

Overview of Activities

FAA National Ceiling and Visibility Product Development Team

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FAA PMR – 4 December 2001



Structure of this Overview

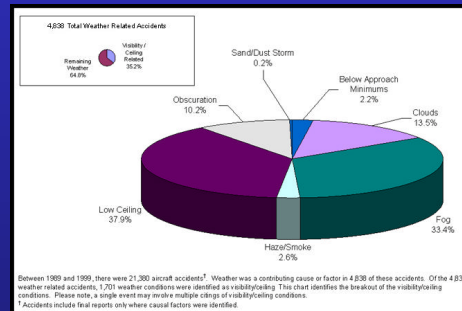
Past C&V Safety Impacts
Pre-PDT Activities

Present . . . Charter of the New PDT
Development Scope
Membership

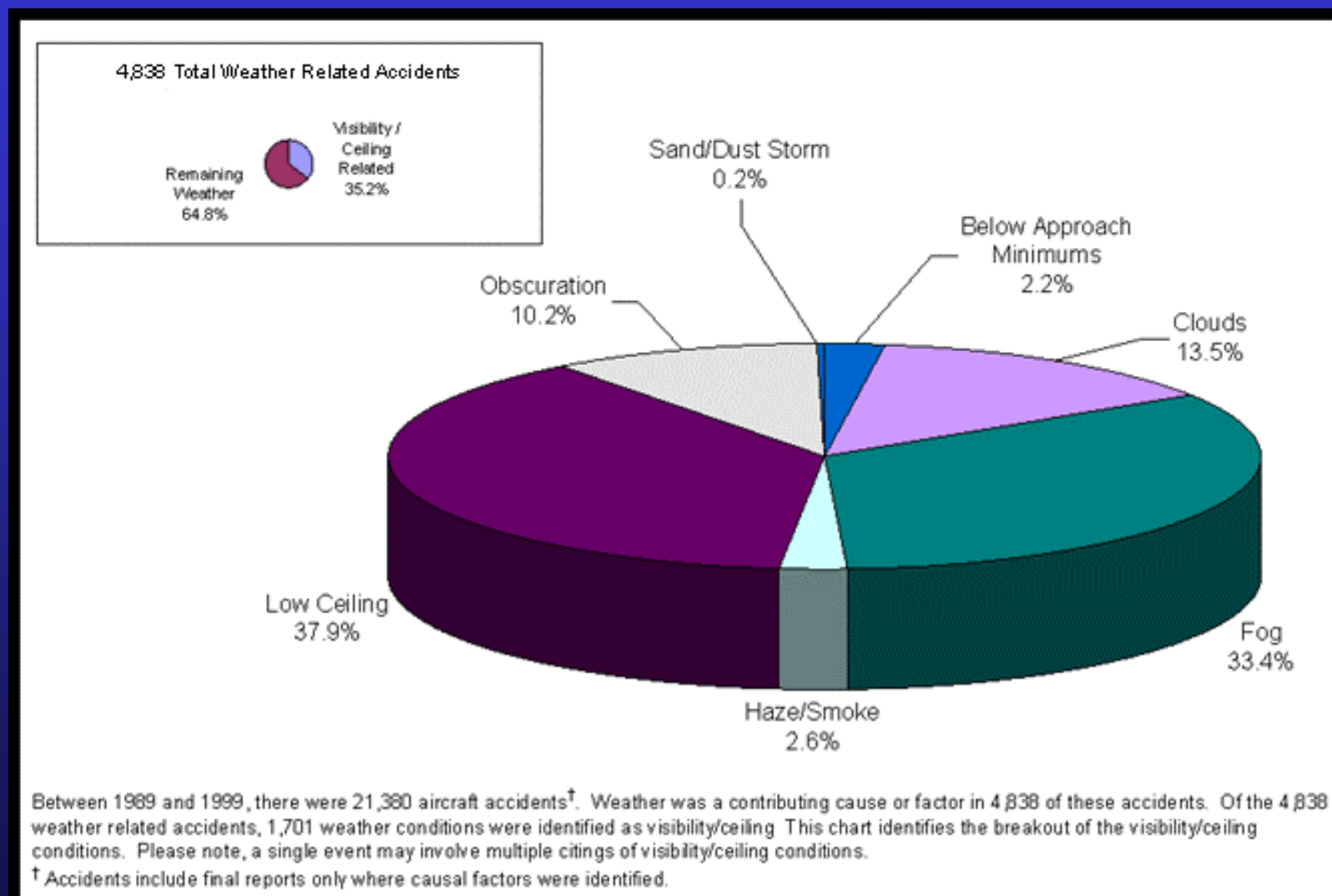
Future . . . Key Near-Term Priorities
Product Timeline

Why is this PDT in business?

