

# SOYUZ THROUGH THE AGES

The **R-7 rocket** that led to the family of Soyuz vehicles launching today lifted off for the first time on **Feb. 17, 1959**. The last launch, on **Dec. 27, 2018**, was number **1,898**.

Irene Klotz and Maxim Pyadushkin Vostochny Cosmodrome

**M**anufactured by the Progress Rocket Space Center in Samara, Russia, the medium-lift expendable booster originally was used for Soviet-era human space missions and later became the workhorse for the country's civilian and military space programs.

The first rocket officially named Soyuz was launched in 1966 and has since flown 1,050 times, of which 1,023 were successful. Production of Soyuz rockets peaked in the early 1980s at about 60 vehicles per year.

Russia began offering Soyuz launch services internationally in the mid-1980s through Glavkosmos, a commercial entity set up to sell Soviet rocket and space technologies.

In 1996, Russia created Starsem, a joint venture (35% ArianeGroup, 25% Roscosmos, 25% RKTs Progress, 15% Arianespace) that had exclusive rights to provide commercial launch services on Soyuz launch vehicles. The agreement expired in December 2017.

In 2002, Russia teamed with Arianespace to sell Soyuz launch services via Arianespace from the Guiana Space Center in Kourou, French Guiana.

In 2017, GK Launch Services—a joint venture of Glavkosmos (now a subsidiary of Roscosmos) and Kosmotras, an operator of Dnepr launch vehicles—was created to provide commercial launch services with the Soyuz from Russia's leased facility at the Baikonur Cosmodrome in Kazakhstan and from the new Vostochny spaceport in Russia's Far East. Kosmotras is a joint venture among Russia, Ukraine and Kazakhstan that was established in 1997.

Russia's Khrunichev Space Research and Production Center is the parent company of Reston, Virginia-based International Launch Services, or ILS, which was established in 1995 for commercial sales of Russia's Proton and Angara launch vehicles.

## Soyuz Medium-Class Launch Vehicle

Manufacturer: Progress Rocket Space Center, Samara, Russia

### Dimensions

Length..... 51.1 m (167.6 ft.)  
Diameter ..... 10.3 m (33.8 ft.)  
Number of Stages..... 3  
Liftoff Mass ..... 313,000 kg (690,000 lb.)

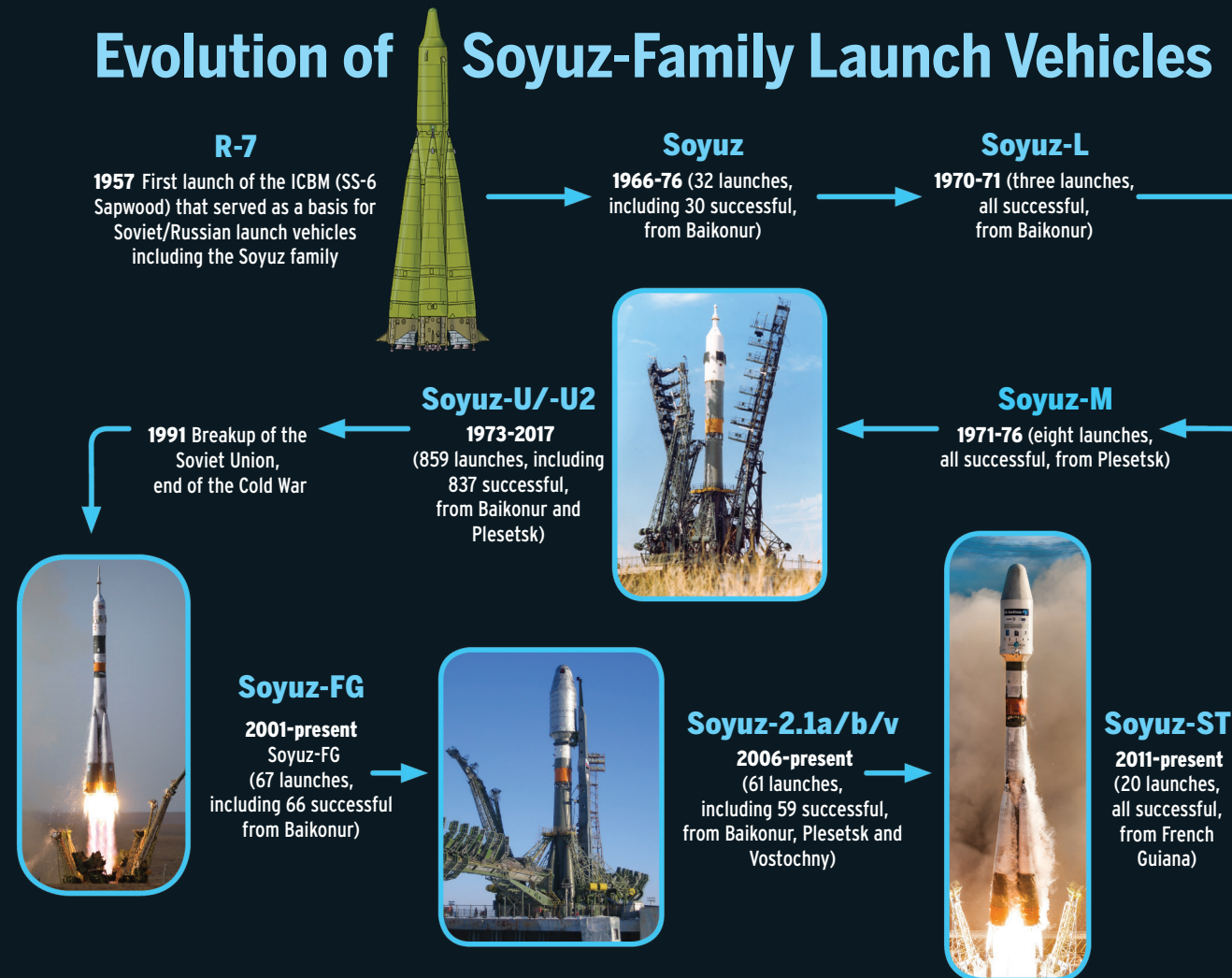
### Fuel

First Stage ..... LOX/kerosene  
Second Stage ..... LOX/kerosene  
Third Stage ..... LOX/kerosene  
Fregat Upper Stage: Dinitrogen tetroxide/UDMH

Payload for Soyuz-2.1a with Fregat Upper Stage: 4,200 kg (9,260 lb.) to Sun-Synchronous Orbit

Launch Price: from \$48.5 million

## Evolution of Soyuz-Family Launch Vehicles



Total for Soyuz-family launches: 1,050, including **1,023** successful.

PHOTO CREDITS IN CHRONOLOGICAL ORDER: HERIBERTO ARRIBASABATO/WIKIMEDIA, ADIUDIN/WIKIPEDIA, BILL INGALS/NASA/WIKIPEDIA, ARIE/WIKIPEDIA, ARIANESPACE

## Rockets come and gone (by lift capability, small to heavy)

ROCKET ILLUSTRATIONS: COLIN THROM/AW&ST

