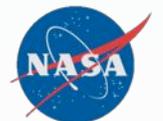




# Typical Separation Test





# Team 1



–Alex Brown, Lindsey Craig, Stephon Lynch,  
Latia Taylor, Quinn White

–Why this design?

–Mass (What you think it will be and what did it  
end up being

–Length

–Predicted Height

–What would you different?





## Team 2



- Bart Brown, Ellen Chang, Michael Cheleala, Bertrand Hester, Vincent Nortro, Jack Wart.
- Why this design?
- Mass (What you think it will be and what did it end up being)
- Length
- Predicted Height
- What would you different?

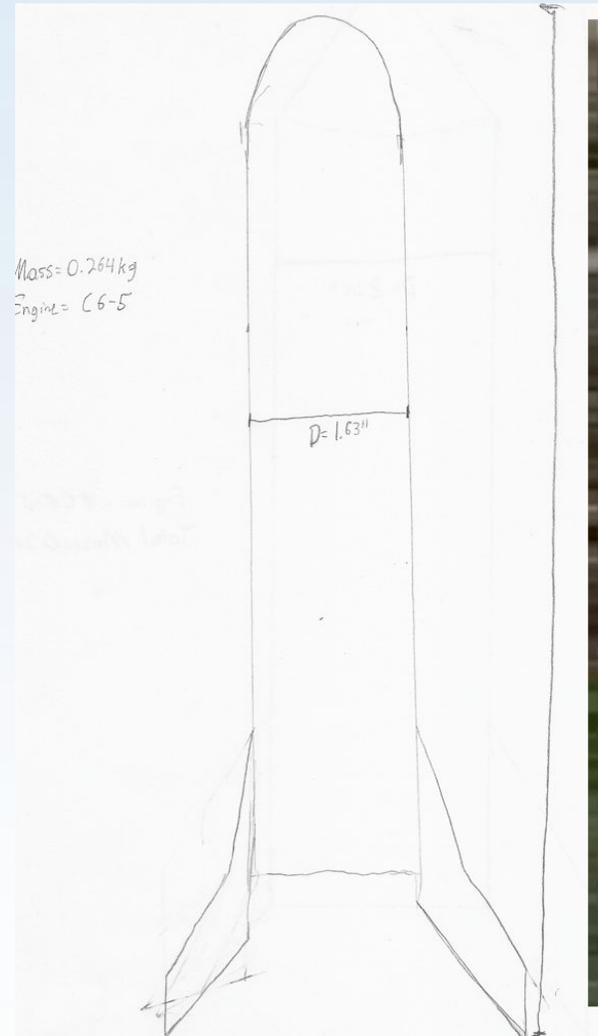




## Team 3-Rocket Something



- Lania Benn, Joseph Cannizzaro, Erin Doran, Brandon McCall, Ruben Tolbert, and Anthony Vila
- Design chosen for innovation and safety
- Total mass-0.264 kg.
- 16 in. length
- Predicted Height-164 ft.
- Pack less wadding!
- Secure rocket during test!

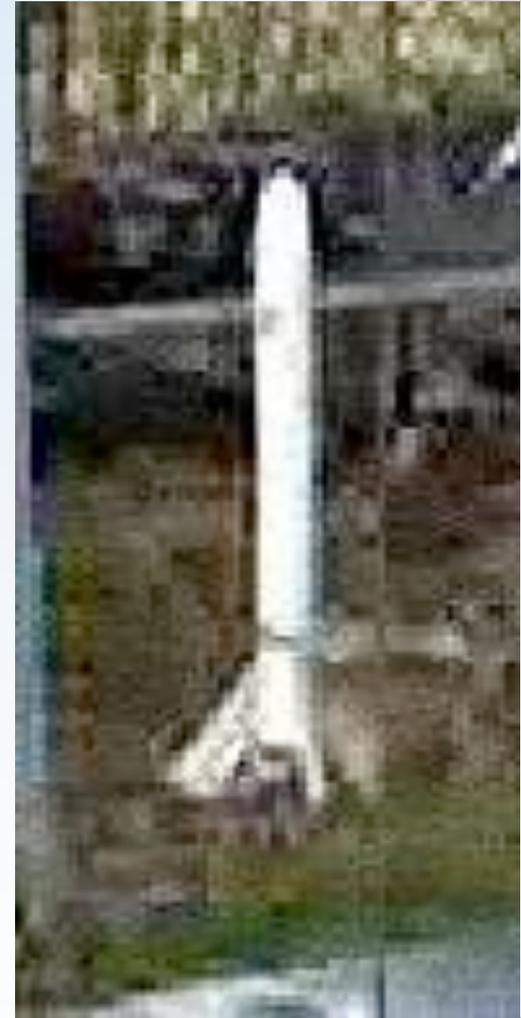




## Team 4



- Team members - James Weaver, Tyler Cullinan, Jourdan Evanish, Michi Vargas, Moses Cobbins, and Daniel Beltran
- Why this design? - We chose this design because it was the smallest size that could accomplish our goals
- Mass - We originally predicted the mass to be 192 grams, but in the end it was ???
- Length - The rocket was twenty inches long with the payload and nose cone occupying 8.25" and the parachute, rocket motor and fins using 11.75"
- Predicted Height - 600 feet
- What would you different? - We will know this on Saturday!





