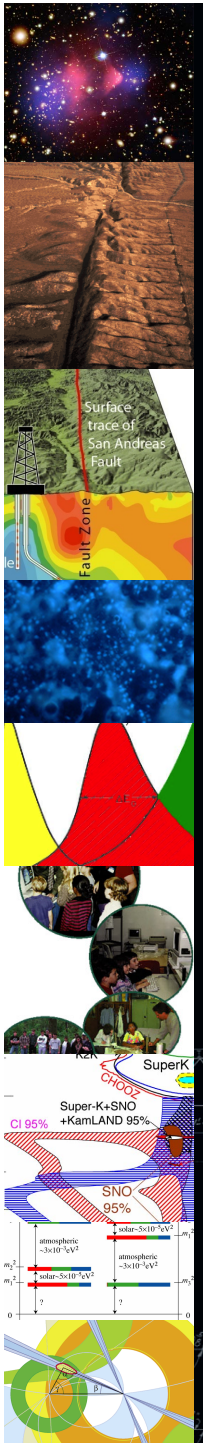
Radon Monitoring at Sanford Laboratory



Jaret Heise

Science Liaison Director, Sanford Lab

AARM Collaboration Meeting

Lead, SD

November 12, 2010

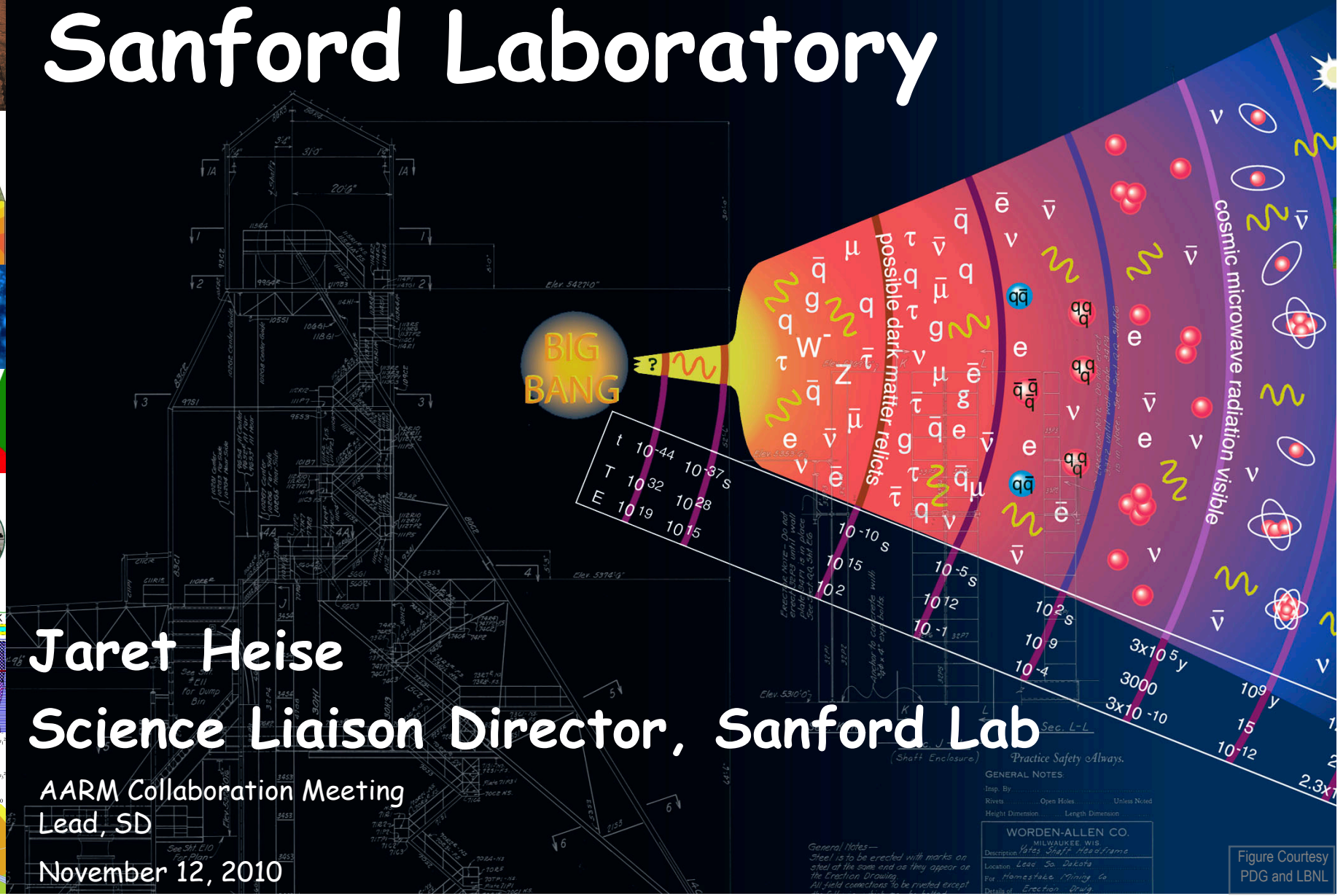


Figure Courtesy PDG and LBNL

Sanford Lab Radon Monitoring

Resources: People

- **Sanford Lab** (Heise, et al): *Deployment, sample collection, data download/analysis*
- **USD** (Mei, Thomas, et al): *Deployment, data & sample analysis*
- **BHSU** (Durben, Keeter, Thompson, et al): *Deployment, sample analysis*

Resources: Hardware

- **USD:**
  - → ***Equipment:*** *1 x RAD7 detector (>4 Bq/m³), DRYSTIK, drierite*
  - → ***Status:*** *RAD7 currently at BHSU*
- **LUX/MAJORANA DEMONSTRATOR:**
  - → ***Equipment:*** *1 x RAD7 (Brown), 1 x RAD7 (UNC)*
  - → ***Status:*** *LUX: In use at Surface Lab, MJD: Early 2011 on 4850L*
- **LBNL:**
  - → ***Equipment:*** *3 x AlphaGuard detectors (>2 Bq/m³), 1 x RAD7 (via BNL)*
  - → ***Status:***
    - AlphaGuard: 2 deployed (1250L, 4850L Ross); 1 on-hold (4850L Yates)
    - RAD7: 1 onsite, not currently deployed

