

Traffic Flow on NOPAC Routes

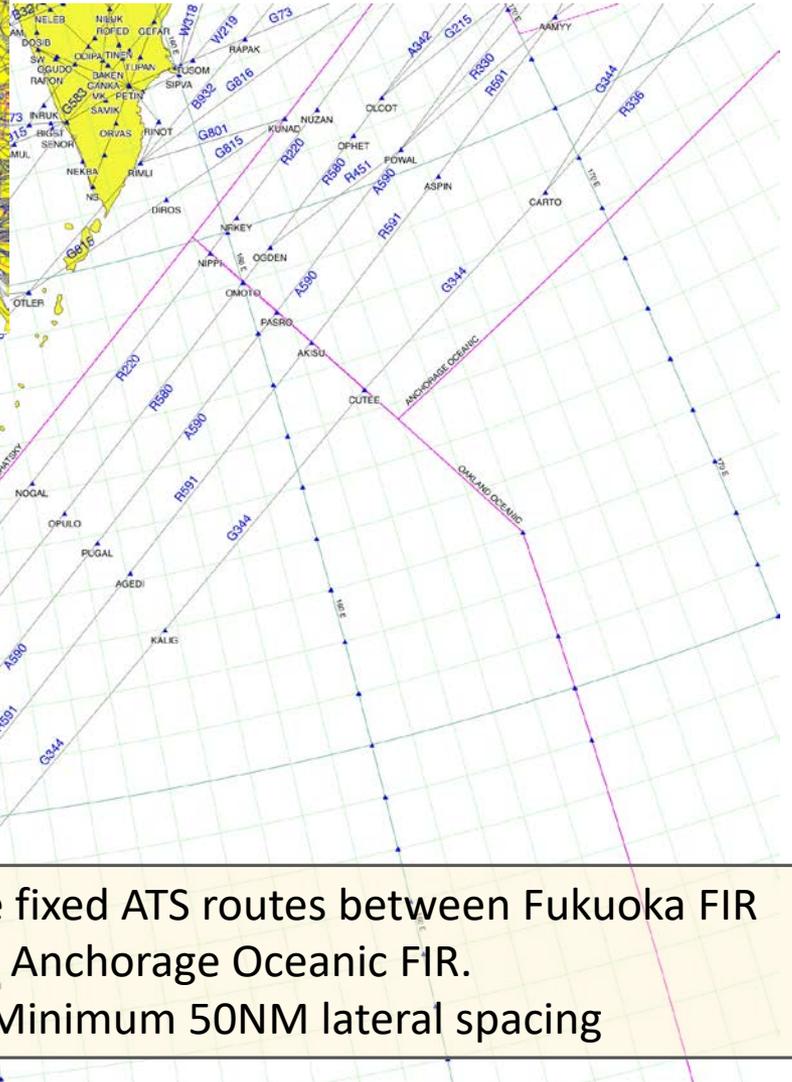
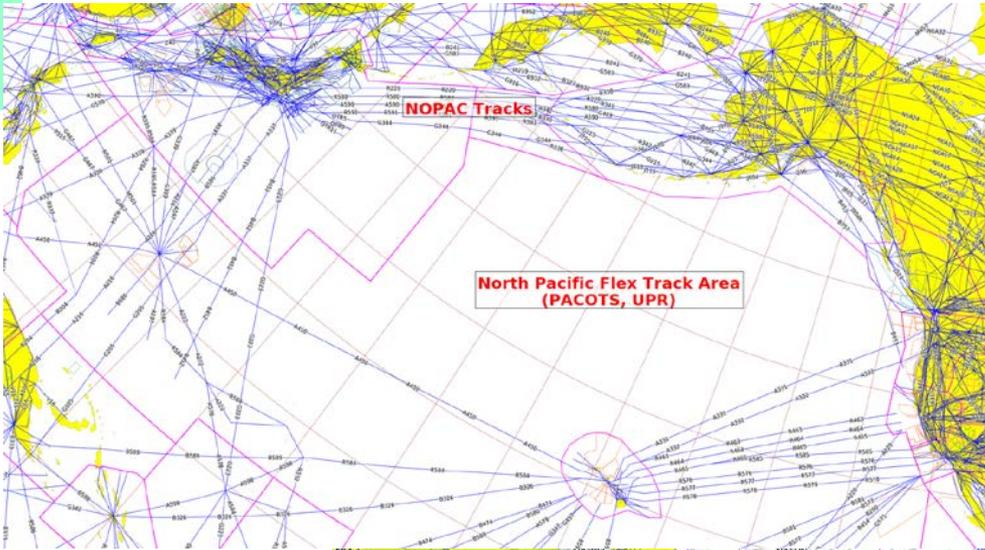
National Institute of Maritime, Port and Aviation Technology,
Electronic Navigation Research Institute