## Team 1

- Second Launch of the day.
- Measured Altitude - 141 ft





## Team-2



- Stable video data
- Clean Launch.
- Measured altitude <math><250\text{ ft}</math>





## Team-4

- Data lost from this launch.
- Reduced mass by deleting payload





## Team-3



- Last minute changes
- Longest video clip
- Large parachute and slow decent
- Did not stay together for second launch.

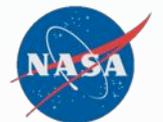




# Video Observation



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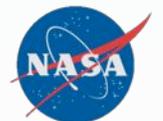




## Launch Attempt-2



**Weather Delay !**





## Launch Attempt-3





## Designing Mission



- **Post Design Mission: obtain video data and Performance data using higher thrust class vehicles**
- Understand the basic build and test Discussion of Vehicle and Vehicle Propulsion System
- Initially, the groups worked on preliminary vehicle designs on paper and on computer simulations.
- The design process included making sketches of our rockets' tentative designs, estimating the size and weight of the rockets, and estimating how high our rockets might fly.





## Lesson learned



- **Pre-Flight Test.**
- **Better team work.**
- **Instrumentation installation need to be more robust.**
- **Cluster ignition system needs more power.**





# Flight Test



<b>Name</b>	<b>baseline mass (%)</b>	<b>baseline Length(%)</b>	<b>performance (%)</b>
pluto	21.8	12.0	-2.8
VSP1 VSP2	10.8	-12.5	90.0
LLiAD (GEAT)	-15.0	-14.6	N/A
UNO	-142.6	-11.8	28.8





# Flight Test



Name	baseline mass (kg)	Measured Mass	baseline Length(m)	Measured Length	performance(alt)	Measured Alt	motor config	type engine configuration	Notes	Launch Note	
pluto	0.34	0.266	0.71	0.625	325	334	D12-0/D12-7	staged	need to check balance -Camera installed outside - need aerodynamic summary		
VSP1	0.24	0.214	0.61	0.686	371	37	C6-7	clustered		only one C motor fired/3 b6-4 successful but low altitude flight	
VSP2	0.24	n/a	0.61	n/a	540	n/a	2	C6.0 1C6.7	staged	Stage one motor too small remd D class	No model Completed
LLiAD (GEAT)	0.2	0.23	0.61	0.699	200	no data	D12-7	Glider	Glider deployment needs definition - dummy payload for test flight insure Camera recovery - mirrored view desired.	No Data- trajectory okay but injection-glider did not delay as expected	
UNO	0.101	0.245	0.5	0.559	160	114	D12-0/D12-x	staged		Not able to get video data-broken cable.	

