Workshop on the Implementation of the International Radiation Monitoring Information System

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Implementation of the International Radiation Monitoring Information System (IRMIS) at a national level

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Implementation of IRMIS at a national level

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  - Brief overview of RadNet
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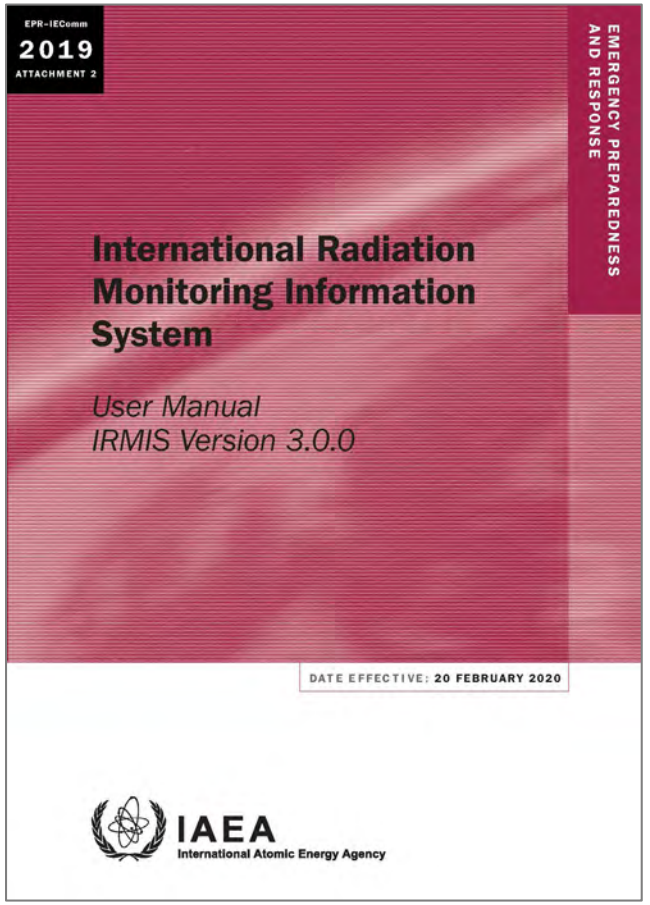
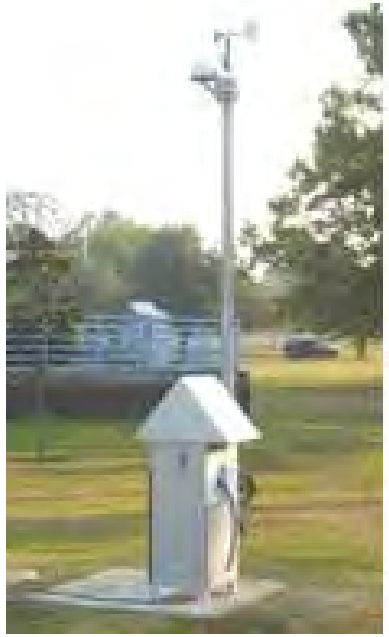
  - Features of iAVID and possible application to IRMIS
  - Scope of iAVID and IRMIS interoperability



International Radiation Monitoring Information System (IRMIS)



Overview of IRMIS

IRMIS provides Competent Authorities, IEC, and other relevant International Organizations with a data sharing tool that helps to

- report and share information,
- evaluate radiation monitoring data to assess if the public is safe,
- identify protective actions,
- keep the public informed by Member State Competent Authority, and
- maintain transparency of data handling and processing.

