Welcome to Stony Brook!

1. Purposes of the workshop.
2. Self-introductions and what you hope to get out of this workshop.
3. Organization of this workshop.
4. A little history.
5. Anticipated outcomes/products.
6. Some useful information during your stay.

Workshop Goals

- To provide a forum for research using high vertical-resolution radiosonde data

- To explore and encourage new applications of these data

- To explore the possibility of expanding the availability of international high vertical-resolution data for use by the international research community.

Self-introductions and what you hope to get out of this workshop.

Workshop Organization

Day 1

8 oral papers, 4 poster papers, 2 hours of discussion, wine and cheese

Day 2

4 oral papers, 5 poster papers, 3 hours of discussion

Day 3

Summary of previous days, Break-out groups to discuss/develop outputs of this workshop, Conclusions.

Gravity wave activity in the lower atmosphere: Seasonal and latitudinal variations

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Abstract. A climatology of gravity wave activity in the lower atmosphere based on high-resolution radiosonde measurements provided by the Australian Bureau of Meteorology is presented. These data are ideal for investigating gravity wave activity and its variation with position and time. Observations from 18 meteorological stations within Australia and Antarctica, covering a latitude range of 12°S – 68°S and a longitude range of 78°E – 159°E, are discussed. Vertical wavenumber power spectra of normalized temperature fluctuations are calculated within both the troposphere and the lower stratosphere and are compared with the predictions of current gravity wave saturation theories. Estimates of important model parameters such as the total gravity wave energy per unit mass are also presented. The vertical wavenumber power spectra are found to remain approximately invariant with time and geographic location with only one significant exception. Spectral amplitudes observed within the lower stratosphere are found to be consistent with theoretical expectations but the amplitudes observed within the troposphere are consistently larger than expected, often by as much as a factor of about 3. Seasonal variations of stratospheric wave energy per unit mass are identified with maxima occurring during the low-latitude wet season and during the midlatitude winter. These variations do not exceed a factor of about 2. Similar variations are not found in the troposphere where temperature fluctuations are likely to be contaminated by convection and inversions. The largest values of wave energy density are typically found near the tropopause.
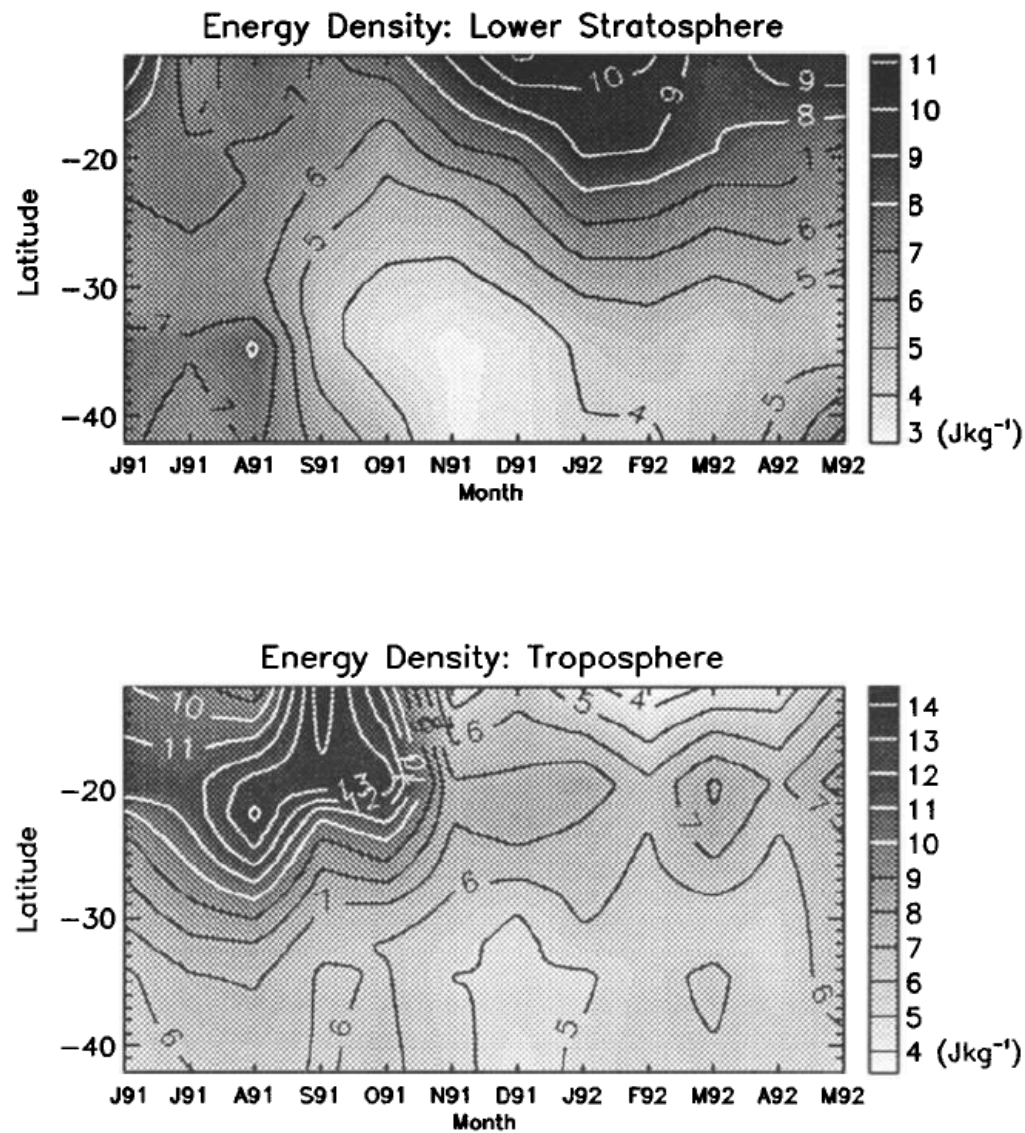
Figure 7. Time-latitude contours of total gravity wave energy density, E_0, for the troposphere and lower stratosphere. The energy density is calculated using (6) where $\overline{T'^2}$ is the normalized temperature variance within the height intervals described in Table 1.

