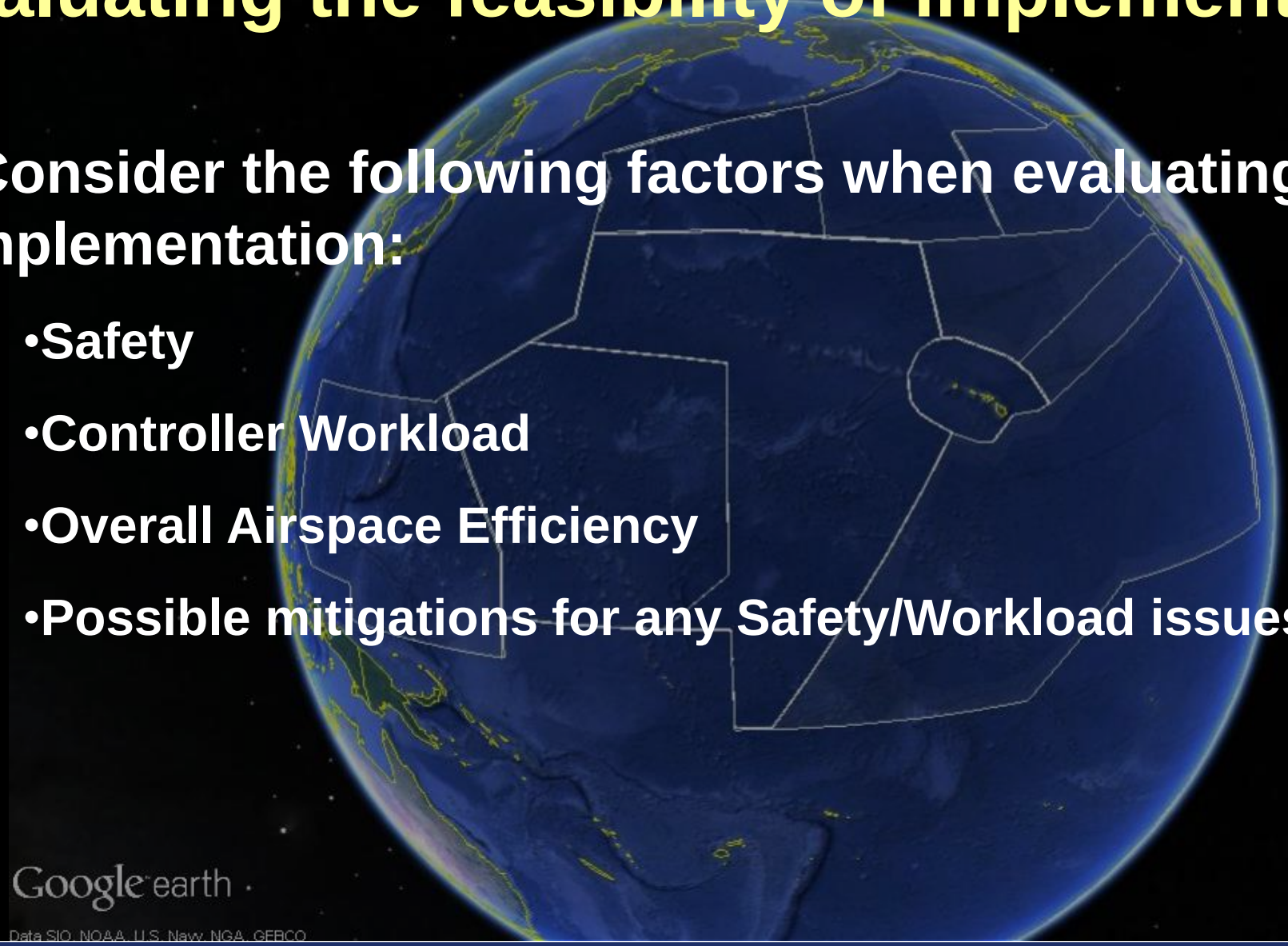


- In a perfect world a UPR would have no restrictions and the route could fly wherever is optimal.
- Most often though, it is just not possible to fly an unrestricted UPR through the airspace.
- UPRs most often have some restrictions that are necessary to manage ATC workload and optimize the efficiency of traffic flows.

