

Part I: 9-year-long mean of specific humidity climatology with  $2\sigma$  uncertainty,  $\text{g kg}^{-1}$ 

Data records	JPL	UCAR	ERA-Interim	MERRA	AIRS
400 hPa	$0.99 \pm 0.12$	$0.92 \pm 0.10$	$0.94 \pm 0.12$	$0.91 \pm 0.10$	$0.81 \pm 0.08$
500 hPa	$2.18 \pm 0.26$	$2.01 \pm 0.22$	$2.04 \pm 0.22$	$2.08 \pm 0.26$	$1.88 \pm 0.20$
600 hPa	$3.88 \pm 0.44$	$3.51 \pm 0.30$	$3.62 \pm 0.30$	$4.03 \pm 0.44$	$3.55 \pm 0.32$
700 hPa	$5.95 \pm 0.60$	$5.64 \pm 0.52$	$5.74 \pm 0.46$	$5.99 \pm 0.46$	$5.64 \pm 0.44$

Part II: 9-year-long mean of specific humidity deviations from JPL RO,  $\text{g kg}^{-1}$ 

400 hPa	NA	-0.08	-0.06	-0.08	-0.19
500 hPa	n/a	-0.17	-0.14	-0.10	-0.31
600 hPa	n/a	-0.37	-0.27	+0.15	-0.33
700 hPa	n/a	-0.31	-0.22	+0.04	-0.32

Part III: linear regression of specific humidity anomalies with  $2\sigma$  uncertainty,  $\text{g kg}^{-1} \text{ month}^{-1}$ 

400 hPa	$(1.0 \pm 3.0) \times 10^{-4}$	$(3.7 \pm 2.2) \times 10^{-4}$	$(2.4 \pm 2.2) \times 10^{-4}$	$(0.1 \pm 2.1) \times 10^{-4}$	$(0.3 \pm 2.0) \times 10^{-4}$
500 hPa	$(2.3 \pm 6.0) \times 10^{-4}$	$(9.6 \pm 4.4) \times 10^{-4}$	$(6.2 \pm 4.6) \times 10^{-4}$	$(3.3 \pm 5.4) \times 10^{-4}$	$(2.1 \pm 4.2) \times 10^{-4}$
600 hPa	$(-1.8 \pm 10) \times 10^{-4}$	$(15.1 \pm 6.6) \times 10^{-4}$	$(6.3 \pm 6.8) \times 10^{-4}$	$(8.4 \pm 8.0) \times 10^{-4}$	$(6.3 \pm 5.4) \times 10^{-4}$
700 hPa	$(6.1 \pm 12) \times 10^{-4}$	$(17.2 \pm 9.0) \times 10^{-4}$	$(14.1 \pm 8.8) \times 10^{-4}$	$(1.3 \pm 7.2) \times 10^{-4}$	$(12.9 \pm 7.2) \times 10^{-4}$