
EWxR, An Enhanced On-board Weather Information System

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The Automation Question

“If we had an expert pilot who was the world’s best at
[*the use of some system*]

and that pilot’s sole responsibility was
[*...using that system...*]

without any time pressures, what would that pilot do?”

- Monitor A
- Decide B
- Perform C
- Compare D
- *etc...*

Can a computer
perform these
functions?

The Automation Question

Can a computer perform these functions?

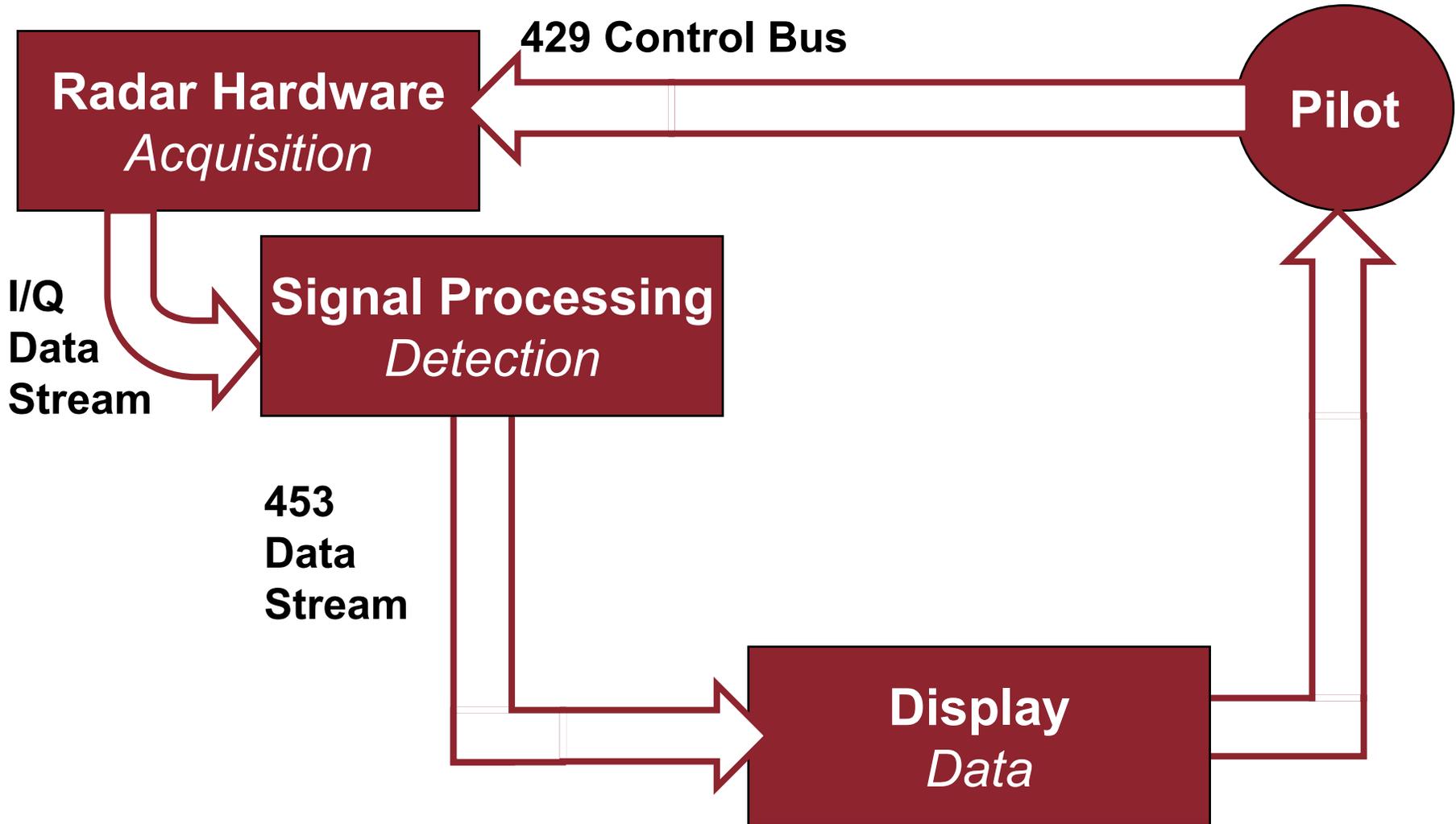


- The answer changes as technology develops.
- “No” is rarely the correct answer.
- Decision Support utilizes the combined strengths of computer and human.

