



Non-Destructive Carbon Measurement in Soil Over Large Fields

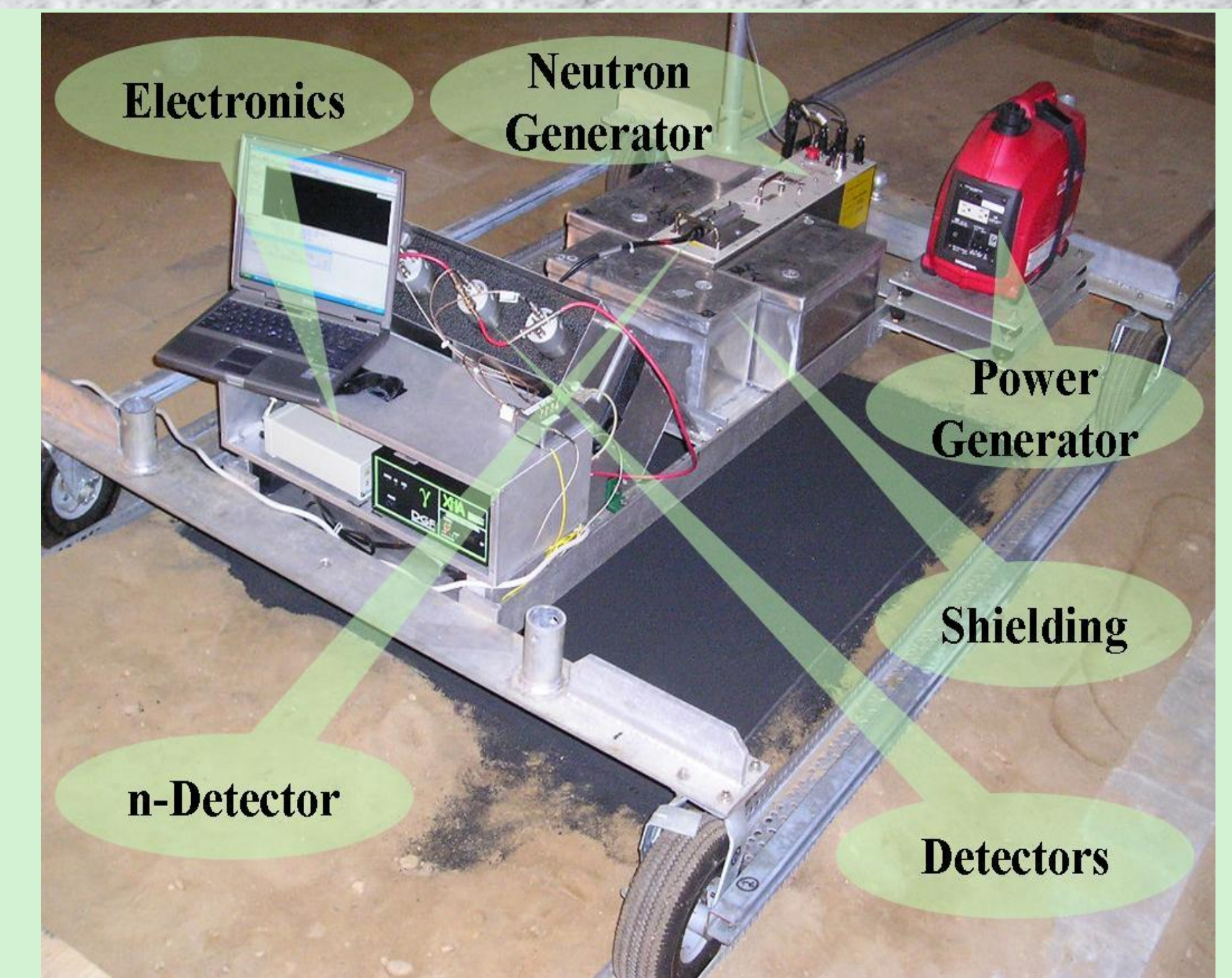


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