Green Bank Weather
Dana S. Balser

Weather Resources

1. Weather Stations
2. Weather Forecasts (NOAA/Maddalena)
3. Pyrgeometer
4. 86 GHz Tipping Radiometer
5. 12 GHz Interferometer

Weather Parameters

Weather Station 2 (1 Hz):

V Instantaneous wind speed

1 May 2004 to 1 March 2007

Weather Forecasts (every hour):

V_s Sustained Wind Speed (1 min)

$\tau(\nu)$ Zenith Opacity

$T_{sys}^{atm}(\nu)$ Zenith Atm. System Temperature

$T_{atm}(\nu)$ Atmospheric Temperature

Calculated Parameters:

$\overline{V}$ Hourly median wind speed

$\overline{V}_{20}^{max}$ Maximum, 20 s median, wind speed

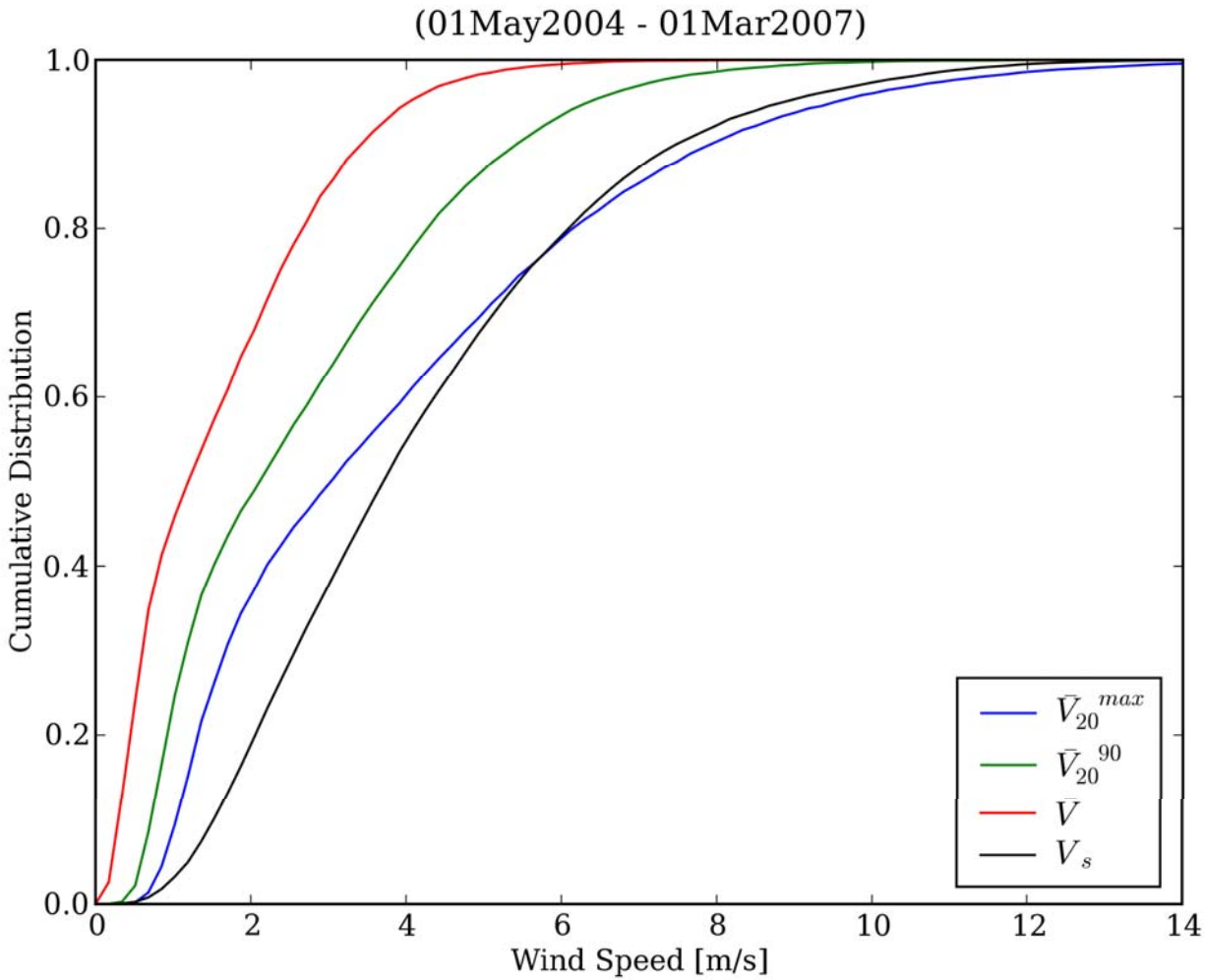
$\overline{V}_{20}^{90}$ 90^{th} percentile, 20 s median, wind speed

$$T_{sys}^{atm}(\nu, E) = T_{atm}(\nu)\left(1 - e^{-\tau(\nu)/\mathrm{Sin(E)}}\right)$$ Atmospheric system temperature

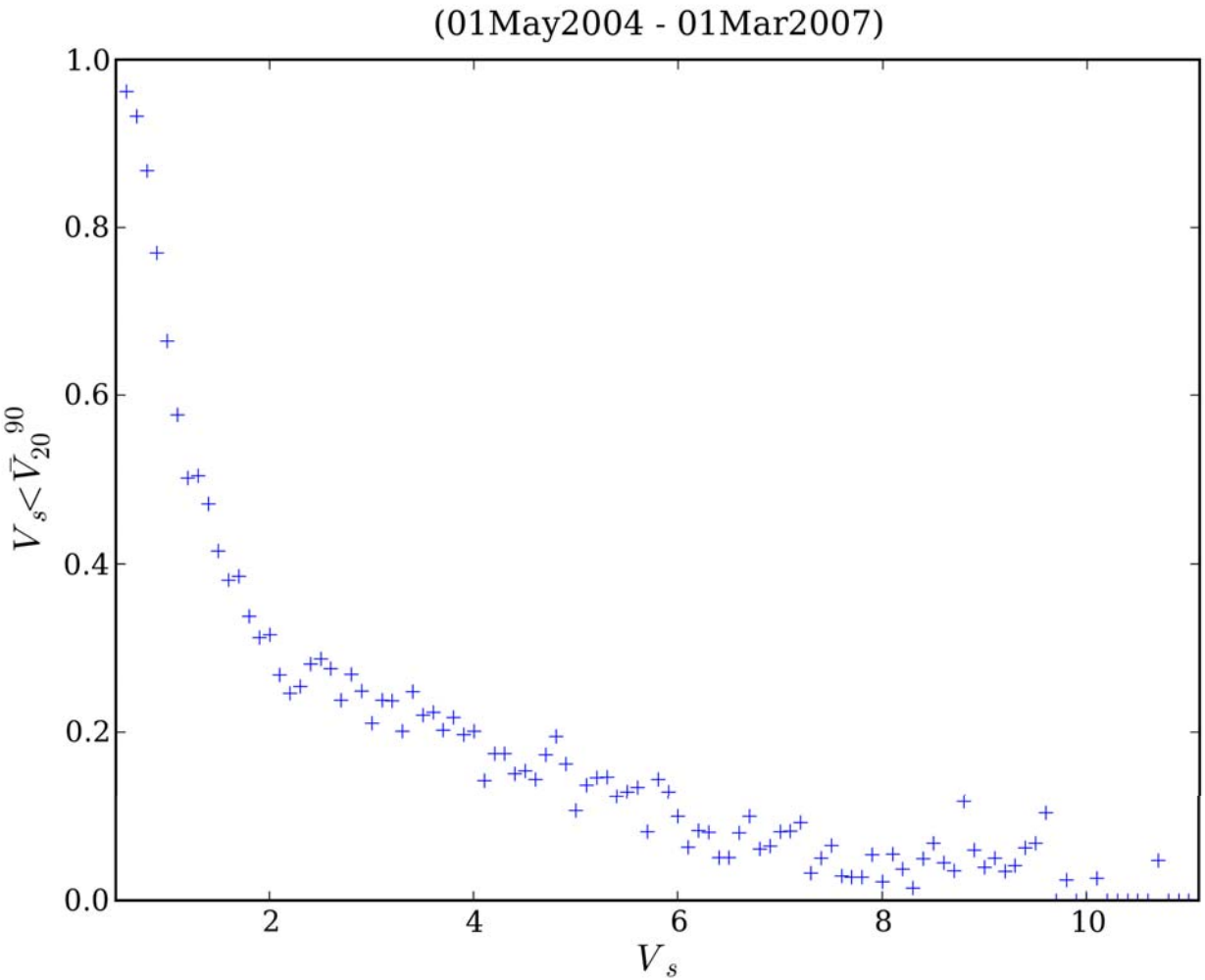
$$T_{sys}^{total}(\nu, E) = T_{sys}^{atm}(\nu, E) + T_{rcvr} + T_{spill} + T_{cmb} + T_{src}$$ Total system temperature

