Exascale Turbulence Simulations: From Fundamental Flows to Flight Scale Aerodynamics[1] KENNETH JANSEN, RICCARDO BALIN, JOHN EVANS, University of Colorado Boulder, PHILIPPE SPALART, The Boeing Corporation — This talk will provide an update on two Argonne Early Science Program (ESP) projects. The first is a Simulation ESP where prior delayed detached eddy simulations of flow control on a vertical tail at a chord Reynolds number of 325k were validated against experiments are being extending to flight scale (53 times higher Reynolds number). The second is Data and Learning ESP focused on: 1) data compression, 2) turbulence modeling improvement from machine learning, 3) uncertainty quantification and multi-fidelity modeling, and 4) in situ data analytics. Progress made towards these ambitious goals will be shared as well as future plans and needed developments.

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