

Surface Temperature Investigation of Untilled and Conservation-Tilled Farm Fields

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Big Question

- Do Changes to the Land Made by People Affect the Earth's Temperature?



Which is warmer?

Untilled (No-Till) Field

The plant debris from last year's harvest remains in the field.



or

Conservation-Tilled Field

The ground is broken up, but some plant debris remains.

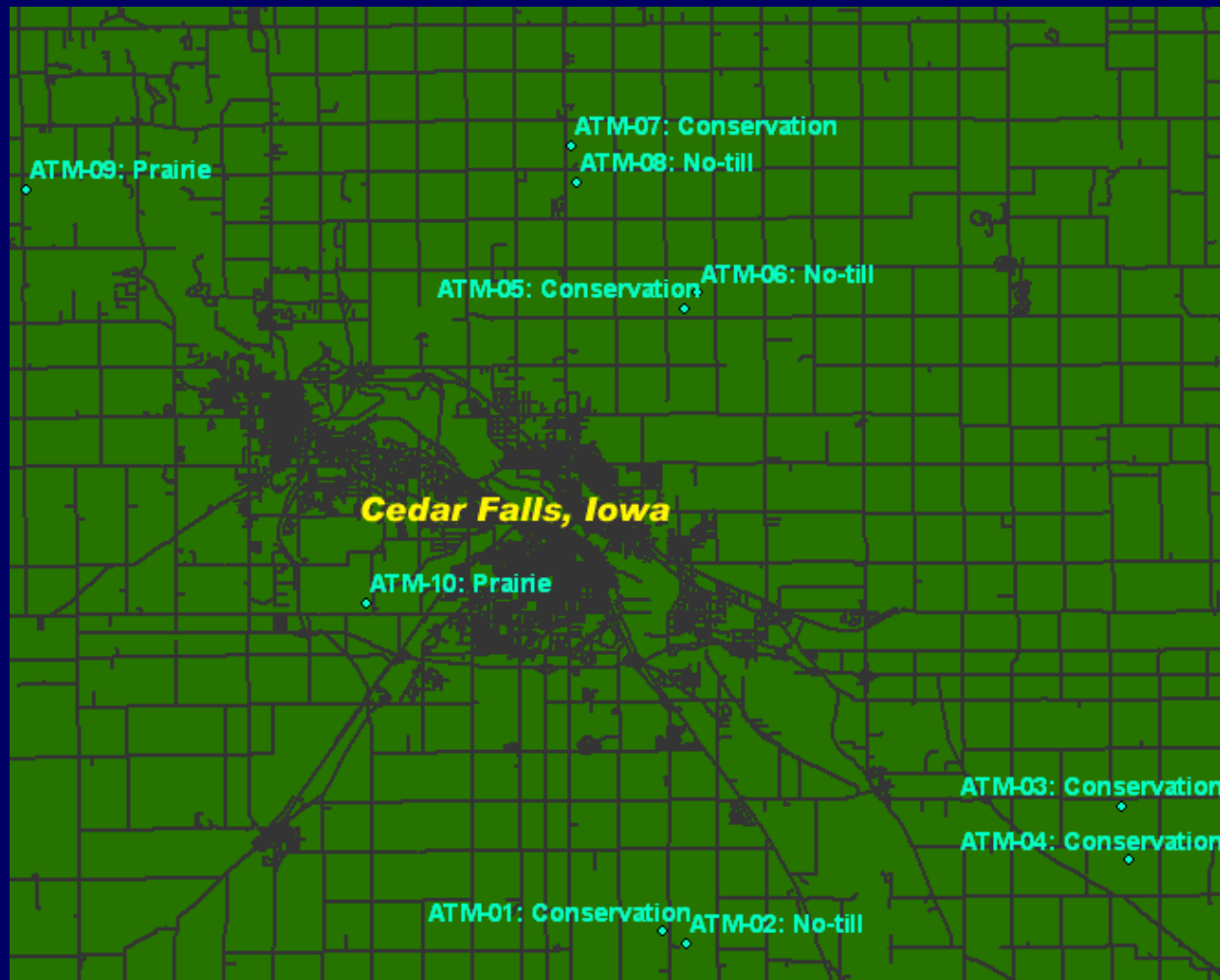


How Did We Determine Which is Hotter?