$$T_{eff}(\nu, E) = T_{sys}^{total}(\nu, E)\, e^{\tau(\nu)/\mathrm{Sin(E)}} \propto 1/\mathrm{SNR}$$ Effective system temperature

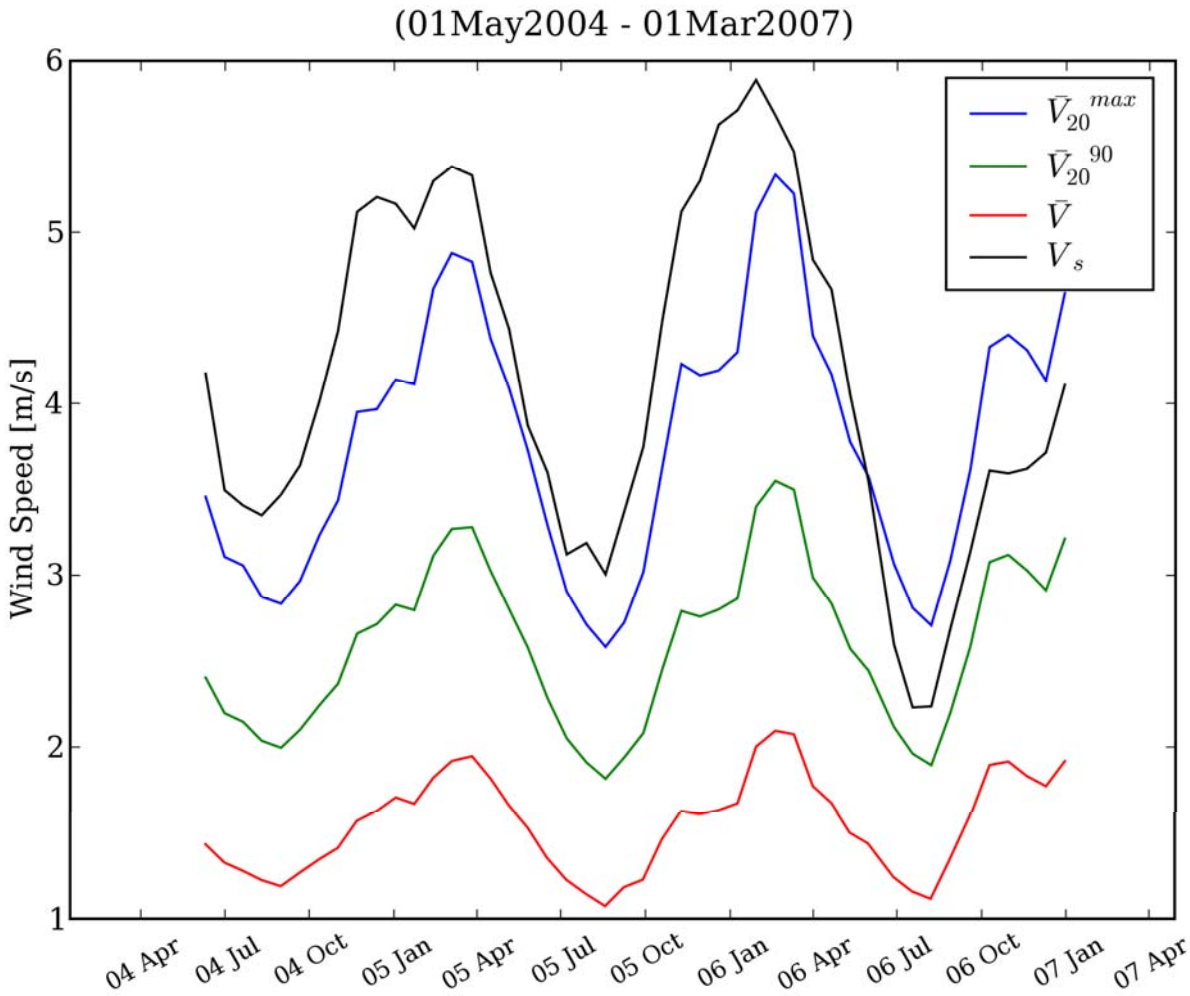
Wind Speed – cumulative distribution function



