

# Trans-African Hydro-Meteorological Observatory

Nick van de Giesen

(n.c.vandegiesen@tudelft.nl)

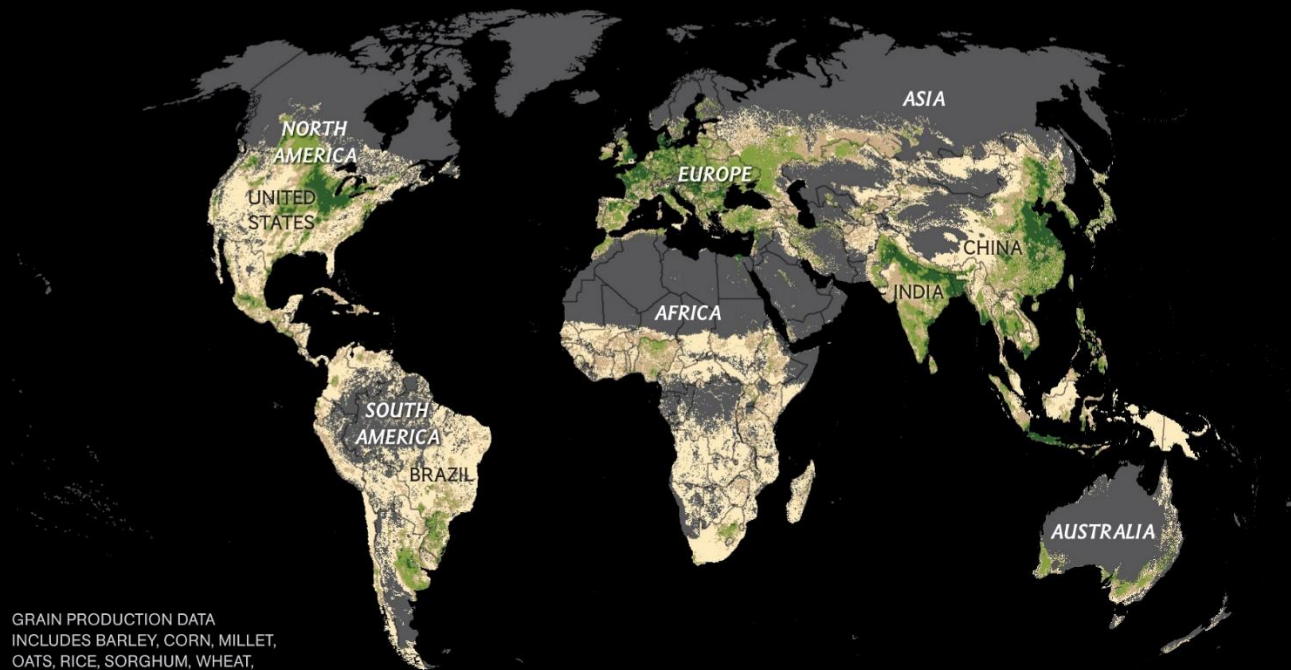
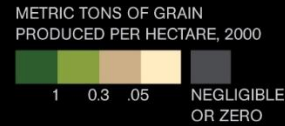
John Selker (OSU)

Frank Ohene Annor (KNUST, TAHMO)



# Background

**GRAIN PRODUCTION** is high in only a handful of countries. Regions that cannot grow enough to meet their demand must depend on imports.



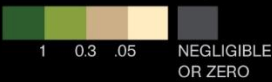
GRAIN PRODUCTION DATA INCLUDES BARLEY, CORN, MILLET, OATS, RICE, SORGHUM, WHEAT, RYE, AND MINOR GRAINS.

MAPS: VIRGINIA W. MASON, NG STAFF. SOURCES: PROGRAM ON FOOD SECURITY AND THE ENVIRONMENT, STANFORD UNIVERSITY; UN FOOD AND AGRICULTURE ORGANIZATION (FAO); CONSORTIUM FOR SCIENCE, POLICY & OUTCOMES, ARIZONA STATE UNIVERSITY; DEPARTMENT OF GEOGRAPHY, MCGILL UNIVERSITY; INSTITUTE ON THE ENVIRONMENT, UNIVERSITY OF MINNESOTA  
CHARTS: SEAN McNAUGHTON, NG STAFF. SOURCES: USDA "PRODUCTION, SUPPLY AND DISTRIBUTION ONLINE"; FAO; WORLD BANK