1. Determined Untilled Versus Conservation Tilled Fields Using Landsat 7 Satellite Image.
2. Used Student GLOBE Surface Temperature Observations to Correct the Satellite Estimated Ground Temperature for Atmospheric Effects.
3. Calculated Average Surface Temperature from the Satellite for the Untilled and Conservation Tilled Fields.



Step 1: Find our Fields on a Map and Validate Their Location



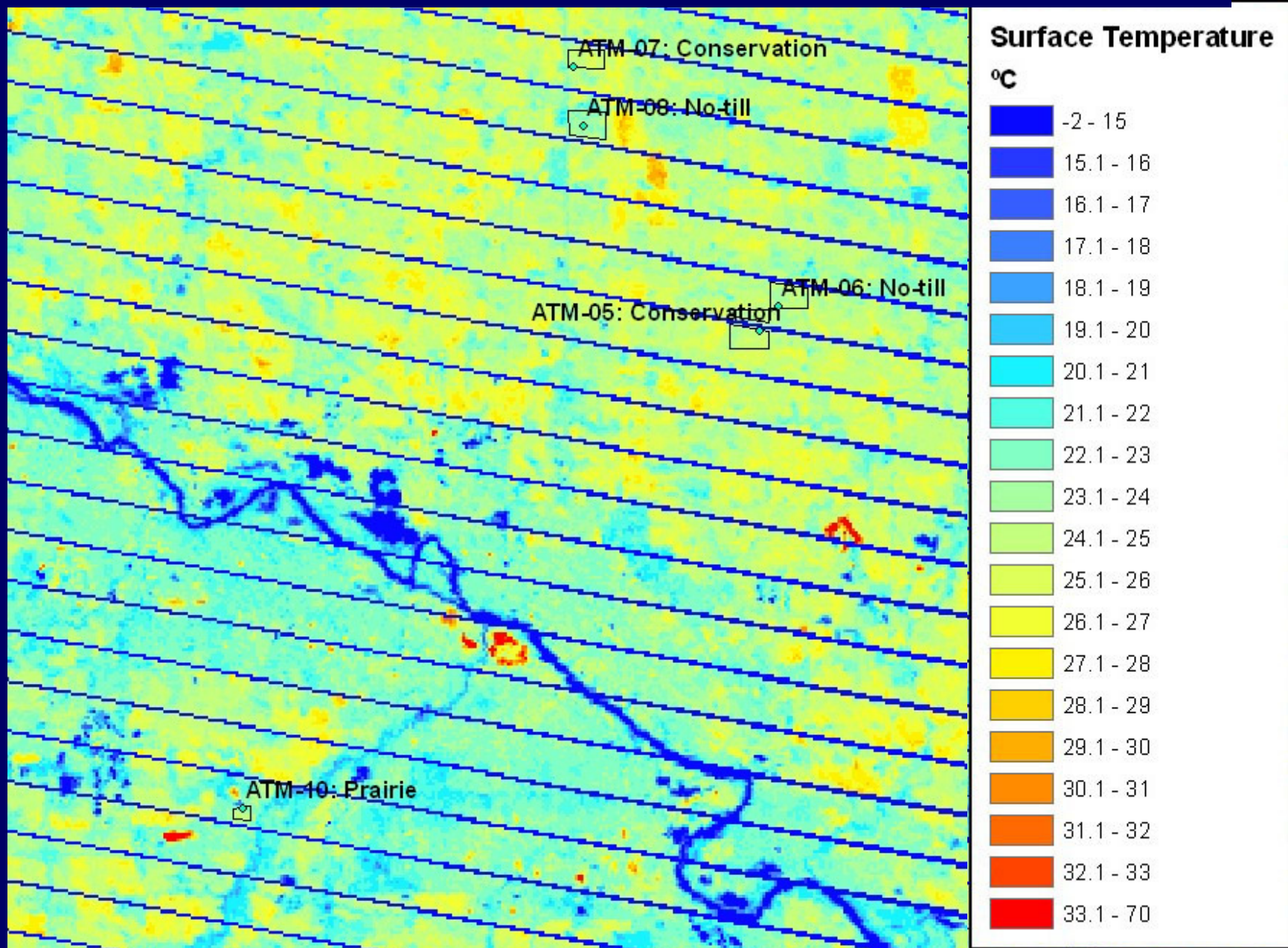
Validation: (Making sure we have the right field)



