Jun 4th, 3:30 PM

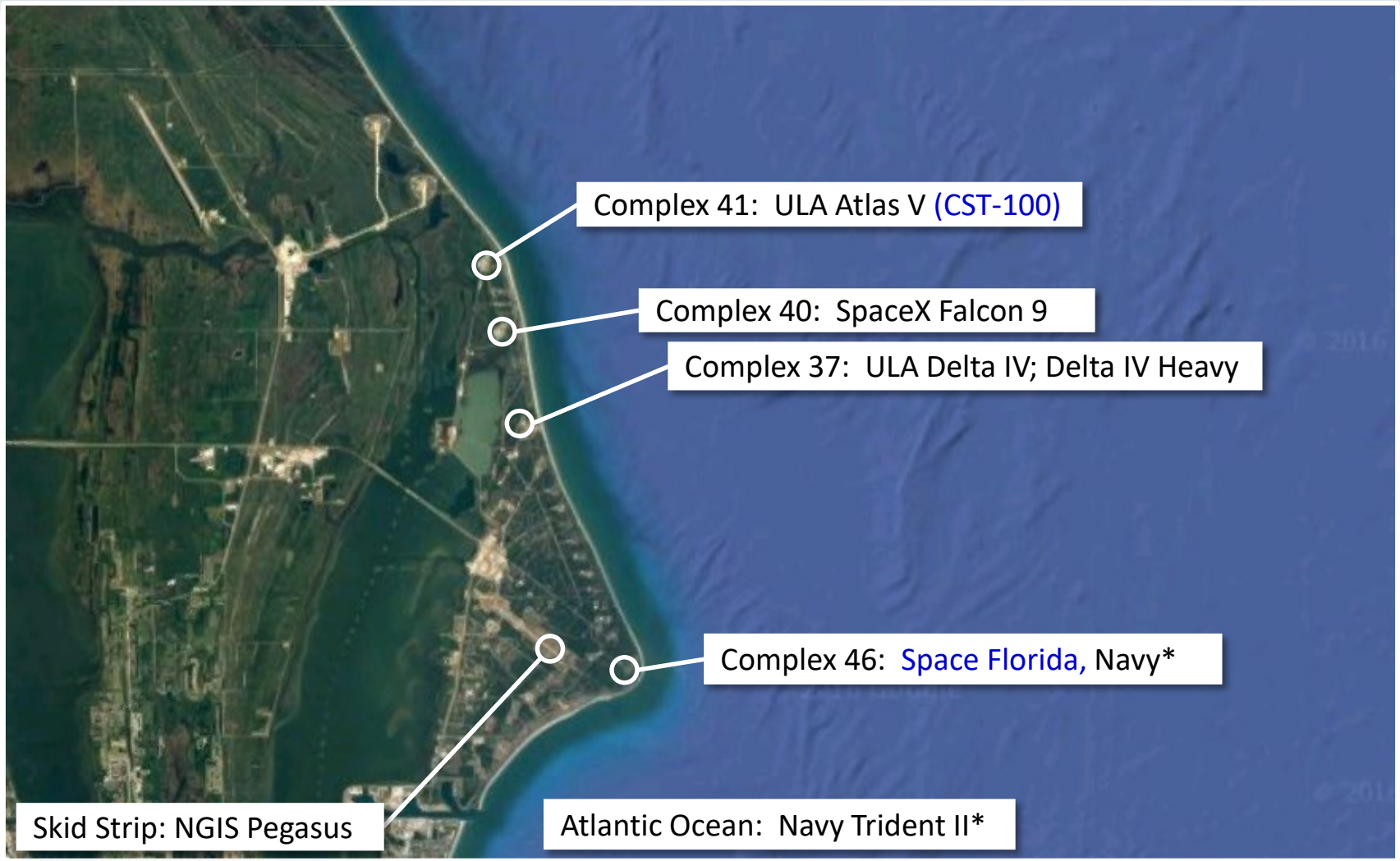
Cape Canaveral Air Force Station Support to Commercial Space Launch

Thomas Ste. Marie
Vice Commander, 45th Space Wing

Cape Canaveral Air Force Station Support to Commercial Space Launch

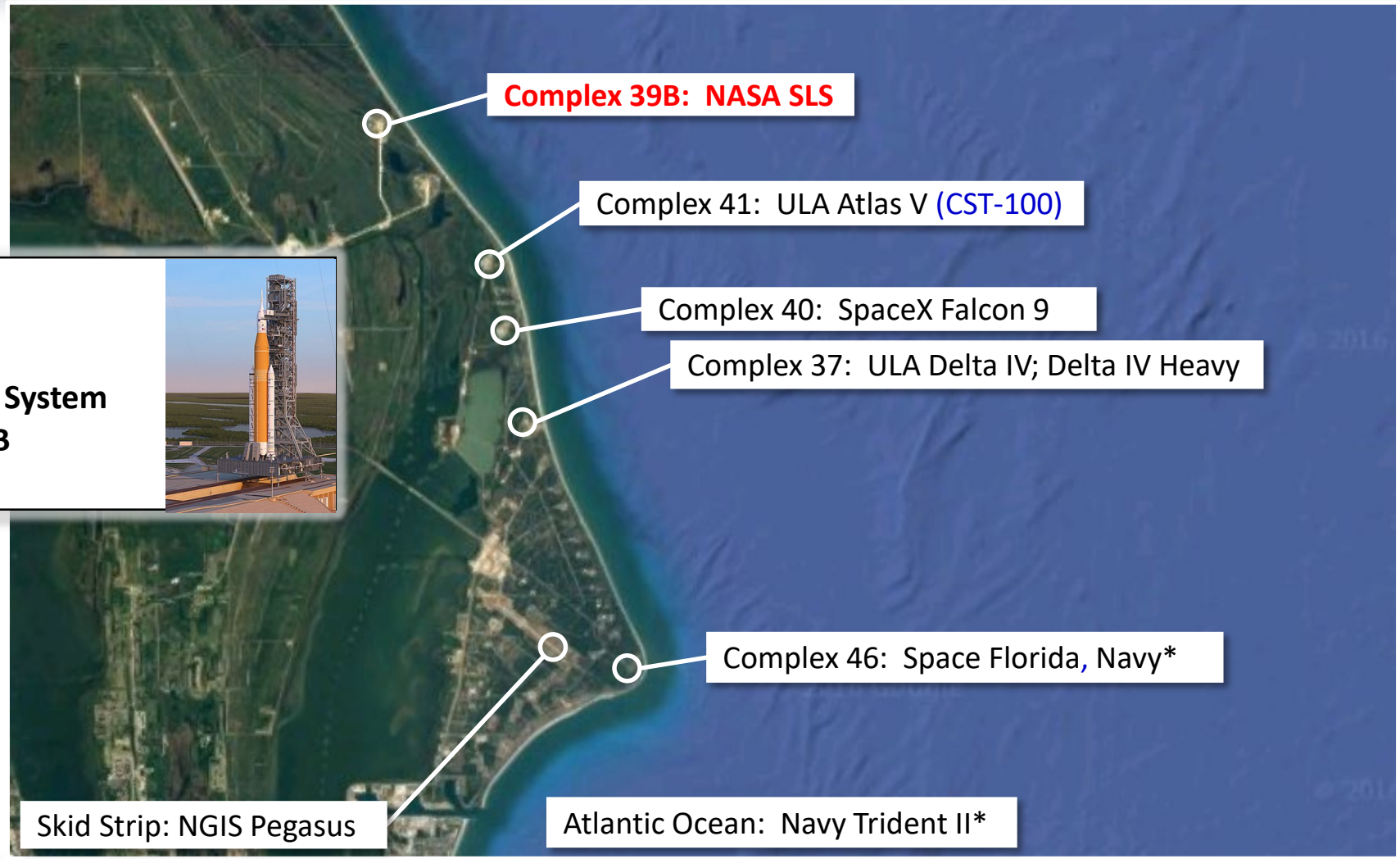
Colonel Thomas Ste. Marie
Vice Commander, 45th Space Wing