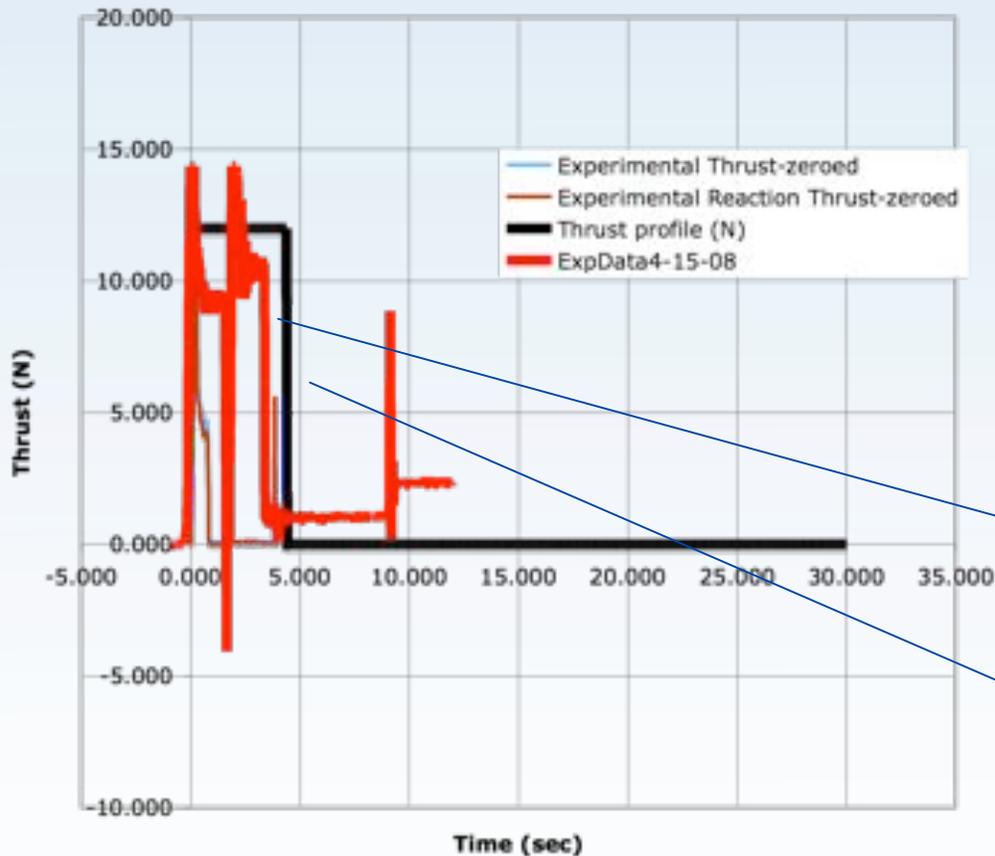
27 (model)



# Propulsion Model/Ground Test



Comparison to Thrust Experiment



Measured

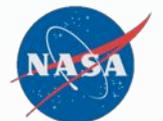
Model assumed



# *Rocket Testing*



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# Ground Testing

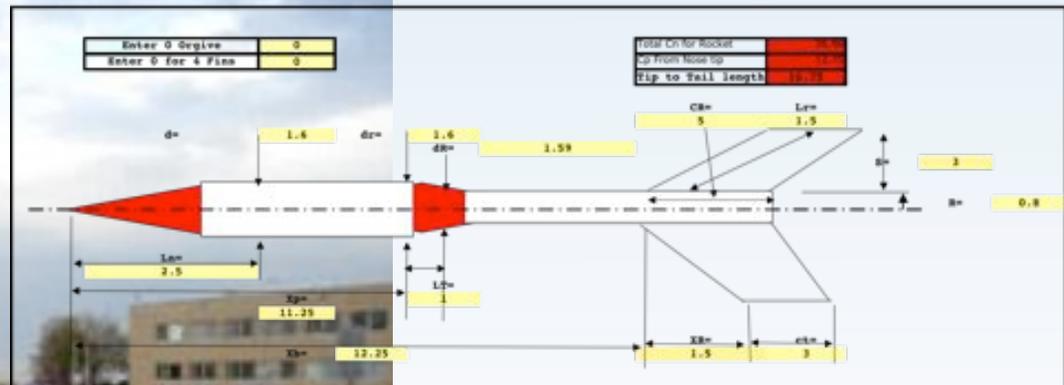
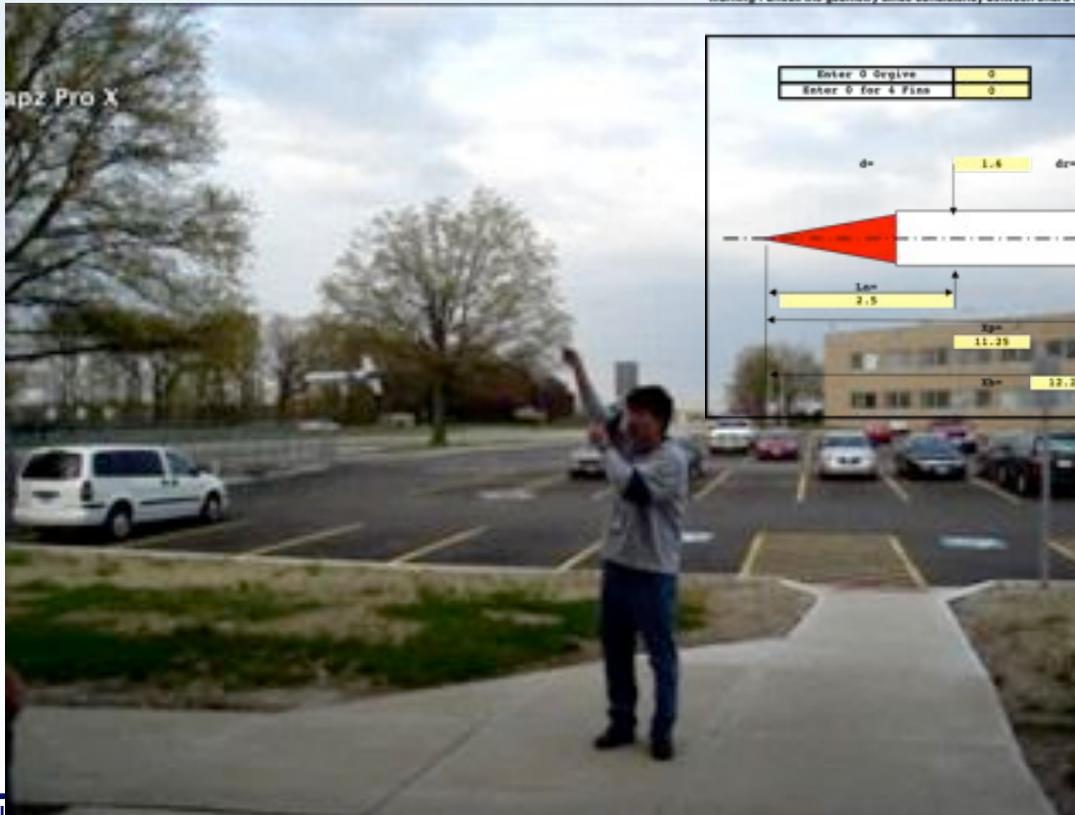


