

FAA-JetBlue-ACSS Working Group

JetBlue GOMEX ADS-B Test Route Benefits' Assessment Review

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Federal Aviation
Administration



Agenda

- **Roll Call / Introductory Remarks**
- **Review FAA benefits' assessment of the JetBlue usage of ADS-B Only Gulf of Mexico (GOMEX) routing**
- **Action Items and Wrap-up**



Meeting Objectives

- **Review FAA benefits' assessment of the JetBlue usage of ADS-B Only Gulf routing per the Letter of Agreement (LOA) between ZHU, ZMA and JetBlue**
- **Achieve Working Group consensus on the assessment conclusions**
- **Achieve JetBlue agreement as to how to “roll up” their proprietary data in an appropriately sanitized form for review outside of the Working Group**
- **Identify JetBlue expectations/recommendations for continued usage of the ADS-B Only routing**
- **Establish target date for subsequent meeting, as needed with key operational personnel, to be coordinated with key FAA personnel**
 - This follow-up meeting would be to review the agreed-upon benefits' assessment conclusions and to identify next steps, if any, for continued usage of the ADS-B Only routing for weather avoidance and/or clear day wind optimization
 - Key FAA personnel to include those from the Command Center, ZHU, ZMA, Miami approach, NATCA, and the OAPM Work Group
 - Also, this meeting would cover extending this scenario to United within the FAA/Boeing/Rockwell/United Operational Benefits' Validation (OBV) Project

Context: Planned, Authorized, and Funded Only FAA-JetBlue-ACSS MOA Phase 1

Phase 1

- Equip up to 35 JetBlue A320s with DO-260B-compliant ACSS ADS-B Out avionics
- Demonstrate the operational benefits of ADS-B Out in revenue service



Phase 2

- Equip up to 35 A320s with ADS-B In, Interval Management (IM) functionality and Surface Area Movement Management (SAMM) functionality
- Demonstrate the operational benefits in revenue service



Phase 3

- Demonstrate the operational benefits of ACSS Merging and Spacing 1 functionality



Phase 4

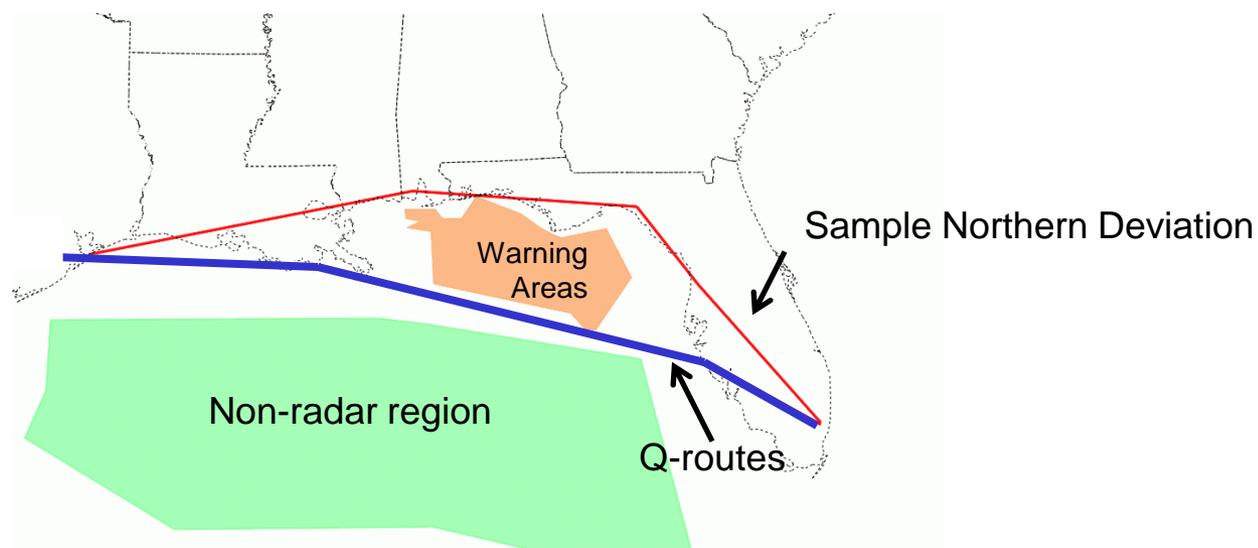
- Demonstrate the operational benefits of ACSS CAVS in IMC arrivals and departures

Context: FAA-JetBlue Phase 1 Benefit Scenarios

- **Use of ADS-B Out to reduce ground delays during Long Range Radar (LRR) outages at Oceana, VA (QVRC) and Fort Fisher, NC (QGVY)**
 - M201 (Threshold)
- **Use of ADS-B Out to reduce ground delays during Severe Weather Avoidance Program (SWAP) events, Airspace Flow Programs (AFPs), and other congestion**
 - Gulf of Mexico (GOMEX) route(s) East-West (Threshold)
 - GOMEX route(s) North-South (Objective)
 - Caribbean route(s) (Objective)
- **Use of ADS-B Out to reduce arrival delays into Caribbean destinations during Long Range Radar (LRR) outages at Grand Turks and Nassau**
 - Caribbean route(s) (Objective)
- **Use of ADS-B Out to fly shorter routes**
 - GOMEX route(s) North-South (Objective)
 - Caribbean route(s) (Objective)
 - Alaska route(s) (Objective)
- **Note that the original Threshold GOMEX E-W scenario changed from reducing ground delays to offering an alternate routing vs the Q routes for “everyday” use and for both Eastbound and Westbound flights - GOMEX Q Route Alternative Scenario**

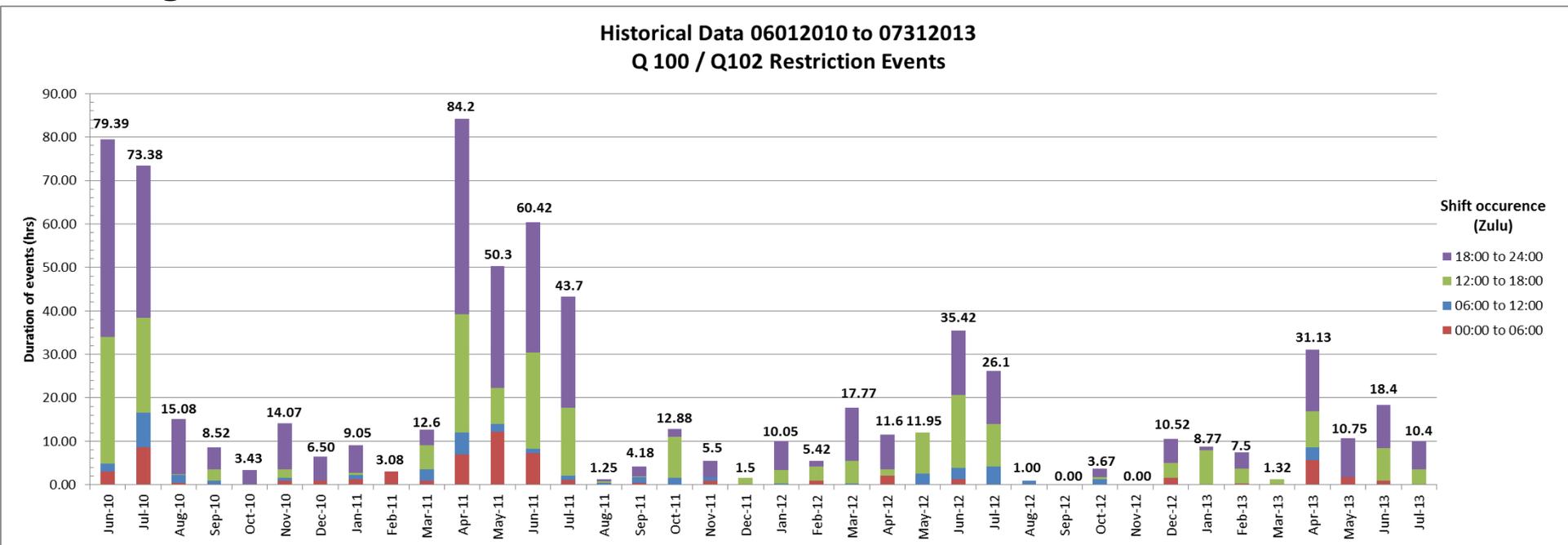
GOMEX Q Route Alternative - Benefit Scenario

- When weather impacts the Q routes, flights often deviate far north around restricted areas due to lack of radar surveillance to the south
- ADS-B surveillance beyond the current radar limit now allows deviations south, for ADS-B Out version equipped aircraft, when convective weather or winds impact routes Q100 and Q102.
- Original scenario focused on using one ADS-B only routing to the south (MÁRCI-MINOW-LEV) as an alternative to a northern deviation when weather impacts the Q routes and only via the ATCSCC Playbook
- Updated scenario as of June 2013 included a set of ADS-B only route segments across the Gulf to assess their utility as “everyday” routing as an alternative to the Q routes – coordinated through a Letter of Agreement (LOA) (see Backup for route details)