**The April 4,
2005 Landsat 7
Satellite Image
of Cedar Falls,
IA was Clear.**



Thermal Infrared Satellite Image April 4, 2005



Using the GLOBE One fields as samples, we can use mathematics to determine if the fields are untilled or conservation-tilled fields.

We called this technique a *supervised classification*.

Classification Results

**Black – Not a field
(urban, water, road, etc.)**

Gray – Prairie or forest

ATM-06: No-till

Green – No-Till Field

**Brown – Conservation-
Tilled Field**

ATM-07: Conservation

ATM-08: No-till

5: Conservation

ATM-06: No-till

M

Surface Temperature Spring 2005 Field Campaign

- GLOBE Schools in Iowa Measured Surface Temperature Using Infrared Thermometers

Orchard Hill Elementary School

Central Middle School

Immaculate Conception

Hoover Middle School

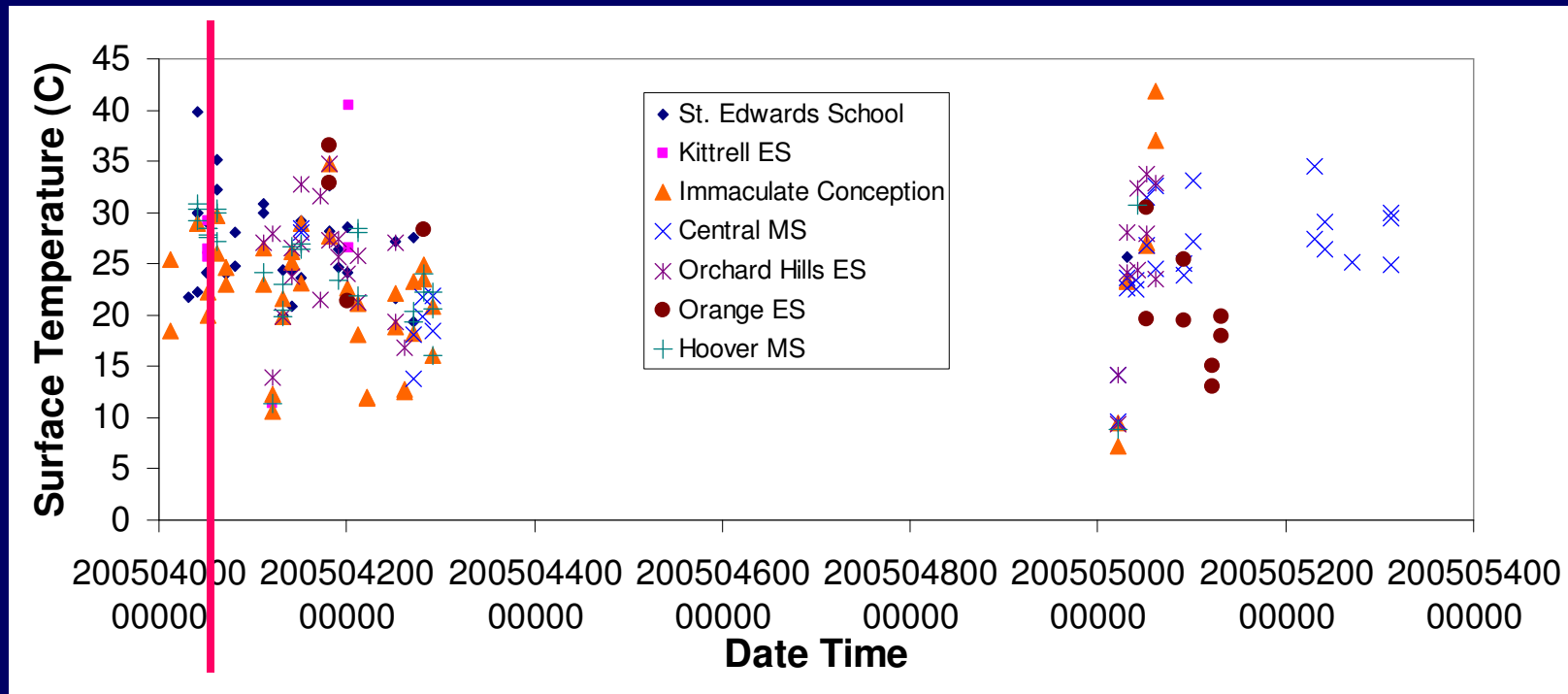
Kittrell Elementary School

St. Edwards School

