Abstract Submitted
for the 4CF12 Meeting of
The American Physical Society

Turbulence Measurement at the Very Large Array KEITH MORRIS, NRAO, New Mexico Tech, BRYAN BUTLER, NRAO, RICHARD SONNENFELD, New Mexico Tech — The effects of Earth's atmosphere on the quality of seeing in optical astronomy are well known, but radio astronomy also suffers from atmospheric interference. As radio waves travel through the troposphere, their speed and direction vary due to fluctuations in refractive index, largely caused by fluctuations in water vapor content. To quantify this interference, the Atmospheric Phase Interferometer (API) measures the RMS phase difference of a geosynchronous satellite beacon at two dedicated antennas. The Very Large Array (VLA) uses this information, plus wind speed, to schedule observations during optimal seeing conditions. The API measures along a single 300m, mostly E-W baseline. To the extent that the turbulence is shear-driven, there is believed to be direction dependence to this measurement. The phase time series can be used to determine the refractive index structure function for the local atmosphere, but only in the direction of that baseline. An upgraded API system, under development, will provide two-dimensional measurements, at lengths up to 813m, spanning the N-S/E-W plane. This paper seeks to establish the correspondence between surface atmospheric parameters and measured phase instability, and investigate what we will expect from the upgraded system.

Keith Morris
NRAO, New Mexico Tech

Date submitted: 21 Sep 2012 Electronic form version 1.4