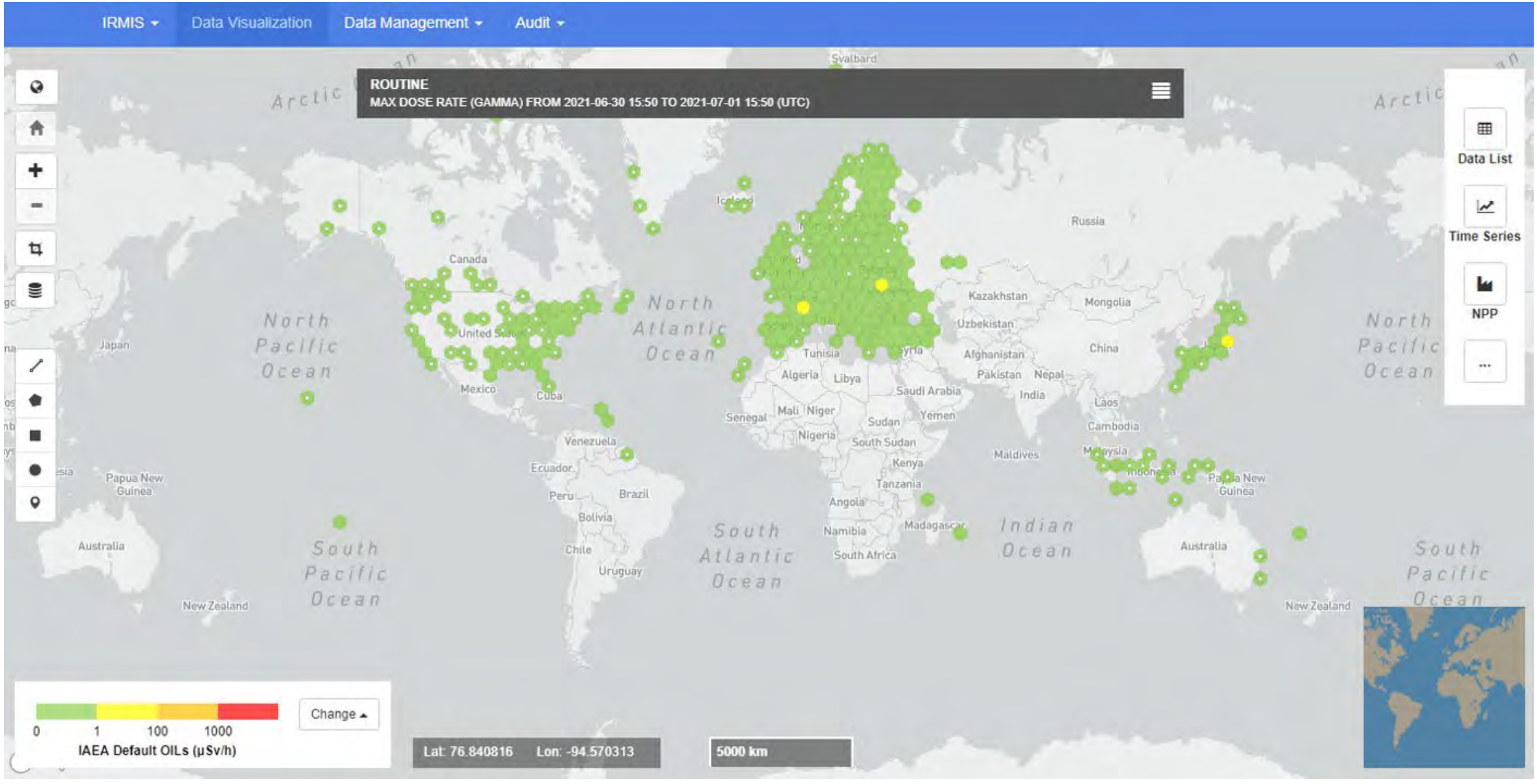
IRMIS accessible to authorized users at https://iec.iaea.org/irmis

IRMIS data types:

- Routine data
- Emergency data

Both routine and emergency data can have ambient gamma dose rate, air concentration, and ground deposition data (for selected nuclides).

Overview of IRMIS

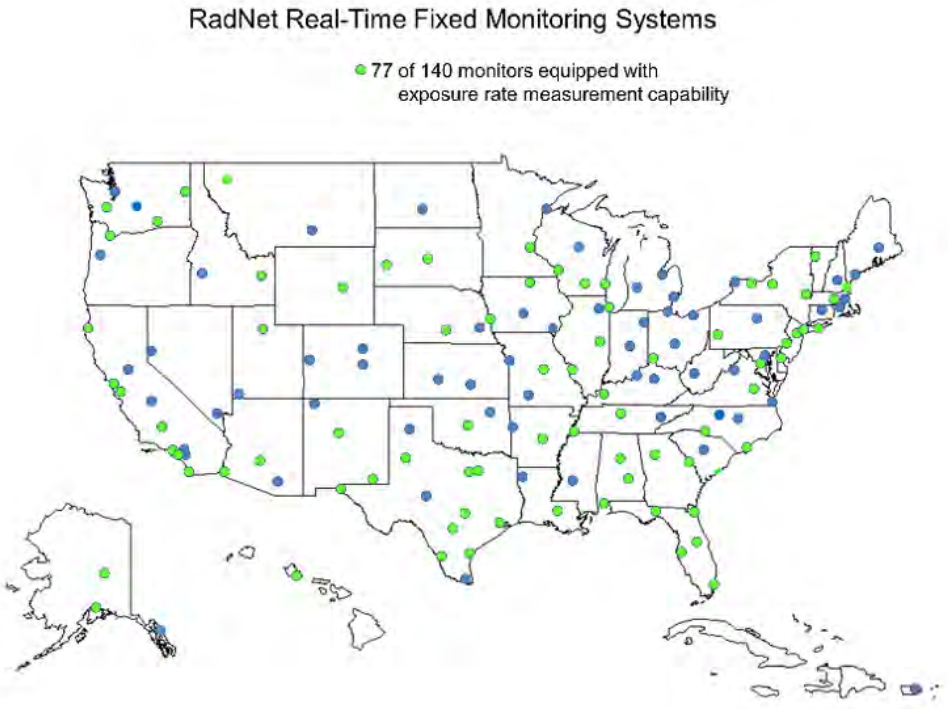


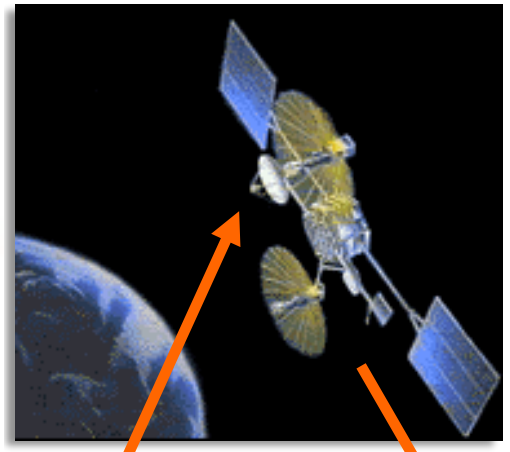
US national perspective – EPA

RadNet Objectives

- Provide data for radiological emergency response assessments in support of homeland security and other responders to radiological incidents/accidents.
- Inform public officials and the general public of the impacts resulting from major radiological incidents/accidents and on ambient levels of radiation in the environment.
- Provide data on baseline levels of radiation in the environment.
- Measure large-scale atmospheric releases of radiation impacting large parts of the country and major population centers due to
  - nuclear weapon detonations,
  - radiological dispersal device incidents,
  - large nuclear facility incidents/accidents, and
  - large foreign radiological incidents/accidents.