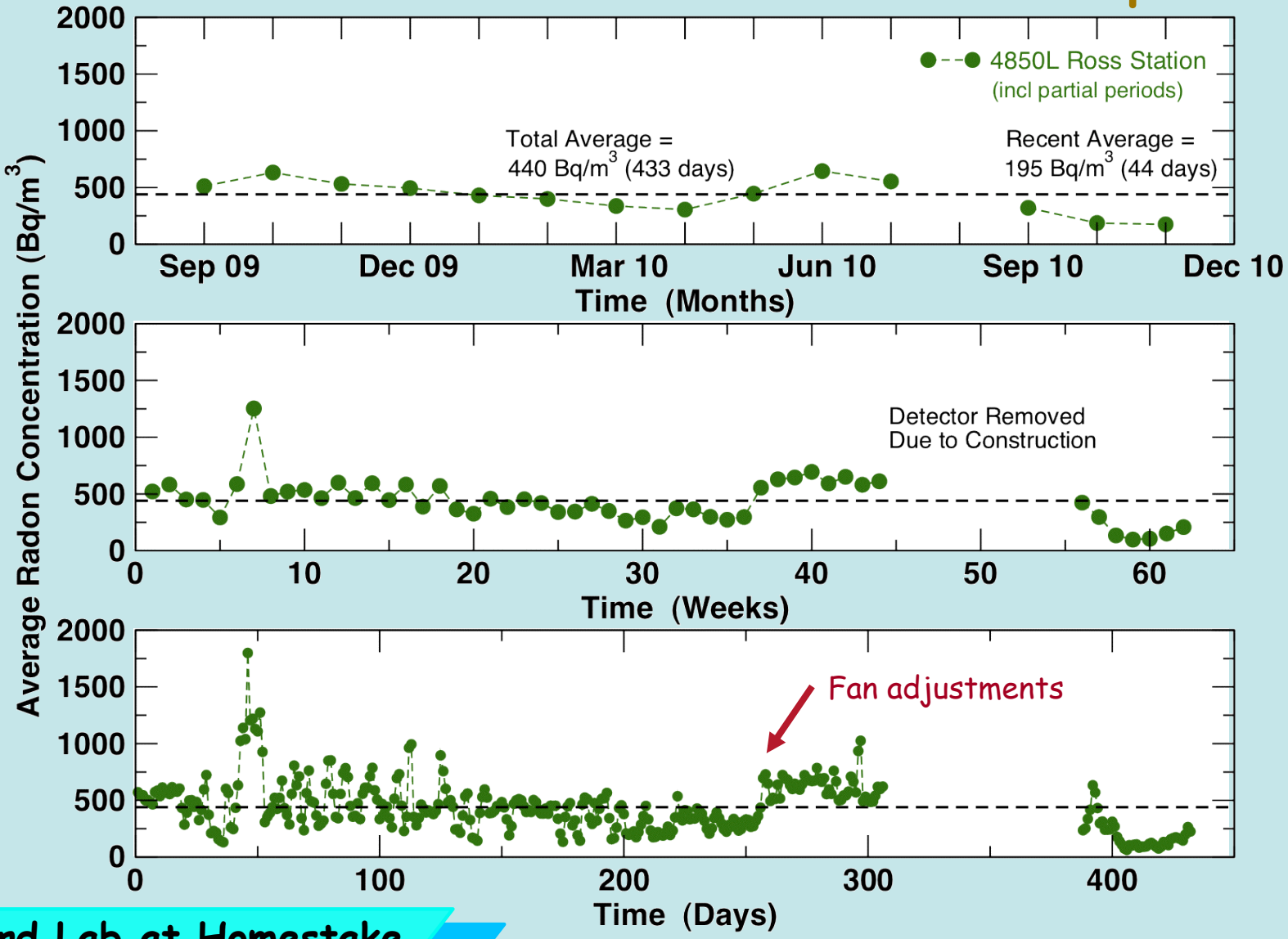
Sanford Lab Radon Monitoring

Radon

- Source:
  - → *Natural radioactivity: Uranium (^{222}Rn), Thorium (^{220}Rn)*
- Data collected on many levels:
  - → ***Short-term monitoring**: Surface, Tramway, 300L, 800L, 1100L, 1250L, 1400L, 1550L, 1700L, 1850L, 2000L, 3950L, 4550L, 4850L (data of limited use)*
  - → ***Long-term monitoring**: 1250L, 4850L*
- Preliminary results:
  - → *Summary paper in production*
  - → *Influenced significantly by ventilation*

