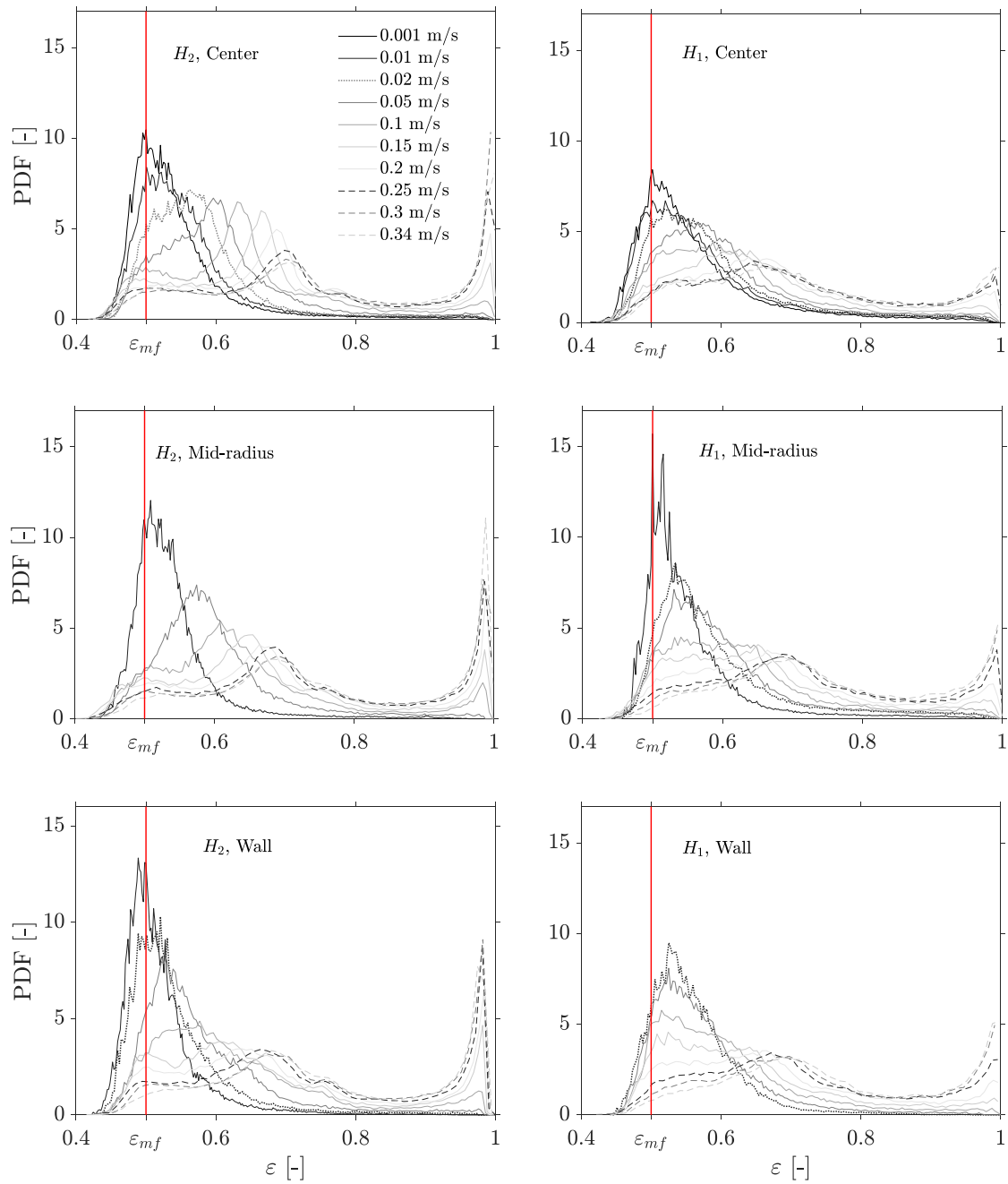
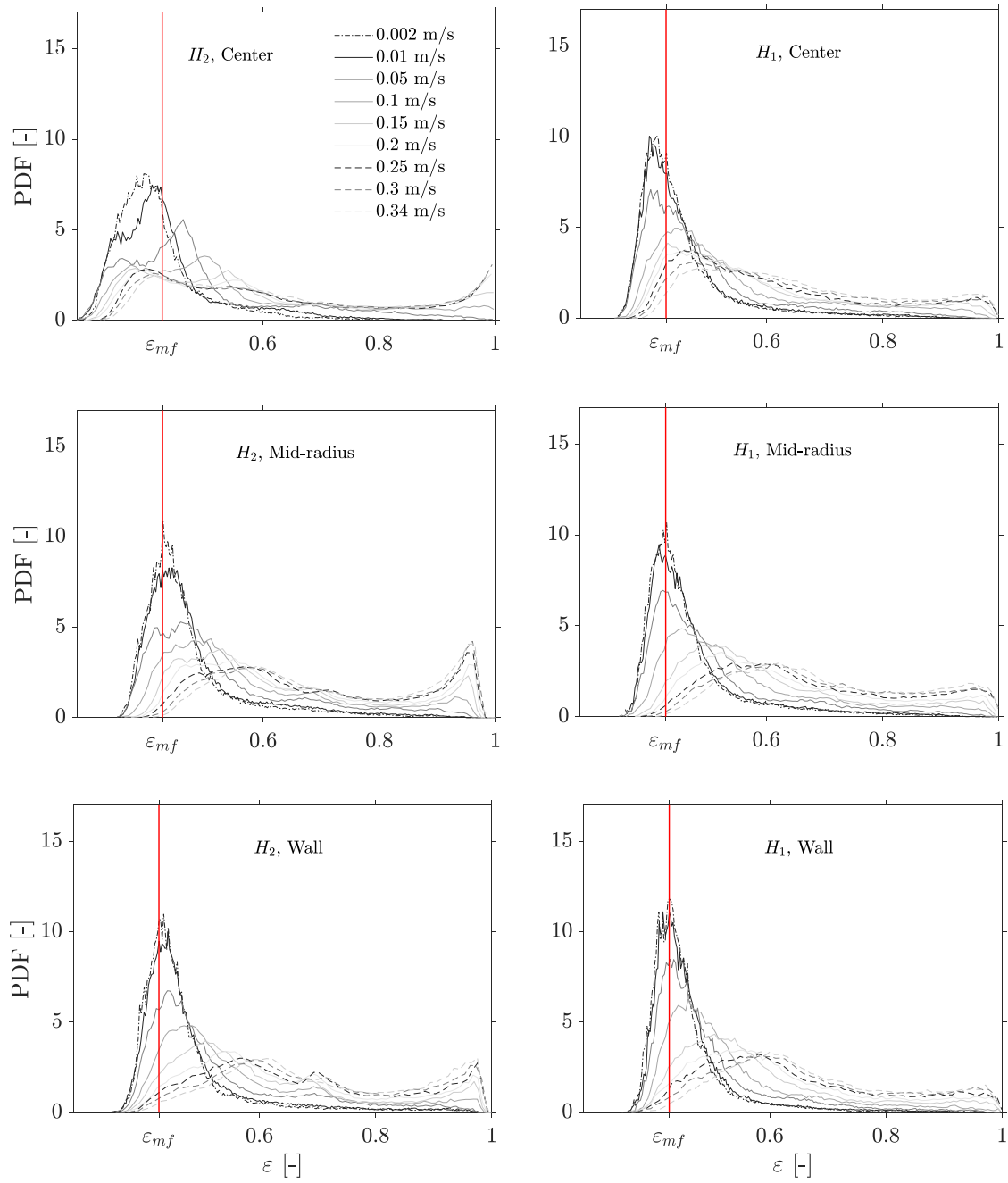


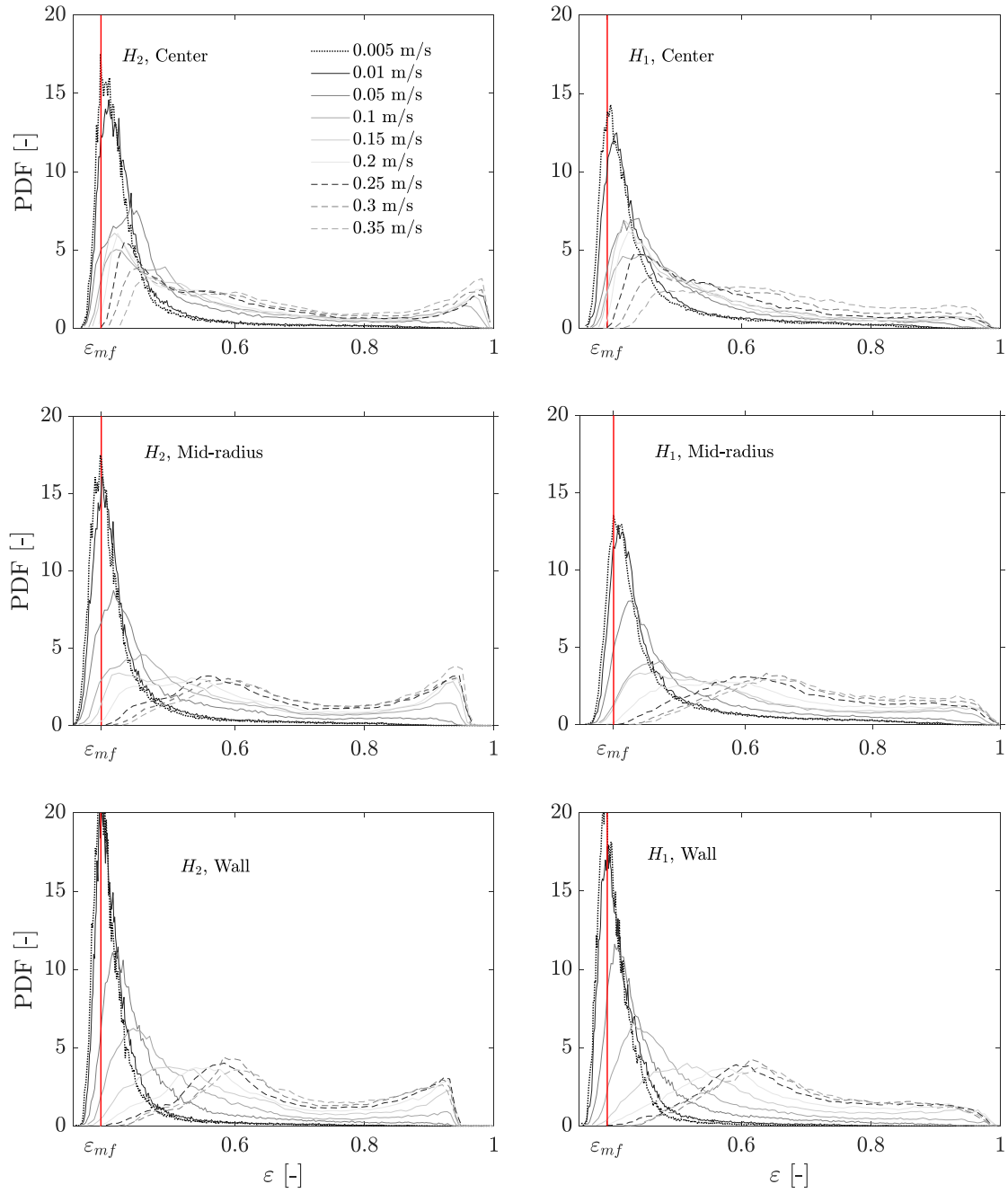
## Supplementary material