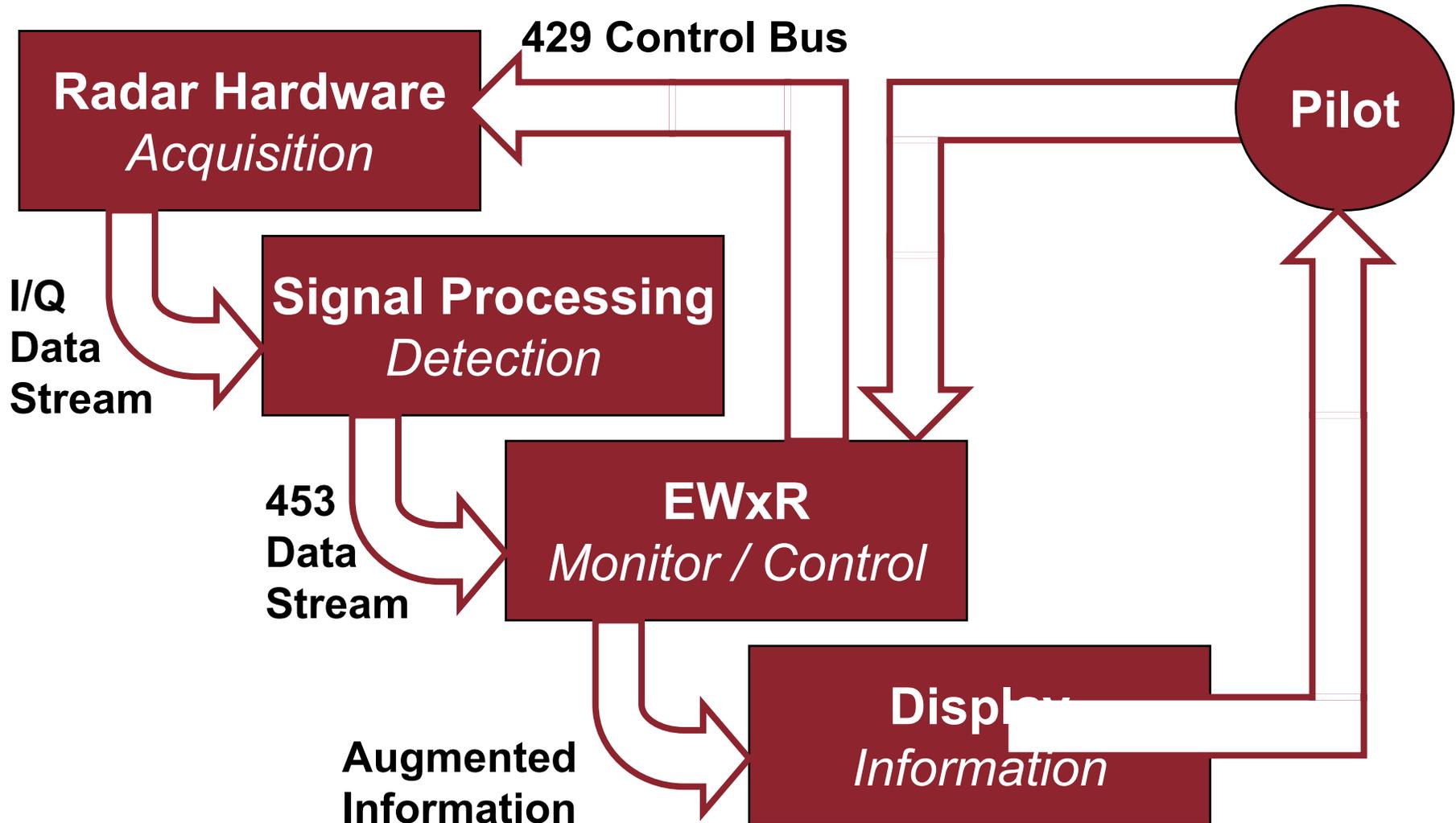
EWxR and The Automation Question

- **“Search for storms”**
- **“Characterize the weather situation”**
- **“Track storm movement”**
- **“Identify dangerous patterns”**
- **“Utilize the tilt, range, and calibration effectively”**
- **“Interpret the radar imagery”**
- **“Correlate information from other sources”**