The 45th Informal Pacific ATC Coordinating Group (IPACG/45) Meeting
11-12 December 2019, Tokyo

Background

- With continuing economic growth in Asia, the air traffic demand in North Pacific airspace continues to increase.
- For long-haul flights, the expansion of UPR airspace leads to the realization of more efficient flights.
- Since the NOPAC routes were designed in the 1980s, CNS performance has been improved, and it is possible to reduce the minimum separation between aircraft in oceanic airspace (PBCS).
- By restructuring the NOPAC routes to exploit PBCS, it will be possible to:
 - increase the route capacity while maintaining safety (reduce longitudinal separation), and
 - to expand the UPR airspace by reducing the NOPAC area (reduced lateral separation between tracks, elimination of some routes).
- Currently, step-by-step NOPAC restructuring is under consideration.
- As an early stage, PBCS-exclusive airspace by altitude is being studied on the current routes.
- Here, we introduce a traffic flow analysis to understand the current demand situation of NOPAC routes.



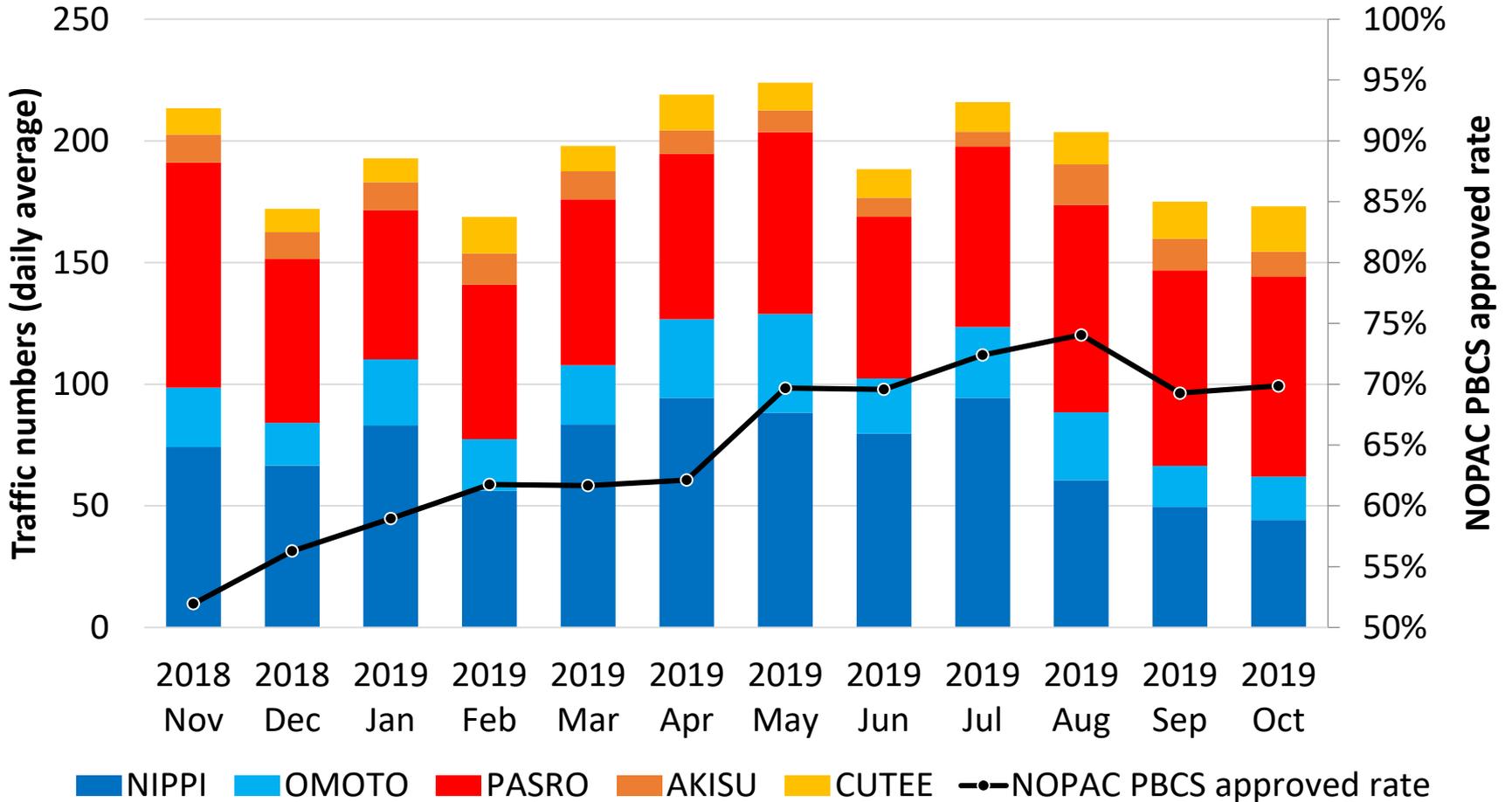
Five fixed ATS routes between Fukuoka FIR and Anchorage Oceanic FIR.
 - Minimum 50NM lateral spacing