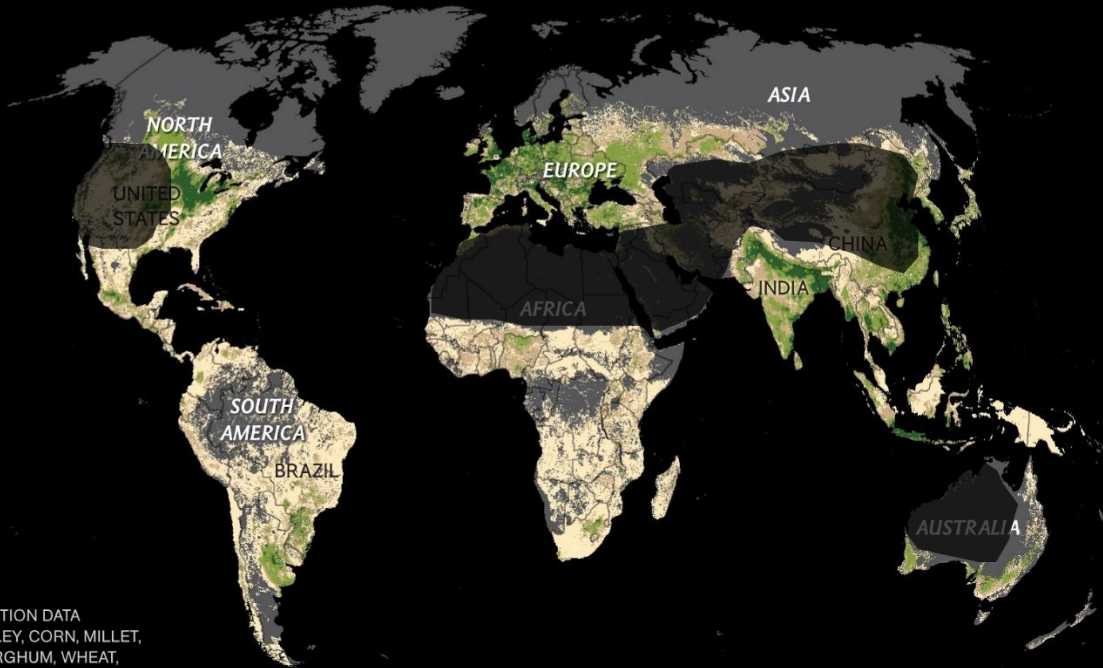
# Background

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METRIC TONS OF GRAIN PRODUCED PER HECTARE, 2000



1 0.3 .05 NEGLIGIBLE OR ZERO

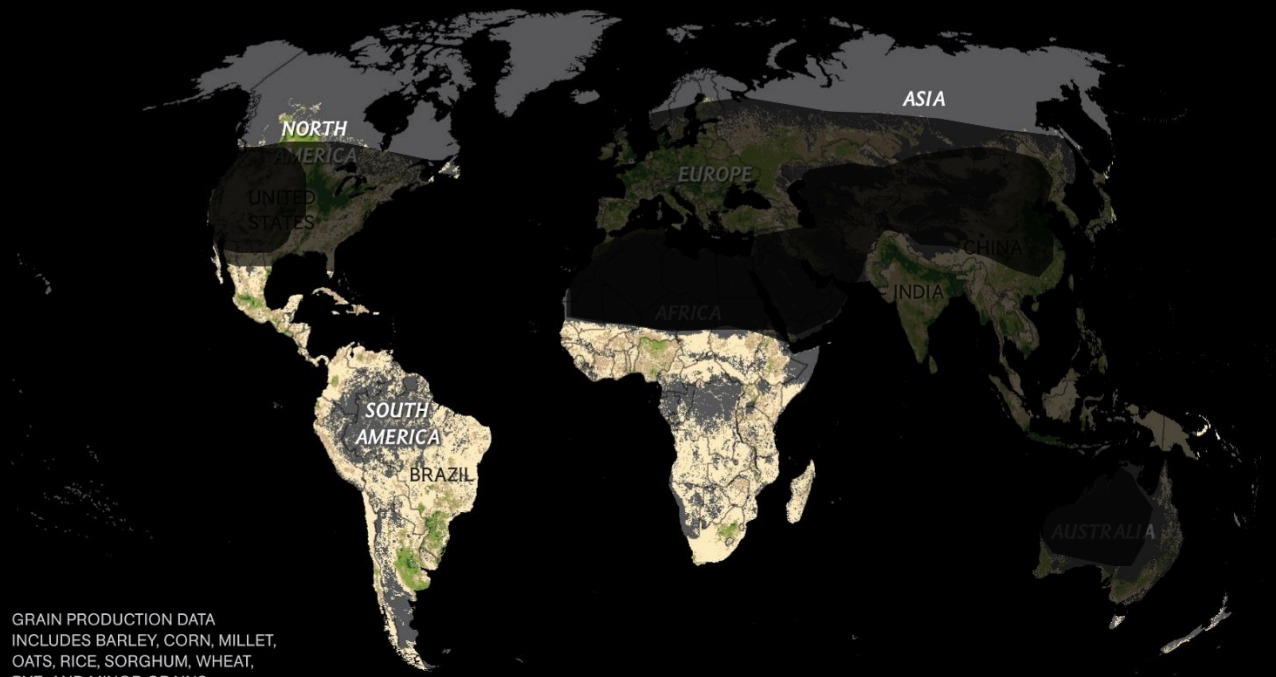
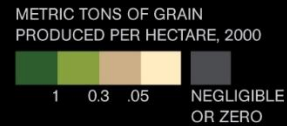