CCAFS Launch Customers: 2013



Black text – current programs; Blue text – in work; * – sub-orbital

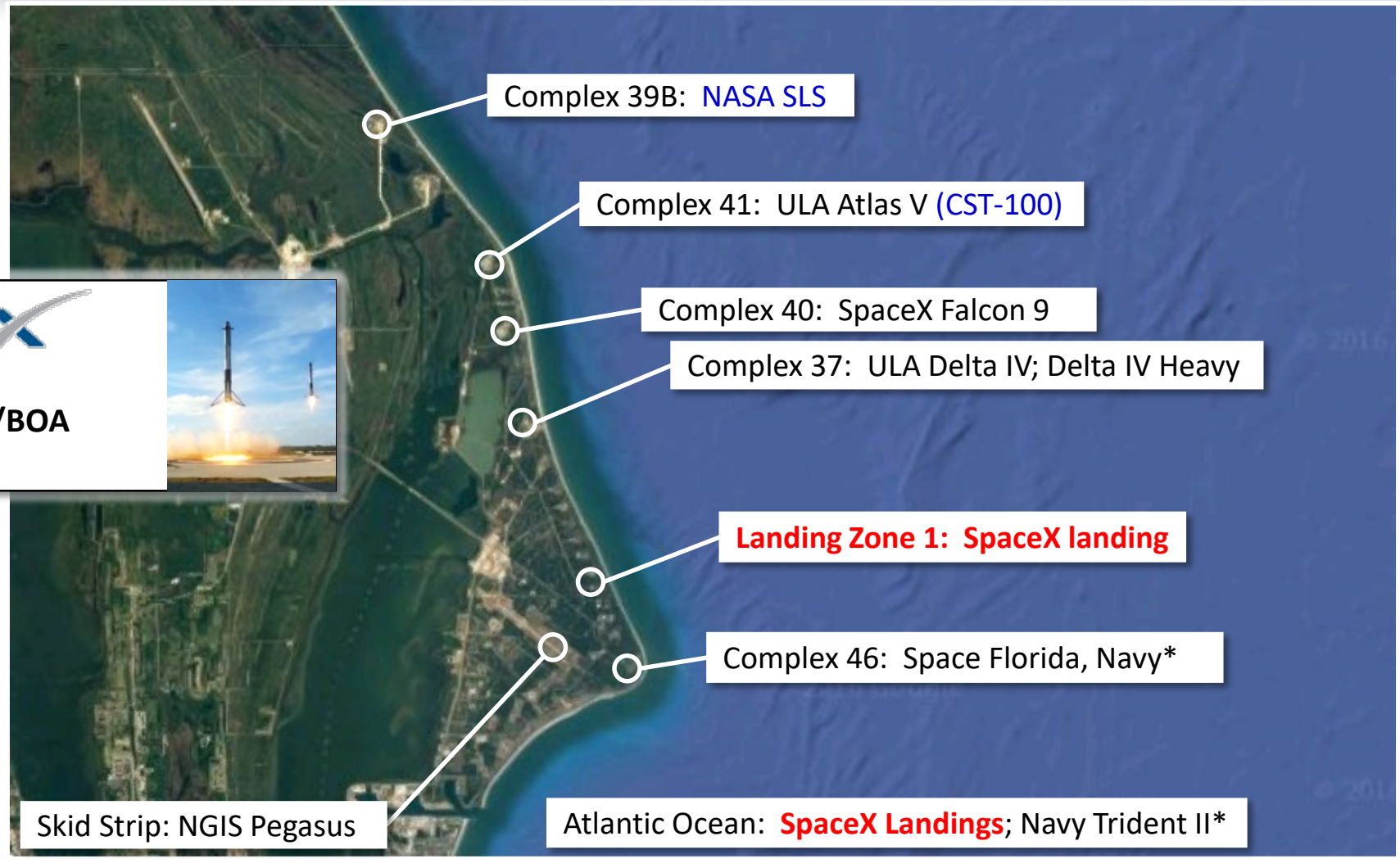
CCAFS Launch Customers: 2013



NASA Space Launch System
Launch Complex 39B
February 4, 2013

Black text – current programs; Blue text – in work; * – sub-orbital

CCAFS Launch Customers: 2014

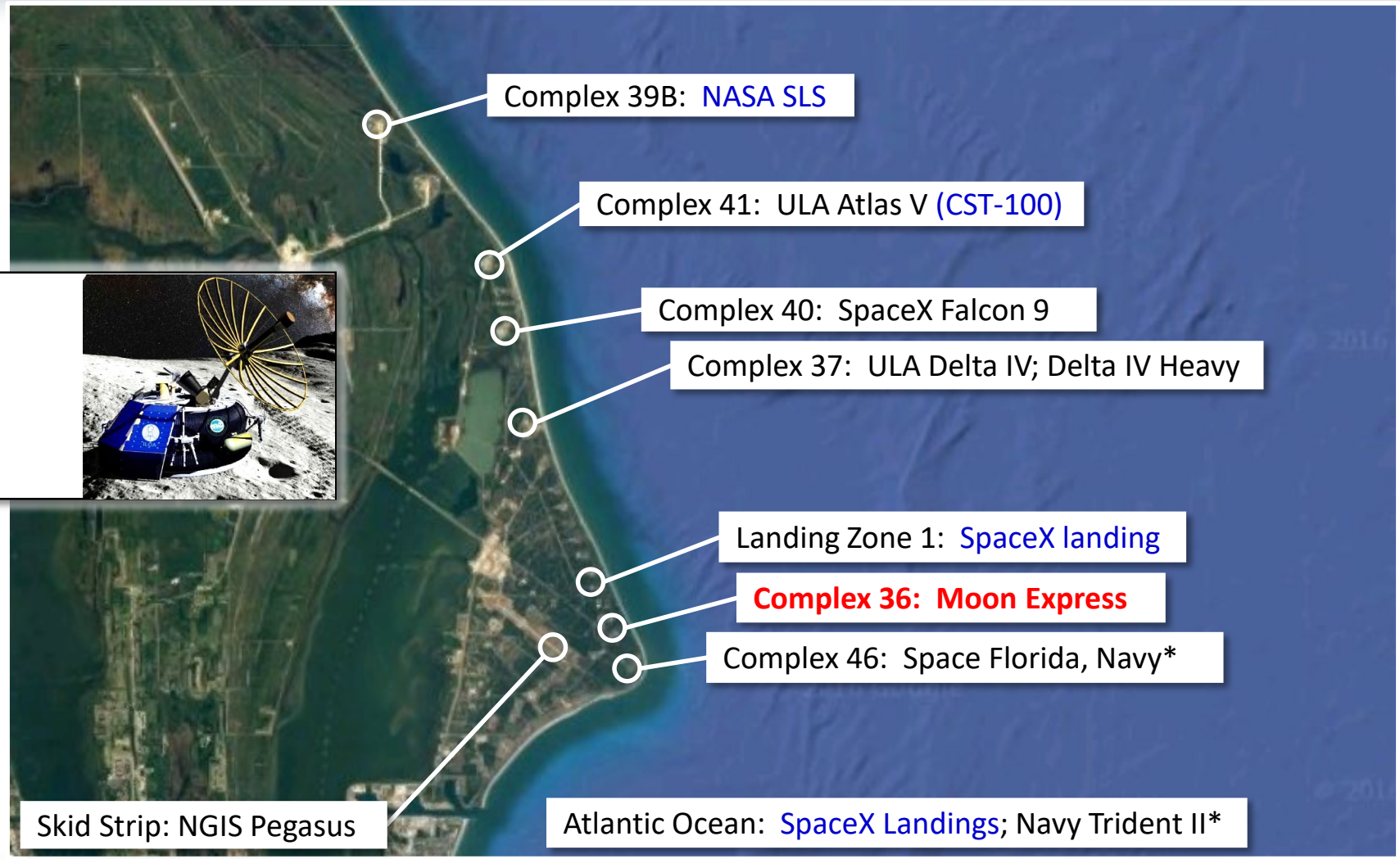


SPACEX

SpaceX Landing
Launch Complex 13/BOA
May 6, 2014

Black text – current programs; Blue text – in work; * – sub-orbital

CCAFS Launch Customers: 2014

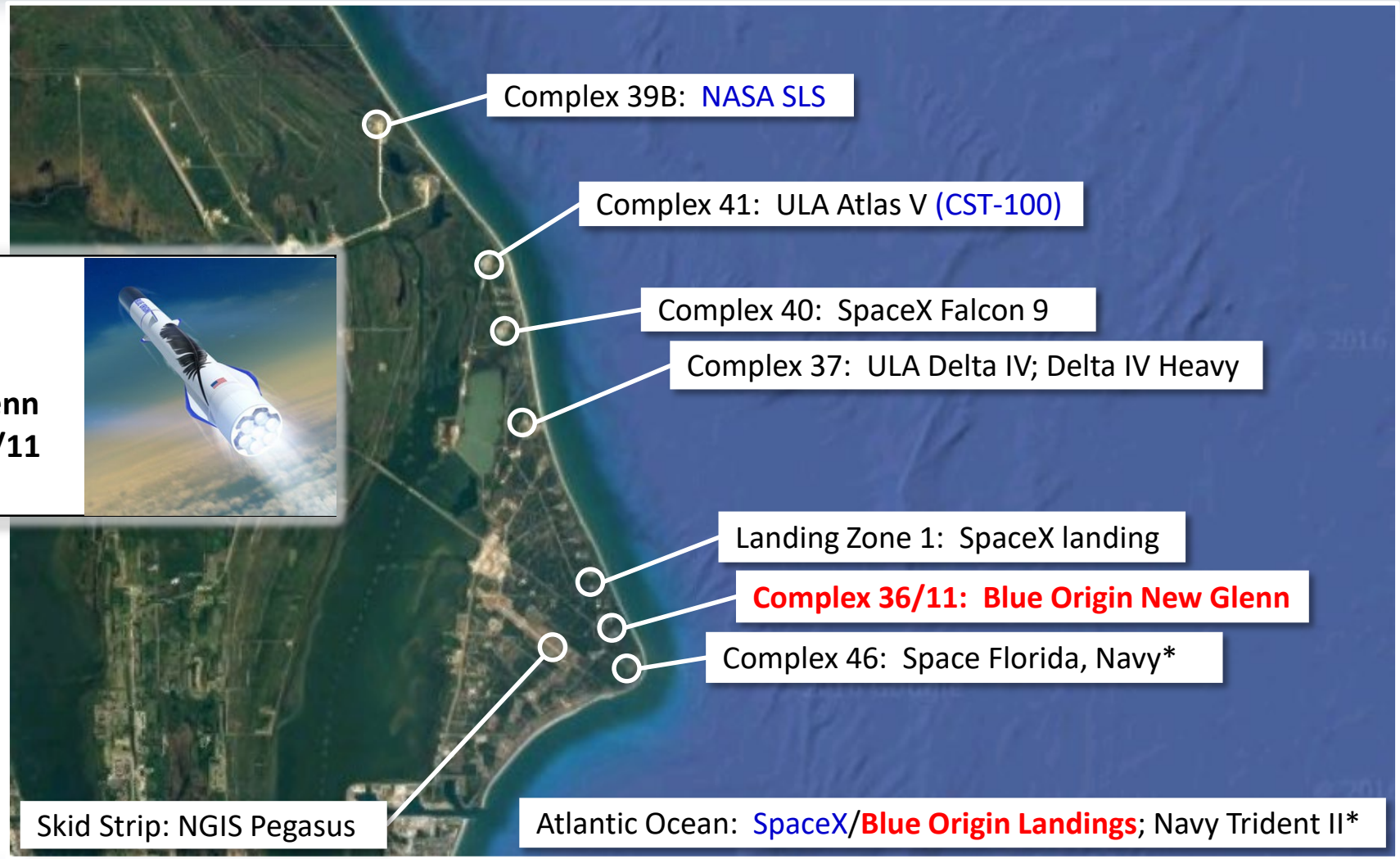


MOON EXPRESS

Moon Express
Launch Complex 36
August 11, 2014

Black text – current programs; Blue text – in work; * – sub-orbital

