Soil Moisture Measurement Survey in the SoMMet project 2023
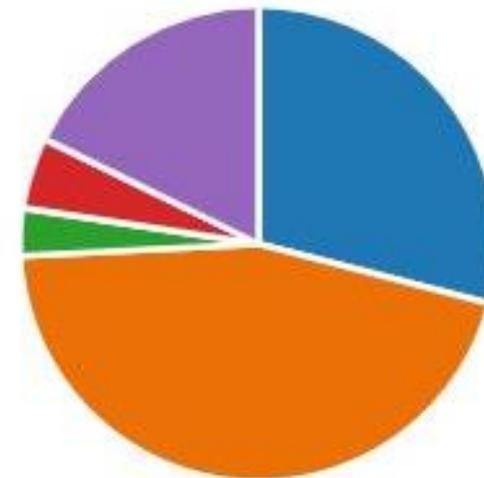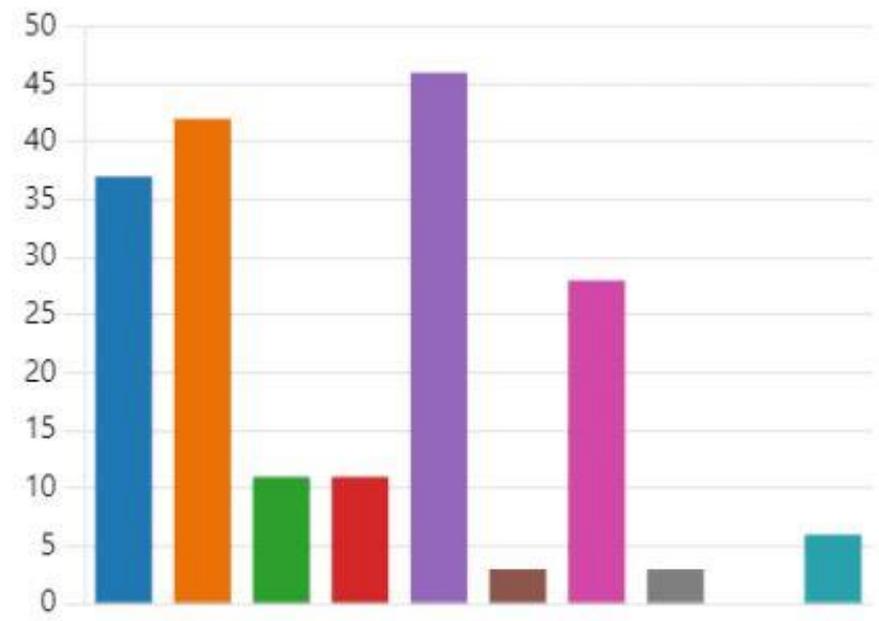
Reidun Anita Bergerud *et al*

Justervesenet

Background

- Online survey in the periode 16 February to 14 April
- 3 different focus areas, point scale, intermediate (CRNS) and satellite
- 65 respondents

Email from SoMMet consortium...	18
Email from other contact	28
LinkedIn	2
https://www.sommet-project.eu...	3
Annet	11

Application areas

● Agriculture	37
● Water resource management	42
● Soil erosion study	11
● Water quality	11
● Hydrology	46
● Geotechnical engineering	3
● Climate change	28
● Greenhouse gas emissions	3
● Trafficability	0
● Annet	6

