



NMHCs observations at Mt. Cimone

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in collaboration with ISAC-CNR
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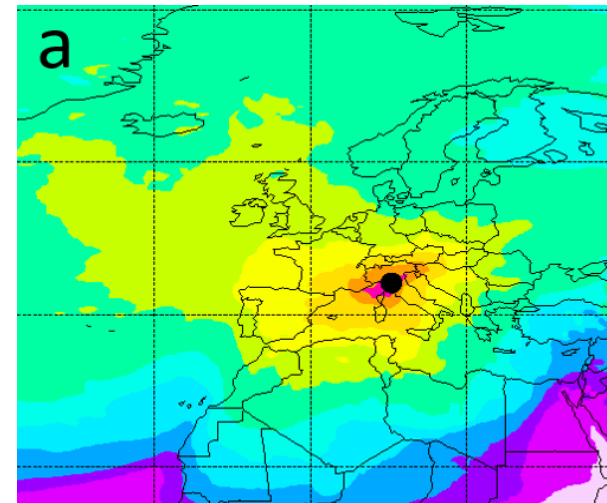
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Mt. Cimone “O. Vittori” CNR Observatory

44.0 °N, 10.7 °E, 2165 m a.s.l.

- The highest peak of the Northern Apennines
- Completely free horizon 360°
- Usually above PBL, except summer
- WMO-GAW Global Station
- CNR Observatory hosted by Italian Air Force

Observations	Start - End year	Lead institution
Surface O ₃	1996	CNR-ISAC
NO,NO ₂	2012	CNR-ISAC
SO ₂	2014	CNR-ISAC
CO	2008	CNR-ISAC/Uniurb
CO ₂	2018	CNR-ISAC
CH ₄	2008	CNR-ISAC/Uniurb
N ₂ O	2008	Uniurb
SF ₆	2008	Uniurb
CFCs, HCFCs	2002	Uniurb
HFCs	2002	Uniurb
Columnar NO ₂	1993	CNR-ISAC
Aerosol size distribution (10 – 500 nm)	2005	CNR-ISAC
Aerosol size distribution (300 nm – 10 µm)	2000	CNR-ISAC
Aerosol scattering	2005	CNR-ISAC
Aerosol absorption	2005	CNR-ISAC
Equivalent BC	2005	CNR-ISAC
Aerosol chemistry (PM1 –PM10)	2005 – 2015	CNR-ISAC
Natural radionuclides (⁷ Be, ²¹⁰ Pb, ²²² Rn)	1998 - 2011	Unibo
Solar photometry	2016	CNR-ISAC
Meteorological parameters and solar radiation	1996	CNR-ISAC



Sensitivity map: Flexpart footprint for 2023

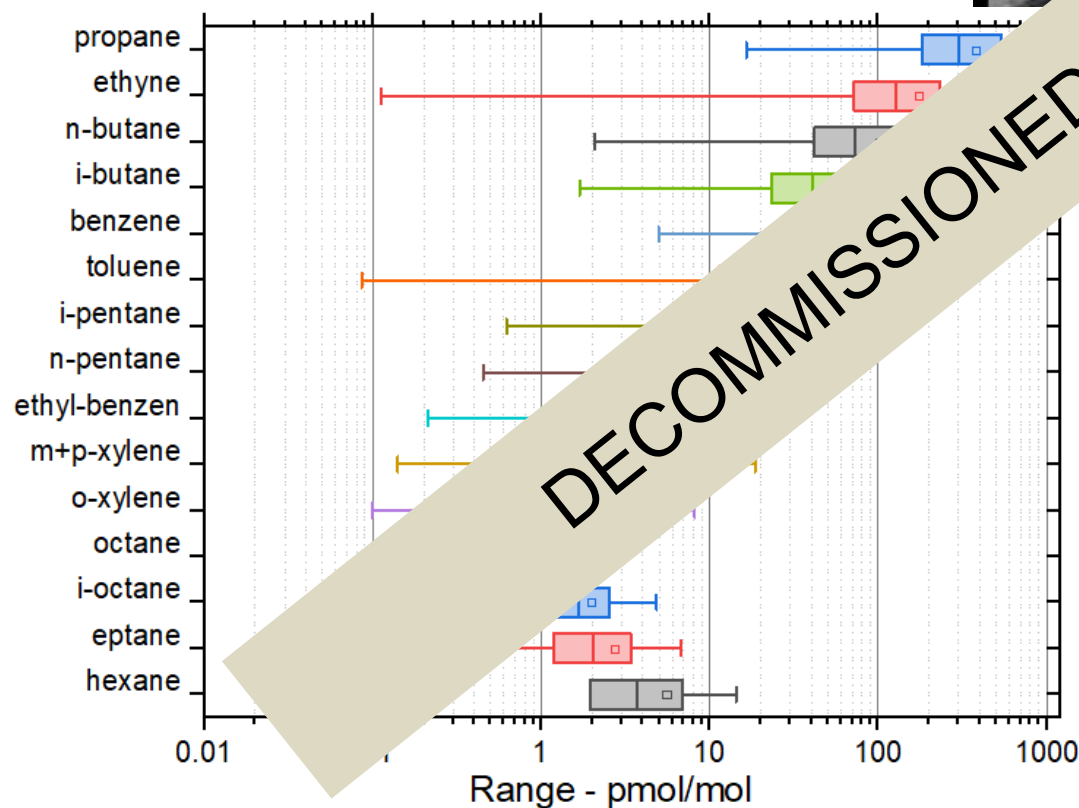


NM-VOCs Instrumental setup

- MARKES UNITY2 Thermal Adsorption/Desorption system (4 stages adsorbing trap, -30°C)
- NAFION drier used
- Analysis by GCMS Agilent 6820/5975C, separation on GC GasPro capillary column
- Calibration against whole air working std, regularly calibrated on NPL-UK O₃ primary standard; **typical**