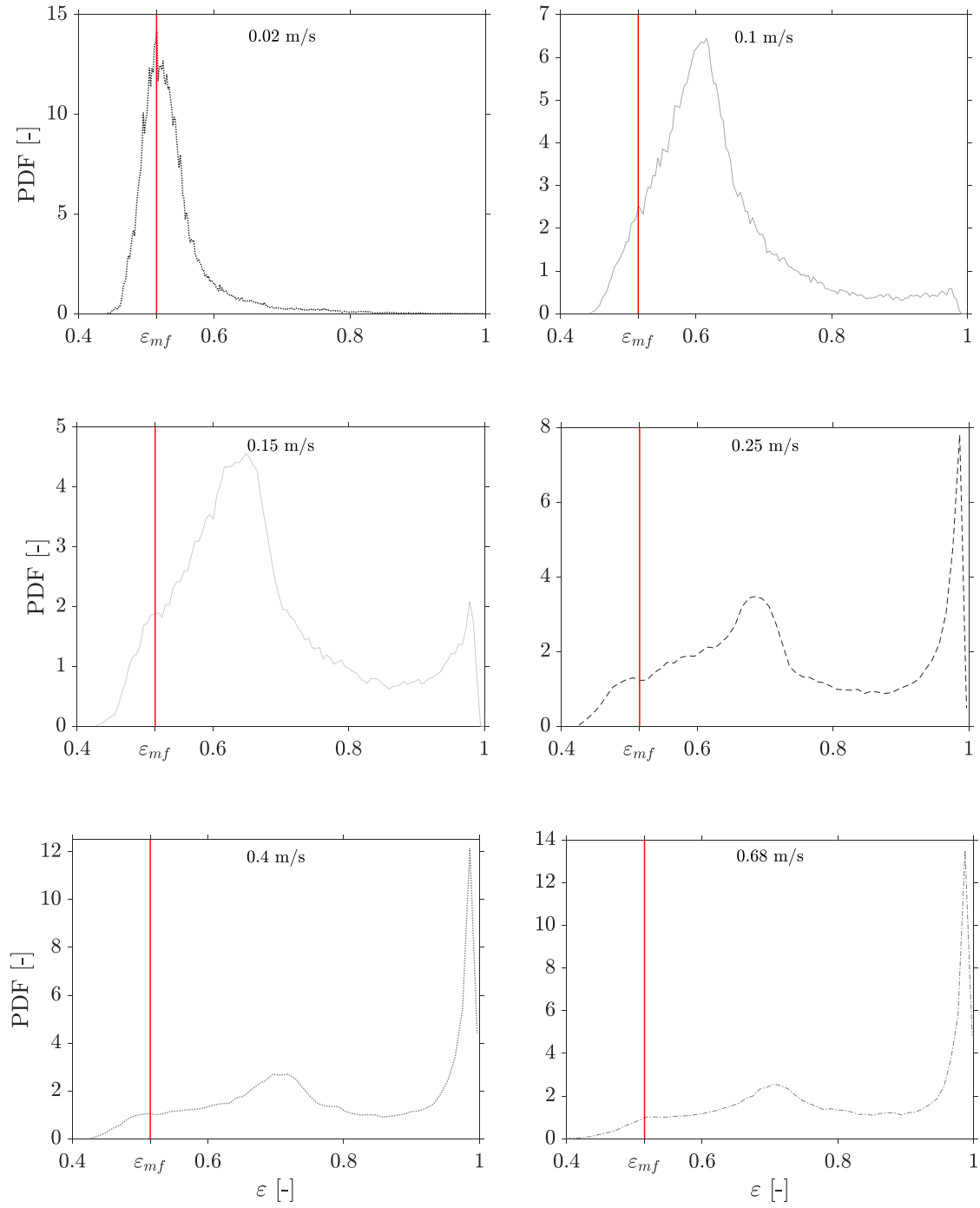
**Figure S.1.** Probability density functions of the local voidage of SiC fluidized bed at ambient temperature