

# In situ and remote sensing of turbulence in support of the aviation community

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Turbulence in the free atmosphere has a significant impact on aviation via passenger and flight attendant injuries, re-routing costs, airframe inspections, and public perception regarding air travel. Aviation users require turbulence information which range from seconds to many hours, e.g., for tactical and strategic purposes. In the past, the only routine measurement of turbulence that was available was via pilot reports (pireps). Unfortunately, pireps are subjective measures of turbulence based on the pilot's perception and the response of their aircraft to the turbulence – they are not measures of the atmospheric turbulence intensity. In the recent past – and continuing to this day – programs sponsored by the FAA, NASA and industry have been implemented to create and use measurements of atmospheric turbulence intensity. These programs include: *in situ* measurements and reporting from commercial aircraft; airborne forward looking radar, lidar and infrared sensors; airborne GPS receivers; ground-based radars; and satellite information. A great deal of progress has been made via these programs and some of this work has been translated into operational use. Furthermore, work is ongoing to determine how to integrate these measurements into turbulence nowcasting and forecasting product.