# Weather and Seeing Statistics

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28 February 2011 / CHARA Array Winter Meeting, Atlanta

# Outline

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## Weather

- Davis Instruments remote weather station
    - Rain gauge adversely affected by "roof winds"
    - Tends to record only about 2/3 the rainfall amount as the NWS-sanctioned method
- RF chokes now installed on all bunker humidity/temperature sensors
    - All but W2 are consitently within a few percent of each other
    - W2 is closer than it used to be

# Outline

# Weather
### – Uptime

|     | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
| --- | --- | --- | --- | --- | --- | --- |
| E1 | 83.4 | 96.0 | 96.1 | 91.1 | 95.7 | 96.6 |
| E2 | 74.9 | 92.9 | 94.9 | 93.8 | 94.3 | 97.4 |
| S1 | 88.8 | 96.3 | 91.2 | 94.0 | 95.9 | 98.2 |
| S2 | 90.0 | 96.1 | 91.3 | 93.0 | 89.5 | 94.2 |
| W1 | 91.1 | 95.3 | 96.9 | 94.7 | 93.8 | 99.4 |
| W2 | 90.1 | 96.7 | 101.7 | 94.7 | 89.2 | 87.3 |

Table: Weather station uptimes as a percentage of time.

## Weather
### Cross-year Vital Stats

|  | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|
| Measurable Wind | 11.6 | 14.0 | 12.9 | 16.2 | 19.2 | 23.2 |
| High Wind† | 0.8 | 0.4 | 0.8 | 0.2 | 0.2 | 0.7 |
| High Humidity♮ | 20.0 | 18.1 | 10.9 | 14.0 | 16.5 | 21.6 |

Table: Table entries are percentages of time. Values quoted are the largest of the six bunker weather stations. † High wind is defined as being above 20 kph. ♮ High Humidity is defined as being above 90%.
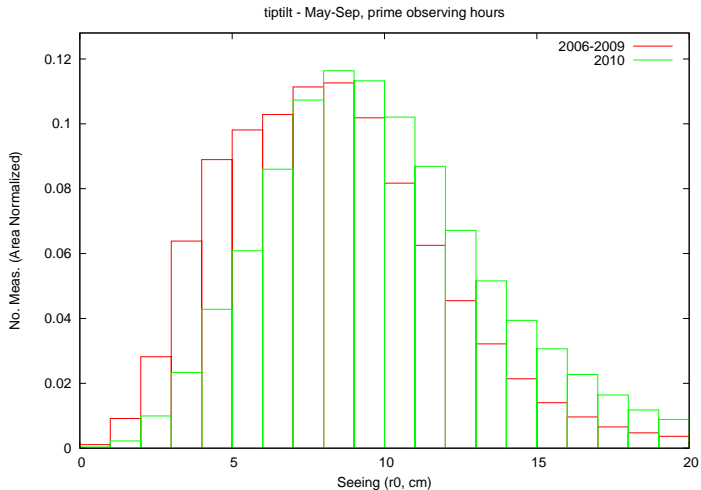
# Rainfall Amounts
## – data courtesy of L. Webster



Cumulative Rainfall, Mount Wilson
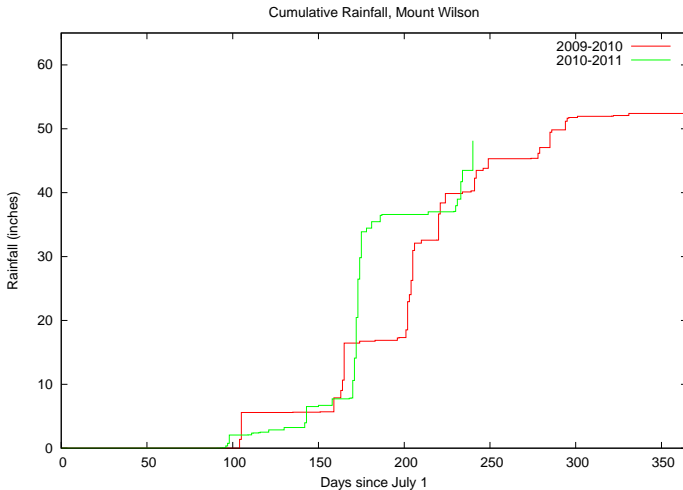
# Outline

1. **Weather**
   - What's New?
   - Stats

2. **Seeing**
   - $r_0$
   - $t_0$

3. **Infrastructure Changes**
   - Server Upgrade
   - Telescope Control
   - Other Control System
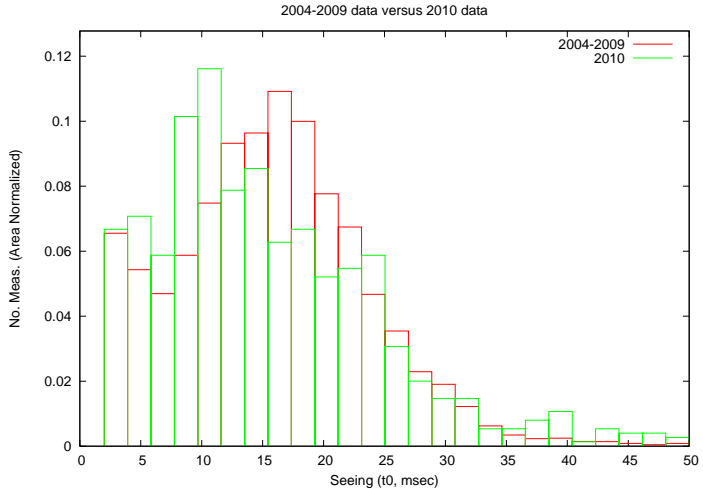
# Seeing
## 2006-2009 and 2010, 2 to 8 hours after sunset