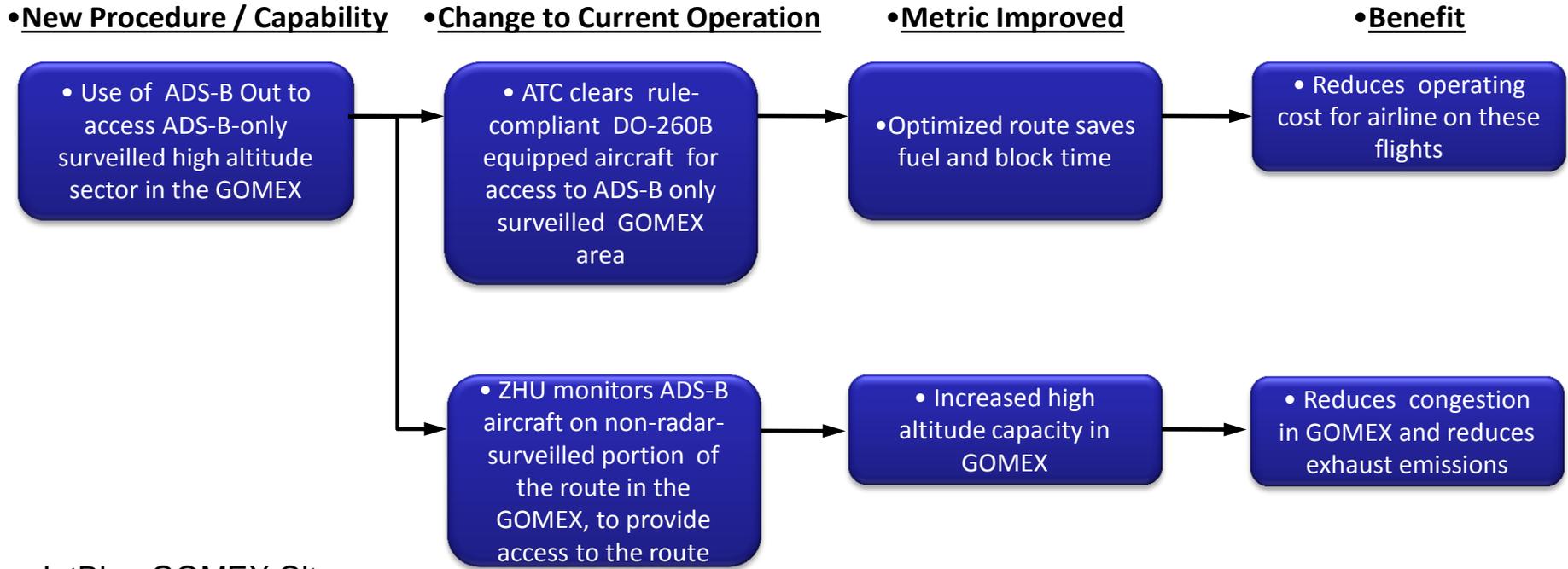


Seasonal Variability to the GOMEX Q Route Alternative Benefit Scenario

- Drives the need for a full year of data collection and analysis to assess the benefit, given convective weather and winds aloft variability
- Note that the test period of mid-August to mid-October 2013 did not cover the times of the year where Q route restrictions are typically most significant



GOMEX Q Route Alternative Scenario – Updated to reflect June 2013 change in plan



JetBlue GOMEX City Pairs E-W & W-E / Varied Dep. Blocks:

Ft Lauderdale - Los Angeles

Ft Lauderdale - San Francisco

Operational Metrics for GOMEX Q Rte Alt. Scenario

Summary of Test Period 08152013-10152013

Validation Metric	Westbound				Eastbound				Totals
	101	701	277	577	100	700	278	578	8-15 to 10-15 2013
	FLL-LAX 1910 EDT	FLL-LAX 1123 EDT	FLL-SFO 1911 EDT	FLL-SFO 1029 EDT	LAX-FLL 2225 PDT	LAX-FLL 1433 PDT	SFO-FLL 2359 PDT	SFO-FLL 1304 PDT	
Number of scheduled JetBlue flights	42	62	43	62	42	62	44	62	419
Number of eligible scheduled JetBlue flights	29	62	30	62	29	49	31	49	341
Number of eligible scheduled JetBlue flights with ADS-B equipped aircraft assigned	24	45	23	51	24	34	19	22	242
Number of eligible scheduled JetBlue flights with non-ADS-B equipped aircraft assigned	5	17	7	11	5	15	12	27	99
Number of ADS-B flights flown out of eligible scheduled flights	13	28	15	33	10	25	7	13	144
Number of non-ADS-B flights flown out of eligible scheduled flights	16	34	15	29	19	24	24	36	197
Number ADS-B flights with successful Wx avoidance vs competitor northern route	1	4	2	9	1	5	1	3	26

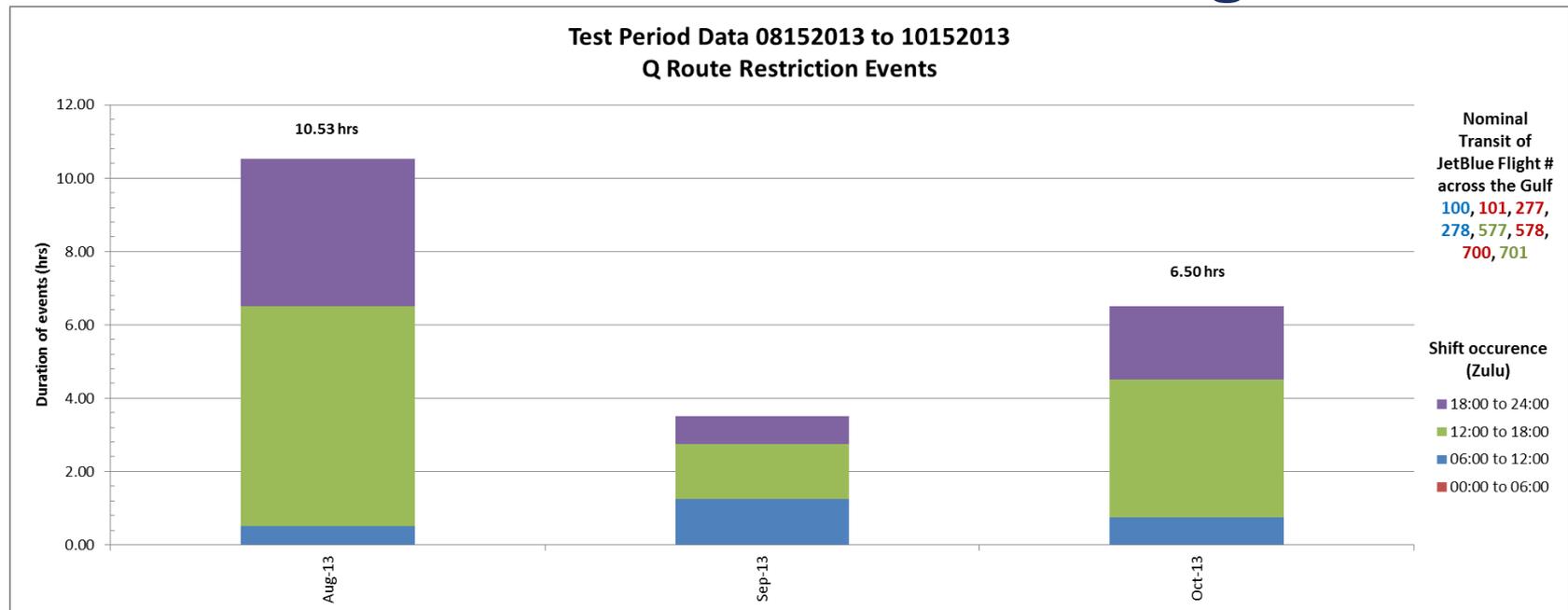
18% $\frac{\text{Number ADS-B flights with successful Wx avoidance vs competitor northern route}}{\text{Number of ADS-B flights flown out of eligible scheduled flights}}$

Number of ADS-B flights flown out of eligible scheduled flights

	FLL-LAX	LAX-FLL	FLL-SFO	SFO-FLL
Air time saved vs competitor (avg, min)	5	11	11	5
Distanced saved vs competitor (avg, nm)	5	109	46	13
JetBlue "Plan vs Plan"	FLL-LAX	LAX-FLL	FLL-SFO	SFO-FLL
Range of fuel savings opportunity lost (lbs)	600-1300	0-400	100-900	0
Range of fuel savings obtained (lbs)	400-1300	0-100	0-1000	0