CCAFS Launch Customers: 2015

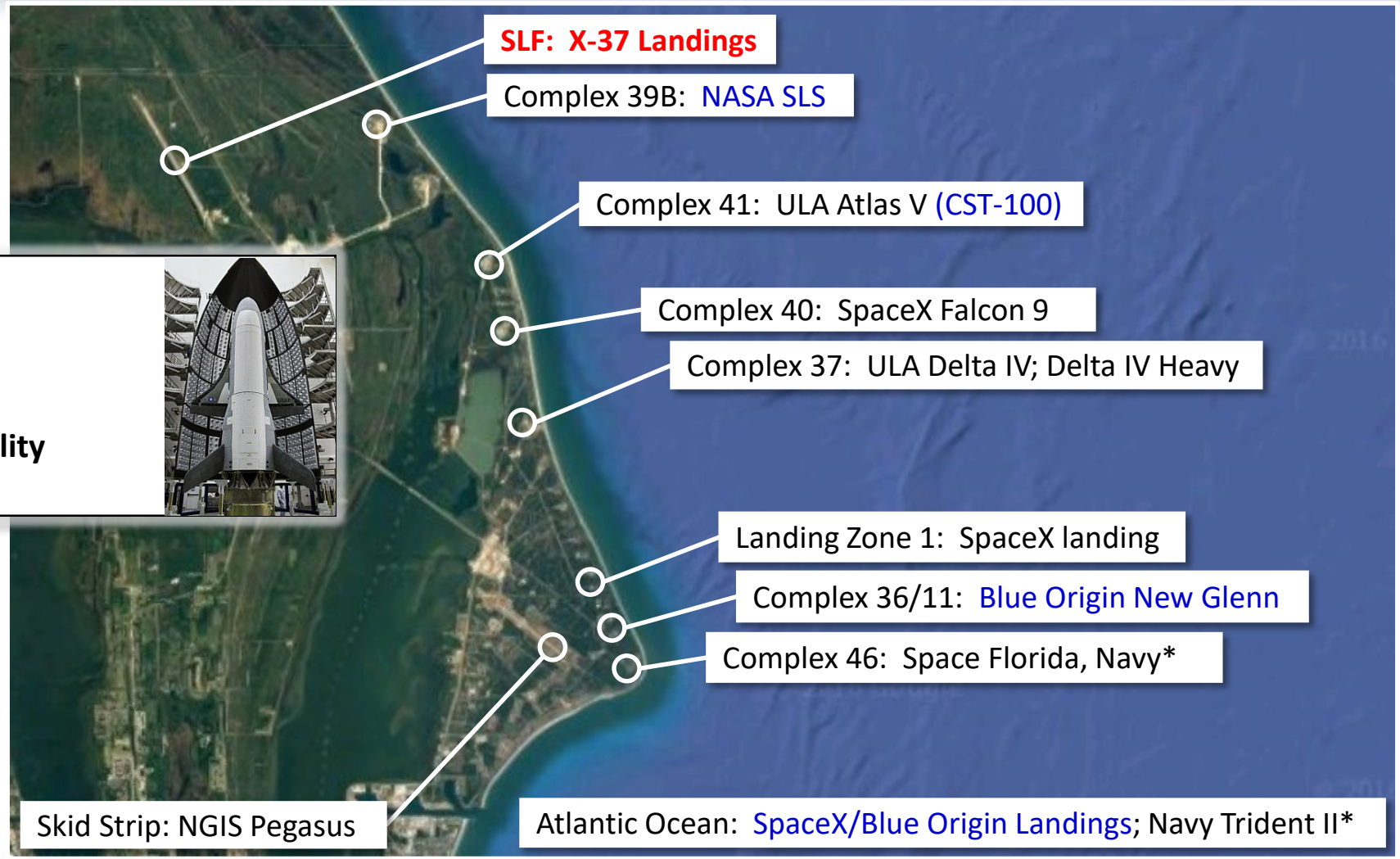


BLUE ORIGIN

Blue Origin New Glenn
Launch Complex 36/11
April 23, 2015

Black text – current programs; Blue text – in work; * – sub-orbital

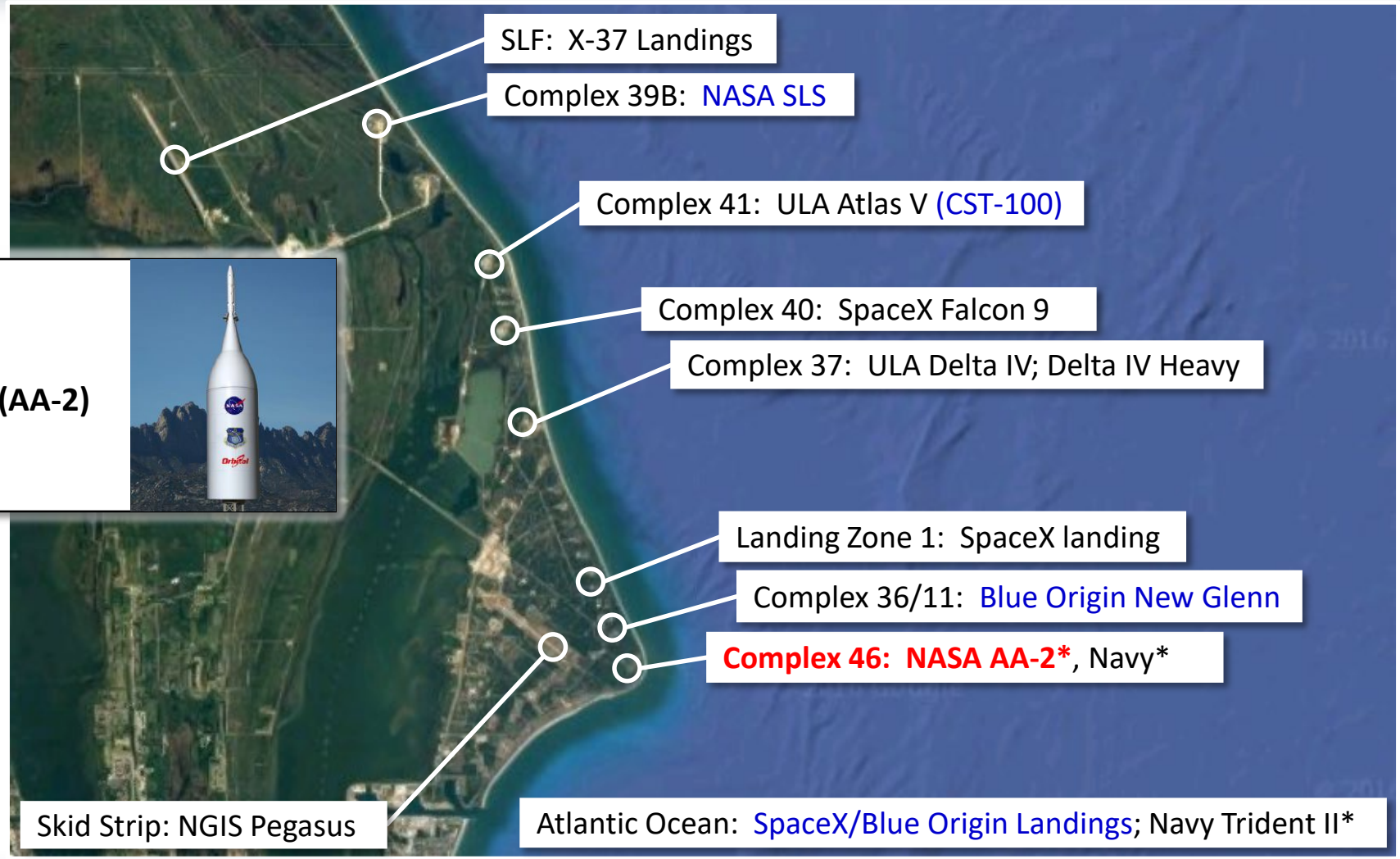
CCAFS Launch Customers: 2015



Air Force X-37/OTV
Shuttle Landing Facility
May 20, 2015

Black text – current programs; Blue text – in work; * – sub-orbital

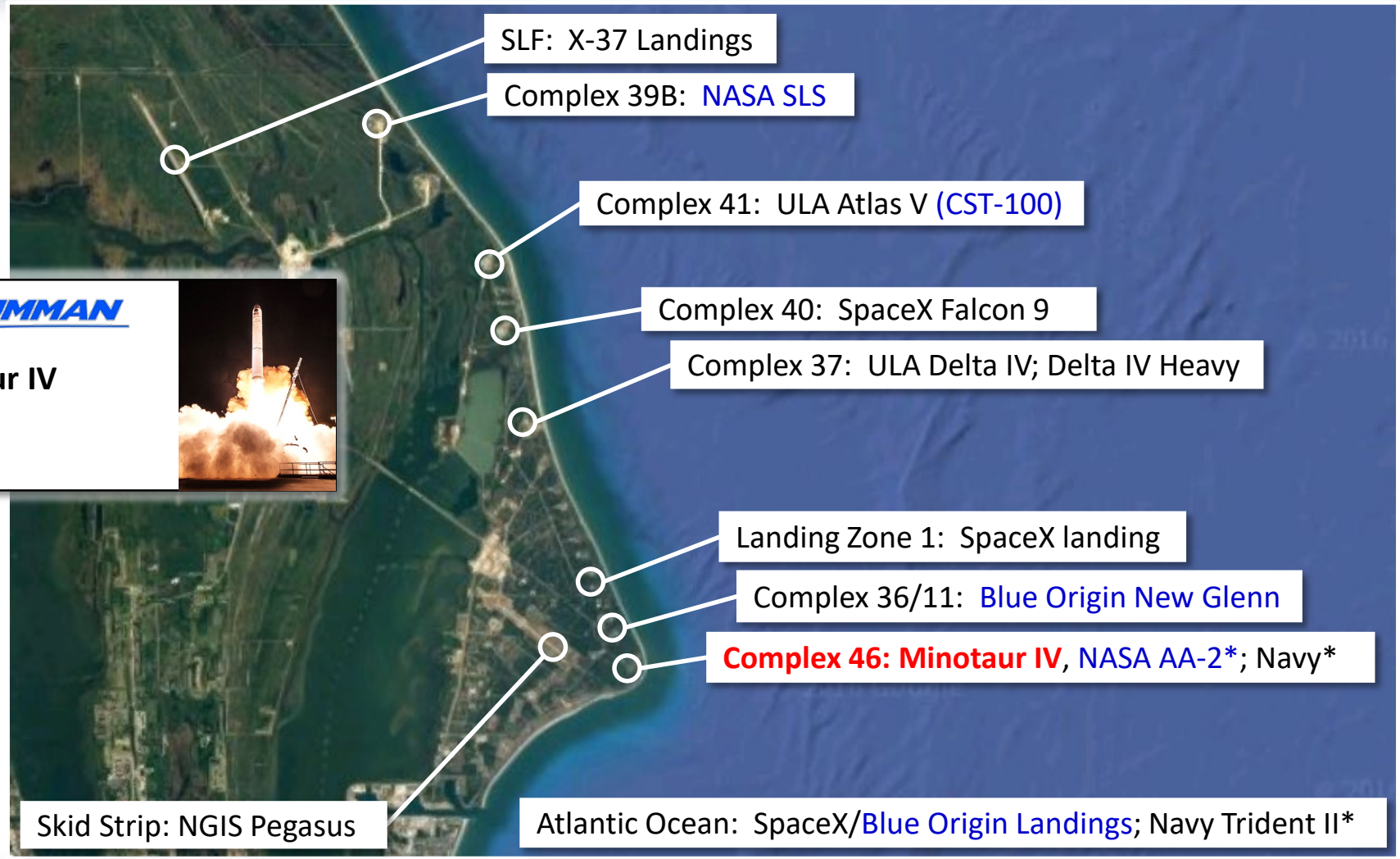
CCAFS Launch Customers: 2015



NASA Ascent Abort (AA-2)
Launch Complex 46
July 27, 2015

Black text – current programs; Blue text – in work; * – sub-orbital

CCAFS Launch Customers: 2016

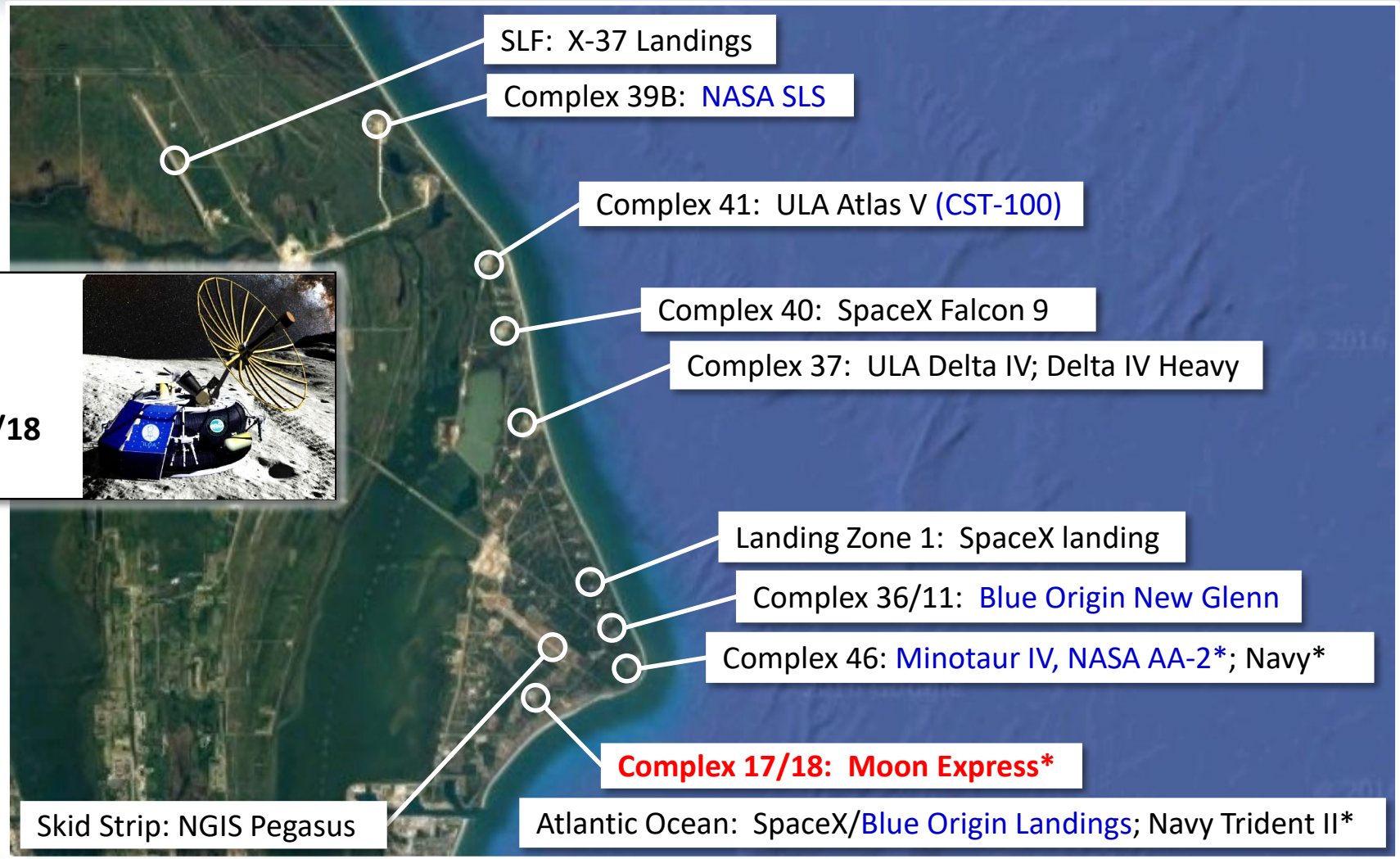


NORTHROP GRUMMAN