Data Analysis

- Target Period
 - 2018 11/01 – 2019 10/31 (1 year)
 - Flights operating on NOPAC routes within Fukuoka FIR
- Data source
 - Flight plans and monitoring data provided by the JCAB
 - Contains time (one-minute resolution) and altitude passing/abeam each significant fix on route.

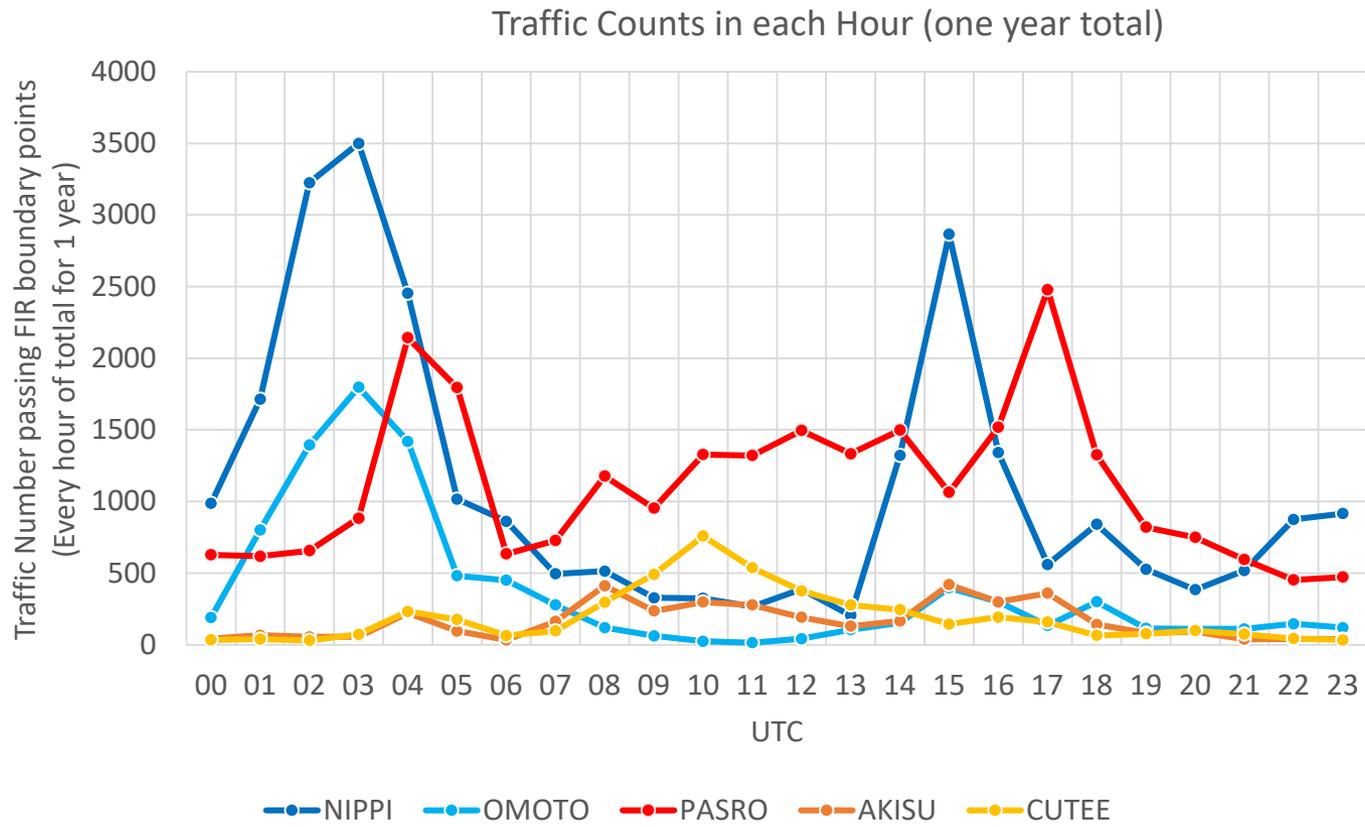
Traffic Numbers and PBCS Approved Rate