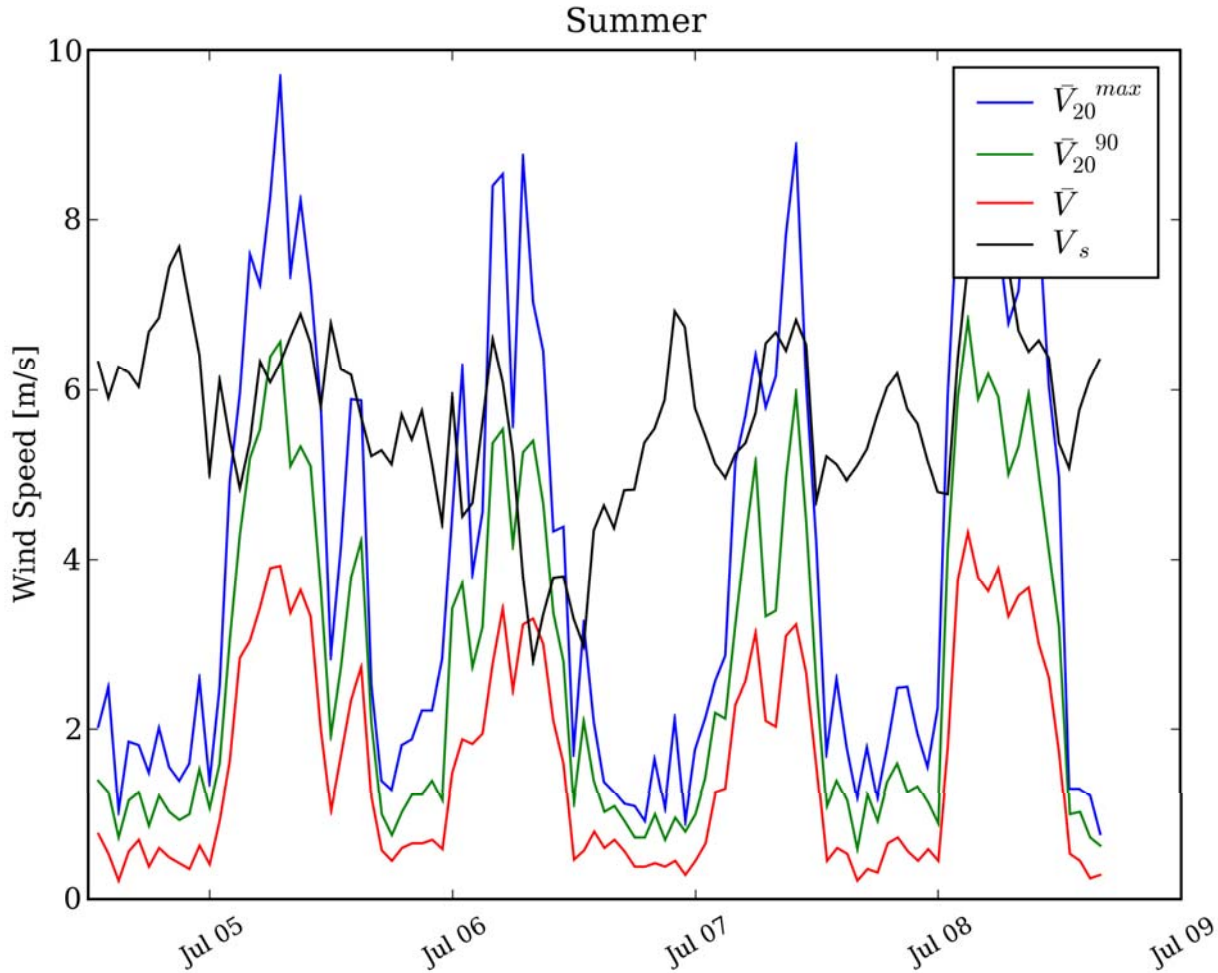
Wind Speed -- Forecasts



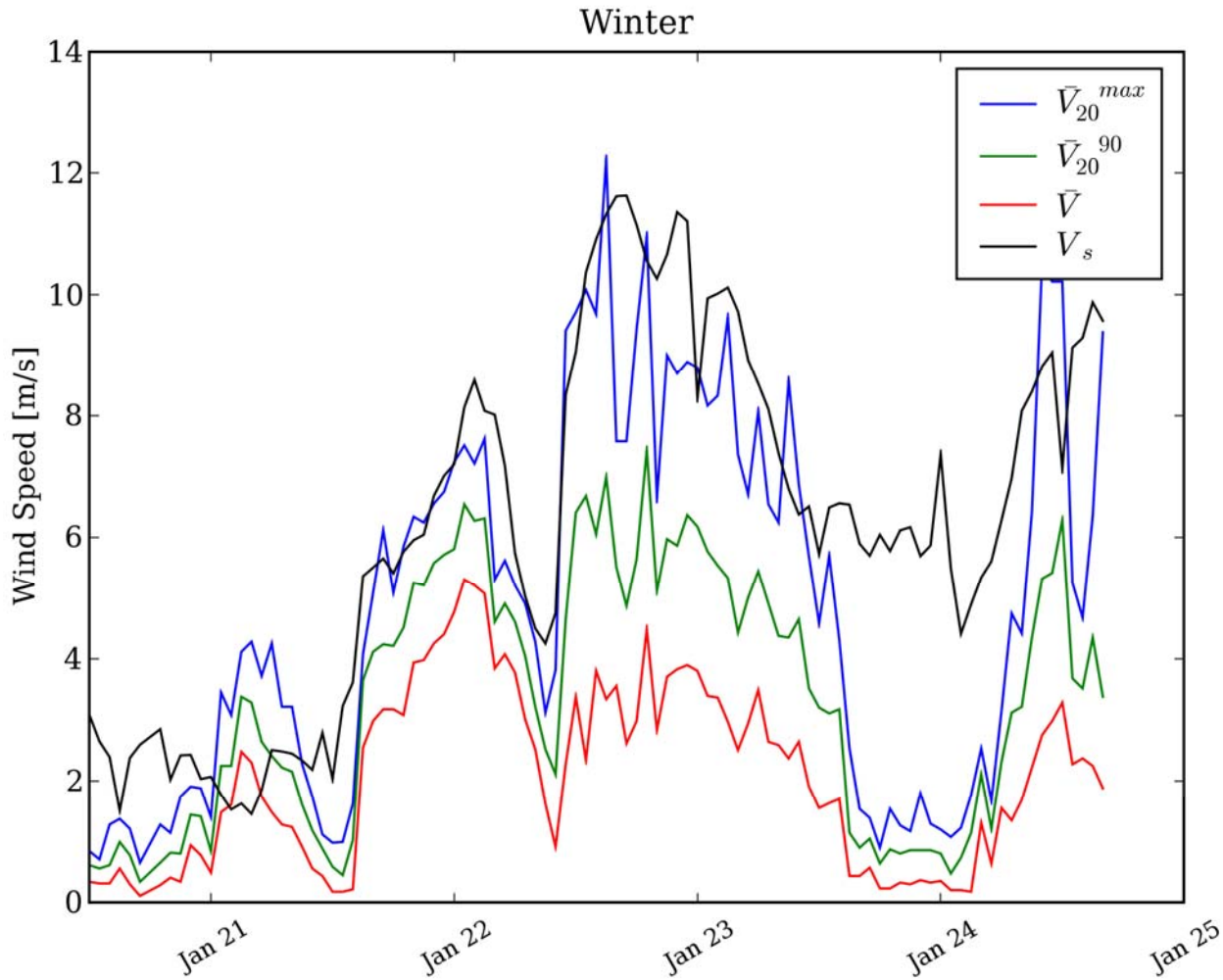
Wind Speed – smoothed over 60 days



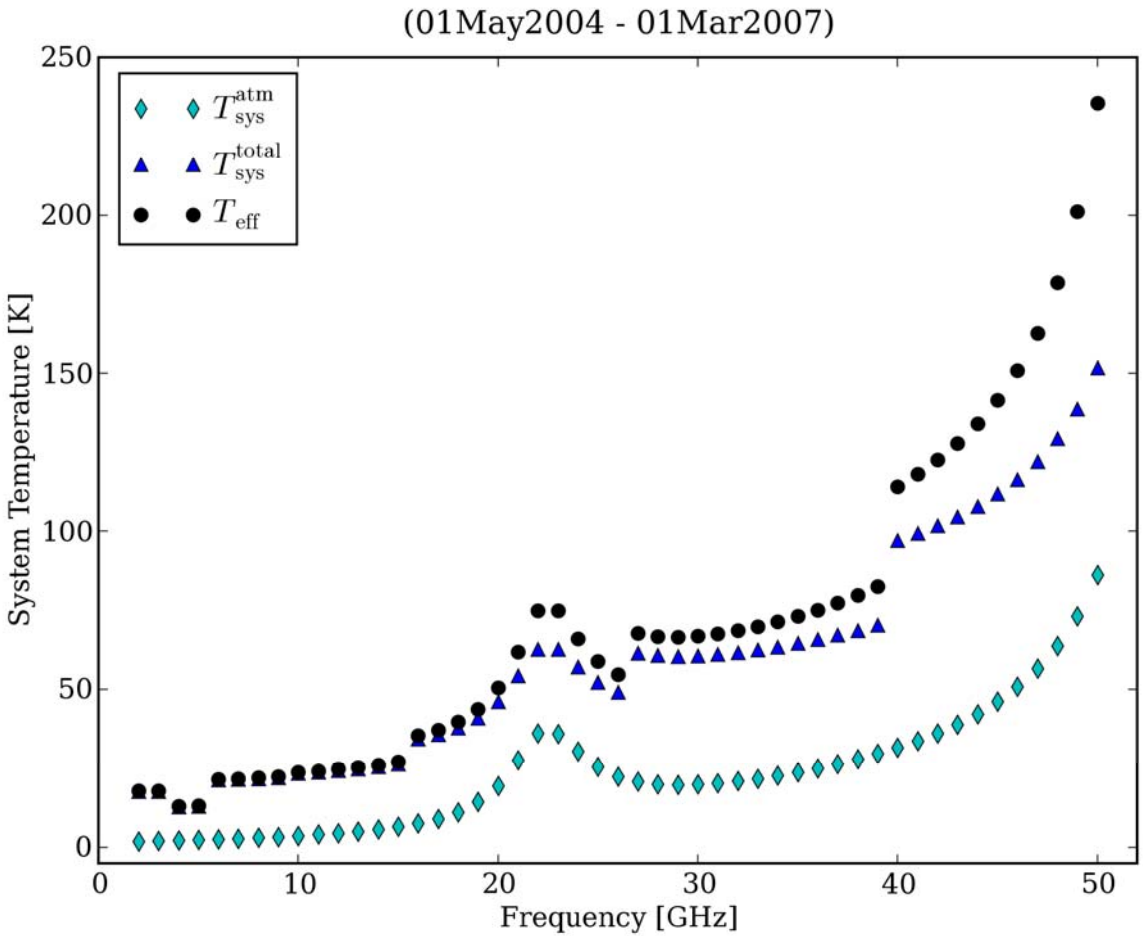
