



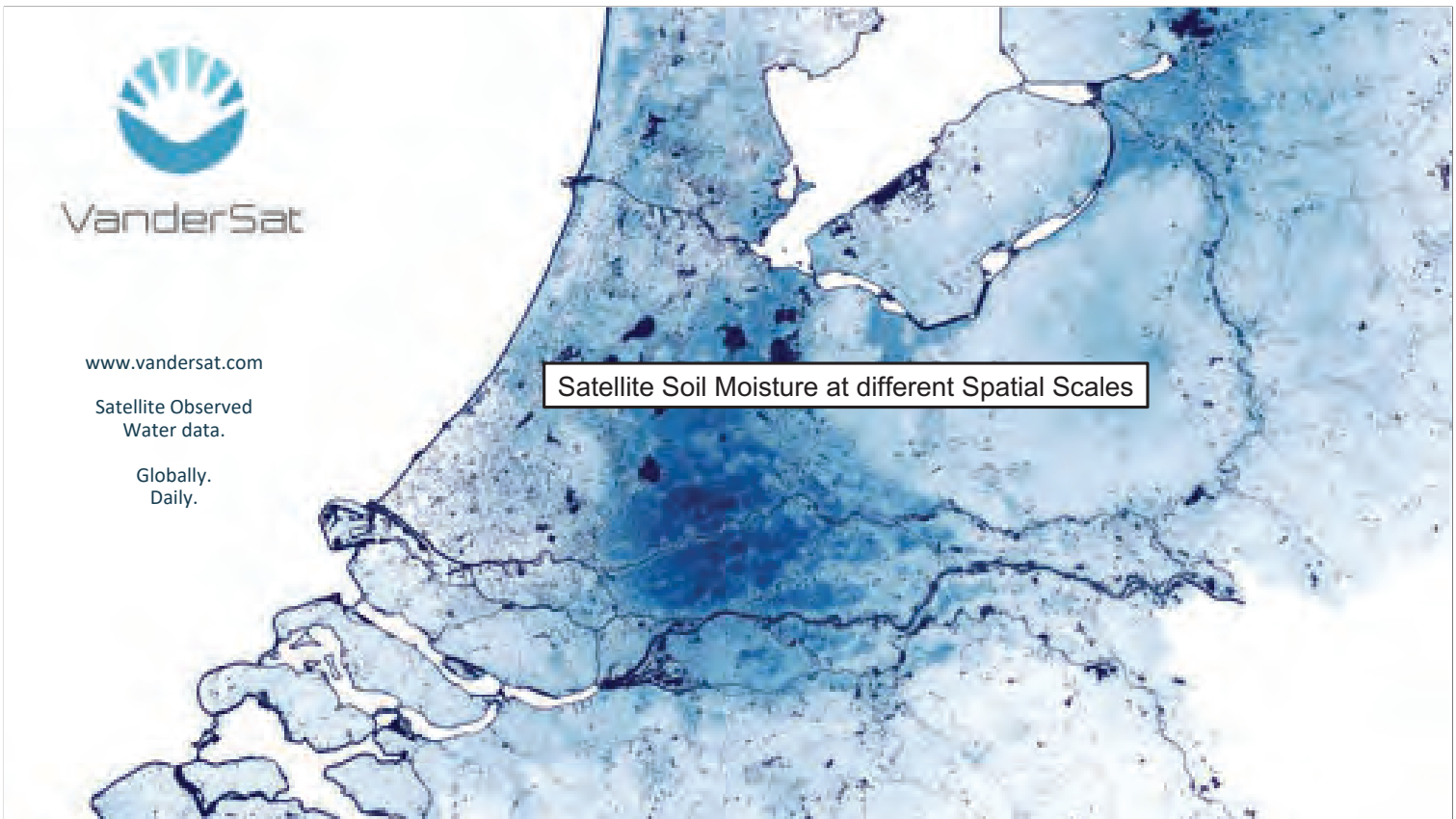
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Satellite Observed
Water data.

Globally.
Daily.

