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The lifetime and evolution of vortical structures in the turbulent boundary layer JEFFREY LEHEW, California Institute of Technology, MICHELE GUALA, St. Anthony Falls Laboratory and Dep. Civil engineering, UMN, BEVERLEY MCKEON, California Institute of Technology — The evolution and persistence of vortices in wall normal and wall parallel planes of a zero-pressure gradient turbulent boundary layer are investigated using time resolved 2D-2C particle image velocimetry at a moderate Reynolds number ($Re_\tau = 470$). Measurements are performed with a large field of view: $5\delta \times 1.2\delta$ (streamwise x wall normal) in the wall normal plane and both $10\delta \times 5\delta$ and $4.3\delta \times 2.2\delta$ (streamwise x spanwise) in the wall parallel planes. Given that the data provides information in both the streamwise direction and time simultaneously, not only can the vortices be tracked as they convect downstream, but the evolution of the surrounding flow structures can be studied in the reference frame of the vortex. In addition to investigating statistics associated with the lifetime and convection velocity of vortices at various wall normal locations, the effects of spatial and/or temporal filters on the identification and shape of vortices will be investigated and an interpretation of vortices in such a filtered velocity field will be given. Support for this work from the AFOSR under award# FA9550-09-1-0701 is gratefully acknowledged.

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