NCAR-Led Applied Technology Insertion into Aviation Operations

John McCarthy, PhD
(Founding) Director of RAP
1981-1995
Technology Transfer to Mitigate Threat to Aviation from Microbursts

- Enhancing the Low Level Wind Shear Alert System (E-LLWSAS) from a six station system to a 32 station system (locations varied on number of sites depending on airport configurations)
- The Terminal Doppler Weather Radar (TDWR), dedicated initially to microburst detection
- Development primarily by NCAR and MIT Lincoln.
- At some sites TDWR was integrated with the Enhanced LLWAS for better detection capabilities
Continued

• 45 TDWR systems were installed by the FAA, and an additional 33 Wind Shear Weather Processors, developed by MIT, were installed, bringing the number of ground-based Doppler radars to 78 total at major airports believed to be at greatest threat of microbursts

• Assisted private sector and NASA development of airborne, forward-looking microburst detectors using Doppler radars.
Continued

• Assisted the FAA, along with Boeing, United Airlines, Lockheed, and Douglas, in developing the Wind Shear Training for airline pilots. It is now a standard training program for all airline pilots in the world, not only by FAA but by airlines under the UN International Civil Aviation Organization (ICAO). Since all air carrier pilots use this training, the concepts go with them world-wide, and are not tied to ground detection systems.
Reducing the Accident Rate
A Model for Success: Wind Shear Accidents

Wind Shear Accidents

- 727 New York 6/24/75
- 727 Denver 8/7/75
- DC-9 Philadelphia 6/23/76
- 727 Doha 3/14/79
- 727 New Orleans 7/9/82
- L1011 Dallas-Ft. Worth 8/2/85
- DC-9 Charlotte 7/2/94
- 707 Pago Pago 1/30/74

Wind Shear Accident Rate (Notional)

Year

Wind Shear Training
Airplane Reactive Systems/Displays
Terminal Doppler Weather Radar
Airplane Predictive Wind Shear Systems

Involvement necessary
- Regulators
- Operators
- Manufacturers

Increasing research and investment in training, airplane systems and infrastructure

Goal established

1 NRC study
2 FAA contract for Training Aid
3 Training Aid contract completed
4 First RWS system certified
5 NPRM on training and RWS equipment
6 FAA rule training and RWS equipment
7 Pilot windshear guide
8 RWS and training required
9 First LLWS installed
10 NASA Predictive Windshear System research start
11 PWS flight trials
12 First PWS STC
13 First PWS delivery as basic
We need to do it again … and we have a process to help us do it

*Industry and Government Working Together*

1. Define problems and interventions
2. Prioritize and develop plan
3. Achieve consensus on priorities
4. Implement the plan

*Data analysis*