Adverse ceiling and visibility conditions contribute to over 35% of all weather-related accidents. (NTSB, 1989-99)



Ceiling & Visibility Conditions in NTSB Weather-Related Accidents 1989 - 1999



The C&V Aviation Safety Record

Results from a recent FAA-funded study by MCR Federal:

The majority of C&V accidents result in fatalities:

- 72% in the contiguous U.S. (CONUS)
- 55% in Alaska.

Of these accidents...

- VFR flight into IMC conditions
 - Most common cause cited (39%)
 - 85% result in fatalities.
- CONUS: About 65% piloted by non-instrument rated pilots.
- Alaska: About 20% piloted by non-instrument rated pilots.

Where/How can NCV Products Make an Impact?

Accidents by non-instrument rated pilots flying into poor ceiling and visibility conditions:

- About 31 accidents per year in the CONUS.
 - About 19 of these are reachable: They obtained weather briefings.
 - Aircraft: 17
 - Fatalities: 32
 - MCR metrics assign an approximate economic impact: ~ \$96 M
-
- About 1-2 accidents per year in Alaska.
 - About 1 of these is reachable: Obtained a weather briefing.
 - Aircraft: ~ 1 aircraft every 2 years.
 - Fatalities: 1-2 per year.
 - MCR-assigned economic impact: ~ \$4 M

Totals per Year: 32-34 lives

~ \$ 100 M

What is the NCV PDT Charter?

- Harness current and emerging scientific & engineering knowhow.
- Develop improved C&V and Flight Category information.
- Focus on public aviation. GA critical constituency.

Further Elements...

- Continental U.S. and Alaska.
- Nowcast and forecast products for C&V.
- Forefront: User Need
- PDT Product:
 - Scientific methodology
 - System engineering
 - Gridded information
 - Measures of value / performance
 - Documentation
 - Provision for public and professional use
- Engineer to anticipate evolution & improved methodologies.
- Plan/Engineer for operational implementation.

What is the Origin & Starting Point for the PDT?

Science / Forecasting Techniques

- Persistence
- Conditional Climatology (DoD, others)
- Observations-Based Techniques (Vislocky, Fritsch, W.Wilson, others)
- Numerical prediction (Stoelinga, Warner, Porter, Seaman, others)
- Model Output Statistics (MOS) Techniques

The Progenitor FAA PDT . . .

- Now termed 'Terminal Ceiling & Visibility'
- Focus: San Francisco area stratus; Traffic management tool.
- Approach: Observations-Based Statistical Forecasting

The Start of Today's NCV PDT

- Established March 2001

The PDT Starting Point . . . Cont'd

Antecedent C&V Product Development at NCAR:

