Thermal SmallSats for Gapfilling Agricultural Information Services

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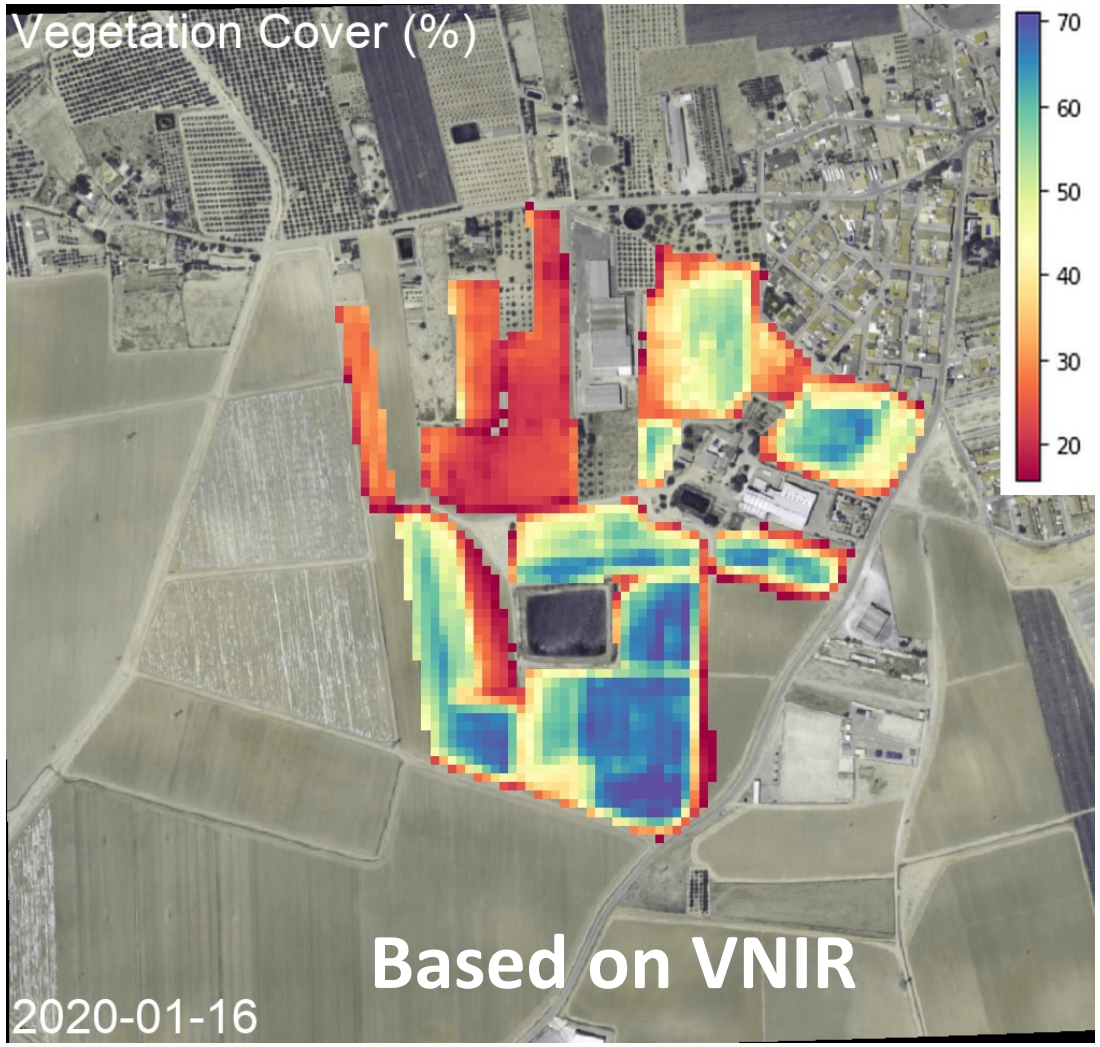
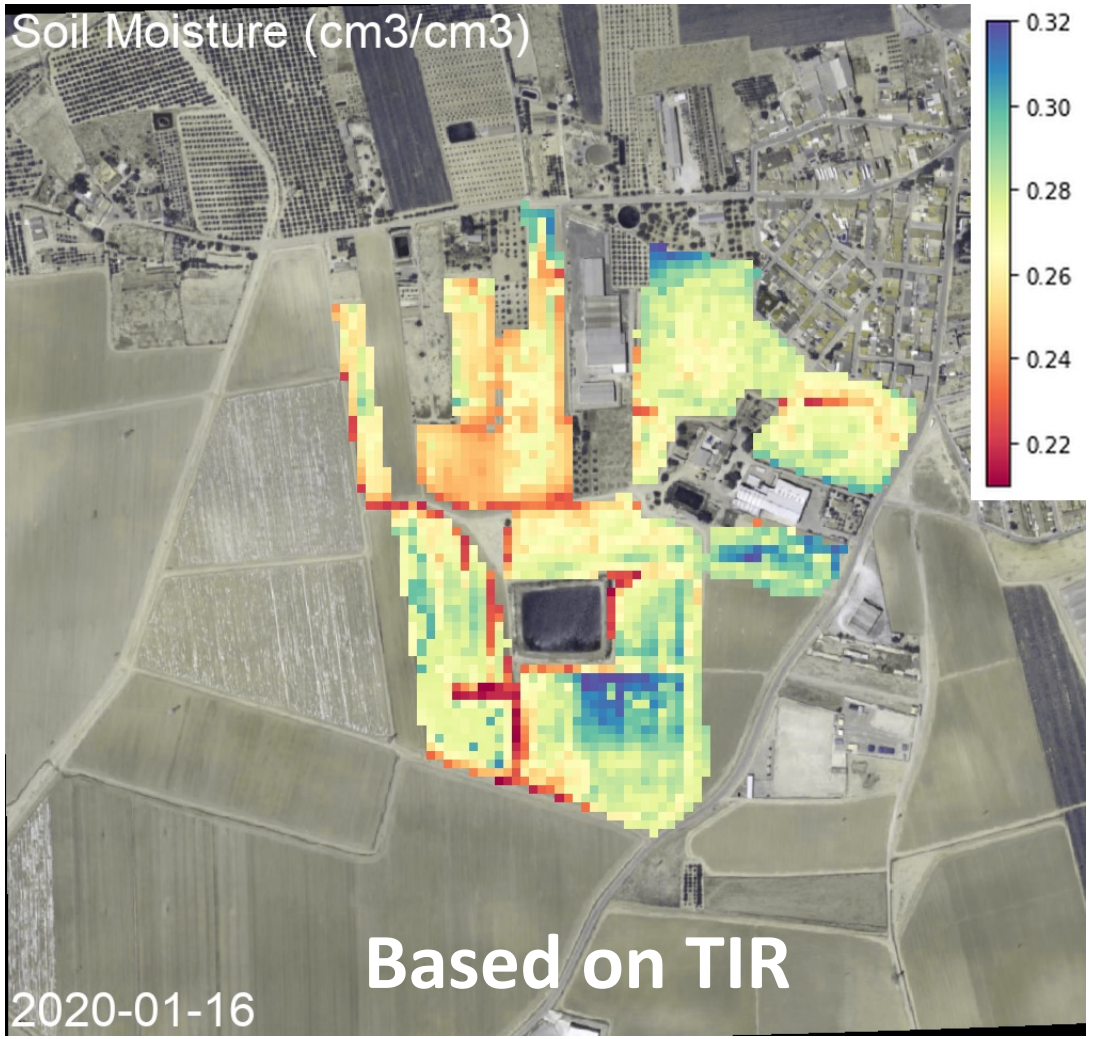
Hydrosat