Followed up by Vincent, Allen and Eckermann in "*Gravity wave processes: Their parameterization in global climate models*" (ed. K. Hamilton) Springer-Verlag, 7-25, 1997 (ISBN 3-540-62036-2) and Eos article.

EOS

## High-Resolution Radiosonde Data Offer New Prospects for Research

PAGES 497, 506–407

Kevin Hamilton and Robert A. Vincent

Determination of Gravity Wave Characteristics

High-resolution radiosonde observations can be exploited to study gravity waves. *Allen and Vincent* [1995] used high-resolution radiosonde temperature data from 18 stations in the ABM network to investigate gravity wave activity in the troposphere and lower stratosphere. They considered the effects of sensor lag on the temperature soundings and

Radiosonde Station Network
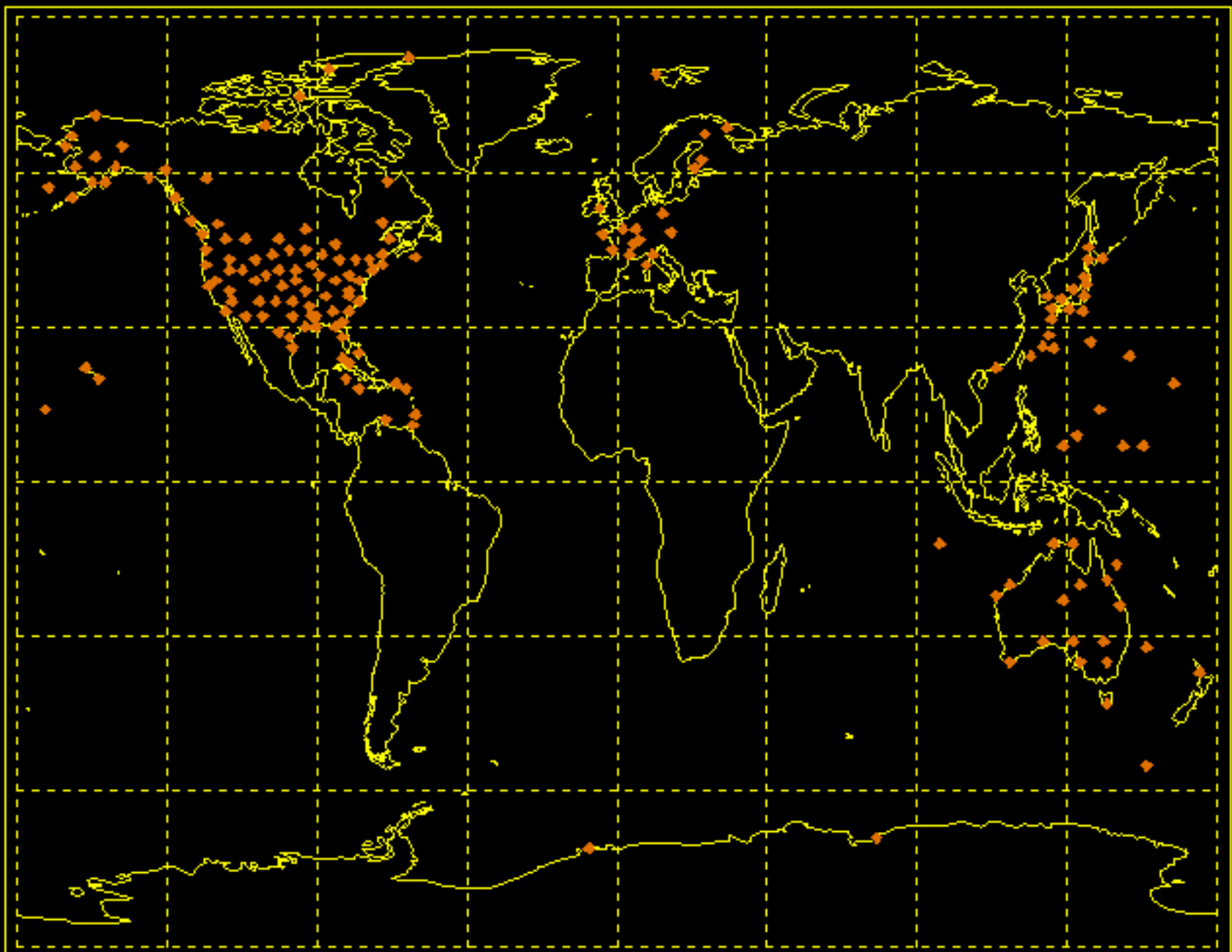
US Radiosonde Data
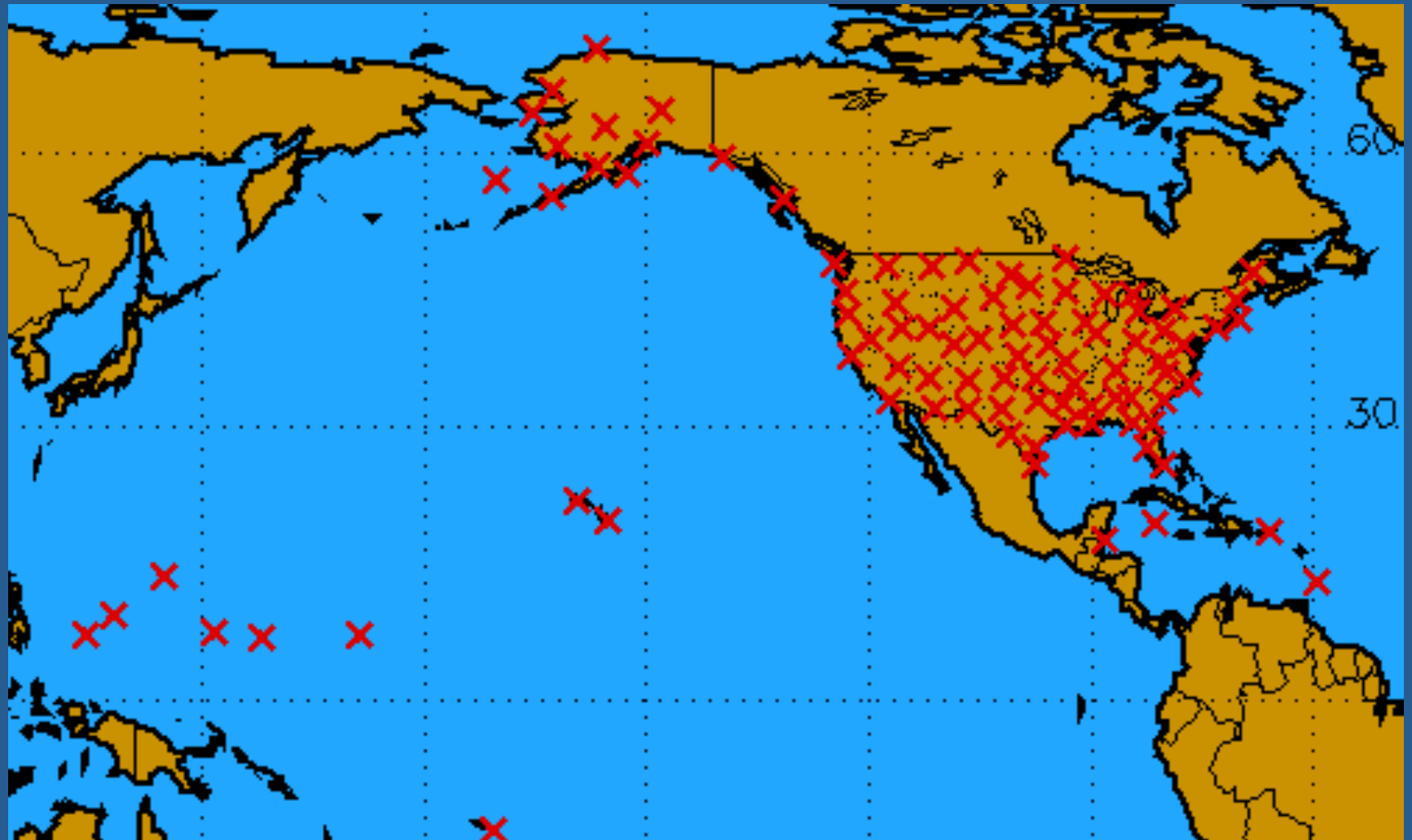
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Research Using High (and Higher) Resolution Radiosonde Data