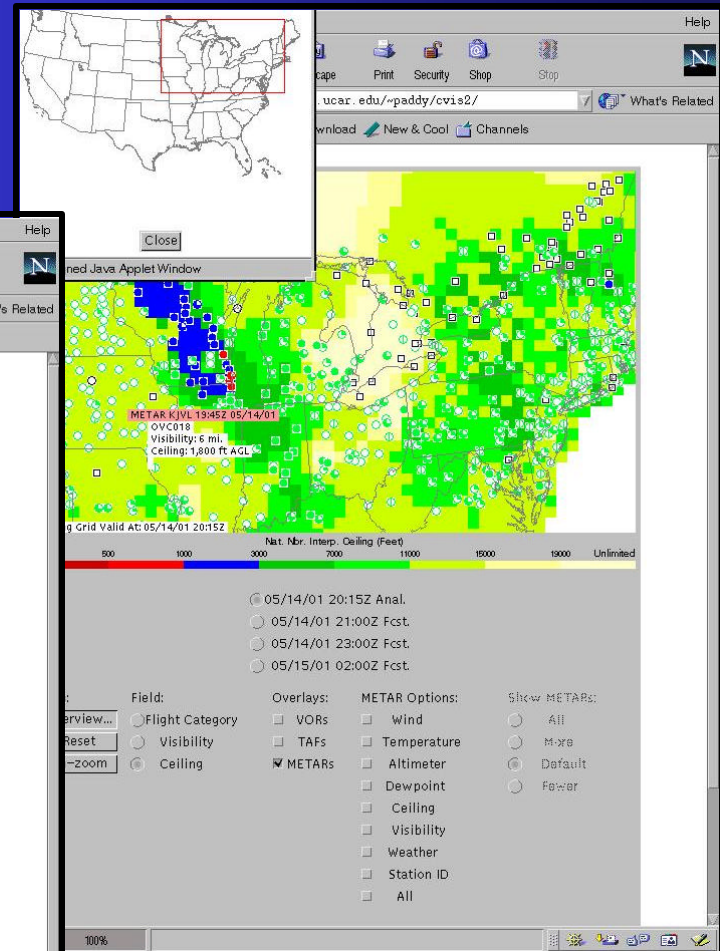
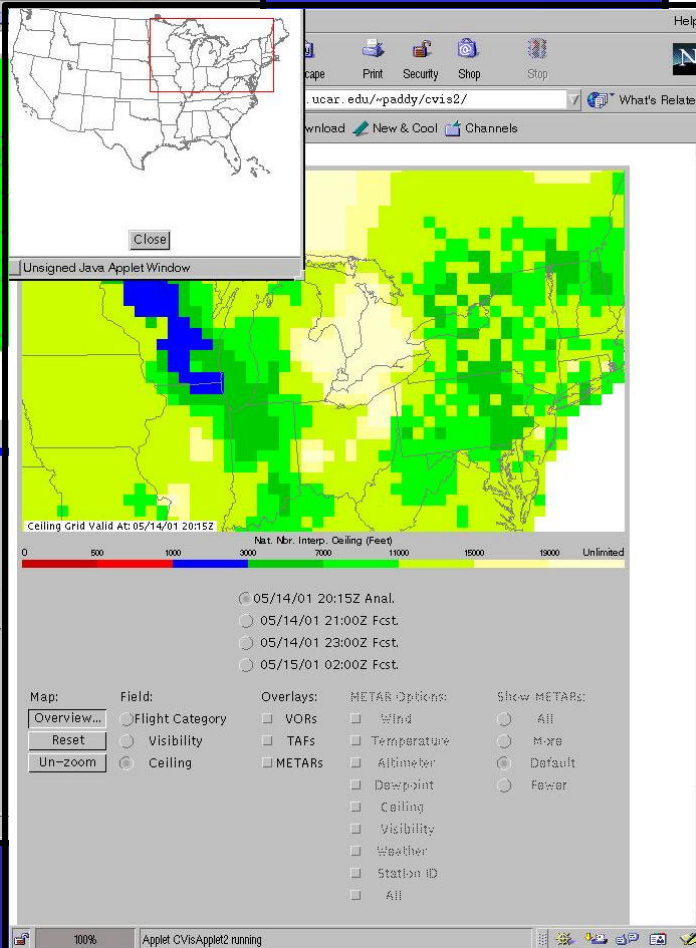
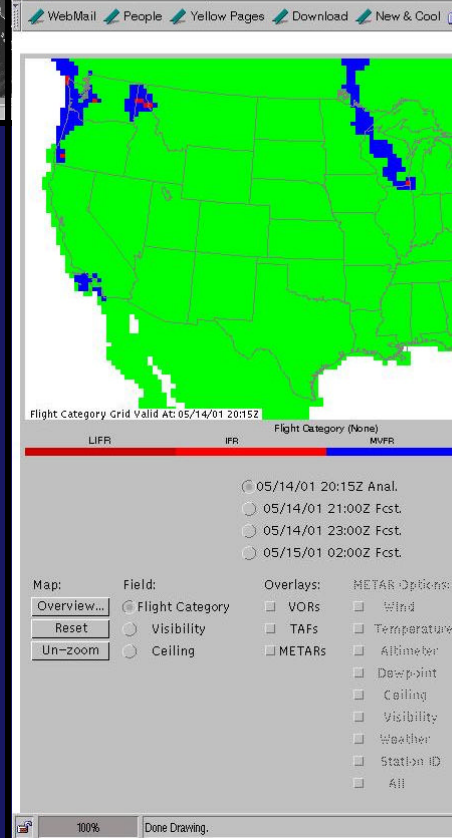
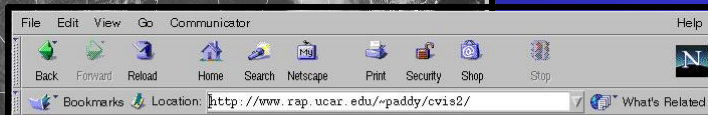
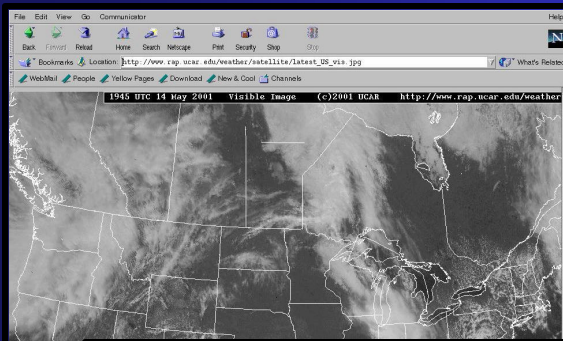
The Foundation for current NCV Development