IrriWatch

Why Farmers want Thermal Infrared Red TIR Data ?





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TIR provides more direct data on growth conditions

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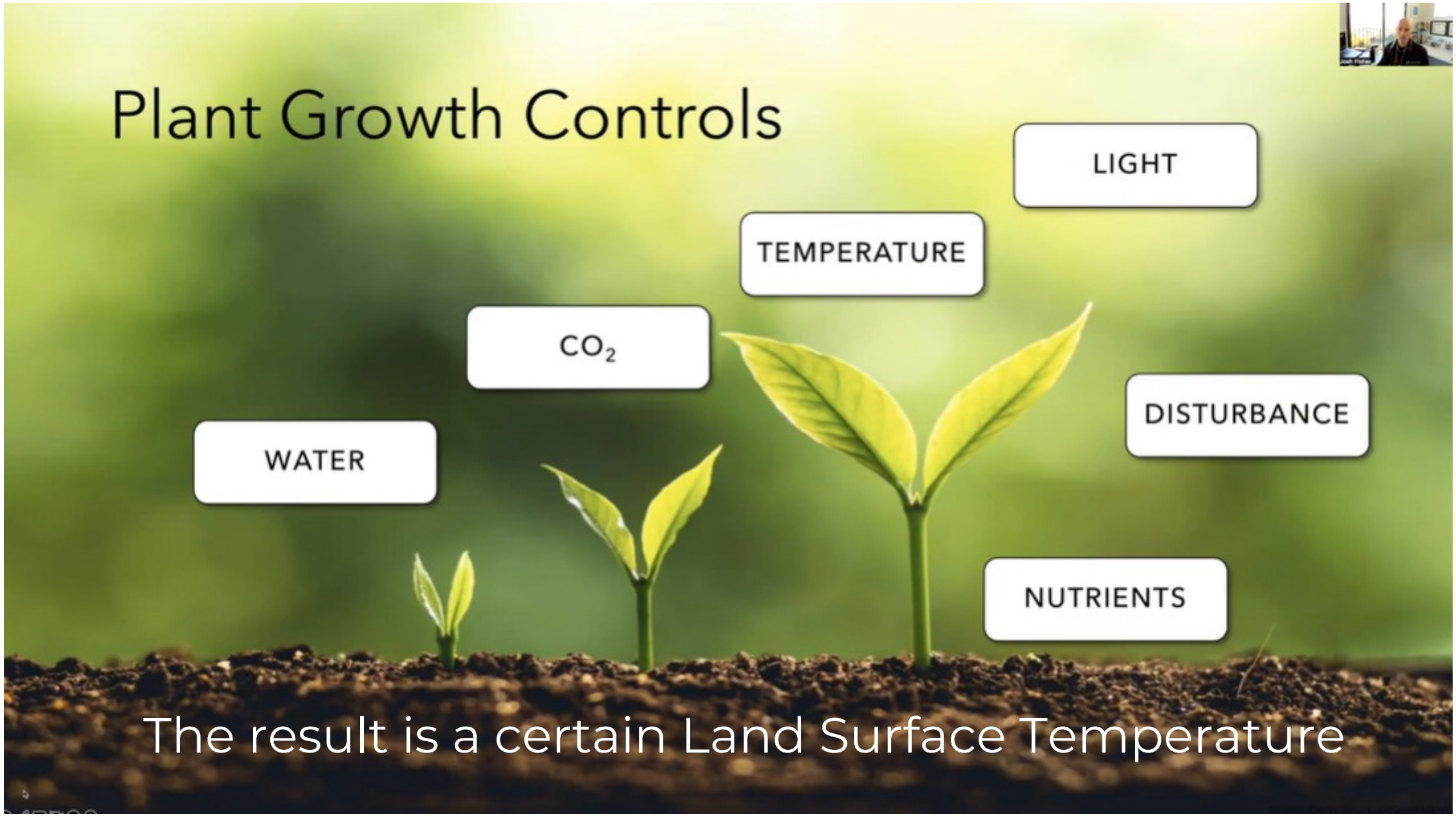

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Source: Josh Fisher, AGU talk