Scale of interest

🔵 (1 - 100) cm	41
🟠 (1 - 1000) m	40
🟢 (1 - 10) km	30

Normal depth for point scale measurments

Measurement frequency

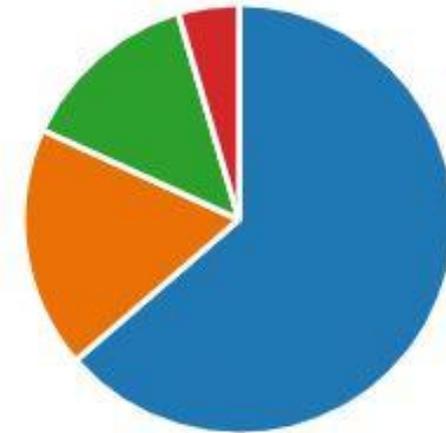|		
🔵	every minute	5
🟠	15 minutes	12
🟢	hourly	30
🔴	daily	34
🟣	weekly	12
🟤	Annet	8
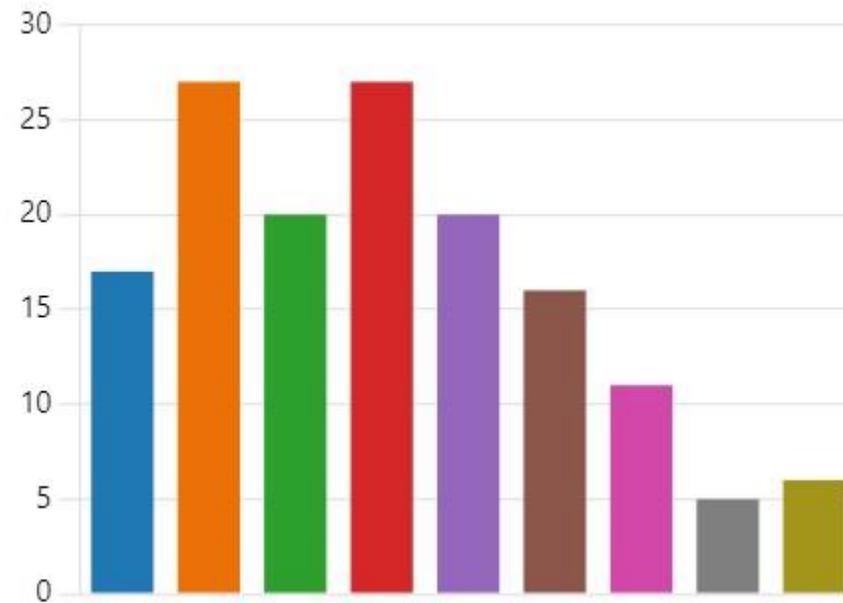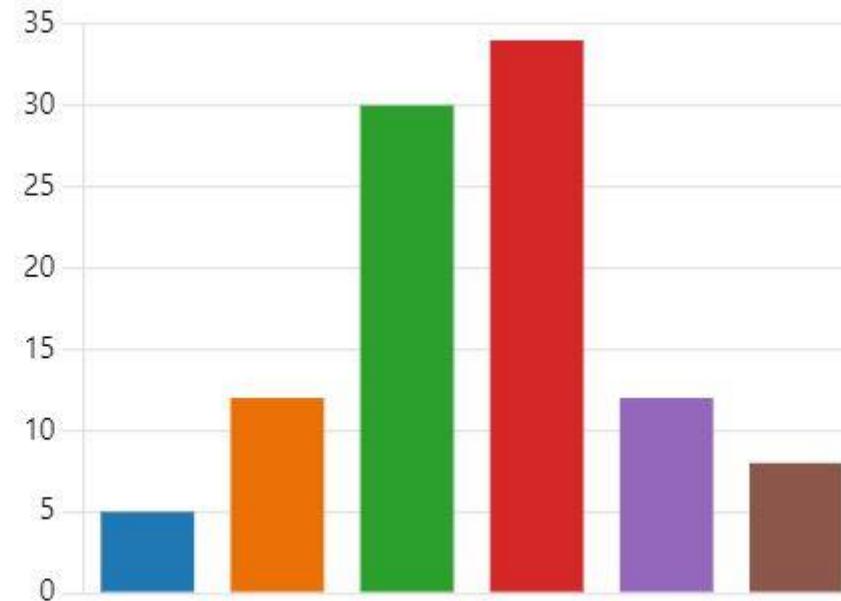
Own soil moisture measurements

🔵 Yes	45
🟠 No	20
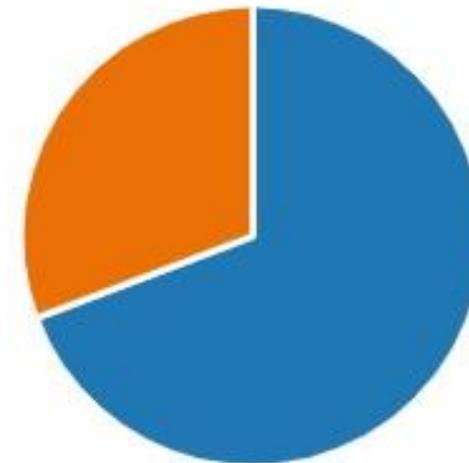
Calibration

Point scale:

🔵 Yes	24
🟠 No	17

CRNS:

