Accessibility of operational, high vertical-resolution soundings of the atmosphere has increased substantially during the past decade and a-half, both due to efforts to disseminate high vertical-resolution radiosonde data and also to technological advances that have led to higher vertical resolution in these sounding data. This has motivated investigators to use these data to compute atmospheric turbulence characteristics from sounding data. The methodology to do so has depended on deriving the spatial scale for vertical overturning that is assumed to both reflect the initiation of instabilities leading to turbulence and also the turbulent overturning motions themselves. This overturning scale is referred to as the Thorpe scale, after the investigator who used this methodology to derive turbulence parameters in the ocean using this technique. A crucial step to derive these turbulence parameters is to relate the Thorpe scale to the Ozmidov scale, which is directly related to the turbulent mechanical dissipation rate and the stratification. Papers deriving turbulence parameters from such operational sounding data have assumed a linear relation between the Thorpe scale, L_T, and the Ozmidov scale, L_0. The purpose of the Schneider et al. paper is to use ultra-high resolution (mms) atmospheric sounding data to check on the validity of this assumed linear relation between L_T and L_0.

Over the years, this group has developed the LITOS (Leibniz-Institute Turbulence Observations in the Stratosphere) balloon-borne instrument, which is a large research instrument, and has been flown three times at polar latitudes during autumn. By comparing the turbulence parameters derived from LITOS with a Vaisala RS92 flown on the same gondola, they reach the following conclusions.

1. There is no obvious proportionality between L_T and L_0; however, the derived means of L_T and L_0 give proportionality constant close to what has been used to derive atmospheric turbulence parameters from radiosonde data.
2. Some turbulent layers seen by LITOS are not seen in the radiosonde analysis, and some turbulent layers seen in the radiosonde analysis are not seen by LITOS.
3. The turbulent dissipation in a given layer derived from radiosonde analysis can differ from that seen in the LITOS data by two orders of magnitude.

This paper is very well-written and of high scientific quality, but these results are not surprising to me for the following reasons. One is that atmospheric turbulence has sporadic initiation and then goes through a development and decay life cycle. The assumptions that go into the radiosonde analysis assume a steady turbulence field, while the LITOS instrument flies through layers with turbulence in differing stages of turbulence development and decay. Another is that the nature of the ensuing atmospheric turbulence depends on its initiation mechanism. For instance, a convective instability driven turbulence layer might develop differently from a shear driven turbulence layer. Finally, the Thorpe analysis looks for convective overturning, so if the turbulence is not associated with convective overturning, it will not “see” the turbulence. Conversely, if the turbulence resulting from a convective instability has not yet developed, LITOS will not “see” turbulence. These points are brought up in the Schneider et al. paper.

Perhaps, the most important point brought up in this paper is in its last two sentences, which are the following.

Our results question the applicability of the Thorpe analysis for the extraction of energy dissipation rates for individual turbulent layers. Nevertheless, statements in the statistical mean seem to be possible."

It will be important to better understand what types of atmospheric turbulence statistics can be derived from operational radiosonde data given its availability over large geographical regions and throughout the year for many years. Similar observational analysis as is given in this paper together with detailed modeling should be able to answer this question.