RadNet Monitoring System provides data to IRMIS





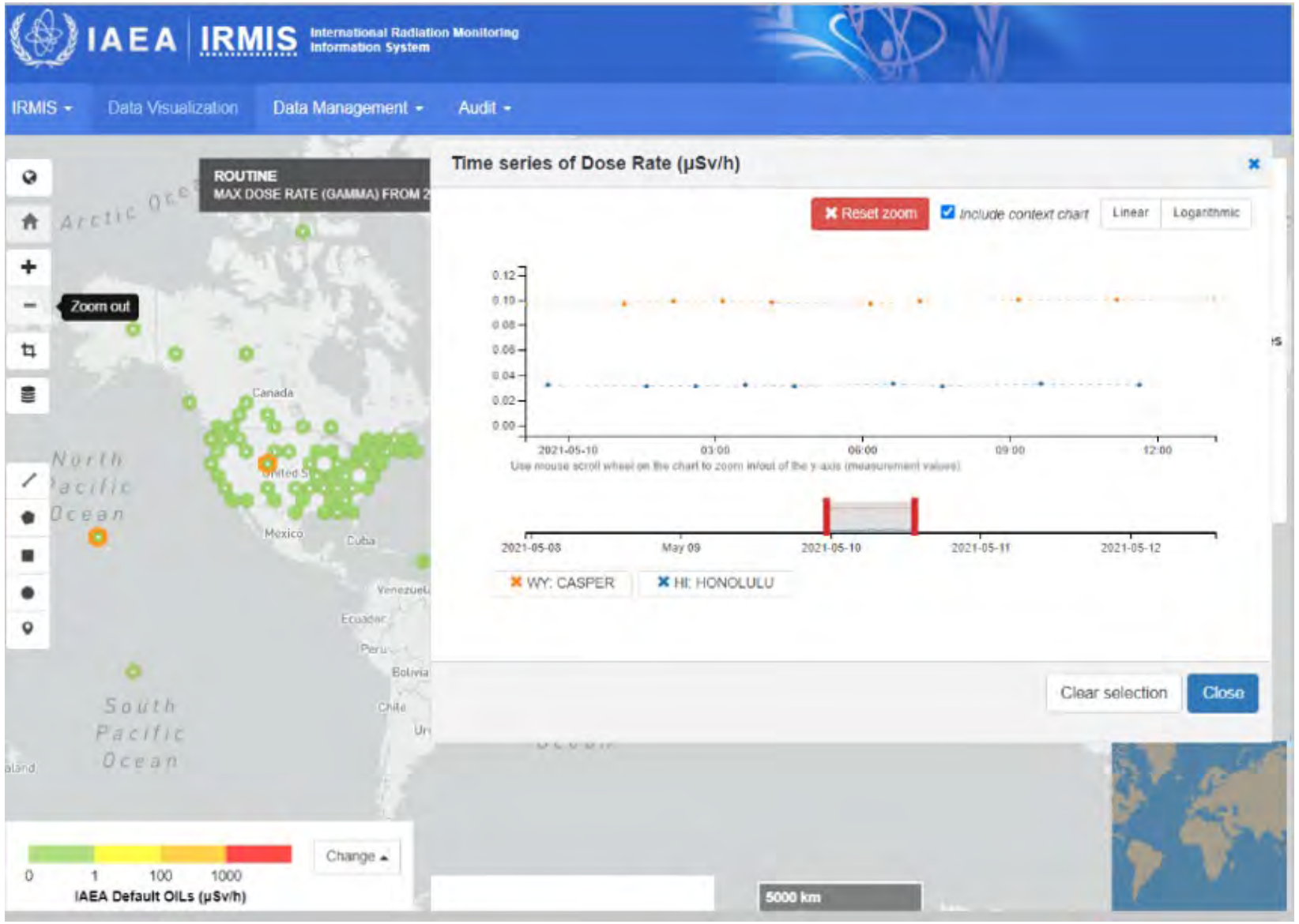
Data Type

- Count rates (cpm)
- Nuclide-specific concentrations
- Dose rate (nSv/h)

Each fixed air monitor provides real-time capability and transmits data to EPA's National Analytical Radiation Environmental Laboratory (NAREL).

Data are transmitted by satellite telemetry and cell phone.

RadNet dose rate data on IRMIS visualization page



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Advanced Visualization and Integration of Data (AVID)

AVID is an acquisition and analysis software of radiological (mostly) data committed to the following ideas:

- Modular, extensible framework for collaborative development
- Sensor agnostic (GOTS+COTS, ~10 systems integrated)
- Scalable configuration to meet mission need