and studies of the effects of geomagnetic storms on the lower atmosphere. A list of references covering some of the studies published in these fields that have used the data available at the SPARC Data Center is pro-

—PETER T. LOVE and MARVIN A. GELLER, School of Marine and Atmospheric Sciences, Stony Brook University, Stony Brook, New York; E-mail: peter.love@stonybrook.edu
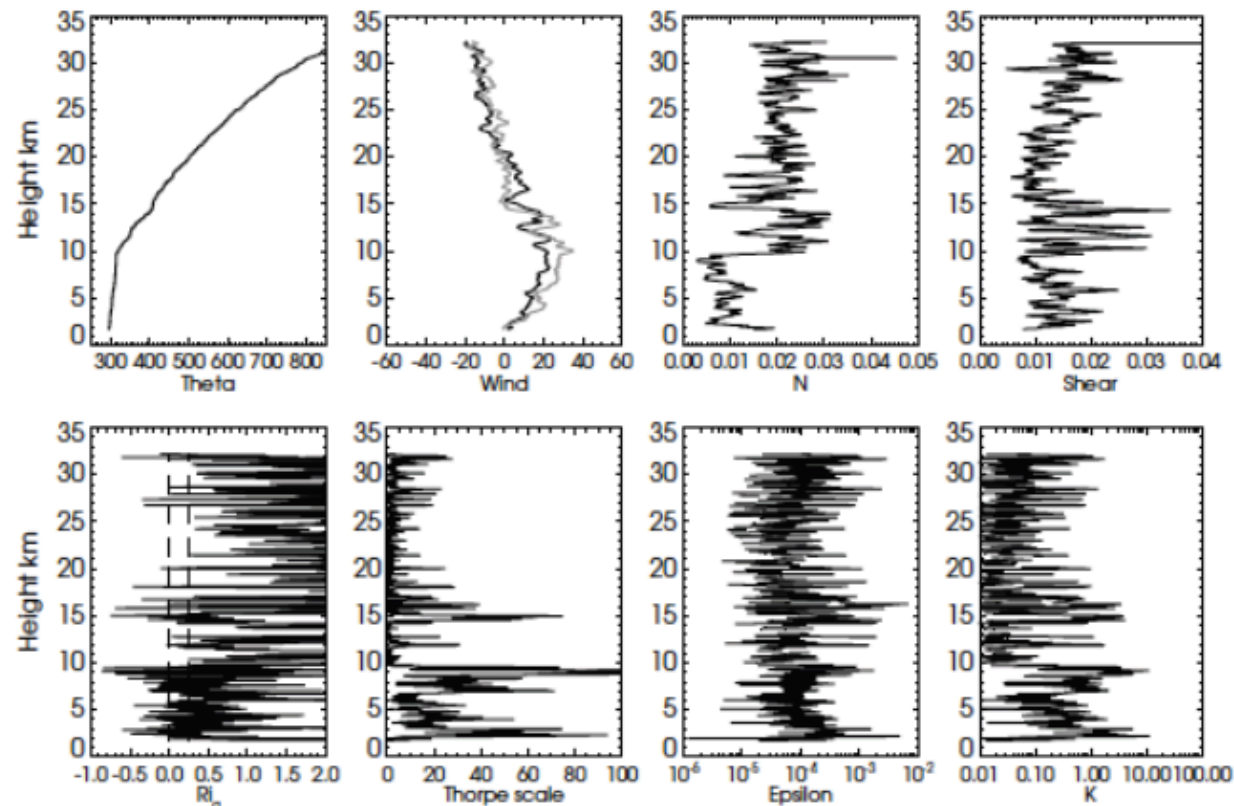
1-Second Data