## Model Rocket Center of Pressure Calculator

Unit Independent but need to be same for all

Force/Moment Data			Nomenclature	
COKE	(cW)N	2	Cx	Natural point Force moment Coefficient
	XN (Neutral Point)	0.466 Ln	d	Diameter
OGIVE	(cW)N	2	X	Axial Distance
	XN	0.466 Ln	C	Chord Distance
			L	Length
			S	Span of Wing

Warning! Check the geometry since consistency between chord length entry and span length is not checked!



Aero Model





# Vehicles



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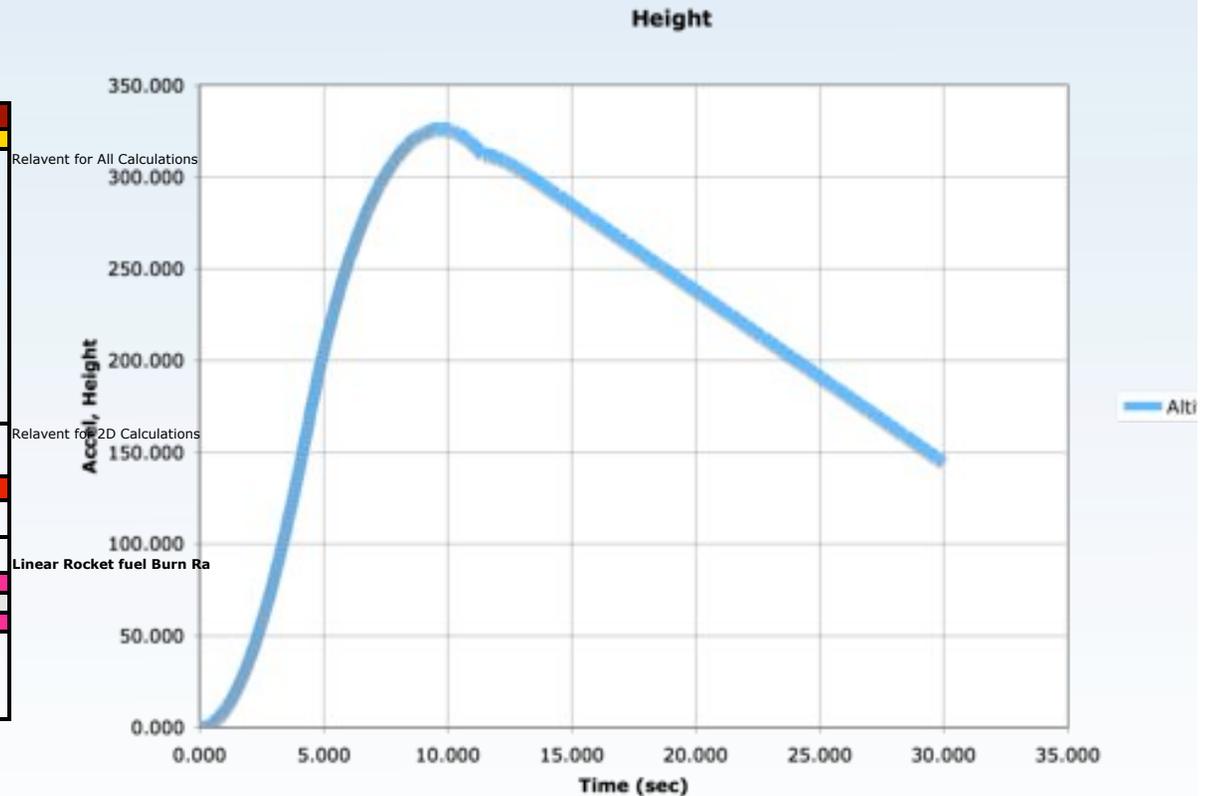