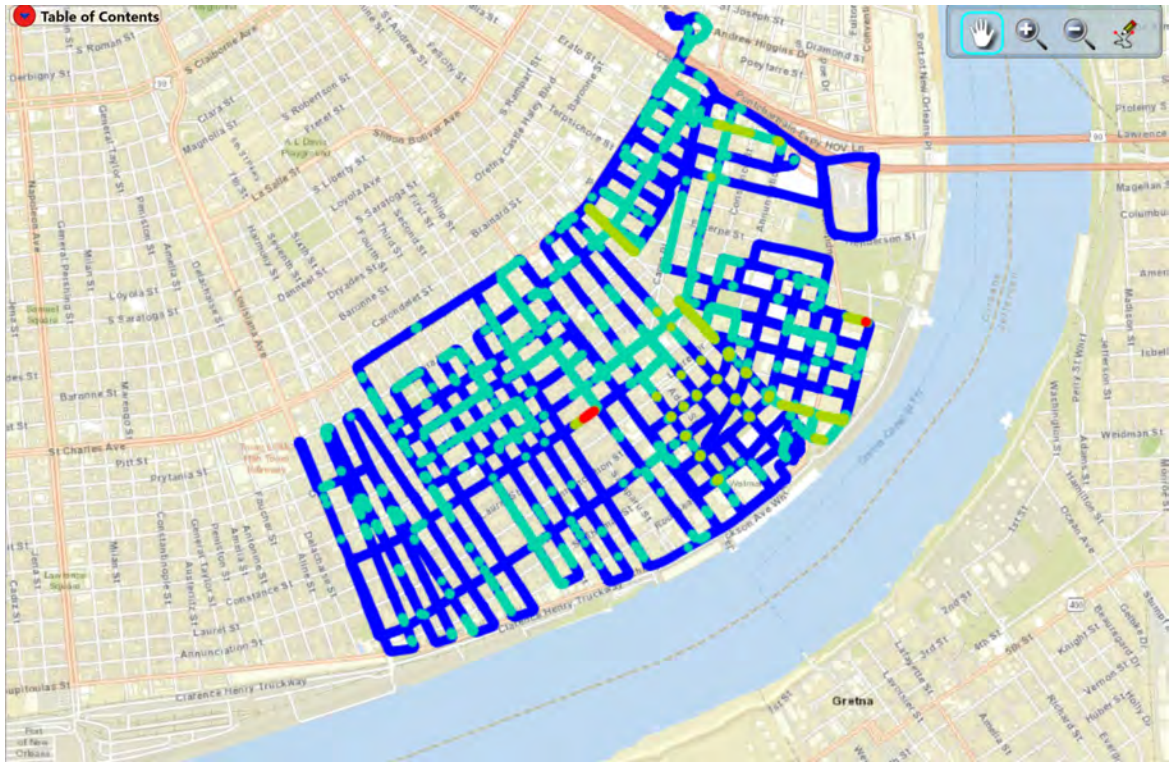
AVID is currently deployed for operational use by US DOE/NNSA and offered to IEC as RANET capability.

AVID Launcher

The AVID Launcher is the shell that starts AVID

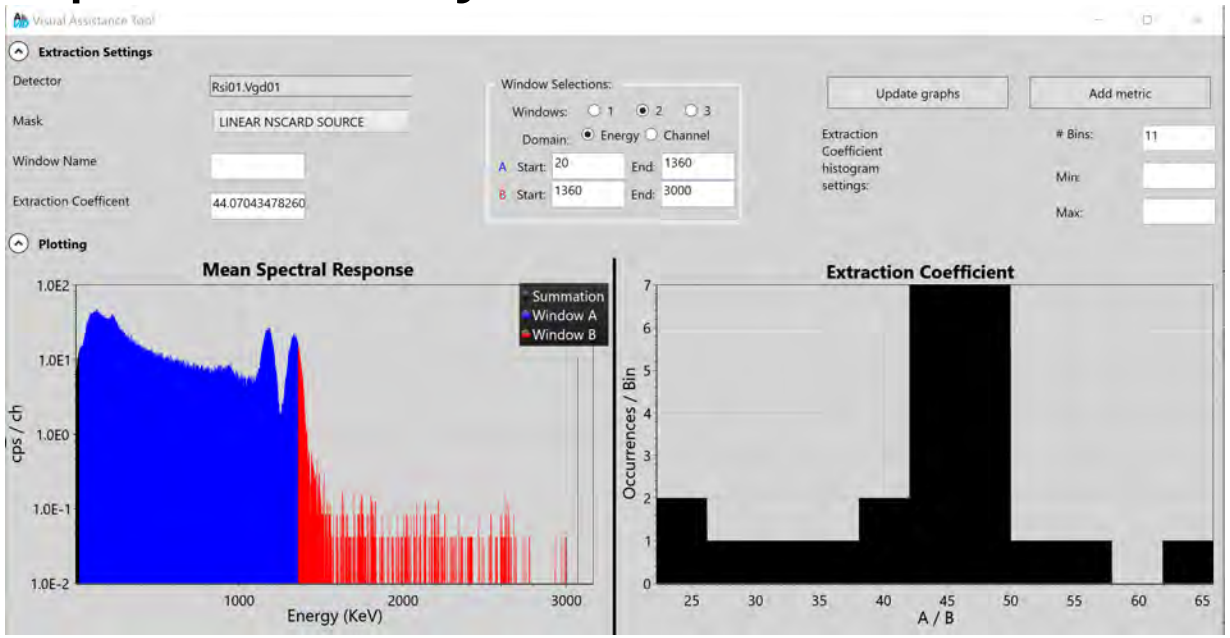
Selection of data from easy graphical interface