General UPR Restrictions

- **The UPR must be planned to avoid military special use and NOTAMed airspace when active.**
- **The UPR must utilize a published SID/STAR where appropriate.**
- **State the Priority for Altitude Assignment:**
- **State Conditions that may not allow the use of UPRs:**
  - Large scale military operations, Typhoons, Volcanic Ash and Space Launches**.**

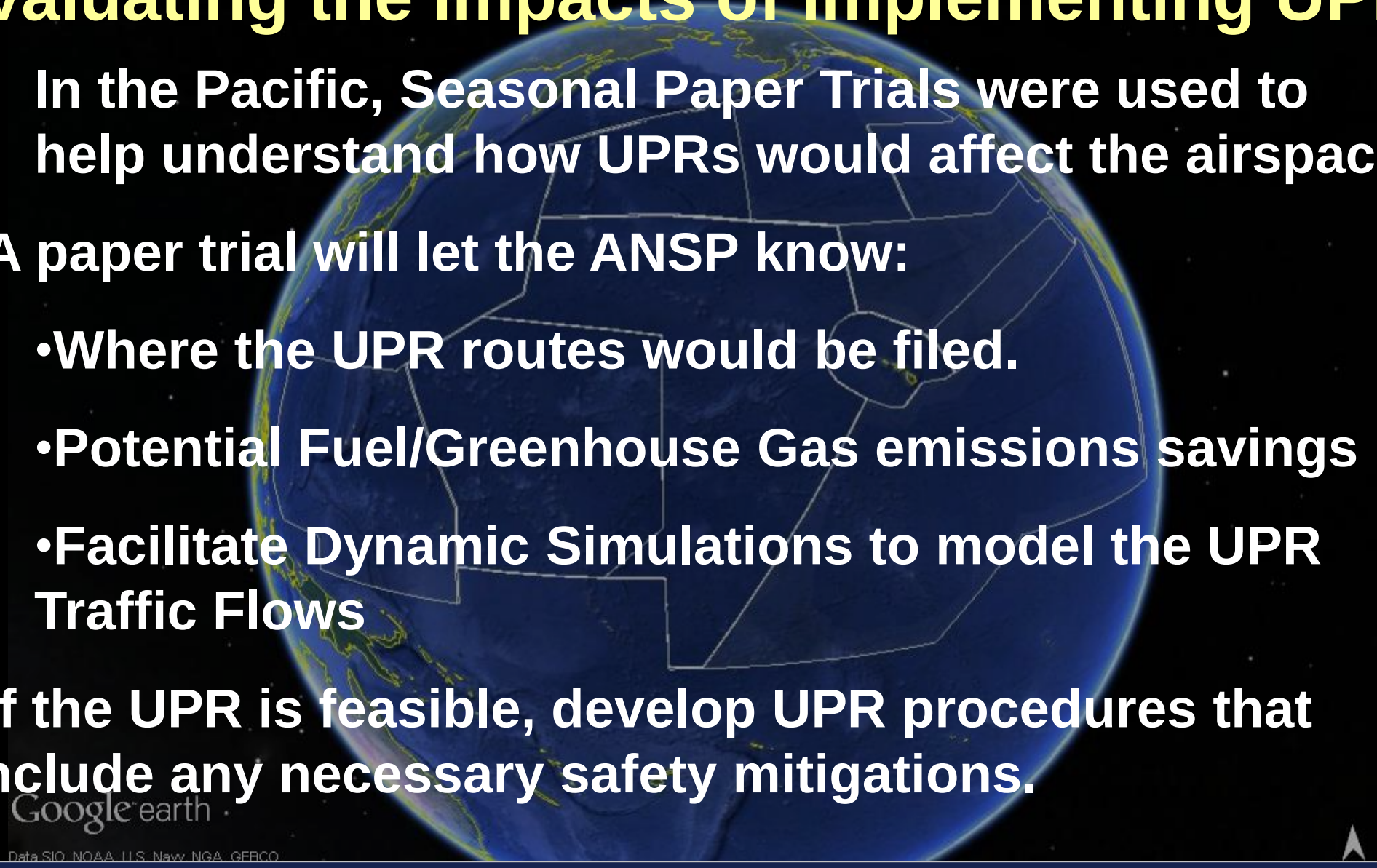
Evaluating the feasibility of implementing UPRs