# Theoretical Model (Version 2)



The Shaded cells need user input

Rocket altitude Calculations				
Input Variable	Input Data	Units	Converted Data	Converted Unit
Initial Motor Mass	0.082	kg	0.037	lbm
Rocket Mass	0.344	kg	0.156	lbm
Burnout Motor Casing Mass	0.032	kg	0.015	lbm
Thrust timeduration	4.400	sec	4.400	sec
Ejector delay Time	7.000	sec	7.000	sec
Thrust Force of Engine	12.000	N	53.400	lbf
Frontal Area	0.004	m <sup>2</sup>	0.043	ft <sup>2</sup>
Drag Coefficient(Rocket)	0.400			
Frontal Area with Chut	0.100	m <sup>2</sup>	1.076	ft <sup>2</sup>
Drag Coefficient (Chut)	0.700			
Air Density	1.200	kg/m <sup>3</sup>	0.075	lbm/s
Total Mission time	30.000	sec	30.000	sec
Launch Angle	90.000	Degrees	1.571	radians
Cross breeze Velocity	0.000	m/s		ft/s
L/D	0.000			
Solver Parameter				
Total no of Calculation points	602,000	pts		
time step	0.050	sec		
fuel mass burn rate	0.011	kg/s	0.025	lbm/s
Universal Gravitational Acceleration				
Gravitation Accleration	9.800	m/s <sup>2</sup>	32.200	ft/s <sup>2</sup>
Mass and Aero property				
Total Vehicle Mass (Motor and Rocket)	0.426	kg		
Specific Drag Ascent	9.600E-04	N/(m <sup>2</sup> /s <sup>2</sup> )	1/2 rho Cd A	
Specific Drag Decent	4.200E-02	N/(m <sup>2</sup> /s <sup>2</sup> )		