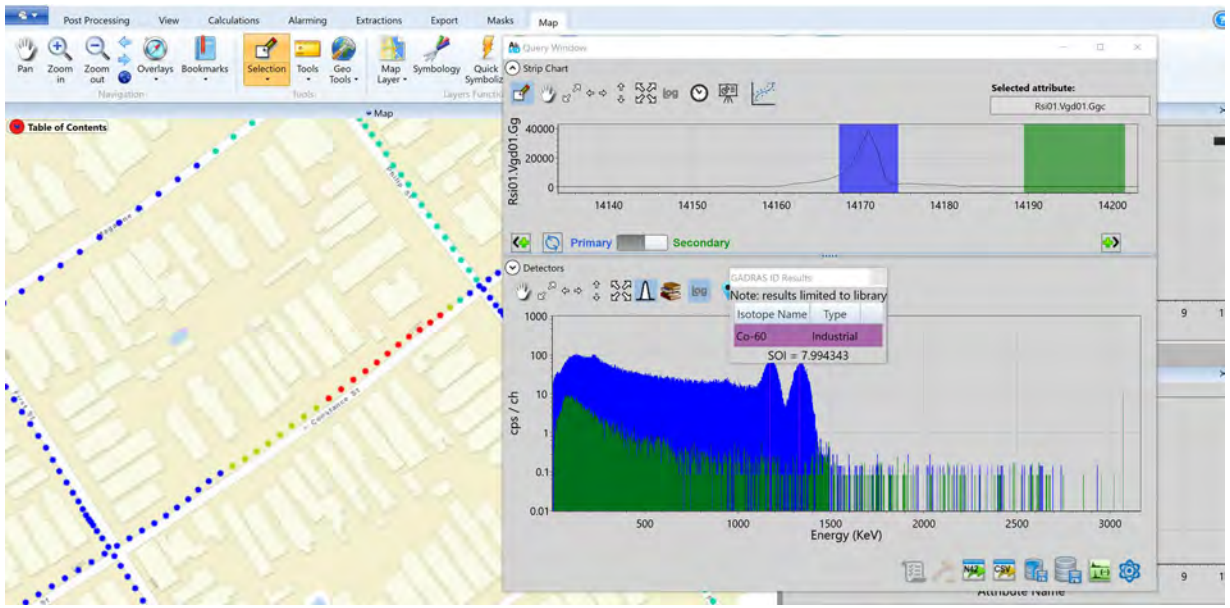
Freehand loops



Multiple algorithms to identify the radioisotope

Spectral analysis tools





2-energy window extraction A/B ~44, Background ~27

Choice of background selection – event by event

Realize background can have strong spatial and time dependence

Application of Gamma Detector Response and Analysis Software (GADRAS)

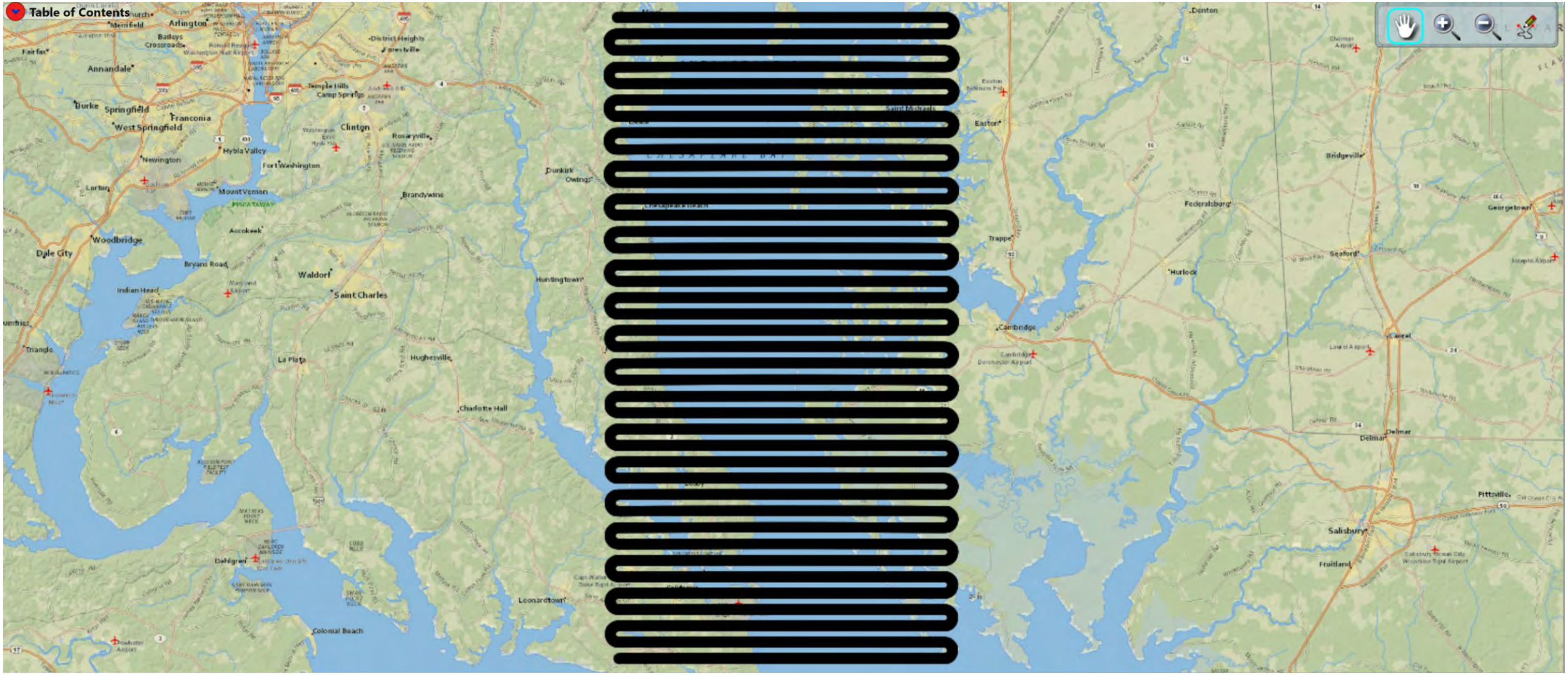
Strength of Index (SOI) ~8, anything about 3 is anomalous

^{60}Co present with high degree of confidence

How can iAVID support IRMIS?