- Consider the following factors when evaluating UPR Implementation:
  - Safety
  - Controller Workload
  - Overall Airspace Efficiency
  - Possible mitigations for any Safety/Workload issues

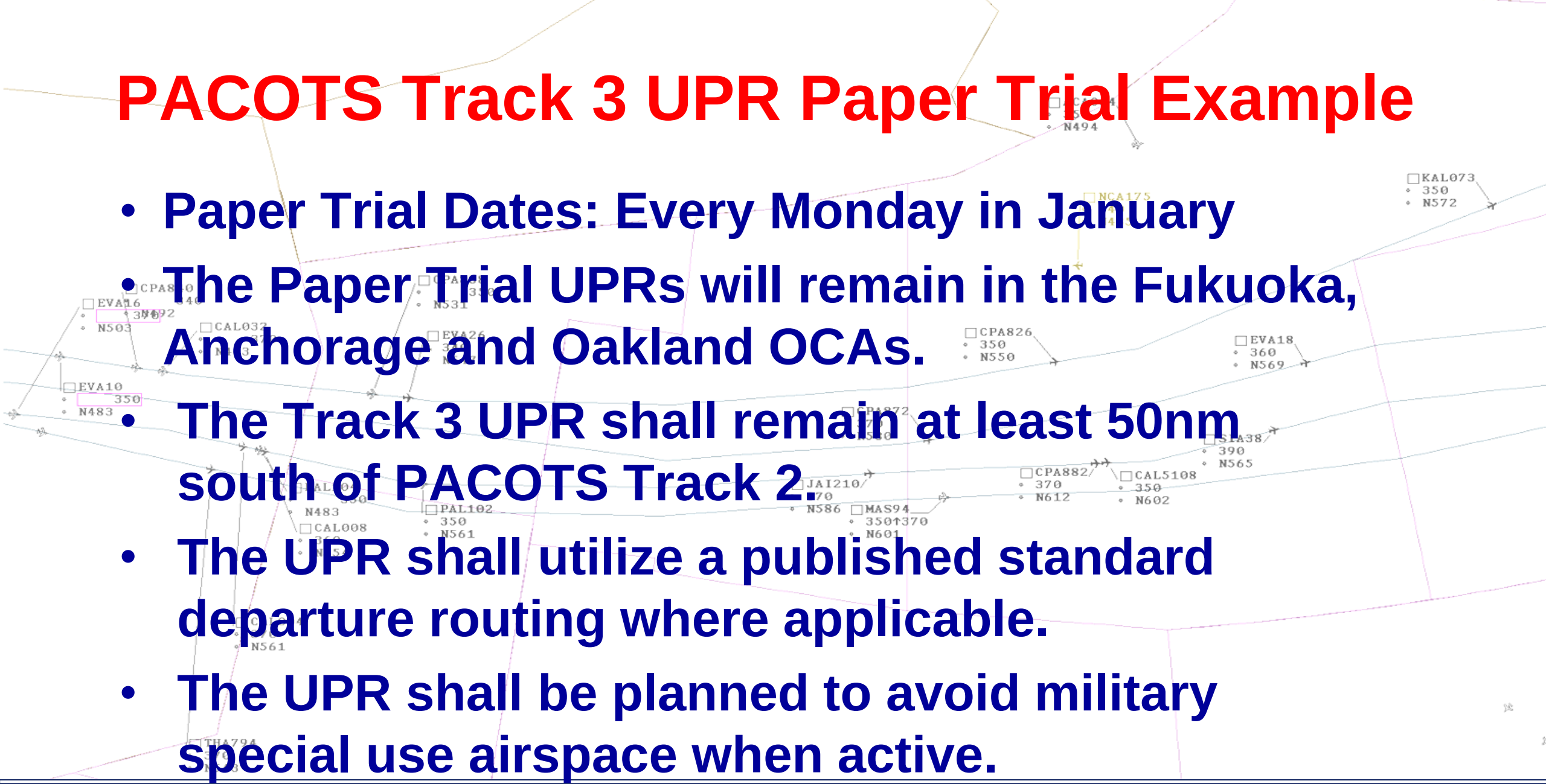
Evaluating the impacts of implementing UPRs

- In the Pacific, Seasonal Paper Trials were used to help understand how UPRs would affect the airspace.
- A paper trial will let the ANSP know:
  - Where the UPR routes would be filed.
  - Potential Fuel/Greenhouse Gas emissions savings
  - Facilitate Dynamic Simulations to model the UPR Traffic Flows
- If the UPR is feasible, develop UPR procedures that include any necessary safety mitigations.