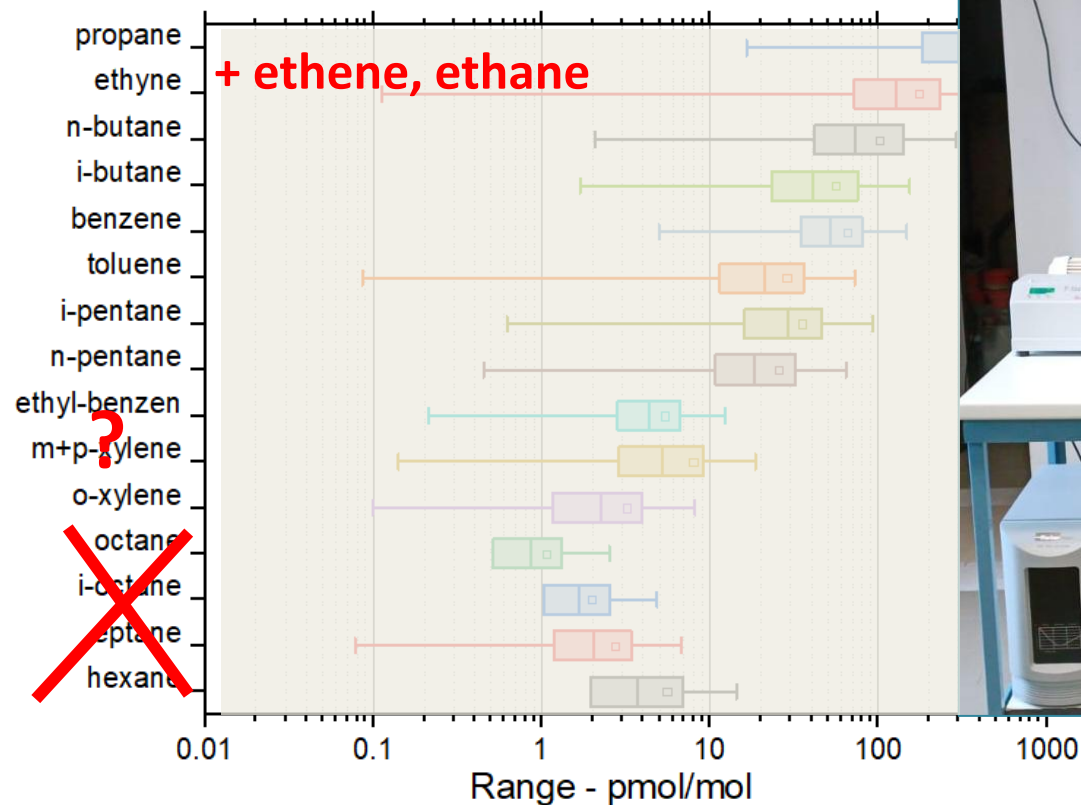
DL < 1ppt, precision < 3%, TU 10÷15 %

- Measurements available since 2010; samples acquired every second day along with working standard runs (12 actual samples per day)