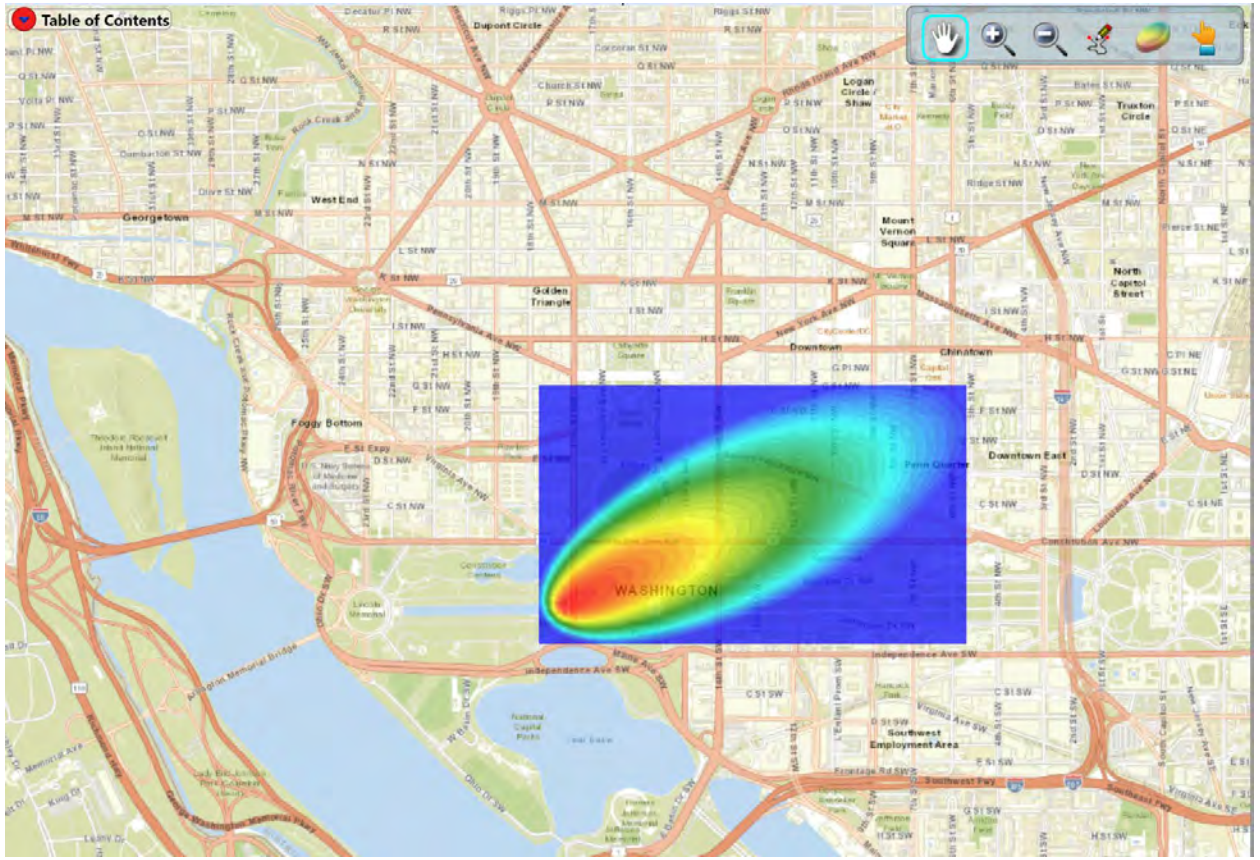
- Can support aerial mission plan by drawing path plot given the starting and end GPS coordinates and line spacing
- Plume simulation
- Can support IRMIS to obtain telemetered data from deployed system in the field in real time via remote control feature – very useful for emergency response
- Can directly incorporate radioisotope-mixture-specific ground deposition concentration data (Bq/m^2) from accidental release – useful for real-world prerelease condition, training and exercise simulations from nuclear power plants or fuel cycle infrastructure like reprocessing units
- Can extract radioisotopes with high degree of confidence by applying GADRAS analysis when spectroscopic data are available in IRMIS