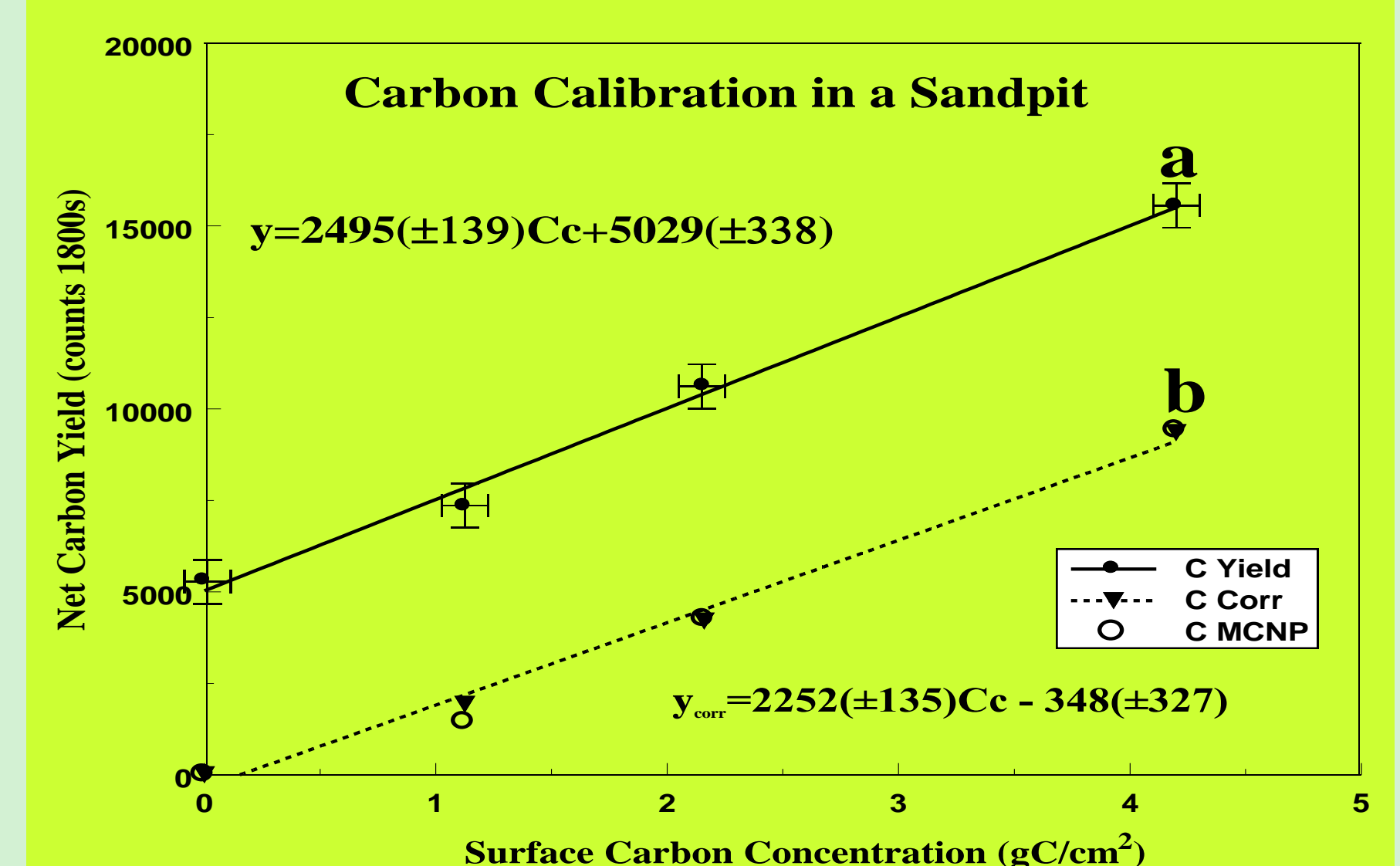
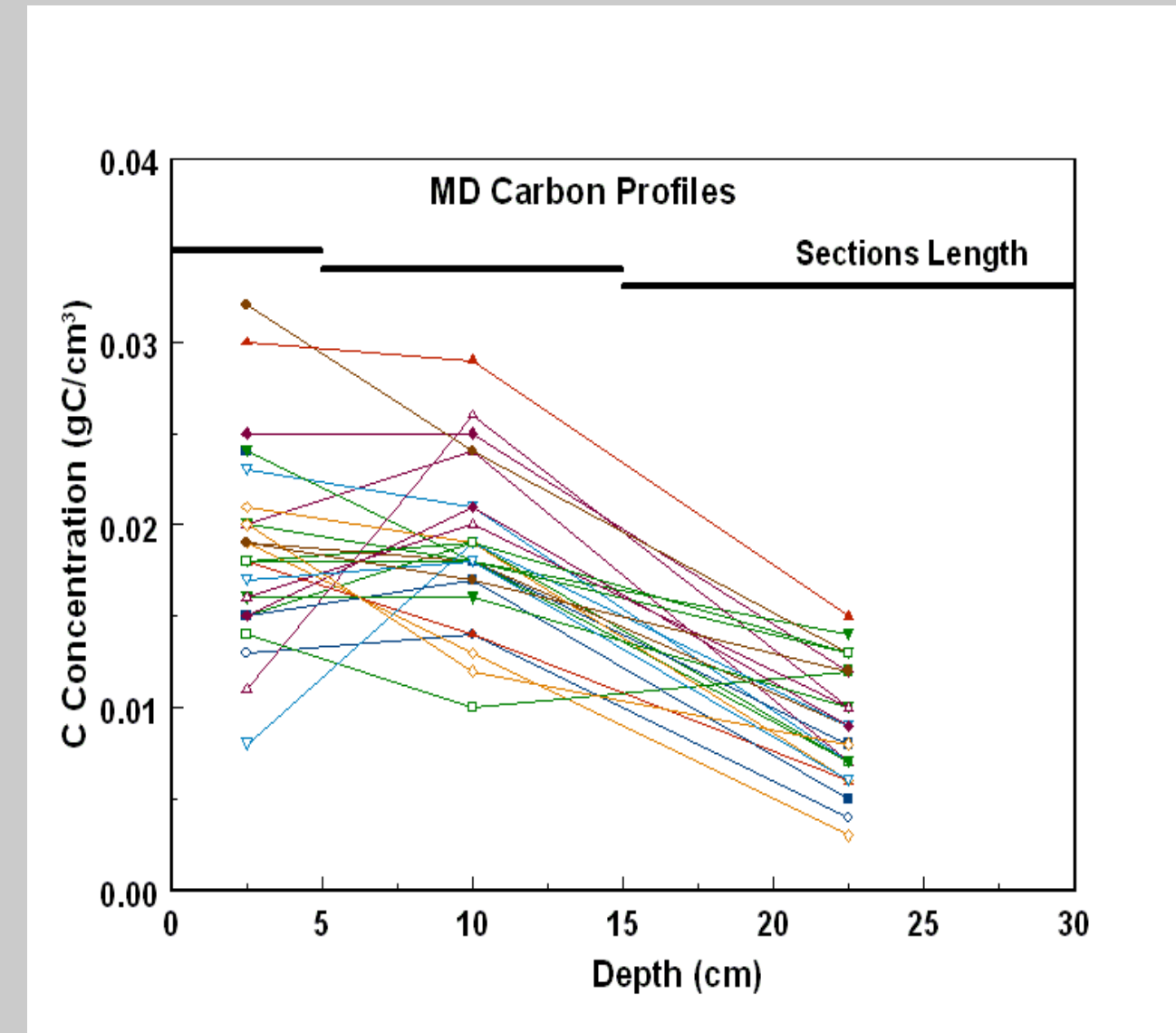