Orbital ATK Minotaur IV
Launch Complex 46
January 11, 2016

Black text – current programs; Blue text – in work; * – sub-orbital

CCAFS Launch Customers: 2016

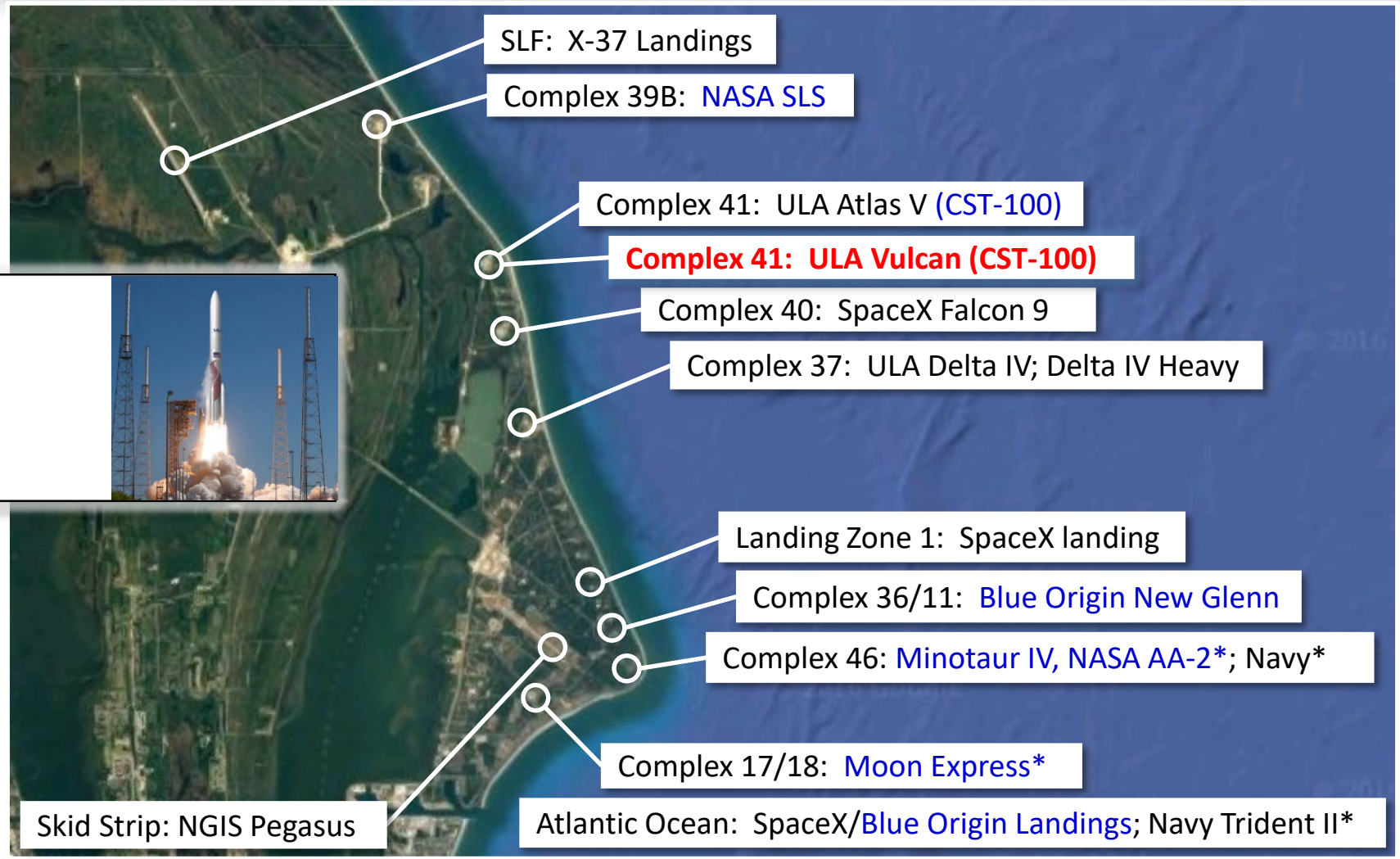


MOON EXPRESS

Moon Express
Launch Complex 17/18
April 7, 2016

Black text – current programs; Blue text – in work; * – sub-orbital

CCAFS Launch Customers: 2016

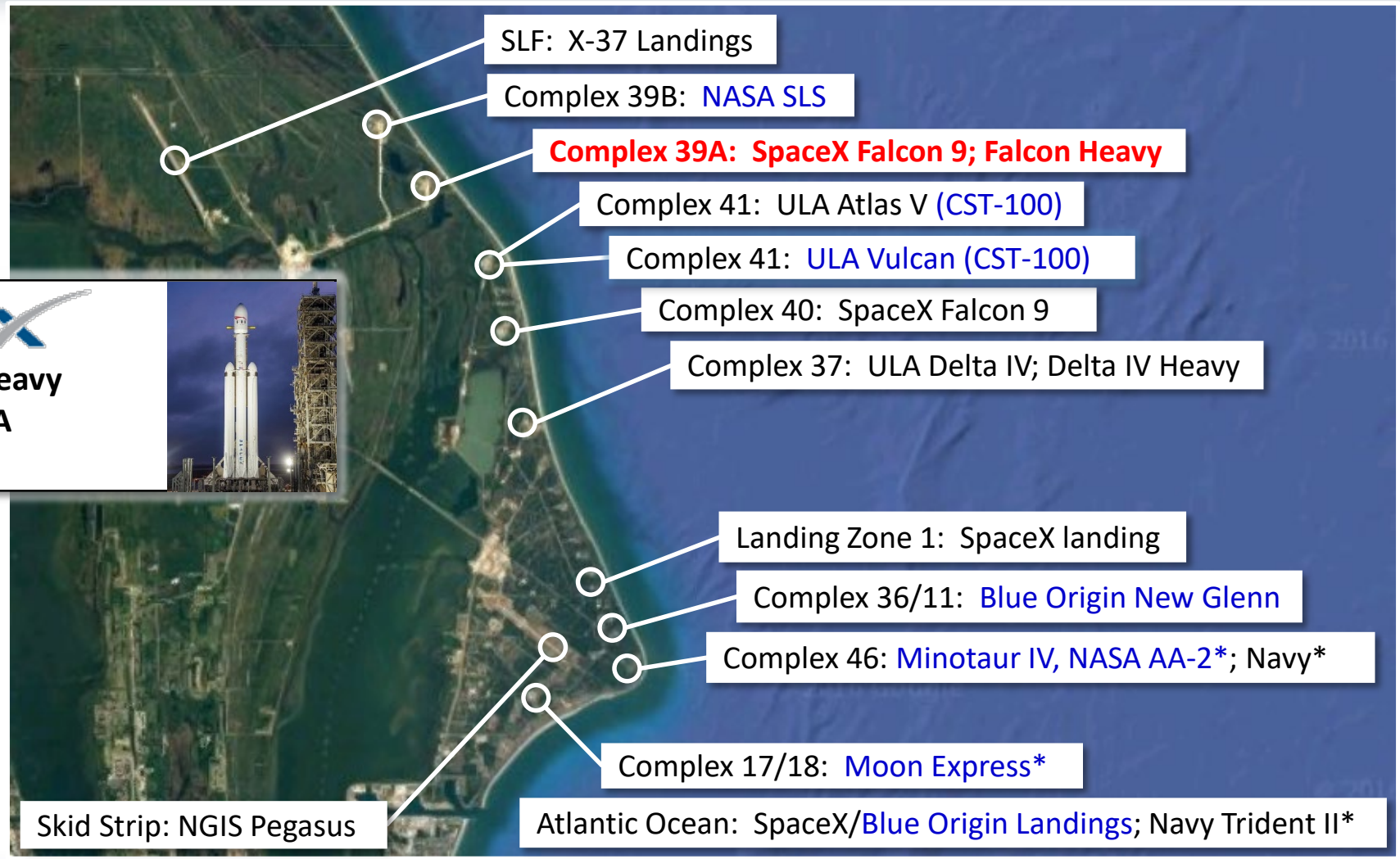


ULA
United Launch Alliance

ULA Vulcan Centaur
Launch Complex 41
August 2, 2016

Black text – current programs; Blue text – in work; * – sub-orbital

CCAFS Launch Customers: 2016

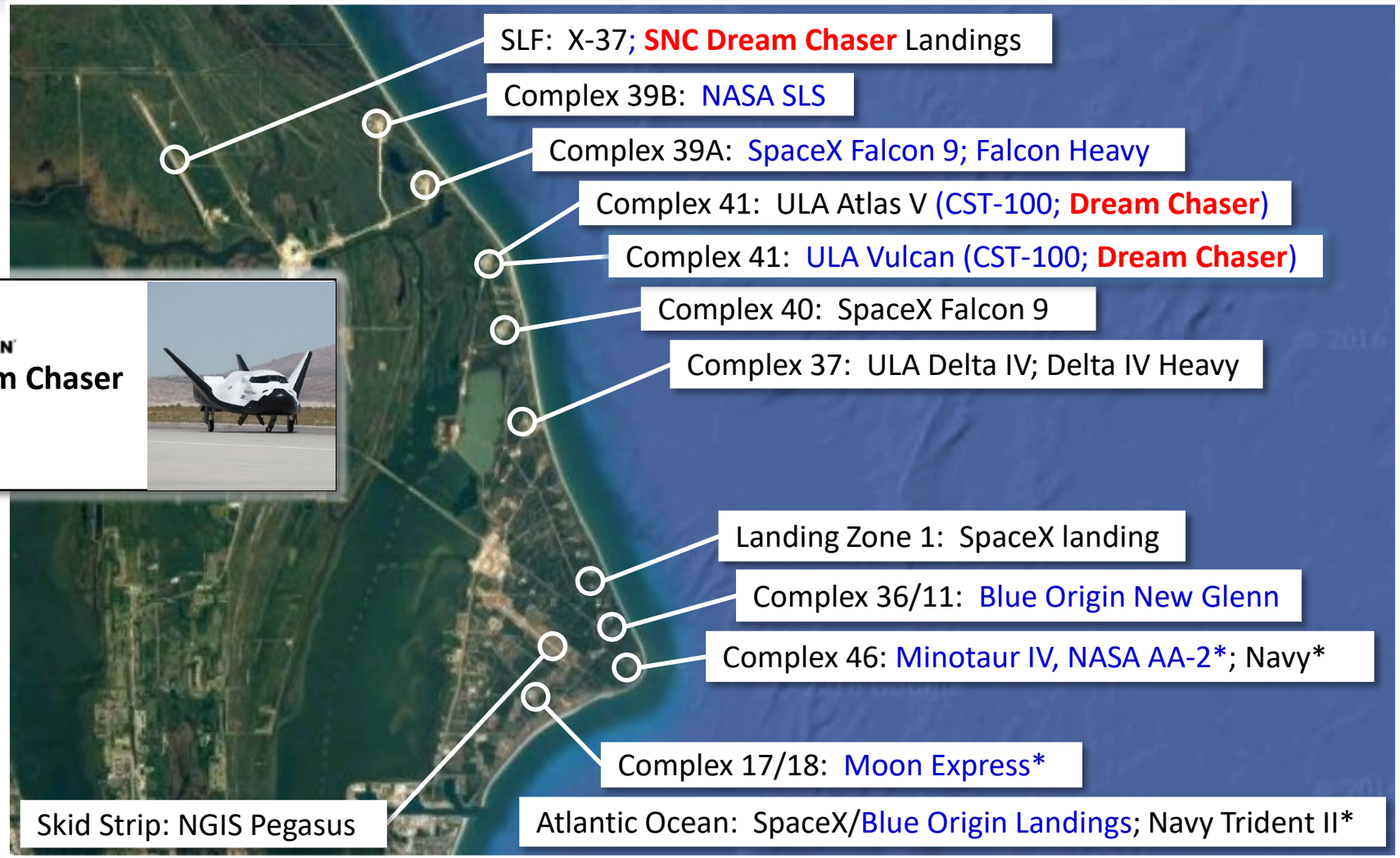


SPACEX

SpaceX Falcon 9 / Heavy
Launch Complex 39A
November 18, 2016