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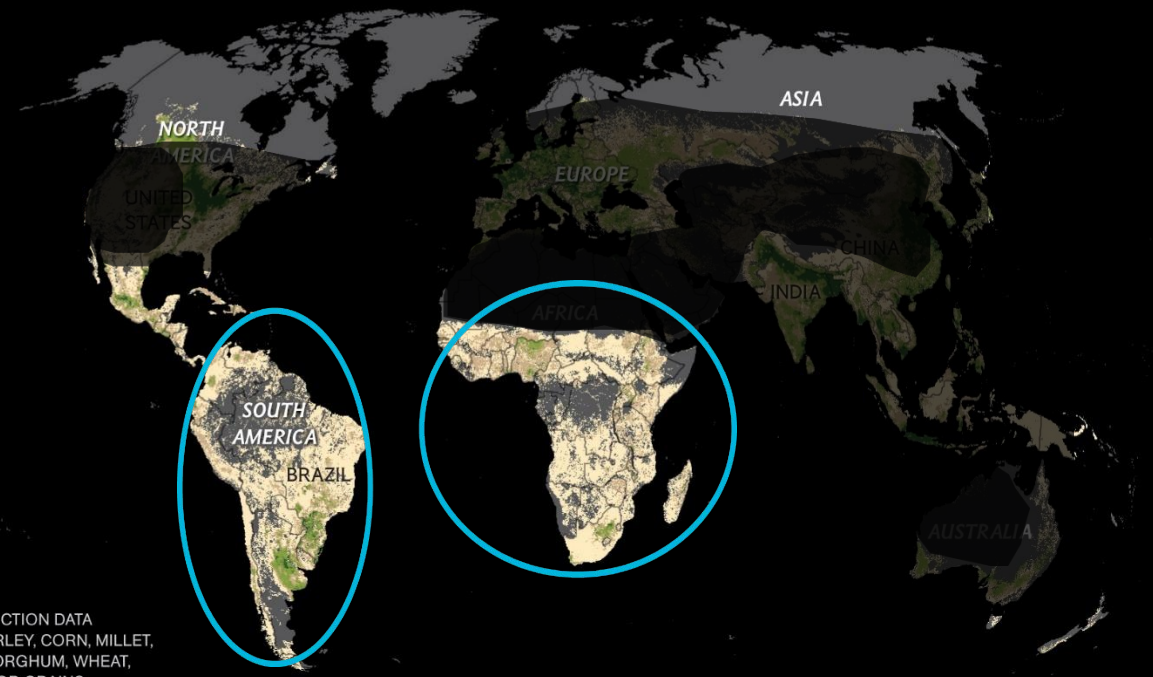
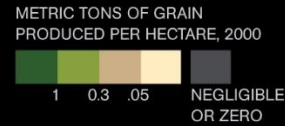


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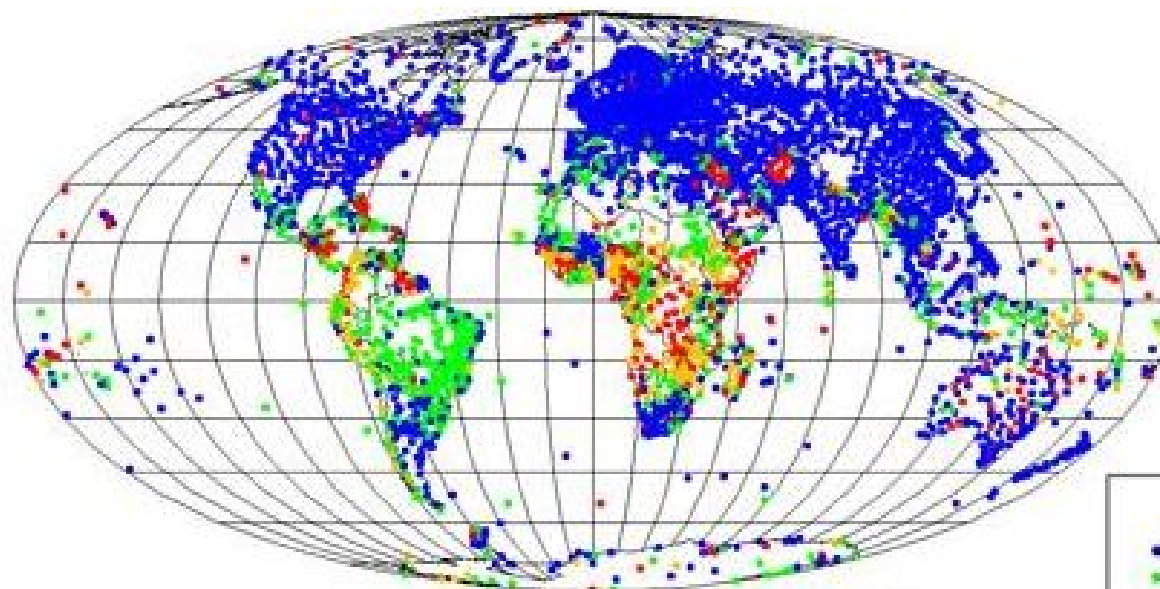
# Background



**60%**  
**world's**  
**uncultivated**  
**arable**  
**land!**

# Background

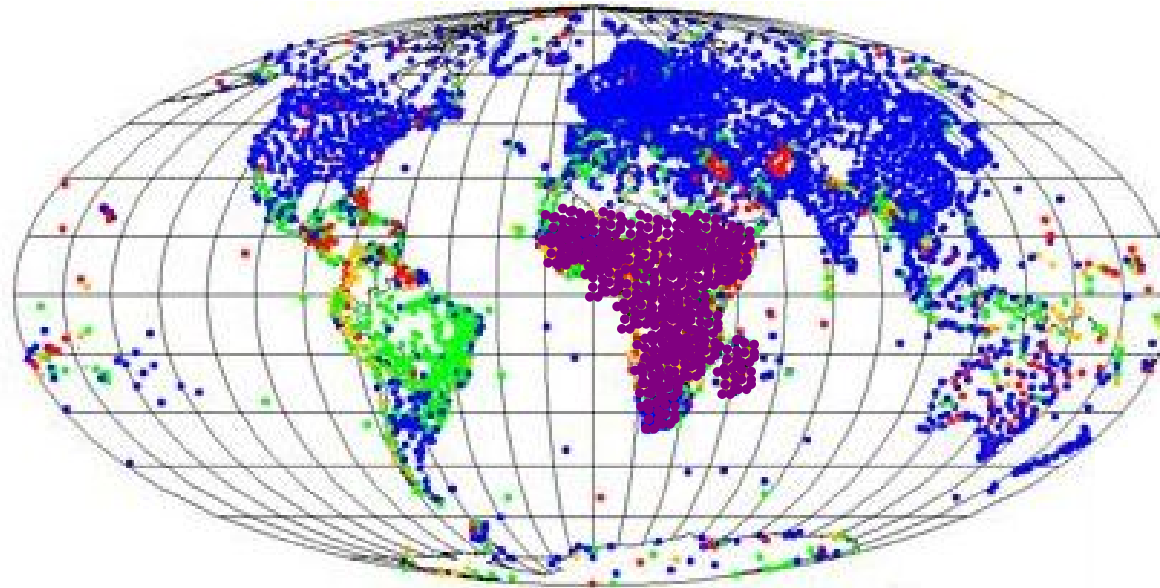
## WMO Stations



WMO Secretariat

# Background

Leapfrog: 20,000 TAHMO Stations!