for different excess gas superficial velocities and probe locations.



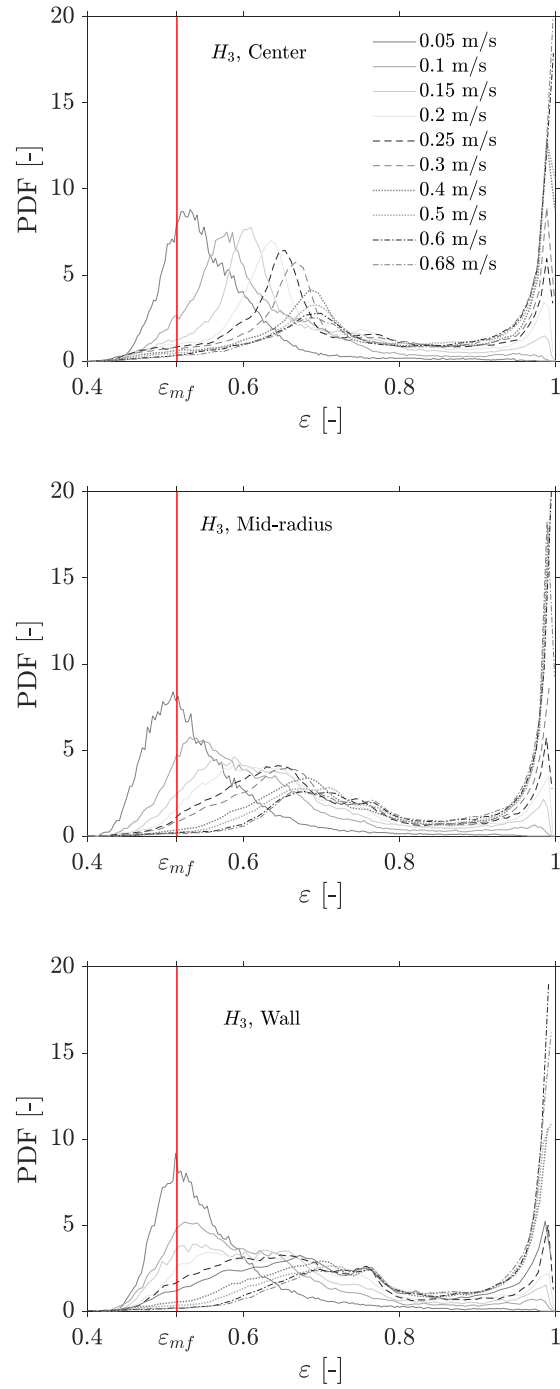
**Figure S.2.** Probability density functions of the local voidage of  $\gamma$ -alumina-1 fluidized bed at ambient temperature for different excess gas superficial velocities and probe locations.