Black text – current programs; Blue text – in work; * – sub-orbital

CCAFS Launch Customers: 2016

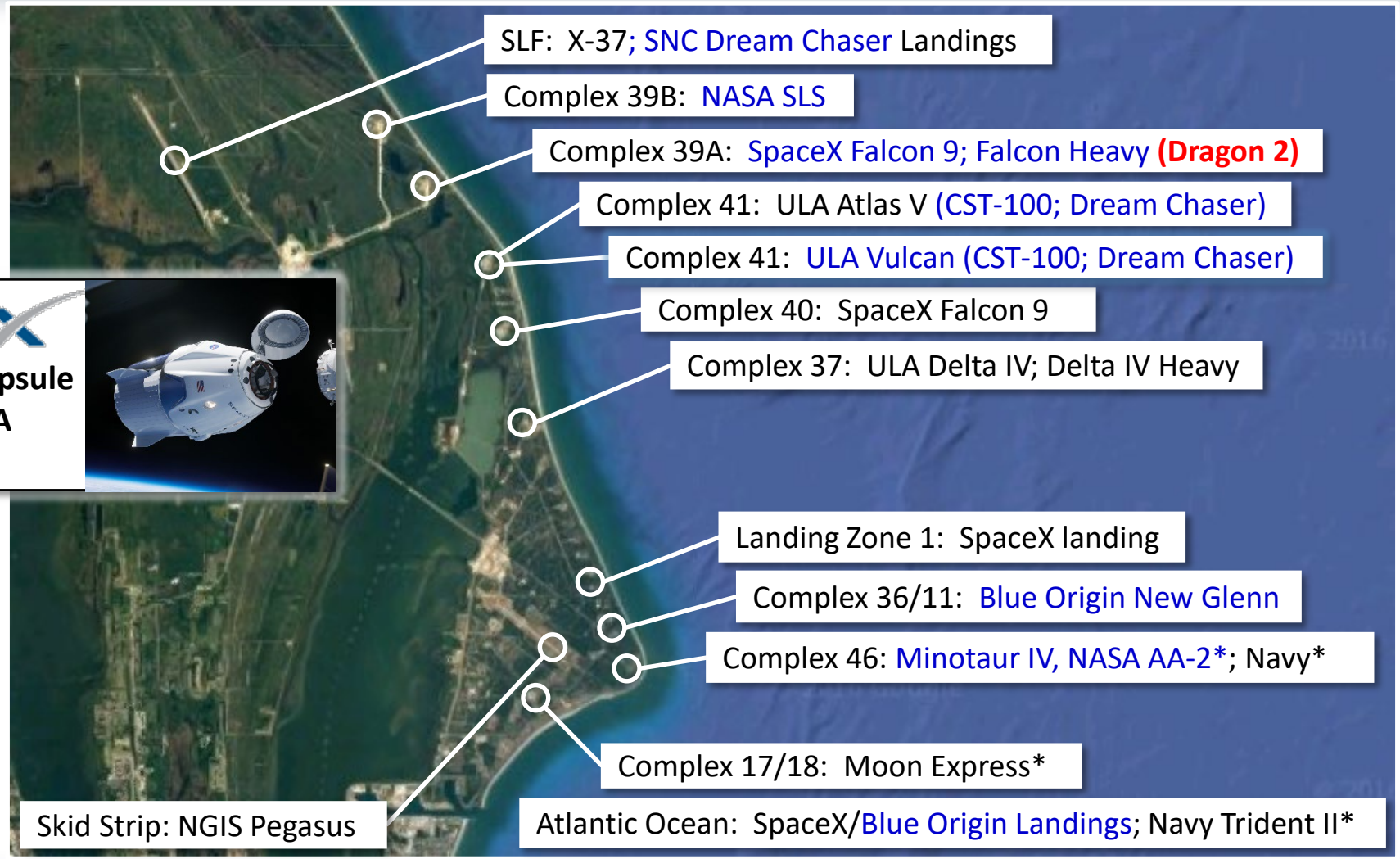


SIERRA NEVADA CORPORATION

Sierra Nevada Dream Chaser
Launch Complex 41
December 2, 2016

Black text – current programs; Blue text – in work; * – sub-orbital

CCAFS Launch Customers: 2016

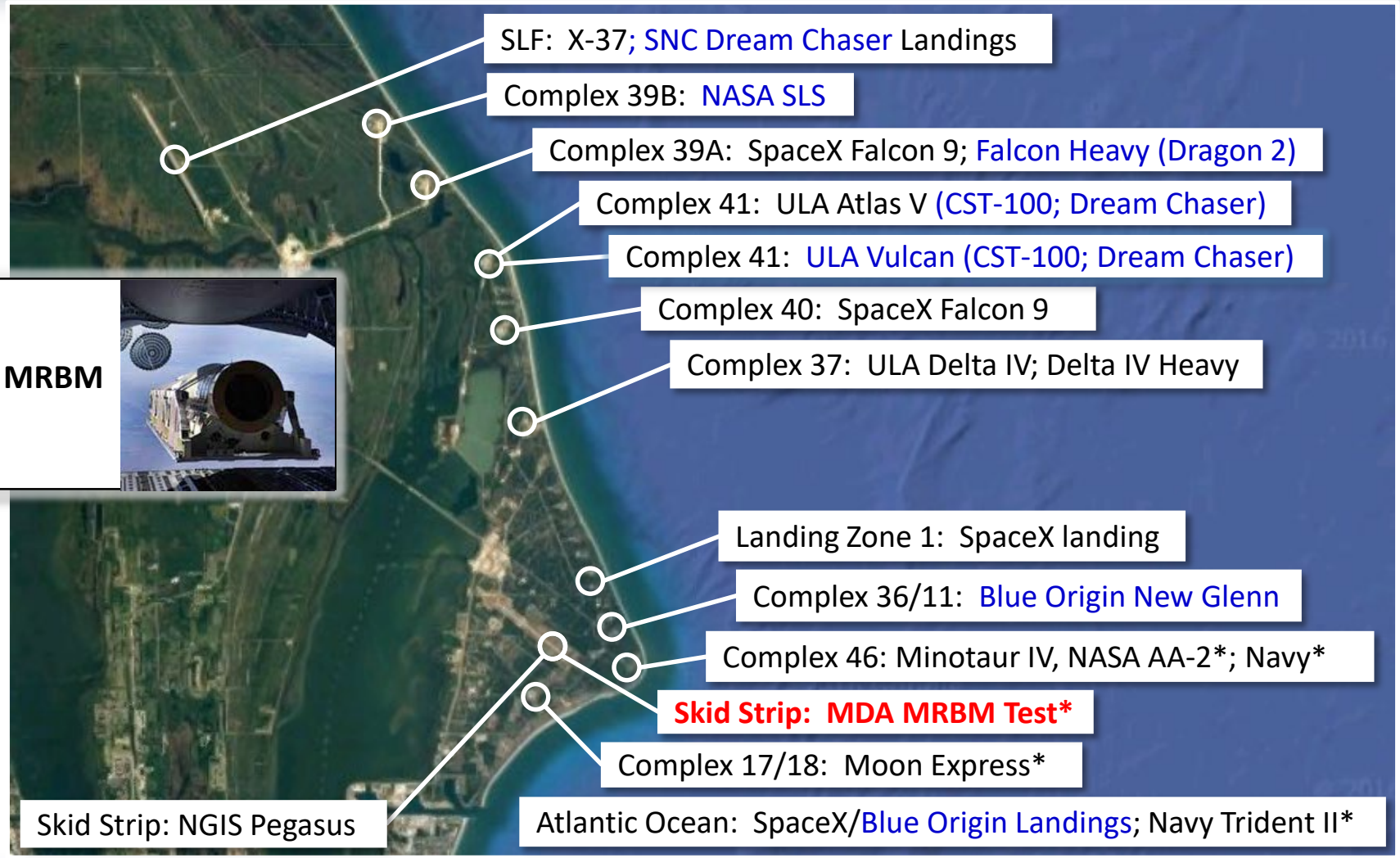


SPACEX

SpaceX Dragon 2 Capsule
Launch Complex 39A
February 9, 2017

Black text – current programs; Blue text – in work; * – sub-orbital

CCAFS Launch Customers: 2017

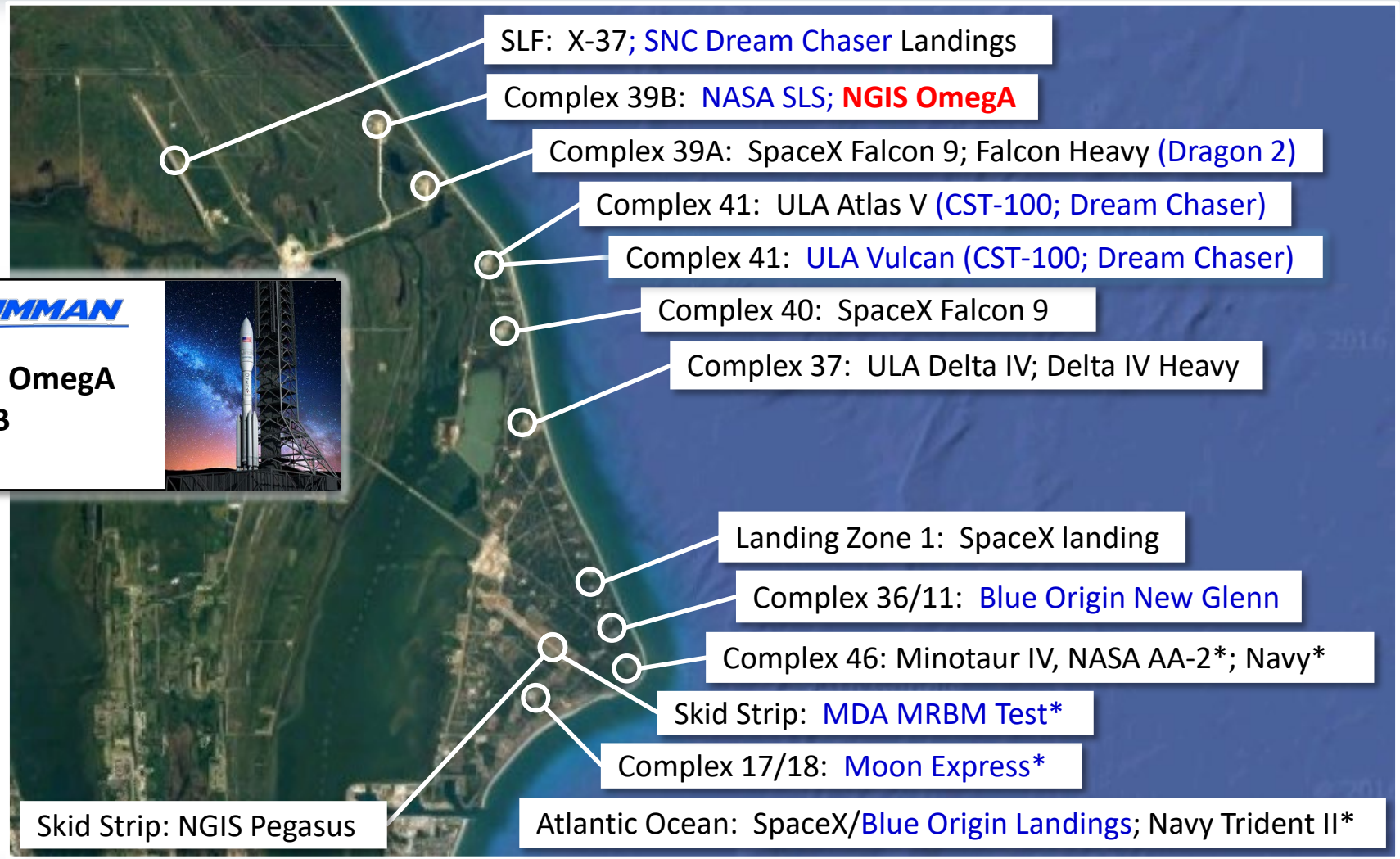


AEROJET ROCKETDYNE
Coleman Aerospace

Aerojet Rocketdyne MRBM
CCAFS Skid Strip
September 27, 2017