# Background



## Pilots

  
**The  
Weather  
Company**  
An IBM Business



# Education

- Associate with schools
- Develop environmental education package
- Teach children about their environment
- Teach children about their environmental connectedness



# Education

## School2School program

- Sister school
- Costs sharing
- Involvement
- Sharing ideas



# Design

## Principles

- Robust
- No moving parts
- No cavities
- Cheap (<\$500)
- Self calibrating
- Cross calibrating



# Design

## Present model



$P, R_{sd}, u$

T, RH

barometer

lightning

GPS, GPRS

compass,

accelerometer

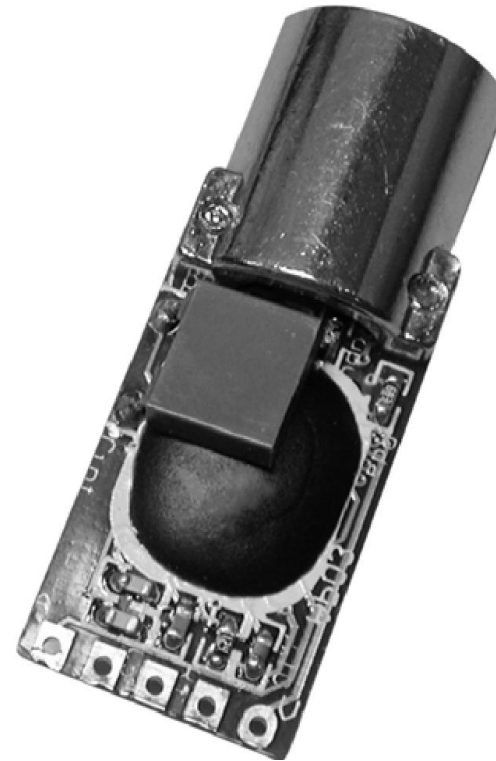