Daily average traffic counts through NOPAC FIR boundary points and PBCS approved rate for each month



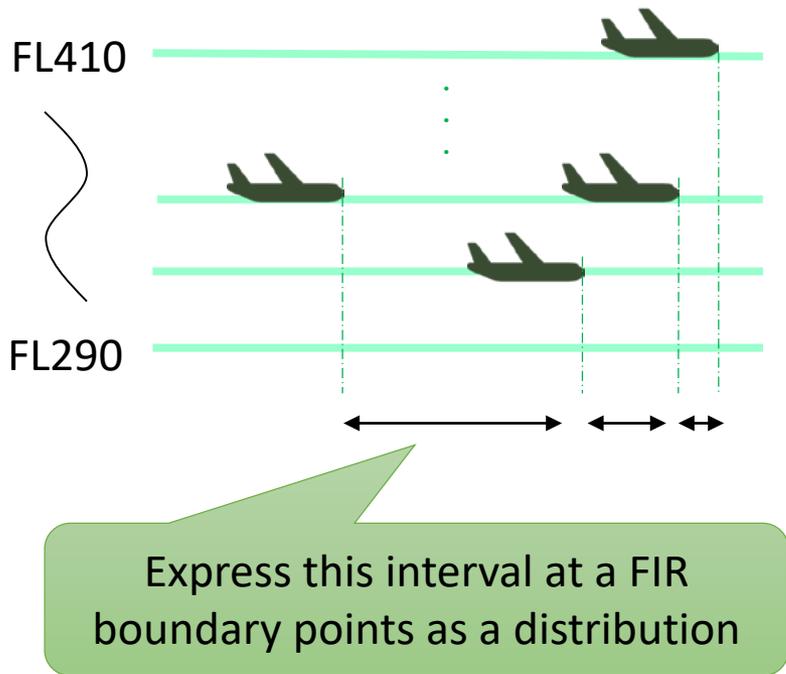
Daily Traffic Flow peaks

To understand how traffic flow on the NOPAC routes varies over the day, traffic counts through the FIR boundary points (FL290-FL410) were tallied for each 1-hour daily interval over the one-year period.