Orange Elementary School

Thank You

GLOBE Iowa Student Observations

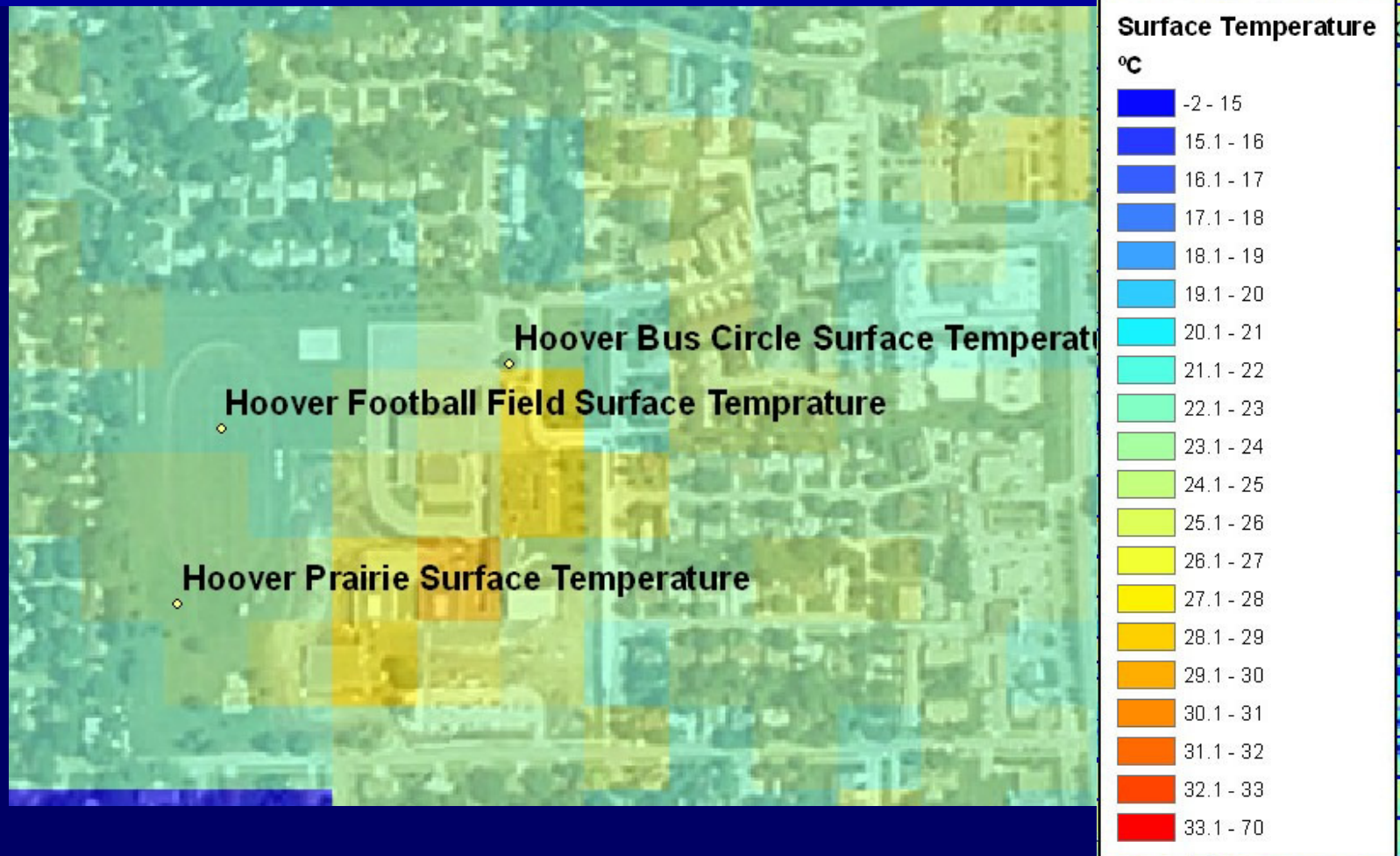


April 4 Satellite
Image

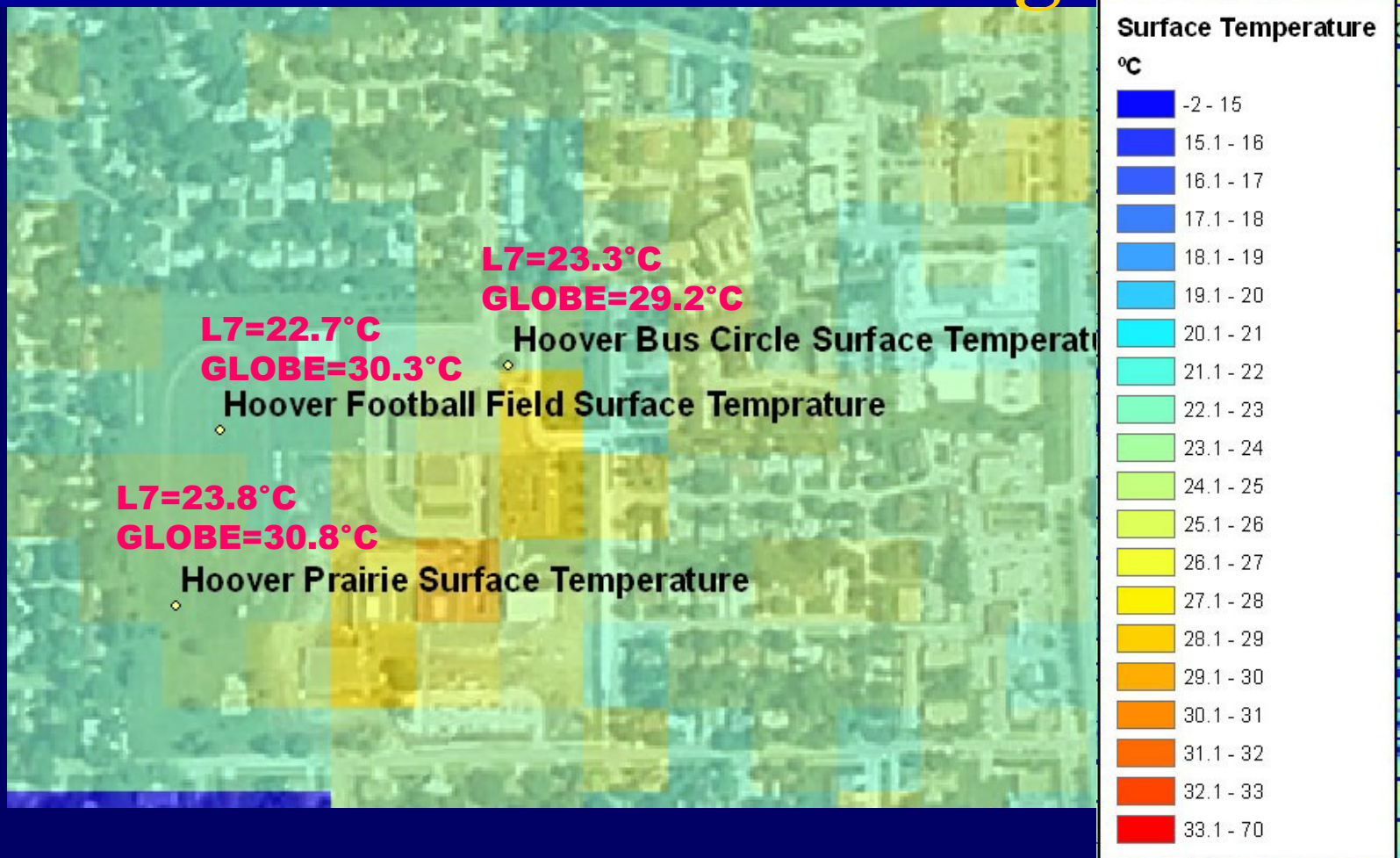
Hoover Middle School Sites



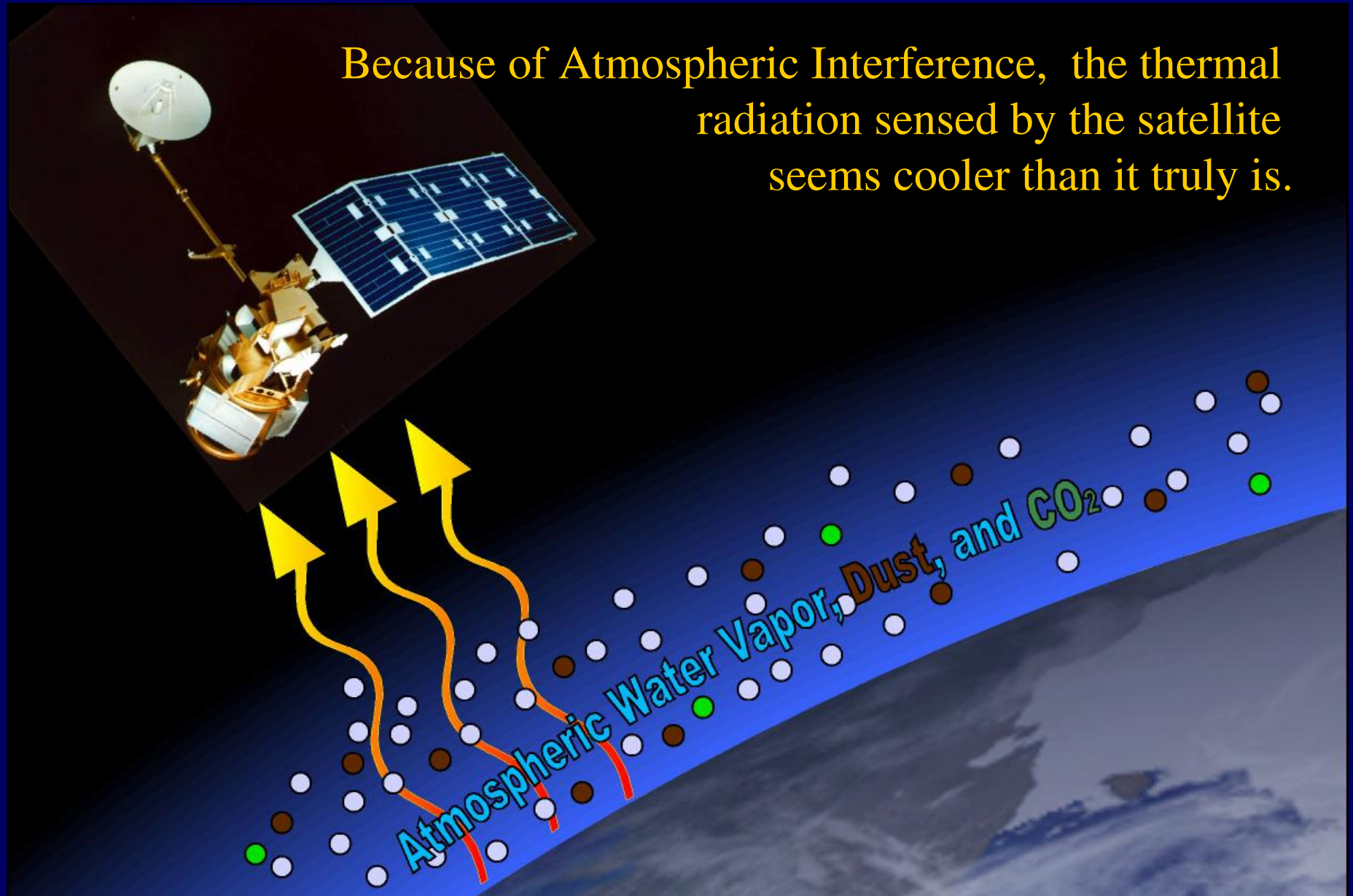
The 'Hot Spot' in the center is the school