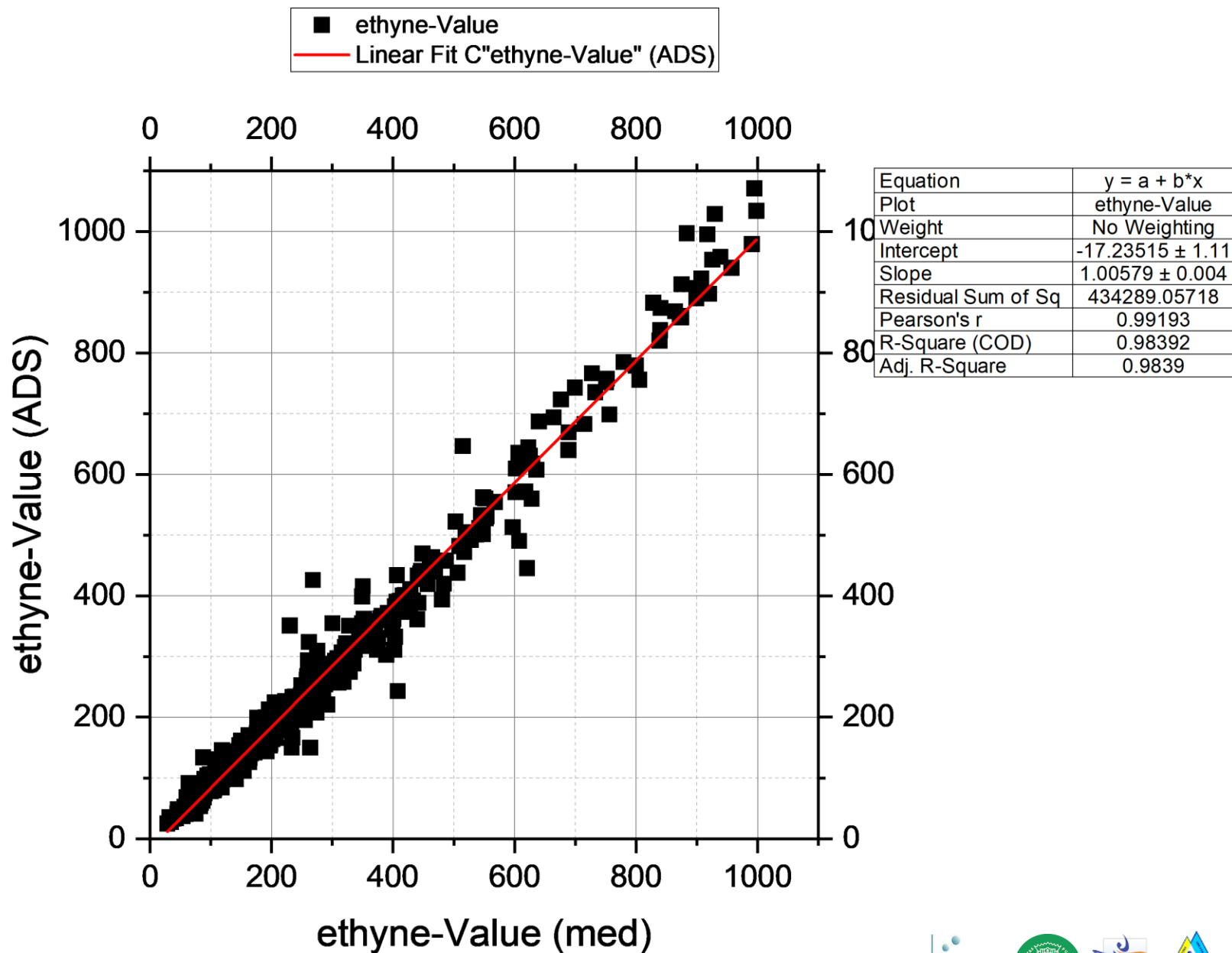


NM-VOCs Instrumental setup

- MEDUSA – AGAGE preconcentration system (single stage adsorbing trap, -160°C)
- NAFION drier used
- Analysis by GCMS Agilent 7890/5977B, separation on multiple capillary columns, SIM detection
- Calibration against whole air working std, regularly calibrated on NPL-UK O₃ precursor mixture ;
- **DL typical < 0.1 ppt, precision < 3% , TU 10÷15 % (still under evaluation)**
- Measurements available since **Oct 2022**; 1 samples acquired per hour, bracketing with working standard every 2 sample runs (14 actual samples per day)



NM-VOCs: ADS vs MED (2023)

