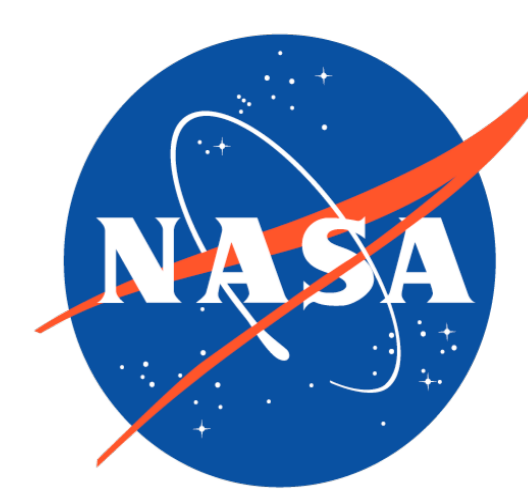


# The Importance of Ozone Sonde Quality Assurance and JOSIE-SHADOZ (2017)



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SHADOZ Sites: <https://tropo.gsfc.nasa.gov/shadoz>



## THE JOSIE (Jülich Ozone Sonde Intercomparison Experiment) EXPERIMENTS

The overall objective of JOSIE is to establish quality assurance guidance for the global ozonesonde community.

- To assess sonde performance in the environmental simulation chamber at the Forschungszentrum Jülich, Germany which was established as the World Calibration Center for Ozone Sondes (WCCOS) in 1996.
- The chamber simulates flight conditions of ozonesondes up to 35 km. This controlled environment allows for accurate comparisons of ozonesonde profiles to the reference UV-ozone photometer (OPM).
- NASA and NOAA/GMD have participated in all the JOSIE Campaigns that started in the mid 1990's (See Table, right).



Smit (JOSIE PI), Machinini, & Wolf

Campaign	Objective
JOSIE-1996 GAW Report #130	<ul style="list-style-type: none"> <li>Operating Procedures</li> <li>Profiling Capabilities</li> <li>Intercomparison sonde types (ECC, BM, Meisel)</li> <li>Manufacturing ECC sondes (SPC, ENSCI)</li> </ul>
JOSIE-1998 GAW Report #57	<ul style="list-style-type: none"> <li>Operating Procedures</li> <li>Focus on ECC sonde                             <ul style="list-style-type: none"> <li>Different sensing solution types</li> <li>Different manufacturers (SPC, ENSCI)</li> </ul> </li> </ul>
JOSIE-2000 GAW Report #158 (Smit et al., 2007)	<ul style="list-style-type: none"> <li>Operating Procedures under flight conditions</li> <li>Focus on ECC sonde                             <ul style="list-style-type: none"> <li>Different sensing solution types</li> <li>Different manufacturers (SPC, ENSCI)</li> </ul> </li> </ul>
BESOS-2004 (Deshler et al., 2008)	<ul style="list-style-type: none"> <li>Define and establish Standard Operating Procedures for ECC sondes</li> <li>Manufacturers (SPC, ENSCI)</li> <li>Refurbished sondes</li> <li>Homogenization and Uncertainties</li> </ul>
ASOPOS 2002-2012 GAW Report #201	<ul style="list-style-type: none"> <li>Operating procedures</li> <li>Tropical simulations</li> <li>Different sensing solution types</li> <li>Different manufacturers (SPC, ENSCI)</li> </ul>
JOSIE-2009	
JOSIE-2010	
O3S-DQA Guidelines Report-2012	
JOSIE-SHADOZ-2017	

## THE JOINT JOSIE-SHADOZ CAMPAIGN – Oct./Nov. 2017

### Objectives/Goals

- JOSIE-SHADOZ is the most recent ozonesonde intercomparison campaign, with a focus on tropical profiles. SHADOZ (Southern Hemisphere ADditional OZonesondes) operators representing 9 stations participated in the October/November 2017 campaign. A major objective is to help resolve on-going discontinuities in the SHADOZ data records (Witte et al., 2017, 2018; Thompson et al., 2017) due to:
  - Small differences in preparation and operating procedures among SHADOZ stations.
  - Changes in the ENSCI ECC (electrochemical concentration cell) sensor performance in the past 7 years.
  - New sensing solution types (e.g. NOAA 1% 0.1 Buffer) proposed to resolve discrepancies in the UT/LS.

