# Ozonesondes GDP progression

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# **ASOPOS report**

- Assessment of Standard Operating Procedures for Ozonesondes (ASOPOS) panel
- Just published by WMO/GAW GAW report 268
- Defines the best practices for the global ozone sonde network
- Was written with GRUAN in mind
- Look at presentation from last year for roadmap
   https://www.gruan.org/gruan/editor/documents/meeting

https://www.gruan.org/gruan/editor/documents/meetings/i cm-13/pres/pres 110 Voemel Ozone-GDP.pdf



GAW Report No. 268

#### Ozonesonde Measurement Principles and Best Operational Practices

#### ASOPOS 2.0

(Assessment of Standard Operating Procedures for Ozonesondes)

#### August 2021



GRUAN ECC product will build on GAW report 268
 → GRUAN ECC stations will follow GAW operational procedures

- Establish traceability to become less dependent on manufacturer
- Remove/minimize known systematic biases, which are ignored in standard processing
- GRUAN ECC product will become anchor observation for all other stations
  → Identify potential issues early
- Make sure that GRUAN stations provide homogeneous data set, despite heterogeneous instrumentation -> Centralized processing



# **Brief roadmap for updated GRUAN ECC data product**

- Existing and new stations will follow GAW 268 recommendations for ozonesondes and continue their best practices
- Stations participating in GRUAN ozonesondes must collect all required, essential, and desired metadata specified in metadata appendix of GAW 268
- High quality ozone destruction filter (or "zero" air) during preparation (GAW 268)

In addition: Ozone sonde station participating in GRUAN ozone

- Must use manufacturer independent ground check for ECC ozone sondes, which is suggested in GAW 268 (need multiple sites for different manufacturers and solutions)
- Work on measuring individual pump efficiencies

# **Brief roadmap for updated GRUAN ECC data product**

In processing: Implement time response correction locally

#### • Empirical ("pump") efficiencies will be separated into

- True pump efficiency
- Stoichiometry factor
- Time response correction
- "Background current" will be deprecated
- Pre-launch data are used in processing
- Uncertainty budget in processing needs to be worked out following GAW 268 and new processing steps



ECC – OMI Total Ozone EnSci SST0.1 Costa Rica



#### ECC drop-off at other stations



From: Stauffer et al., 2022

## **Unexpected change at EnSci**

- ECC community was surprised by drop off
- Two factor challenge:
  - a) Production change at Manufacturer
  - b) affecting only low buffered sensing solutions
- Current uncertainty estimates are incorrect
- ECC community has (almost) no tool to evaluate accuracy issues prior to launch

### SHADOZ network: EnSci ECC (SST0.1) – OMI comparison



### SHADOZ network: SPC ECC (SST1.0) – OMI comparison



## → ECC community needs manufacturer independent ground check



#### **ECC conditioning prior to launch**





Boulder: manual check at 100 ppbv after sonde conditioning





Payerne: automatic check at ~230 ppbv during sonde conditioning



ECC

-> Correction factor just stored, not applied, following GAW

Lauder: automatic check at ~100 ppbv prior sonde conditioning So far: functionality check only no quantitative comparison

- Current ground check data too short and too limited to address changes at using EnSci or SPC ozone sondes
- But ground check shows promise to evaluate changes

Propose to coordinate existing ground checks to overcome the lack of understanding of manufacturer changes



Pump efficiencies



# **Pump Efficiencies**

Current processing: Mix physical and chemical efficiency corrections in one single "empirical" efficiency, depending on manufacturer and solution

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- Need to use pump efficiency to correct behavior of pump (well understood)
- Chemical stoichiometry is considered separately





### **Pump Efficiency Measurements**



Nakano, T. and Morofuji, T.: Development of an automated pump efficiency measuring system for ozonesonde utilizing the airbag type flowmeter, EGUsphere [preprint], https://doi.org/10.5194/egusphere-2022-565, 2022

#### **Pump efficiency measurements**



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Time response correction



#### Time response correction for Jülich Ozone Sonde Intercomparison Experiment

Average of 77 simulation experiments in the Jülich Environmental Chamber, 2017



- Continue draft of GRUAN Ozonesonde Technical Document
- Agree on best manufacturer independent ground check (ozone calibrator, e.g. Boulder, Lauder, Payerne, Lindenberg)
- Work on implementing pump efficiency measurement
- Define GRUAN processing algorithms based on GAW 268 with updated time response correction -> work out manual flagging