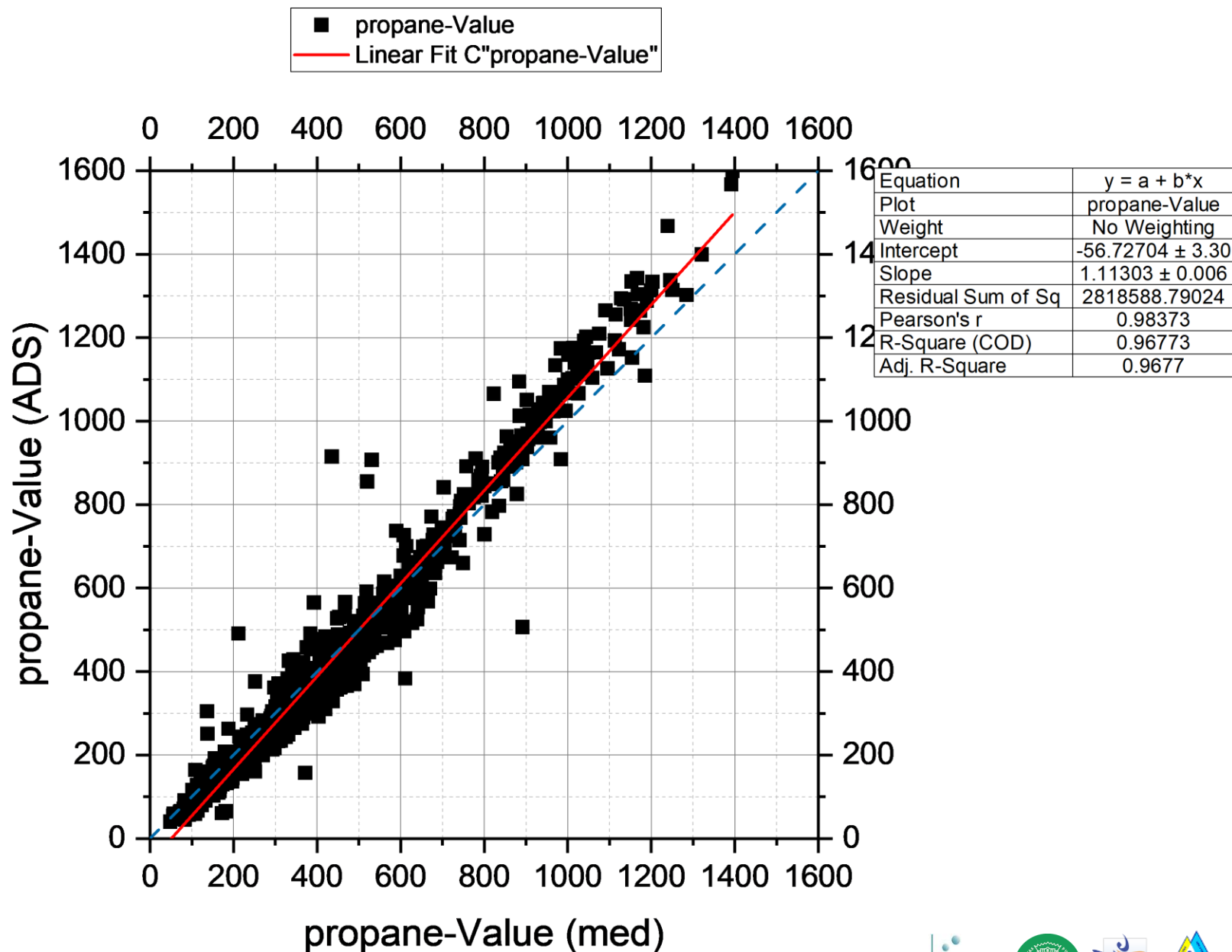


ethyne-Value (med)

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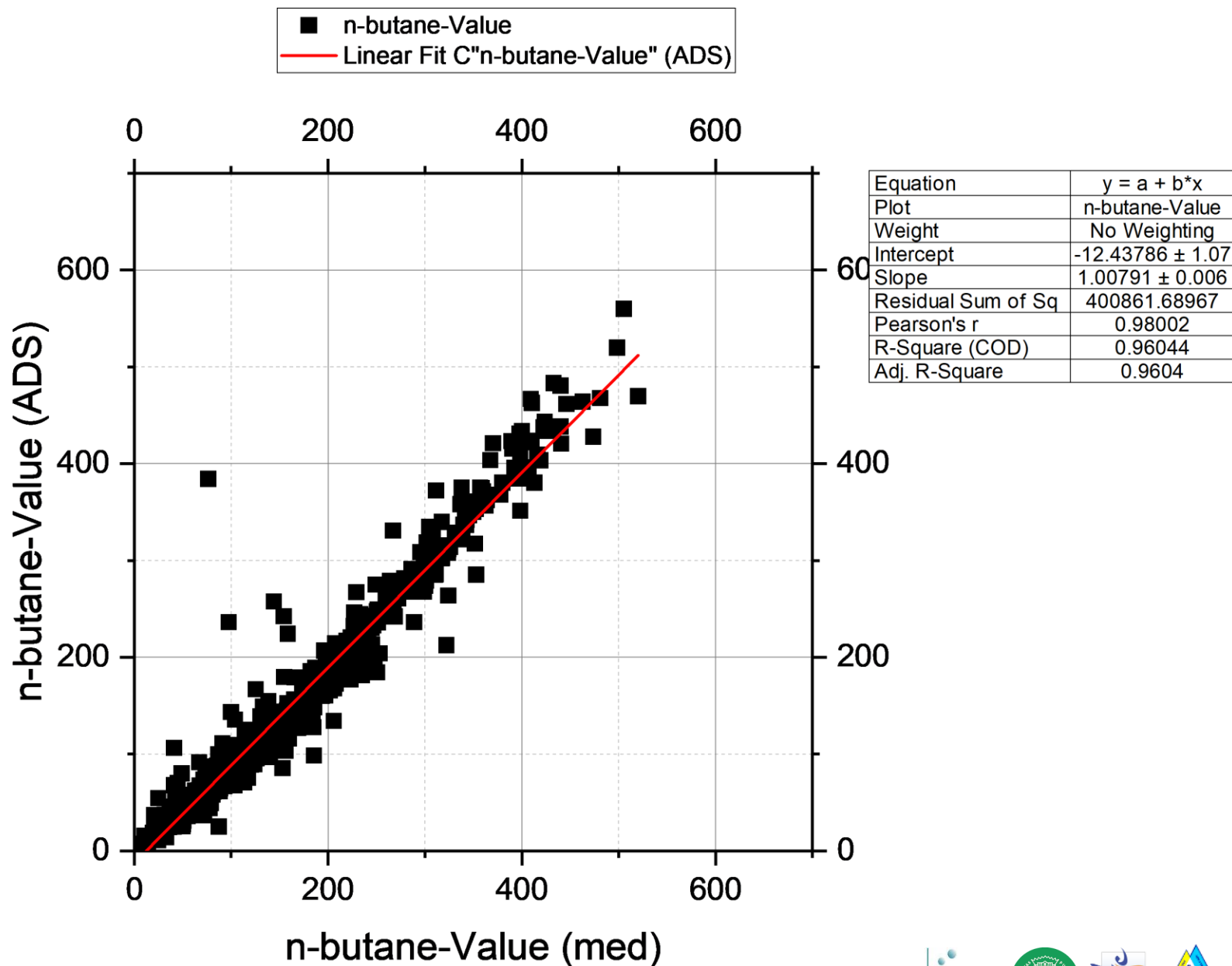
NM-VOCs: ADS vs MED (2023)