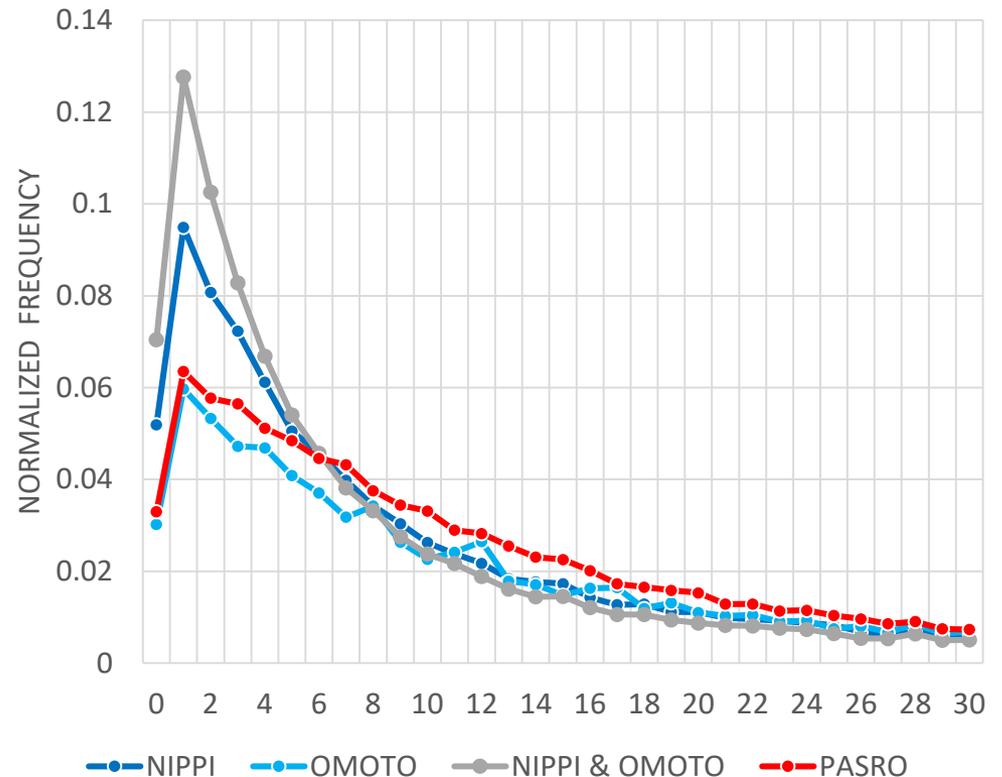


FIR boundary crossing intervals per route: NIPPI, OMOTO and PASRO

To further understand peak time route occupancy, look at distribution of intervals between flights crossing boundary (same route and direction, ignoring altitude).
1 minute interval is the most frequent, accounting for 6-10% of the total.



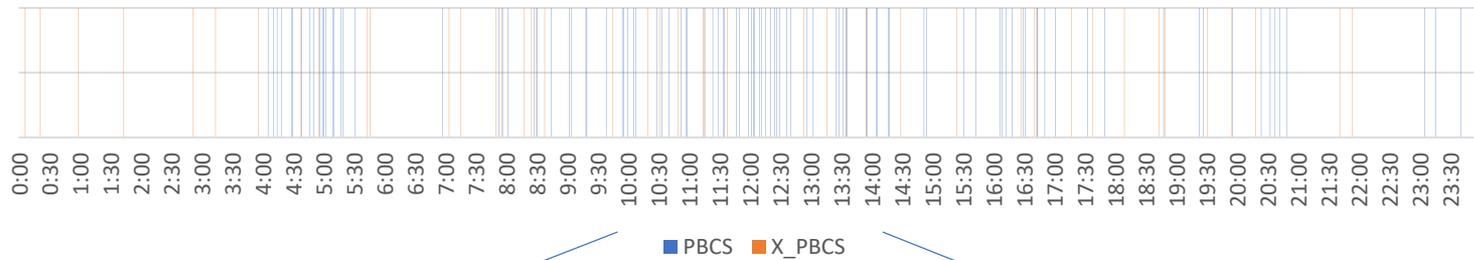
NOPAC FIR boundary entry / exit intervals FL290-FL410



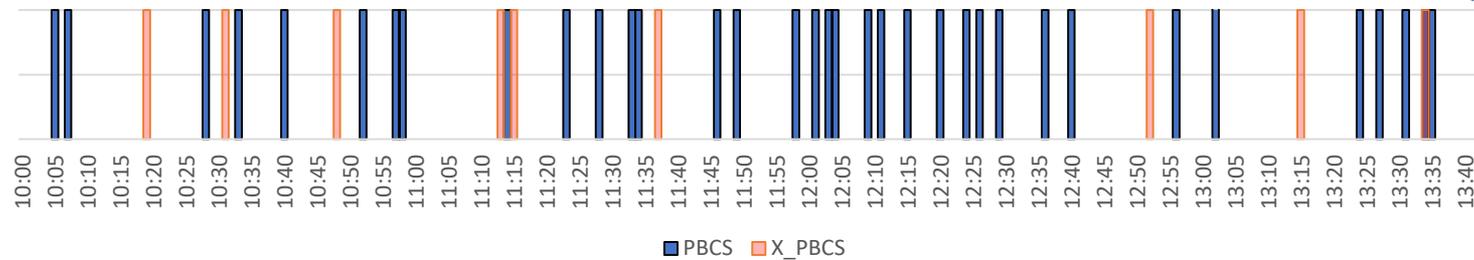
FIR crossing intervals on heaviest traffic day (1) PASRO