# Technologies

## Use existing sensors

- Automotive
- Household

ZyTemp TN9



# Technologies

## 2D Sonic



**METER**



# Technologies

## 2D Sonic





# Technologies

## 2D Sonic



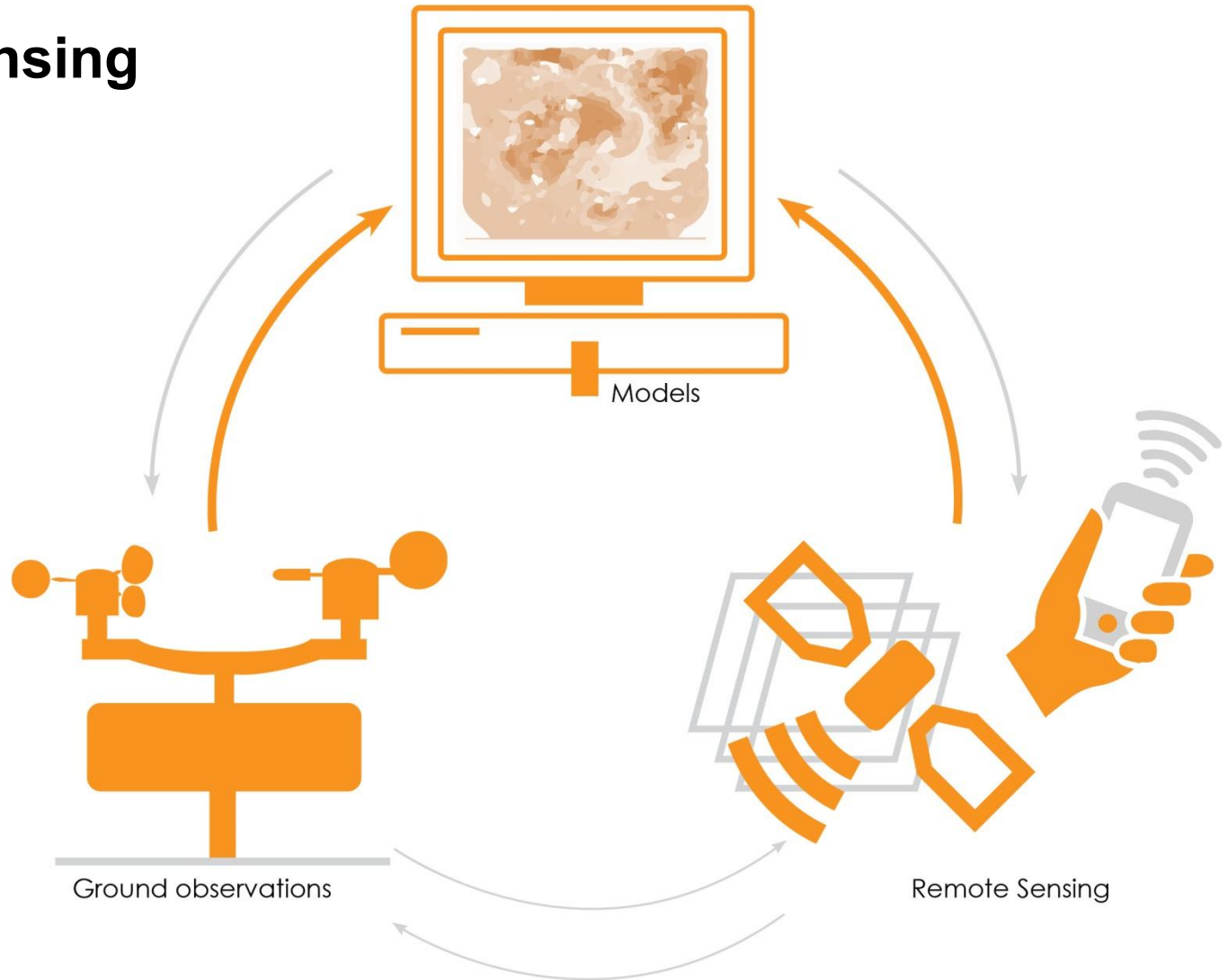
# Technologies

## 2D Sonic



# Technologies

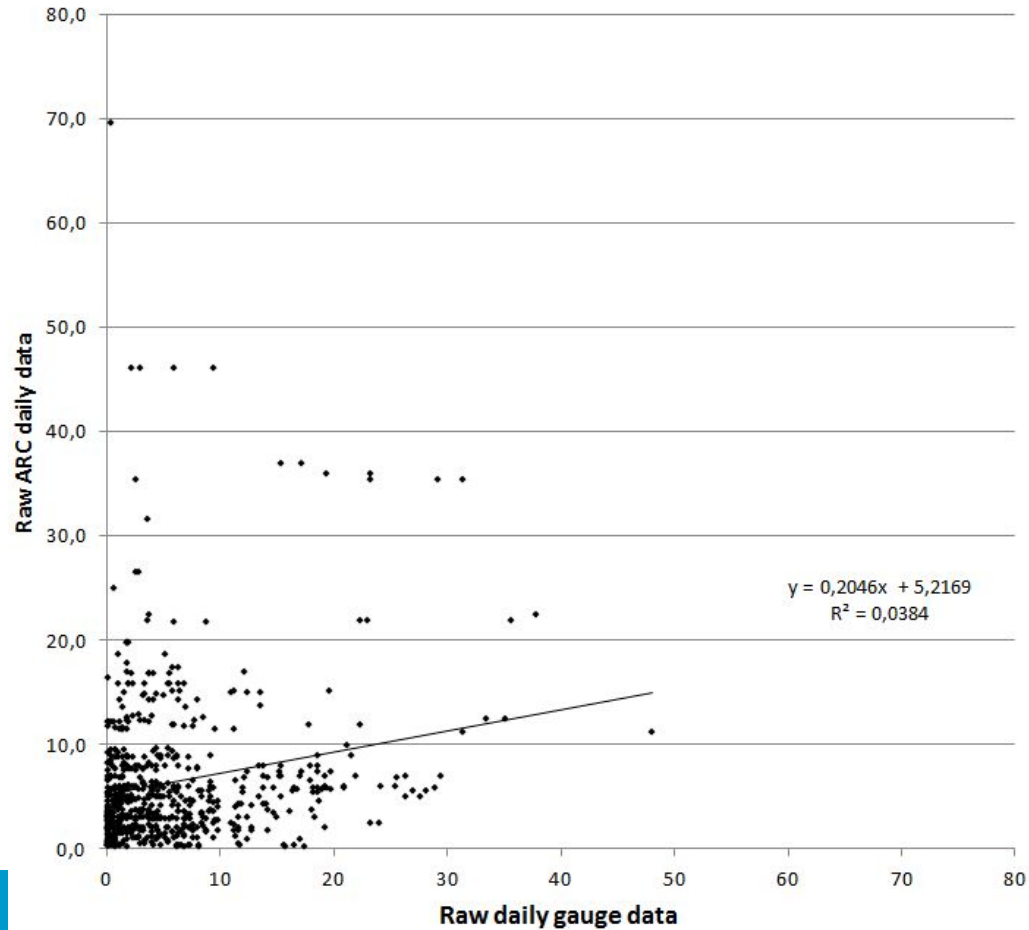
## Remote Sensing



# Technologies

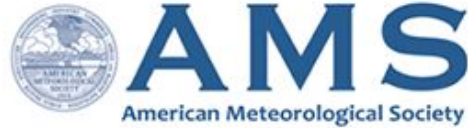
## Busogo study Rwanda

Basic regression between ARC pixel and daily gauge rainfall



# Technologies

## Precipitation



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Precipitation Characteristics in West and East Africa from Satellite and in Situ ...