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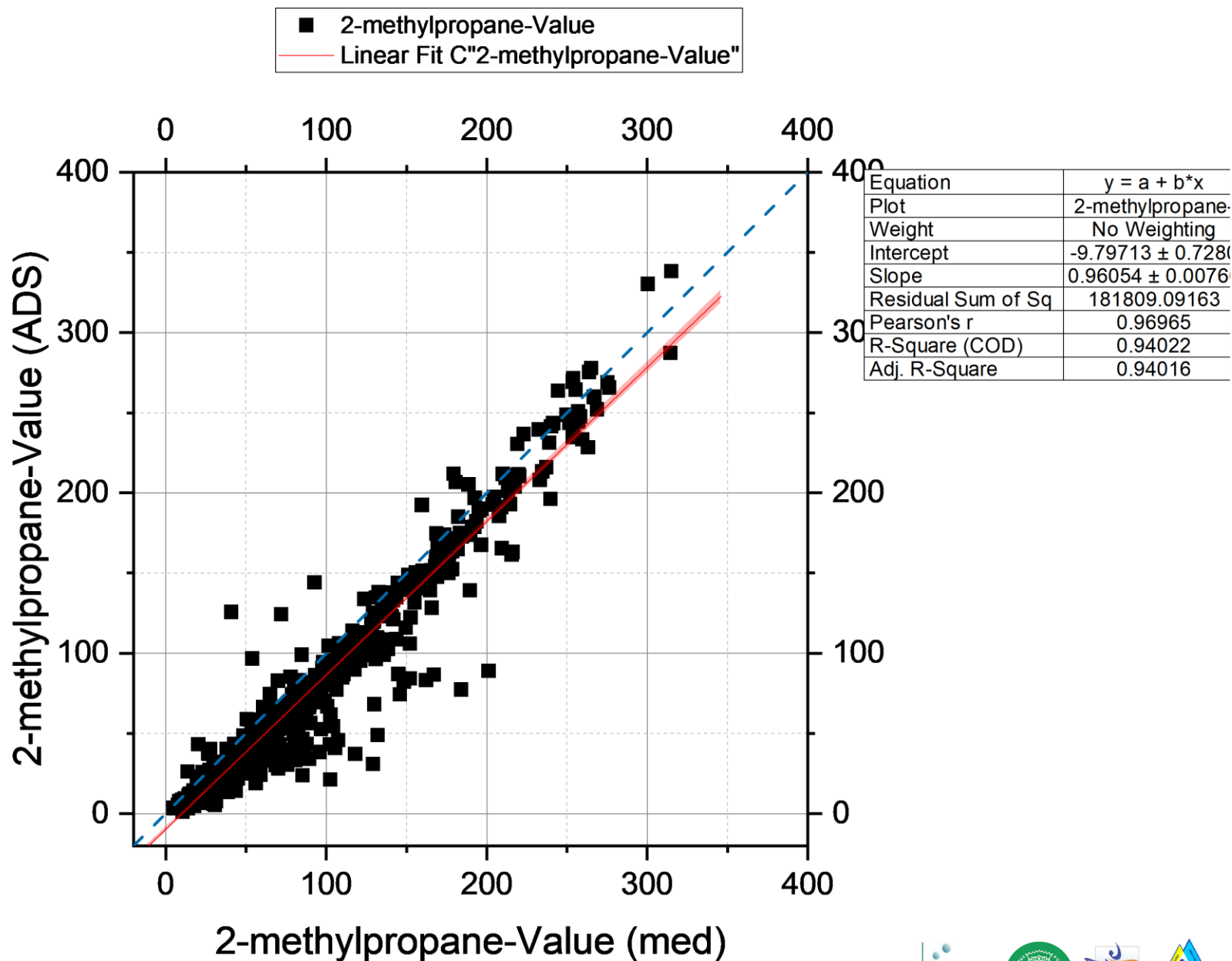
NM-VOCs: ADS vs MED (2023)