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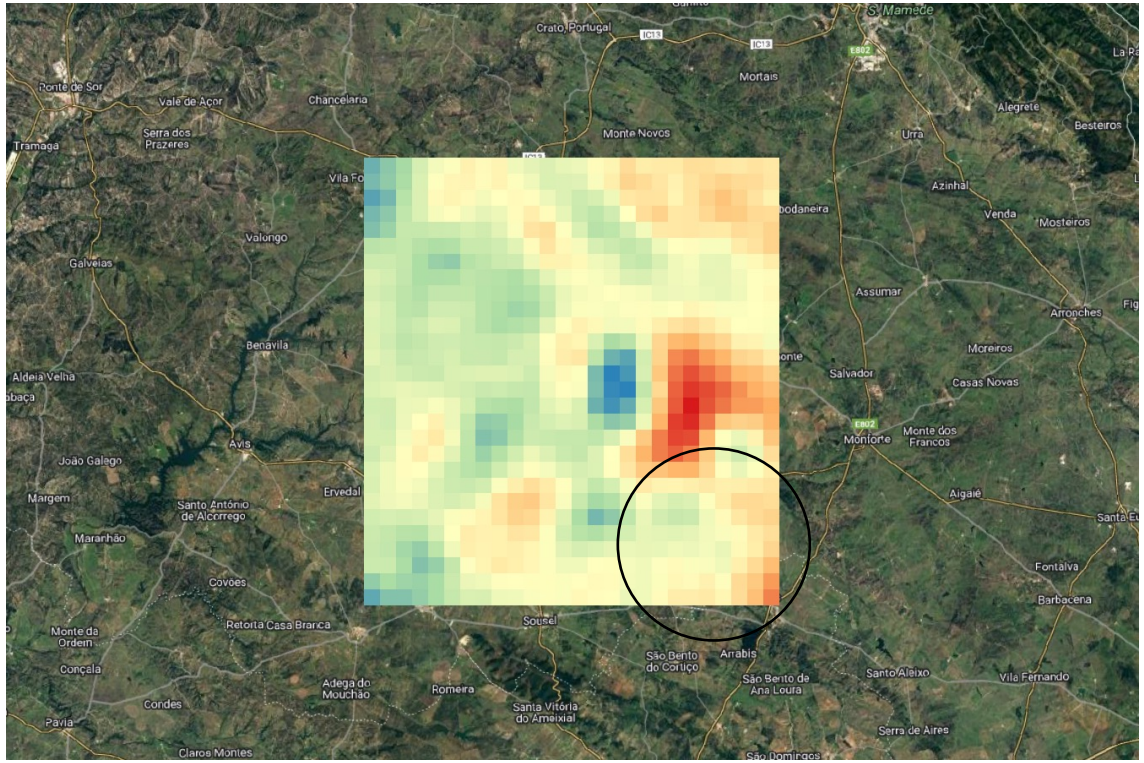
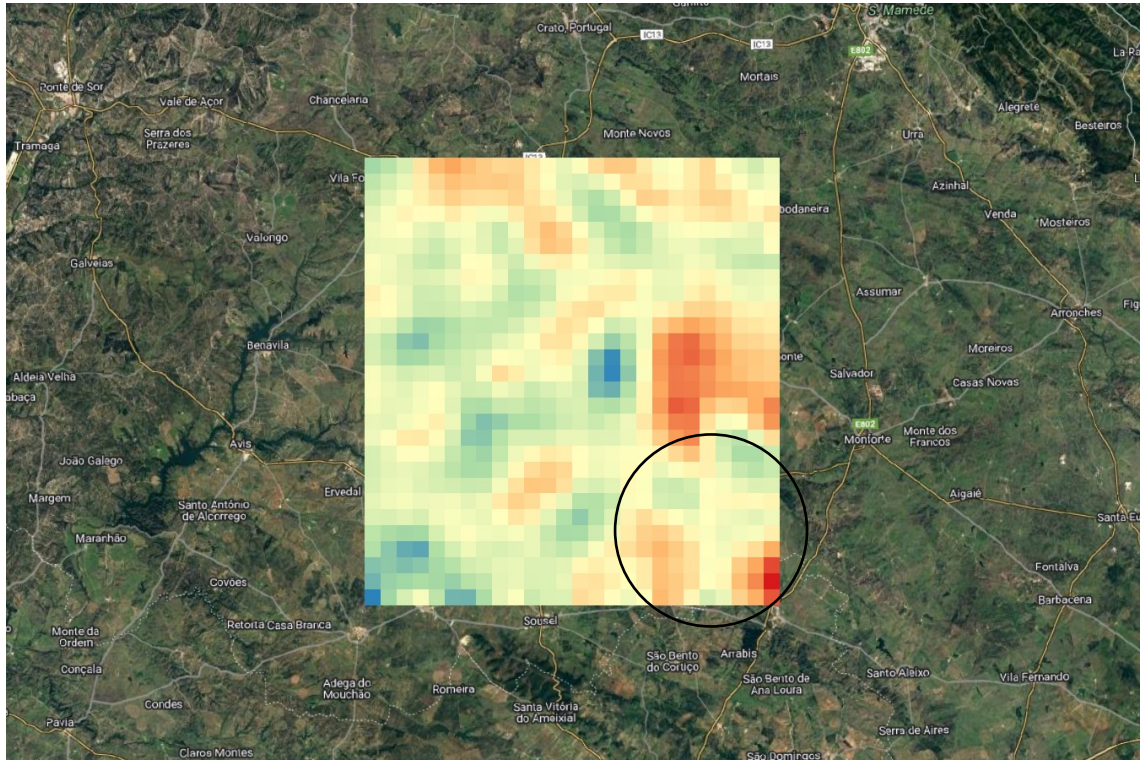
Why daily & 10 m thermal imagery ?