Figure 1: Turbulence parameters derived from 1-second resolution sounding made at Riverton, WY on 2 Feb 2007. (a) potential temperature (in ^{0}K), (b) zonal (black) and meridional (grey) wind (in m s^{-1}), (c) buoyancy frequency (in s^{-1}), (d) mean shear (in s^{-1}) , (e) gradient Richardson number, (f) Thorpe scale (in m), (e) TKE dissipation rate (in J s^{-1}) and (f) K, the eddy diffusivity (in m^2 s^{-1}). Note that N was calculated from the sorted potential temperature profile while Ri_g was calculated using the unsorted profile, hence the regions of $Ri_g < 0$.
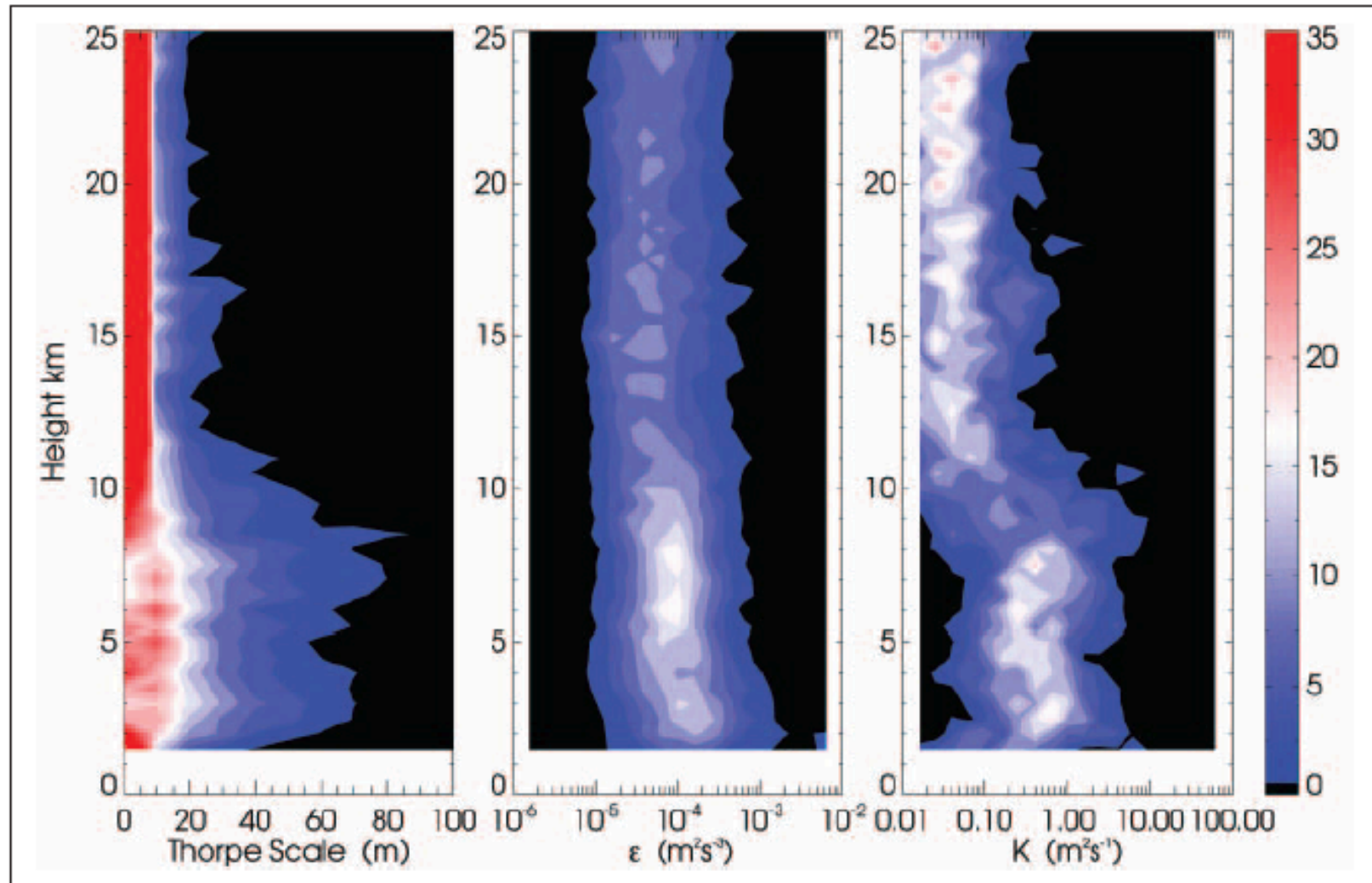
Fig. 1. Probability densities (in percent) of turbulence parameters derived from 3 months of 1-second resolution radiosonde soundings at Riverton, Wyo., in winter 2007. (left) The Thorpe scale (m), which provides a measure of the length scale of turbulent fluctuations, calculated from the potential temperature profile, which is taken to be proportional to the Ozmidov scale, a characteristic length scale above which overturning is inhibited by buoyancy; (middle) eddy dissipation rate; and (right) eddy diffusivity.

Anticipated Products/Outcomes

- New research ideas.

- Initiatives to widen availability of high-resolution radiosonde data.

- Access point or points for these data.

- Proposal for new SPARC or WCRP project on high-resolution radiosonde data.

- Eos and SPARC Newsletter articles on this workshop.