Q Route Restriction Correlation During Test Period



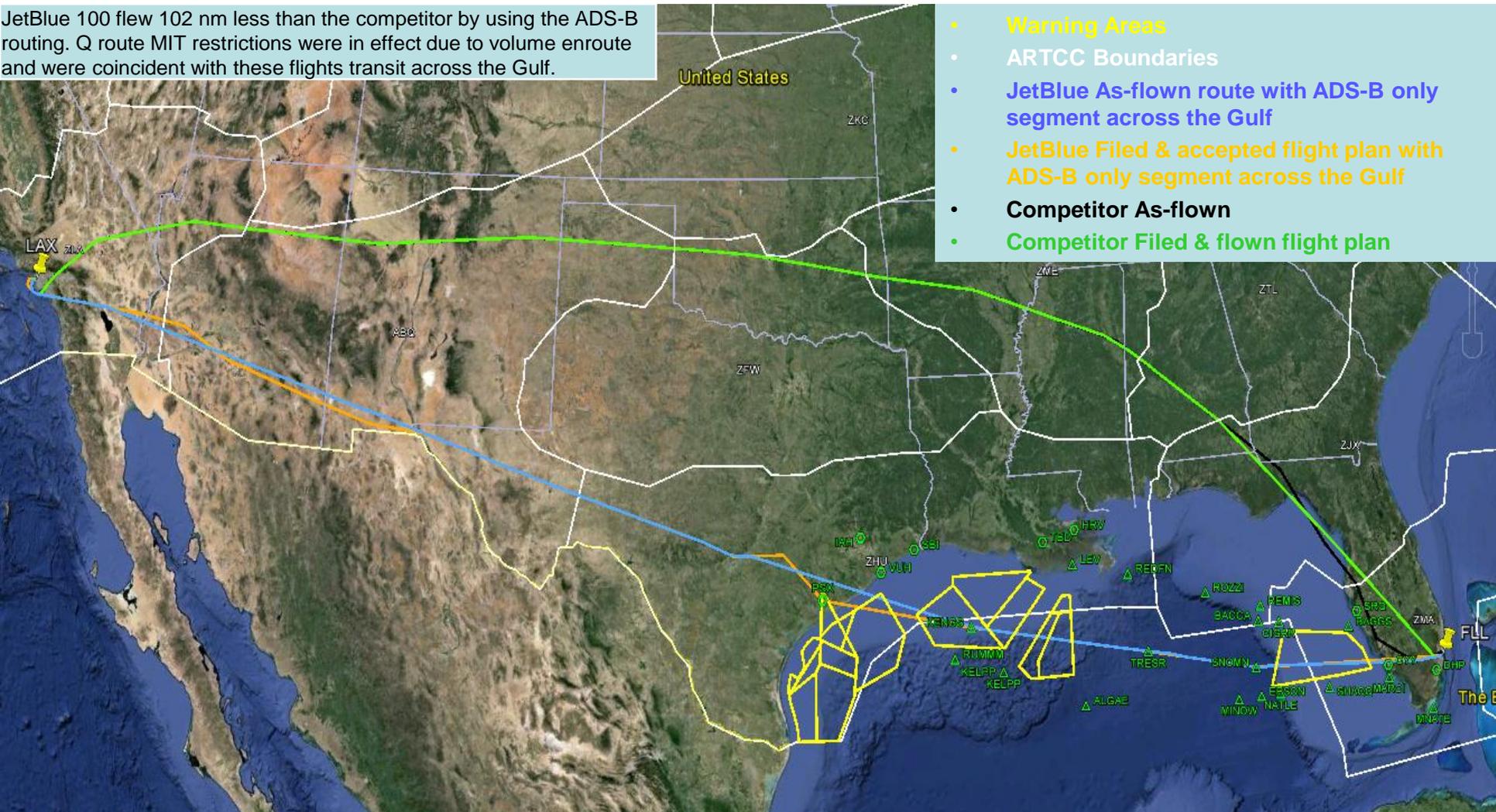
- **Subset of successful ADS-B flights versus competitors correlated with Q Route Restrictions**
- **Flights with transit across the Gulf during the Q Route Restriction times**
 - 8/26/2013: JetBlue 577 and 701 on ADS-B routing vs Competitor flights on a northern deviation, with JetBlue 577 saving 46 nm over Competitor flight, and JetBlue 701 roughly equivalent to Competitor flight due to thunder storms along Texas coast
 - 9/6/2013: JetBlue 101 and Competitor flight both required to file and fly MNATE – since JetBlue could continue on the ADS-B routing there was a savings of 11 min of air time over Competitor
 - 9/20/2013: JetBlue 278 flew non-ADS-B routing on significant northern deviation due to ADS-B aircraft not being available; JetBlue 700 flew the ADS-B routing while Competitor flew a significant northern deviation, resulting in JetBlue saving 116 nm and 14 min of air time
 - 10/13/2013: JetBlue 100 flew the ADS-B routing while Competitor flew a significant northern deviation, resulting in JetBlue saving 102 nm

Examples of Effective Southern Deviation



Example: JetBlue Flight 100 compared to Competitor, LAX-FLL, 10:25 PM PDT Dep 10/13/2013

JetBlue 100 flew 102 nm less than the competitor by using the ADS-B routing. Q route MIT restrictions were in effect due to volume enroute and were coincident with these flights transit across the Gulf.

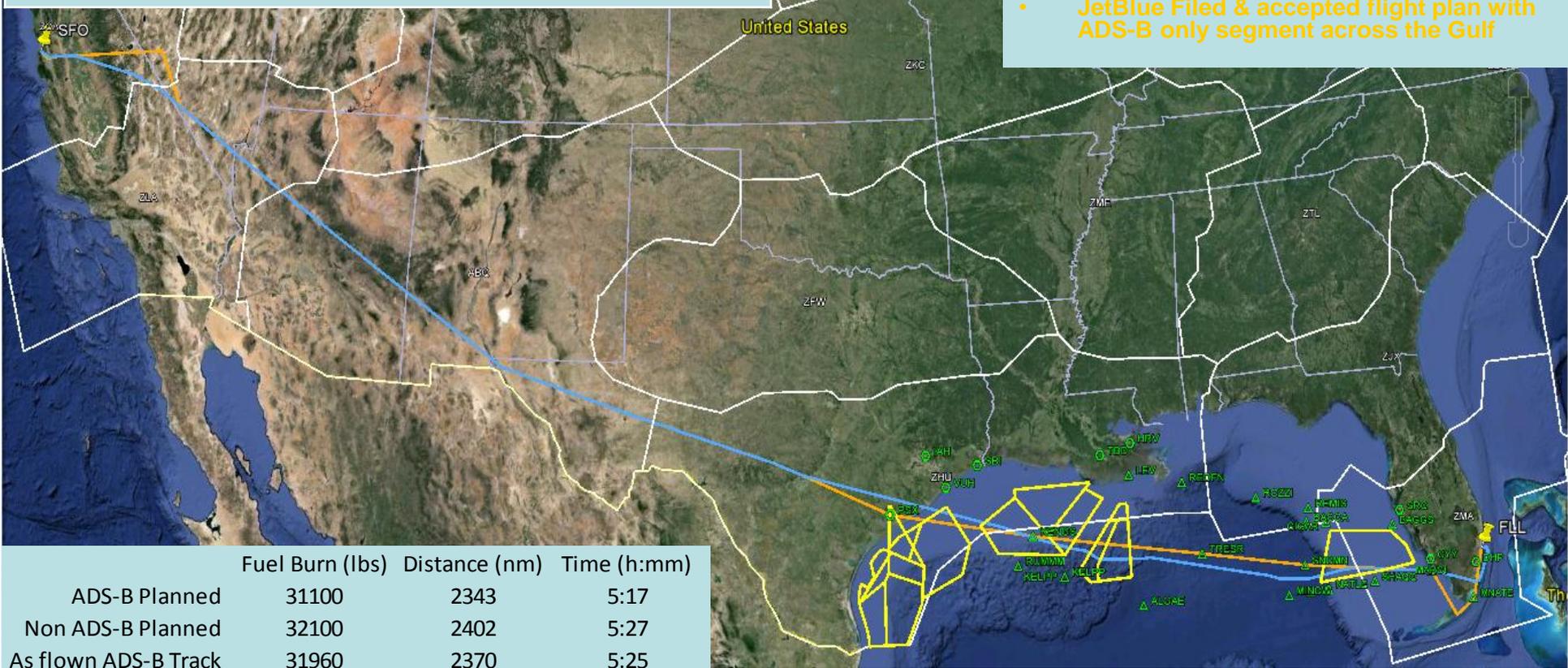


JetBlue Flight 577, FLL-SFO

Sched. Dep. 1029 EDT 8/23/2013

JetBlue calculated ADS-B flight plan (without MNATE fix) saved fuel (1000 lbs) and block time (10 min) and was a shorter distance by 59 nm versus JetBlue's calculated non-ADS-B flight plan for the day's conditions. Significant thunderstorms were present across the northeastern Gulf from FL to LA.