PASRO: 2019 April 26

20190426 PASRO FL290-FL410

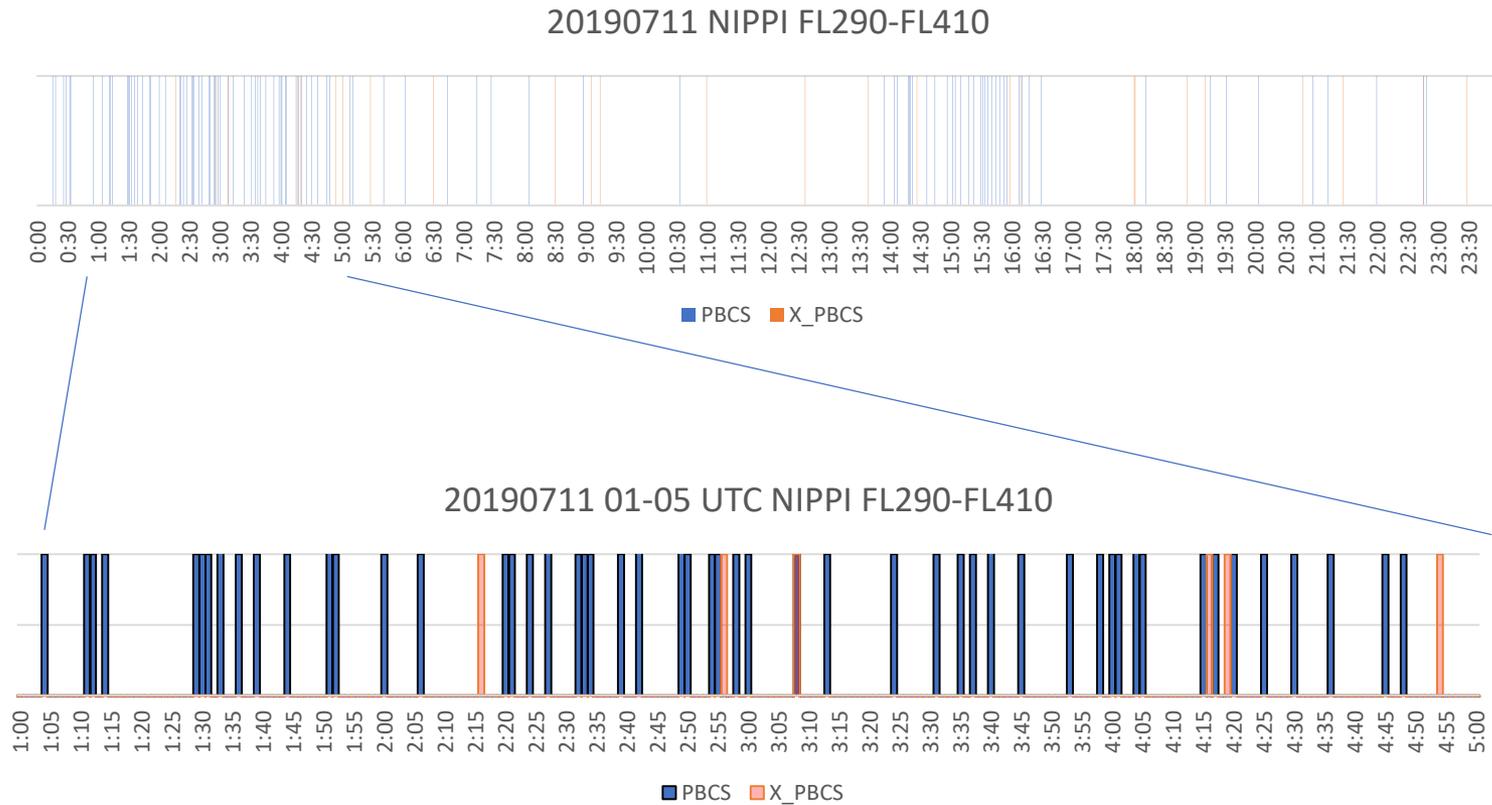


20190426 10-14 UTC PASRO FL290-FL410



