

Review of ESSD-2025-628 « iDust-ut: A Global Wind Erosion Threshold Dataset for Enhanced Dust Forecasting »

This article presents a novel methodology to compute a key input of desert dust emission parameterizations : the threshold velocity (u_t), which drives the occurrence and intensity of dust emissions, alongside simulated wind speed and gusts. The dataset is made public and will certainly be of interest to the whole air quality and climate modelling communities. The methodology is clearly explained and appears robust, especially the derivation of threshold velocity from present weather codes, the integration with the remote sensing derived threshold velocity from remote sensing (Pu et al 2020), and the adaptation to simulated wind speed. I recommend publication of this outstanding article after a few minor comments are addressed.

Specific comments:

Line 15: while a poor parameterization of U_t is certainly a factor, I am not sure it is the main one – many other sources of error exist : wind speed/gusts, resolution, inputs (soil type, etc), etc...The claim that U_t is the main factor to explain errors in simulated dust specifics should be substantiated (I completely agree that it is an important factor though).

Line 36: for impact of dust on plane engines, see also <https://nhess.copernicus.org/articles/24/2263/2024/>

Line 105 and following : how many ISD stations were used? The location of the station is not very clear in Figure A1.

Section 4: while this comparison to independent U_t observations is very welcome, I would remove the correlation from the comparison : with a sample of 5, r is not a very robust measure (although the value of iDust-ut is very impressive)

Line 542: The problems encountered by CAMS for PM10 simulations in NW China are known and should be addressed in next operational cycle (51R1)

Section 5.4.2 : the wavelength (550nm I presume) should be mentioned somewhere

Line 602 : CAMS is optimized on AOD, not DOD : while a significant underestimation is noted for DOD, this is not the case for simulated AOD, including over desert areas.