- **Warning Areas**
- ARTCC Boundaries
- **JetBlue As-flown route with ADS-B only segment across the Gulf**
- **JetBlue Filed & accepted flight plan with ADS-B only segment across the Gulf**

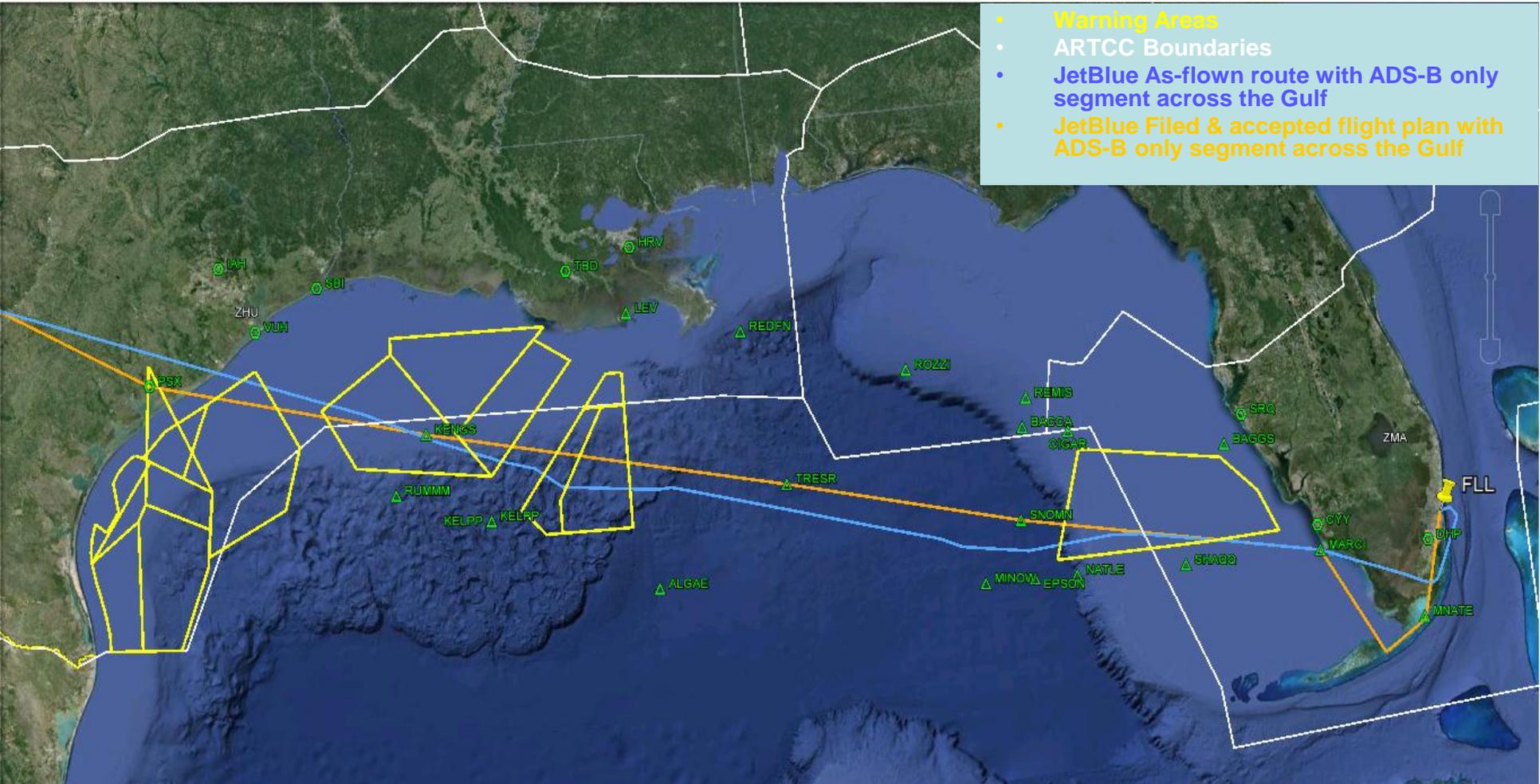


JetBlue ADS-B Filed Flight Plan: MNATE MTH MARCI SNOMN TRESR KENGs PSX SAT J138 SHUCK J138 FST J86 FIGMO J86 ELP BLD J92 OAL MOD4

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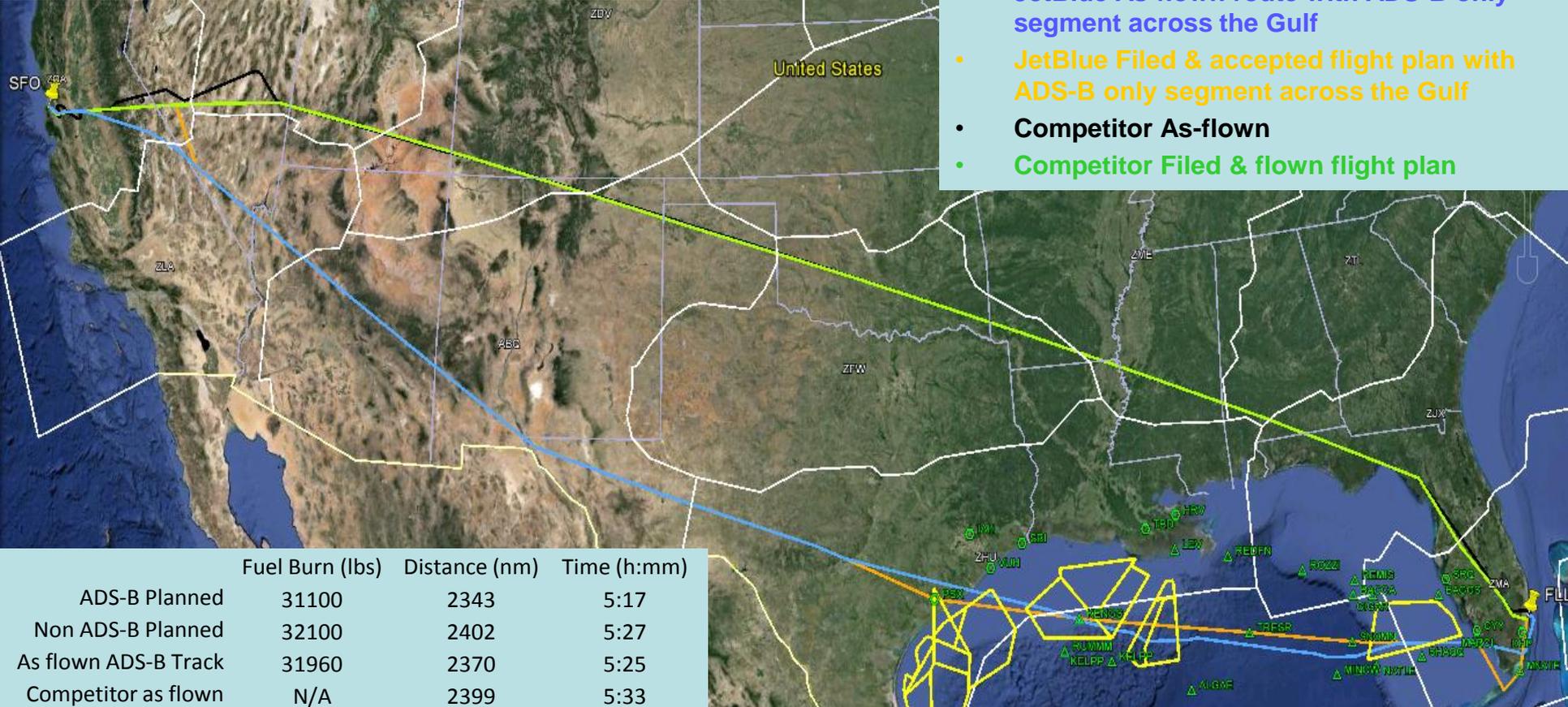


JetBlue ADS-B Filed Flight Plan: MNATE MTH **MARCI SNOMN TRESR KENG PSX** SAT J138 SHUCK J138 FST J86 FIGMO J86 ELP BLD J92 OAL MOD4

JetBlue Flight 577 compared to Competitor, FLL-SFO, Morning Dep 8/23/2013

JetBlue ADS-B flight, even with MNATE fix, saved 9 min en route time and was a shorter distance (46 nm) versus Competitor's flight deviating around the weather in the Gulf. No Q route restrictions were issued, but ATCSCC included ZJX in an en route thunderstorm advisory for the time of flight.