Why diurnal variation LST is relevant (Portugal – 14 July 2022)

Sentinel 3 – 1031 hour – 37.2 °C



VIIRS – 1258 hour – 41.5 °C



Different relative LST behaviour

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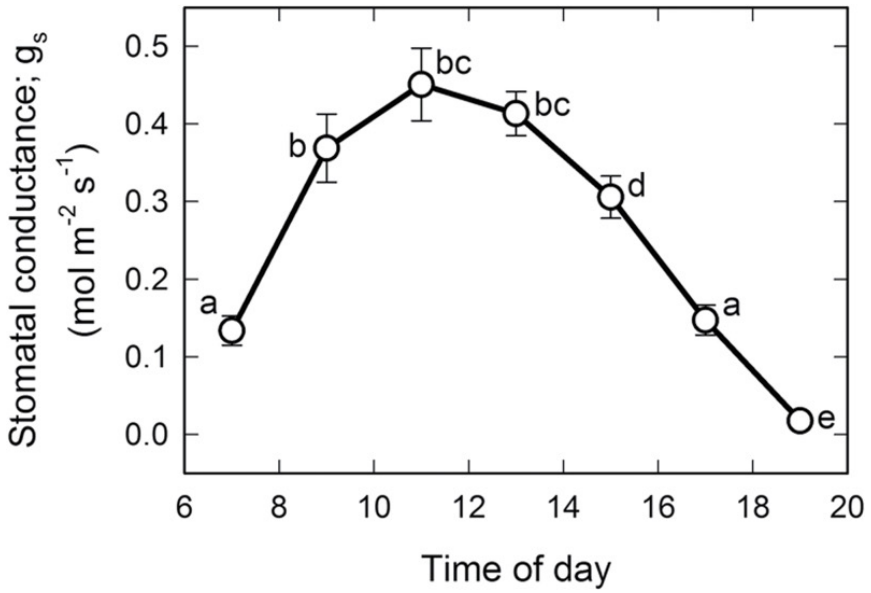
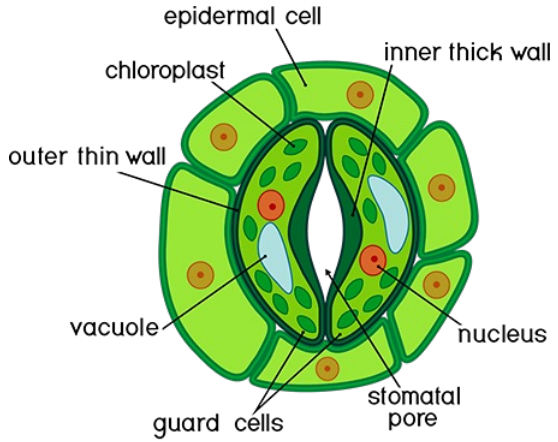
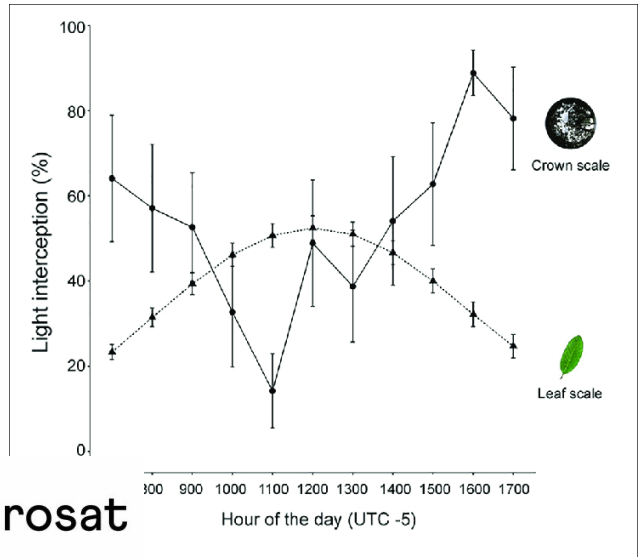
Why diurnal LST is essential ?



