NASA Aviation Safety Reporting System

Contributions to Aviation Safety

Middle Tennessee State University

March 24, 2021

Mary Keller
ASRS Project Manager
Mary.T.Keller@nasa.gov
(408) 541-2831

Becky L. Hooey
ASRS Program Director
Becky.L.Hooey@nasa.gov
(650) 604-2399

Aviation Safety Reporting System

ASRS Genesis

Prior to the creation of ASRS, sharing of aviation safety-related information was done internally by companies / operators

Lessons learned and notification of unsafe conditions were generally not available across organization boundaries

- *On December 1, 1974 TWA Flight 514 crashed into Mt. Weather in Virginia on final approach into Dulles Airport, Washington, D.C., killing all 85 passengers and seven crew members on board*
- *Flight crew misunderstood an ATC clearance and descended prematurely to an altitude below the minimum safe altitude for the area*

This graphic is for illustrative purposes only and not to be used for any other purpose.

ASRS Genesis

- Six weeks earlier the accident was foreshadowed by a United Airlines flight experiencing an identical clearance misunderstanding and barely missing the same mountain during an approach conducted at night
- The United crew reported the event internally and a precautionary notice was issued to United pilots
- No means existed to share the knowledge gained by United's experience with other airline operators
- Aviation community needed a way to share and receive safety information across organizations
- Advisory Circular 00-46A issued May 9, 1975
- Aviation Safety Report System (ASRS) established April 1976 (NASA/FAA)

ASRS Purpose

- Identify deficiencies and discrepancies in the National Airspace System
  - Objective: Improve the current aviation system
- Provide data for planning and improvements to the future National Airspace System
  - Objective: Enhance the basis for human factors research and recommendations for future aviation procedures, operations, facilities, and equipment

ASRS Concept & Mission

- ASRS receives, processes and analyzes voluntarily submitted incident reports from pilots, air traffic controllers, dispatchers, cabin crew, maintenance technicians, and others.
- Reports submitted to ASRS may describe both unsafe occurrences and hazardous situations.
- The experiences described in the reports benefit the aviation industry

Sample Report Topics:

- Near-mid air collisions,
- Airspace violations,
- Runway incursions
- Confusing airport signage
- Charting / navigation issues
- Confusing phraseology
- Aircraft / Equipment failures
- Automation Failures / Over-reliance
- Training

ASRS Principles

VOLUNTARY PARTICIPATION

Aviation personnel voluntarily submit reports concerning events related to safety for the purpose of system alerting, understanding and learning

CONFIDENTIALITY PROTECTION

Protection of identity is provided by NASA through de-identification of persons, companies, and any other identifying information

NON-PUNITIVE

FAA will not use, nor will NASA provide, any report submitted for inclusion under ASRS guidelines or information derived therein for use in any disciplinary or other adverse action (14 CFR 91.25 & AC 00-46E)

INDEPENDENT

NASA serves as the independent honest-broker.

We do not share your identity with FAA

ASRS Government & Industry Partnership

- FAA provides funding to NASA for ASRS operations and report processing
- NASA manages ASRS operations and provides research and analysis capabilities
- The Aviation Community provides support through advocacy for reporting, feedback, and communications