Surface Temperature with the Landsat7 Thermal Image

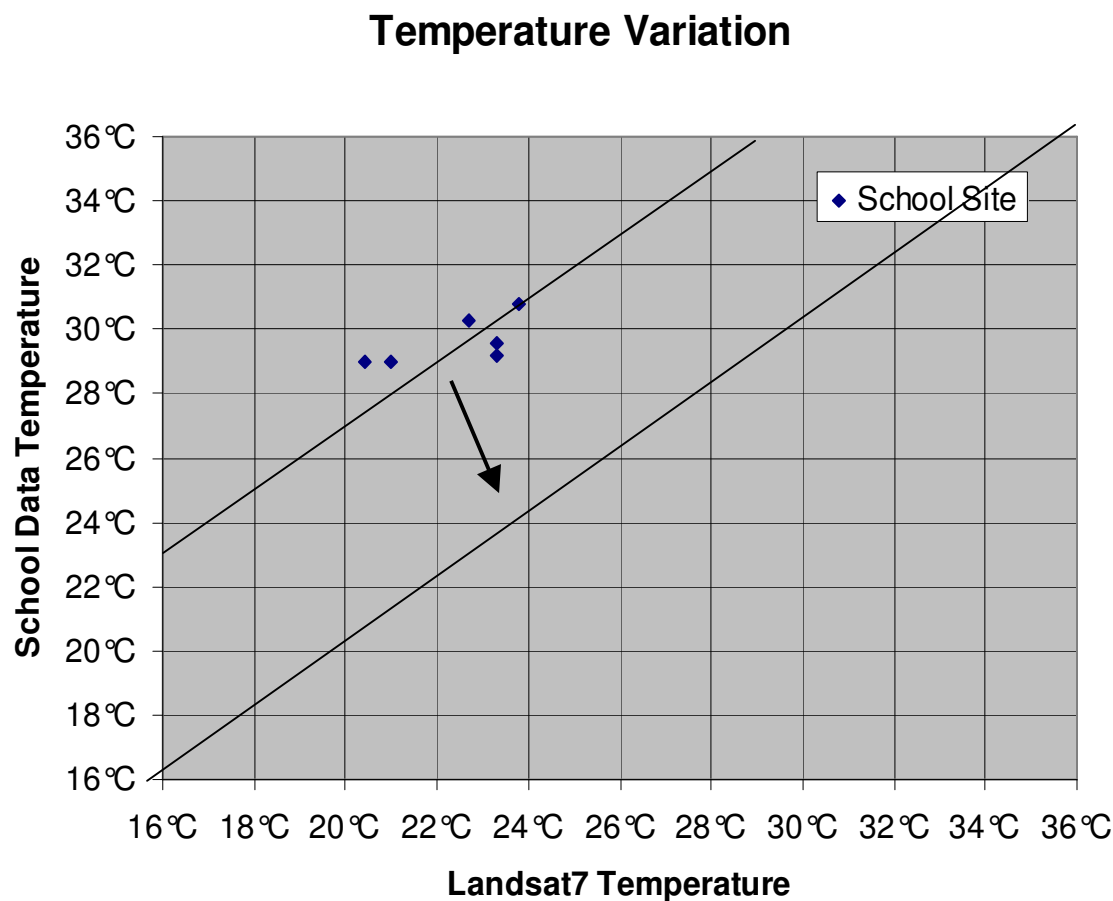


Because of Atmospheric Interference, the thermal radiation sensed by the satellite seems cooler than it truly is.