Sanford Lab Radon Monitoring

4850L Ross Station Rn Concentrations Since Sept 2009

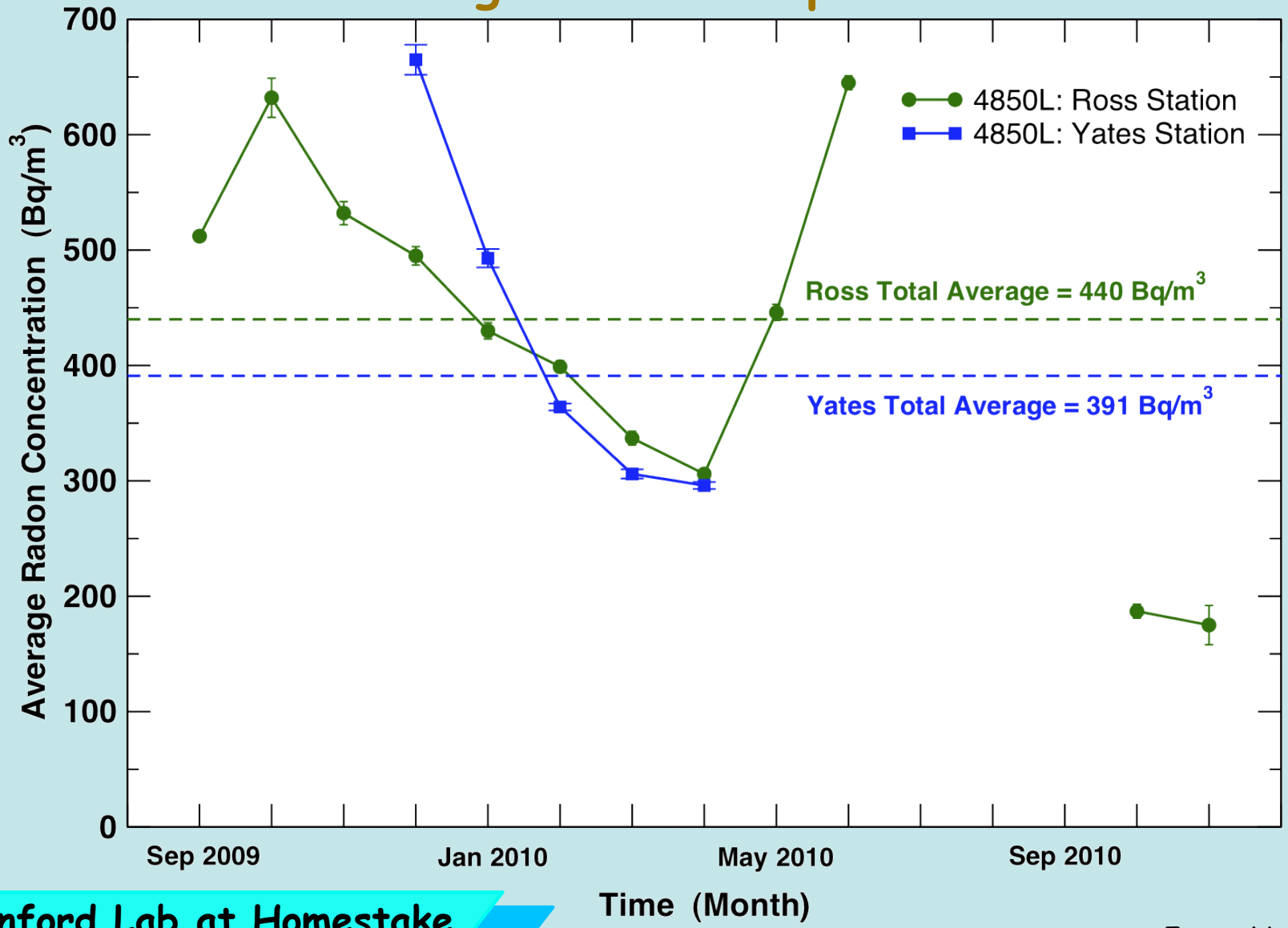


Sanford Lab at Homestake

Jaret Heise

Sanford Lab Radon Monitoring

Measured Using Genitron AlphaGuard Detectors



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Sanford Lab Radon Summary

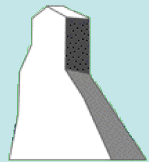
Overview

- **Radon monitoring program underway:**
  - → *First radon measurements in current program began Oct 2008*
  - → *Contributions from several institutions*
  - → *Use two different types of detectors (cross-calibration)*
  - → *Summary document in preparation*
- **Radon data (preliminary):**
  - → *Long-term site data most useful due to many changing factors*
  - → *Average radon concentration:*
    - 4850L Ross station: 440 Bq/m^3 total (recent period = 195 Bq/m^3)
    - 4850L Yates station: 391 Bq/m^3 total (limited due to construction)
    - 1250L Ross station: 180 Bq/m^3 total (data not shown)
    - Surface: ~10-100 Bq/m^3 (data not shown)
- **Comments:**
  - → *Significant variations in early radon concentrations due to evolving ventilation (eg., fans, air doors, contractor activity/access, etc)*
  - → *Deeper sites receive air that has increased contact with rock*
  - → *Ventilation changes should be converging, tests being considered*