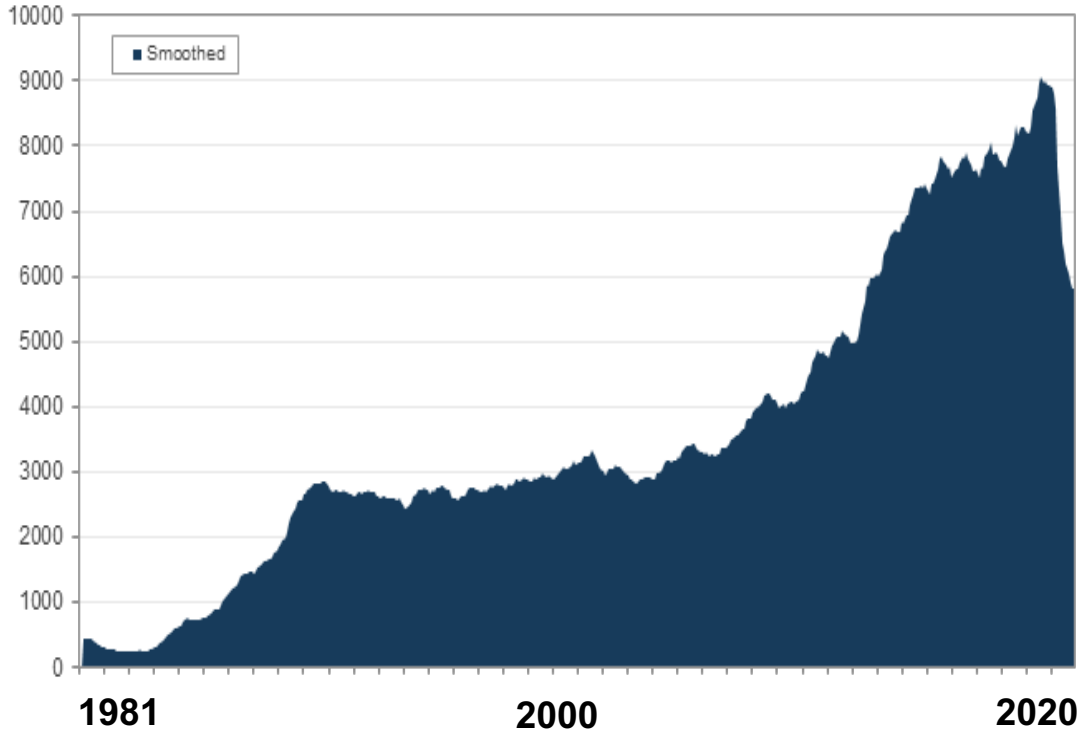
ASRS Staff

- Highly experienced ***pilots***, ***air traffic controllers*** and ***mechanics***, and a management team that possess aviation and human factors experience.
- Analysts' combined experience of over 600 cumulative years of aviation expertise in:
  - Air carrier, corporate, military, and general aviation
  - ATC in Towers, TRACONs, Centers, and Military Facilities.
- Human factors and psychology research experience in training, fatigue, crew resource management, user interface design, usability evaluations, and research methodology.

Report Intake Overview

- Over 44 years of confidential safety reporting
- Over 1,780,000 reports received
- Total report intake for 2020 was 65,656
- Report intake for 2019 was 107,879

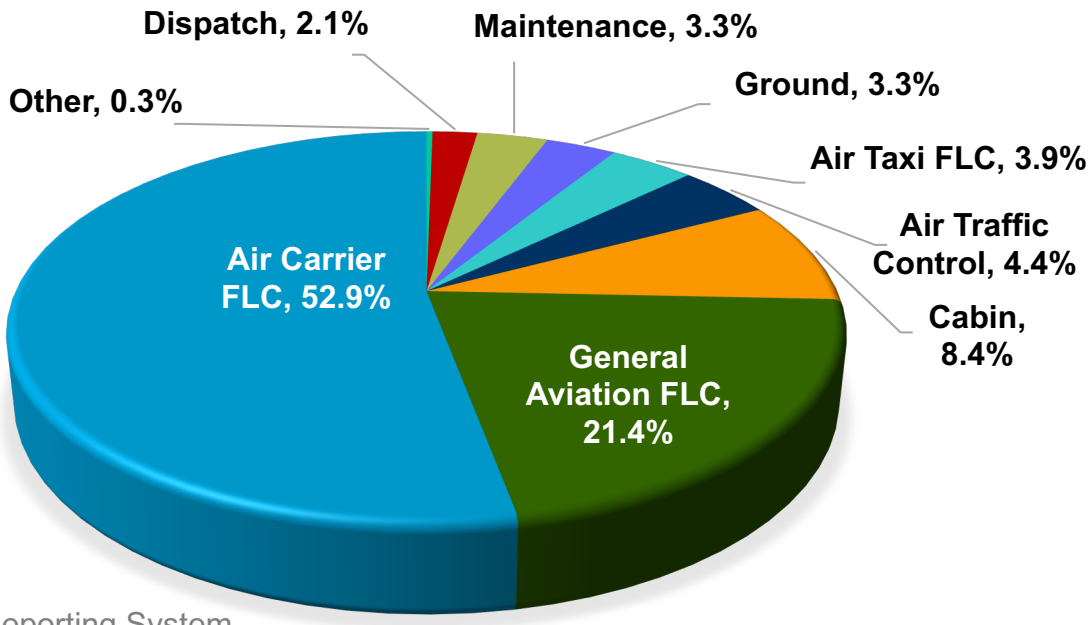
Monthly Intake
January 1981 – December 2020