# Vehicles



Glide Vehicle

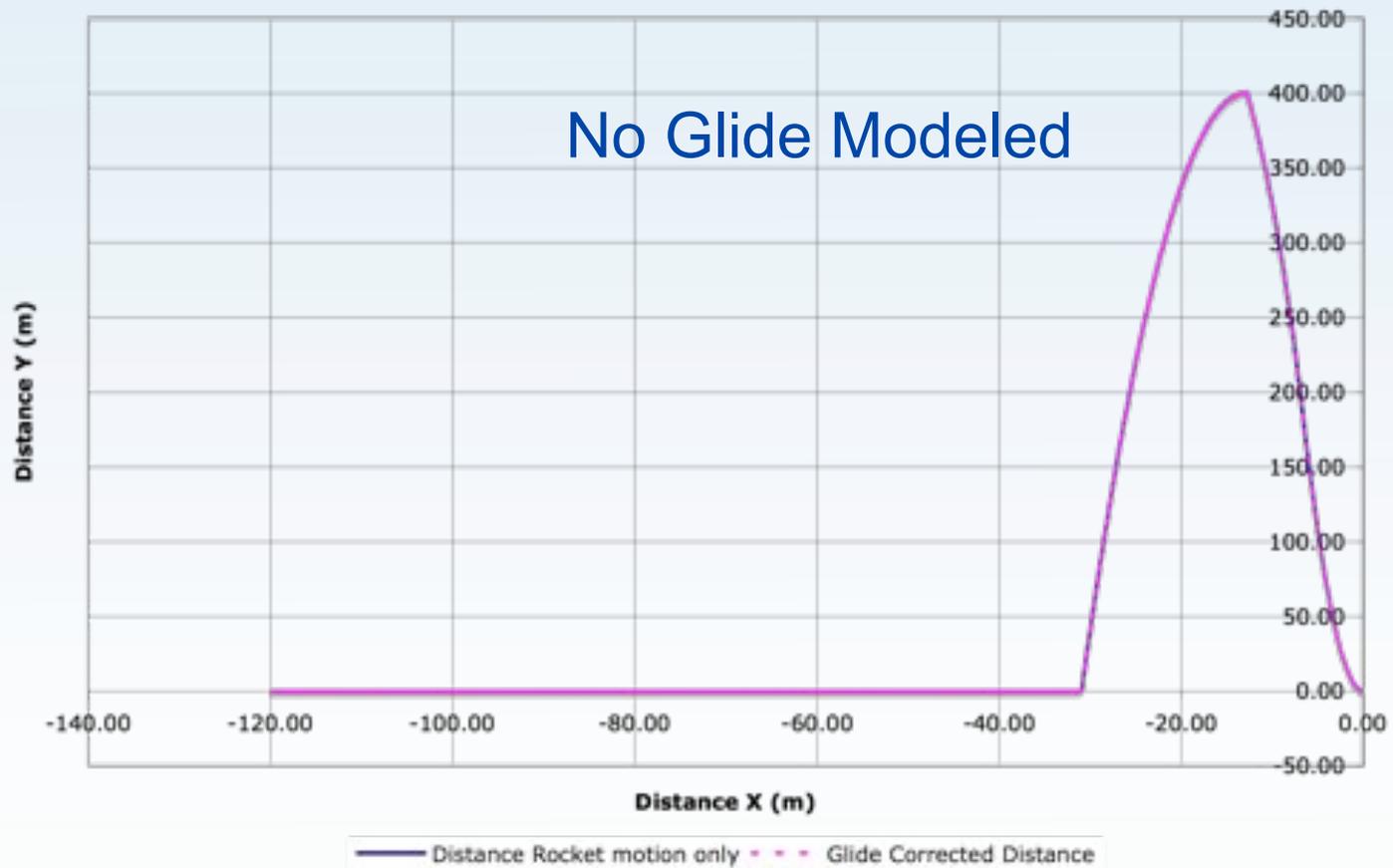




# Vehicles



Trajectory

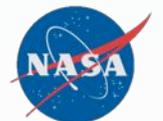




# Vehicles



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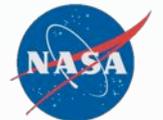
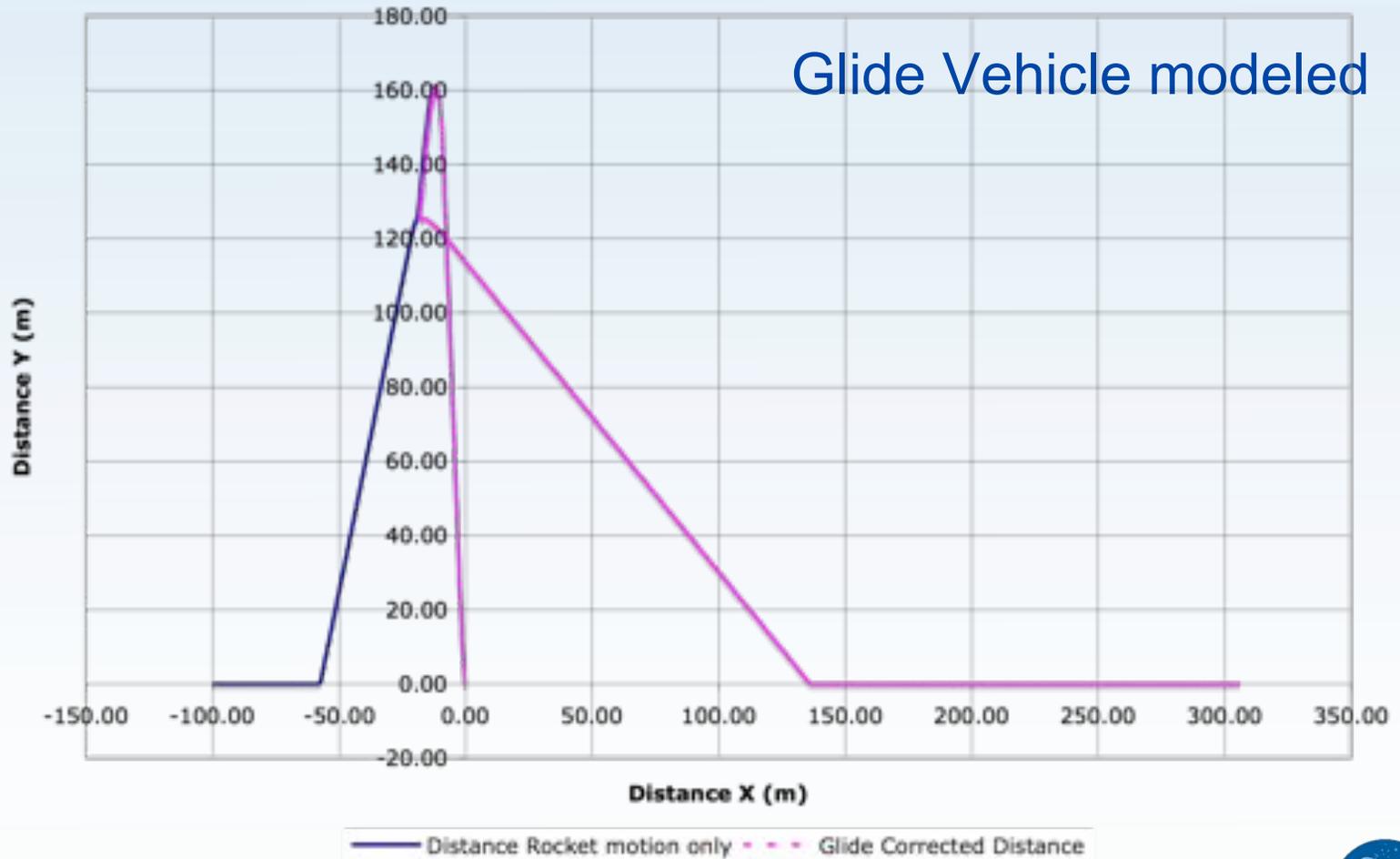