Black text – current programs; Blue text – in work; * – sub-orbital

CCAFS Launch Customers: 2018

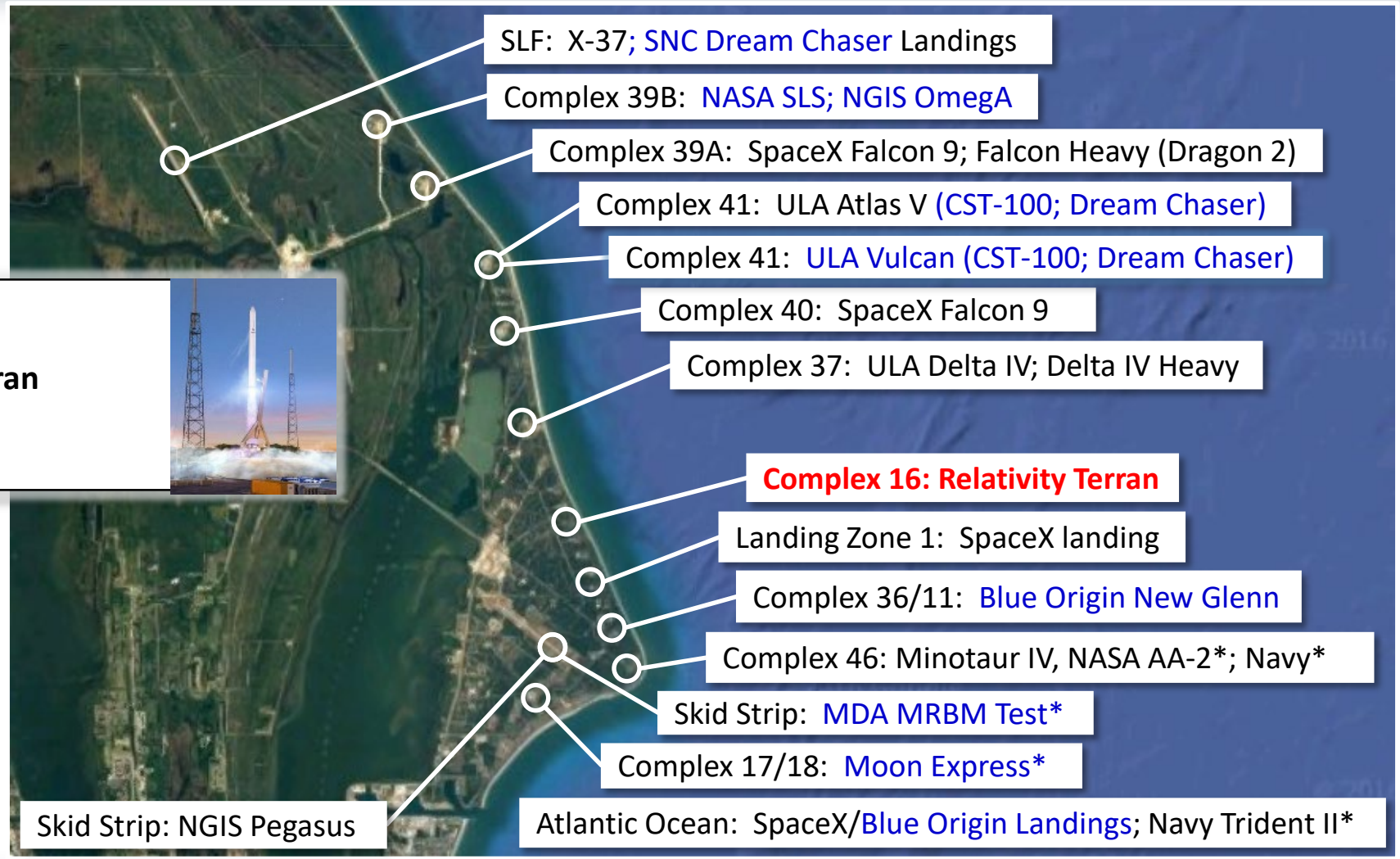


NORTHROP GRUMMAN

Northrop Grumman OmegA
Launch Complex 39B
September 26, 2018

Black text – current programs; Blue text – in work; * – sub-orbital

CCAFS Launch Customers: 2019

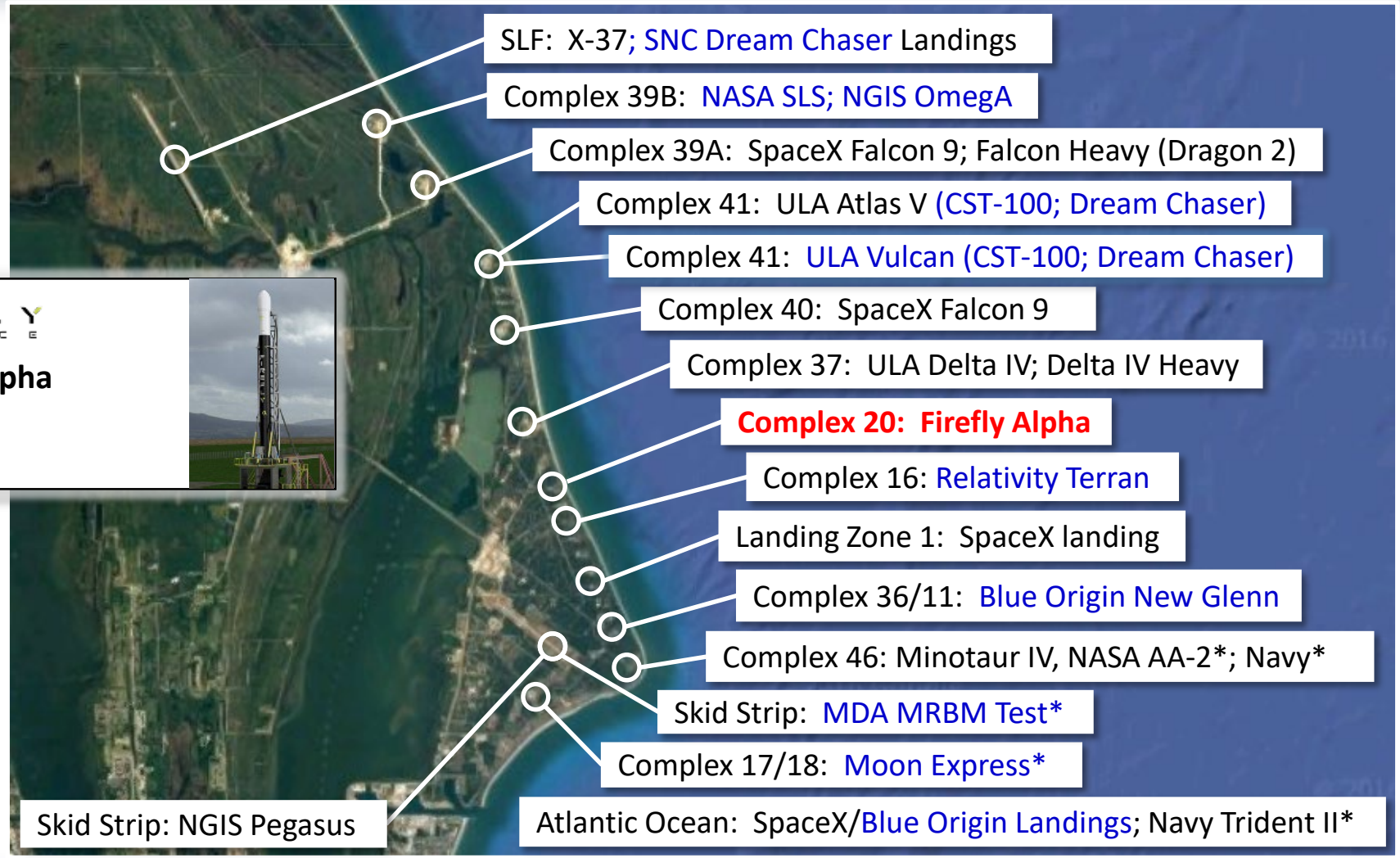


Relativity

Relativity Space Terran
Launch Complex 16
January 11, 2019

Black text – current programs; Blue text – in work; * – sub-orbital

CCAFS Launch Customers: 2019

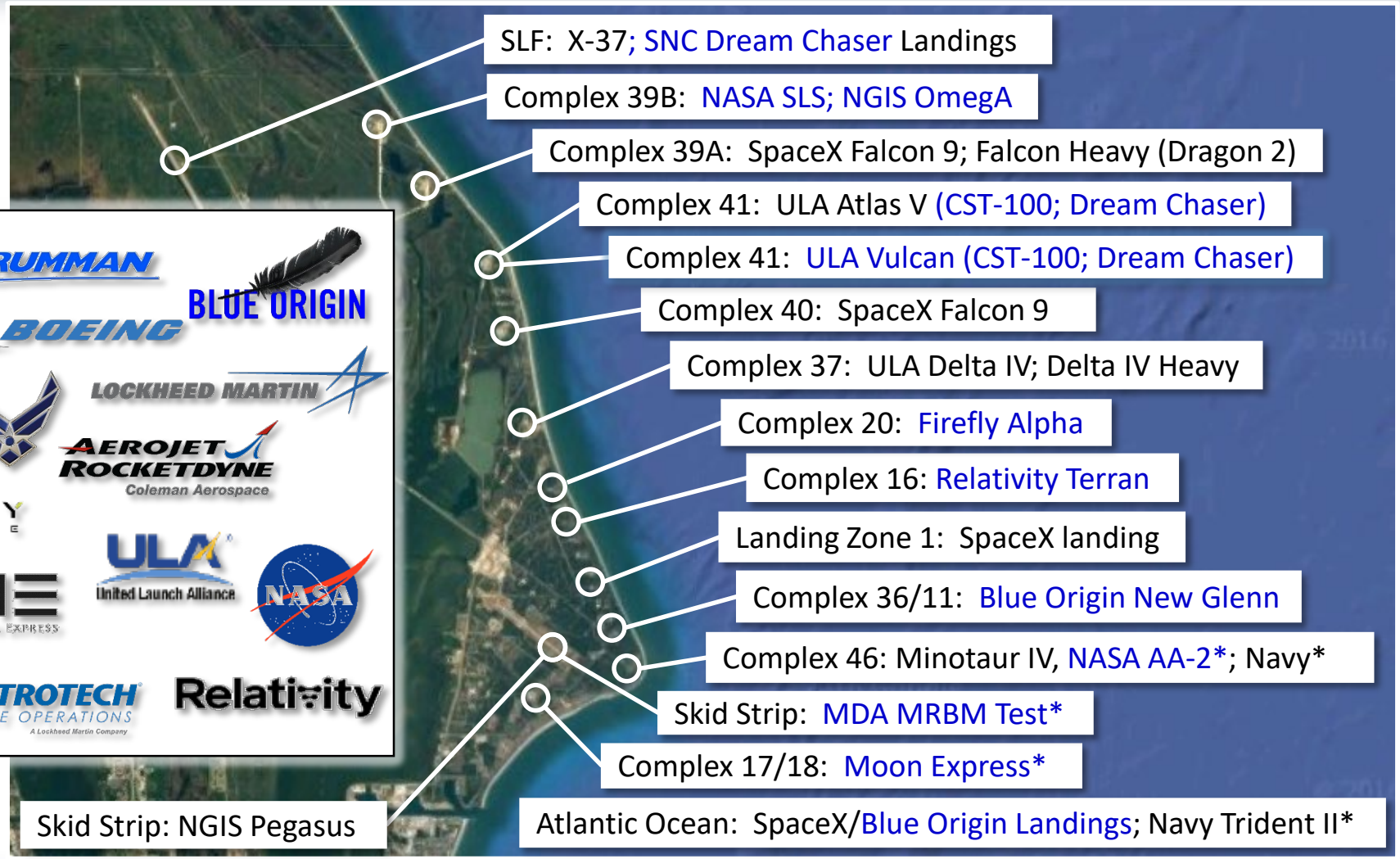


FIREFLY AEROSPACE

Firefly Aerospace Alpha
Launch Complex 20
January 24, 2019

Black text – current programs; Blue text – in work; * – sub-orbital