- **Warning Areas**
- **ARTCC Boundaries**
- **JetBlue As-flown route with ADS-B only segment across the Gulf**
- **JetBlue Filed & accepted flight plan with ADS-B only segment across the Gulf**
- **Competitor As-flown**
- **Competitor Filed & flown flight plan**



Example of Potential Clear Day Alternative Route Advantage

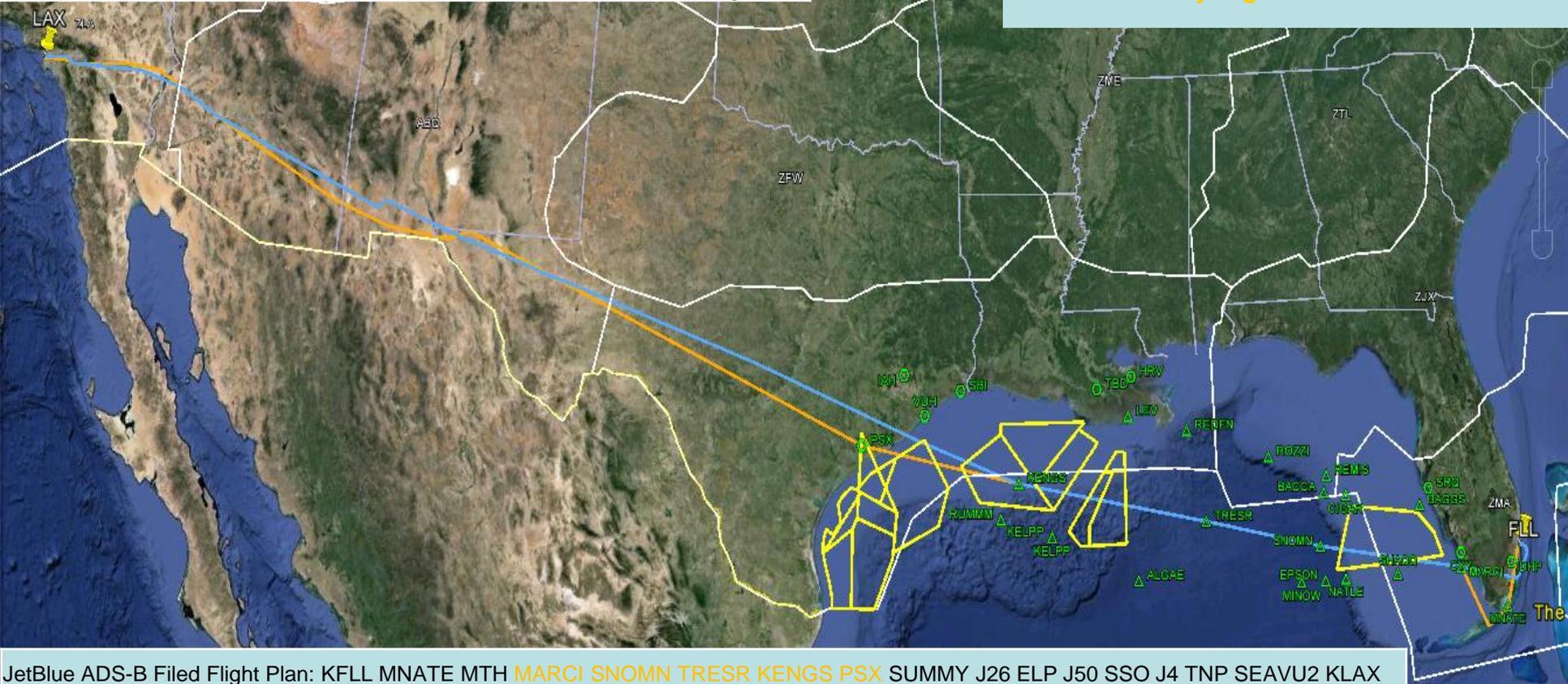


JetBlue Flight 101, FLL-LAX

Sched. Dep. 1900 EDT 9/27/2013

JetBlue ADS-B calculated ADS-B flight plan was without MNATE fix for this case, showing a potential fuel savings (400 lbs), shorter block time (5 min) while 16 nm longer versus JetBlue's calculated non-ADS-B flight plan for the same conditions of that day. Conditions were clear with no Q route restrictions or ATCSCC advisories affecting the route. Advantage would have been due to being able to avoid winds aloft over the Q routes. The need to file MNATE eliminated the fuel advantage.

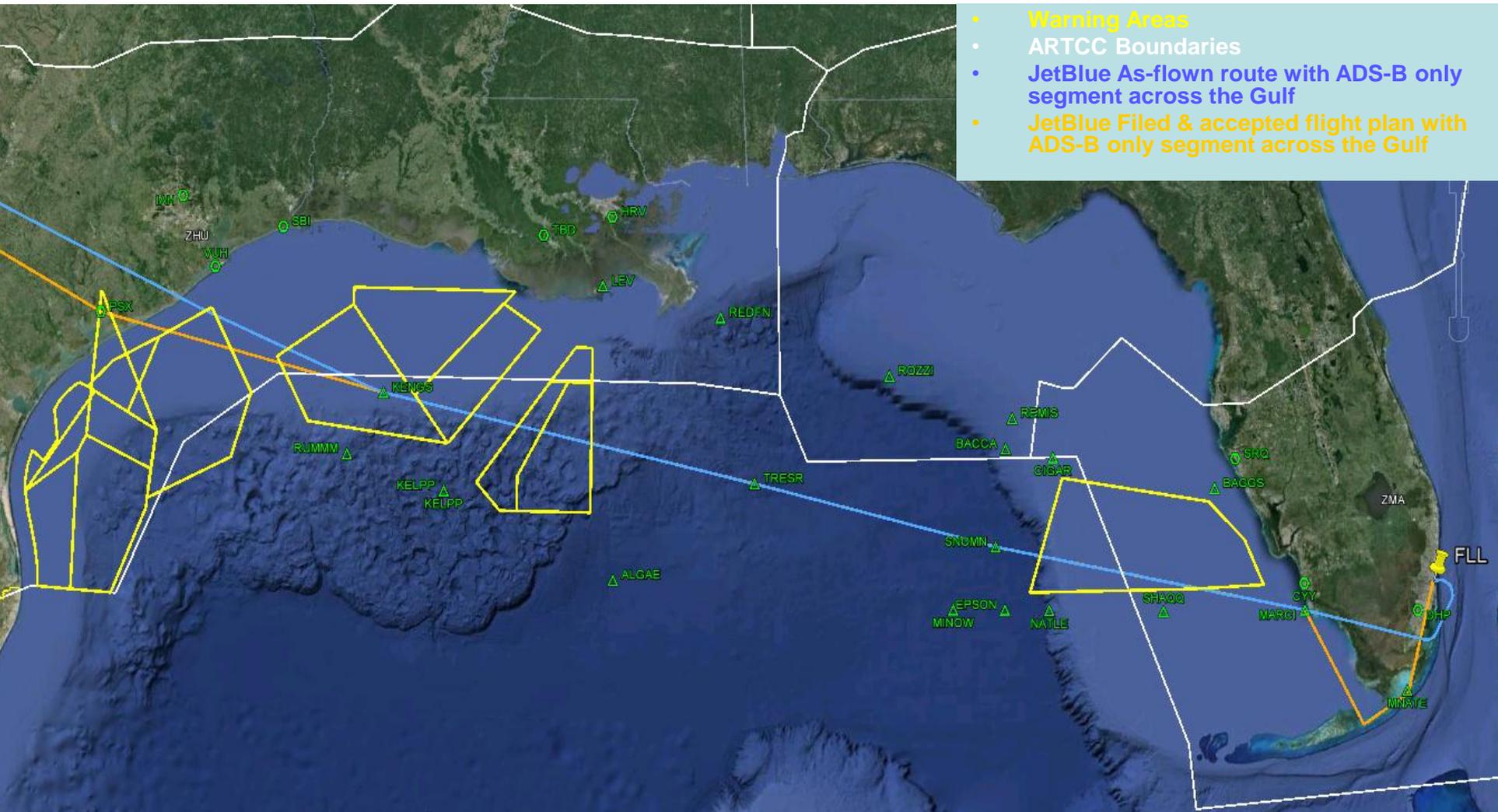
- **Warning Areas**
- **ARTCC Boundaries**
- **JetBlue As-flown route with ADS-B only segment across the Gulf**
- **JetBlue Filed & accepted flight plan with ADS-B only segment across the Gulf**