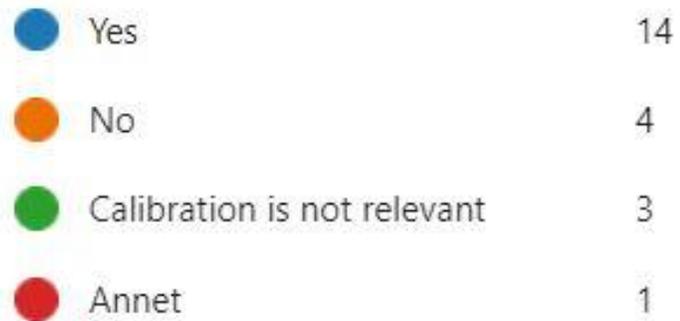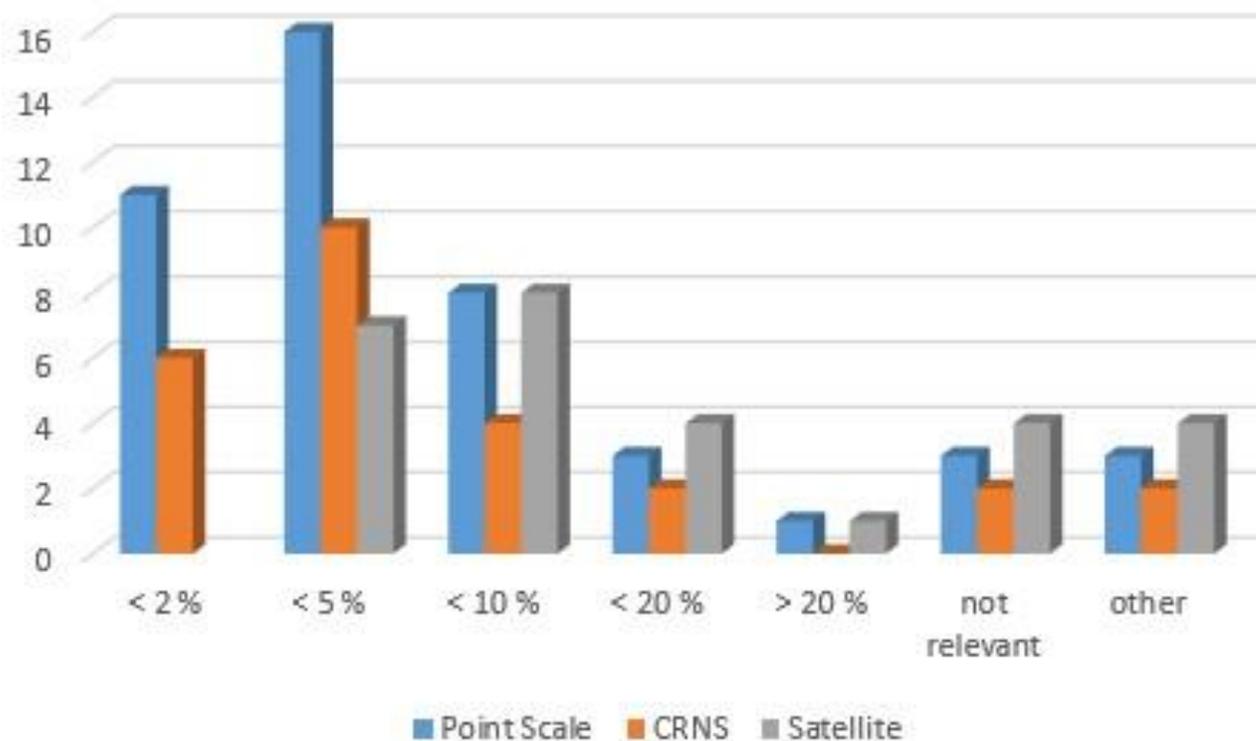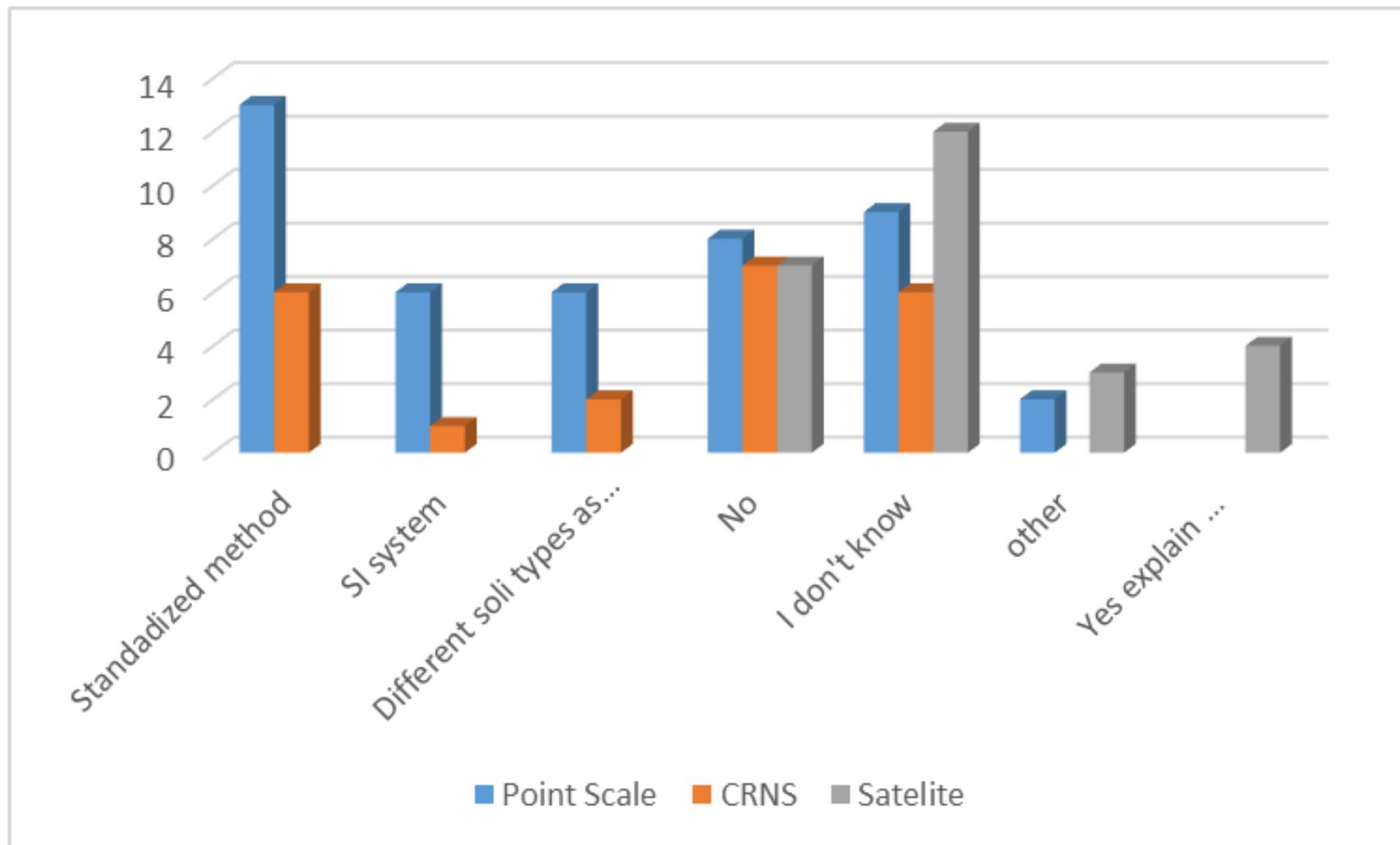|	
🔵 Yes	14
🟠 No	4
🟢 Calibration is not relevant	3
🔴 Annet	1
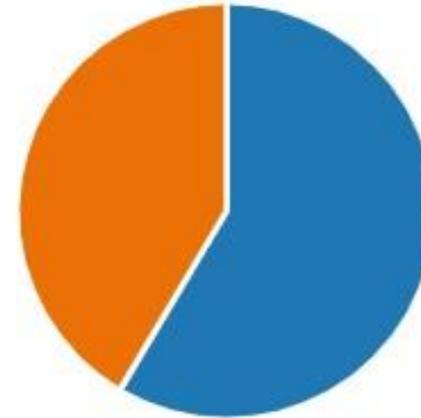
What is the target uncertainty for your moisture / water content measurements?

