OBJECTIVE:
Design a meteorological instrumentation network at
Dugway Proving Ground, UT, that has the ability to
fully characterize the 3D environmental conditions at
multiple locations on a test grid and to determine and
predict impacts on agent simulant challenges. The
test grid is defined as a box either 1km or 3km in
the horizontal, and from 100m to 1000m deep.

I. CLIMATE ANALYSIS
Hourly SAMs observations for the
period April through October, 1994-
2007. Over 50,000 observations at
each site are used in the wind rose
analysis.

Go/No-Go criteria for testing are:

- Time: 72am to 6am local
- Wind Speed: 2 to 8 m/s
- Direction: SE or NW
- Temperature: greater than 40F
- Relative Humidity - less than 80%
- Precipitation - none

A SOM is an unsupervised-learning
neural-network algorithm that is used to
reduce the dimensionality of the
data.

A SOM can be used to help classify
and categorize high-dimension data. Over
20,000 observations meet the
go criteria and are used in the SOM
analysis.

II. SCALE ANALYSIS
EuLag, an LES model, is run using characteristic
conditions identified in the
climate analysis.

The model is run with a 10 meter
coronal grid separation
over the 1km test
grid.

A 2D spatial FFT is applied
EuLag fields to examine key spatial scales.

To simulate the effects of
observing the test grid at varying sensor densities
we apply a 2D Butterworth filter
to the FFT results and then
reconstruct the field.

Comparison is then made with
the original model
output to determine the
quality of the reconstruction.

This process is repeated
for a wide range of scales
determining the
transitions.

Critical transition occurs at
length scales of 150 to
200 meters.

Scales below this range are purely turbulent and
best observed via traditional time averaged turbu-
ment statistics methods.

III. OSSE
Use of 2 and 10 meter obs make a significant,
~7%, improvement in the quality of the analysis
compared to using only lidar radial winds.

Quality of analysis not sensitive to density of
sensors used. Most likely this is a result of the resolution
of the truth simulation, 500m. All sensor net-
works used are capable of resolving existing
scales of motion.

Differences in results due more to simulated
sensor error than sensor density.