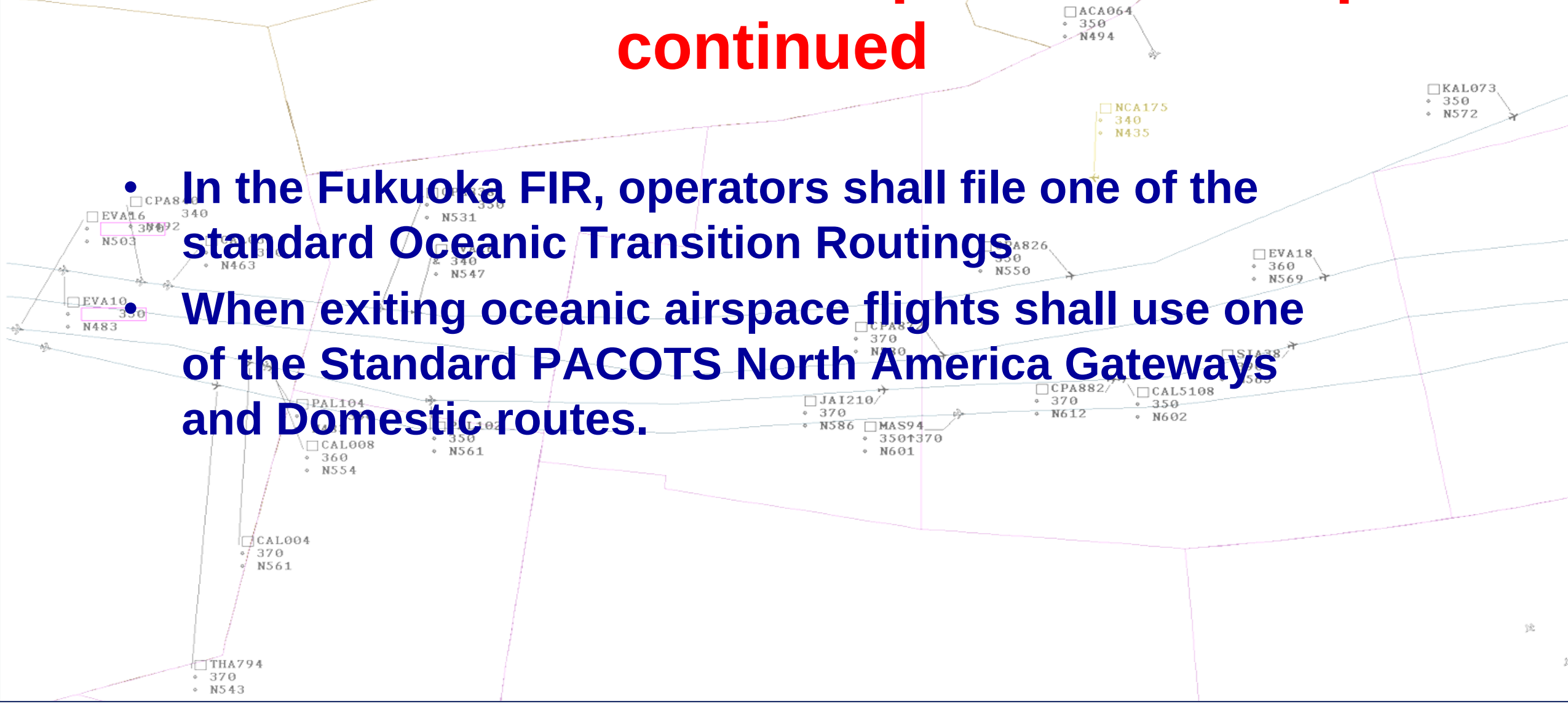


PACOTS Track 3 UPR Paper Trial Example

- Paper Trial Dates: Every Monday in January
- The Paper Trial UPRs will remain in the Fukuoka, Anchorage and Oakland OCAs.
- The Track 3 UPR shall remain at least 50nm south of PACOTS Track 2.
- The UPR shall utilize a published standard departure routing where applicable.
- The UPR shall be planned to avoid military special use airspace when active.