Satellite Soil Moisture at different Spatial Scales



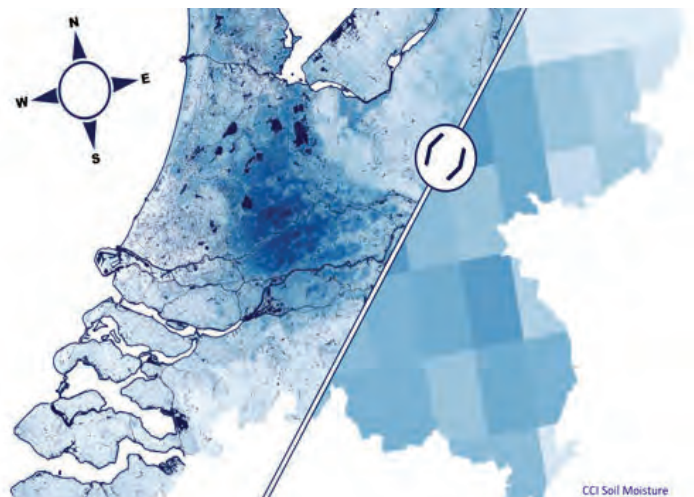
Outline

Coarse Scale Soil Moisture (~25 km)

- Public available Satellite Soil Moisture Climate Records
 - Background
 - Applications
 - Next Steps

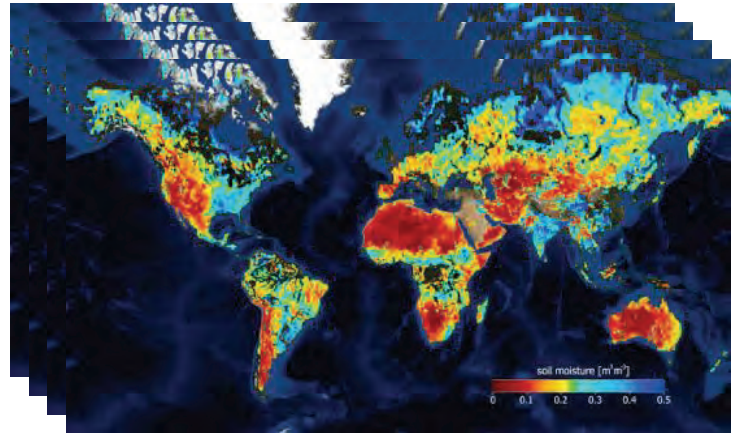
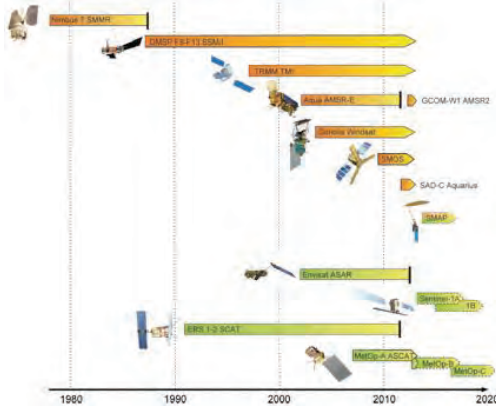
High Resolution Soil Moisture (~100 m)

- Commercial Soil Moisture Service
 - Background
 - Applications
 - Next Steps



Coarse Scale Soil Moisture (Background)

ESA WACMOS (2009-2012)+ESA CCI (2012-2021) + Copernicus Climate Services, C3S (2018-2022): Combine passive+active microwave soil moisture products to make one “benchmark” soil moisture product

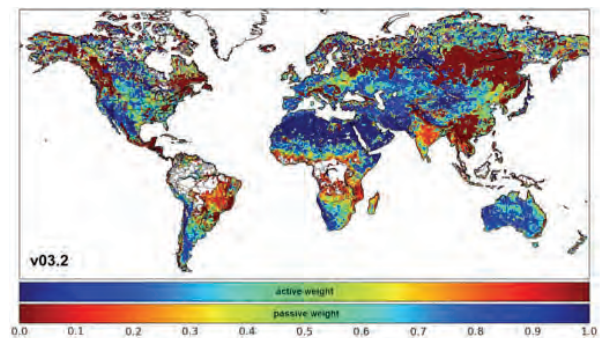
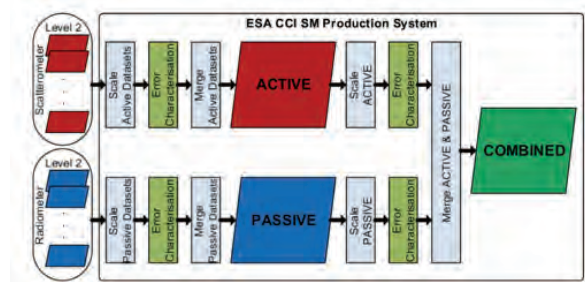


