



RIPPLE AEROSPACE

DISCLAIMER

THIS DOCUMENT AND THE INFORMATION IN IT ARE PROVIDED IN CONFIDENCE, FOR THE SOLE PURPOSE OF EXPLORING BUSINESS OPPORTUNITIES AND MAY NOT BE DISCLOSED TO ANY THIRD PARTY OR USED FOR ANY OTHER PURPOSE WITHOUT THE EXPRESS WRITTEN PERMISSION OF THE DISCLOSING PARTY. THE INFORMATION CONTAINED IN THIS DOCUMENT IS CONFIDENTIAL, PRIVILEGED AND ONLY FOR THE INFORMATION OF THE INTENDED RECIPIENT AND MAY NOT BE USED, PUBLISHED OR REDISTRIBUTED IN ANY CIRCUMSTANCE. THE OPINIONS AND INFORMATION EXPRESSED ARE IN GOOD FAITH AND WHILE EVERY CARE HAS BEEN TAKEN IN PREPARING THESE DOCUMENTS, RIPPLE AEROSPACE AS MAKES NO WARRANTIES OF WHATEVER NATURE IN RESPECT TO THESE DOCUMENTS, INCLUDING BUT NOT LIMITED TO THE ACCURACY OR COMPLETENESS OF ANY INFORMATION, FACTS AND/OR OPINIONS CONTAINED THEREIN. ALL DRAWINGS, SPECIFICATIONS, PROTOTYPES, AND DATA FURNISHED BY RIPPLE AEROSPACE AS ("RIPPLE") SHALL REMAIN THE PROPERTY OF RIPPLE AND SHALL NOT BE DISCLOSED OR USED BY RECIPIENT AND SHALL BE USED BY RECIPIENT ONLY AS, AND TO THE EXTENT, REQUIRED FOR THE PERFORMANCE OF THIS ORDER, UNLESS RIPPLE SHALL OTHERWISE APPROVE IN WRITING. UPON COMPLETION OF WORK BY RECIPIENT UNDER THIS ORDER AND UPON RIPPLE'S REQUEST, RECIPIENT SHALL PROMPTLY RETURN TO RIPPLE, ALL DRAWINGS, SPECIFICATIONS, PROTOTYPES, AND OTHER DATA FURNISHED BY RIPPLE, IN CONNECTION THEREWITH, TOGETHER WITH ALL COPIES OR REPRINTS THEN IN RECIPIENT'S POSSESSION OR CONTROL, AND RECIPIENT SHALL THEREAFTER MAKE NO FURTHER USE EITHER DIRECTLY OR INDIRECTLY OF ANY SUCH DRAWINGS, SPECIFICATIONS, PROTOTYPES, OR DATA OR OF ANY INFORMATION DERIVED THEREFROM, WITHOUT RIPPLE'S PRIOR WRITTEN CONSENT. SUCH DRAWINGS, SPECIFICATIONS, PROTOTYPES, AND DATA FURNISHED BY RIPPLE TO RECIPIENT COMPRISE CONFIDENTIAL AND PROPRIETARY INFORMATION OF RIPPLE, AND SUCH DRAWINGS, SPECIFICATIONS, PROTOTYPES, AND DATA ARE BEING PROVIDED TO RECIPIENT IN CONFIDENCE. RECIPIENT AGREES TO MAINTAIN SUCH DRAWINGS, SPECIFICATIONS, PROTOTYPES, AND DATA FURNISHED BY RIPPLE IN CONFIDENCE.



RIPPLE AEROSPACE

COMPANY OVERVIEW

Overview

- ♦ Norwegian aerospace startup located in Norway
- ♦ Initial funding provided by the Government of Norway
- ♦ Goal is to commercialize the Sea Serpent Class oceanic rocket by 2020
- ♦ Office in Kristiansand, Norway, with manufacturing and testing operations outside of Kennedy Space Center in Cape Canaveral, Florida

Technology Development

- ♦ Medium-lift launch vehicle
- ♦ Maritime launch ballast system (MLBS)
- ♦ First-stage aerospike engine
- ♦ Off-shore cryogenic fueling technology

Goals

- ♦ Develop, manufacture and operate oceanic launch systems
- ♦ Commercialize medium, heavy, and super-heavy lift oceanic rockets
- ♦ Develop low-cost, reusable, massed produced launch systems costing <\$1,500/kg
- ♦ Create elastic demand within the new space sector by decreasing launch costs to enable the exploration and commercialization of space



PROVEN OCEAN ROCKETRY

120+ successful oceanic launches

55 years of development

Oceanic rocketry has been under development for six decades

20+ programs and 25+ launch vehicle

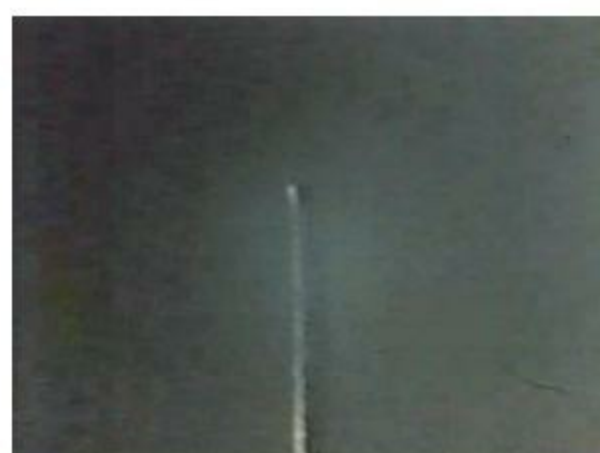
Prominent projects include: Project Hydra, Sea Dragon, Dolphin and Leviathan Launch Vehicles