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## Precipitation Characteristics in West and East Africa from Satellite and in Situ Observations

[Amin K. Dezfuli](#)

*NASA Goddard Space Flight Center, and Universities Space Research Association, Greenbelt, Maryland*

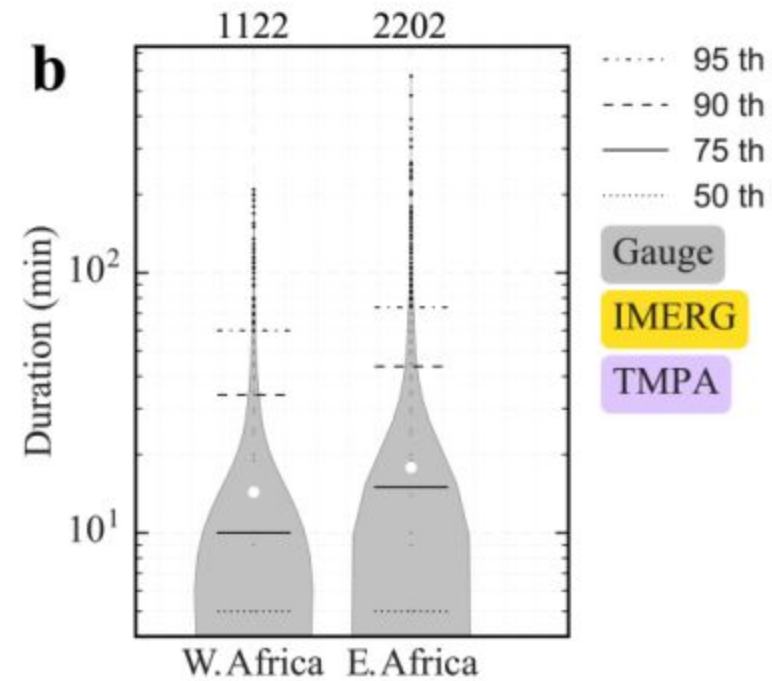
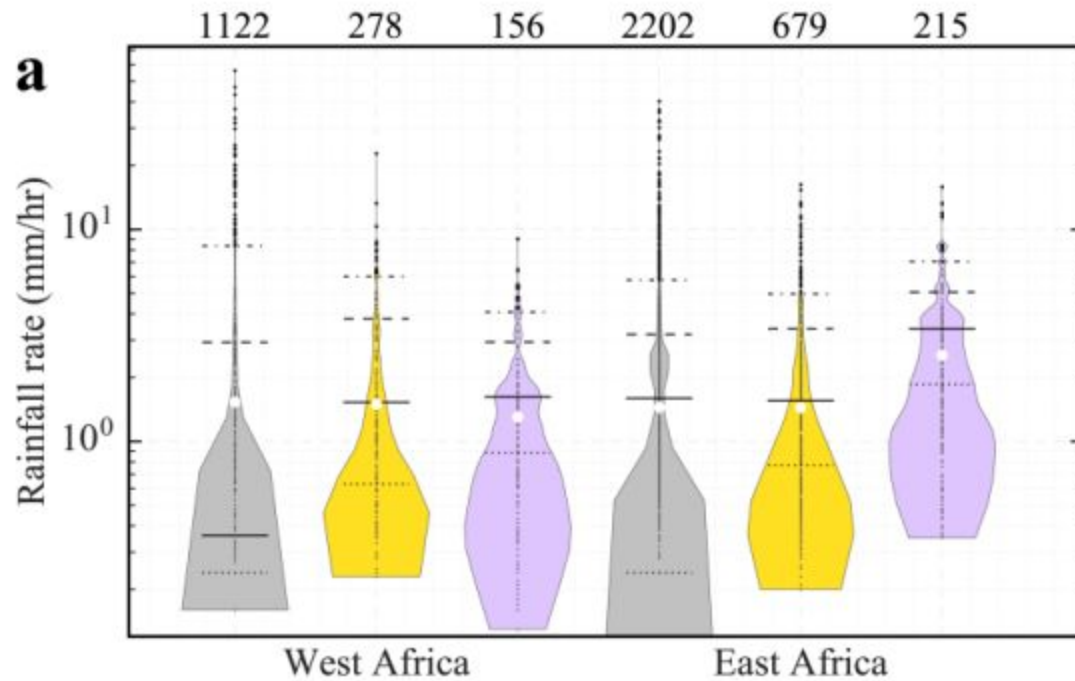
[Charles M. Ichoku](#), [Karen I. Mohr](#), and [George J. Huffman](#)

*NASA Goddard Space Flight Center, Greenbelt, Maryland*

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# Technologies

## Precipitation



# Technologies

## Precipitation

Video  
disdrometer



Microwave disdrometer



>10,000 Euros

Laser  
disdrometer



Joss-Waldvogel (acoustic)

