

Evaluating Temperature Data

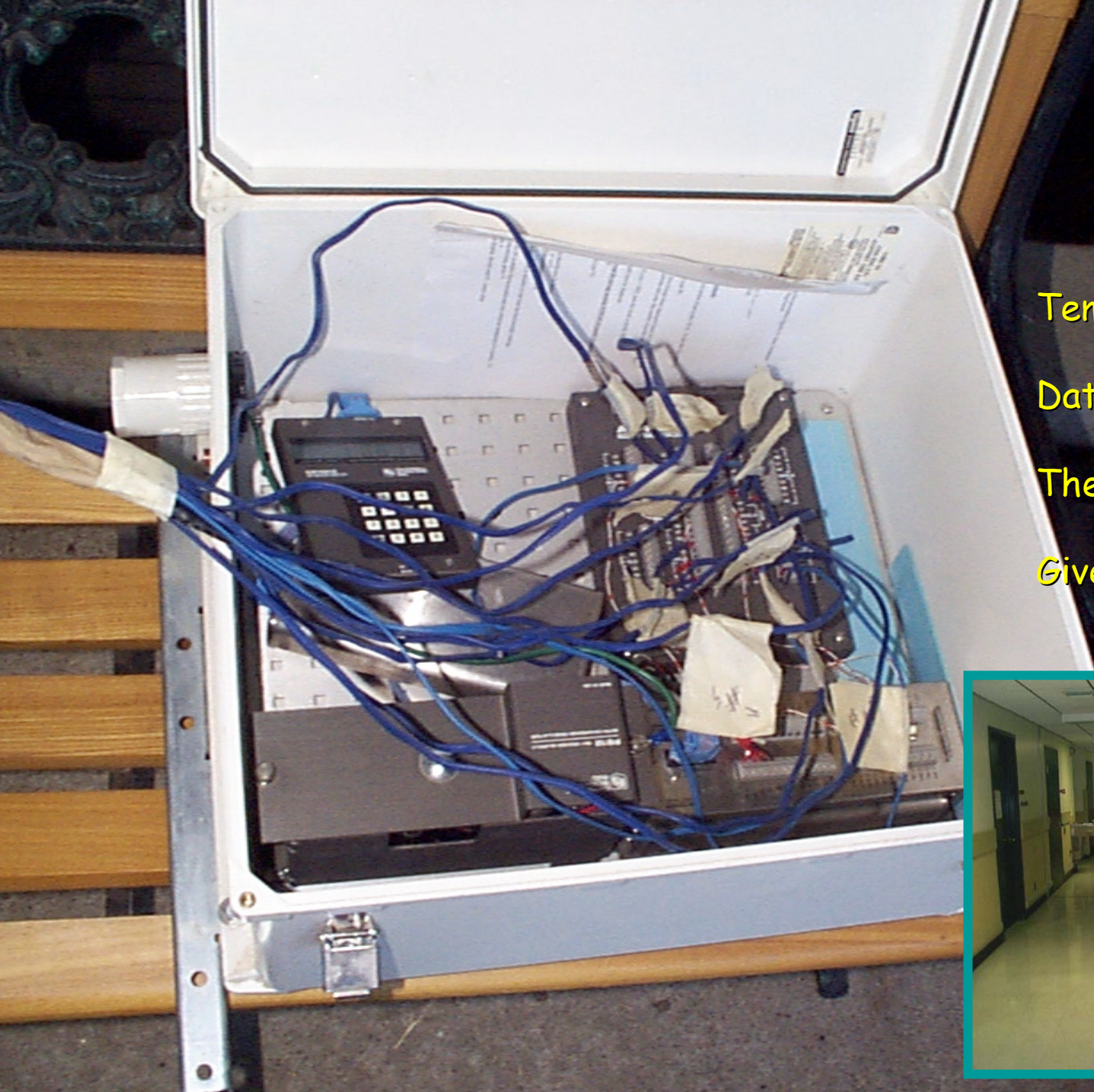
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Importance of Measuring Temperatures

- Determine rate of heating
- Determine uniformity of heating
 - Take corrective action
 - Regulate heat input and distribution
- Determine rate of cool down
- Determine if minimum temperature-time combinations have been attained to kill insect species and stages
- Protect heat sensitive equipment
- Estimate heat treatment costs