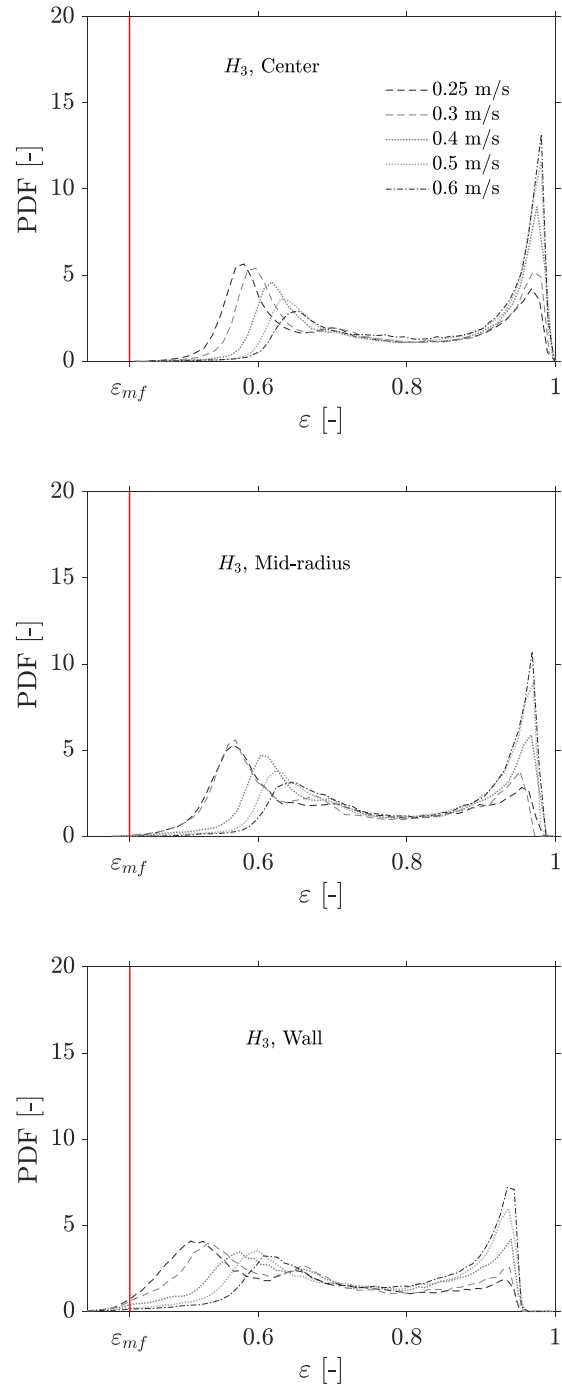
**Figure S.3.** Probability density functions of the local voidage of  $\gamma$ -alumina–0.6 fluidized bed at ambient temperature for different excess gas superficial velocities and probe locations.