tiptilt - May-Sep, prime observing hours

# Outline
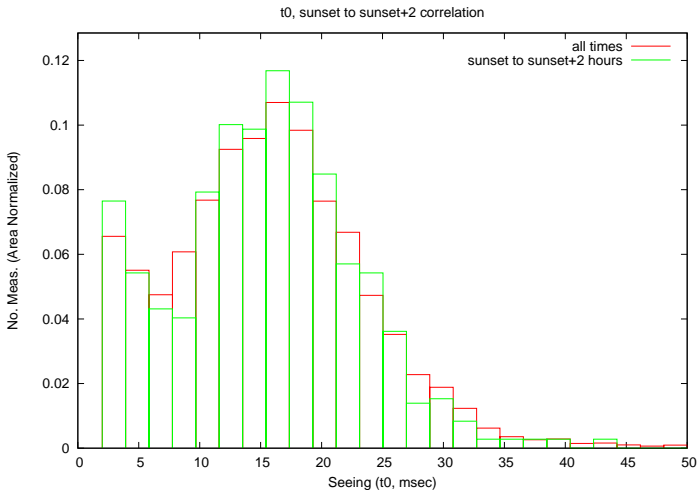
# Seeing
## 2004-2009 versus 2010



2004-2009 data versus 2010 data

# Seeing
## 2004-2010, Sunset to Sunset+2 hour Correlation

# Seeing
## 2004-2010, Sunset+2 to Sunset+4 hour Correlation



t0, sunset+2 to sunset+4 correlation

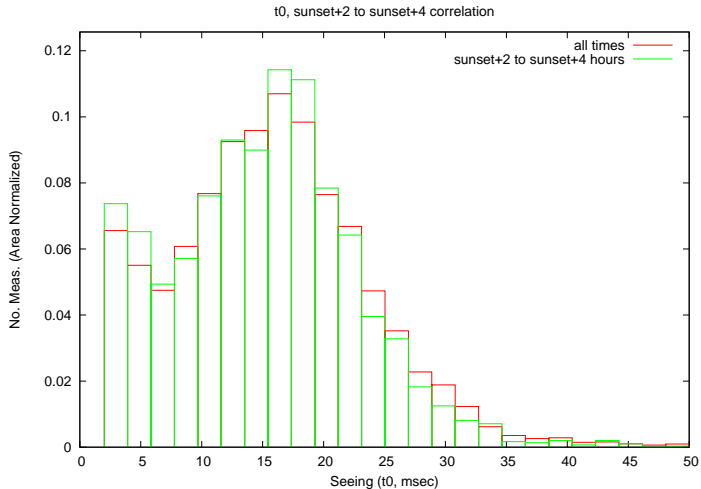# Seeing
## 2004-2010, Sunset+4 to Sunset+6 hour Correlation



t0, sunset+4 to sunset+6 correlation
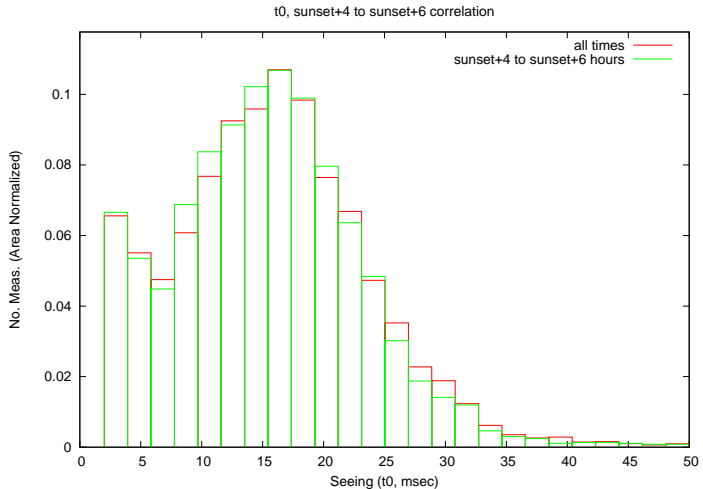
# Seeing
## 2004-2010, Sunset+6 to Sunset+8 hour Correlation



t0, sunset+6 to sunset+8 correlation

all times
sunset+6 to sunset+8 hours

No. Meas. (Area Normalized)

Seeing (t0, msec)

Weather
Seeing
Infrastructure Changes
Server Upgrade
Telescope Control
Other Control System

