What is VIEWS?
The Visibility Information Exchange Web System is an online system designed to acquire, manage, and provide access to data and metadata related to visibility and air quality, and to support the efforts of the five Regional Planning Organizations (RPOs) to meet the requirements of the Environmental Protection Agency’s Regional Haze Rule to reduce regional haze in national parks and wilderness areas.

Sponsor: Five Regional Planning Organizations
Guiding Body: VIEWS Steering Committee
Development: CIRA, Colorado State University
Location: CSU Foothills Campus, Fort Collins, CO
Other Affiliations: IMPROVE Monitoring Network
Over 500 registered users

Over 150 organizations represented (probably many more that are undeclared)

An estimated 250+ unique hits a day

Over 50 nations represented
  - Denmark, Poland, New Zealand, Australia, Zimbabwe, and more...

Search engine positioning (Google.com):
  - #1 for “Visibility Information”
  - #3-6 for “Visibility Data”, up from #43 in April and #90+ in February

An ever-increasing number of feedback responses

Linked to by over three dozen other sites (growing rapidly)
  - EPA, RPOs, State Environmental Agencies, Universities, etc.

An increasing number of requests for data and new features
  - Online submission and immediate use of data sets
  - Geographical Information System (GIS) integration
  - Online modeling tools and simulations
VIEWS
Visibility Information Exchange Web System

VIEWS Architecture

Systems & Components

User Logon and Accounting System
GIS
Visualization Engine
Formatting Engine
Data Transformation Engine
Query Engine
Data Access Layer

User Requests
OLTP
Data Warehouse
Data Repository

QA/QC Subsystem
Data Transformation Engine
File I/O Subsystem

ASCII Text File
Access Database
Excel Spreadsheet
ASCII Text File
Excel Spreadsheet
Access Database
The front-end **DSS** is automatically generated by the back-end **OLTP**

- **Map Projection Analogy**: Base system (globe) and derived views (projections)
- **Optimization**: Allows each architecture to do what it does best without compromise
- **Data Transparency**: User doesn’t need to know how data is stored, only how to use it
- **Exchangeability**: A wide variety of diverse schemas can be generated from OLTP
Wrap-up of back-end **OLTP** design and implementation
- Optimized for import, transformation, and quality control
- Robust, general-purpose data ingest routines
- Faster turnaround time for new datasets
- Provision for more detailed metadata

Wrap-up of front-end **Data Warehouse** design
- Optimized for query and output
- Online Analytical Processing (OLAP)
- Multidimensional analysis, pivot table analysis
- Analysis tools will be usable with ALL datasets, not just IMPROVE
- Facilitates analysis across multiple datasets
- Common set of parameters for all datasets
- Provides much more flexible output options
Database Query Update: Query Wizard

- Site Browser for exploring monitoring site metadata
- Popup Parameter and Variable metadata
- New Excel Pivot Table output option
- Improved query performance
- Expanded error handling and reporting
- Query Wizard Version 2 being designed
Pie and doughnut charts
Bar & stacked bar charts
Line, curve, & area graphs
Scatter plots
Contour and surface charts
3D charts and graphs
Extensive formatting options
Easy-to-use chart controls
New VIEWS Hardware:

- 3.06 GHz Pentium 4 processor
- 2 Gigabytes of RAM
- 10/100/1000 Network Card
- 250 Gigabyte Hard Disk

New Web Server:

New Database Server:

- Dual 3.06 GHz Pentium 4 processors
- 2 Gigabytes of RAM
- 10/100/1000 Network Card
- RAID 5 Hard Disk System – 1 Terabyte total
# VIEWS Data Inventory Update:

Data Sets currently available from VIEWS:

<table>
<thead>
<tr>
<th>Agency</th>
<th>Data Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARS</td>
<td>nephelometer, transmissometer</td>
</tr>
<tr>
<td>CASTNET</td>
<td>drychem, vischem</td>
</tr>
<tr>
<td>EPA FRM</td>
<td>frm data</td>
</tr>
<tr>
<td>EPA Speciation</td>
<td>speciation data</td>
</tr>
<tr>
<td>IMPROVE</td>
<td>aerosol, calculated variables, regional haze rule data</td>
</tr>
<tr>
<td>MOHAVE</td>
<td>aerosol</td>
</tr>
<tr>
<td>PREVENT</td>
<td>aerosol</td>
</tr>
<tr>
<td>REVEAL</td>
<td>aerosol</td>
</tr>
<tr>
<td>SEAVS</td>
<td>aerosol</td>
</tr>
<tr>
<td>SFU</td>
<td>aerosol</td>
</tr>
</tbody>
</table>

Data Sets soon to be added to VIEWS *(before Christmas 2003 *):