PACOTS Track 3 UPR Paper Trial example continued



- In the Fukuoka FIR, operators shall file one of the standard Oceanic Transition Routings.
- When exiting oceanic airspace flights shall use one of the Standard PACOTS North America Gateways and Domestic routes.

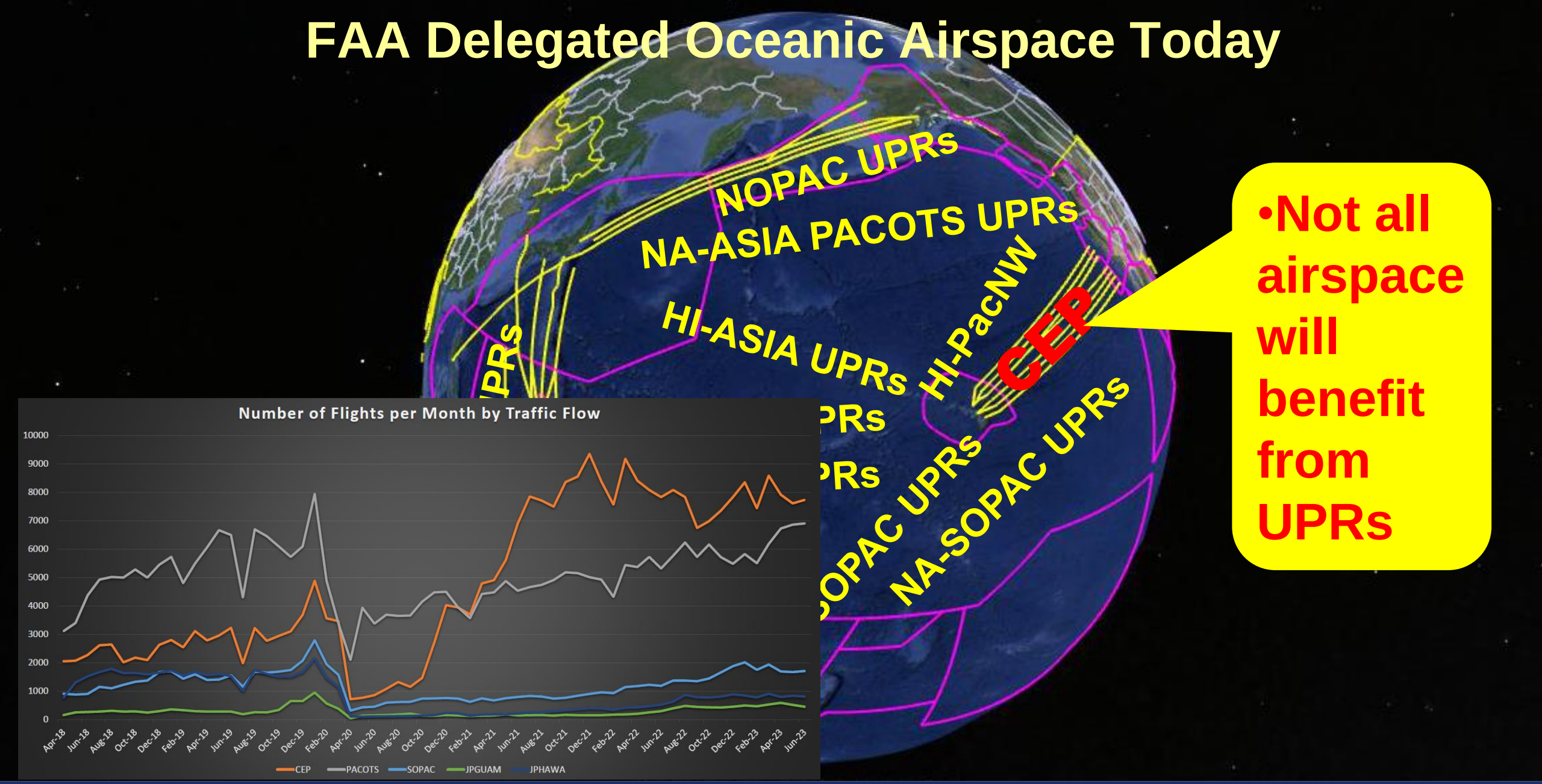
PACOTS Track 3 UPR Paper Trial example

- **As a minimum we are looking to collect the following information. Operators may use the attached Excel spreadsheet for the data collection.**
  - Aircraft Call Sign
  - Type Aircraft
  - Current Structured Routing in use today for the flight including the departure and destination.
  - En route time for Current PACOTS Routing
  - Fuel Burn for the Current PACOTS Routing note kilos or pounds.
  - Corresponding UPR Route of flight
  - En route time for UPR Routing
  - Fuel Burn for the UPR Routing in either kilos or pounds.
  - Note any other operational advantages if any; e.g., “The UPR route allowed us to avoid an area of forecast severe turbulence.”