Environmental changes



stoma open



Shadow changes

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FUNCTION

high frequency

low frequency

Time

- GOES/GEOSTATIONARY TIR
- MODIS/VIIRS TIR
- SENTINEL 3 TIR
- SBG TIR
- LSTM TIR
- TRISHNA TIR
- ECOSTRESS TIR
- Landsat TIR

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low spatial resolution

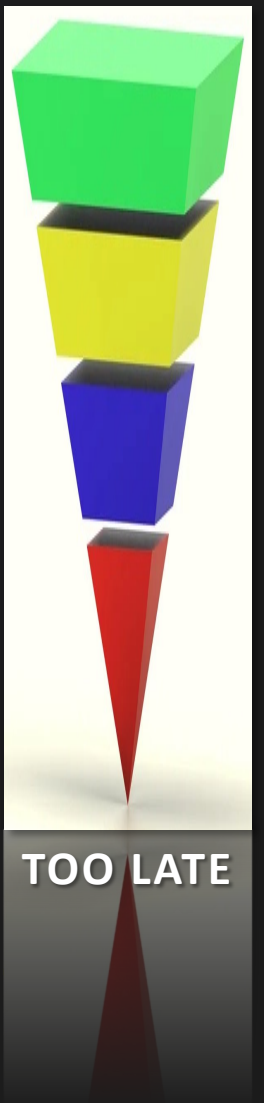
Space

high spatial resolution

TIR

SIF

EARLY WARNING



ET, GPP

Leaf angle
Wilting

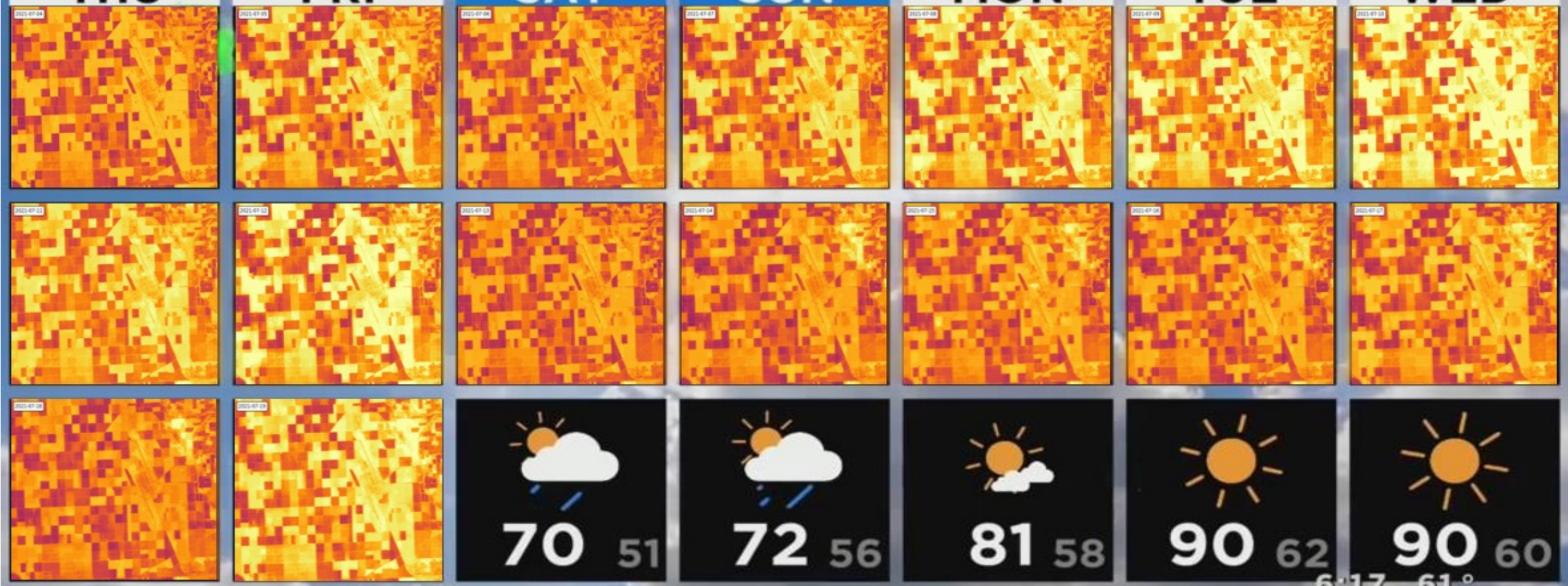
Leaf damage
Leaf loss

Dormancy

Mortality

TOO LATE

DAILY Hydrosat



6:17 61°