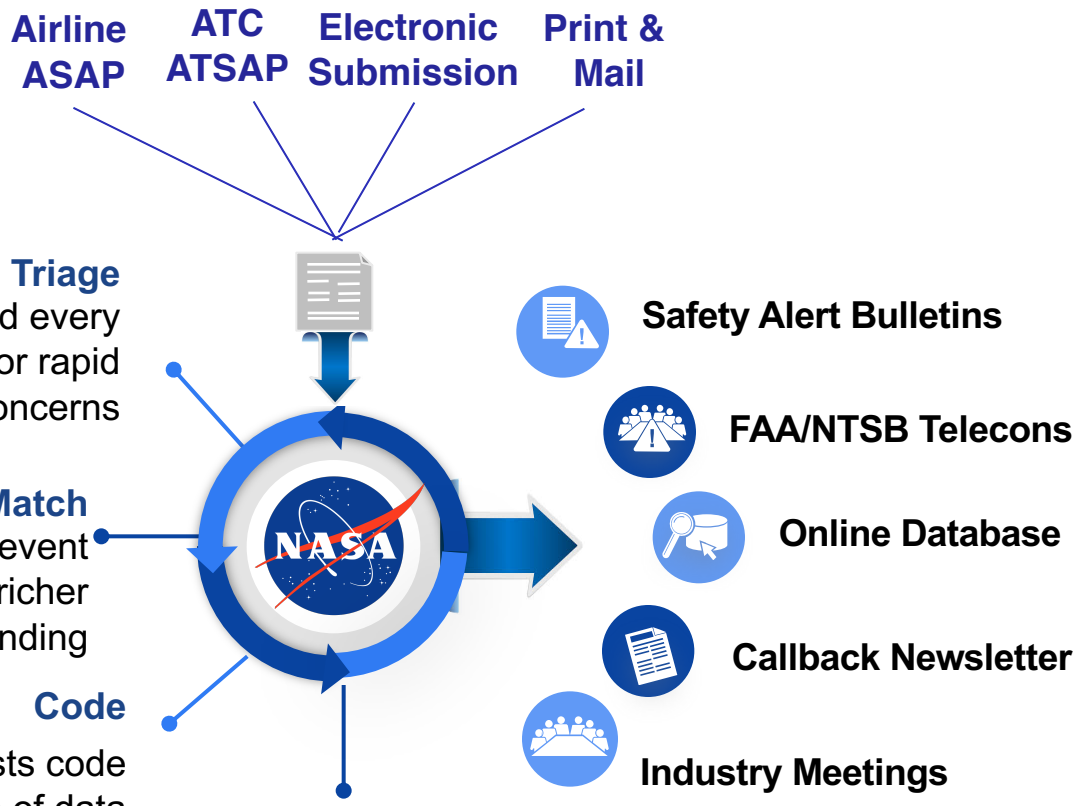
Report Intake Overview

Who Reports to ASRS?

- Any person who is aware of a safety concern in the National Airspace System
- Airline ASAP participants, ATC ATSAP participants, General Aviation participants
- Pilots, Maintenance, Dispatch, Ground Ops, Cabin Crew and UAV/UAS Operators
- If two pilots are involved in an incident, both should submit their own report



Report Processing Flow



ASRS General Report Form

https://asrs.arc.nasa.gov/report/electronic.html

DESCRIBE EVENT/SITUATION

Keeping in mind the topics shown below, discuss those which you feel are relevant and anything else you think is important. Include what you believe really caused the problem, and what can be done to prevent a recurrence, or correct the situation.

Report Narrative

Tell us Your Story

PLEASE FILL IN APPROPRIATE SPACES AND CHECK ALL ITEMS WHICH APPLY TO THIS EVENT OR SITUATION.

REPORTER

☐ Captain ☐ First Officer
☐ pilot flying ☐ pilot not flying ☐ relief pilot ☐ check airman
☐ Single Pilot ☐ Instructor ☐ Trainee ☐ Dispatcher: ____ yrs ☐ Other: ____

FLYING TIME (in hours)

Total Time ____ hrs
Last 90 Days ____ hrs
Time in Type ____ hrs

CERTIFICATES & RATINGS

☐ Student ☐ Sport/Rec ☐ Private ☐ Commercial ☐ ATP
☐ Flight Instructor ☐ Multiengine ☐ Instrument ☐ Flight Engineer ☐ Other: ____