Sanford Lab Radon Summary

Summary of DUSEL Discussion

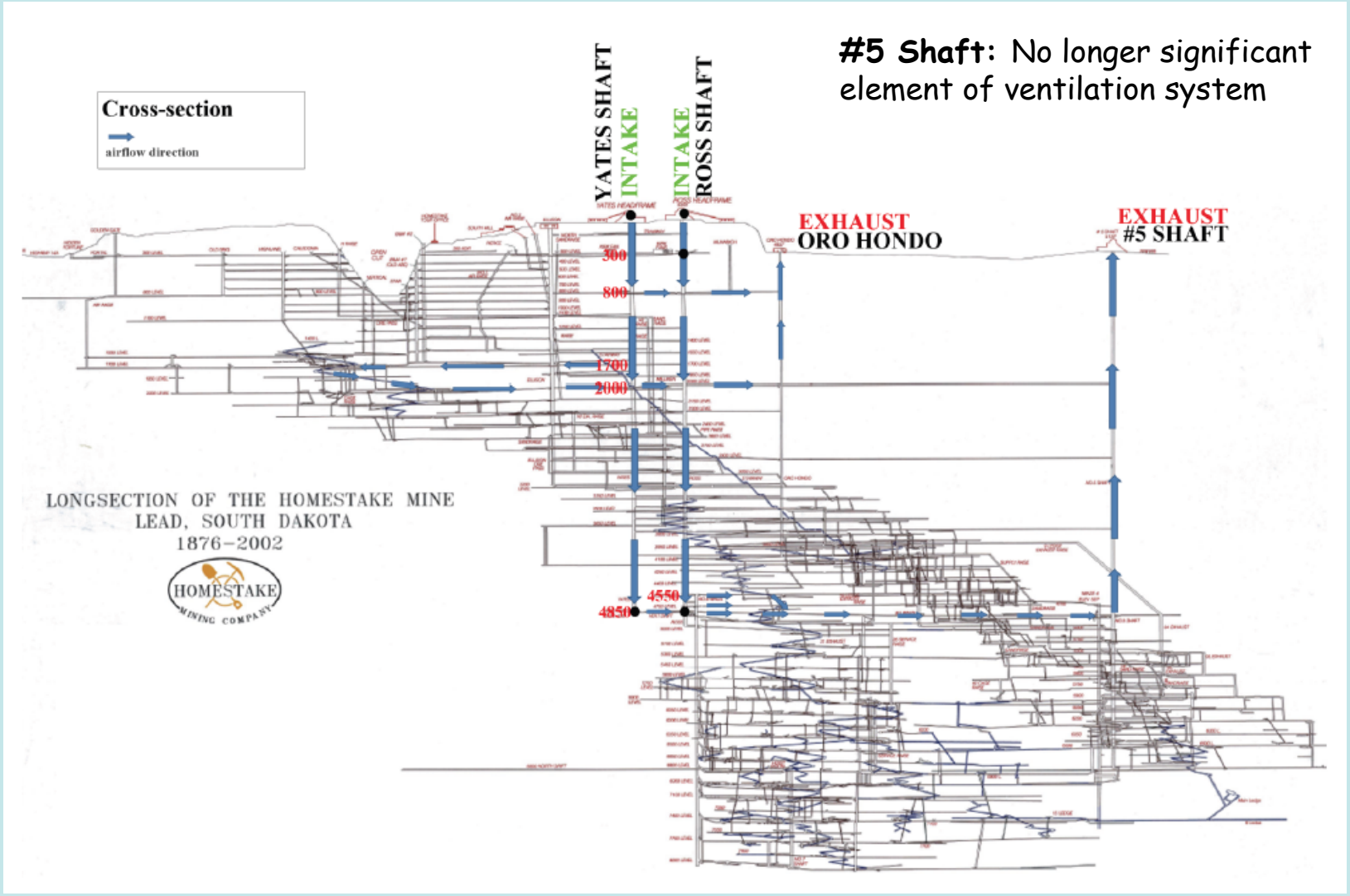
- **DUSEL preliminary design:**
  - → *Large duct initially proposed to bring air from surface abandoned (excavation cost to accommodate duct was >$10M!)*
  - → *Providing surface air to limited cleanroom volumes may be possible (either coordinated via AARM or DUSEL Science Liaison)*



Thank You!