de Jeu et al., J. Geophys, 2008; Wagner et al., ISPRS 2012; Liu et al., RSE 2012 ; Dorigo et al., RSE, 2017



Coarse Scale Soil Moisture (Background)

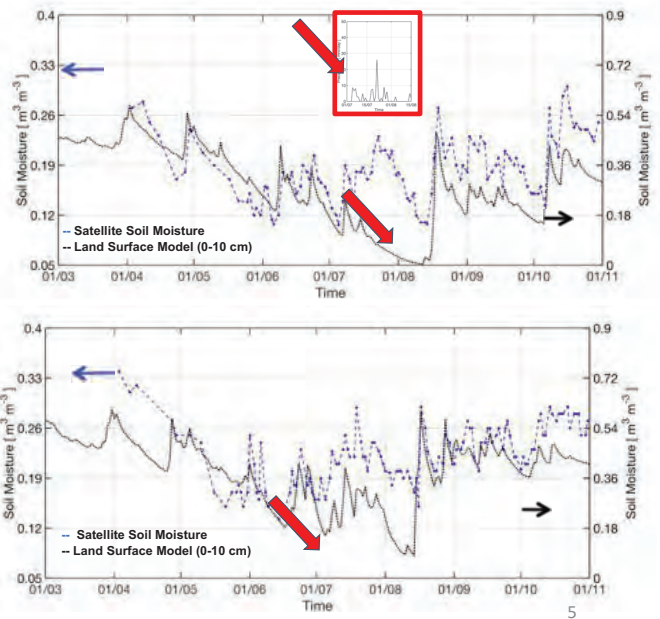
- Daily soil moisture from 1978-Now
- 0.25 degree resolution
- Represents 0-5 cm of the soil
- Global Coverage
- Data free available at <https://www.esa-soilmoisture-cci.org>
- NRT datafeed <https://cds.climate.copernicus.eu/>
- Currently ~9000 registered users



Coarse Scale Soil Moisture (Applications)

Benchmarking Models:

- Support model improvement (e.g. rainfall, and evaporation input)
- Independent data record
- 40+ years

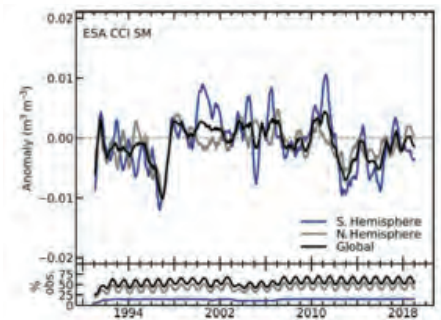
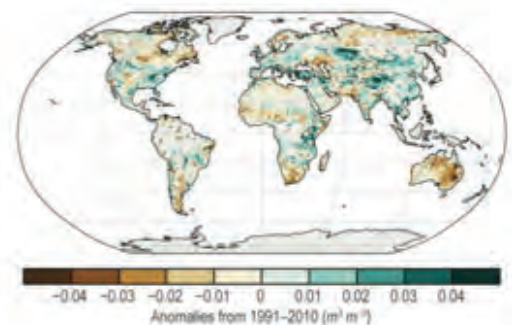


Coarse Scale Soil Moisture (Applications)

- Climate Variability and Change (e.g. Albergel et al., J Hmet, 2013)
- Land Atmosphere Interactions (e.g. Guillod et al., Nat. Com. 2014)
- Global Biogeochemical Cycles (e.g. Rebel et al., HESS, 2013)
- Land Surface Modelling (e.g. Schellekens et al., ESSD, 2016)
- Drought Applications (e.g. Liu et al., RSE, 2019)
- Hydrological Applications (e.g. Ciabatta et al., ESSD, 2018)

