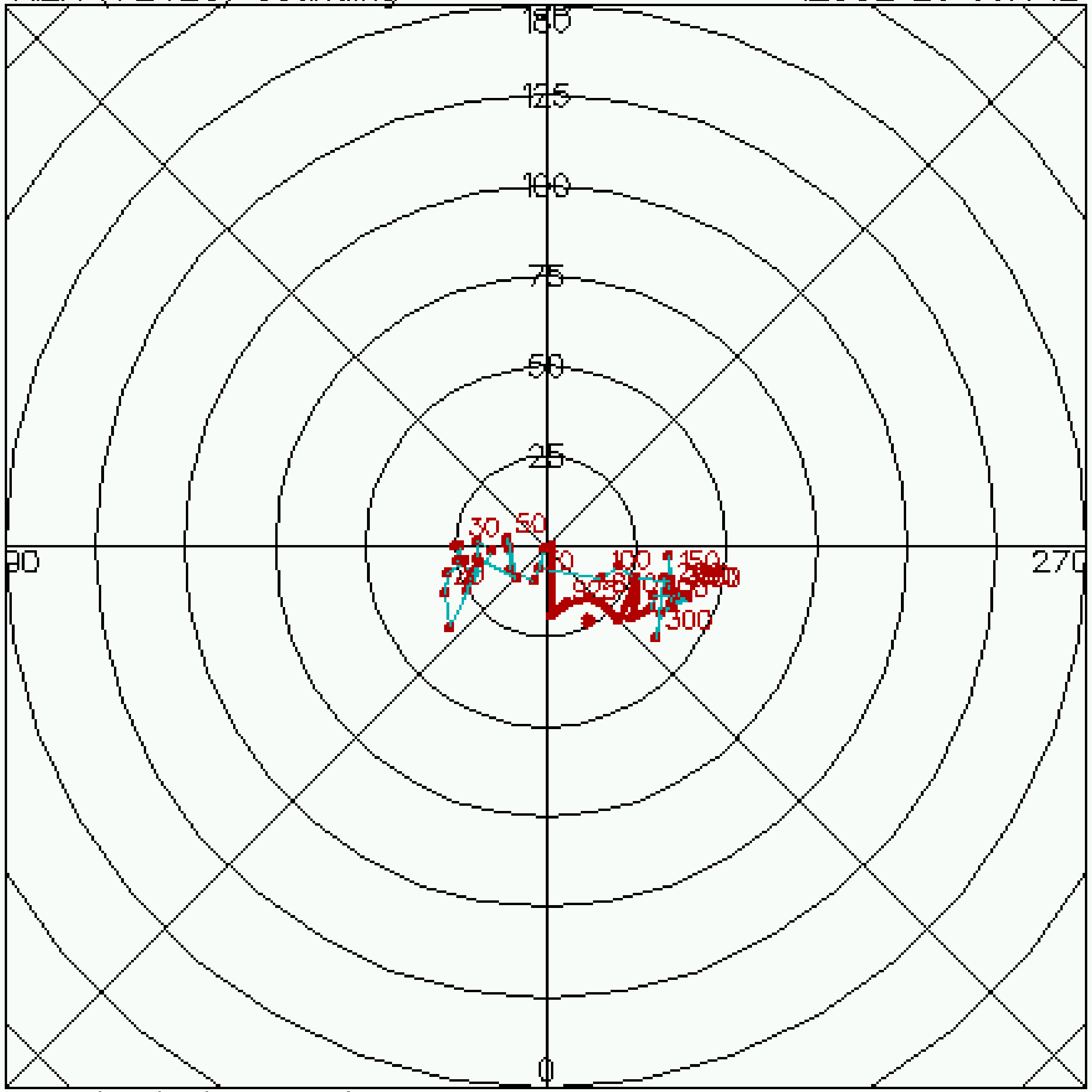
Plymouth State Weather Center

KILN (72425) Sounding 1200Z 29 JUN 12



Red line indicates winds from surface to 700 mb

WMO:72425
TP:107
FRZ:580
WBO:633
PW:1.79
RH:52.6
MAXT 35.1
TH:5818
L57:8.7
LCL:906
LI:−9.6
SI:−11.4
TT:61
KI:38
SW:580
EI:−7.6
−PARCEL−
CAPE:3407
CINH:195
LCL:873
CAP:5.0
LFC:678
EL:148
MPL:78
−WIND−
STM:329/24
HEL:18
SHR+:0.0
SRDS:104
EHI:1.1
BRN:39.8
BSHR:13