Wind Speed – summer



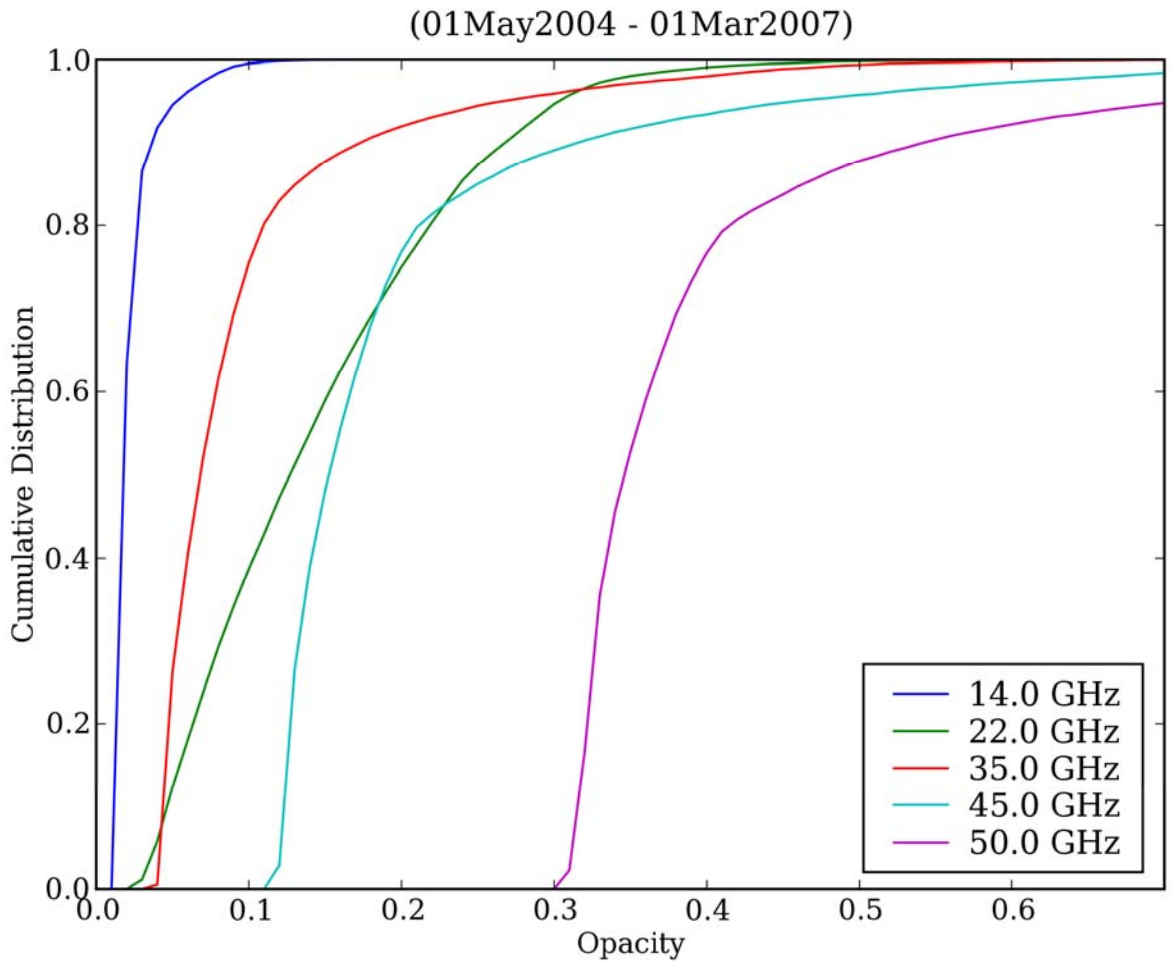
Wind Speed – winter



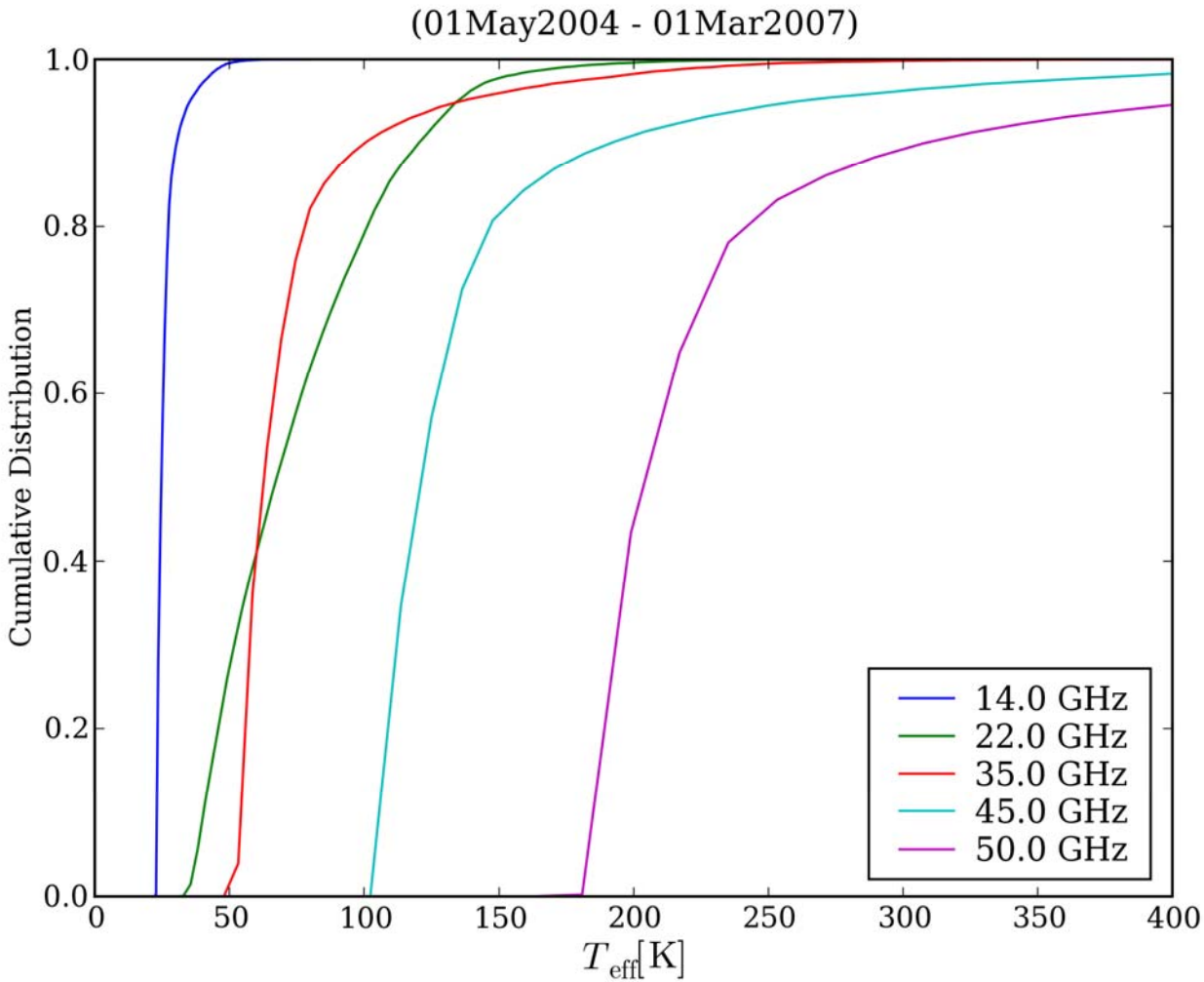
Mean System Temperature