Measurement Devices



Temperature recorder

Data logger

Thermocouples

Gives real-time reading





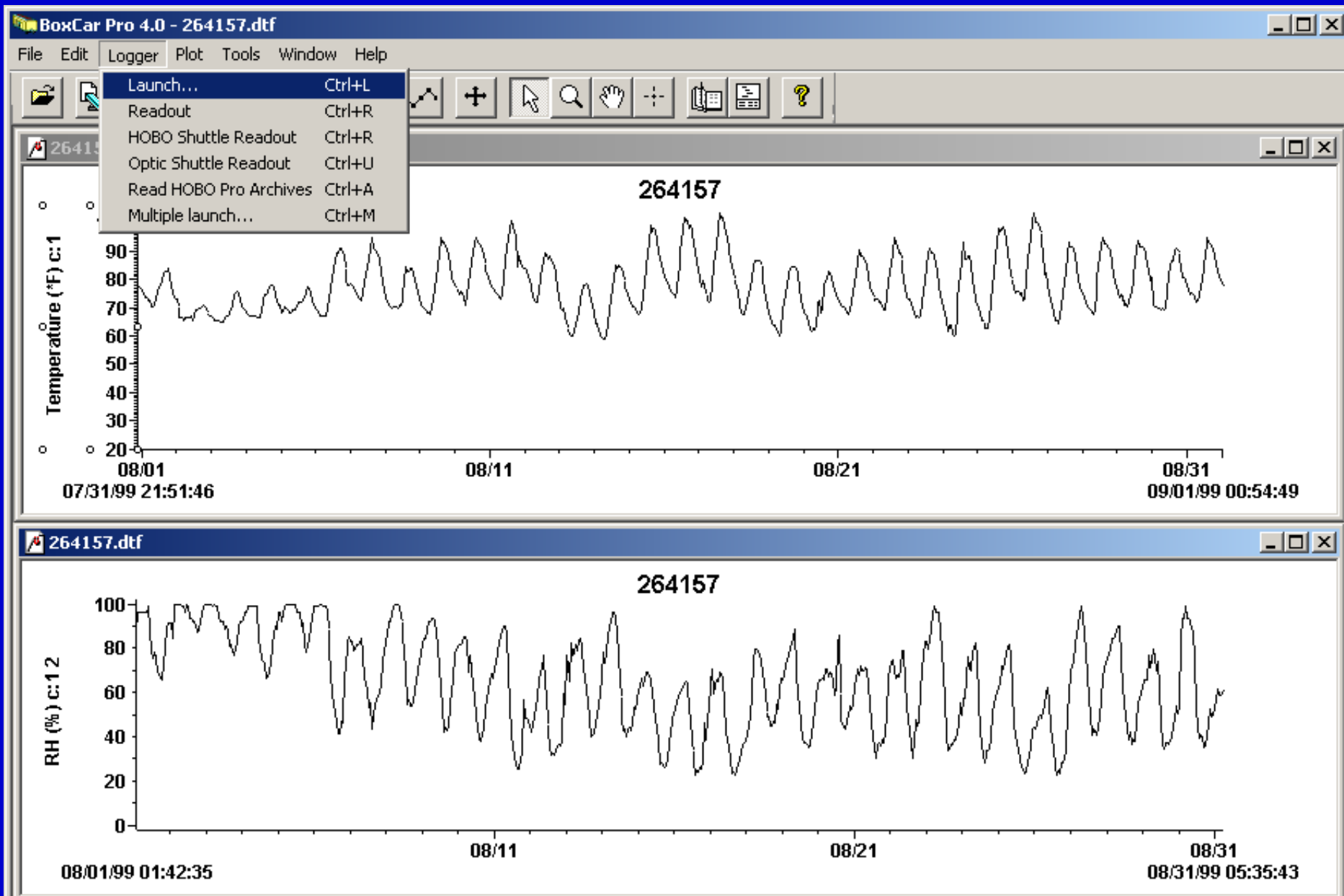
Microprocessor based data logger

Records temperature and relative humidity

Launched and read by computer