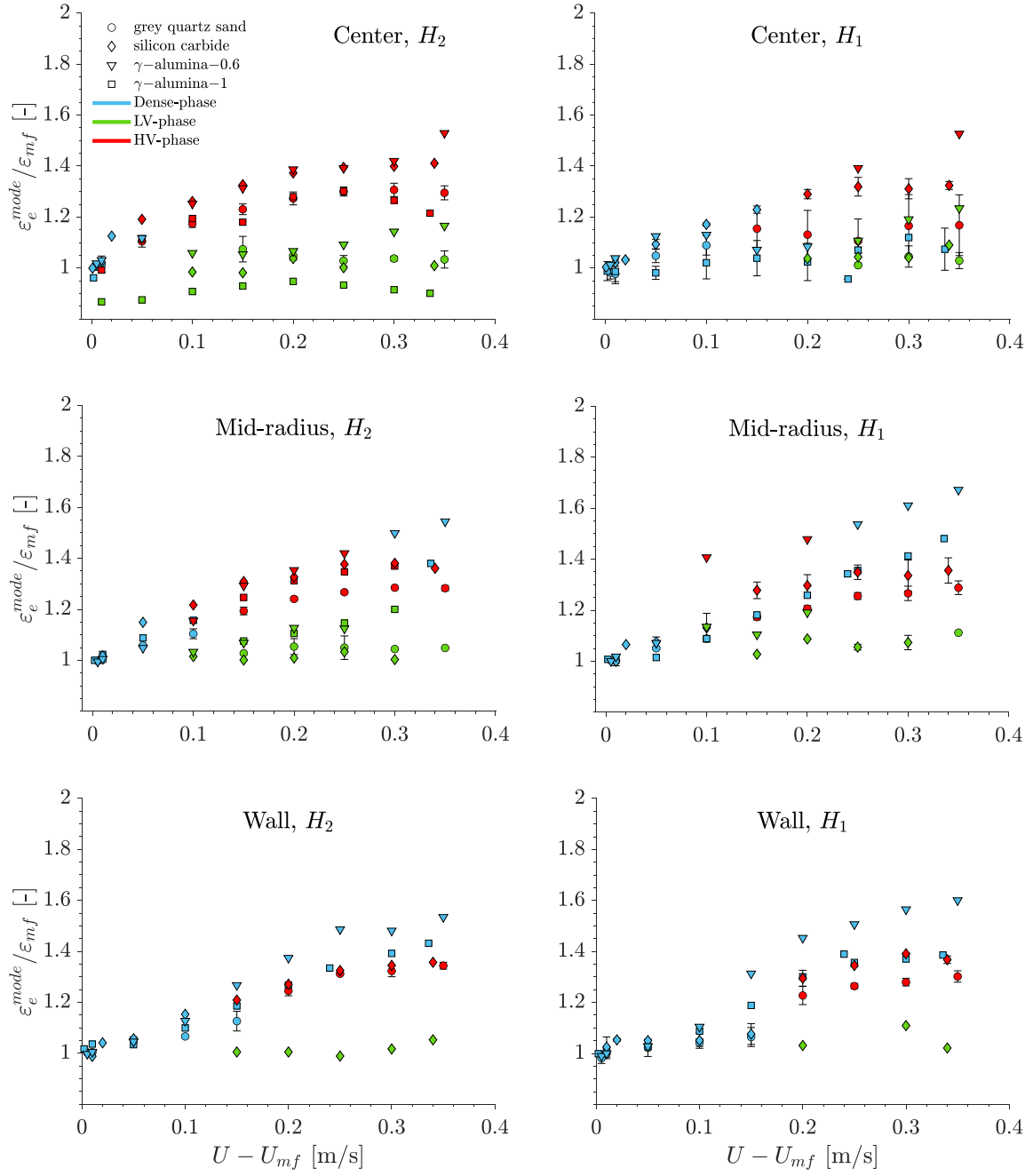
**Figure S.4.** Probability density functions of the local voidage of SiC fluidized bed at 500 °C for different excess gas superficial velocities. Probe location: Center,  $H_2$ .



**Figure S.5.** Probability density functions of the local voidage of SiC fluidized bed at 500 °C for different excess gas superficial velocities and probe radial locations at the axial coordinate  $H_3$ .



**Figure S.6.** Probability density functions of the local voidage of  $\gamma$ -alumina-1 fluidized bed at 500 °C for different excess gas superficial velocities and probe radial locations at the axial coordinate  $H_3$ .



**Figure S.7.** Normalized mode values of the PDFs of the emulsion-phase voidage for the four material samples, at ambient temperature, as a function of  $U - U_{mf}$ .