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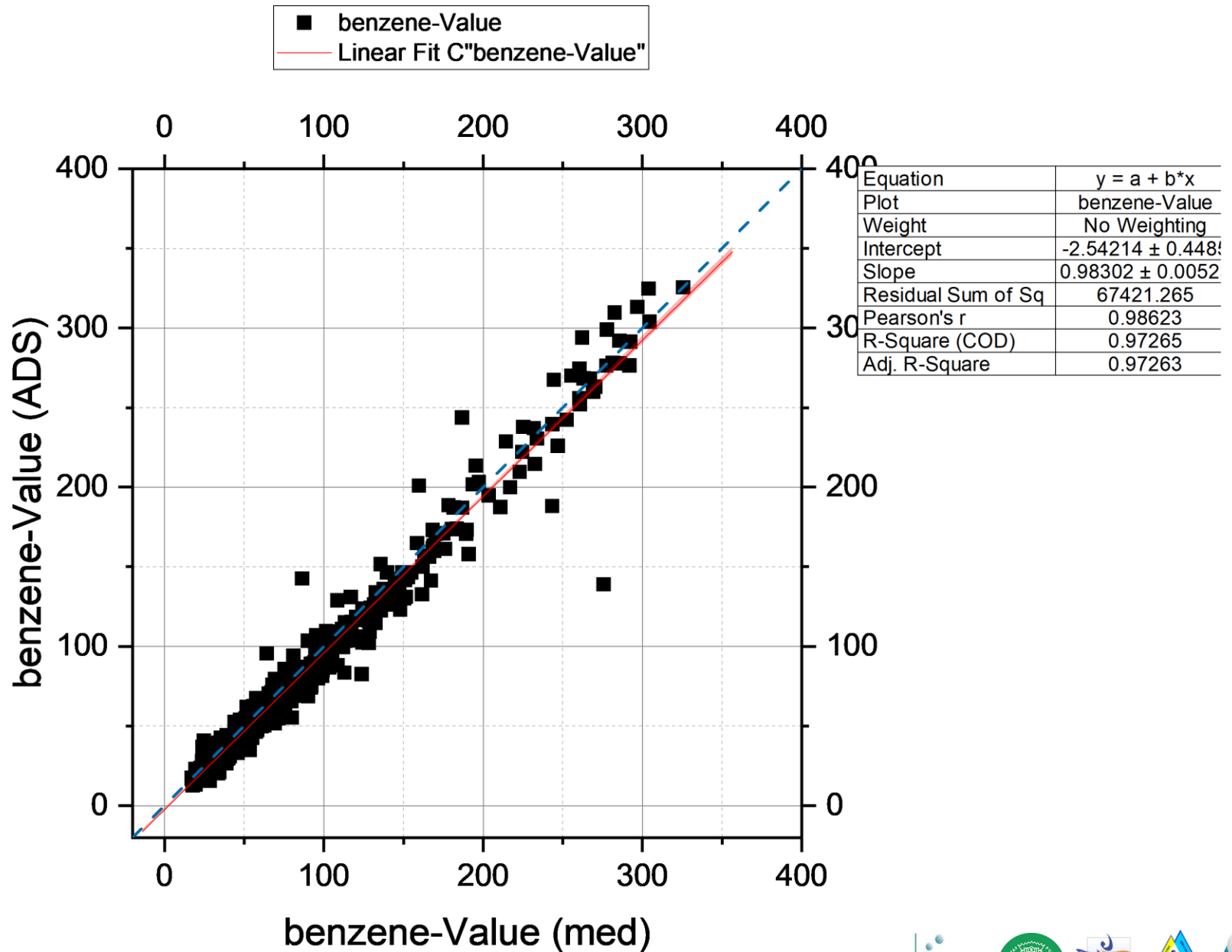
NM-VOCs: ADS vs MED (2023)



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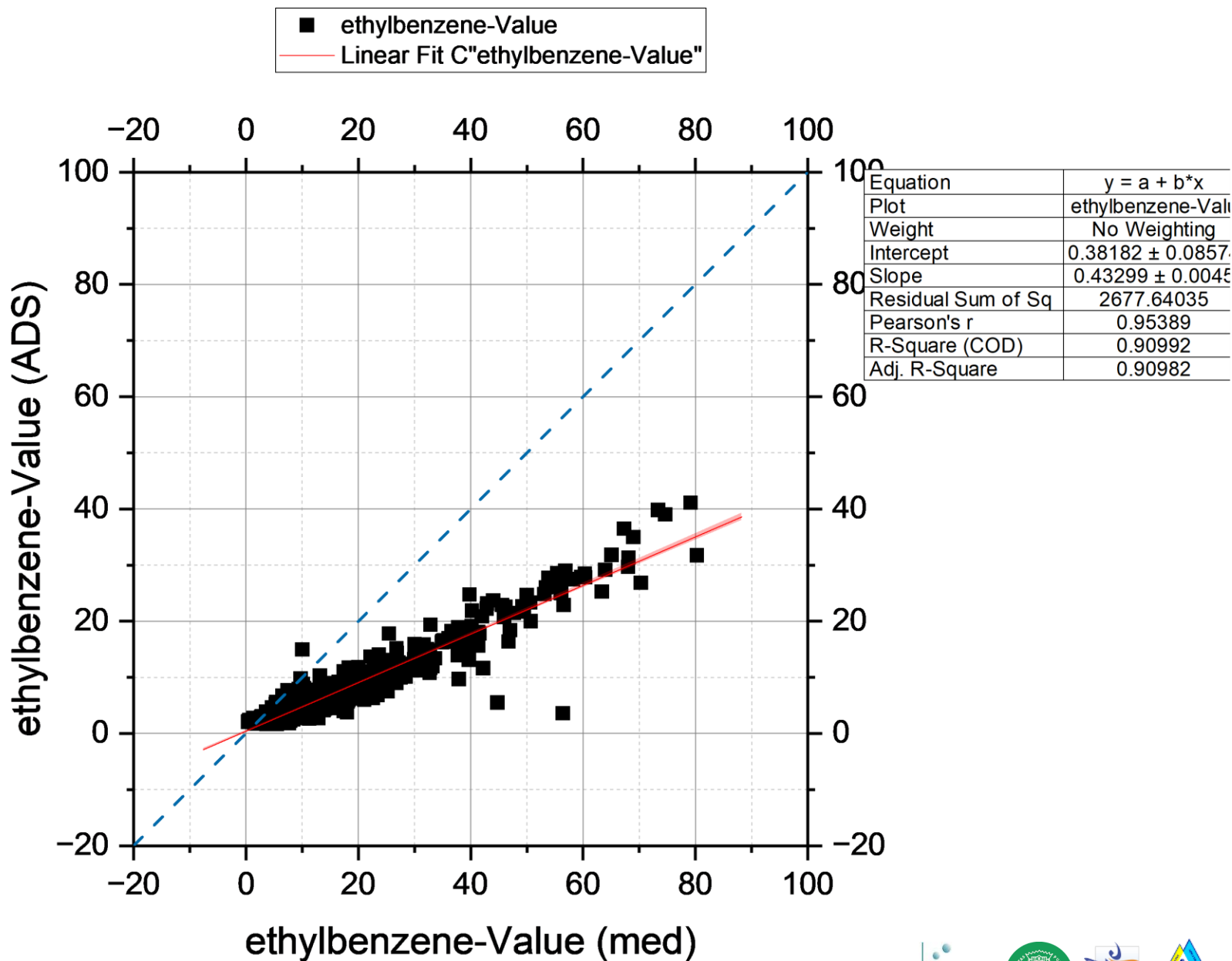
NM-VOCs: ADSvsMED (2023)