Sanford Lab Radon Monitoring

Sanford Lab Ventilation



#5 Shaft: No longer significant element of ventilation system

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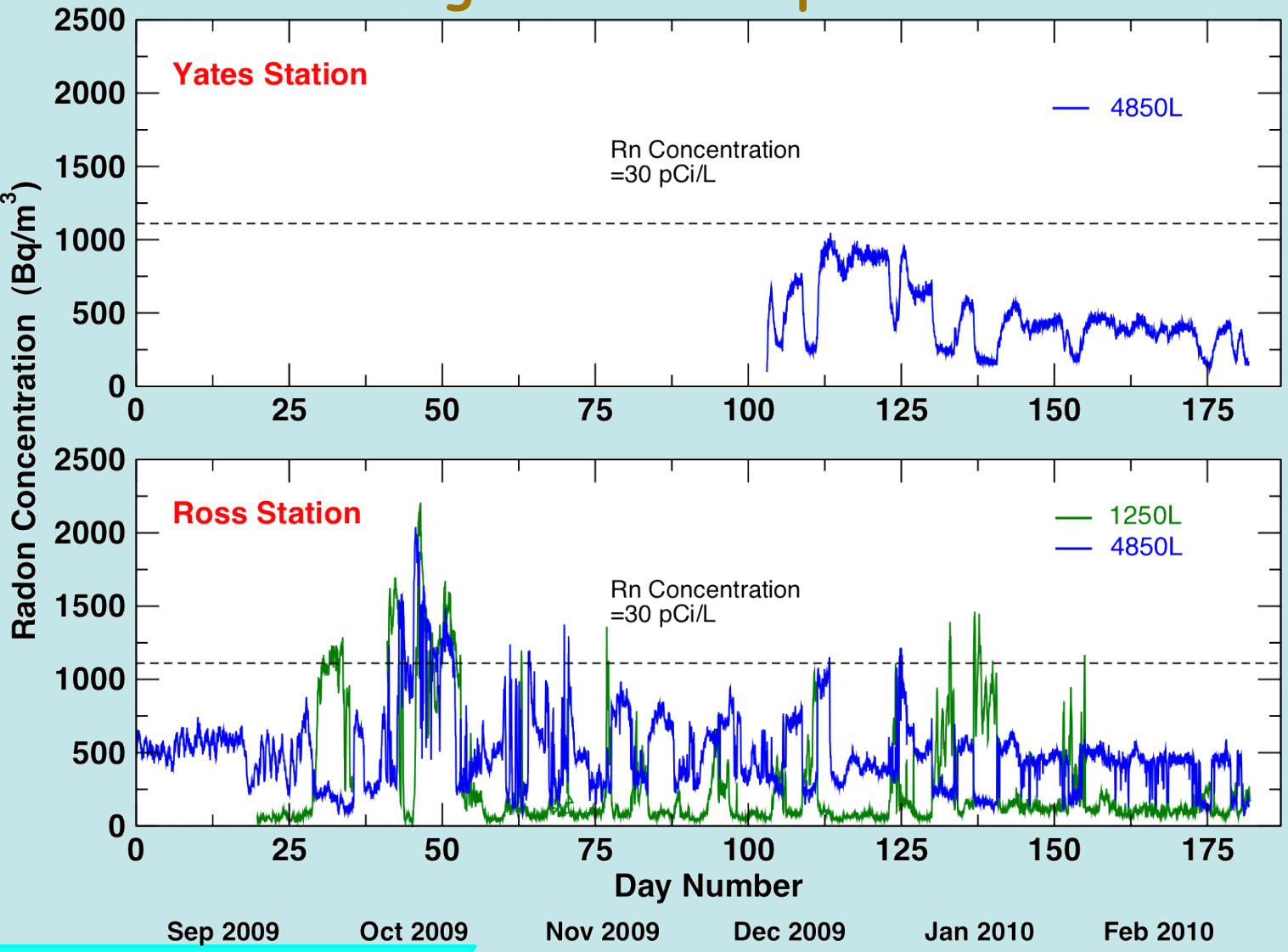

