



Working together with Minnesota communities, aircraft operators and the FAA to reduce the impact of aircraft noise.

MACNOMS

Since 1992, the MAC Community Relations Office has operated one of the most sophisticated and comprehensive computerized aircraft noise and flight track data collection and processing systems of its kind. MACNOMS™ (MAC Noise and Operations Monitoring System) provides a cost-effective tool to help MAC staff analyze aircraft noise impacts around MSP and provide public access to flight tracking and detailed aircraft noise data. Community Relations Office staff are able to make informed decisions about aircraft noise and operations impacts and assess specific operations in a timely way. Community members can access near real-time flight operations information and can review detailed historical information at their convenience.

MACNOMS data collection, processing and analysis and reporting tools are made up of customized software programs and instruments that provide system flexibility to conduct detailed analyses and reporting of aircraft operations and associated noise. The system does this by fusing aircraft flight tracks, aircraft operator information, Remote Noise Monitoring Tower (RMT) noise measurements, geographic information, and information on other variables that influence aircraft operations (e.g., weather). The system was most recently validated in 2014 and a copy of the validation study can be found here: [MACNOMS Validation Study 2014](#).

The MACNOMS system can be broken down into four main components: data collection, data processing, data analysis and publication, and community tools for accessing data. These components are described in more detail below.

Data Collection

Aircraft Flight Tracking

MACNOMS collects flight track data through a multi-sensor surveillance data feed available for the U.S. National Airspace System. The data feed is a fusion of multiple data collection services, including data from a privately-owned network of Automatic Dependent Surveillance-Broadcast (ADS-B) sensors, FAA en route and terminal secondary surveillance data, FAA Airport Surface Detection Equipment Model X (ASDE-X) data, FAA Wide Area Multilateration (WAM) data, and FAA flight plan data.

The MAC has an agreement with an external secure data-handler to provide the merged data feed for flights operating within a 40-mile area around the Minneapolis-St. Paul International Airport (MSP) and extending to a height of 20,000 feet. This surveillance area covers all seven MAC-owned airports. The data-handler provides the MAC with a nightly file of the previous day's flight data as well as a real-time feed that is updated every second. This allows for a "near-real-time" streaming flight



MAC Noise and Operations Monitoring System

tracking capability on the macnoise.com FlightTracker application. The MAC is required by law to delay showing real-time flight data for at least 10 minutes.

The technology being used to collect and process flight data provides a high level of accuracy, quick data update rates, expansive coverage and superb reliability when compared to traditional flight tracking systems.

Aircraft Noise Monitoring and Measuring

The MAC's [system of 39 Remote Monitoring Towers \(RMT\)](#) is one of the most extensive permanent aircraft noise monitoring systems in the world. This system monitors noise events continuously in communities surrounding MSP.

Each RMT site consists of laboratory-quality noise monitoring equipment that includes a noise analyzer, a preamplifier and a measurement microphone. This equipment undergoes annual calibration and certification by an independent accredited laboratory.

The analyzer in each RMT monitors noise levels continuously utilizing slow response with A-weighting as directed by the Federal Aviation Regulations (14 CFR Part 150). The analyzer is set to detect an event when the sound pressure level (SPL) reaches 65 dBA and records an event when the SPL remains at or above 63 dBA for at least eight seconds. These measured noise events are downloaded daily and correlated with flight tracks to determine whether the noise source was an aircraft event or a community event.

Each RMT has an "area of influence," which can be thought of as a cylinder surrounding it. The size of the area of influence varies based on the location of the RMT. If an aircraft flies through the area of influence and correlates with the time of a noise event then the event is determined to be caused by the aircraft. When multiple aircraft correlate to the same noise event, the aircraft that is known to produce louder events is correlated with the event. If there is no aircraft in the area of influence during the noise event window of time, the event is determined to be caused by a source within the community.

Data Processing

Much of MACNOMS is built using publicly available open-source software. The internal and external data access is made possible through customization of the open-source software, which increases data analysis flexibility and publication capabilities.

Flight track spatial data and measured aircraft noise data are stored in MACNOMS. The data are processed each night to correlate aircraft operations and associated noise through the "Noise-to-Track" process, which determines which noise events are associated with each MSP arrival and departure.

Data Analysis and Publication

Other MACNOMS data processes tag aircraft events to specific airports, establish runway use, determine compliance with noise abatement procedures, and calculate noise impacts with various metrics such as Day-Night Average Sound Level (DNL), [Time Above](#), and [Number Above](#).

MACNOMS data and tools have proven to be valuable for investigating specific aircraft operations and associated noise. MAC Community Relations Office staff are able to analyze flight data and aircraft noise to identify trends, view activity for specific



locations, research runway use and fleet mix information, and to conduct sophisticated modeling and analyses associated with environmental assessments, planning studies, and aircraft flight procedure monitoring and development.

MAC Community Relations Office staff also are able to retrieve and investigate submitted complaints, and track aircraft noise complaint trends through a specialized web-based application called Aircraft Noise Complaint and Communications Record System (ANCCRS). ANCCRS provides MAC staff with a comprehensive suite of internally-used noise complaint investigation tools. Complaint details and communication records are stored for each address recorded. The ANCCRS mapping function integrates spatial flight track and geographical complaint location information and displays weather, flight activity, aircraft noise events and documented aircraft maintenance run-ups that occurred during the reported complaint date and time. ANCCRS will also display other complaint locations if there are any that were filed during the reported time period.

Community Tools for Accessing Data

The [Interactive Reports](#) tool provides options for the public to view arrival and departure information, runway use statistics, aircraft fleet mix, and aircraft noise data for specified dates and times that are indicated by the user.

The MAC [FlightTracker web tool](#) allows users to investigate and research aircraft operations at all of the MAC-owned airports. The FlightTracker viewing options provide flexibility for accessing flight data through any updated internet browsers, and include static flight track maps, variable animated replay of aircraft activity, and streaming flight activity (with 10 minutes of delay).

Members of the community who wish to [submit aircraft noise complaint](#) information are able to do so easily and conveniently through the customized web-based form provided on the Community Relations Office website. The data entered by the community member go directly into the MACNOMS database.

The MAC's commitment to the community is demonstrated by its investment in delivering high-quality data through user-friendly tools. MACNOMS makes it possible for the public to access detailed aircraft operations data in a timely way through convenient methods.

For more information about MACNOMS, please contact the MAC Community Relations Office staff at 612-726-8100 or via the [Contact Us](#) web form.