# Outline

Weather
Seeing
Infrastructure Changes

Server Upgrade
Telescope Control
Other Control System

# Server Upgrade
### Current Servers



- Bought 4 identical machines in 2006
- One motherboard has failed
- Motherboard requires non-standard power supply
- Ridiculously noisy

Weather
Seeing
Infrastructure Changes

Server Upgrade
Telescope Control
Other Control System

# Server Upgrade
## New Servers



- Two machines based on 6-core AMD processors
- 16 GB of memory each
- Hot-swappable external drive bays
- Plan to install before beginning of observing season

Weather
Seeing
Infrastructure Changes

Server Upgrade
Telescope Control
Other Control System

## Computer Area
– Other Changes

- Expand the KVM switch to remove the monitor/keyboard clutter
- Move the fiber panel out of the racks to improve rack accessibility
- Improve electrical distribution – too few circuits
- Upgrade racks
- Move the control system to gigabit ethernet

Weather
Seeing
Infrastructure Changes

Server Upgrade
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# TCS Replacement

Process well-underway

- Driver for dome encoder written
- Driver for DIO/counter/timer card tested and working
- Combined to create a dome server and GUI

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# TCS Replacement
## – Dome Control

Weather
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## TCS Replacement

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- Driver for dome encoder written
- Driver for DIO/counter/timer card tested and working
- Work continues on the counter/timer aspect

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Weather
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# TCS Replacement
– Terminal Block

Weather
Seeing
Infrastructure Changes

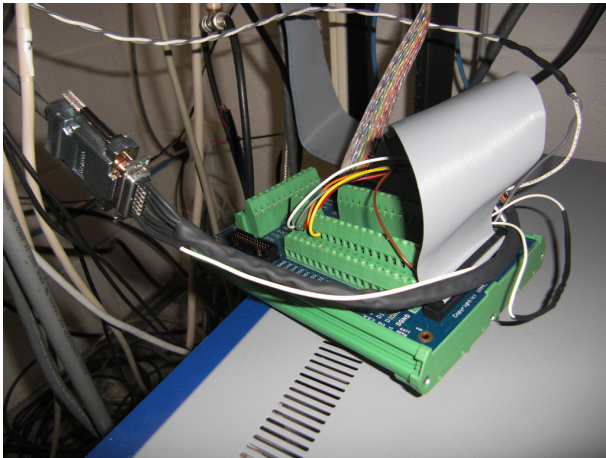Server Upgrade
Telescope Control
Other Control System

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- Work still needed on the telescope encoder
- Hope to be testing on the sky by June

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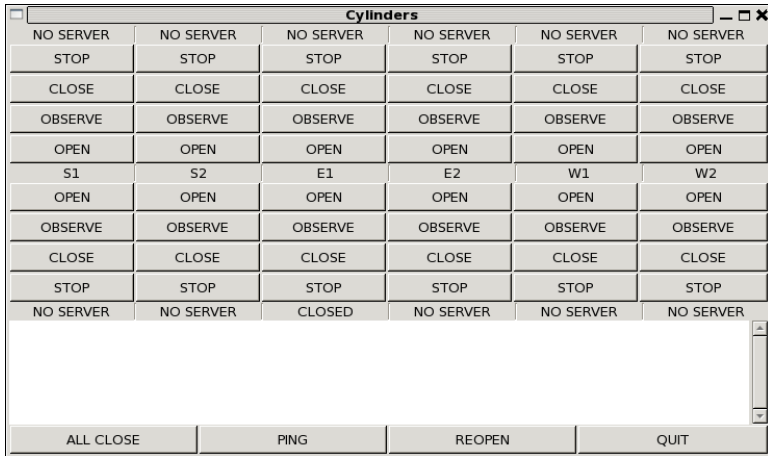- Hope to be testing on the sky by June

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## Cylinder Control

- Original cylinder control would only run on Linux 2.2 kernels
- Rewrote it in the CHARA client-server model

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# Cylinder Control
## – Standard GUI



| Cylinders | | | | | |
|---|---|---|---|---|---|
| NO SERVER | NO SERVER | NO SERVER | NO SERVER | NO SERVER | NO SERVER |
| STOP | STOP | STOP | STOP | STOP | STOP |
| CLOSE | CLOSE | CLOSE | CLOSE | CLOSE | CLOSE |
| OBSERVE | OBSERVE | OBSERVE | OBSERVE | OBSERVE | OBSERVE |
| OPEN | OPEN | OPEN | OPEN | OPEN | OPEN |
| S1 | S2 | E1 | E2 | W1 | W2 |
| OPEN | OPEN | OPEN | OPEN | OPEN | OPEN |
| OBSERVE | OBSERVE | OBSERVE | OBSERVE | OBSERVE | OBSERVE |
| CLOSE | CLOSE | CLOSE | CLOSE | CLOSE | CLOSE |
| STOP | STOP | STOP | STOP | STOP | STOP |
| NO SERVER | NO SERVER | CLOSED | NO SERVER | NO SERVER | NO SERVER |

| ALL CLOSE | PING | REOPEN | QUIT |
|---|---|---|---|

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# Cylinder Control
– Engineering GUI