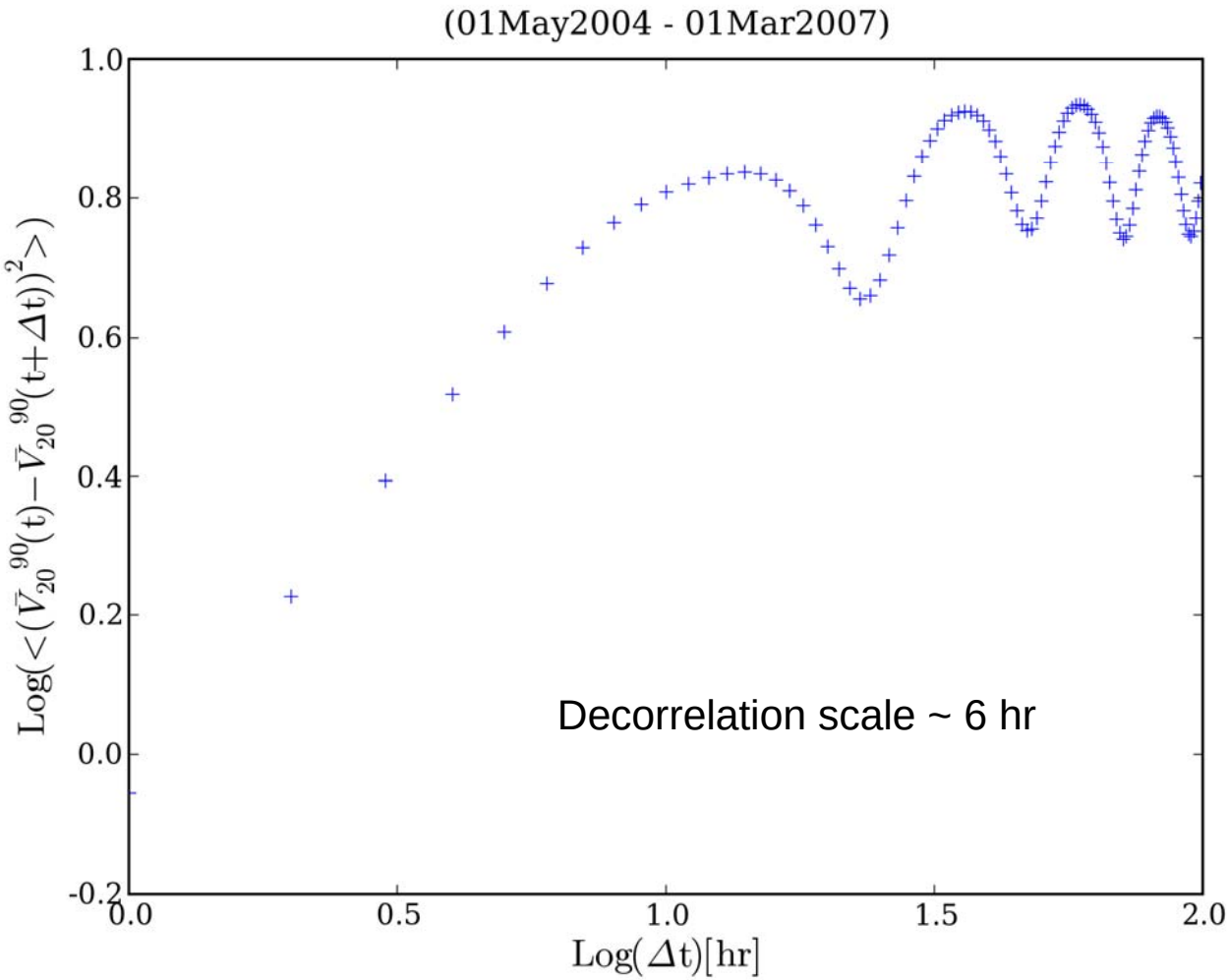
Atmospheric Opacity



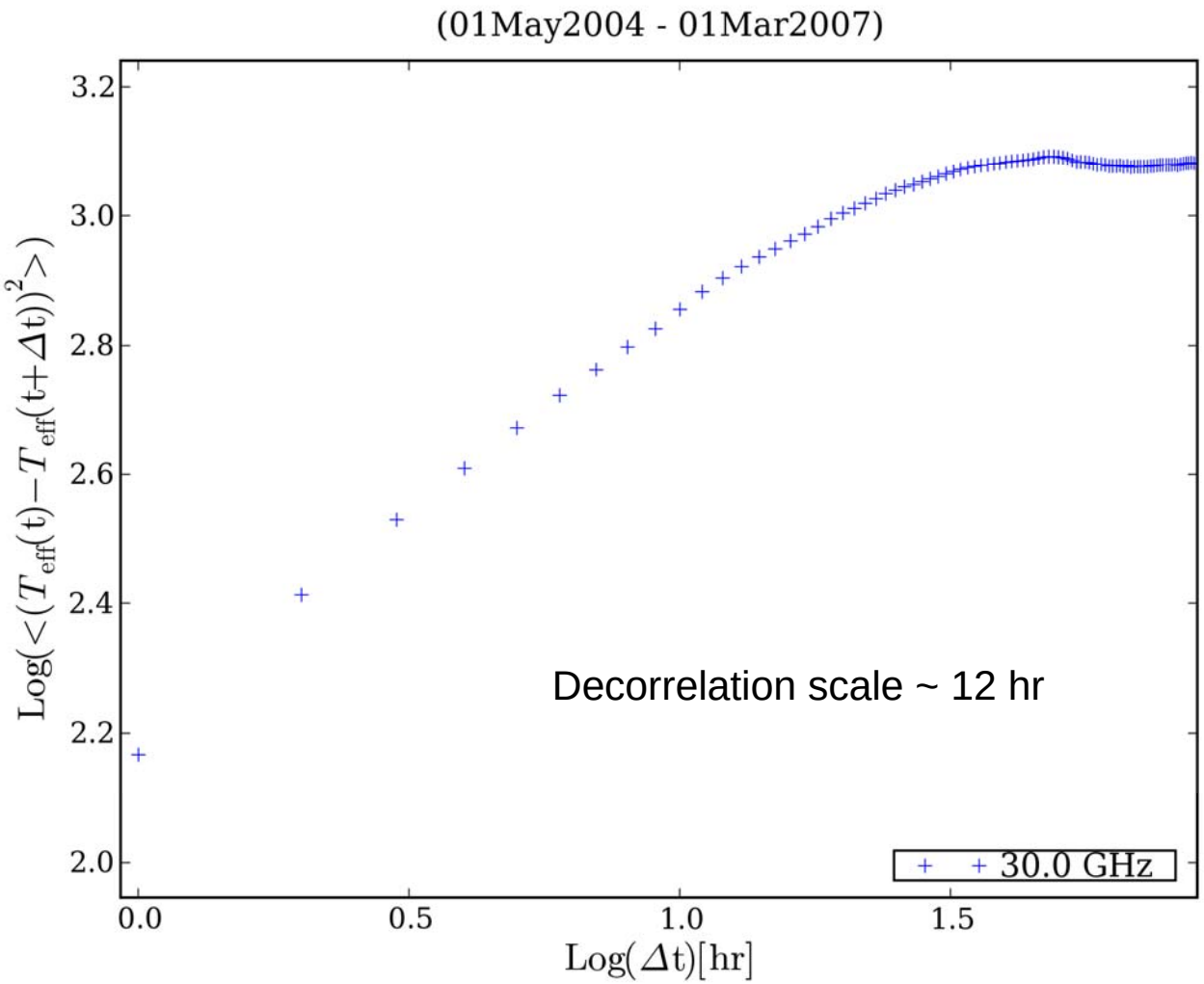
Effective System Temperature



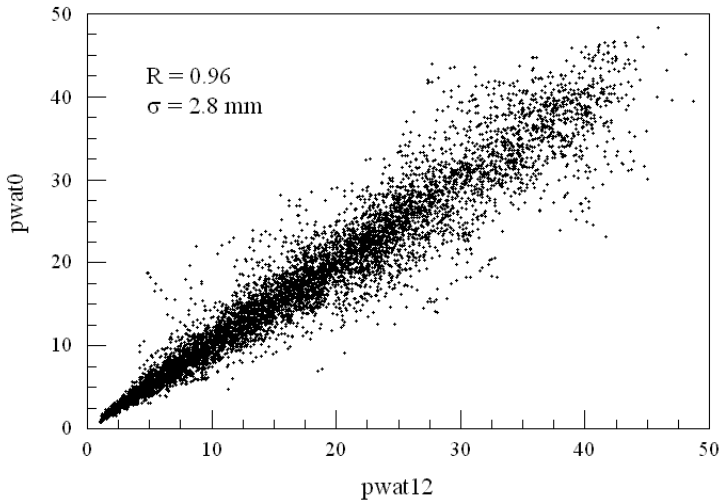