Built-in aerial mission planning simulation tool

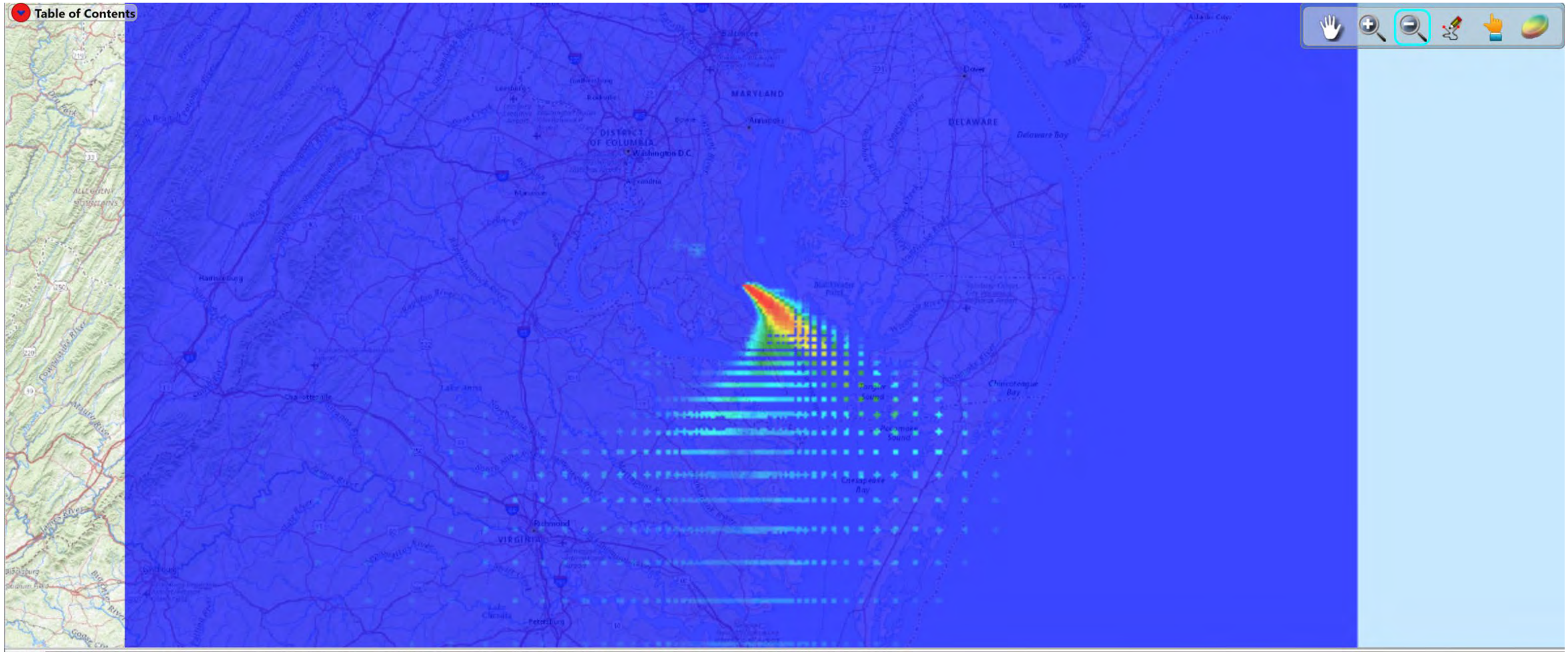


Built-in plume simulation capability

- Can add a simulated detector response to real background data
- Add plumes and ground deposition
  - Launch AVID in **Mission Planning** mode
  - Use **Plume** tool to specify foci of elliptical plume
  - Name plume, set total activity, and click OK
  - Plume will appear in **Concentration File Manager**
  - Optional: Highlight and click **Add to Map**
  - Will add raster image to survey

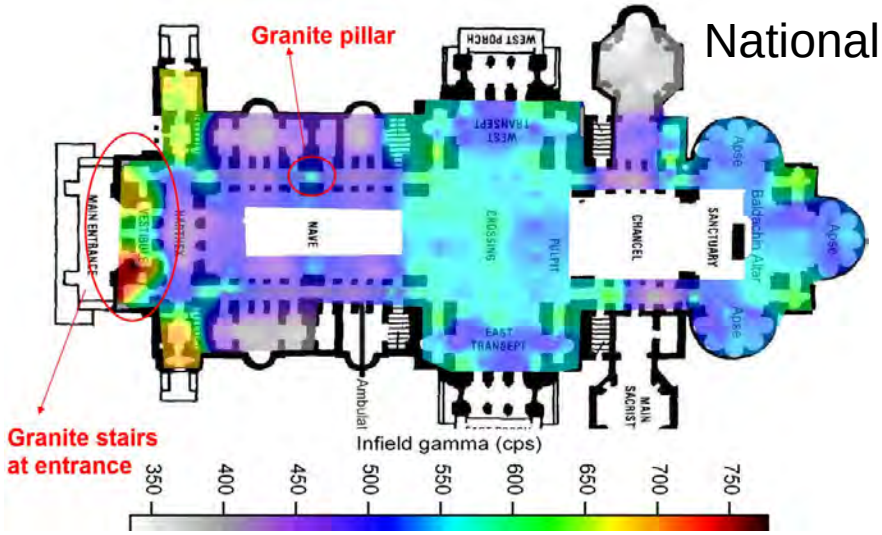


Ground deposition concentration simulation map from NARAC atmospheric model (via IXP)