CCAFS Launch Customers: 2019



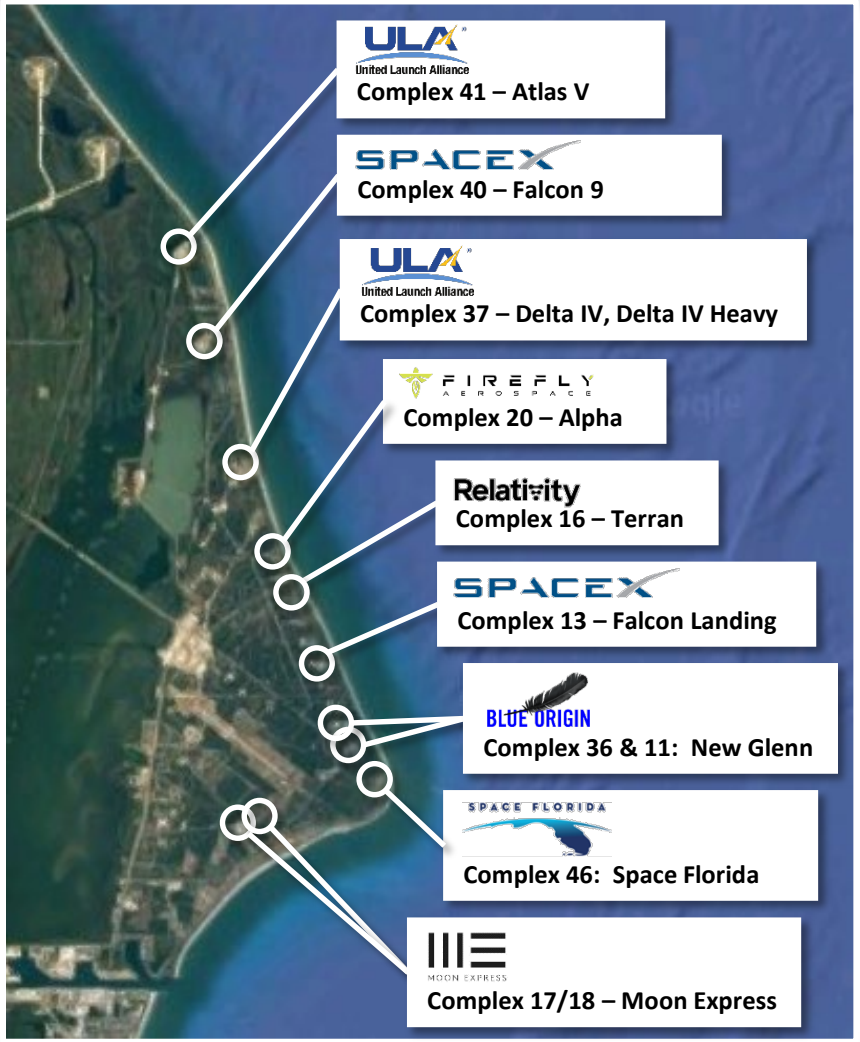
- SLF: X-37; SNC Dream Chaser Landings
- Complex 39B: NASA SLS; NGIS OmegA
- Complex 39A: SpaceX Falcon 9; Falcon Heavy (Dragon 2)
- Complex 41: ULA Atlas V (CST-100; Dream Chaser)
- Complex 41: ULA Vulcan (CST-100; Dream Chaser)
- Complex 40: SpaceX Falcon 9
- Complex 37: ULA Delta IV; Delta IV Heavy
- Complex 20: Firefly Alpha
- Complex 16: Relativity Terran
- Landing Zone 1: SpaceX landing
- Complex 36/11: Blue Origin New Glenn
- Complex 46: Minotaur IV, NASA AA-2*; Navy*
- Skid Strip: MDA MRBM Test*
- Complex 17/18: Moon Express*
- Atlantic Ocean: SpaceX/Blue Origin Landings; Navy Trident II*
- Skid Strip: NGIS Pegasus