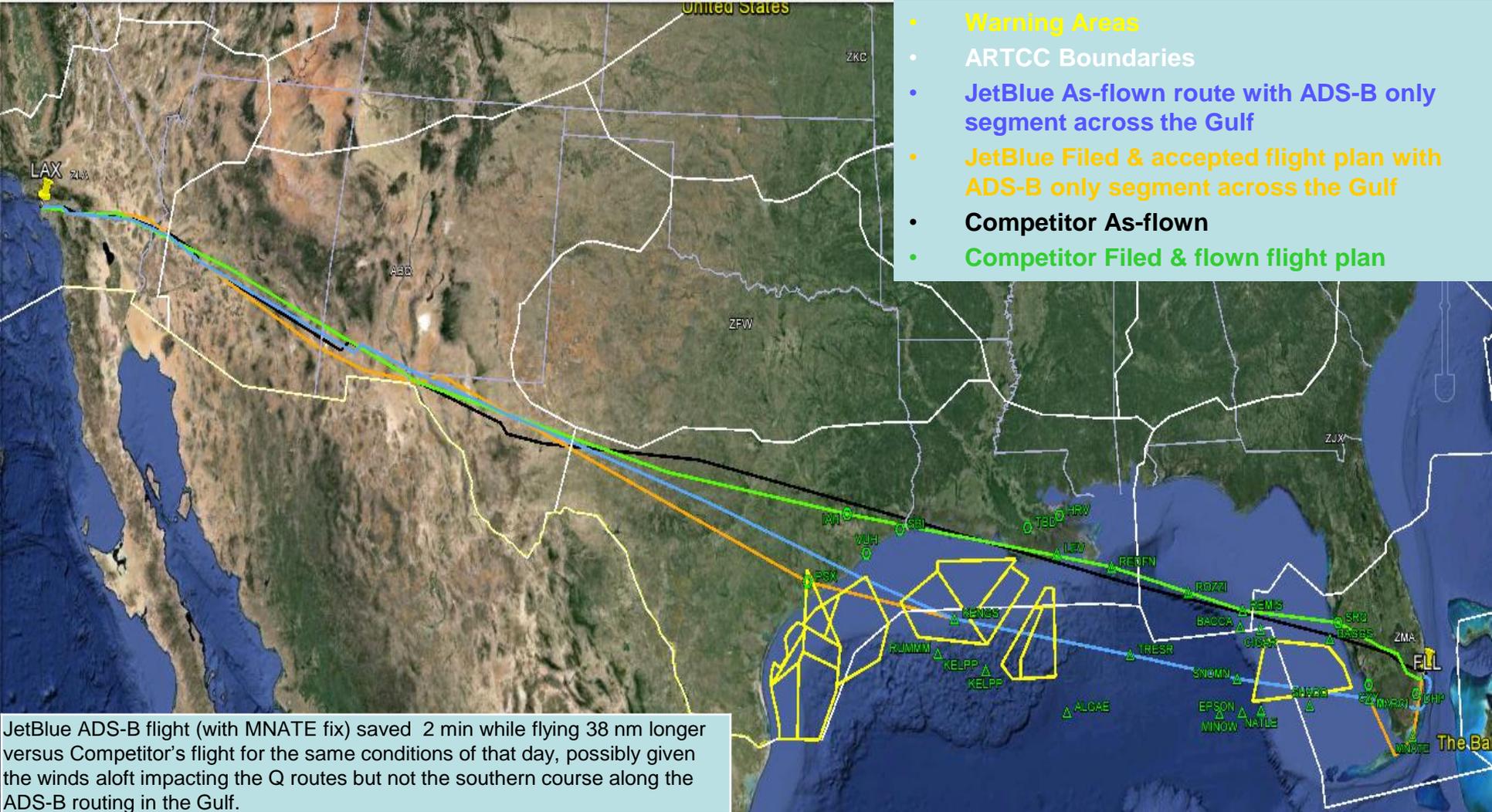
JetBlue ADS-B Filed Flight Plan: KFLF MNATE MTH MARCI SNOMN TRESR KENG PSX SUMMY J26 ELP J50 SSO J4 TNP SEAVU2 KLAX

JetBlue Flight 101, FLL-LAX

Sched. Dep. 1900 EDT 9/27/2013



JetBlue Flight 101 compared to Competitor 337, FLL-LAX, Evening Dep 9/27/2013



Post Test Period Operations

- **ADS-B Only Flights since 15 Oct 2013, through 26 Jan 2014**
 - JetBlue Flight 278 – 30 Oct 2013, SFO-FLL
 - Saved 51 nm over Competitor 346
 - JetBlue Flight 701 – 16 Nov 2013, FLL-LAX, via MNATE
 - Better winds overcome MNATE disadvantage
 - JetBlue Flight 101 – 6 Dec 2013, FLL-LAX, via MNATE
 - Better winds overcome MNATE disadvantage
 - JetBlue Flight 101 – 7 Dec 2013, FLL-LAX, via THNDR
 - No Competitor Flight 337 on 7 Dec 2013 for comparison
 - JetBlue Flight 577 – 16 Jan 2014, FLL-SFO, via MNATE
 - Better winds overcome MNATE disadvantage
 - 2 min advantage over Competitor 345
- **Potential ADS-B only GOMEX opportunities not taken, 16 Oct 2013 through 26 Jan 2014, strictly based on assessing flight track deviating to the north without knowledge of day's wind optimization or of ADS-B Out aircraft availability:**
 - JetBlue Flight 100: 1
 - JetBlue Flight 101: 12
 - JetBlue Flight 277: 15
 - JetBlue Flight 278: 9
 - JetBlue Flight 577: 20
 - JetBlue Flight 578: 9
 - JetBlue Flight 700: 2
 - JetBlue Flight 701: 14

Assessment Conclusions

- **Use of the GOMEX ADS-B only alternative to the Q routes has provided benefit to JetBlue for weather avoidance & in select clear day cases due to winds**
 - 18% of the ADS-B flights conducted demonstrated weather/wind avoidance on the southern route versus competitors on the longer northern route
 - Demonstrated advantage over northern weather avoidance when en route storms do not preclude their usage and when winds on the southern avoidance route are more favorable than the northern route
 - Westbound flights may not realize this benefit if MNATE continues to be required
 - Indicates clear day advantage if winds are more favorable on the ADS-B route
 - Westbound flights not likely to realize this benefit if MNATE continues to be required
 - JetBlue achieved their goal of developing and implementing effective business practices to conduct regular ADS-B Out operations
 - Route segment utilization sufficient to assess all offered segments in the LOA
 - 76% of all segments used SNOMN-TRESR-KENGs
- **Beyond providing continued benefit to JetBlue, further usage is warranted to fully assess the benefits of the routing across all seasons**
 - Test Period of mid-August to mid-October fell in a rather “benign” period for Q route restrictions and wind profiles
 - Given the “plan vs plan” issues and missing data, fuel savings could not be fully assessed

Recommendations and Next Steps (II)

- **Establish target date for subsequent meeting with key FAA operational personnel and JetBlue, as well as United**

Additionally:

- **For JetBlue:**

- Are the GOMEX ADS-B route options currently included in the JetBlue Route Guide (i.e. flight plan optimizer)?
 - If so, would this enable a more straightforward system for managing route selection and benefits' data collection?
 - Is there an optimal wind profile for baseline comparison?
- Are there suggestions from JetBlue to carry forward into the next round of discussions with the FAA operational community?

- **For the FAA operational community:**

- Determine if there are any procedural recommendations as this routing continues to be requested, on a SWAP and/or and/or clear day wind avoidance basis?
- Determine if there is a way to eliminate/reduce MNATE requirement for westbound departures out of FLL? (Possibly when FLL runway construction is completed in fall 2014)

BACKUP



General Procedural Points from the LOA

- **JetBlue will only file for the GOMEX ADS-B routes when there are DO-260B equipped aircraft on that flight.**
- **JetBlue will contact Supervisory Traffic Management Coordinators (STMCs) at both ZMA and ZHU to obtain status on all GOMEX Warning Areas and for approval to file an ADS-B only route in the GOMEX.**
- **If requested route is not available, ZHU STMC and/or ZMA STMC will provide JetBlue with alternate routes, altitudes, and/or times when possible.**
- **JetBlue recognizes that all GOMEX Warning Areas are time dependent and can result in last minute route amendments or cancellation of the coordinated ADS-B Only GOMEX Route. JetBlue also recognizes that requested altitudes on the requested ADS-B Only GOMEX Route may not be available due to other IFR traffic, sector complexity or other requests in the system.**
- **In the event that the aircraft's ADS-B Out equipment fails in flight, the JetBlue pilot must inform ATC immediately and expect a revised routing.**
- **For all flights using one of the GOMEX ADS-B Only coordinated routes, the JetBlue dispatcher must file "ADS-B Test Route" in the remarks (Field 18) of the flight plan.**
- **The JetBlue Air Traffic Desk will complete the JetBlue GOMEX ADS-B Route Coordination sheet as agreed within the LOA.**