Gives readings after heat treatment

Boxcar Pro Software



Infrared ray gun

Gives surface temperatures

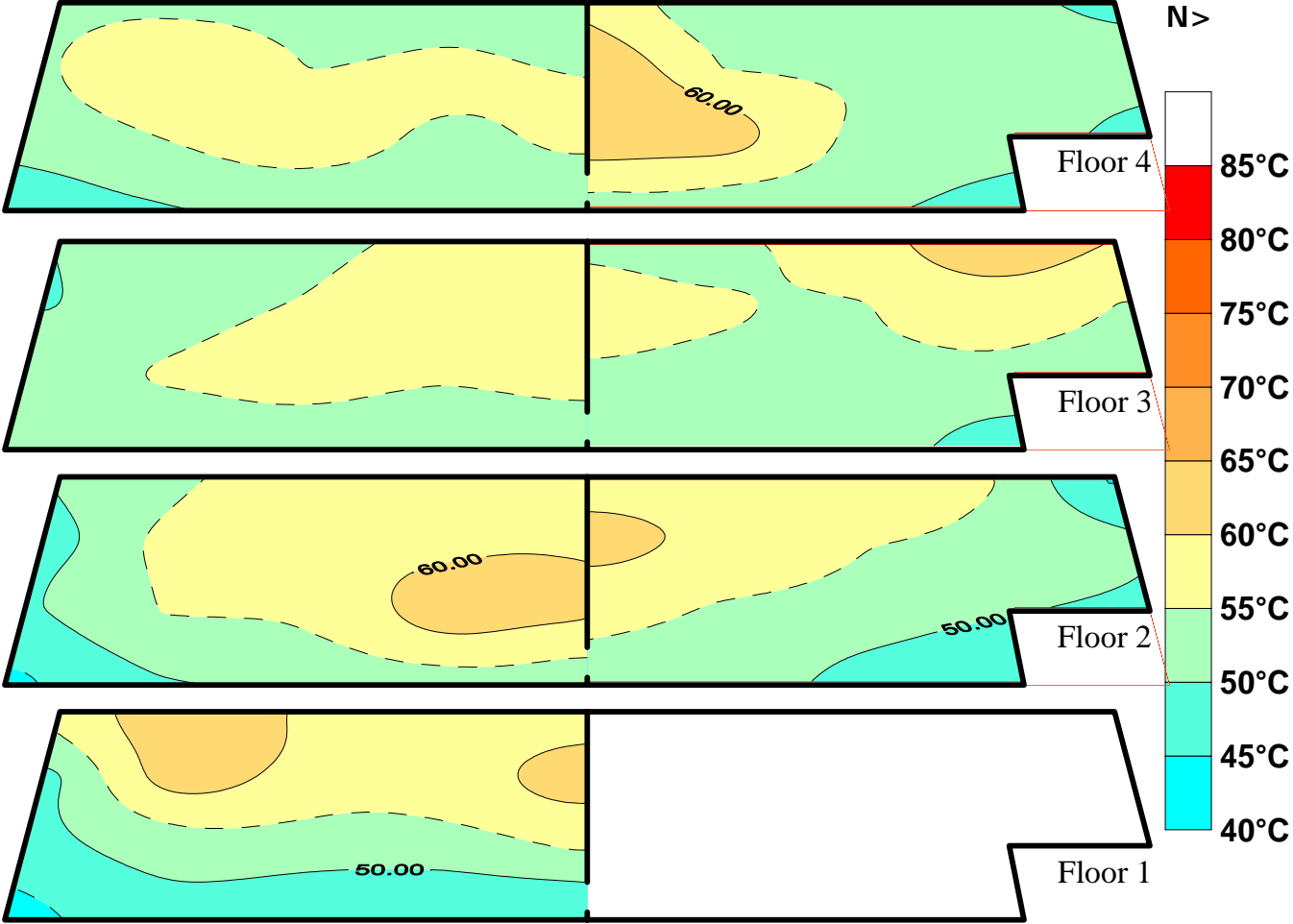
Should be calibrated



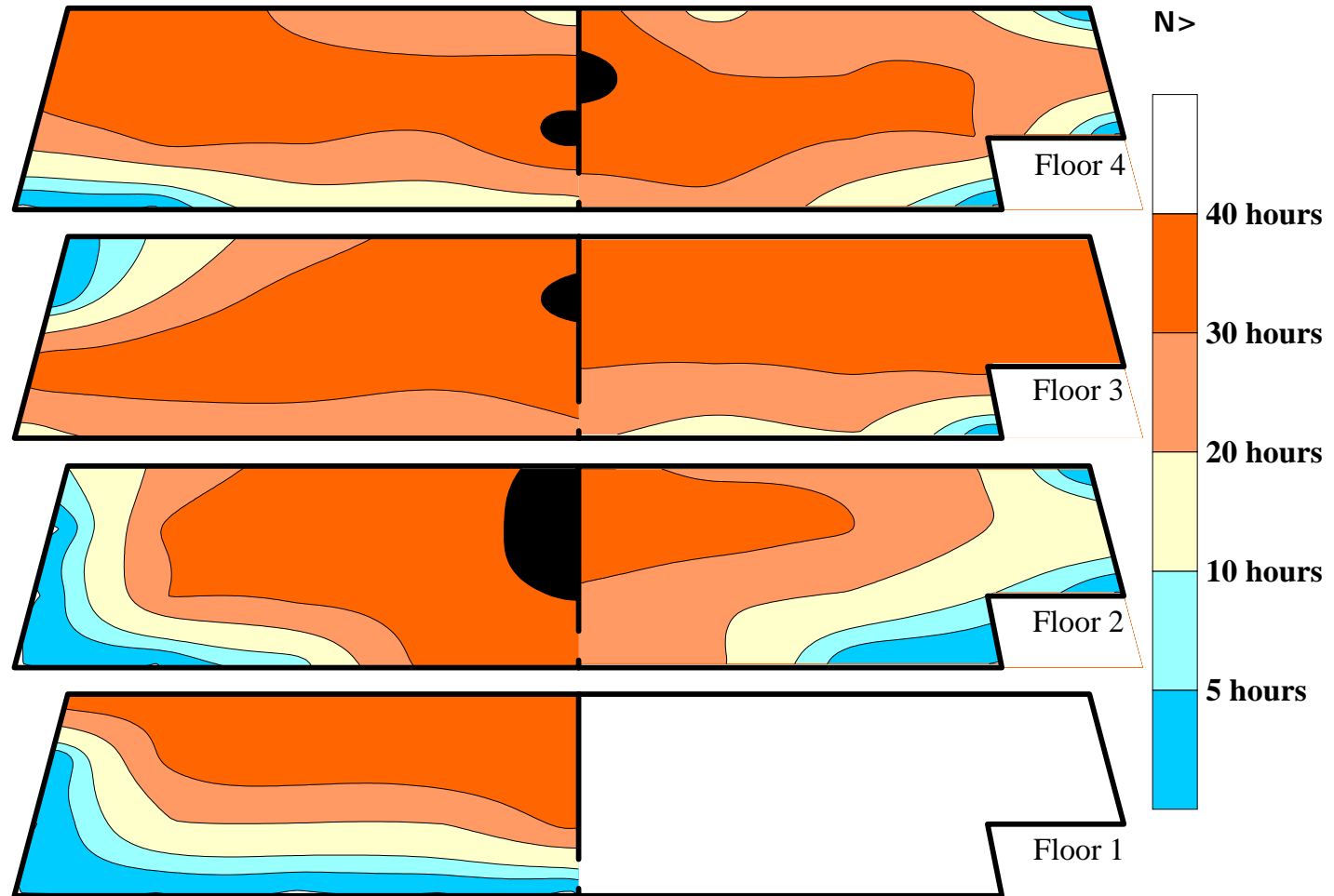
Batteries should be protected from heat