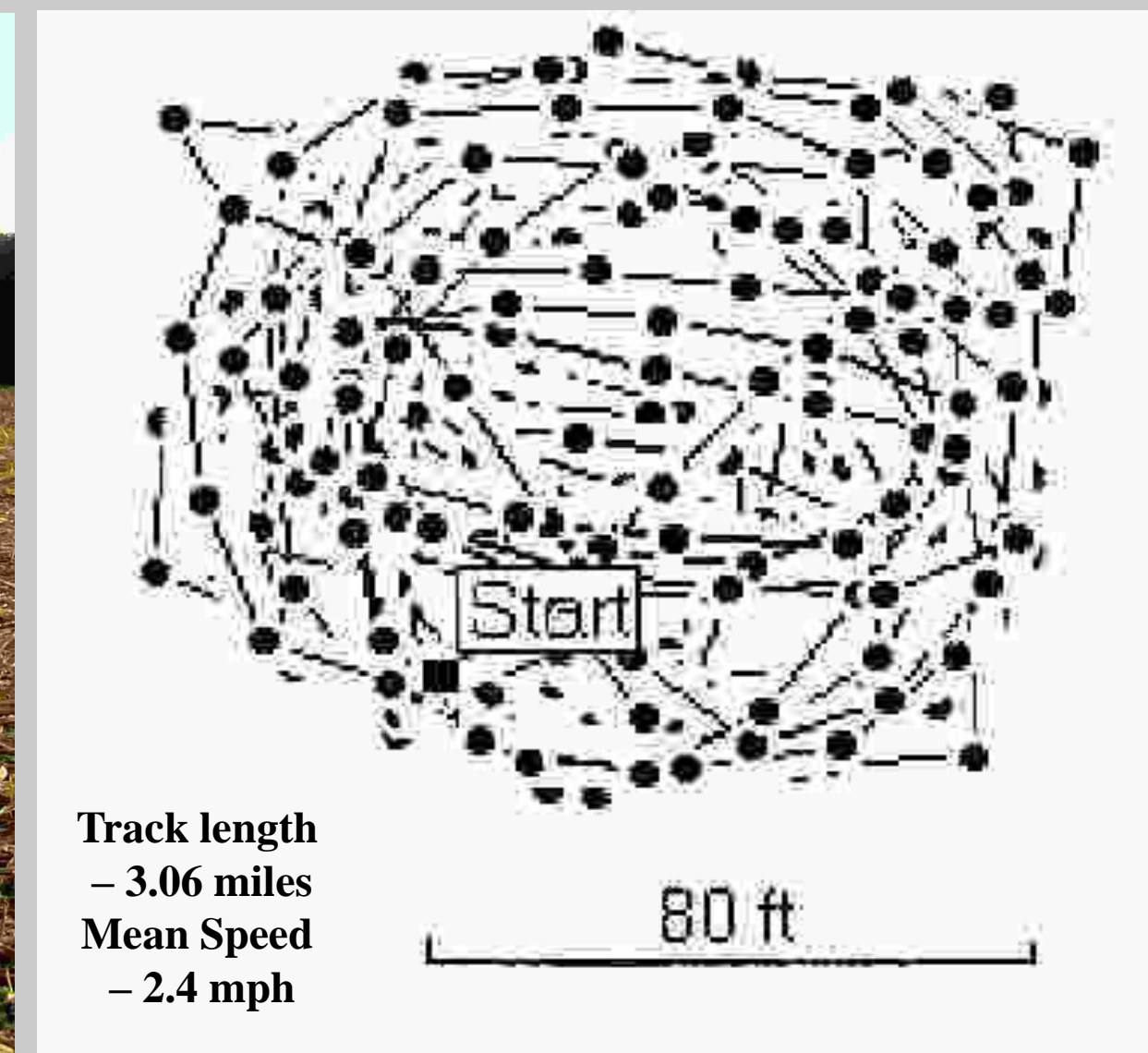
Carbon Yield for 1800 s in Alabama Soil Bins