Route Segments through ZMA and ZHU Warning Areas

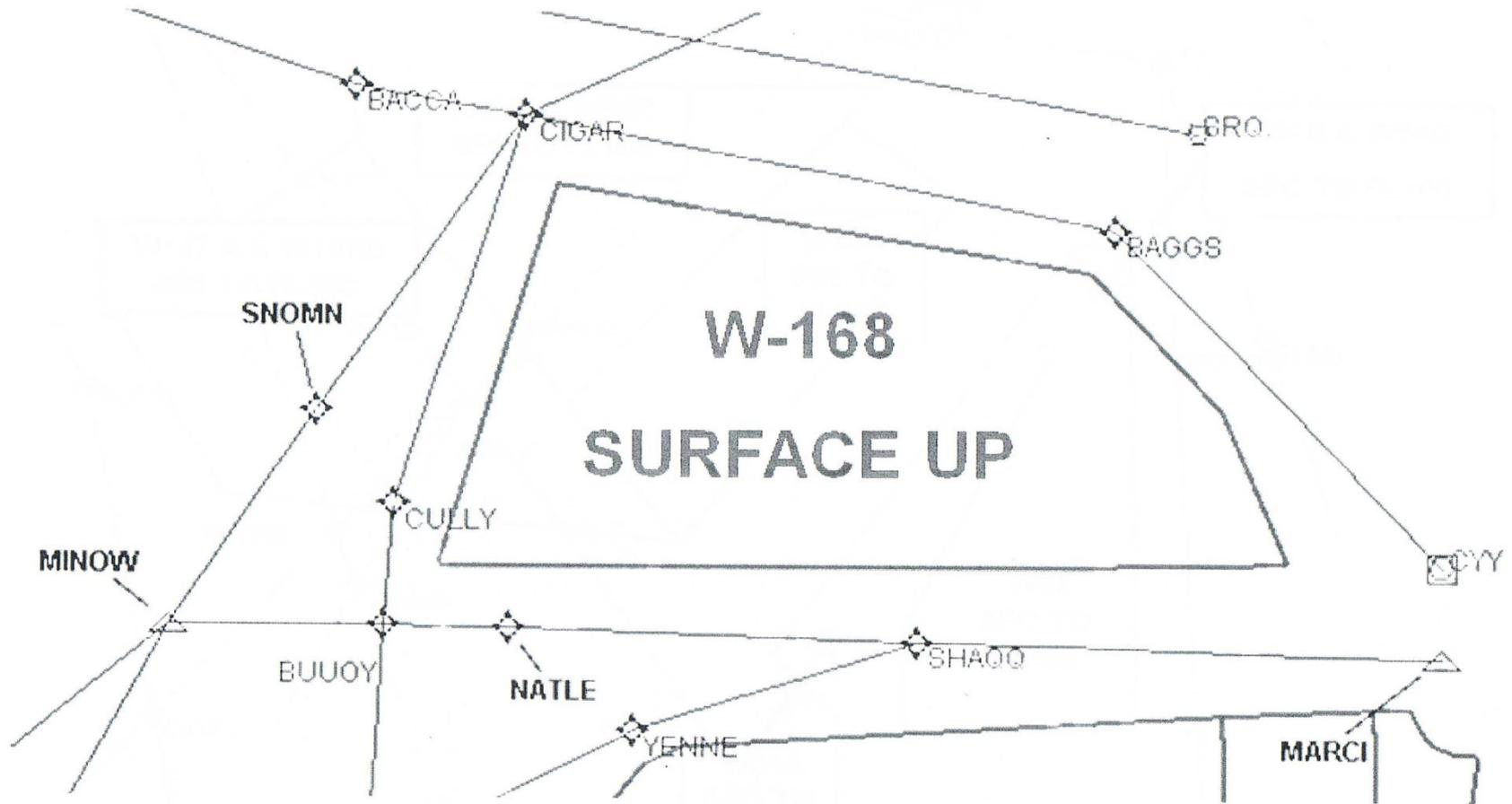
- **ZMA Warning Area involved is W-168, from the Surface Up.**
- **ZMA segments are:**
 - MARCI-MINOW-ALGAE
 - MARCI-NATLE-TRESR
 - MARCI-SNOMN-TRESR
- **ZHU Warning Areas are: W59 A, W59B & W59C, FL 050-500; W147A & W147B, FL 050-500; W54A, W54B & W54C, Surface to FL 400; and W92 Surface to FL 400.**
- **ZHU segments are:**
 - SNOMN/NATLE-TRESR-HRV-LEV
 - SNOMN/NATLE-TRESR-KENGS
 - MINOW-ALGAE-KELPP-PSX
 - MINOW-ALGAE-KELPP-VUH