Wind Speed – structure function

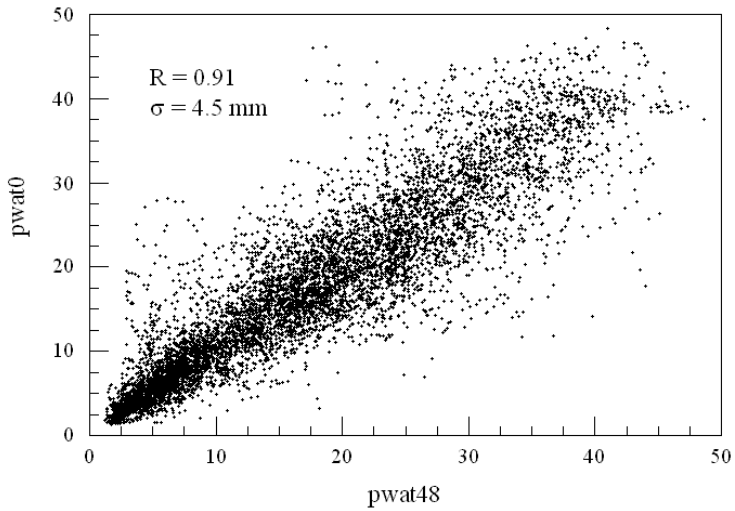


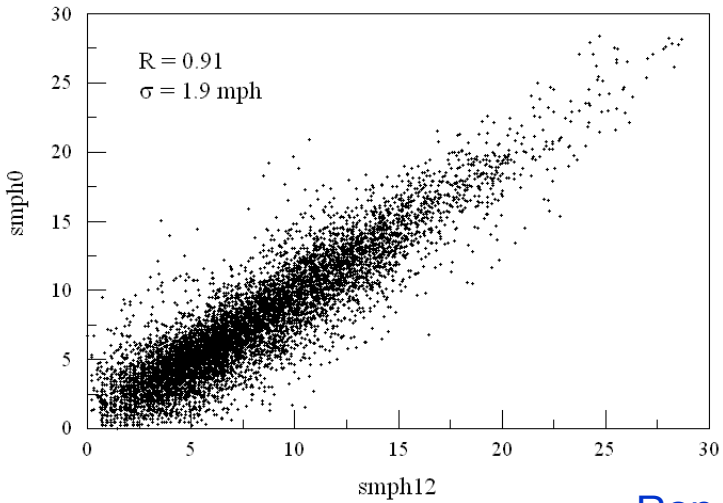
Effective System Temperature – structure function

