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Space Operations in the NAS: Analysis of Impacts to the Aviation Industry

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Background

This research effort examines impacts to aviation stakeholders of the National Airspace System (NAS) due to spacecraft launch activities. The focus of this research is to determine whether general aviation (GA) and airports are impacted by Temporary Flight Restrictions (TFRs) due to spacecraft launches out of Cape Canaveral. The focus airports for this research are Melbourne International Airport (MLB), and Space Coast Regional Airport (TIX).

Research Questions

1. Is General Aviation activity impacted by space launches at Cape Canaveral?
2. What are the negative impacts and positive impacts?
3. What are the impacts of manned vs unmanned spacecraft launches?
4. Do Temporary Flight Restrictions (TFRs) imposed by the Federal Aviation Administration (FAA) affect GA activities at surrounding airports?

Methodology

Using data from the FAA Air Traffic Activity System (ATADS), I analyzed itinerant and local airport operation activity for possible GA impacts. The historical space launches used for the analysis are NASA's SpaceX Crew-1, Ionospheric Connection Explorer (ICON), Solar Orbiter, NASA's SpaceX Demo-2, and Mars 2020. GA air-traffic and airport operation data on each spacecraft launch date was collected from the ATADS database and compared to historical dates at the same point in time using previous years. Every launch date for each space mission has 2 - 3 years of historical data collected, which is used to compare whether there was an increase or decrease in GA activity. Interviews were also conducted with the Operations Manager from MLB airport and the Fire Chief of Titusville-Cocoa Airport Authority, to investigate whether they noticed any impact on general aviation from spacecraft launch activities.

Figure 1 shows the average change in GA activity for Manned Vs Unmanned launches

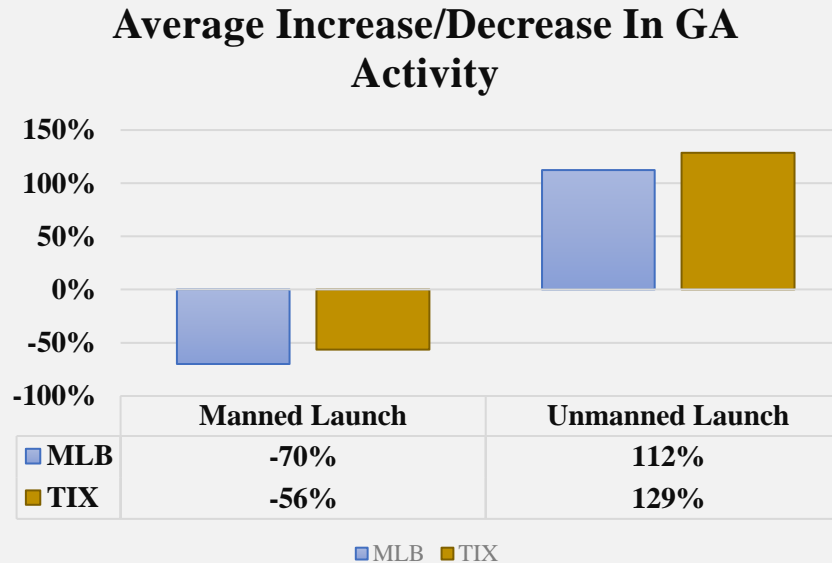


Figure 2 shows the average change in GA activity using 2 - 3 years of historical data as a base

Spacecraft Launch	Airport	% Change in GA Activity	Manned or Unmanned
Ionospheric Connection Explorer (ICON)	MLB	80%	Unmanned
	TIX	27%	
Solar Orbiter	MLB	252%	Unmanned
	TIX	285%	
NASA SpaceX Demo-2	MLB	-69%	Manned
	TIX	-67%	
Mars 2020	MLB	5%	Unmanned
	TIX	74%	
NASA's SpaceX Crew-1	MLB	-71%	Manned
	TIX	-46%	

Findings

- Unmanned space launches out of Cape Canaveral had a positive impact on GA operations at surrounding airports MLB and TIX.
- Manned space launches out of Cape Canaveral had a negative impact on GA operations at surrounding airports.
- Based upon historical Notices to Airmen (NOTAMS) that the FAA placed on the manned launch days, the FAA placed a TFR order which restricted flight activity within a radius of 40 NM from the launch site. Both MLB and TIX are within 40 NM from the launch site.
- TFRs placed on unmanned launch days extend east over the ocean, not west, following the path of the spacecraft vehicle. MLB and TIX were not directly impacted by the restriction.
- The Operations Manager at MLB and the Fire Chief at Titusville-Cocoa Airport Authority did not notice a decrease in general aviation activity during spacecraft launch events.

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