Maximum temperature attained at floor level during heat treatment in August, 1999



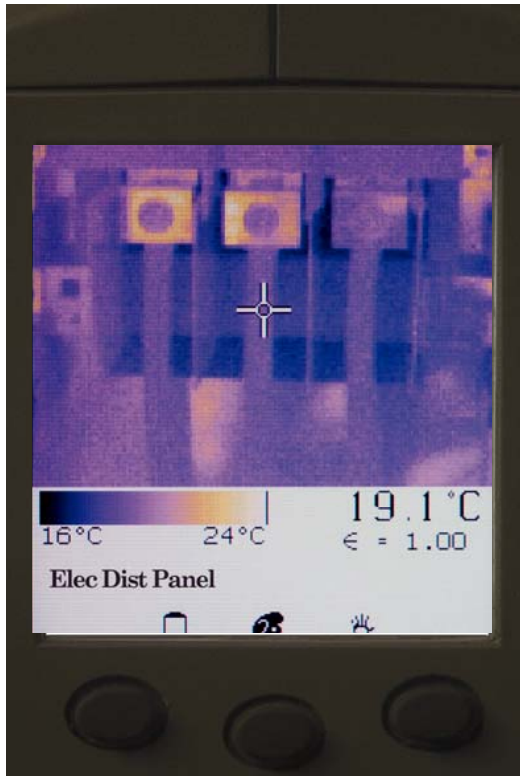
The length of time floor temperatures were above 50°C during a heat treatment in August, 1999