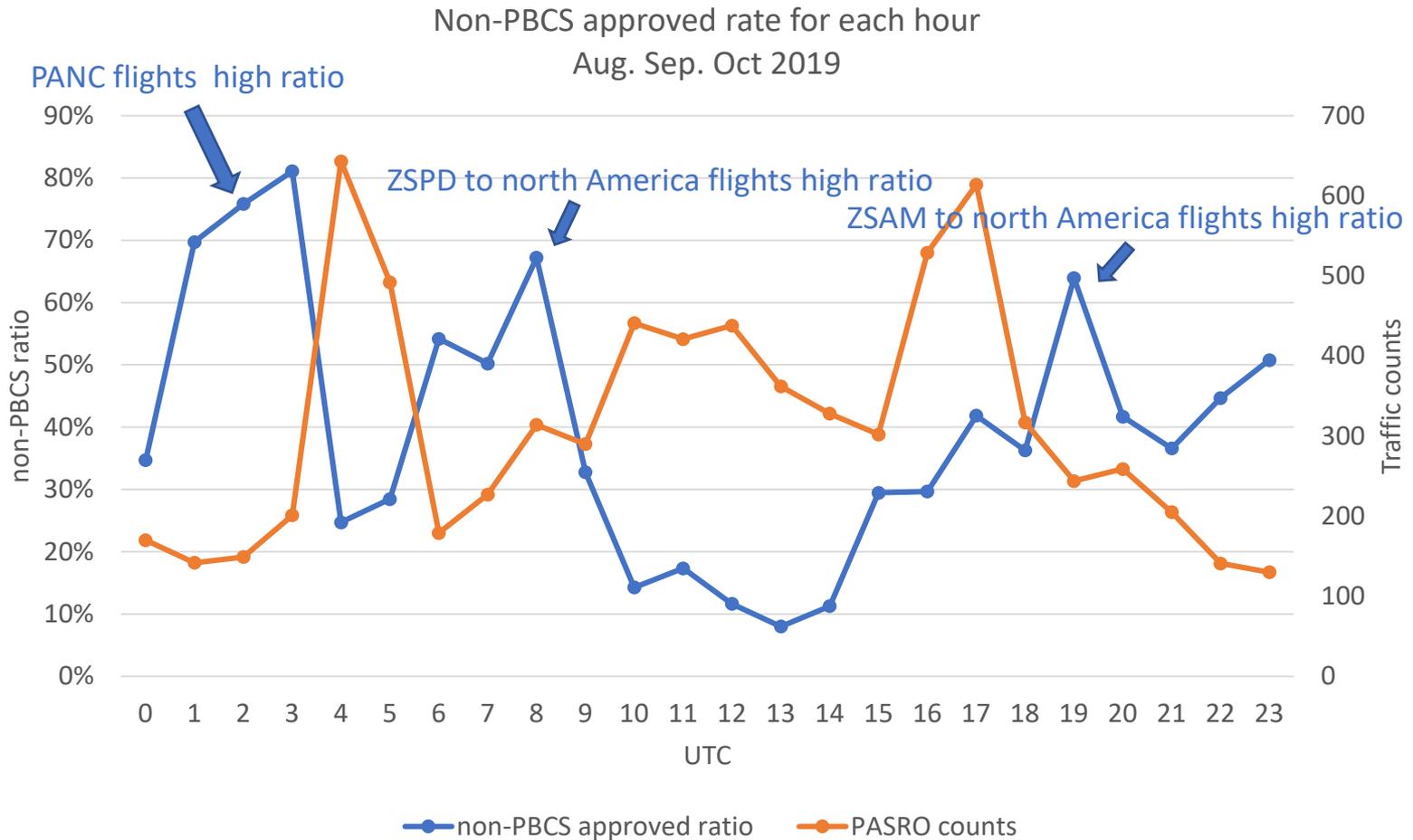
FIR crossing intervals on heaviest traffic day (2) NIPPI