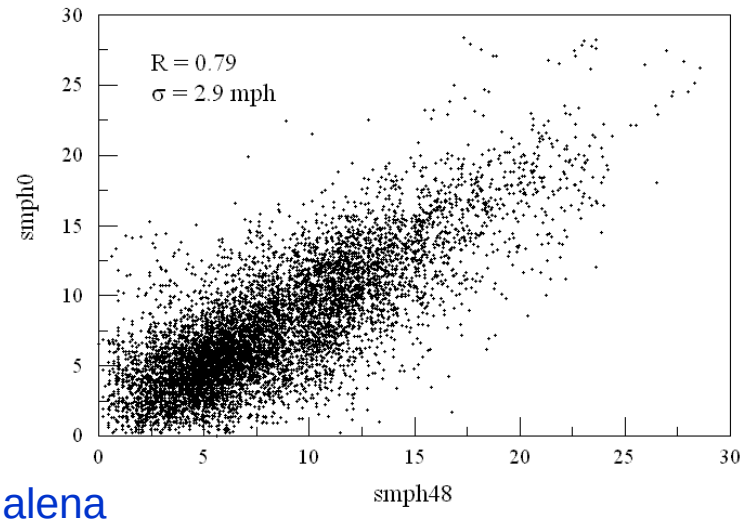


Weather Forecasts – PWV and wind speed



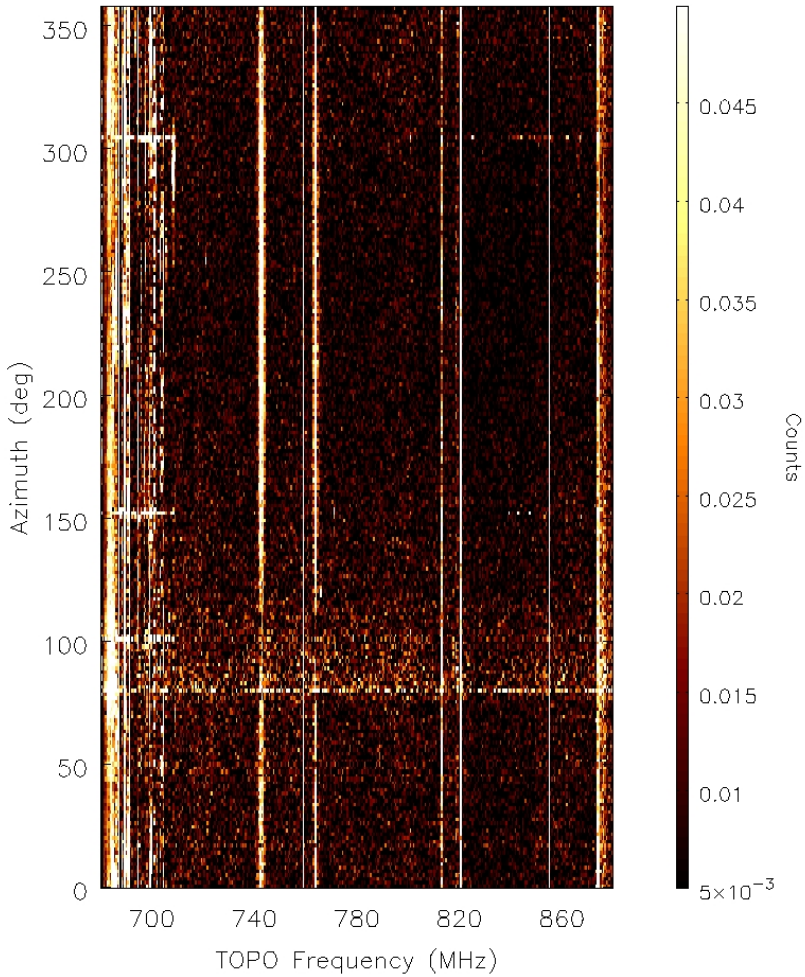






Ron Maddalena

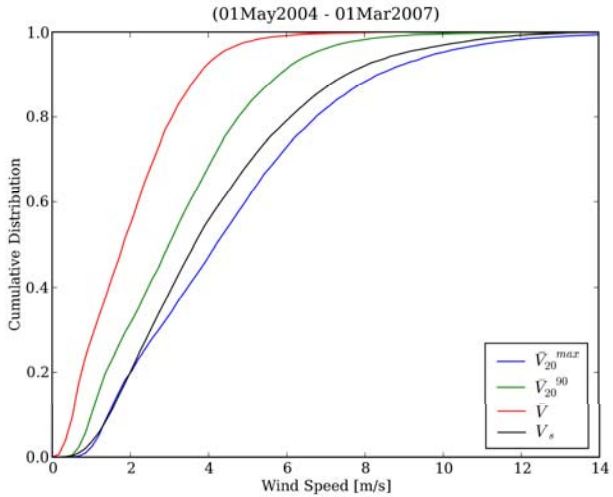
Radio Frequency Interference Weather



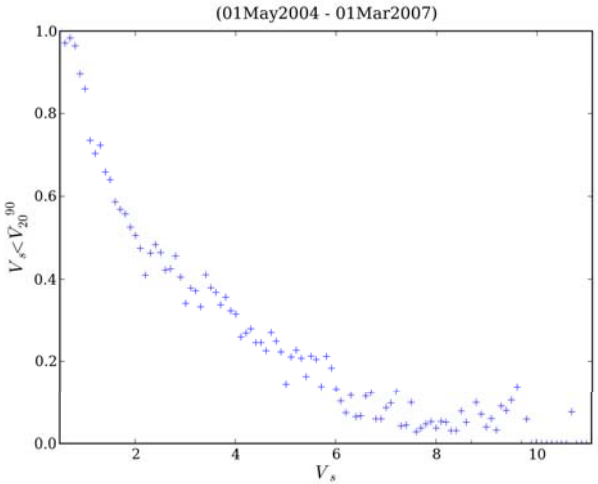
Toney Minter

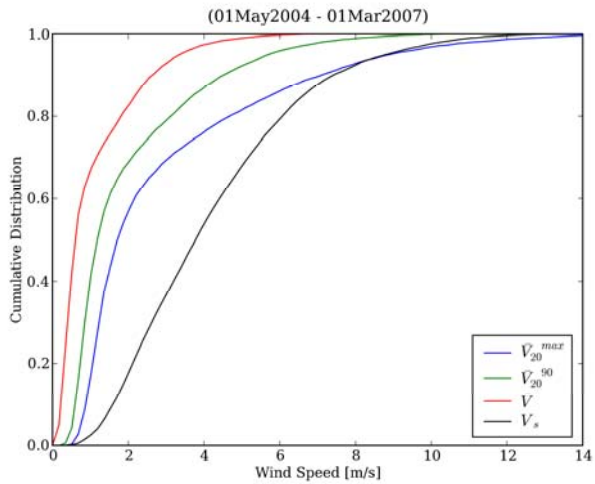
End

Wind Speed – Day/Night