NB complete overview can be found at Dorigo et al., RSE 2017

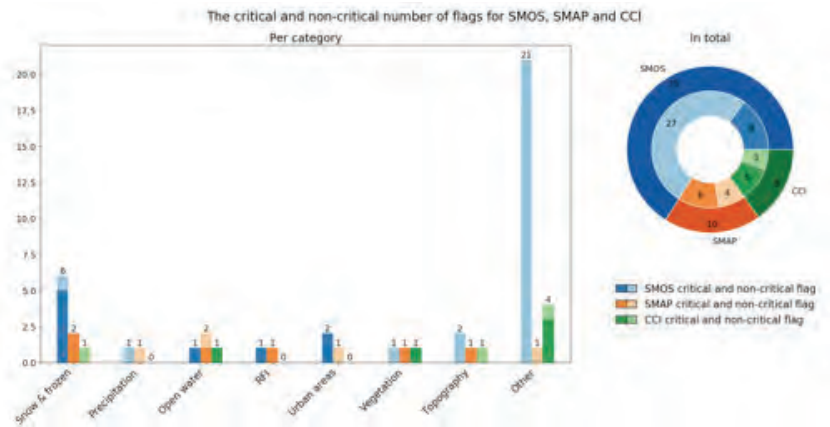
CCI soil moisture is used in 200+ scientific studies



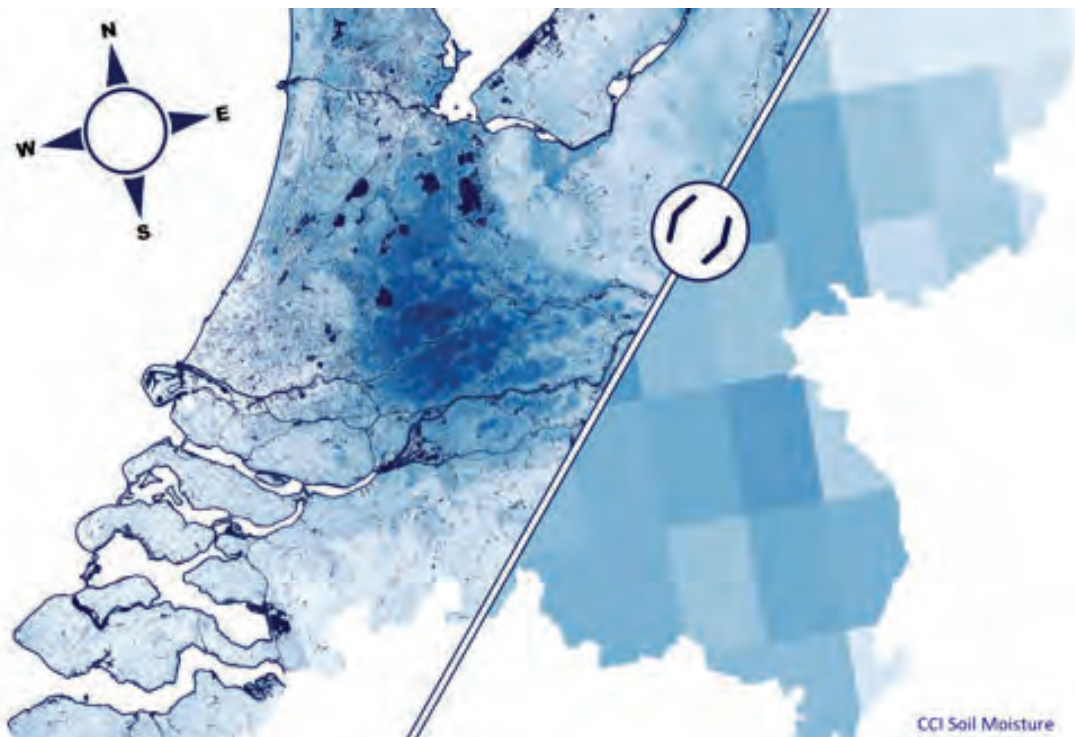
Scanlon et al., BAMS, 2019

Coarse Scale Soil Moisture (Next Steps)