	Mean Static Counts	Dynamic Counts	Difference In SD
Hiwassee Clay (V ₁)	3830	4676	5.1σ _{n-1}
Vaiden Silty Clay (2V ₁)	8775	5986	-1.4σ _{n-1}
Hiwassee Sandy Loam (Random V)	3447	2403	-1.0σ _{n-1}

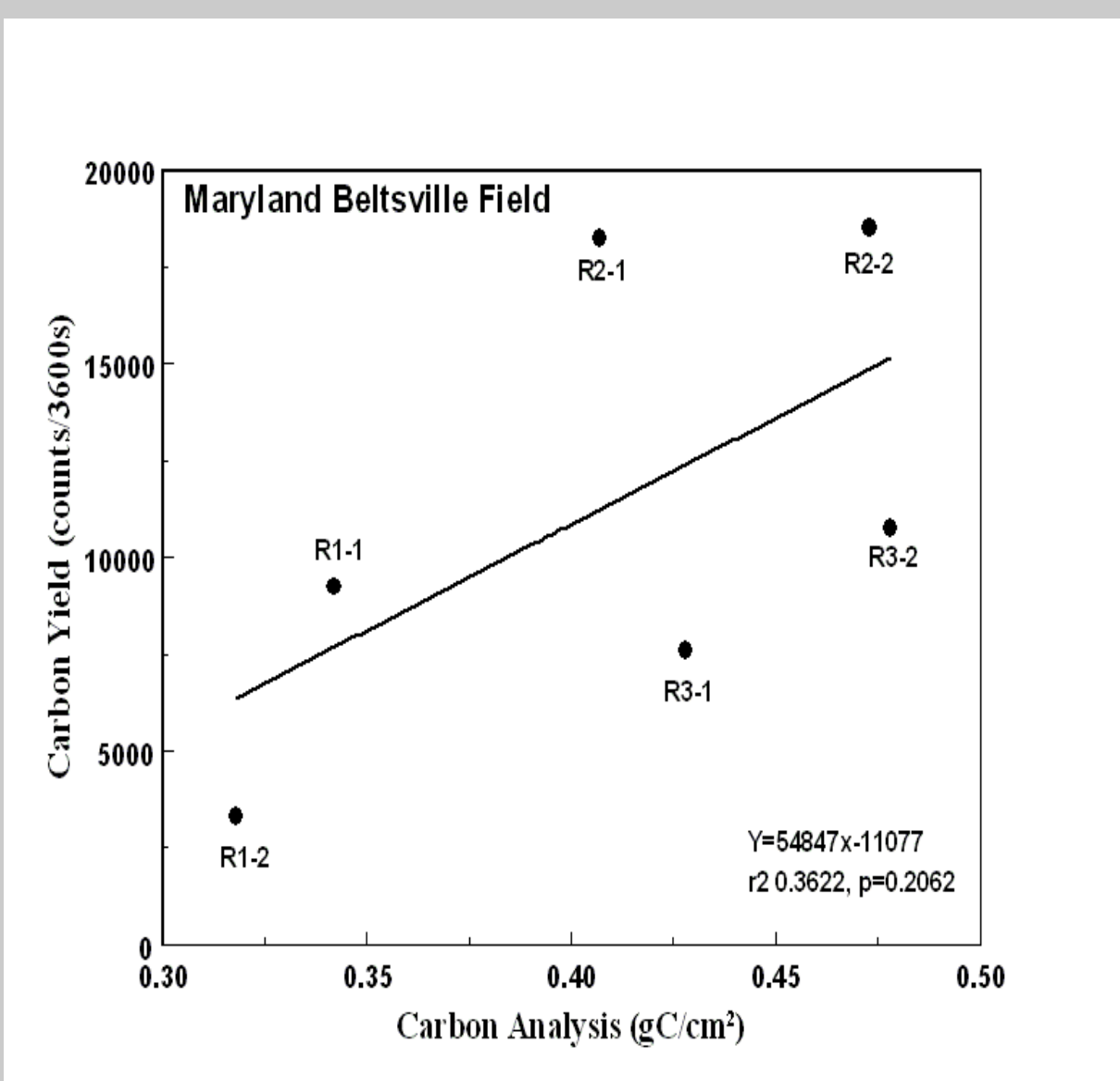


INS Alpha prototype used for stationary and scanning purposes

Maryland corn field and GPS trace of a scan, in addition three static measurements were taken in the field



Summary:
 • INS system is completely non-destructive.
 • INS system operates in static and scanning modes.
 • INS measures large volumes and areas.
 • Special protocols need to be developed to interpret and validate the comparison between INS results and dry combustion.



Field Prediction versus INS		
LECO	0.407	13.5%
INS	0.257	19%

Narrative

The tremendous difference in volumes, about factor 10^6 , inspected by the Inelastic Neutron Scattering (INS) system and that sampled by Dry Combustion (DC) and the newly emerging modalities, entails a detailed examination of the validity of direct comparison of these results.

The INS measurement is physically a depth dependent weighted sum of the signal arriving from the carbon in soil. This result is contrasted with an arithmetic mean or composite of several cores taken from the large INS's footprint. Under lateral uniform conditions it would be fair to say that proportionality between these two quantities is maintained. However, it is lost or distorted when variable carbon depth profiles or a high lateral non-uniformity that affects the INS and DC readings, respectively, prevails.

The situation is further exacerbated when INS results from a continuous scan, which samples the entire field are compared with carbon field predictions based on several discrete core.

Under present conditions the scans should represent a better measure of the field true value than discrete prediction.

Montana wheat field and GPS trace of a scan, in addition three static measurements in the field were taken.