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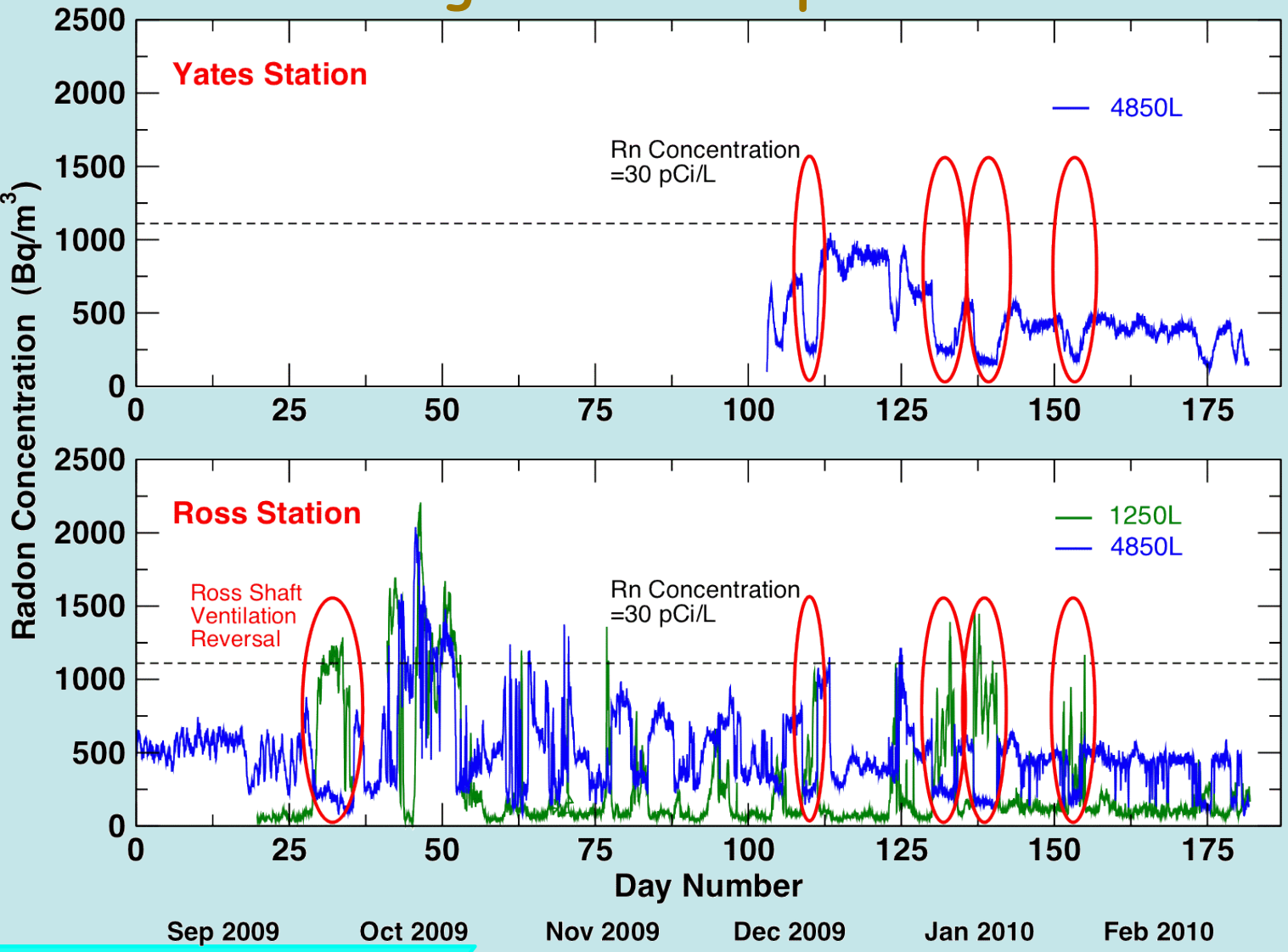

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