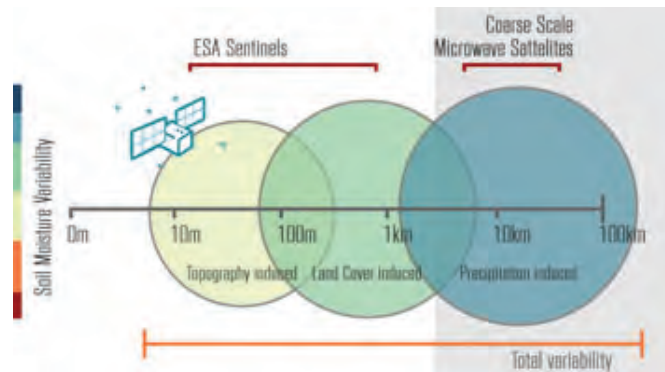
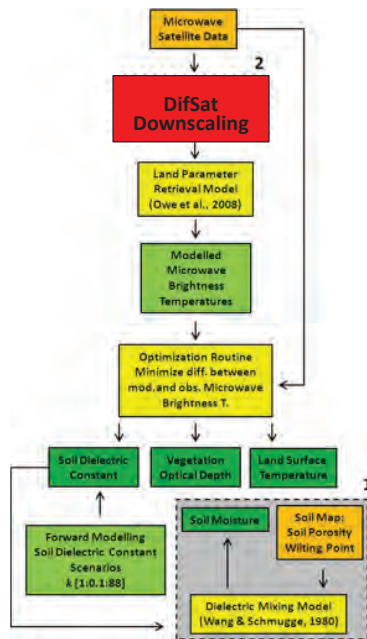
- Multi model approach (ensemble of different soil moisture retrieval algorithms)
- Improved data flagging strategy (Van der Vliet et al., in prep)
- Inclusion of new satellite data sets
- CCI V5 release in 2020



Van der Vliet et al., in prep



High Resolution Soil Moisture (Background)



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Pub. No.: WO/2017/18196 International Application No.: PCT/EP2017/06446
 Publication Date: 23.12.2017 International Filing Date: 13.06.2017
 Chapter 2 Demand Filed: 13.04.2019

IPC: G06K 9/00 (2006.01) G06K 9/62 (2006.01) G

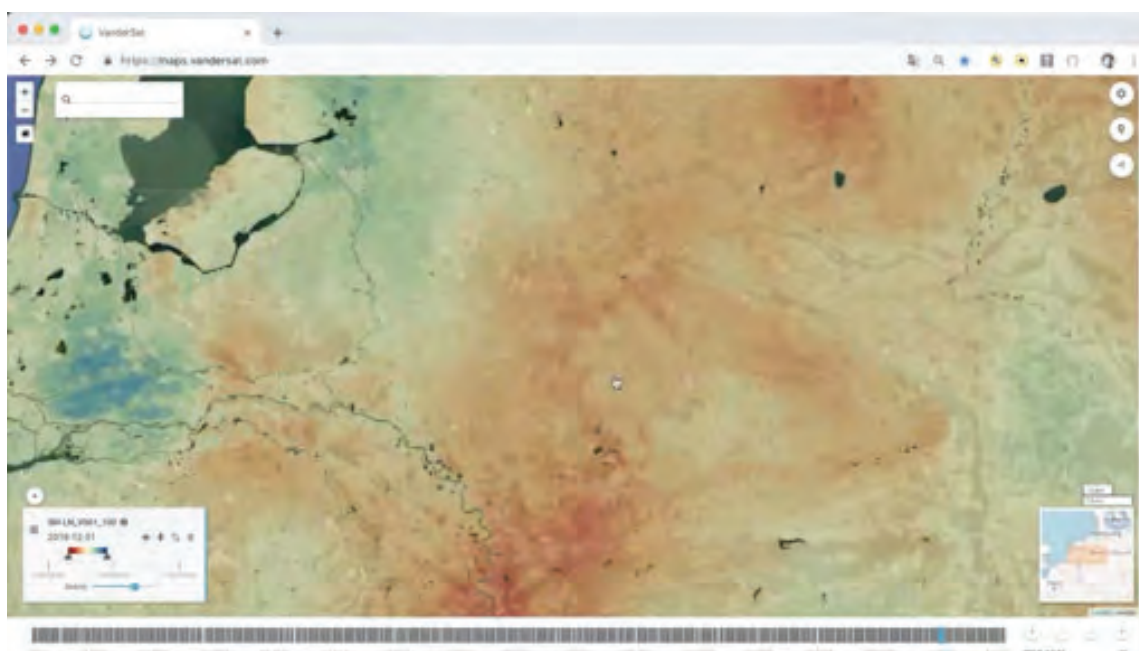
Applicants: WANDERSAT B.V. (NL,NL), Hooftstraat 34 2201 DK Noordwijk, NL
 Inventors: DE JEU, Richard Adriaans Maria, NL
 DE NIJL, Anne Heleen Abille, NL
 VAN KUNIN, Michel Hendricus Wilbrandt, NL
 Agent: DE VRIES & NIETMAN, Ovenschuurste 160 1062 XX Amsterdam, NL
 BRUGER, Patrick, NL
 16174190.5 13.06.2016 EP