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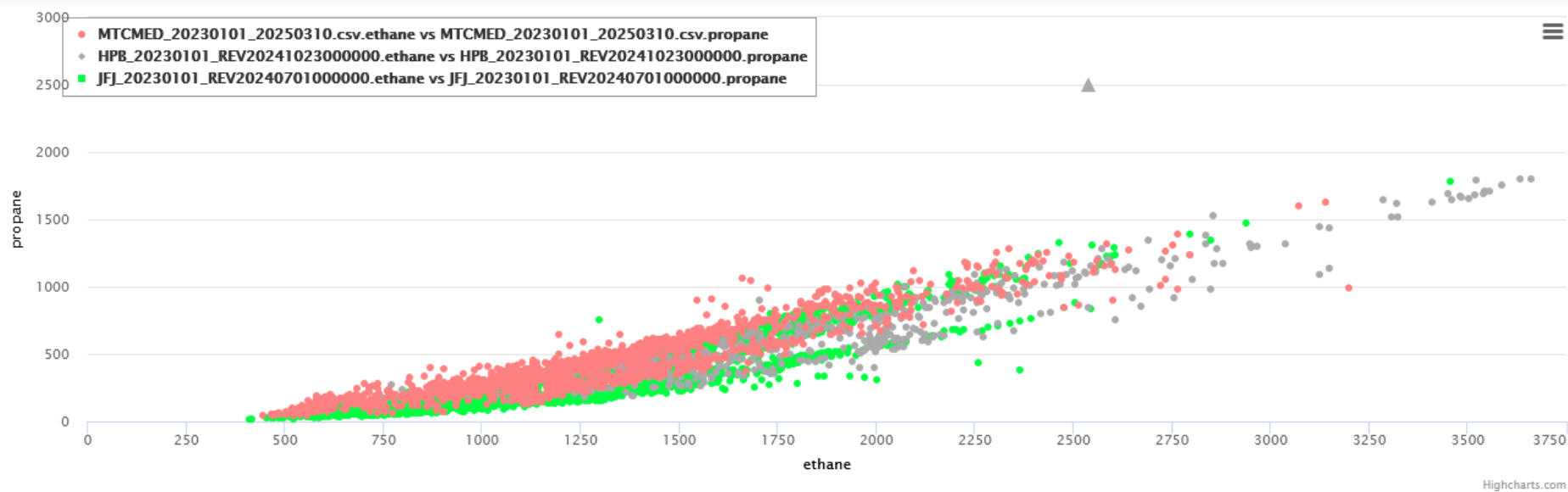
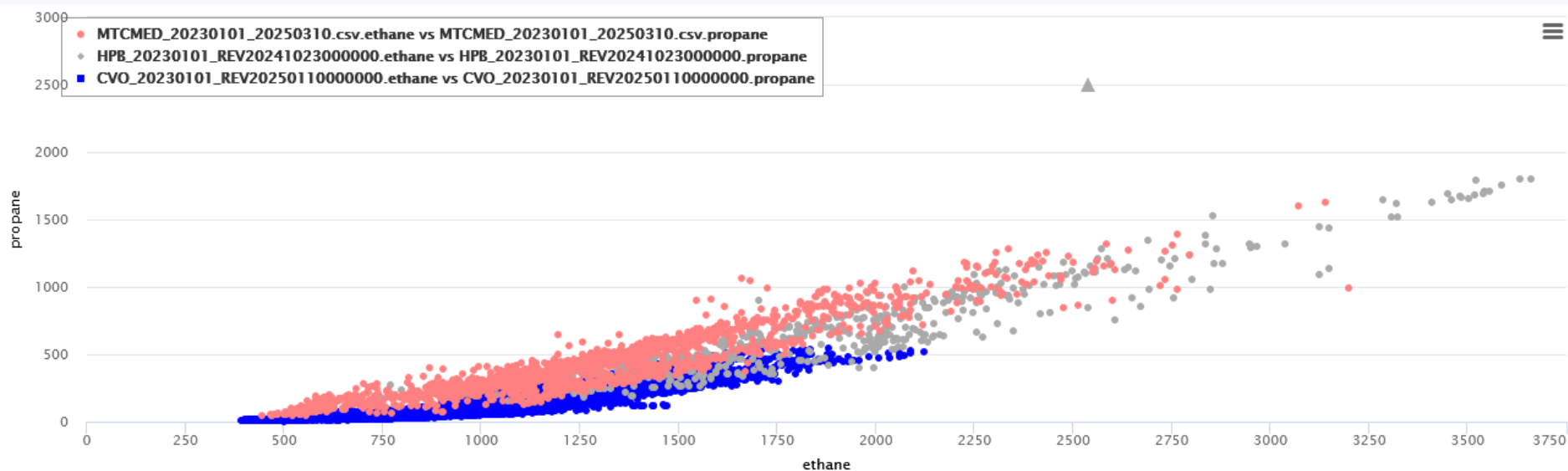
NM-VOCs: ADSvsMED (2023)



