Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Direct numerical simulation of bubble-induced turbulence at high Reynolds number ALICE JACCOD, Sorbonne Universite, ALESSIO INNOCENTI, Istituto Nazionale di Geofisica e Vulcanologia, STEPHANE POPINET, SERGIO CHIBBARO, Sorbonne Universite — Among the various kind of multiphase flows, bubbly flows represent a challenging and key field of investigation for their particular dynamics and their applications in several fields. Important experiments have been carried out in the last decades but a precise understanding of bubble-induced turbulence is still lacking. In the present work, a study of this phenomenon is presented, by performing fully resolved two and three dimensional numerical simulations of bubbles, rising up under the effect of buoyancy. Bubbles, initially placed at rest at the bottom of a channel, experience a large transfer rate with the liquid, resulting in an agitated turbulent motion, called pseudo-turbulence. Varying the physical parameters of the problem as the bubble volume fraction and increasing the Reynolds number, it's possible to outline a large phenomenology of the dispersed phase flows.
An investigation of energy spectra and velocity fluctuations probability density function has been done, for both two and three dimensional cases. Moreover, we performed a scale-by-scale analysis of energy transfer, to highlight the spatial range within which a direct or inverse energy cascade is present.

Alice Jaccod
Sorbonne Université

Date submitted: 19 Jul 2019 Electronic form version 1.4