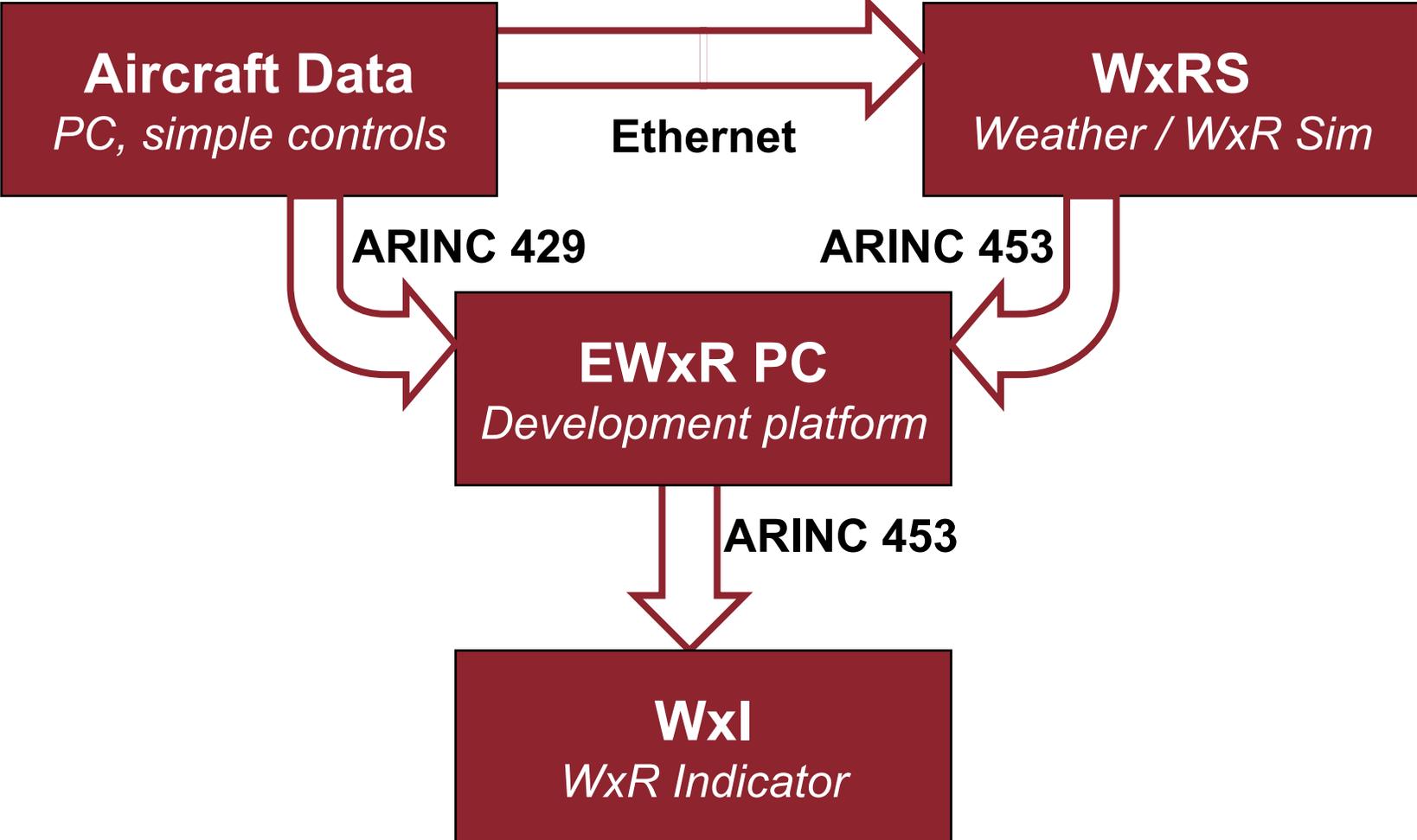
Signal-level Processing



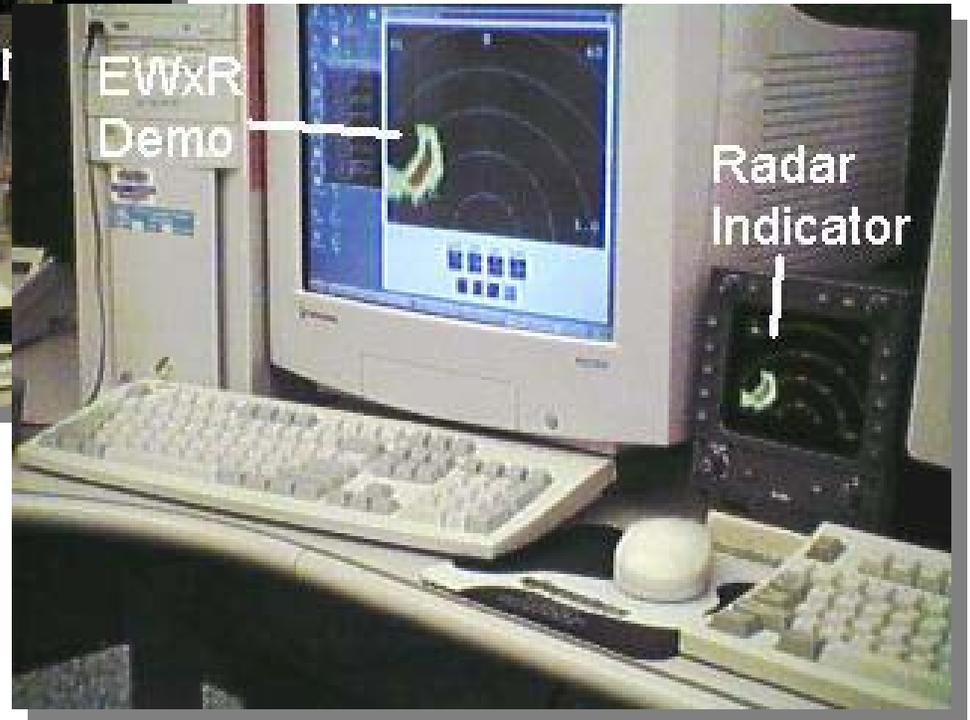
Information-level Processing



EWxR Development Testbed



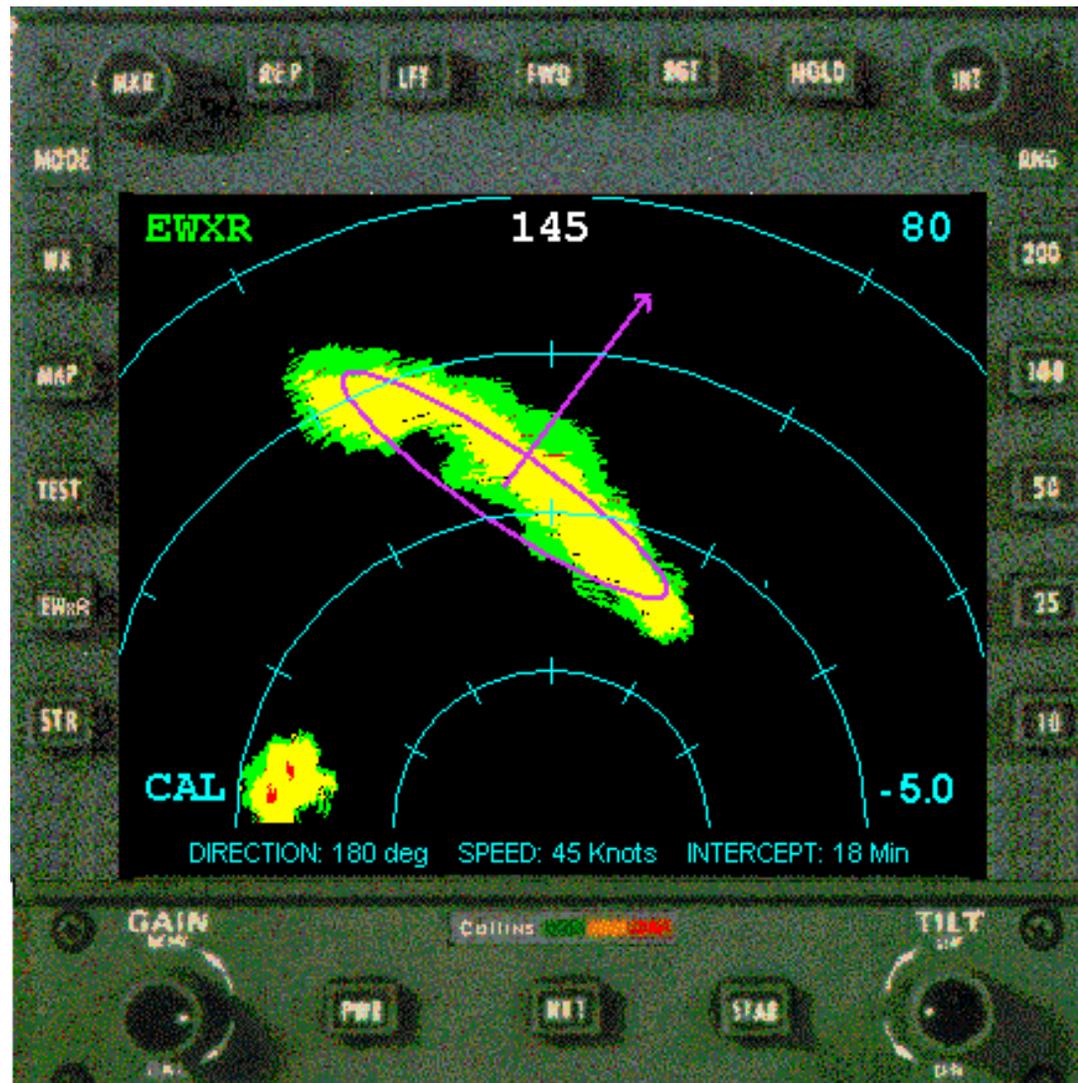
EWxR Development Testbed



Major Accomplishment

- **Concept Demonstrations**
- **System Architecture**
- **COTS Weather/Weather Radar Simulation**
- **Simulation Control Software**
- **Storm Image Database**
- **3D Data Model**
- **Storm Finding / Auto Search**
- **Radar Top Estimation**
- **Pilot Reviews (UAL, Archie Trammel)**

Concept Demonstrations



Simulation Control Software

The image displays a screenshot of a simulation control software interface. The main window, titled "Enhanced Weather Radar Concept", has a menu bar with "Controls", "Images", and "Data". A status bar at the top indicates "Running simulation...". The main panel shows various controls for an airplane, including "Current Position", "Move (nm) Forward" and "Right" (both set to 0), "Altitude (ft)" (input: 10000, output: 11696), "Climb" (vertical slider from -2000 to 2000), "Heading (deg)" (input: 20, output: 172), and "Turnrate (de)" (horizontal slider from -180 to 0). "Airspeed (knots)" is set to 300. A "Weather Scenario Data" dialog box is open in the foreground, containing the following settings:

- Storm Type:** Multiple Cells Not Active (dropdown menu)
- Storm Status:** Activate, Deactivate
- Storm Position (relative to current Airplane Position):** Move (nm) 0, Heading (deg) 0
- Global Storm Settings:** Velocity (knots) North 0, East 0, Lifetime (min) 0

Buttons for "Update" and "Close" are present at the bottom of the dialog box and also on the main panel.

