

## **Assessment of Launch Failures from 1989-Present**

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Rocketry is inherently complex, hazardous, and at the vanguard of technology. Over the past three decades and after 2,300 orbital flights, the world has seen little reduction in launch risk with the privatization and international expansion of space exploration; in some nations, the probability of launch failure is increasing. Tendencies in global and national launch and failure rates, evidence of driving risk contributions from launch vehicle subsystem failures, and forecasting future launch failure probability are important facets of risk evaluation as many organizations develop launch capability.

This presentation examines publicly-available failure records compiled for orbital launches by nation from 1989 through September 2017. Analysis emphasizes American and Russian launch trends and failures by critical subsystems. Data forecasting methodology predicts launch vehicle reliability to 2030. The data suggest dramatic improvements in launch reliability would require modifications to vehicle design.