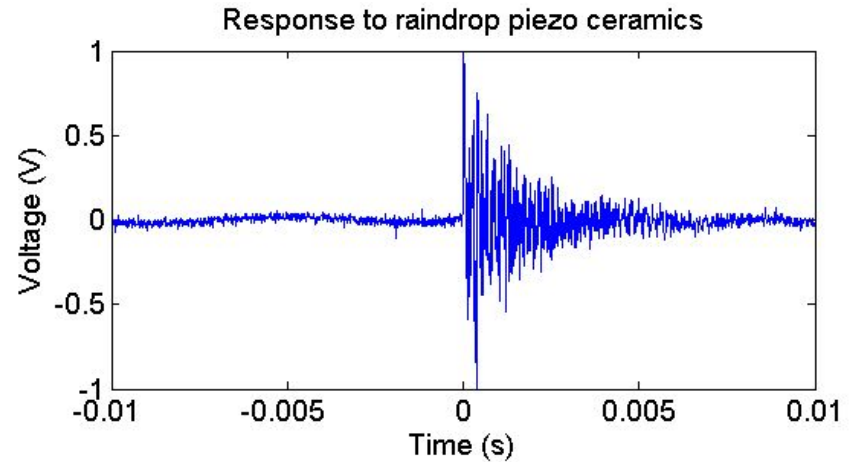


# Technologies

## Precipitation

Coen Degen

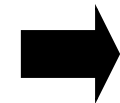
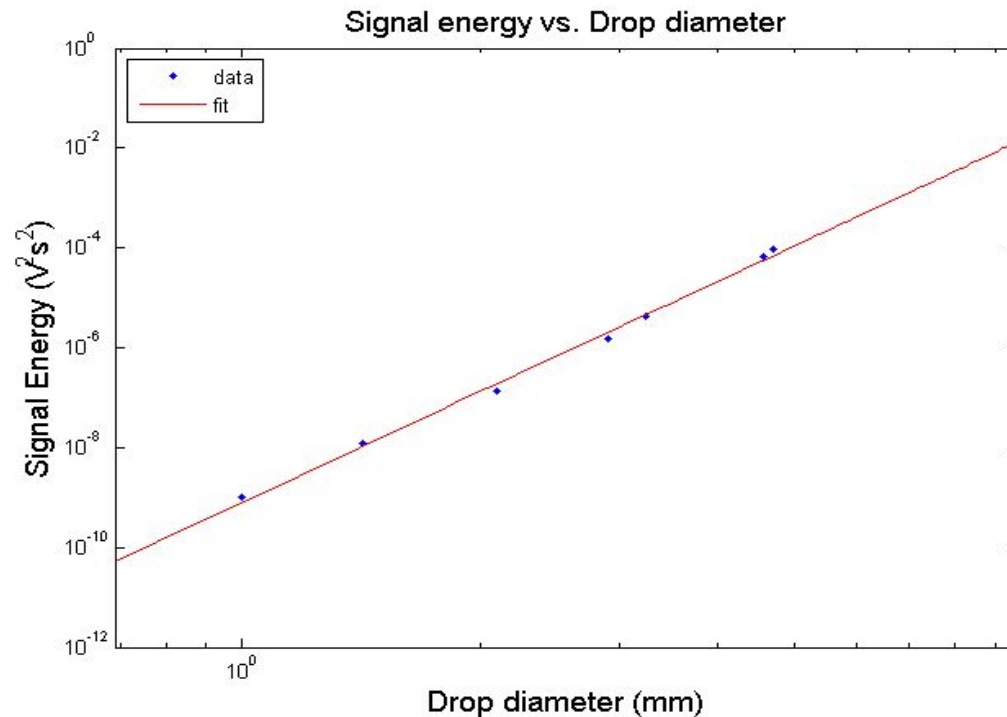
Piezo ceramic element