NIPPI: 2019 July 11



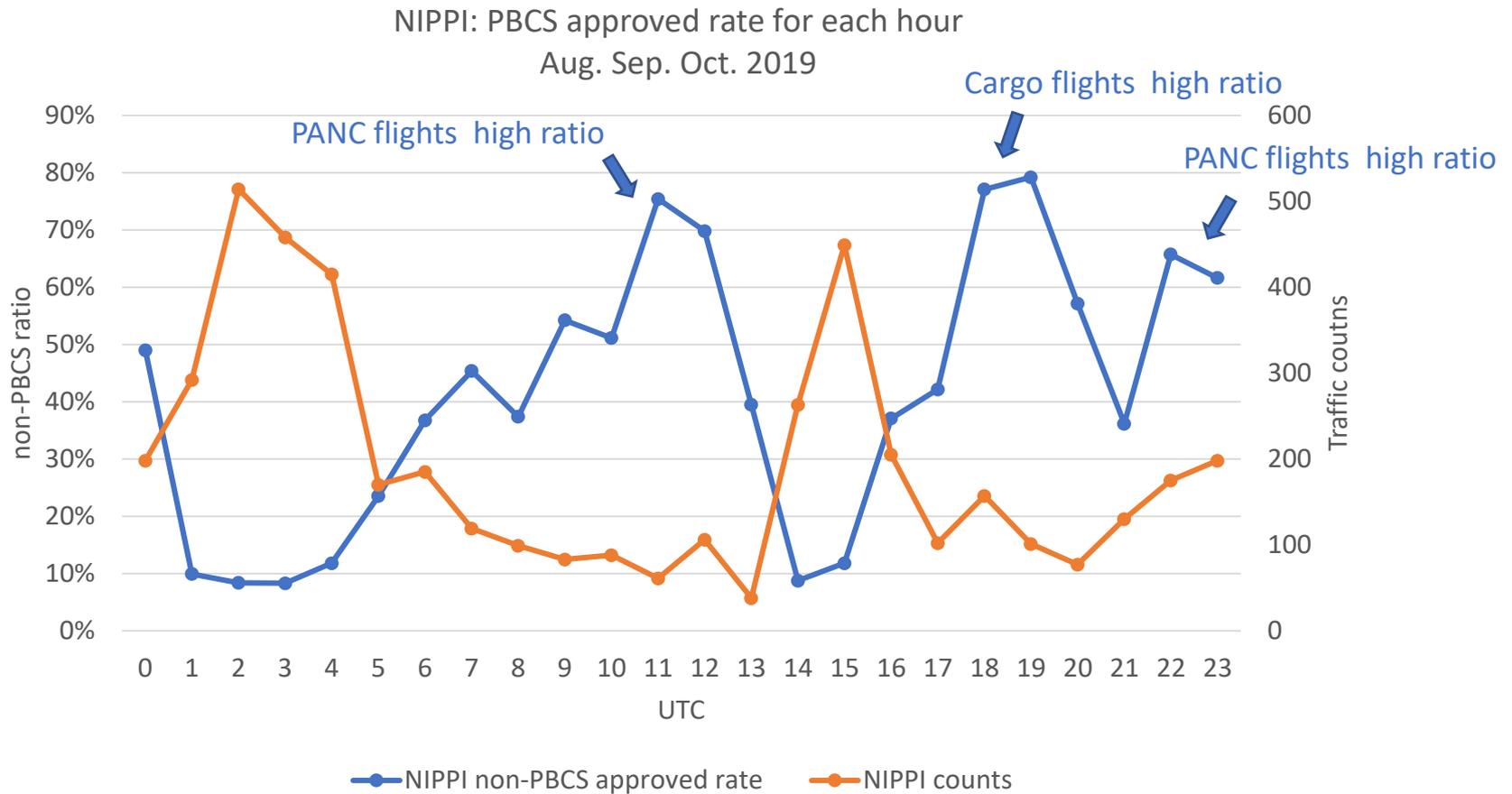
PBCS approved rate for each time period peak or non-peak

PASRO



PBCS approved rate for each time period peak or non-peak

NIPPI



Discussion

- PBCS-approved rate
 - Has increased throughout 2018-2019 to around 70-75% on NOPAC.
 - Expected to increase further, but a small non-PBCS fraction may remain (e.g. cargo aircraft not economical to retrofit).
 - The PBCS-approved rate shows a relatively high value during peak traffic volumes.
- Eastbound
 - Traffic demand on R591 (AKISU) and G344 (CUTEE) (mainly eastbound) is low – these routes seem redundant.
 - Eliminating R591 and G344 will expand UPR airspace.
 - Propose deleting R591 and G344 but leaving their waypoints to allow UPR/PACOTS routes up to 50NM from A590.
- Westbound
 - Peaks through PAZA/RJJJ boundary at 00:00-05:00 UTC (R220 and R580) and 13:00-17:00 UTC (R220 only). Little traffic outside those times.
 - Little non-PBCS traffic at peaks during busiest days analyzed.
 - PBCS-exclusive operation could be made time-limited initially reduce impact on non-PBCS traffic.