Climate 2019, 7, 12 13 of 18 iron cycle, in which iron-containing dust is transported from the soil through the atmosphere and then into the ocean, and due to biogeochemistry has the opposite effect on the climate and dust content of the atmosphere. This review summarised the results of observations and studies of DDs. Special attention was paid to the mechanism of their generation. It has been established from observations that one of the main conditions for the occurrence of DDs is the convective instability of the atmosphere associated with the super adiabatic temperature gradient in the near-surface layer. Such an instability occurs as a result of abnormally strong heating of the Earth’s surface by solar radiation. In the boundary layer with a seed large-scale vorticity there is a spiralling movement to the central region with reduced pressure. This causes the concentration of vortex motion to smaller scales. A nonlinear hydrodynamic model of the generation of convective motions and dust vortices in an unstably stratified atmosphere was also discussed. This particular model for generating convective plume cells assumed an axially symmetric flow field and nonlinear equations governing internal gravitational waves. It was shown that in a convectively unstable atmosphere with a large-scale seed vorticity, small-scale intense vertical vortices are formed extremely rapidly from jets. The structure of radial, vertical and toroidal velocity components in such vortices was studied. It was found that these vortices have a low pressure inner region with a strong toroidal motion which can suck up dust from the Earth’s surface. The structure of vertical vorticity and toroidal velocity in the radius-restricted areas of the vortex was also investigated. Further studies of DDs, including numerical modelling, will allow us to study: (a) generation and structure of generated vortices at arbitrary radial distances, (b) the study of the vortex structure without the restriction of axial symmetry, (c) incorporation the effect of charged dust in the dynamics of vortices and dust content of the atmosphere. Such modelling can help in the study and prediction of more powerful tornadoes and hurricanes, as well as verification of the role of DDs and dust storms in the dynamics of dust in the atmosphere. Author Contributions: Conceptualization, O.O.G., O.A.P. and VF; methodology, O.O.G.; software, VF, O.O.G.; validation, O.O.G., VF, O.A.P, WH and GV; formal analysis, O.O.G., O.A.P, VF, WH and GV; investigation, O.O.G., O.A.P, VF, WH and GV; resources, VF; writing-original draft preparation, O.O.G. and O.A.P.; writing-review and editing, O.O.G., O.A.P, VF, WH and GV; visualization, VF; project administration, O.O.G. Funding: We have provided this info in the acknowledgments.

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