ATC EXPERIENCE

☐ FPL ☐ Developmental
radar ____ yrs
non-radar ____ yrs
supervisory ____ yrs
military ____ yrs

AIRSPACE

☐ Class A ☐ Class E ☐ Class B ☐ Class G ☐ Class C ☐ Special Use ☐ Class D ☐ TFR

CONDITIONS / WEATHER ELEMENTS

☐ VMC ☐ IMC ☐ Mixed ☐ Marginal
☐ fog ☐ hail ☐ haze/smoke ☐ icing ☐ rain ☐ snow ☐ thunderstorm ☐ turbulence ☐ windshear ☐ other: ____

LIGHT / VISIBILITY

☐ dawn ☐ daylight ☐ night ☐ dusk
Ceiling ____ feet
Visibility ____ miles
RVR ____ feet

ATC / ADVISORY SVC.

☐ Ramp ☐ Center ☐ Ground ☐ FSS ☐ Tower ☐ UNICOM ☐ TRACON ☐ CTAF
ATC Facility Name: ____

	AIRCRAFT 1			AIRCRAFT 2		
Your Aircraft Type (Make/Model) (e.g. B737, Not "N#", Flt#", etc.): ____			Operating FAR Part: ____	Other Aircraft: ____		Operating FAR Part: ____
Operator	☐ air carrier ☐ air taxi ☐ corporate	☐ fractional ☐ FBO ☐ government	☐ military ☐ personal ☐ other: ____	☐ air carrier ☐ air taxi ☐ corporate	☐ fractional ☐ FBO ☐ government	☐ military ☐ personal ☐ other: ____
Mission	☐ passenger ☐ personal	☐ cargo/freight ☐ training	☐ ferry ☐ other: ____	☐ passenger ☐ personal	☐ cargo/freight ☐ training	☐ ferry ☐ other: ____
Flight Plan	☐ VFR ☐ IFR	☐ SVFR ☐ DVFR	☐ none	☐ VFR ☐ IFR	☐ SVFR ☐ DVFR	☐ none
Flight Phase	☐ taxi ☐ parked ☐ takeoff ☐ initial climb	☐ climb ☐ cruise ☐ descent ☐ initial approach	☐ final approach ☐ missed/GAR ☐ landing ☐ other: ____	☐ taxi ☐ parked ☐ takeoff ☐ initial climb	☐ climb ☐ cruise ☐ descent ☐ initial approach	☐ final approach ☐ missed/GAR ☐ landing ☐ other: ____
Route in Use	☐ airway (ID): ____ ☐ direct ☐ SID (ID): ____	☐ STAR (ID): ____ ☐ oceanic ☐ vectors	☐ visual approach ☐ none ☐ other: ____	☐ airway (ID): ____ ☐ direct ☐ SID (ID): ____	☐ STAR (ID): ____ ☐ oceanic ☐ vectors	☐ visual approach ☐ none ☐ other: ____

If more than two aircraft were involved, please describe the additional aircraft in the "Describe Event/Situation" section.

LOCATION

Altitude: ____ (single value) ☐ MSL ☐ AGL
Distance: ____ and/or Radial (bearing): ____ from:
☐ Airport ____ ☐ ATC Fac ____
☐ Intersection ____ ☐ NAVAID ____

CONFLICTS

Estimated miss distance in feet: horiz ____ vert ____
Was evasive action taken? ☐ Yes ☐ No
Was TCAS a factor? ☐ TA ☐ RA ☐ No
Did terrain warning system activate? ☐ Yes ☐ No

NASA ARC 277B (May 2009) **GENERAL** OMB No. 2700-0172 Exp 7/31/2022

Alert Safety Bulletins

Alert Safety Bulletins are issued based on information in reports describing a hazardous situation, a confusing procedure, or any other circumstance which might compromise safe flight

Purpose is to relay safety information to organizations in positions of authority so that they can evaluate the information and take possible corrective actions.

Examples of Safety Alerting Success

- **FRG Taxiway Signage (FYI 2019-39)**
  An FRG Airport representative responded and stated "...In reviewing the NASA/ASRS report, we believe a possible communication error occurred regarding the transmission between the tower and the pilot. We will speak with our Certification Inspector to see what other options or recommendation could be used at this location to increase situational awareness. The airport is in the early stages of a runway safety area project for runway 1-19."