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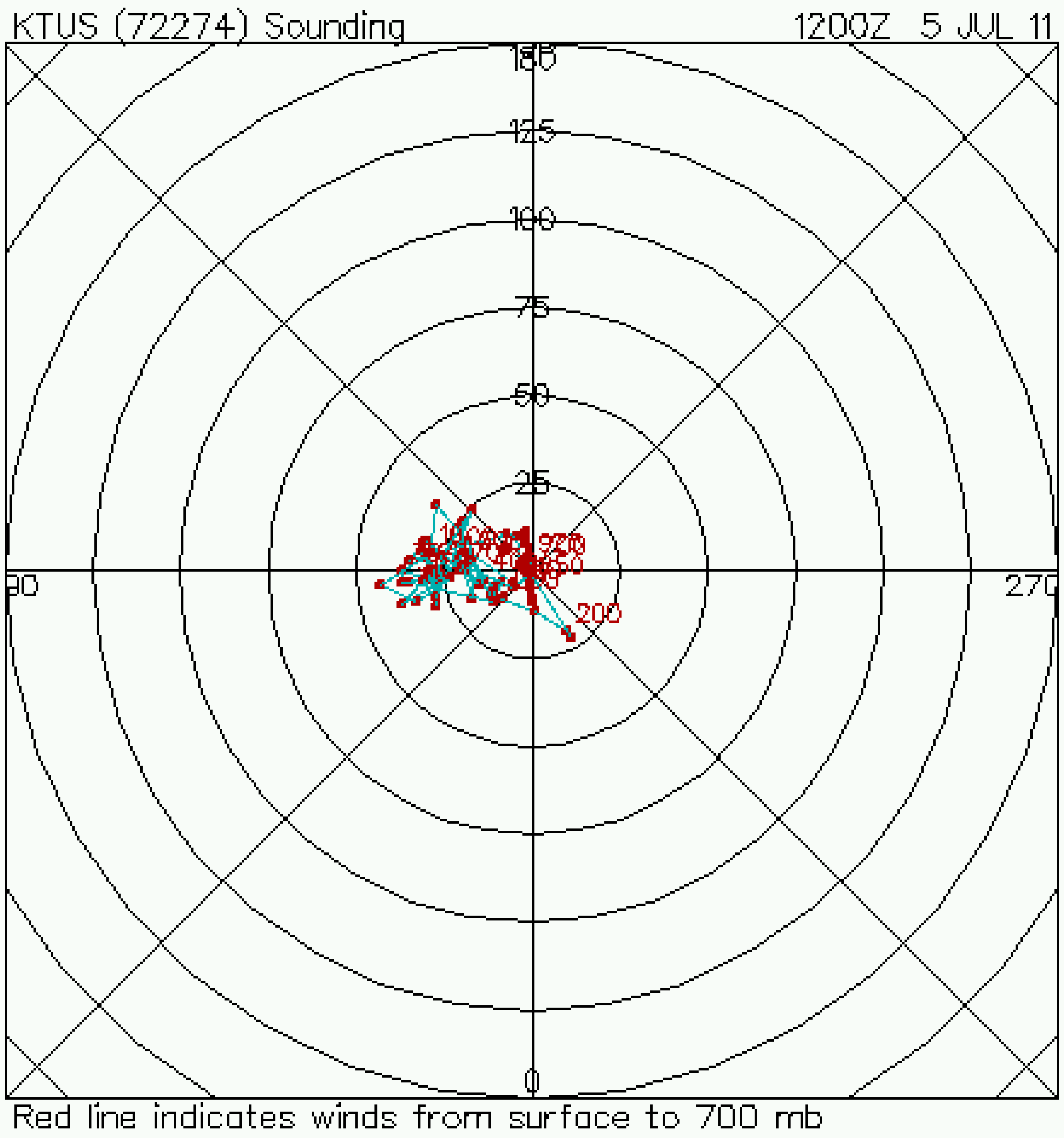
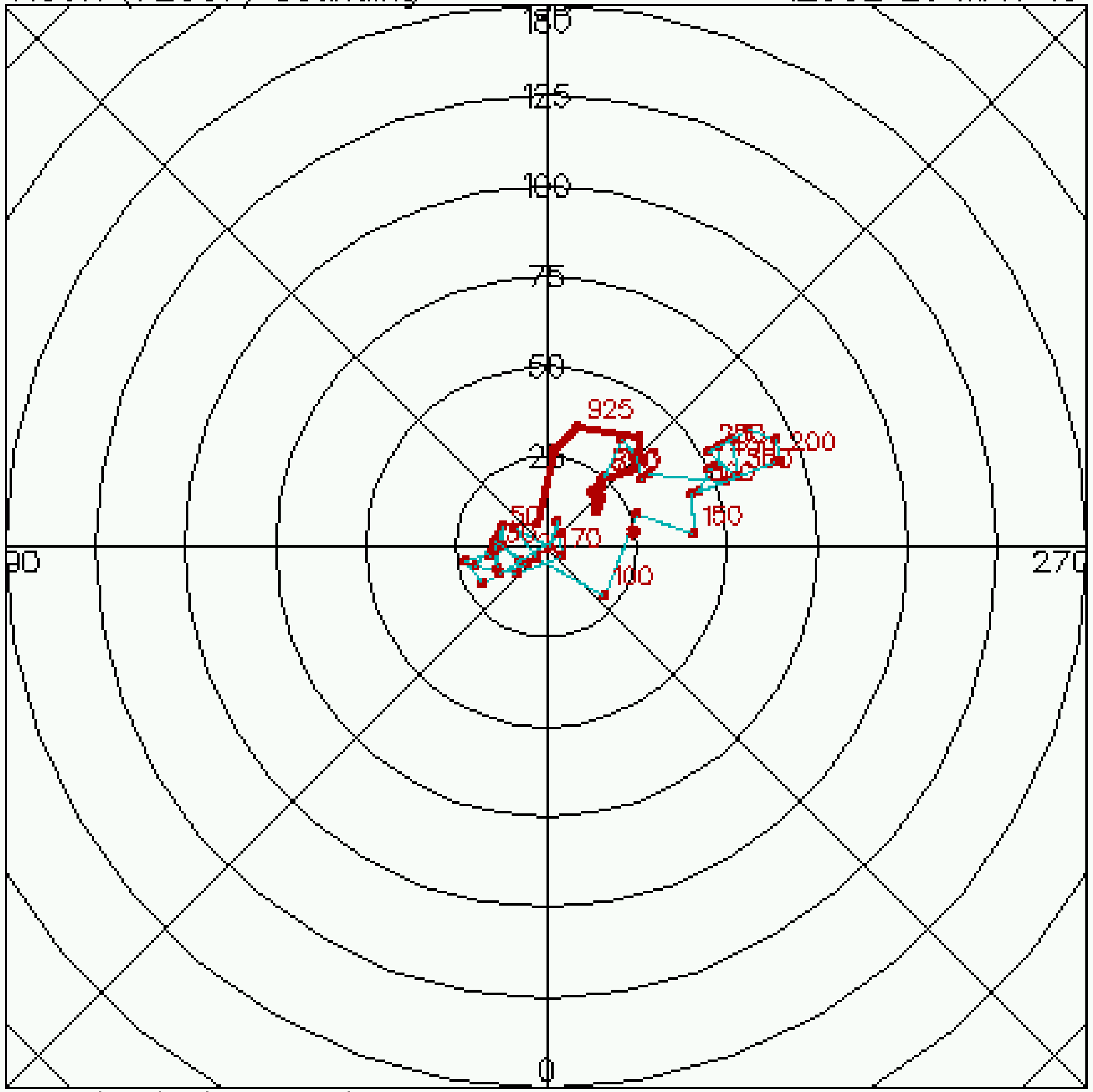