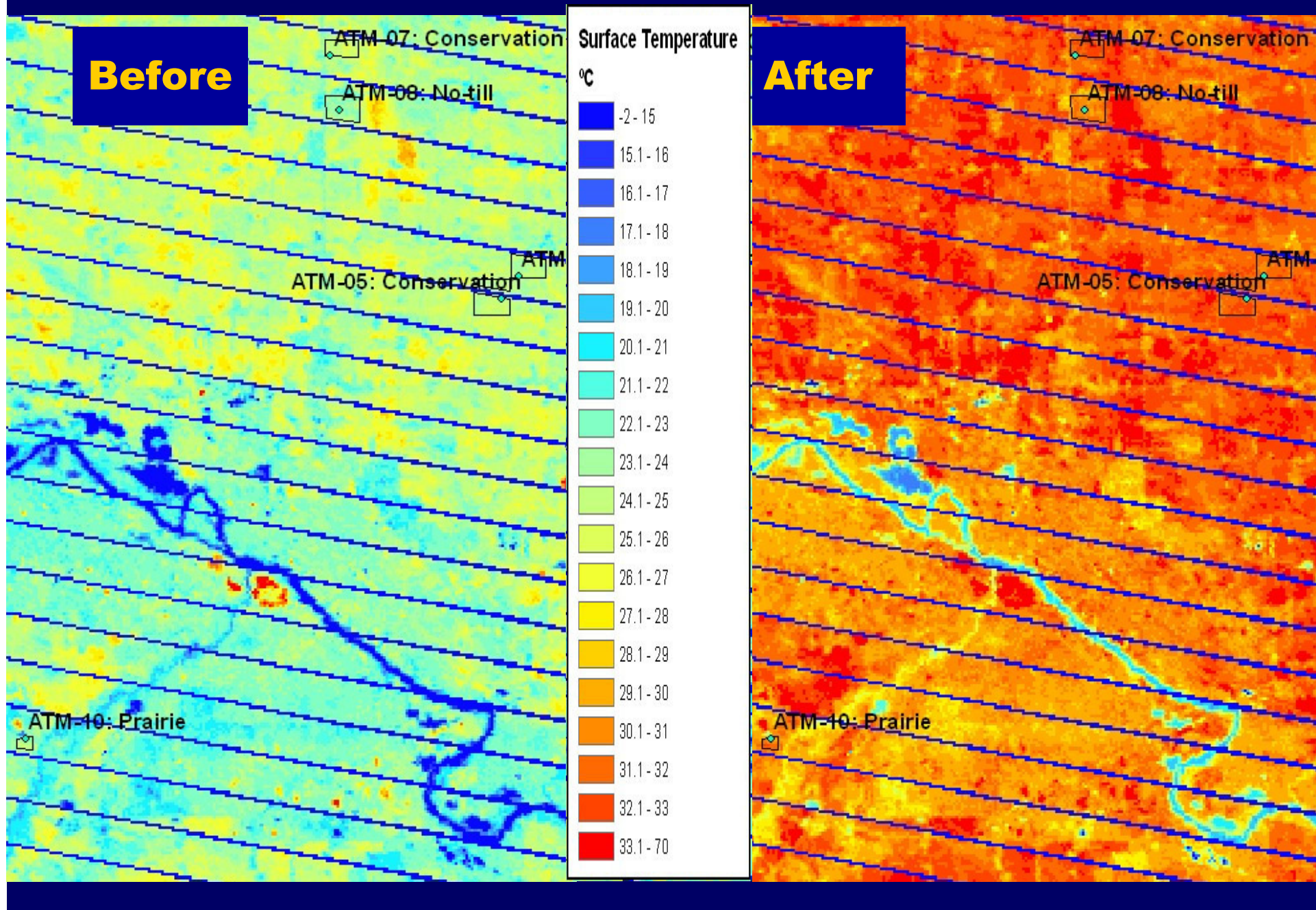
How much Does the Atmosphere Affect the Satellite Temperature?

School
Hoove
Hoove
Hoove
Immac
Immac
St.Edv



Difference
7.6
7
5.9
8.6
8
6.3
7.2

Results of Atmospheric Correction



Which is warmer?

Untilled (No-Till) Field



29.2° C

Conservation-Tilled Field



32.3° C

or

Thank You!