Traceability

"Both NASA and ESA follow EOS protocols - that's traceable, right?"

«Through field measurements.»

Challenges

- Inhomogeneities in the soil, difficult to find representative spot for area

- Different soil capacity for moisture

- The role of roots on soil moisture; plant growth & soil biogeochemistry

- Vegetation cover variability (remote)

"Surface soil moisture and vertical soil moisture is completely different how do you estimate two spatial system in soil?"

[https://soilsensor.com]

More challenges

- Instrument failure!

- Different techniques (TDR, neutron probes, remote Sensing) gives different results

- Data availability

- Calibration - *define a clear protocol to calibrate soil moisture sensors*

- Uncertainty - *Unknown or inappropriate measurement accuracy*

[https://sentektechnologies.com]

Intermediate / CRNS - challenges

🔵 Calibration /validation	19
🟠 Surface vegetation	14
🟢 Surface roughness	6
🔴 Surface temperature	3
🟣 Low spatial resolution	4
🟤 I don't know	2
🟣 Annet	5
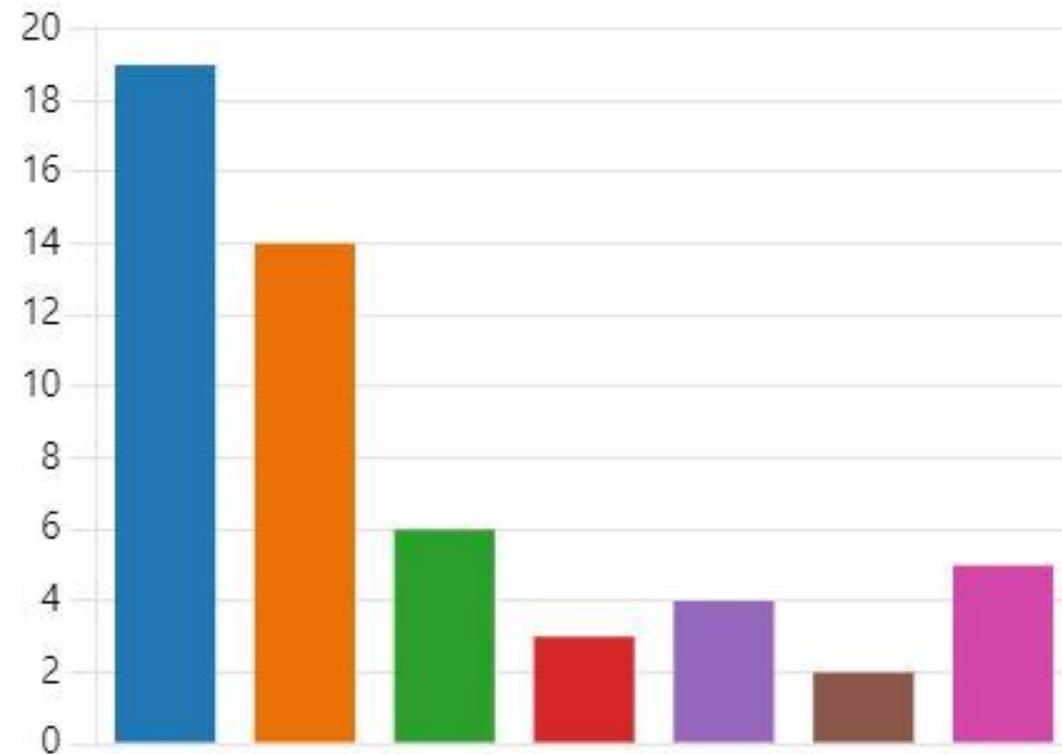
How do you deal with heterogeneity in the footprint (sensing volume)?

"100+ volumetric soil samples are collected within the footprint area to account for the spatial variability"

"Using horizontal and vertical weighing according to Schrön et al., (2017)"

"Consider it an average"

"Yes, but we lack proper expertise"

"By turning a blind eye to it"

https://www.finapptech.com/

Needs

[ESA Sentinel -1]

- Standardisation of data formats and validation of products

- Standardisation of in situ soil moisture measurements

    - *building a traceability diagram*

- Developing models and algorithms to *enhance the resolution and reduce the uncertainty*

- Better communication about satellite products how are they obtained (measurements, modelling framework, etc...)

"Building a network of super sites to characterise uncertainty, real spatial and temporal resolution, and other characteristics"

"Discussion with CEOS and related WG groups. Joined implementation using standardised documentations and guides, e.g. through WMO"

Thank you for your attention!

https://www.sommet-project.eu/home