Priority Date: 18.12.2015

Title: (EN) METHOD AND SYSTEM FOR IMPROVING THE RESOLUTION OF SENSOR DATA
 (FR) PROCÉDÉ ET SYSTÈME POUR AMÉLIORER LA RÉOLUTION DE DONNÉES DE CAPTEURS

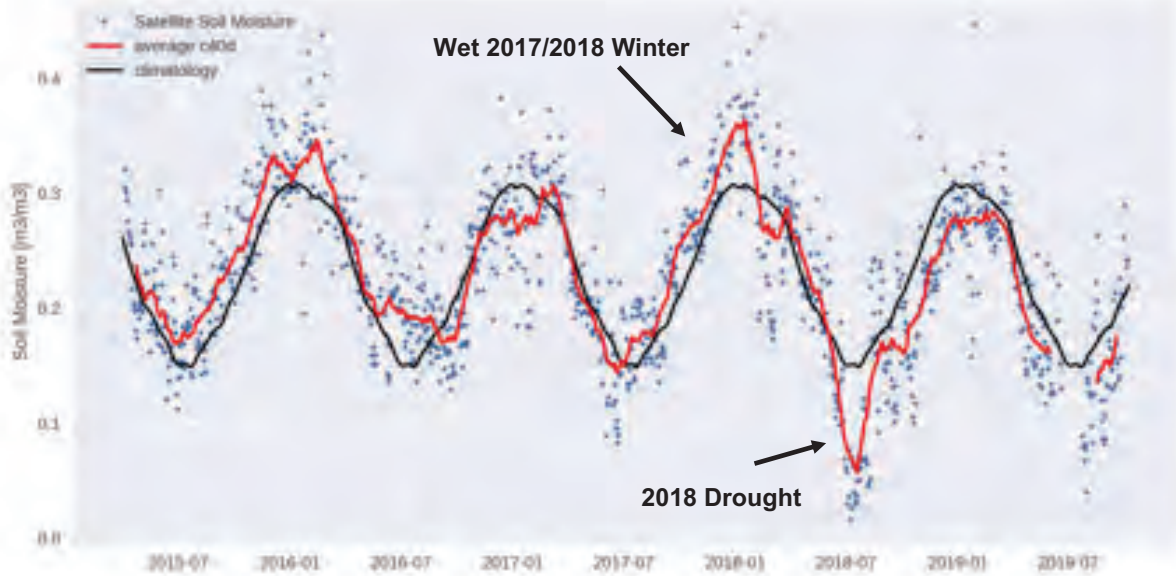
Abstract: (EN) The invention relates to a system (S1) for improving the spatial resolution of sensor data. The system comprises at least one receiver (S2) and at least one processor (S3). The at least one receiver (S2) is configured to receive a sensor data set and a map. Each element of the sensor data set comprises a sensor footprint identifier allowing a sensor footprint to be identified and a brightness temperature measured for the sensor footprint. The map defines for each of a plurality of geographical areas whether it belongs to one of the first class and the second class. The first class represents a land type and the second class represents a water type. The geographical area is smaller than the sensor footprint. The at least one processor (S3) is configured to determine for each element of the sensor data set... (FR) L'invention concerne un système (S1) pour améliorer la résolution spatiale de données de capteurs. Le système comprend au moins un récepteur (S2) et au moins un processeur (S3). Le récepteur (S2) est configuré pour recevoir un ensemble de données de capteurs et une carte. Chaque élément de l'ensemble de données de capteurs comprend un identifiant de empreinte de capteur permettant d'identifier une empreinte de capteur et une température de brillance mesurée pour l'empreinte de capteur. La carte définit pour chacune d'une pluralité d'aires géographiques si elle appartient à l'une des premières classes et de la seconde classe. La première classe représente un type de terrain et la seconde classe représente un type d'eau. L'aire géographique est plus petite que l'empreinte de capteur. Le processeur (S3) est configuré pour déterminer pour chaque élément des données de capteurs...