# Technologies

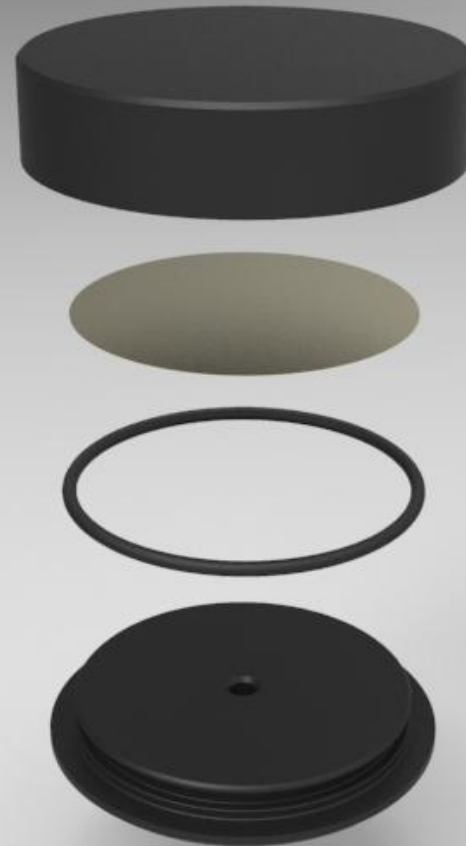
## Precipitation



$$E_s = 8 \cdot 10^{-10} \cdot D^{7,34}$$

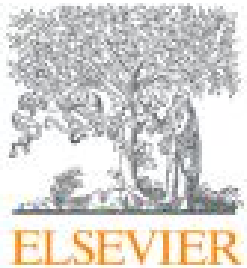
# Technologies

1. Housing top
2. Piezoelectric sensor
3. O-ring
4. Housing bottom



Disdro 

## Precipitation



### Journal of Hydrology

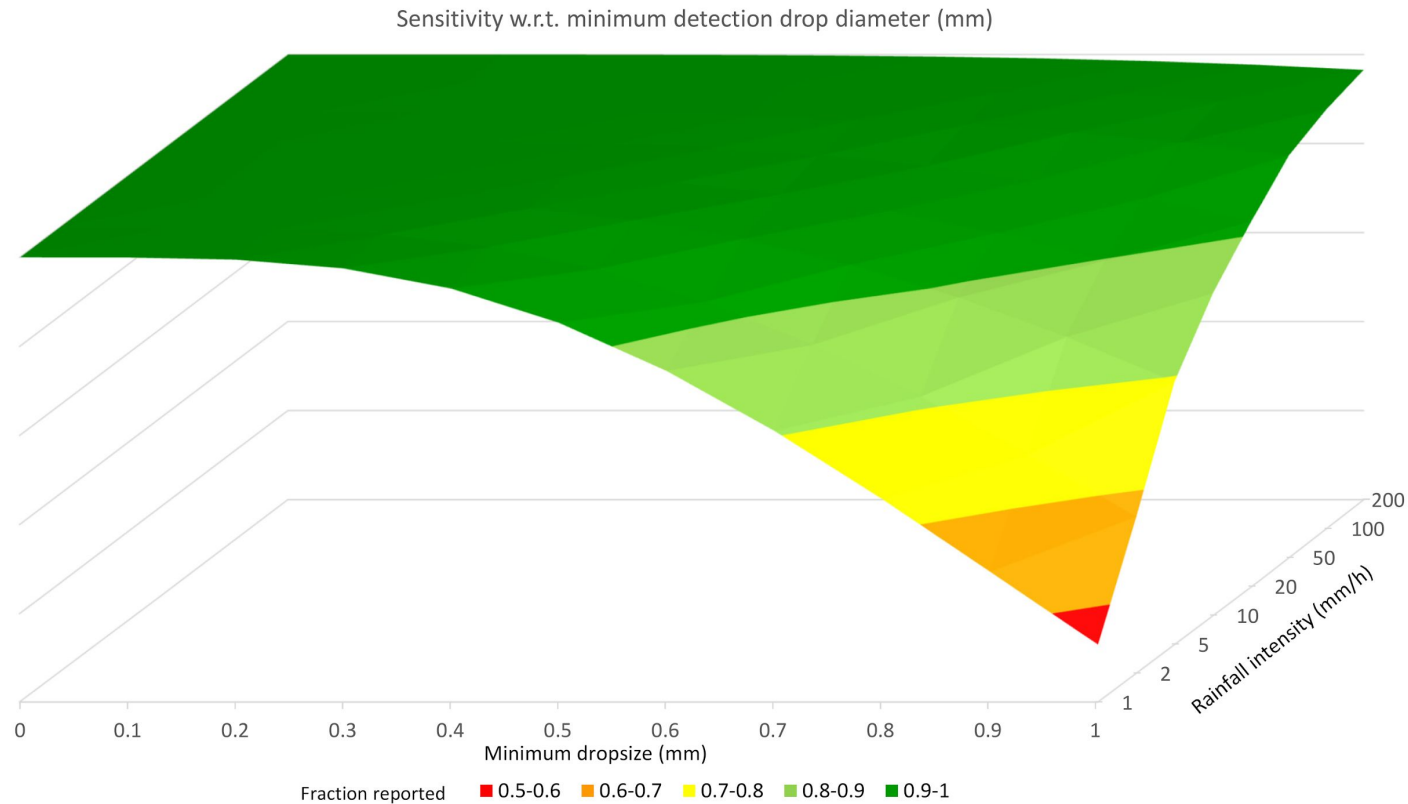
Volume 218, Issues 3–4, 24 May 1999, Pages 101-127

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## A consistent rainfall parameterization based on the exponential raindrop size distribution

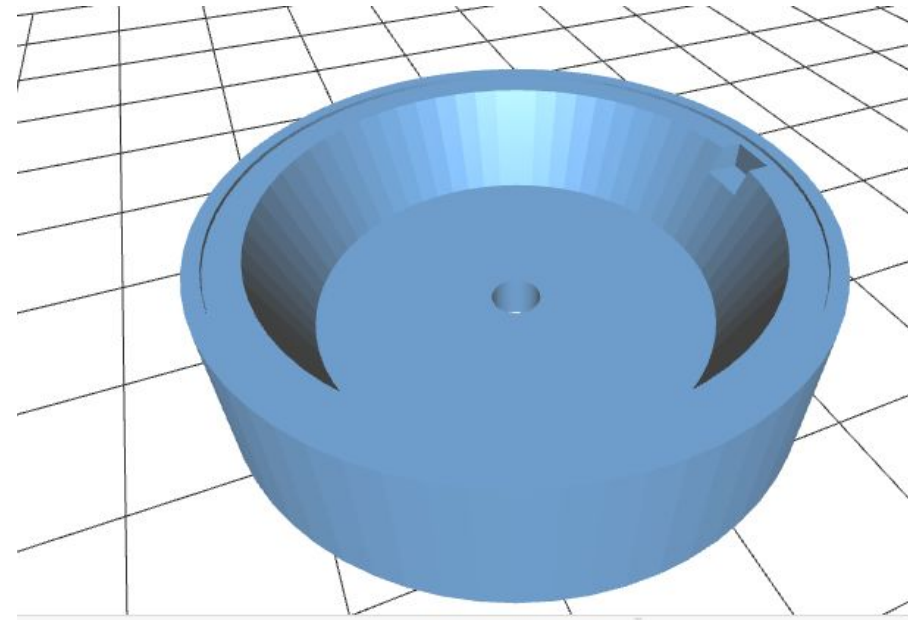
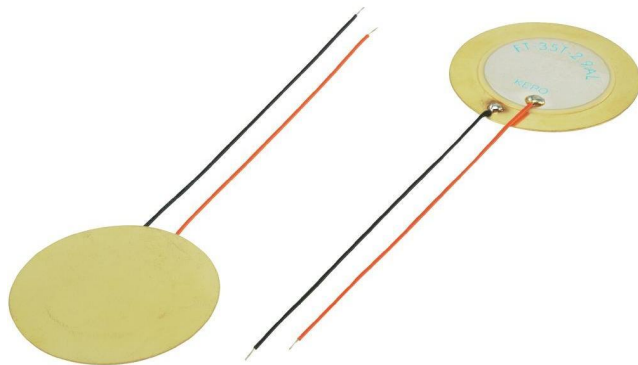
R. Uijlenhoet <sup>1</sup>  , J.N.M. Stricker

## Precipitation



# Technologies

## Precipitation



# Technologies



## Precipitation

**.../nvandegiesen/Intervalometer**





**Join!**

**WWW.TAHMO.ORG**

[n.c.vandegiesen@tudelft.nl](mailto:n.c.vandegiesen@tudelft.nl)

[info@tahmo.org](mailto:info@tahmo.org)