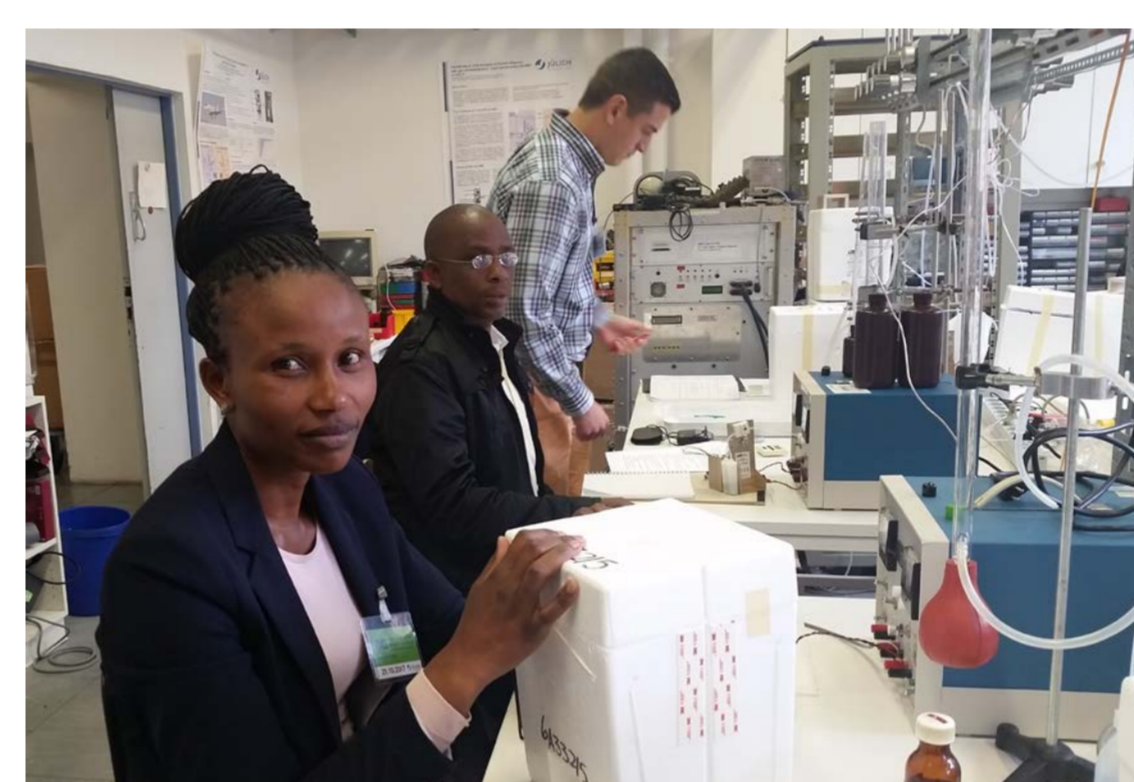
Operators		
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George Brothers	NASA/Wallops Flight Facility	USA
Ernesto Corrales	University of Costa Rica	Costa Rica
Tshidi Machinini	South African Weather Service	South Africa
George Paiman	Meteo. Service of Suriname	Suriname
Françoise Posny	Université La Réunion, Météo-France, CNRS	France
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Ryan Stauffer	NASA/GSFC	USA
Kennedy Thiongo	Kenyan Meteorology Department	Nairobi
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Zamuna Zainal	Malaysian Meteorological Dept.	Malaysia
Coaches		
Marc Allaart	Royal Netherlands Meteo. Institute	Netherlands
Patrick Cullis	NOAA/Global Monitoring Division	USA
Rigel Kivi	Finnish Meteorological Institute	Finland
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Gary Morris	St. Edward's University	USA
Anne Thompson	NASA/GSFC	USA
Referees		
Jonathan Davies	Environment and Climate Change Canada	Canada
Roeland v. Malderen	Royal Mete. Institute of Belgium	Belgium
Peter von der Gathen	Alfred Wegener Institute	Germany