# Vehicles



## Trajectory

Glide Vehicle modeled





## Vehicles(Launch 1- one c6-4)

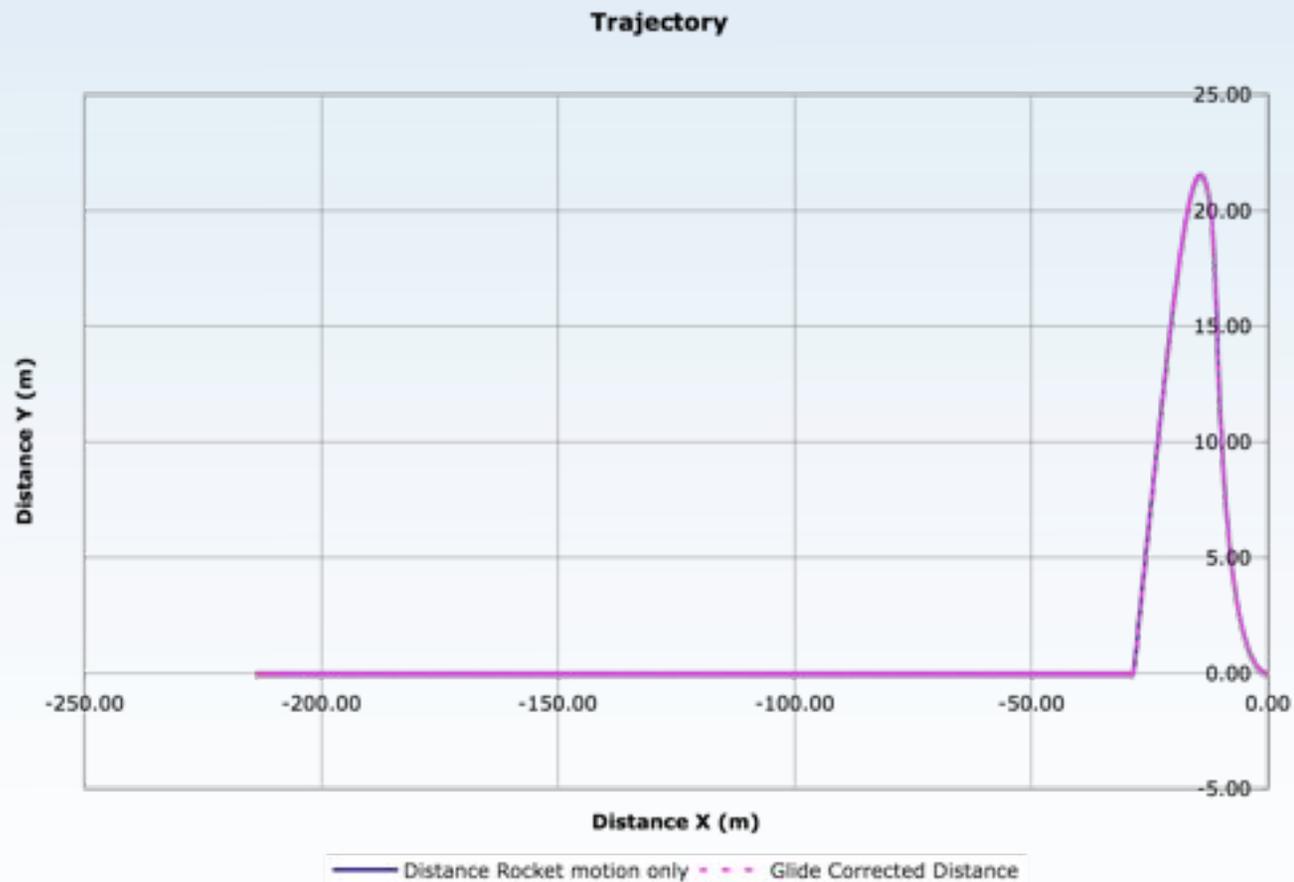


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# Vehicles(Launch 1- one c6-4)