- FAA/NASA/Navy Funded
- Developed FY 2000 (K. Petty, lead)
- CONUS & S. California Domains
- Analysis plus 0 – 6 hour forecasts
- Taken by NCV as V1.0 System

Architecture of the Antecedent System

- Expert System (additive model) fusion of
 - Model Data: RUC (CONUS), COAMPS (S. California)
 - Stoelinga/Warner model translation to C&V fields
 - GOES Visible imagery (as a cloud mask)
 - Surface Obs (METARS)
 - Persistence
 - Climatology (selected sites)
- Verification data drive dynamic updates to fusion weights

C&V Product V1.0 CONUS System



What is the PDT Development Scope/Direction?

Retain/build expert system data fusion approach.

- User feedback on display/usability

Data Sources / Productivity

- Satellite data: move from use as cloud mask to
 - cloud types, heights
 - low cloud / ground discrimination
 - high latitude (polar orbiter) use for later Alaska use
- Use of NEXRAD/TDWR radar for precip characteristics.
- PIREPS

Independent Verification – work through QAG

- Real-time verification (RTVS) early 2002
- Forecast intercomparison July '02 (TAFs, TCV, AIRMETS)
- Complementary off-line verification system for tests/studies

PDT Development Scope/Direction... Cont'd

Improved Understanding of Phenomenology

- Fog / Winter weather / low cloud
- Regional focus, e.g., NE Corridor, Alaska
- Participation in focused, instrumented field studies/tests

Improved Modeling of C&V

- Add/Evaluate ETA-derived C&V fields
- COBEL (column) boundary layer model – Add/Evaluate – Fog/Cloud
- Explore development of a next-generation Expert System Translation Algorithm

Observations-Based Statistical Forecast Techniques

- Leverage experience/techniques from TCV as appropriate
- Evaluate statistical approaches (C. Tebaldi)
- Examine 'conditional climatology' approach where data record is long.

National C&V PDT Membership

NCAR

U. Quebec/Montreal

Naval Res. Lab.

NOAA/FSL

MIT/LL

SAMA – (Small Acft.
Manuf.'s Assn.)

Alaska Aviation
Weather Unit

NOAA Aviation
Weather Center

- Primary Development (science & eng.)
- Validation
- Other...

- User Info support
- User Liaison
- Alaska User Liaison
- Other...

