

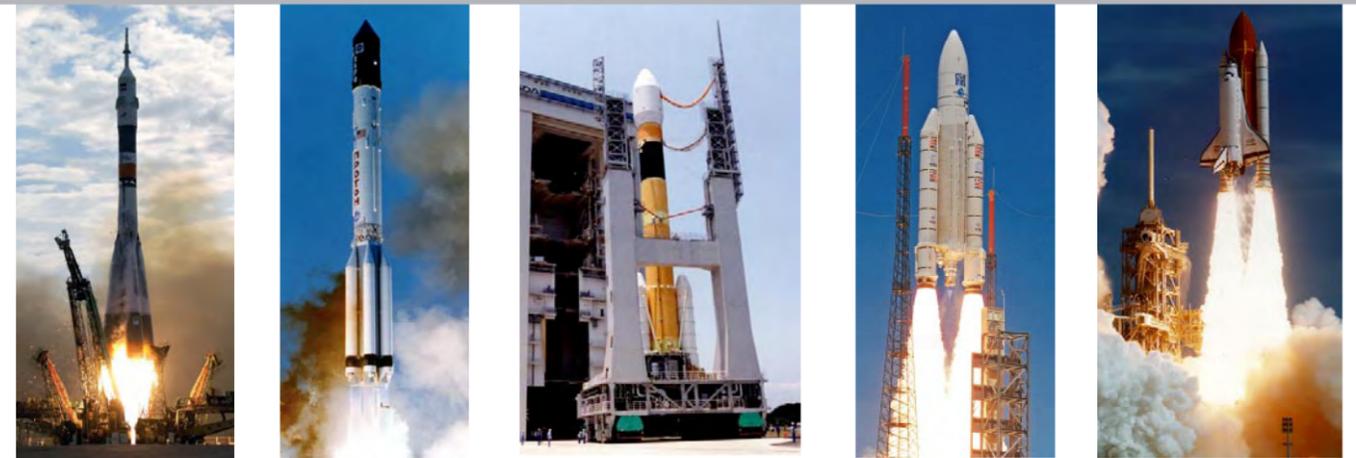
# Launch Vehicles



Building and maintaining the International Space Station (ISS) is a very complex task. An international fleet of space vehicles launches ISS components; rotates crews; provides logistical support; and replenishes propellant, items for science experiments, and other necessary supplies and equipment. The Space Shuttle must be used to deliver most ISS modules and major components.

All of these important deliveries sustain a constant supply line that is crucial to the development and maintenance of the International Space Station. The fleet is also responsible for returning experiment results to Earth and for removing trash and waste from the ISS.

Currently, transport vehicles are launched from two sites on Earth. In the future, the number of launch sites will increase to four or more. Future plans also include new commercial transports that will take over the role of U.S. ISS logistical support.



**Soyuz** Roscosmos Russia  
**Proton**  
**H-II** JAXA Japan  
**Ariane** ESA Europe  
**Shuttle** NASA United States

	RUSSIA		JAPAN	EUROPE	U.S.
	Soyuz SL-4	Proton SL-12	H-II	Ariane 5	Space Shuttle
<b>First launch</b>	1957 1963 (Soyuz variant)	1965	1996	1996	1981
<b>Launch site(s)</b>	Baikonur Cosmodrome	Baikonur Cosmodrome	Tanegashima Space Center	Guiana Space Center	Kennedy Space Center
<b>Launch performance payload capacity</b>	7,150 kg (15,750 lb)	20,000 kg (44,000 lb)	16,500 kg (36,400 lb)	18,000 kg (39,700 lb)	18,600 kg (41,000 lb) 105,000 kg (230,000 lb), orbiter only
<b>Return performance payload capacity</b>	N/A	N/A	N/A	N/A	18,600 kg (41,000 lb) 105,000 kg (230,000 lb), orbiter only
<b>Number of stages</b>	2 + 4 strap-ons	4 + 6 strap-ons	2 + 2 strap-ons	2 + 2 strap-ons	1.5 + 2 strap-ons
<b>Length</b>	49.5 m (162 ft)	57 m (187 ft)	53 m (173 ft)	51 m (167 ft)	56.14 m (182 ft) 37.24 m (122.17 ft), orbiter only
<b>Mass</b>	310,000 kg (683,400 lb)	690,000 kg (1,521,200 lb)	570,000 kg (1,256,600 lb)	746,000 kg (1,644,600 lb)	2,040,000 kg (4,497,400 lb)
<b>Launch thrust</b>	6,000 kN (1,348,800 lbf)	9,000 kN (2,023,200 lbf)	5,600 kN (1,258,900 lbf)	11,400 kN (2,562,820 lbf)	34,677 kN (7,795,700 lbf)
<b>Payload Examples</b>	Soyuz Progress Pirs	Service Module Functional Cargo Block (FGB) Research Module (RM) Multipurpose Lab Module (MLM)	H-II Transfer Vehicle (HTV)	Ariane Automated Transfer Vehicle (ATV)	Shuttle Orbiter Nodes, U.S. Lab Columbus, JEM, Truss elements Airlock, SSRMS

The largest U.S. and Russian launch vehicles are used to place elements of the ISS, crew, and cargo in orbit. Eventually, Japanese and European launch vehicles will support cargo delivery. Currently, only the U.S. Space Shuttle provides the capability to return significant payloads.