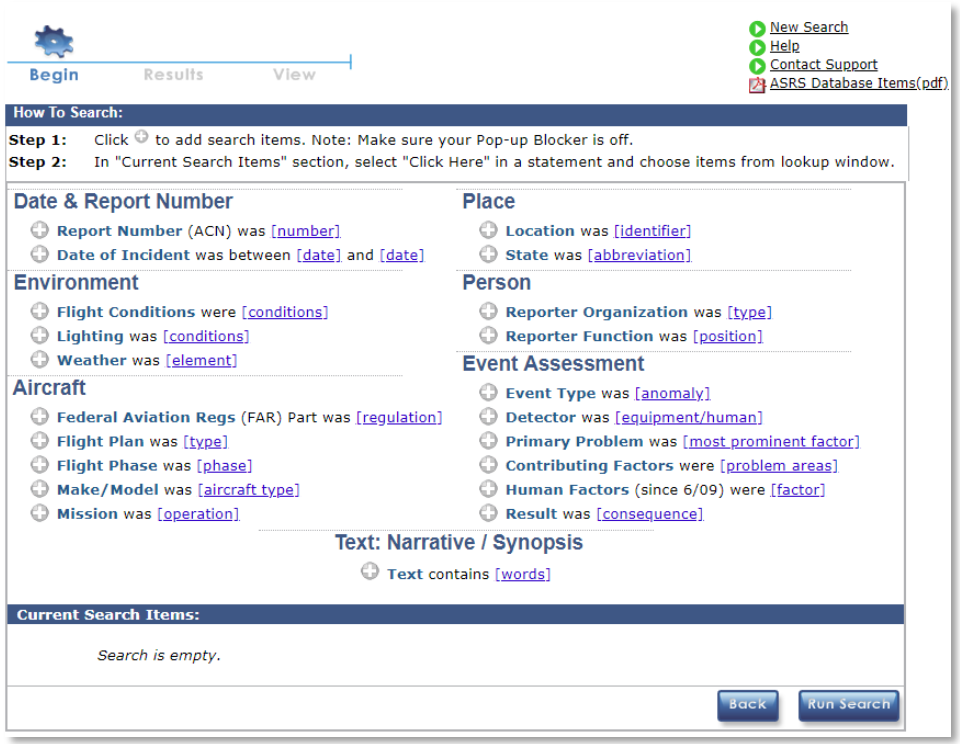
- **MSLP Arrival Charting (FYI 2019-46)**
  A Jeppesen Sanderson Inc., representative responded and stated "...we revised the (20-2B) ATUMA 2K, MORAM 2K, RELTA 2K Arrivals Chart and the (20-2C) ATUMA 2L, MORAM 2L, RELTA 2L Arrivals Chart for the changes, we missed updating that specific altitude at ASTOR. So, the two Jepp Charts will be revised in the next two weeks... A Chart Change Notice has already been issued."

- **DFW Runway 17C Light Intensity Issue (FYI 2019-88)**
  The Dallas-Fort Worth Airport Operations office responded and stated "Please be advised DFW Operations is in receipt of ACN # 1685472 regarding in-pavement LED lighting on DFW runway 17C-35C. In coordination with DFW Air Traffic Control, the airport tested various in-pavement light settings. Pilots were made aware of the settings check and were asked to comment upon rollout. Consensus was reached on a preferred setting. Default in-pavement lighting settings have been changed to the lower, preferred step."

ASRS Database

Direct access to search de-identified reports in the ASRS database is available through **ASRS Database Online (DBOL)**

https://asrs.arc.nasa.gov/



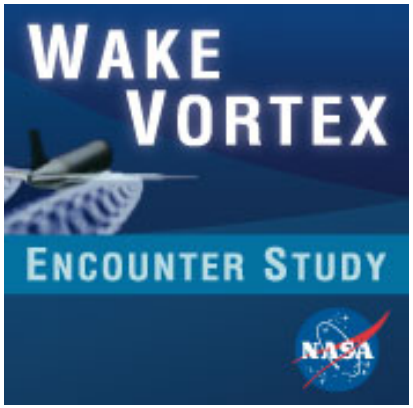
Over 212,800 reports currently available

Special Report Sets

- Collections of records on specific safety topics
- Contain at least 50 records each
- 30 sets available

Focused Study

Wake Vortex Encounter Study



In cooperation with the FAA in 2007, ASRS began examining Wake Vortex Encounter incidents reported to ASRS. Study includes all airspace within the United States, enroute and terminal environments and documents event dynamics and contributing factors underlying unique wake vortex encounter incidents.