Participants from Team 1



Participants from Team 2



Operators: Machinini, Kennedy, Stauffer

Operators (L-R): Posny, Corrales, Paiman



## JOSIE-SHADOZ: PRELIMINARY FINDINGS

- (Fig. 1) JOSIE-SHADOZ tested solutions with a reduced buffer recipe of the type used at four SHADOZ stations operated by NOAA/GMD. For this solution type the agreement with the OPM in the tropopause region was improved. The sensitivity to stratospheric ozone may be reduced. However, the differences are small (~5%).
- (Fig. 2) All stations participating in JOSIE-SHADOZ-2017 measured ozone that agreed well with the OPM. This affirms the very high quality of the SHADOZ methods that use WMO recommended SST-instrument combinations based on earlier JOSIE campaigns and field tests.
- (Fig. 3) The SPC / ENSCI instrument offsets seen in JOSIE-2000 and BESOS-2004 (Deshler et al., 2008) are confirmed in JOSIE-2017. ENSCI records more O<sub>3</sub> with the same sensing solution.



Zainal and Thompson (SHADOZ PI)

Fig. 1. Reducing the buffer (NOAA recipe) in the sensing solution improves O<sub>3</sub> accuracy near the tropopause

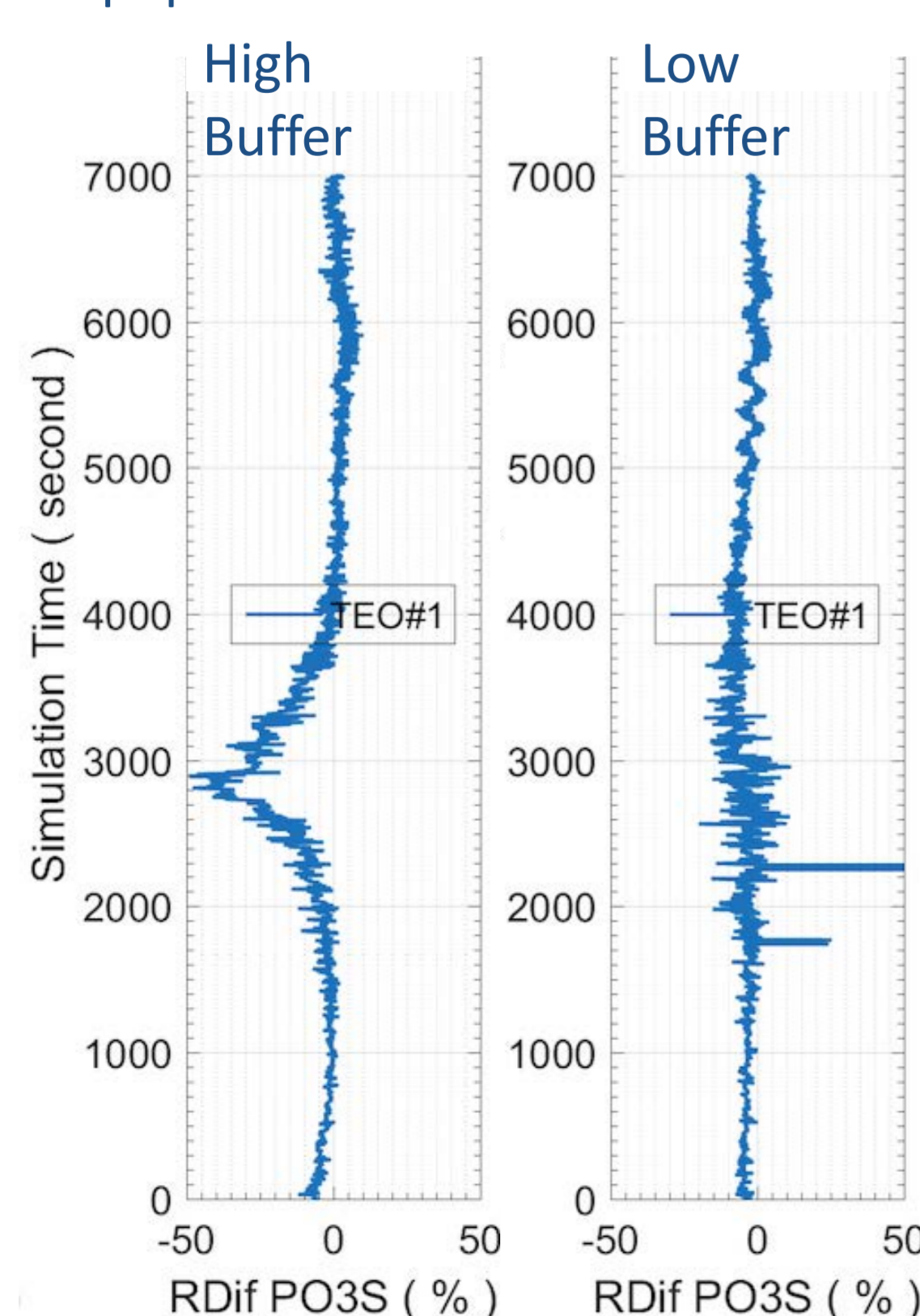
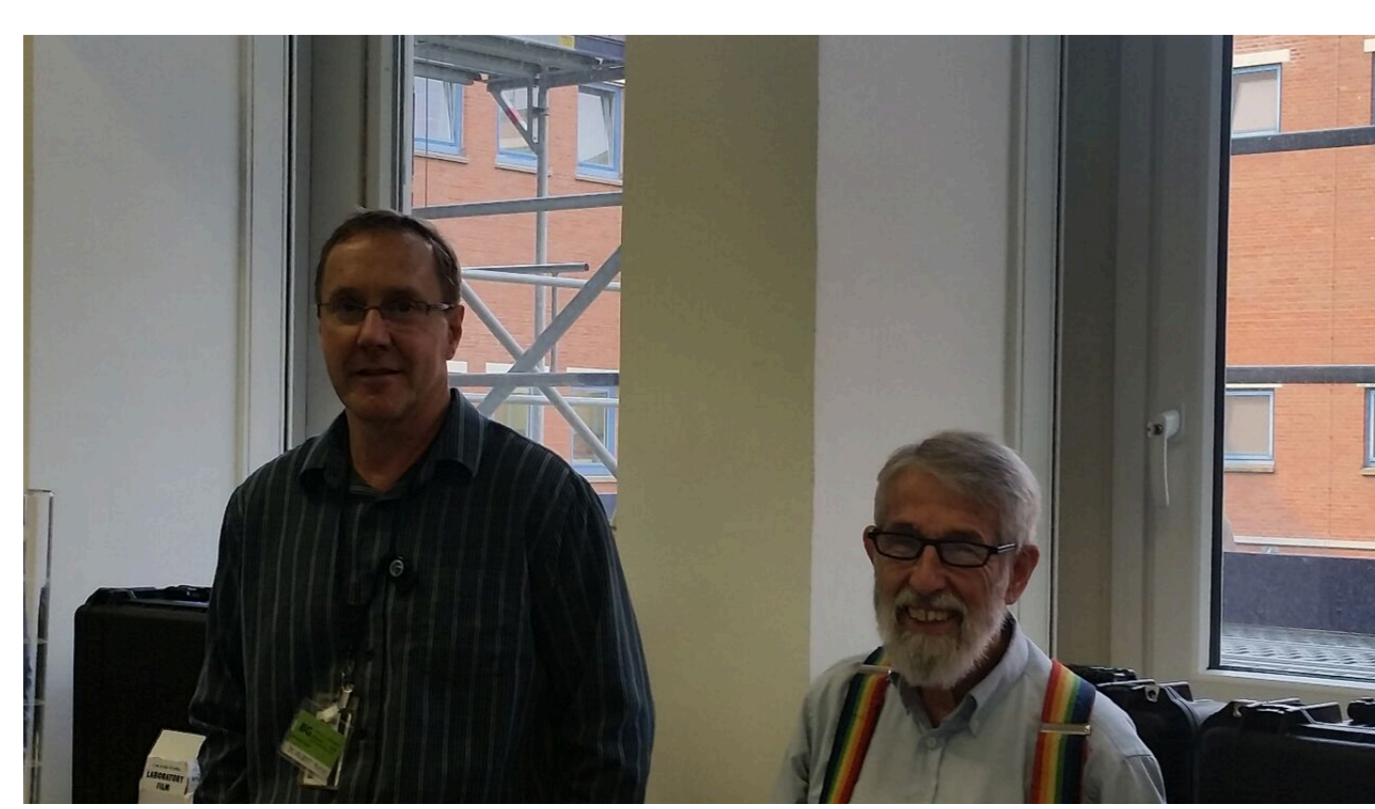
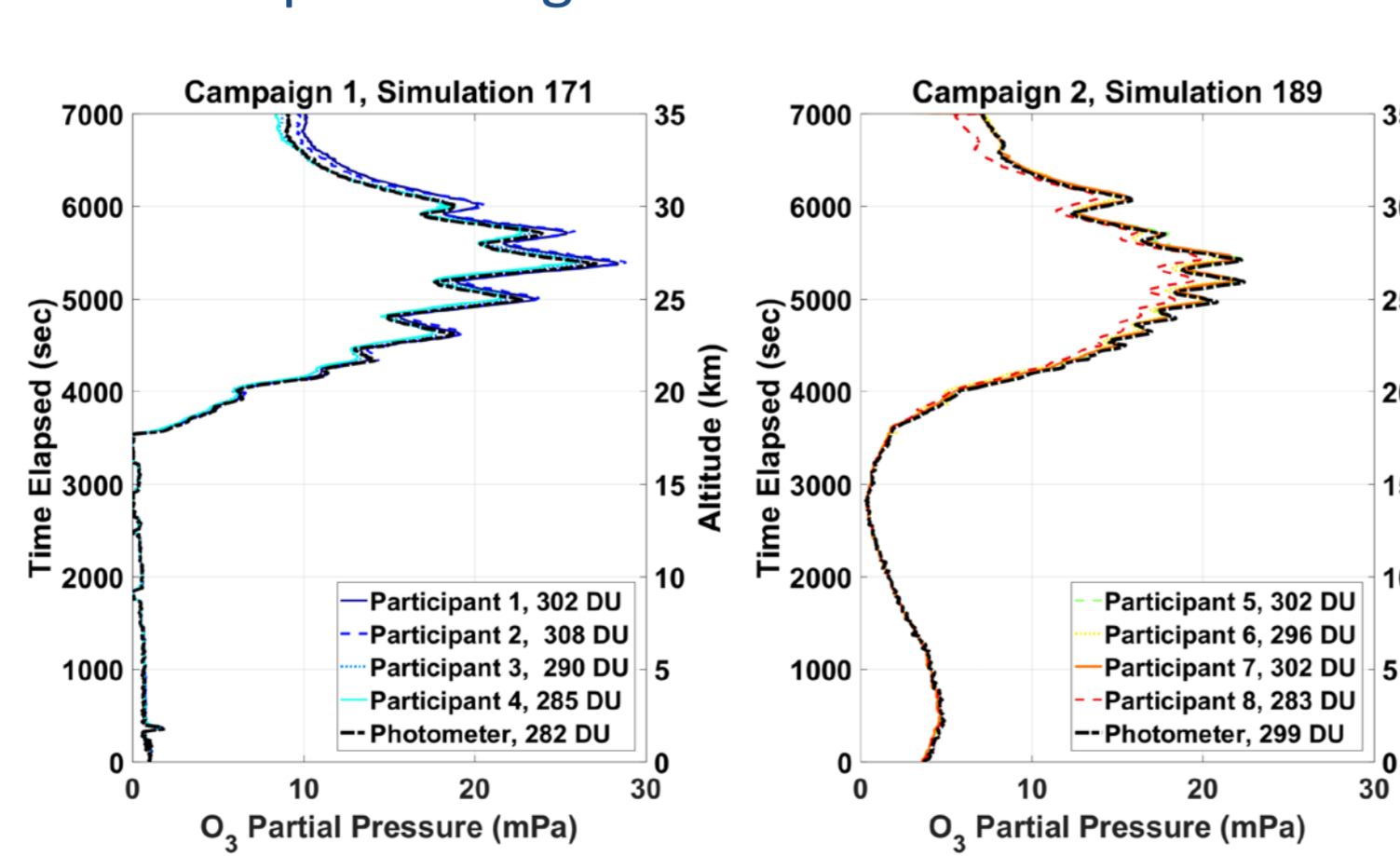
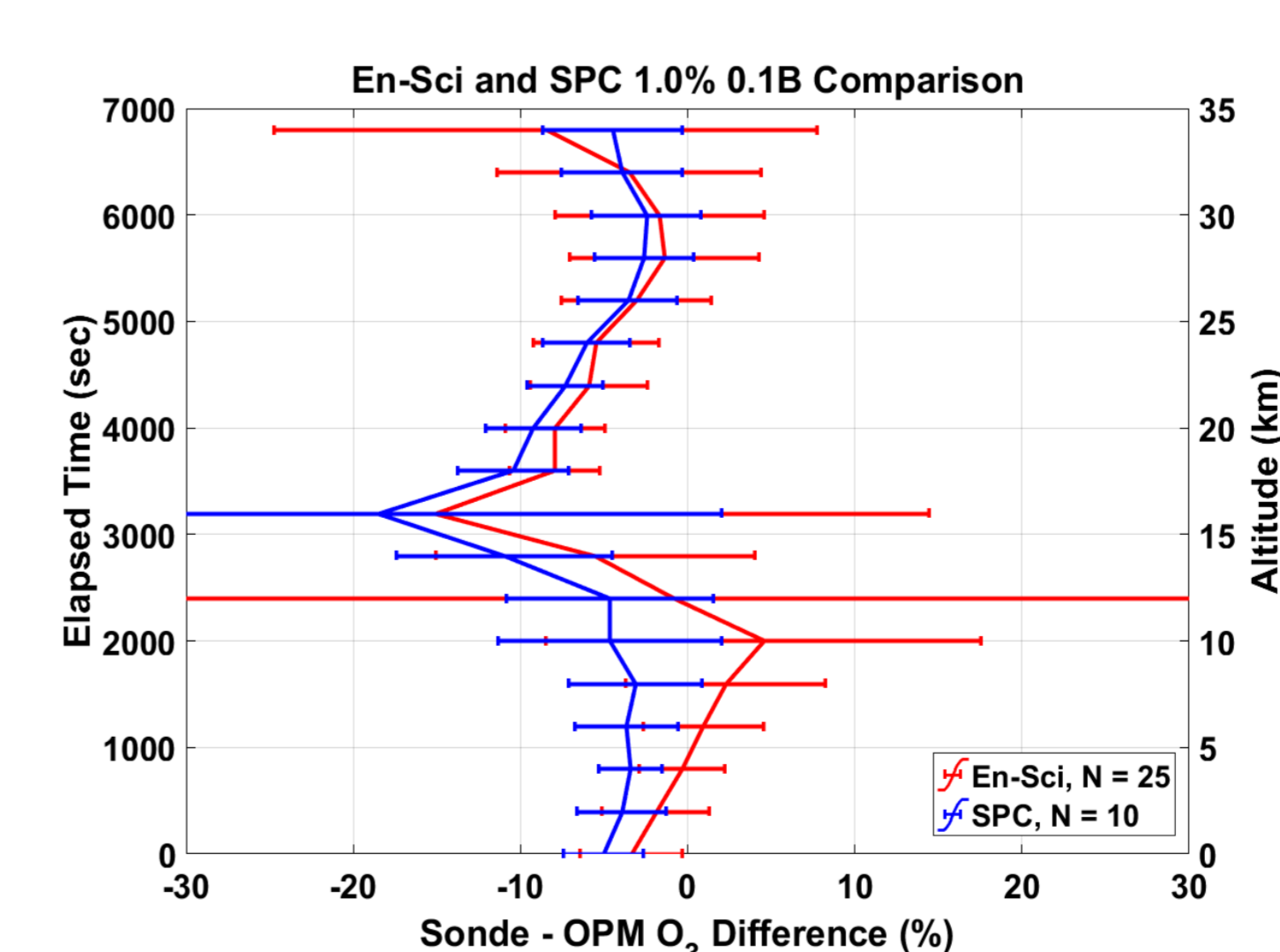


Fig. 2. With uniform preparation procedures, SHADOZ profiles agree within 5% of UV OPM



Johnson (NOAA), Brothers

Fig. 3. As expected, SPC measures lower ozone than ENSCI relative to the OPM.



Anh, Cullis (NOAA), Davies, and Allaart

## Acknowledgements

JOSIE-SHADOZ support comes from NASA and NOAA (USA, NASA Program Manager Kenneth Jucks) and FZ-Jülich with special travel support from the UNEP Vienna Convention Trust Fund (Sophia Mylona).

