Breakout 1 Readout: D

- The carbon capture problem is very complex – root is a factor, but any biomass back to the soil is important. There is partitioning of C in the soil, which requires measurement. The residence time of that carbon is important, and challenging to measure over a three year timeframe.
- Doubling carbon sequestration is very hard. 0.5 Gt/year in the US could be feasible, and increase of 2-3 Gt/year across the world would be great.
- Lots of discussion of tradeoffs for phenotyping root growth – consensus that it would be very challenging to increase roots without decreasing yield. One dissenting voice – not necessarily a tradeoff.
- Value
  - increase water capacity, soil “health”, less runoff and erosion.
  - N_2O and methane important (ammonia?)
  - Economically viable

Breakout 1 Readout: D

- Measuring success over a 3 year timeframe
  - Very hard – lots of variation.
  - Possibly look a tsurrogate measures such as ratio of fungi to bacteria

Breakout 2 Readout: H

- Measuring Impact
  - Less expensive CO_2 analyzers
- Technology gaps
  - In-situ fine root phenotyping, fine root turnover
  - Precise measurement of N-P-K in real time
  - Measurements of soil structure
  - Radar based systems (or others) to measure soil moisture
  - Dielectric properties of soil
  - Replacement for Cs137 and neutron scattering
- Important plant traits highly dependent on soil – croplands, grazing lands, forest land

Breakout 2 Readout: H

- Lab vs. field measurements
  - General consensus – no substitute for field measurements
  - However – can depend on what question you're asking. Can identify role of a gene, or learn about plasticity, that can be done in the lab, If you want a breeding perspective, need field work.
  - Can be useful to untangle mechanisms, but need the field for connection to real world.
  - Increasing role of in silico "measurements"