Storm Image Processing

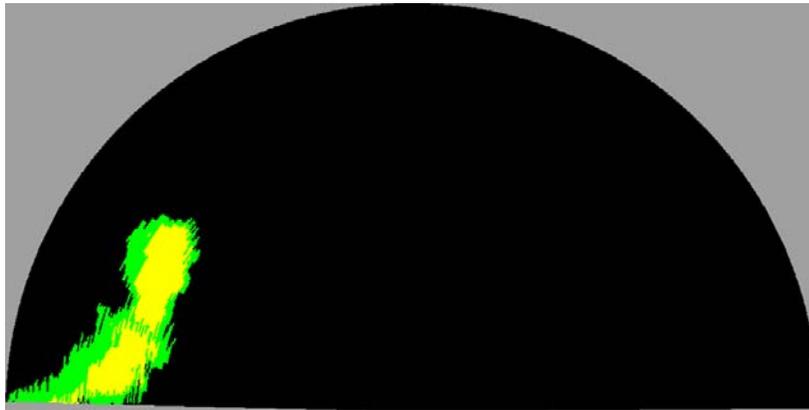
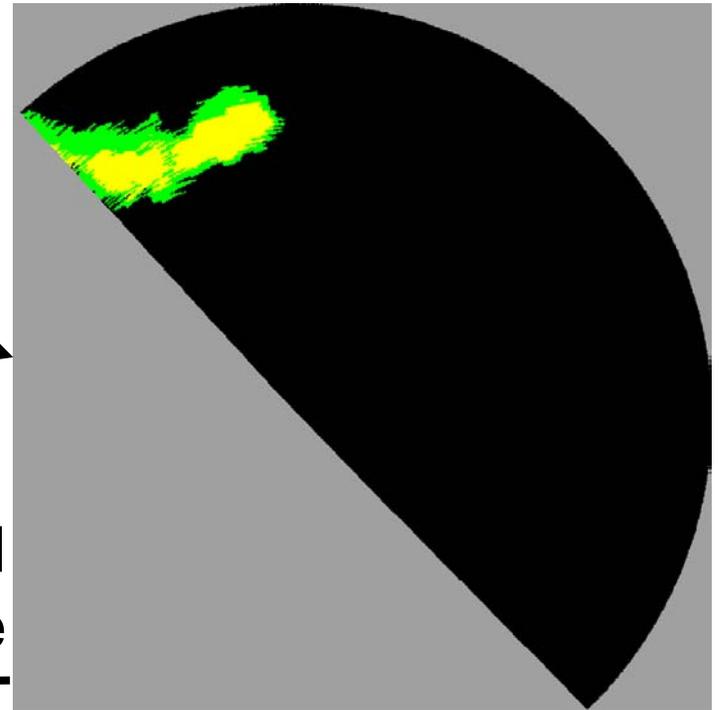
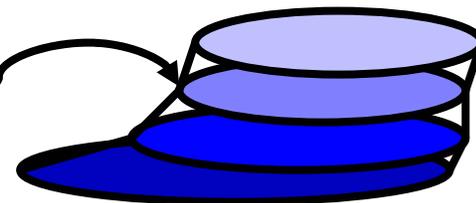
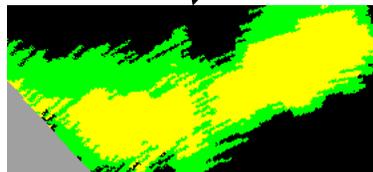


Image
acquisition



Earth-based
reference

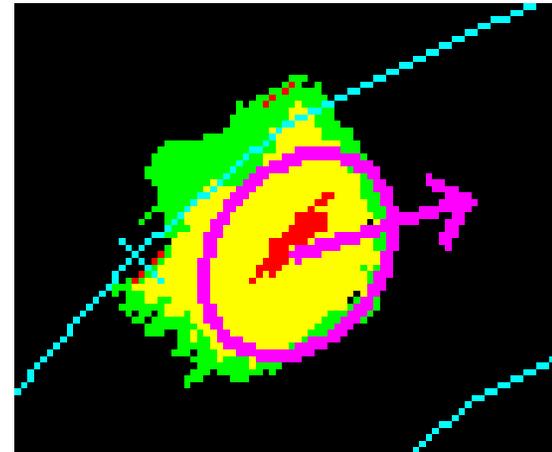
Storm-based
reference



3D Data
Model



Storm Tracking, Radar Top Analysis



- Grouping/Segmenting
- Tracking
- Estimation
- Storm searching
- Radar top analysis

August 200 Flight Demonstration