Pacific Paper Trial Analysis

- A single UPR will show a savings when evaluated by itself.
- The implementing ANSP must look at all the UPRs together as a complete change and determine:
  - Does the implementation of the UPRs provide an overall benefit.
  - Conduct the Safety Risk Analysis to determine if the UPRs can be safely implemented.
- Consider conducting Operational Trials if it is determined to meet Safety requirements.
- Monitor the Operational Trial for any issues that may occur.
  - Implement mitigations as necessary.
  - Terminate/Suspend the Trial if necessary

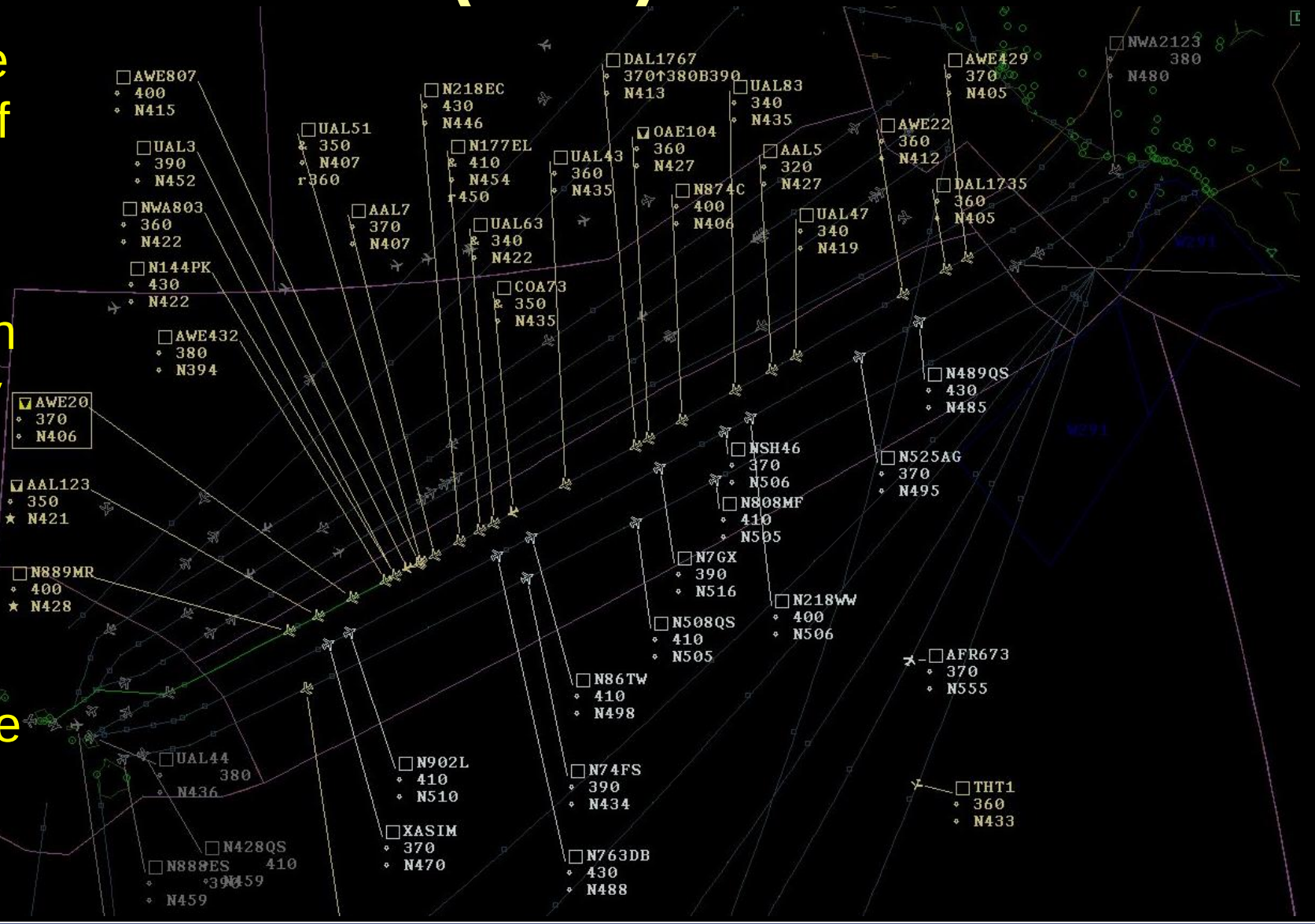
FAA Delegated Oceanic Airspace Today