NextGen Human Factors Study

ASRS provided insight into airspace operations in the New York Metroplex region for the FAA. Reports described procedural deviations and other situations where a crew was unable to complete a procedure, such as communication issues or transitions from arrival to approach segments.

CALLBACK Newsletter

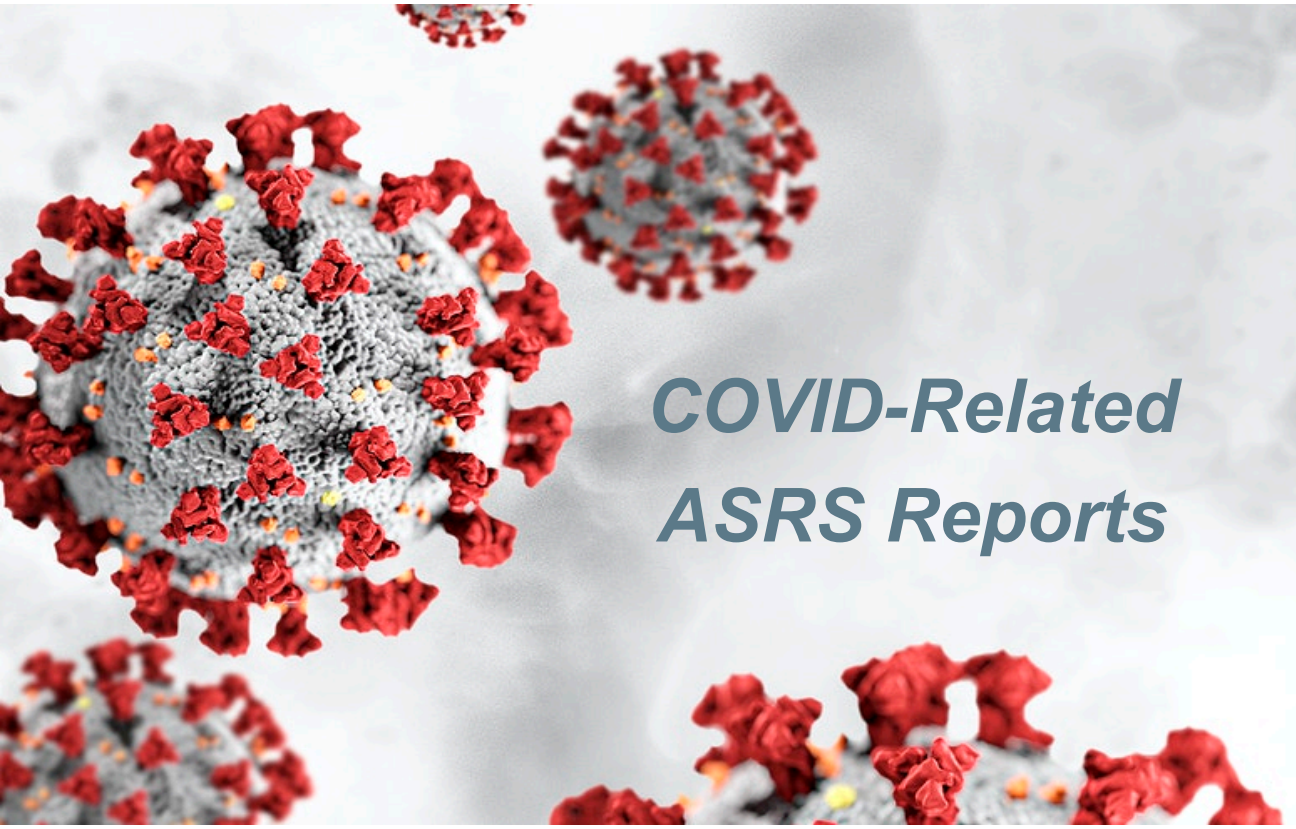
Issue Number	Month	Issue Title / Topic
480	January	The “Whether” of Winter Weather
481	February	What Would You Have Done?
482	March	Adventures in Ground Operations
483	April	Observations of RNAV (RNP) Approaches
484	May	A Day in the Life of a Maintainer
485	June	The COVID-19 Confrontation
486	July	The Old Threat From a New Enemy
487	August	What Would You Have Done?
488	September	MEL Missteps
489	October	Late Clearance Changes
490	November	Airmanship and Automation
491	December	VFR Flight into IMC

https://asrs.arc.nasa.gov/publications/callback.html

CALLBACK

- In "**The First Half of the Story**," you will find report excerpts describing an event up to a point where a specific decision must be made, an immediate action must be taken, or a non-normal situation must be actively managed.
  - You may then exercise your own judgment to make a decision, determine a possible course of action, or devise a plan that might best resolve the situation.
- In "**The Rest of the Story**," you will find the actions actually taken by reporters to resolve each situation.
- ASRS does not endorse reporters' action and the decisions presented may not necessarily represent the best course of action. Our intent is to stimulate thought, discussion and training related to the type of incidents that were reported.