WMO:72274
TP:109
FRZ:577
WBO:586
PW:1.64
RH:69.6
MAXT 32.8
TH:5828
L57:7.5
LCL:863
LI:-4.1
SI:-3.1
TT:51
KI:36
SW:251
EI:-2.3
-PARCEL-
CAPE:593
CINH:219
LCL:798
CAP:4.3
LFC:653
EL:223
MPL:153
-WIND-
STM:131/10
HEL:-0
SHR+:0.0
SRDS:-4
EHI:0.1
BRN:29.9
BSHR:6

Plymouth State Weather Center

KOUN (72357) Sounding 1200Z 20 MAY 13



Red line indicates winds from surface to 700 mb

WMO:72357
TP:210
FRZ:620
WB0:687
PW:1.00
RH:43.5
MAXT 34.6
TH:5722
L57:8.5
LCL:940
LI:-9.1
SI:-2.5
TT:55
KI:24
SW:364
EI:-1.9
-PARCEL-
CAPE:2146
CINH:274
LCL:874
CAP:6.7
LFC:699
EL:199
MPL:119
-WIND-
STM:260/25
HEL:327
SHR+:0.0
SRDS:68
EHI:4.9
BRN:39.6
BSHR:10

1 Hodograph

Hodographs represent the vertical profile of wind direction and magnitude captured from soundings. Each point along the hodograph corresponds to wind at a given level; the distance from the origin shows the magnitude and the angle to the origin gives the wind direction. Mean winds and shear characteristics for a given layer can be estimated for a given layer by visual inspection of the hodograph. The length of the hodograph (or part of the hodograph if considering a certain layer) corresponds to the total speed shear, curvature of the hodograph corresponds to vertical changes in the direction of the shear vector $\mathbf{S} = \frac{d\mathbf{v}}{dz}$.

2 Shear vector and horizontal vorticity

The shear vector $\mathbf{S}$ at a given level can be approximated from sounding data by finite difference, $\mathbf{S} \approx \frac{\mathbf{v}_2 - \mathbf{v}_1}{z_2 - z1}$, has units of s^{-1}, and in the absence of significant horizontal gradients of vertical motion, can be rotated -90° to obtain horizontal vorticity, $\boldsymbol{\omega}_h = \hat{\mathbf{k}} \times \mathbf{S}$.

3 Streamwise and crosswise horizontal vorticity

Sounding data and the information contained in the hodograph are used to characterize the environment in which convective storms will develop. Storm-relative winds are obtained by estimating a storm velocity $\mathbf{c}$ and subtracting from observed winds, $\mathbf{v}_{SR} = \mathbf{v} - \mathbf{c}$. I estimated $\mathbf{c}$ as the mean winds in the 850-600 mb layer. The storm-relative wind at a given layer can then be used to decompose the horizontal vorticity into streamwise vorticity, $\omega_s = \frac{\mathbf{v}_{SR}}{\|\mathbf{v}_{SR}\|} \cdot \boldsymbol{\omega}_h$, and crosswise vorticity, $\omega_c = (\hat{\mathbf{k}} \times \frac{\mathbf{v}_{SR}}{\|\mathbf{v}_{SR}\|}) \cdot \boldsymbol{\omega}_h$ which is useful to understanding how parcels will behave when caught in storm updrafts.