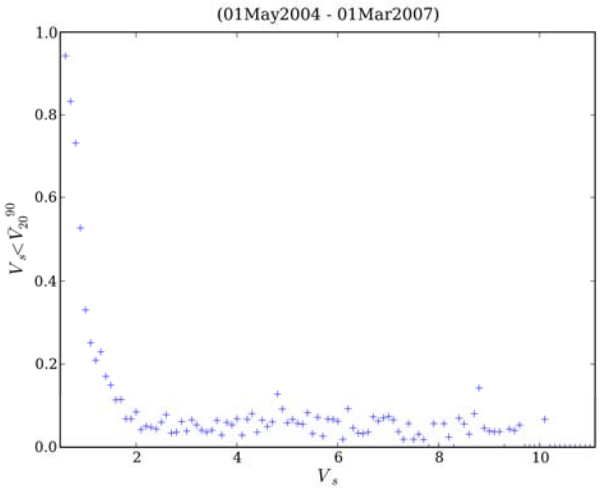


← Day →

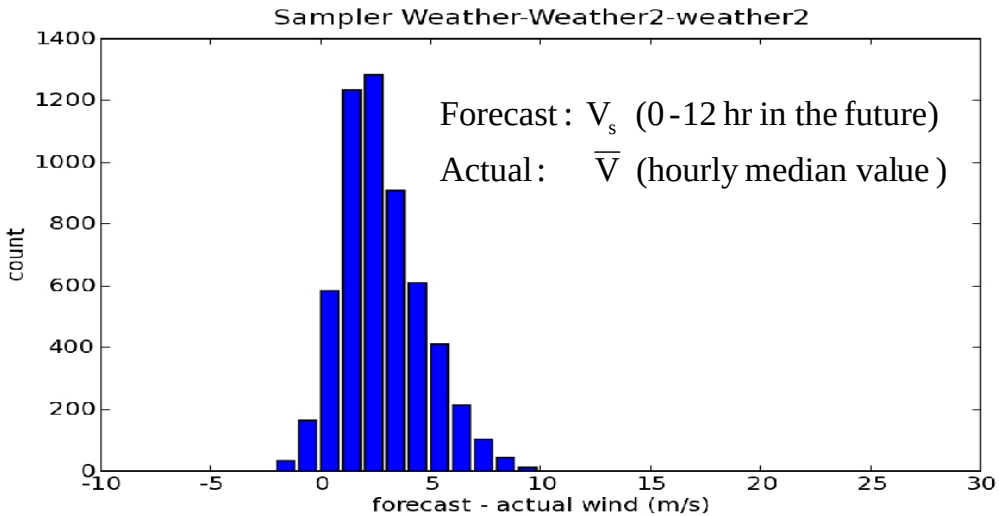


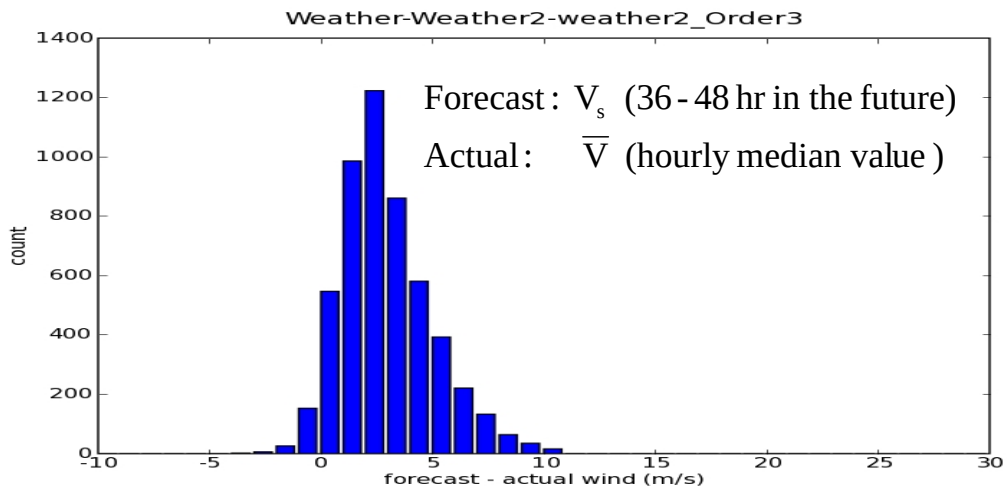


← Night →



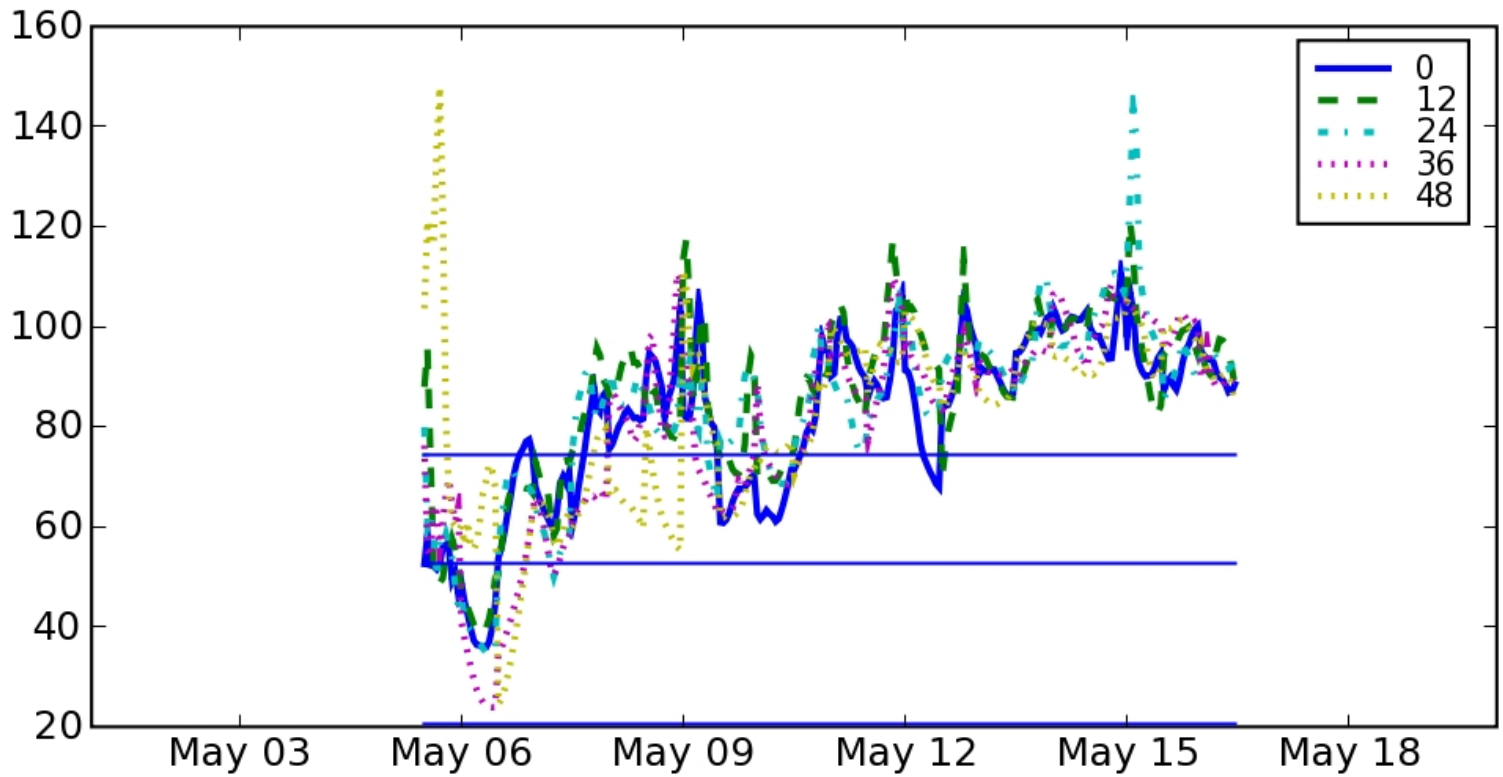
Weather Forecasts – Wind Speed (Aug 2004 – Oct 2006)





Paul Marganian

Weather Forecasts – Effective System Temperature



Freq. = 24 GHz; Elev. = 30 deg.

Mark Clark