<table>
<thead>
<tr>
<th>Agency</th>
<th>Data Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>NESCAUM</td>
<td>aerosol</td>
</tr>
<tr>
<td>MOHAVE</td>
<td>nephelometer, transmissometer</td>
</tr>
<tr>
<td>SEAVS</td>
<td>nephelometer, transmissometer</td>
</tr>
<tr>
<td>BRAVO</td>
<td>aerosol, nephelometer, transmissometer</td>
</tr>
<tr>
<td>SEARCH Continuous</td>
<td>PM2.5, speciated aerosol, gaseous, surface met</td>
</tr>
<tr>
<td>SEARCH 24hr</td>
<td>PM2.5, speciated aerosol</td>
</tr>
<tr>
<td>NPS</td>
<td>Gaseous</td>
</tr>
<tr>
<td>GAViM</td>
<td>PM2.5, speciated aerosol</td>
</tr>
</tbody>
</table>
## Planned Data Acquisitions

<table>
<thead>
<tr>
<th>Source</th>
<th>Measurements</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPA AIRS</td>
<td>PM10</td>
</tr>
<tr>
<td>NEPART</td>
<td>PM2.5, speciated aerosol</td>
</tr>
<tr>
<td>Trans-Boundary Monitoring Network (TBDM)</td>
<td>PM10, PM2.5, SO2, NOx, meteorology</td>
</tr>
<tr>
<td>Surface Meteorology</td>
<td>meteorology and visual range</td>
</tr>
<tr>
<td>EPA AIRS Gaseous</td>
<td>O3, CO, SO2, NO2</td>
</tr>
<tr>
<td>NAPS</td>
<td>PM2.5, speciated aerosol</td>
</tr>
<tr>
<td>NADP/NTN</td>
<td>Wet deposition ions</td>
</tr>
<tr>
<td>UV Radiation</td>
<td></td>
</tr>
<tr>
<td>EPA Supersites</td>
<td>aerosol, gaseous, met, SO2, NOx, PM10, VOC, CO</td>
</tr>
<tr>
<td>AIRS Emissions</td>
<td></td>
</tr>
<tr>
<td>Modeling Data and Output(?)</td>
<td></td>
</tr>
<tr>
<td>Other Emissions</td>
<td></td>
</tr>
</tbody>
</table>
Optimize data storage and retrieval mechanisms

Further refine and automate data ingestion and transformation tools

Identify and acquire additional data sets
  - Special studies and projects
  - University programs and research
  - International data sets
  - Modeling data and output results (?)

Allow online submission of data sets – per standardized format
  - Directory Interchange Format (DIF) – from NASA’s GCMD
  - NARSTO’s Data Exchange Template

Implement an easily searchable catalog of offsite data resources
  - ISO 11179: Specification and Standardization of Data Elements
  - Dublin Core standard by Online Computer Library Center (OCLC)

Develop and emphasize the “Exchange” nature of VIEWS
Additional searching & filtering options
Faster loading of metadata
Easier and faster query building
Multidimensional interface model
Easier, more powerful results formatting
Large query handling – no timeouts
Email notification of query results
Saving query templates and style options
Future Directions: Annual Data Summary

- Additional searching & filtering options
- Faster loading of metadata
- Easier and faster query building
- Multidimensional interface model
- Easier, more powerful results formatting
- Large query handling – no timeouts
- Email notification of query results
- Saving query templates and style options
Future Directions: Data Products

- Consolidated Excel Pivot Tables, Pivot Charts, and Spreadsheets
- Presentation-ready Regional Haze Rule compliance reports
- Conversion of results to XML
- Custom Reports: Choose titles, text, graphics, results, and arrange them
- Online Analysis Server Cubes: Explore your data in multiple dimensions
- Annual Summary tools available for ALL datasets – not just IMPROVE
Future Directions: Data Repository

FTP Access with minimum data description
- Upload data with simple "ReadMe"-type data description
- Download data by browsing our FTP site
- Minimum development time required
- No tools available

Website User Interface with more formal data description
- Upload and download data via a simple web interface
- Describe data using an accepted standard for metadata, perhaps NASA’s D.I.F.
- Perhaps some tool availability

More sophisticated Web Interface with automated data description
- Upload and download data via a helpful web interface
- Describe data using an automated, fill-in-the-blanks-type interface
- Use VIEWS tools to display and analyze data
Future Directions: Help, Documentation, and Training

- Extensive Help, Tutorials, and Step-by-step guidance
- Integrated annotations and popup tool tips
- Context-sensitive FAQs and User Message Boards
- Instant messaging for immediate help
- Online Regional Haze Rule guidance
- Conference calls and training sessions for new tools
Integrated, easy-to-use data “dashboard” – all tools from one interface

Automatic, on-demand contour map generation

Full integration of dynamic charting and graphing features

Multithreaded, asynchronous query processing

Integration with CAPITA CATT and Gridder tools

Direct connection to AIRS/AQS for faster, more complete data updates

XML Web Services for query submission and map products

Expose data model for ad hoc queries
Conclusion and call for participation...

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- Give us your comments, suggestions, and feedback (Really!! ...and often.)

Thank You.

http://vista.cira.colostate.edu/views