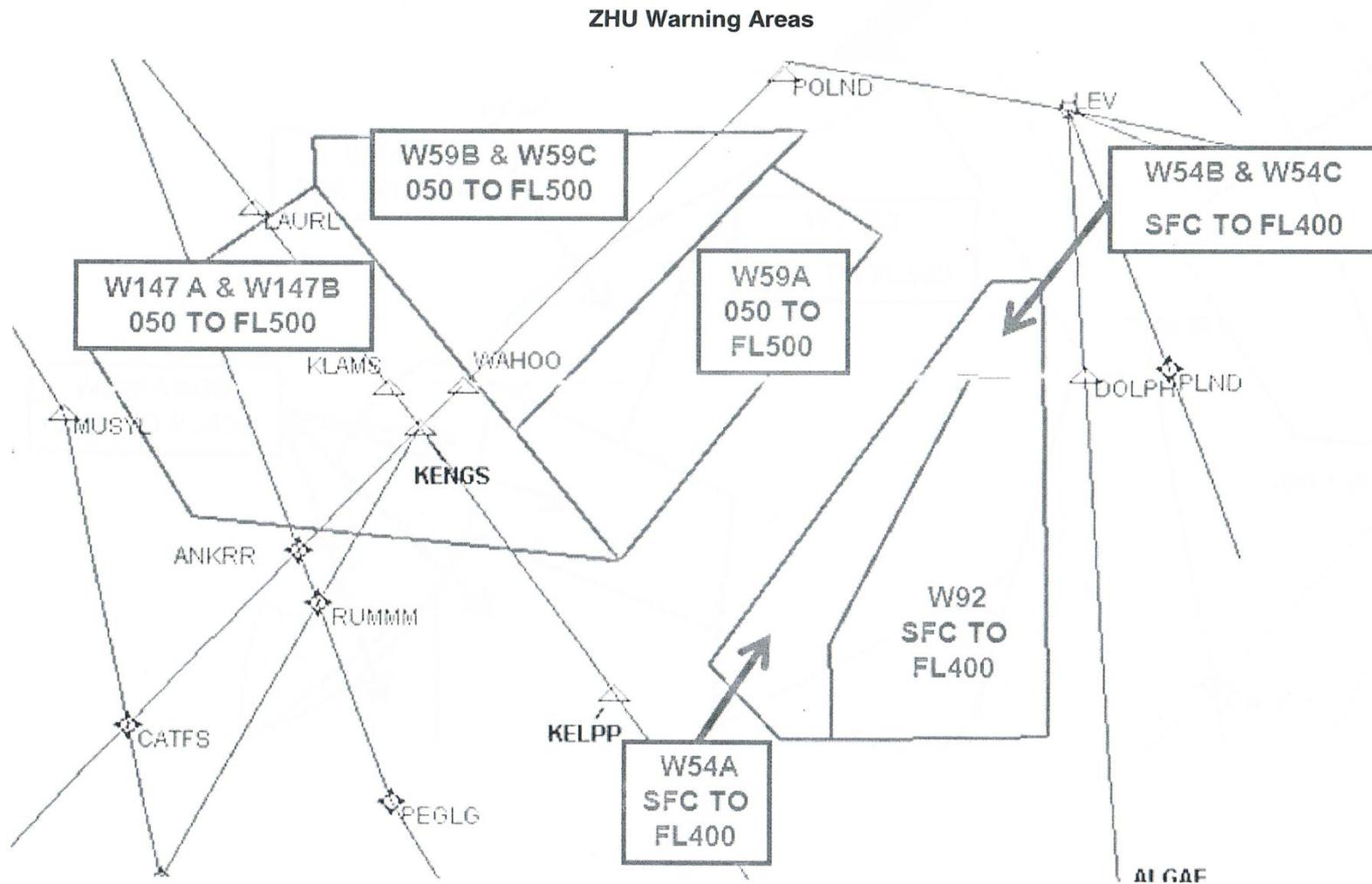
ZMA Warning Area

ANNEX 1

ZMA Warning Area

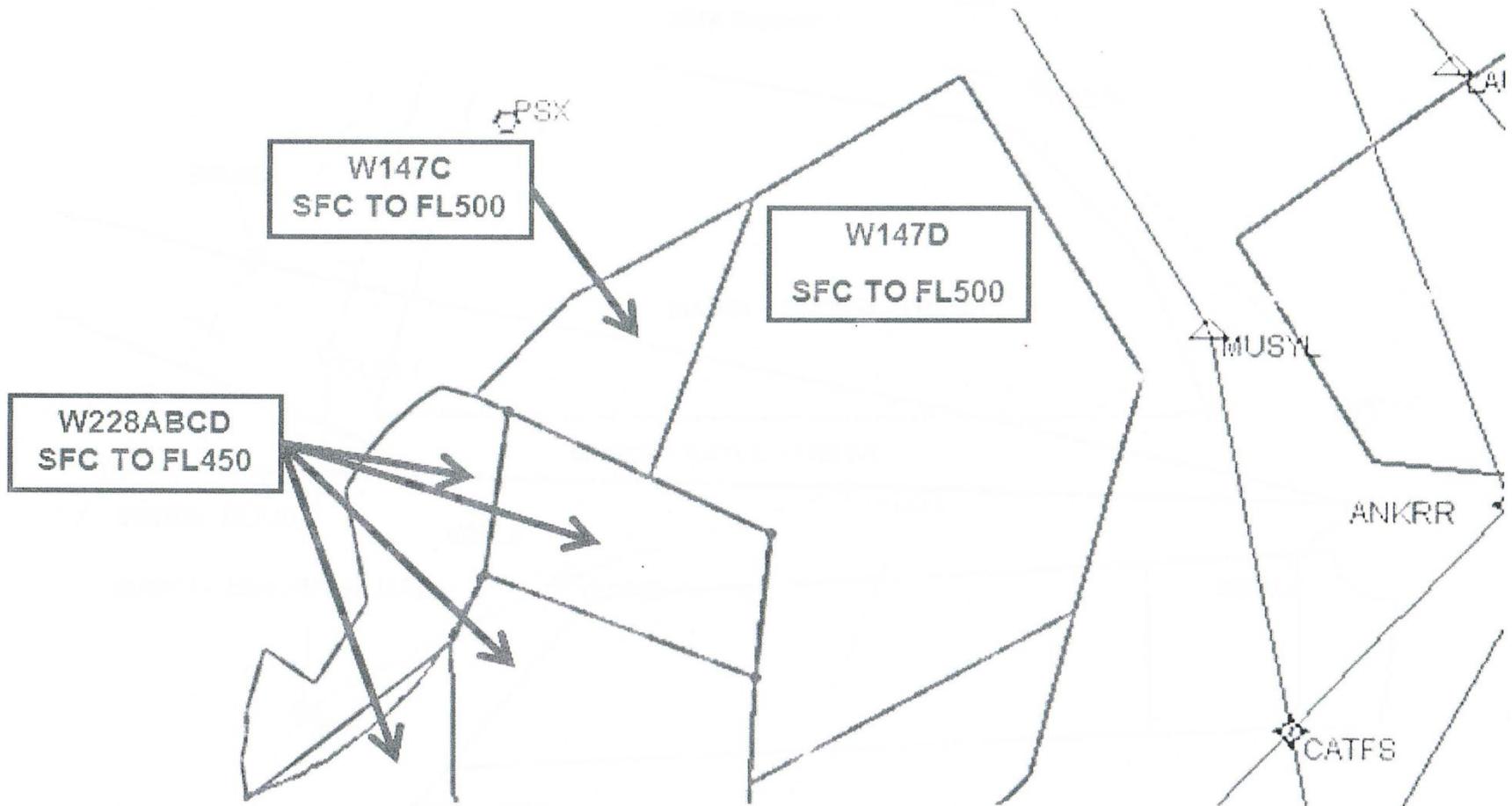


ZHU Warning Areas

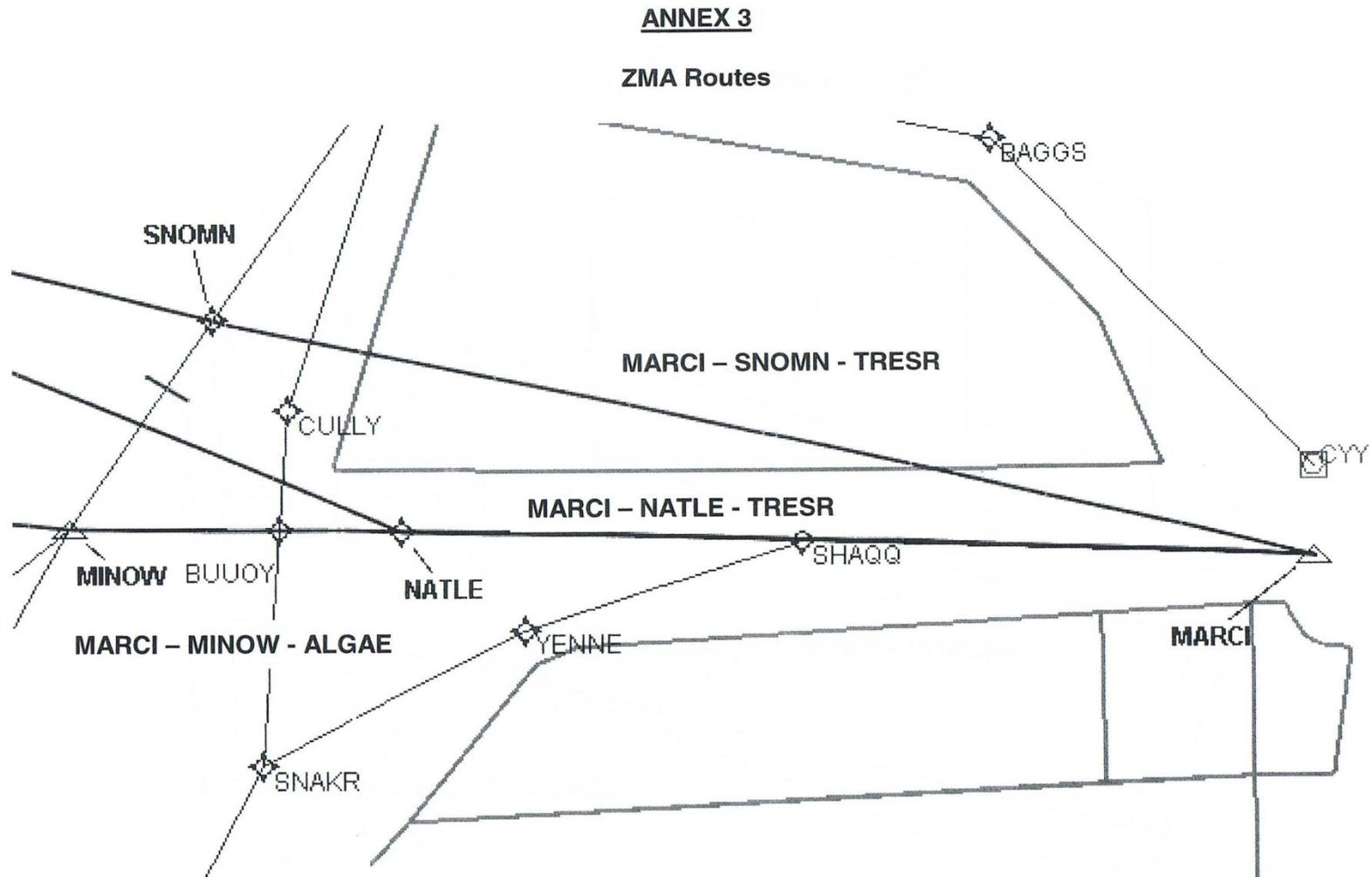


ZHU Warning Areas, cont'd

ANNEX 2, cont.



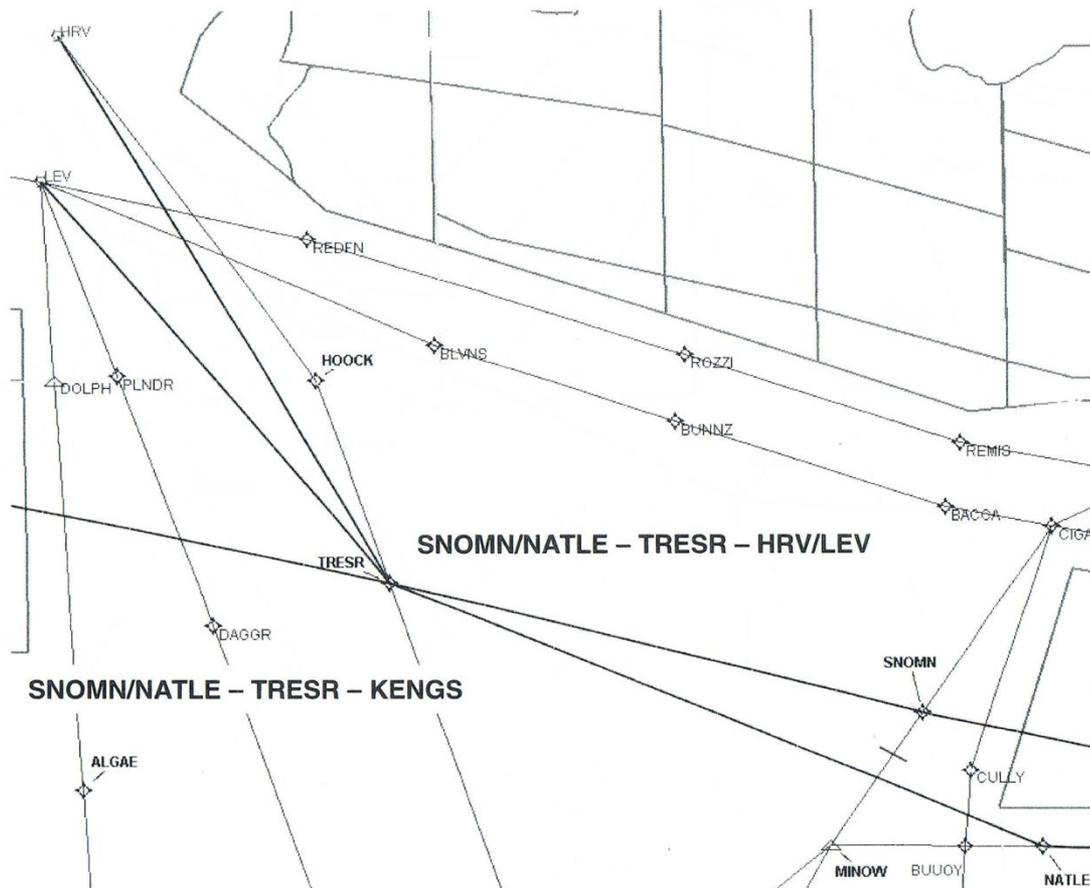
Route Segments through ZMA airspace



Route Segments through ZHU airspace

ANNEX 4

ZHU TRESR Routes



Route Segments through ZHU airspace, cont'd

ANNEX 5

ZHU MINOW - ALGAE Route