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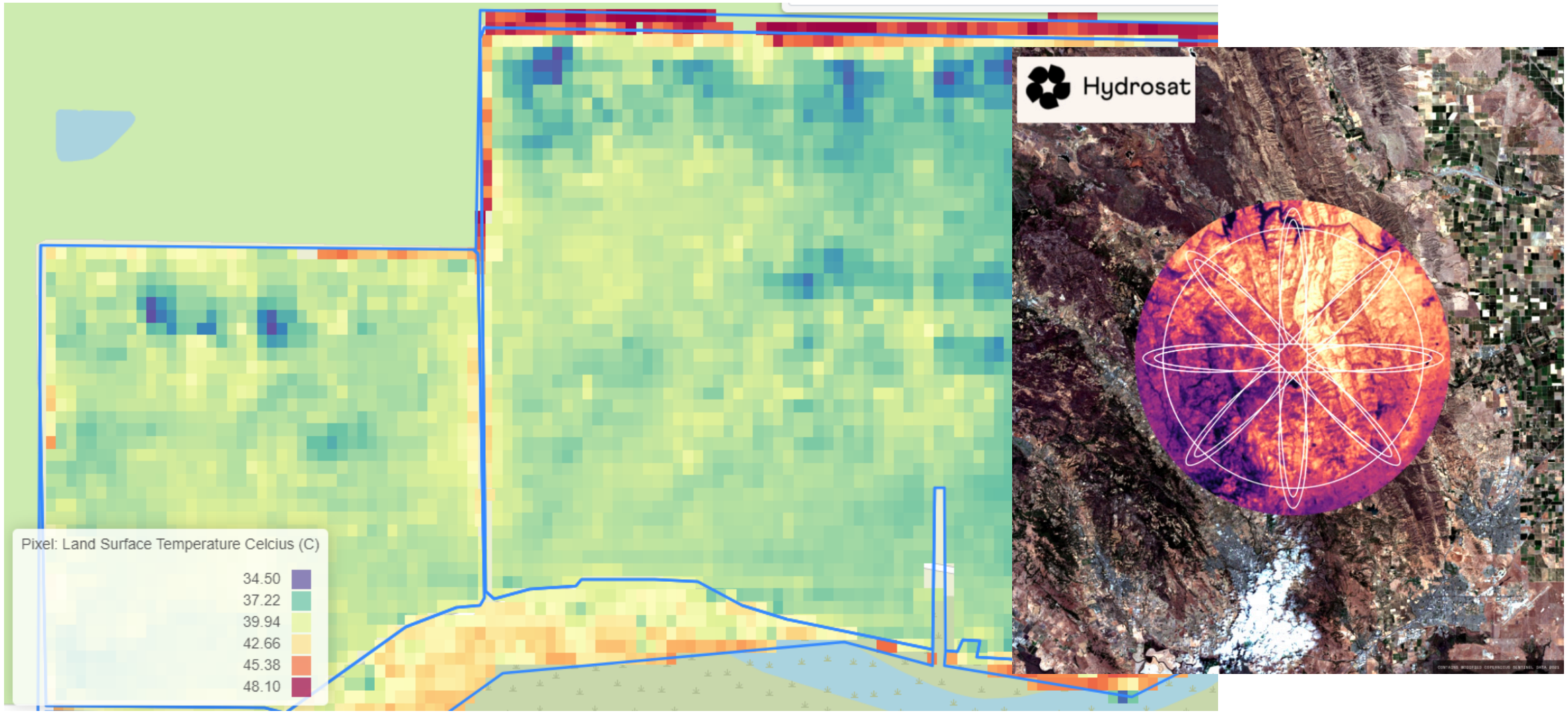
CBSLA.com

10 m thermal data fusion product “proxy data”



Example from California, 23 Sep 2022

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Messages home

- This ESA workshop is a thermal come back
- VNIR information is insufficient for implementing precision agriculture and TIR data gives better representation of crop health
- Farmer applications require (twice) daily TIR data and 10 m spatial resolution
- It is great that ESA, JPL, CNES and ISRO join forces to get a good as possible near daily thermal product. Phantastic
- SmallSats will fill the gap with LSTM / SBG / THRISNA data