Wireless Devices

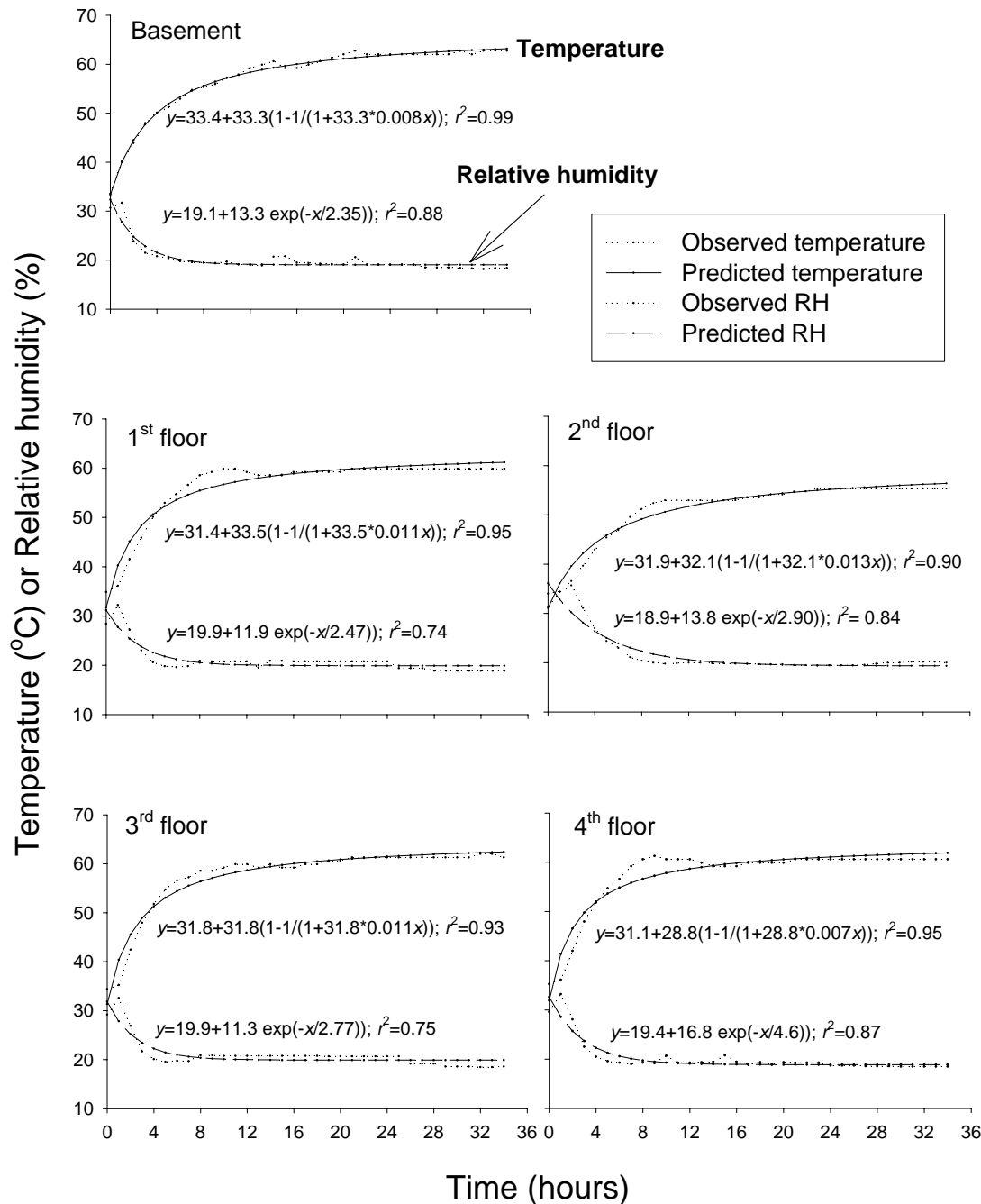
- Radio frequency
- Transmitter
- Receiver
- Gives real time reading

Thermal Imager



Surface temperature vs radiant energy

Observed and fitted lines to temperature and RH data



August 4-6 gas heat treatment Feed mill, KSU

Location	Hours to reach 50°C	Hours above 50°C	Maximum temperature (°C)
Basement	4-4.3	31.7-32	71.7
1 st floor	1.5-3.2	32.8-34.5	63.9
2 nd floor	2.1-2.4	33.6-33.9	70.7
3 rd floor	3.1-3.4	32.6-32.9	70
4 th floor	7.2-8	28-28.8	64.4
Warehouse	1.3-2.3	33.7-34.7	65.6

Heater discharge: 62.8-104.4°C. Outside: 22.2-24.4°C. Mill: 28.3-30.6°C.

Bottomline

- Heat works!
- Minimum temperature, 50°C or 122°F
- Time, variable
 - Time of year (winter vs summer)
 - Spot or whole building
 - Insect species and stage