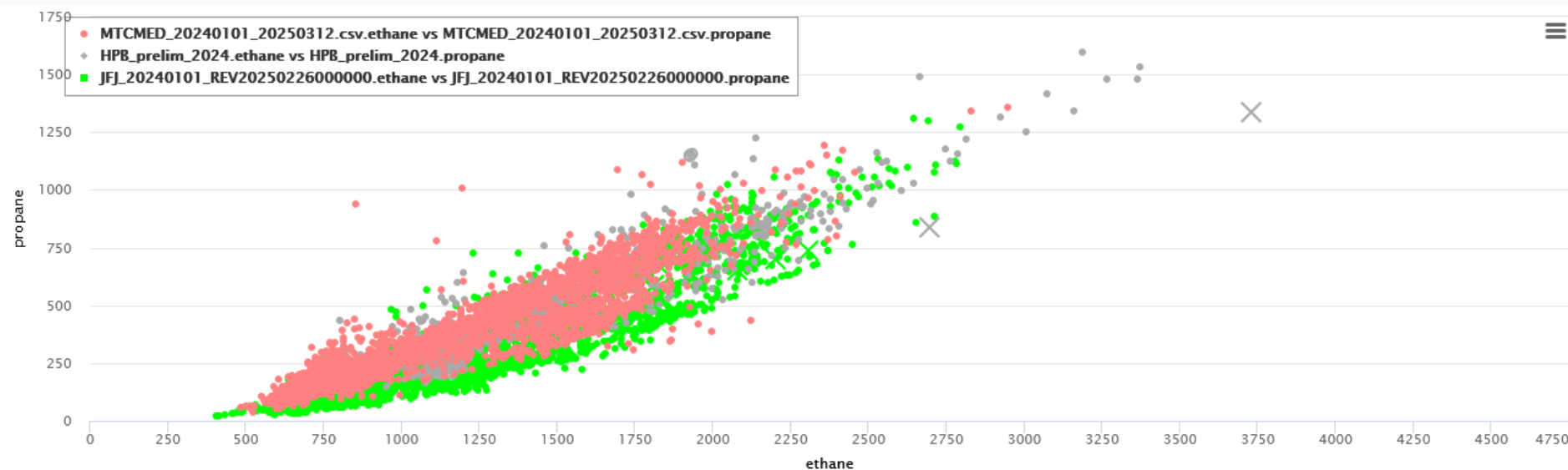
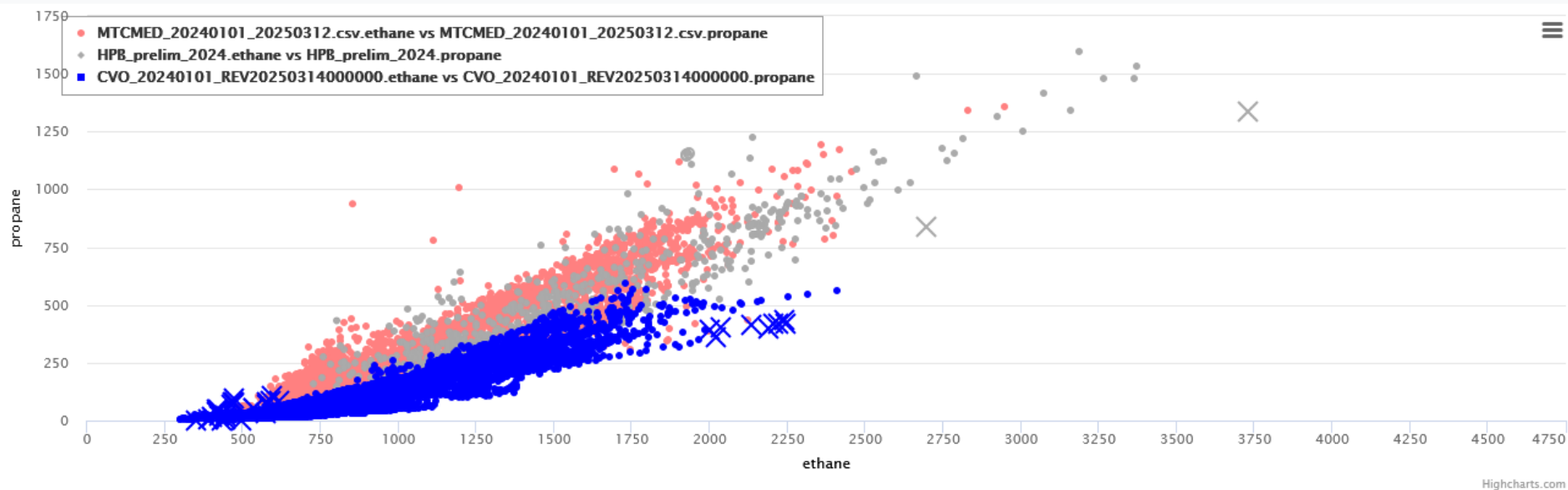
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NM-VOCs: new compound MED (2023)



NM-VOCs: new compound MED (2024)



NM-VOCs: new compound MED (2023&2024)