High Resolution Soil Moisture (Background)



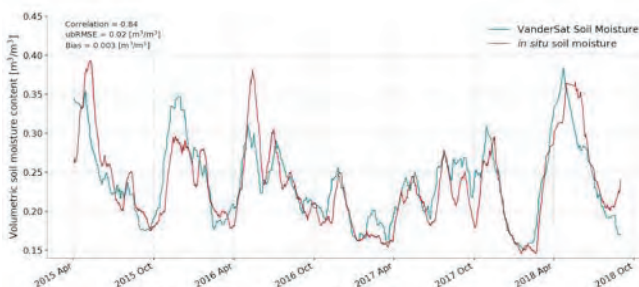
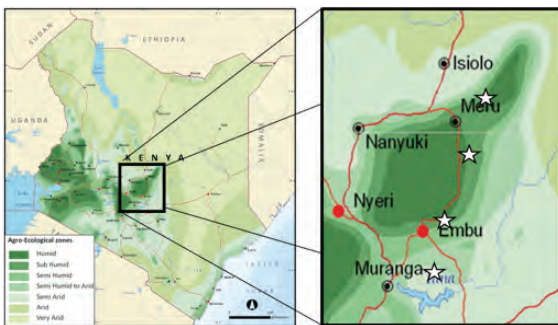
High Resolution Soil Moisture (Background)

Timeseries High resolution Soil Moisture for the Municipality of Emmen (NL)



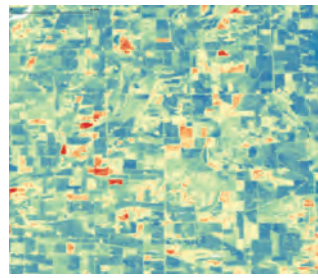
High Resolution Soil Moisture (Applications)

“Can we improve the financial security for small holder farmers in Kenya?”
ACRE Africa Case; Agricultural Insurance for Maize farmers

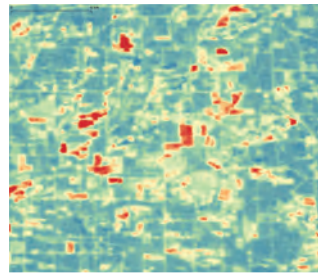


High Resolution Soil Moisture (Next Steps)

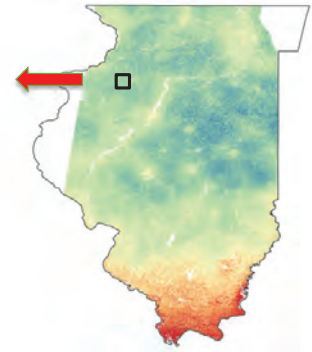
- Further development back-up system
- Inclusion of more satellite data (*i.e.* GMI, Sentinel 3)
- Derived RootZone Soil Moisture
- Thorough spatial validation
- Improvement other microwave based data products (*i.e.* LST, VOD)
- V4 release in 2020



VanderSat LST



LandSat LST



LST Illinois (USA)



VanderSat

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Satellite Observed
Water data.

Globally.
Daily.

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