COVID-19 Related Reporting



- Pandemic caused 40% reduction in report intake during 2020
- In 2020, over 2,000 COVID-19 related reports were received from all sectors of aviation
- ASRS identified trends and safety concerns which were compiled in safety-related products

COVID-19 Related Reporting

PPE

(Personal Protective Equipment)

Sanitizing

Social Distancing

- Pilot recency of experience

"Due to lack of recent flight currency, a good idea would [be] to reiterate in approach briefing that you haven't flown in a while and for Pilot Monitoring (PM) to be on alert with increased vigilance." ACN 1754995

- Controller Workload and Airspace Issues

"With surrounding airspace closed for COVID-19 we are working a higher than normal volume. The situation was made far more complex when we got an aircraft non RVSM (Reduced Vertical Separation Minimum) who needed direct ZZZ during the peak of complexity." ACN 1737093

- Flight Attendant Concerns

"On this flight, my first flight worked since the introduction of mandatory masks I found it incredibly difficult to address the non-compliance of many passengers with the mandatory mask requirement based on the guidelines provided." ACN 1742271

Unmanned Aerial Systems (UAS)

UAS Report Form

Who Should Report?

- Anyone involved in UAS Flight Operations or Maintenance
  - Recreational Flyers
  - Part 107 Crew
  - Part 135 Operators
  - Public Operators
  - Not involved Bystanders
  - Repairman
  - Technician
  - Mechanic
  - Inspector

What Can Be Reported?

- Near Midair with another UAS / aircraft
- Lost Link / Fly Away
- Equipment Issues (hardware / software / automation)
- Airspace Incursions / Excursions
- Deviations
- Communication, Training, Environmental Hazards, or Procedural Issues

Unmanned Aircraft Systems (UAS)

Over 800 records in ASRS database relating to drones and UAS

Equipment Issues	Airborne Conflicts	Airspace Violations	FAR/Procedural Deviations
Remote pilot reported a complete loss of control of UAV due to **electrical failure**. (ACN 1712281) A UAV Pilot in Command reported the **UAV lost power** and glided to a landing. (ACN 1692946) UAV ground commander reported the **drone flying erratically after takeoff**. (ACN 1637257) UAV operator reported that the UAV suffered a **complete loss of power** during flight despite indications of sufficient battery time remaining (ACN 1591117)	UAV pilot reported an **airborne conflict** with an approaching helicopter (ACN 1741764) UAV ground crew reported a **NMAC with low flying aircraft** that was not flying the airport traffic pattern. (ACN 1638145) Unmanned Aerial Vehicle (UAV) pilot reported losing control of the drone, causing it to **collide with a ship**. (ACN 1577960) A UAS operator reported taking **evasive action to avoid traffic** at a non towered airport. (ACN 1600211)	Observer reported a 'toy' UAV operated by his daughter **failed to respond to controls and flew toward DCA at 1500'** AGL (ACN 1728337) A UAS pilot operated their drone **on a different day than what was approved** by the FAA. (ACN 1721078) UAV pilot reported flying and **not realizing authorization had been denied**. (ACN 1712204) UAV operator reported **violation of a TFR**. (ACN 1629713)	A drone operator taking photos reported they allowed their drone to **fly over a moving vehicle**. (ACN 1633911) UAV pilot reported **temporarily losing line-of-sight** with drone. (ACN 1577960)

Contact Information

- **Contact the NASA ASRS Director**
  - Becky L. Hooey– Becky.L.Hooey@nasa.gov

- **Additional Information & Resources**
  - Confidentiality & Incentives to Report
    https://asrs.arc.nasa.gov/overview/confidentiality.html
  - Immunity Policies
    https://asrs.arc.nasa.gov/overview/immunity.html
  - Requesting ASRS Data
    https://asrs.arc.nasa.gov/search/requesting.html