Black text – current programs; Blue text – in work; * – sub-orbital

DRIVE TO 48

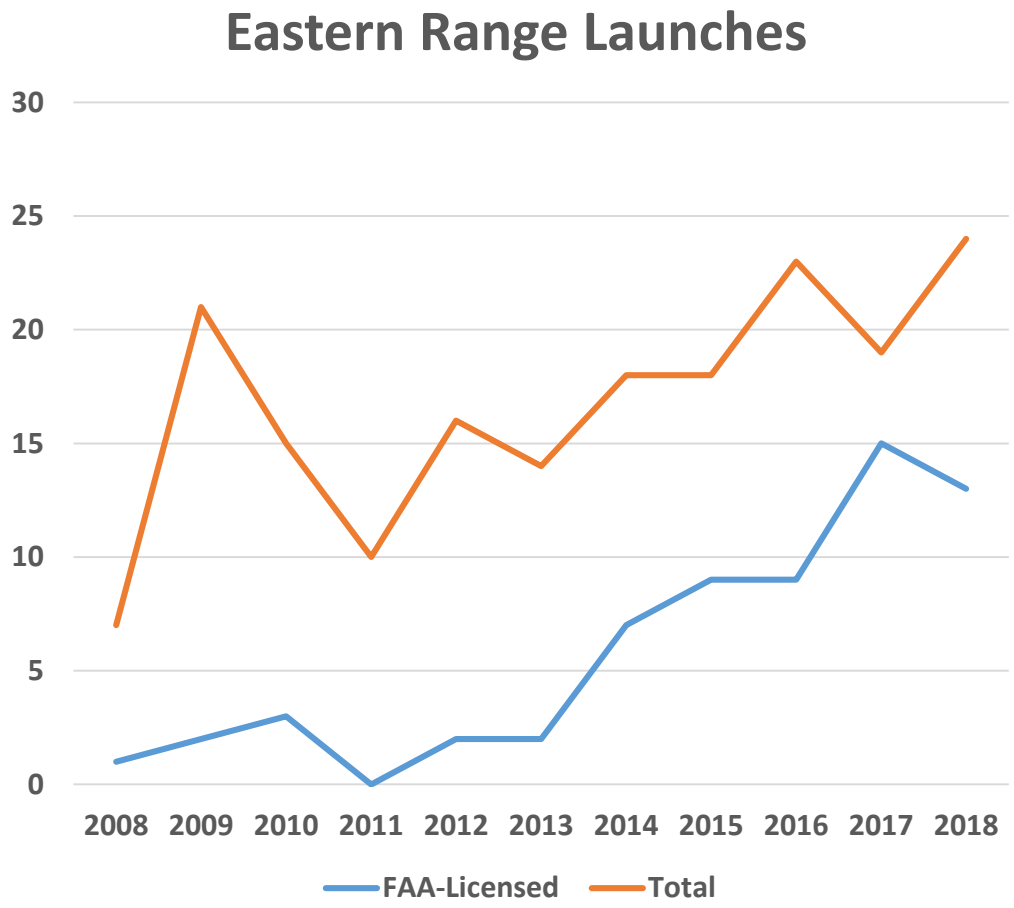
Commercial Activity at CCAFS

- Commercial space operations thriving at CCAFS
  - 45 SW agreements with eight commercial companies
  - Nine launch complexes leased/licensed to commercial/non-federal entities
    - ULA – Complex 37 and 41
    - SpaceX – Complex 40 and 13
    - Blue Origin – Complex 11 and 36
    - Moon Express – Complex 17 and 18
    - Space Florida - Complex 46
  - Two more launch pads pending
    - Firefly (Complex 20) and Relativity (Complex 16)
  - In preliminary talks with five more companies
  - Leased/licensed 102 facilities with over 930,000 square feet of space worth over $491M



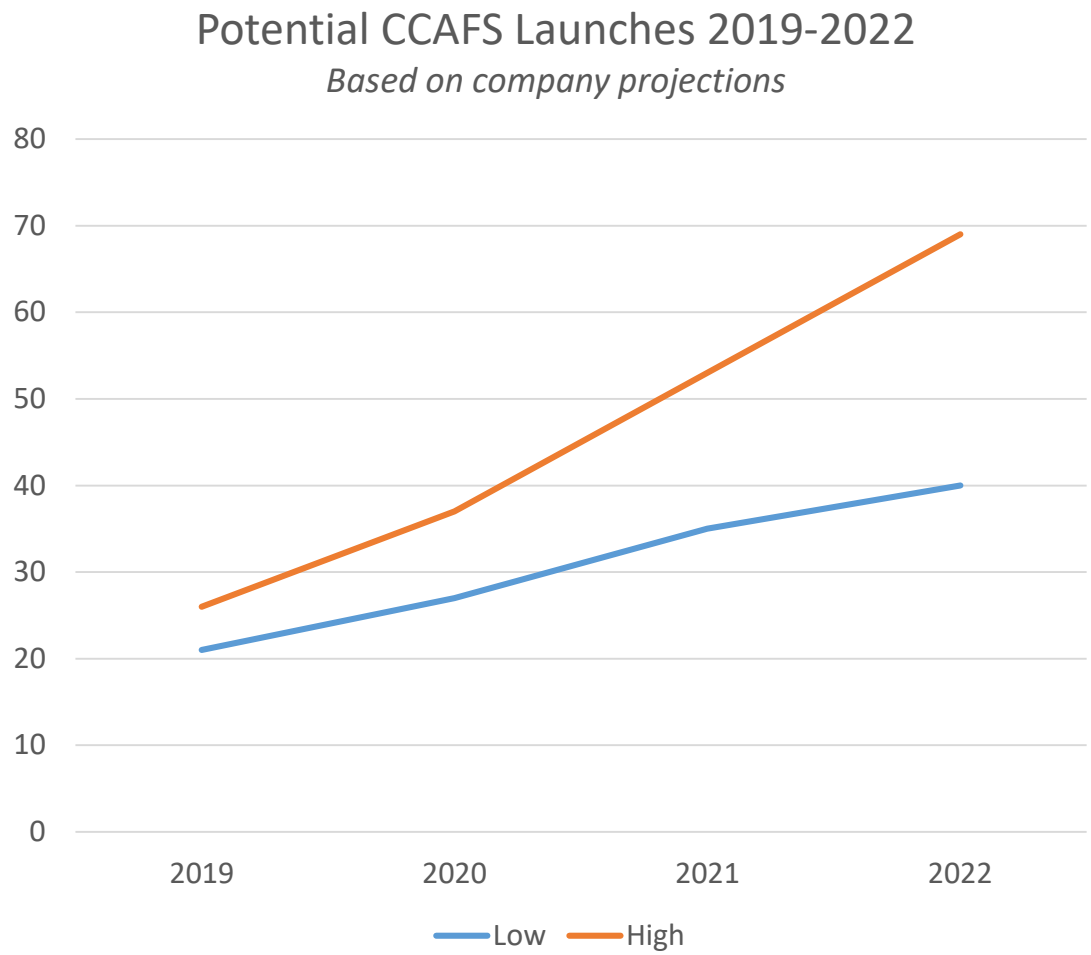
Drive to 48

- Launch cadence climbing at steady rate
- Commercial represents an ever increasing percentage of launches
  - 2008 – 14%; 2018 – 54%
- Autonomous Flight Safety Systems allow for faster launch cadence
- New vehicles and large satellite constellations will push launch rates even higher



Drive to 48

- Launch rate projected to continue climbing
  - 11 potential new launch vehicles in the next 5 years
  - Emerging satellite constellations from SpaceX, OneWeb, Kuiper (Amazon)
- Actual launch rates dependent on success of new companies



On the Way to 48

Future Launch Vehicles

Firefly Aerospace	Relativity	Blue Origin	NASA	Northrop Grumman	ULA
Alpha & Beta **CX-20, CY21 launch**	**Terran 1 & 2** **CX-16, CY20 launch**	**New Glenn** **CX-36, CY21 launch**	**SLS** **CX-39B, CY20 launch**	**OmegA** **CX-39B, CY21 launch**	**Vulcan** **CX-41, CY21 launch**
45 SW Support:	45 SW Support:	45 SW Support:	45 SW Support:	45 SW Support:	45 SW Support:
• Launch pad • Facilities • Safety • Range	• Launch pad • Facilities • Safety • Range	• Launch pad • Facilities • Safety • Range	• Safety • Range	• Safety • Range	• Launch pad • Facilities • Safety • Range

Future Sub-Orbital Test Vehicles

Aerojet Rocketdyne	Moon Express	NASA
MRBM **Skid Strip, CY19 test**	**MTV & MX-1** **CX 17/18; CY20 test**	**Ascent Abort 2** **CX 46; 19 launch**
45 SW Support:	45 SW Support:	45 SW Support:
• Facilities • Runway	• Facilities • Safety	• Launch pad • Safety • Range

Cargo/Crew Vehicles

Boeing	SpaceX	Sierra Nevada Corporation
CST-100 **CX-41, CY19 launch**	**Dragon-2** **CX-39A, CY19 launch**	**Dream Chaser** **CX-41, CY20 launch** ***KSC SLF Landing***
45 SW Support:	45 SW Support:	45 SW Support:
• Safety • Range	• Facilities • Safety • Range	• Safety • Range