The Competitor to NASA's SLS Vehicle

In 2011, 62 NASA rocket scientists formed the DIRECT Group to make the case that the next generation NASA rocket should be an oceanic launch system

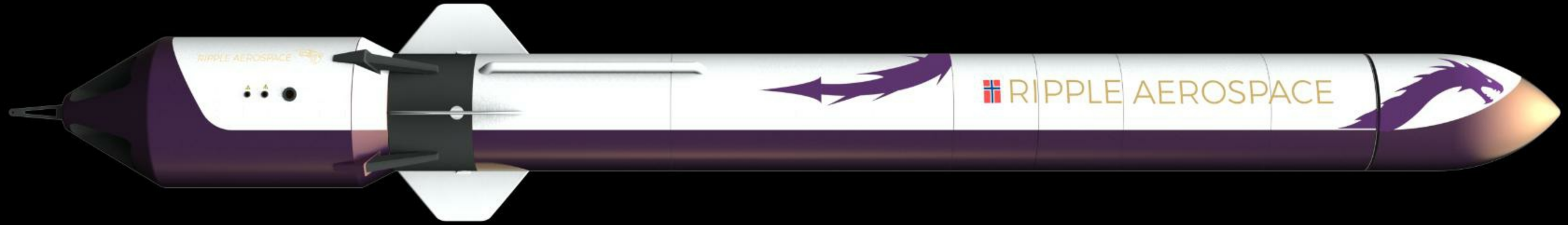
Commercialization of oceanic rockets never materialized because:

- ♦ Political advantages of highly visible, secure land site
- ♦ Lack of funding to pursue dual land and maritime programs
- ♦ Lack of historical funding for heavy launch vehicles
- ♦ Perceived technical challenges of maritime engineering





RIPPLE'S SEA SERPENT OCEANIC ROCKET



Launch System

- ◆ Launch Type: Reusable Oceanic Rocket
- ◆ Dimensions: 46.5m x 3.6m
- ◆ Orbital Capability: 6,220kg - 6,960kg
- ◆ Launch: Maritime
- ◆ Launch Infrastructure: Maritime Launch Ballast System



Ballast System

- ◆ Multi-chamber cylinder ballast system
- ◆ Horizontal stabilization of rocket during transportation
- ◆ Vertical maneuvering and stabilization during fueling and launch

Key Benefits

- ◆ Low Cost
- ◆ Unconstrained Launch Schedule
- ◆ Mobile
- ◆ Limited Infrastructure Investment and Cost
- ◆ Scalable

SEA SERPENTS ORBITAL CAPABILITIES



EARTH

LEO (250KM)

EXPENDABLE 6,960 kg

REUSABLE 6,220 kg

SSO (500KM)

EXPENDABLE 4,200 kg

REUSABLE 3,706 kg

GTO

THREE STAGE 2,790 kg

EXPENDABLE 2,530 kg

REUSABLE 2,172 kg

GEO

THREE STAGE 1,548 kg

EXPENDABLE 1,034 kg

REUSABLE 794 kg

MOON

LUNAR INJECTION

THREE STAGE 2,136 kg

EXPENDABLE 1,762 kg

REUSABLE 1,466 kg

HIGH LUNAR ORBIT

THREE STAGE 2,020 kg

EXPENDABLE 1,622 kg

REUSABLE 1,338 kg

LOW LUNAR ORBIT (300KM)

THREE STAGE 1,528 kg

EXPENDABLE 1,008 kg

REUSABLE 772 kg

MARS

MARS INJECTION

THREE STAGE 1,758 kg

EXPENDABLE 1,300 kg

REUSABLE 1,042 kg

HIGH MARS ORBIT (9,000KM)

THREE STAGE 1,528 kg

EXPENDABLE 1,008 kg

REUSABLE 772 kg

LOW MARS ORBIT (300KM)

THREE STAGE 804 kg

EXPENDABLE 22 kg

PHOBOS & DEIMOS

DEIMOS INJECTION

THREE STAGE 1,322 kg

EXPENDABLE 740 kg

REUSABLE 524 kg

PHOBOS INJECTION

THREE STAGE 1,110 kg

EXPENDABLE 456 kg

REUSABLE 260 kg





LAUNCH INDUSTRY TRENDS

1. Strong demand for launch services

2. Large growth in secondary payloads

3. Consistent growth in primary payloads

4. Nominal growth in launches per year

5. Decrease in launch prices

Key Takeaways

- ◆ Launch prices are too high to create elastic demand within the satellite industry
- ◆ The limited number of launches is severely constraining space sector growth



Commitments & Beneficial Conditions



Outside normal regulatory systems

Environmentally friendly. Safer

70% of the world is our launchpad

Can sail under any flag

Will democratize space access

Launch in international waters

Green fuels

No need for landmass infrastructure

Countries can have access to their own space program at a fraction of the cost

Poor and wealthy nations alike will have equal and cheap access to space

Reduced danger to population centres



Ripple is committed to develop low-cost oceanic launch vehicles which will provide open, green and cheap access to space



CONTACT



Kristoffer Liland
CEO

Phone: +47.905.69.963
Email: kistoffer@rippleaerospace.com



Elliot Carol
CFO

Phone: +1.646.455.8382
Email: elliott@rippleaerospace.com



Oystein Borgesen
Sea Serpent R&D Manager

Phone: +47.905.69.963
Email: oystein@rippleaerospace.com

From the Seas to the Stars

www.rippleaerospace.com