## Vehicles(Launch 2 - 3B6-4)



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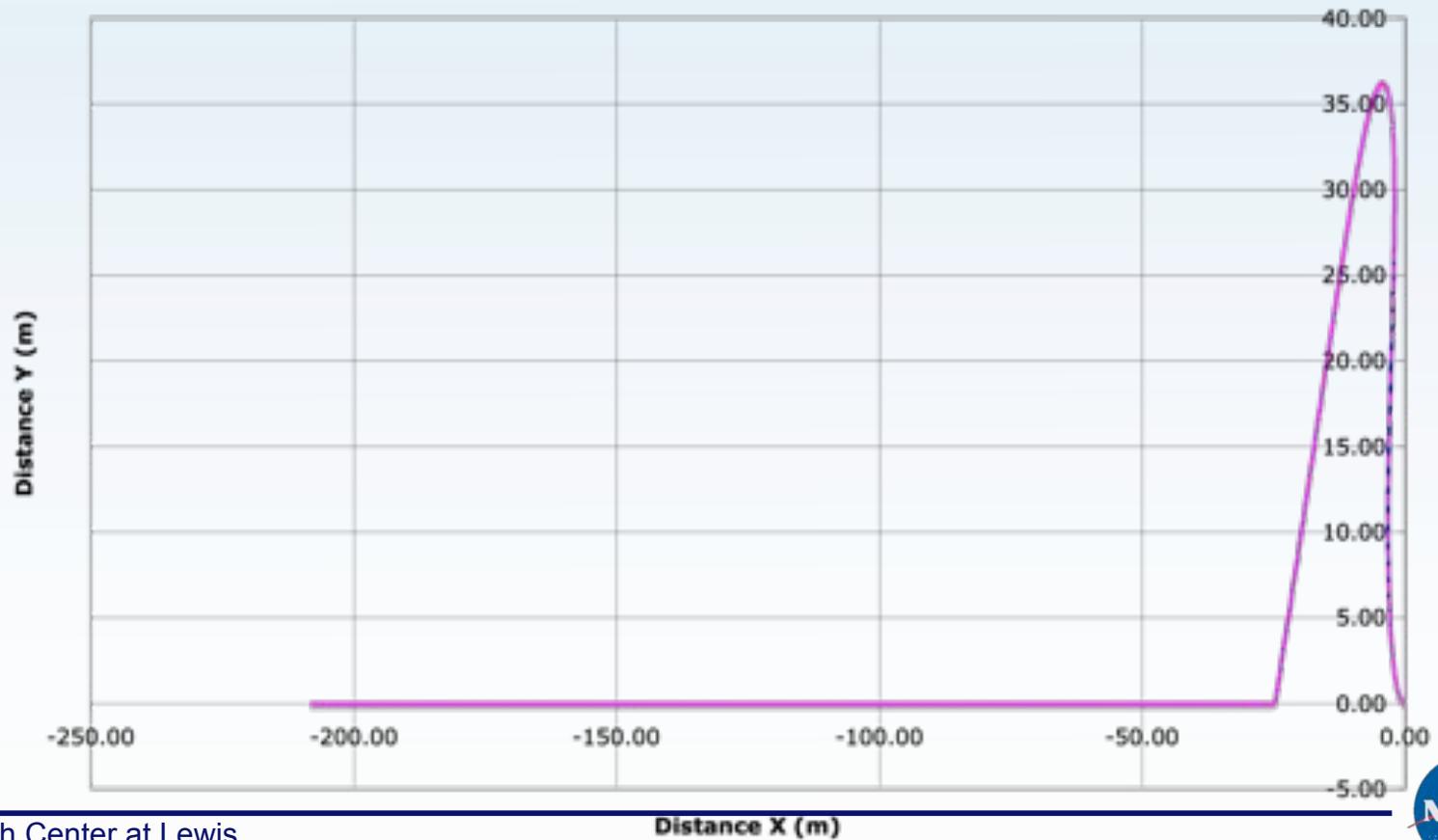




# Vehicles(Launch 2 - 3B6-4)



Trajectory



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Distance Rocket motion only - - - Glide Corrected Distance





# Congratulations



Gle  
Field





# 3-2-1 Launch



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