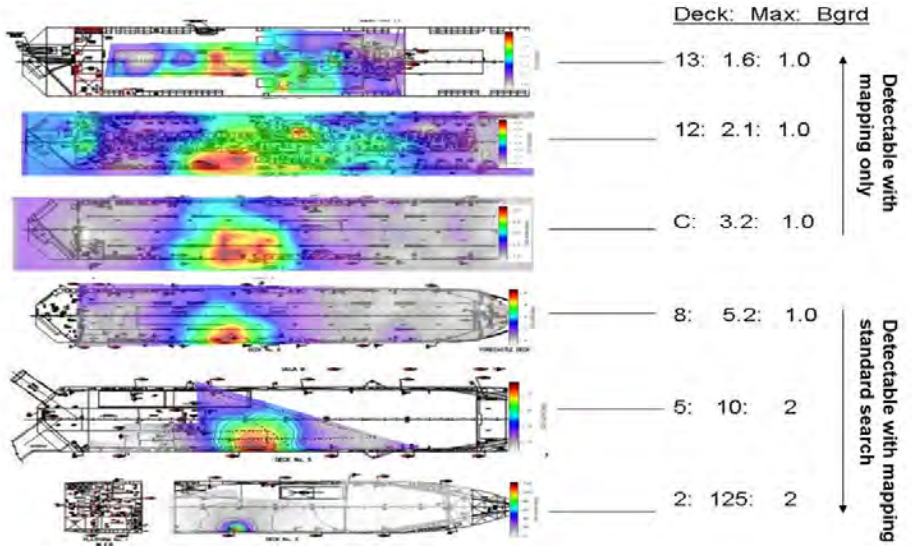


This would tremendously simplify IRMIS data simulation workflow

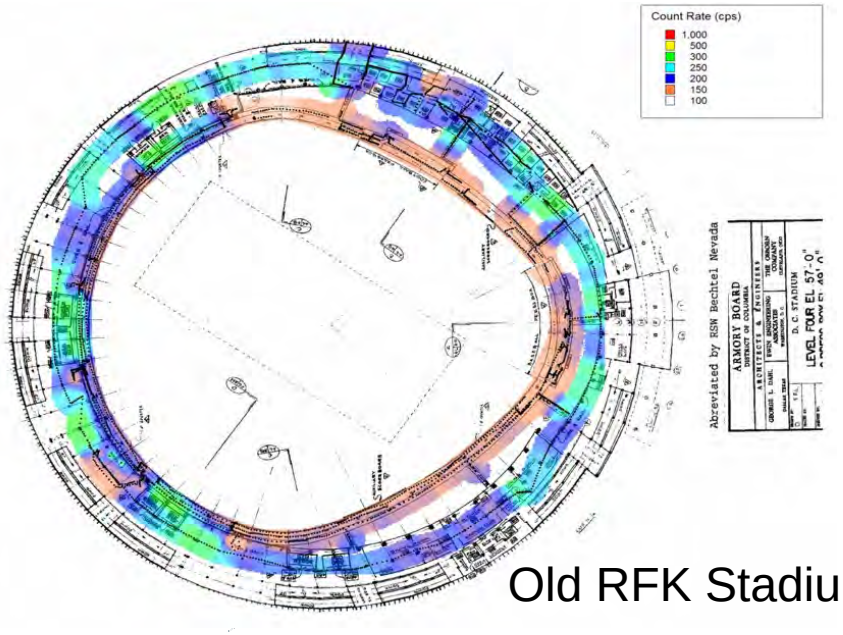
Mapping in GPS-denied area with Inertial Measurement Unit (IMU)



National Cathedral in Washington DC

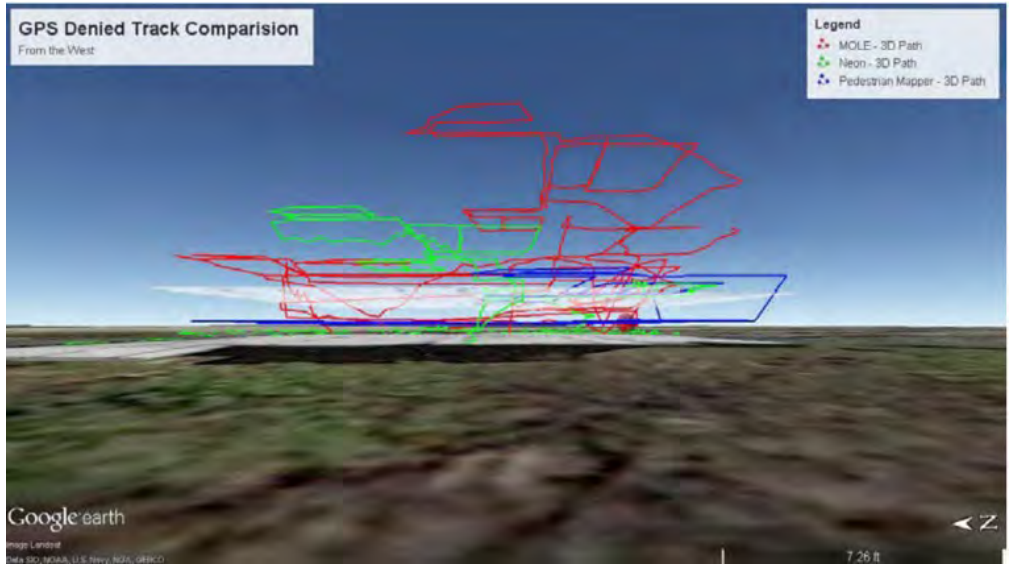


Radiation map on board a ship



Old RFK Stadium in Washington DC

Stitching together 2D maps to reconstruct 3D images



Concluding remarks

US DOE/NNSA Nuclear Incident Policy and Cooperation has been providing support to IEC Emergency Preparedness and Response operations by providing equipment, infrastructure, and technical reach-back capabilities. For example,

- IXP (International Exchange Program) – coordinated access to US National Atmospheric Release Advisory Center (NARAC)
- Spectral Advanced Radiological Computer System (SPARCS)
- TRIAGE radiological ALARM adjudication support
- REAC/TS – Radiation Emergency Assistance Center/Training Site
- CM Home Team – Consequence Management Support
- iAVID – International Advanced Visualization and Integration of Data