- Product design aid
- Validation support
- Test & Eval support
- Path to Operations

Overall Labor Resources: ~ 5-7 FTE
Shared Membership with Other PDTs: TCV, Winter Wx, AF&QA, OW

Key Priorities/Activities for the Coming Year

Initiate ongoing independent verification

- Real-time (RTVS)
- Post-analysis system

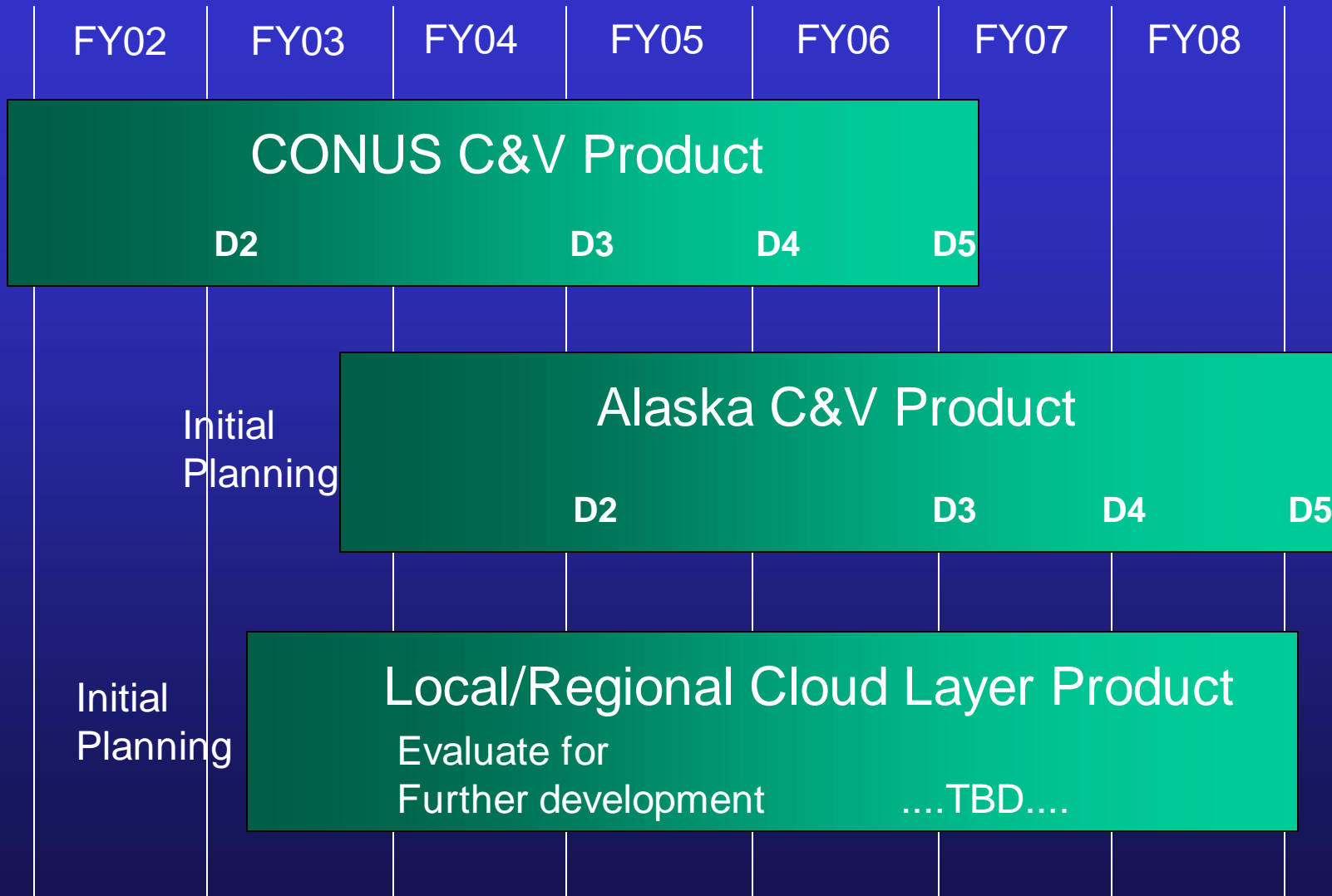
Bring COBEL column model to functionality with RUC

- Warm/Cold cloud microphysics & radiation codes
- Apply COBEL/RUC system in NE Corridor winter field study
- Evaluate COBEL impact on fog / cloud formation

Seek 'Experimental' Status for CONUS C&V Product

- User trials first
- Incorporate user guidance

NCV Product Introduction – Rough Timeline



Acknowledgement

- . . . of Dr. Kevin Petty's key role as a skillful
- Scientific lead in pre-PDT C&V development work, and
 - 1st Lead of the NCV PDT



- . . . Thanks, Kevin!!
- . . . Good Luck in Washington DC . . .