- **Not all airspace will benefit from UPRs**

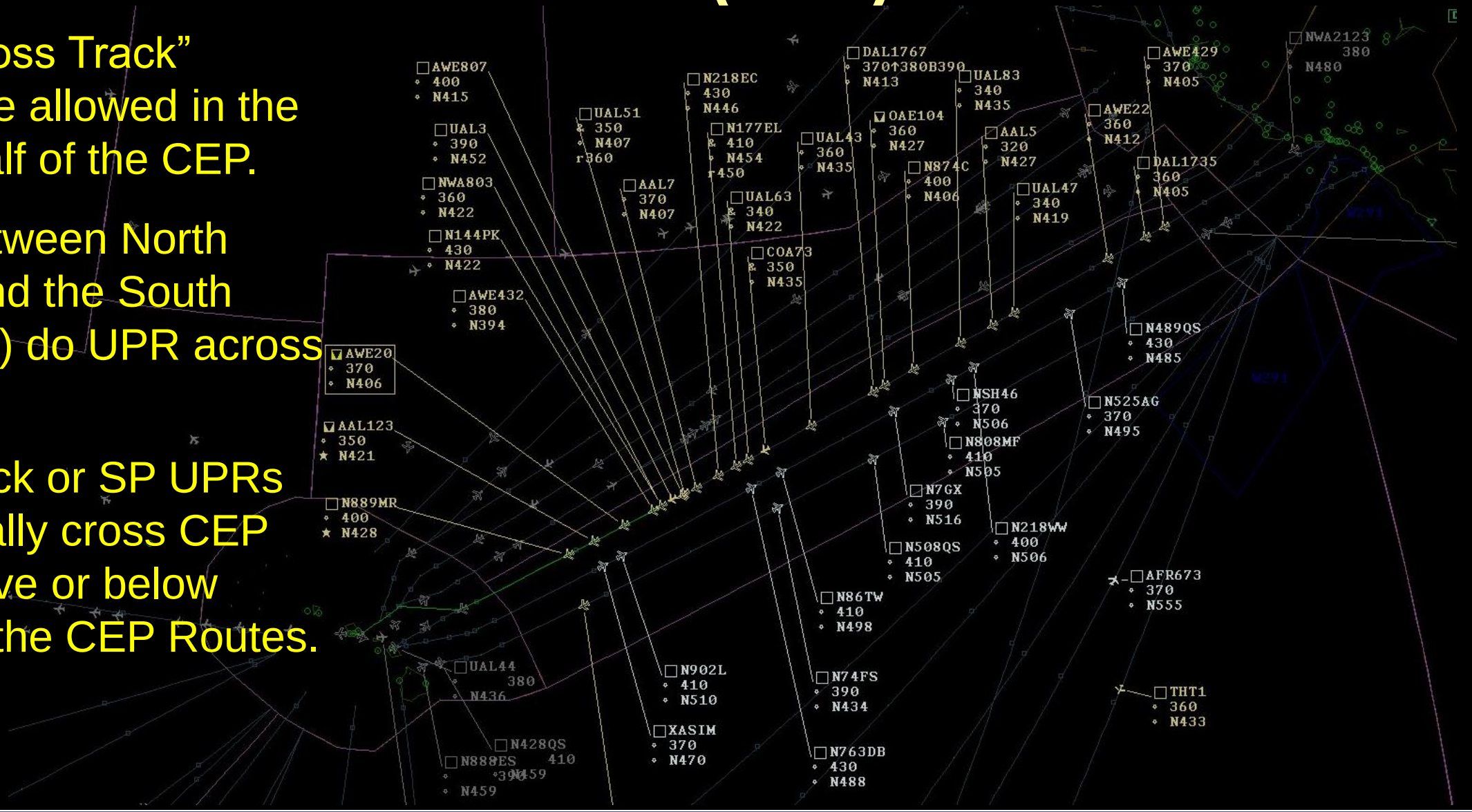
Central East Pacific (CEP) UPRs

- The 6 parallel routes in the CEP allow large volumes of traffic to be moved through the airspace.
- Oceanic Opposite direction separation minima are very large (around 160 NM)
- UPRs would create numerous opposite direction conflicts that would cause aircraft to have to operate at unreasonably low altitudes at times.



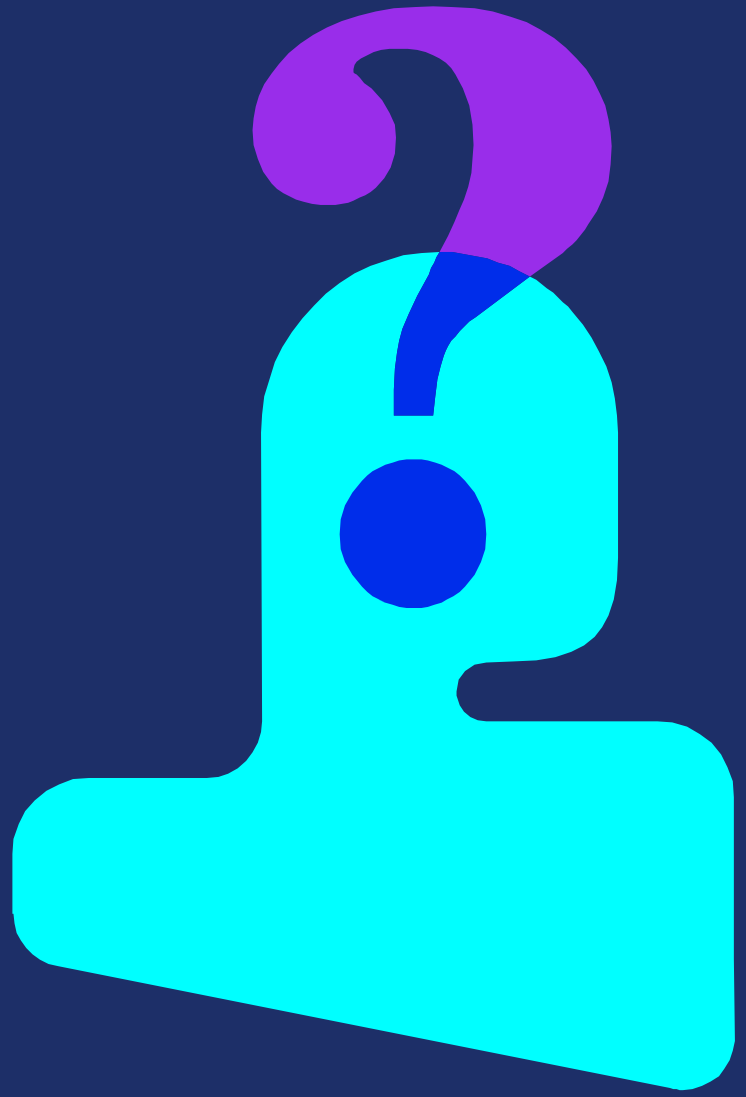
Central East Pacific (CEP) UPRs

- Some “Cross Track” routings are allowed in the Eastern Half of the CEP.
- Flights between North America and the South Pacific (SP) do UPR across the CEP.
- Cross Track or SP UPRs must typically cross CEP routes above or below aircraft on the CEP Routes.



User Preferred Routes Summary

- When evaluating UPRs, the ANSP must look at the overall airspace benefits.
- Conduct Safety Risk Analysis and Paper Trials (as needed) to determine if the UPR can safely be implemented.
- In many Pacific traffic flows UPRs are providing Fuel and Green House gas emissions savings.
- However, in some airspaces like the CEP, unrestricted UPRs would not provide an overall airspace advantage.
- Monitor the UPR procedures that are in place and make adjustments in the UPR procedures as necessary.



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