All Weather Precipitation Accumulation Gauge (AWPAG) Transfer Function for ASOS 2005-2006

Jennifer Dover
Sterling Test and Evaluation Facility, Virginia
January 15, 2007

Outline

- Introduction
- Gauge/Shield Combinations
- WMO Equation (Transfer Function)
- Results
- Case Study
- Conclusions
- Future

Introduction

- Current ASOS precipitation gauge under-reports in certain conditions
- Improve catch in the AWPAG to that of the reference gauge
  - Apply a transfer function to increase catch
  - Use additional shielding with the AWPAG
- Test conducted at test site in Johnstown, Pennsylvania

Production AWPAG

8-Foot Outer Alter Shield

Double Fence Intercomparison Reference (DFIR)

WMO Equation

- CR = 103.10 – 8.67 *Ws + 0.30*Tmax
  - Ws = daily average wind speed
  - Tmax = daily maximum temperature

- CR = 103.10 – 8.67 *W + 0.30*T
  - W = Wind Speed (2 min avg updated every min)
  - T = Temperature (5 min avg updated every min)
- **Equation is applied each minute**:
  - Accumulation increase in gauge **AND** it is snowing

Results

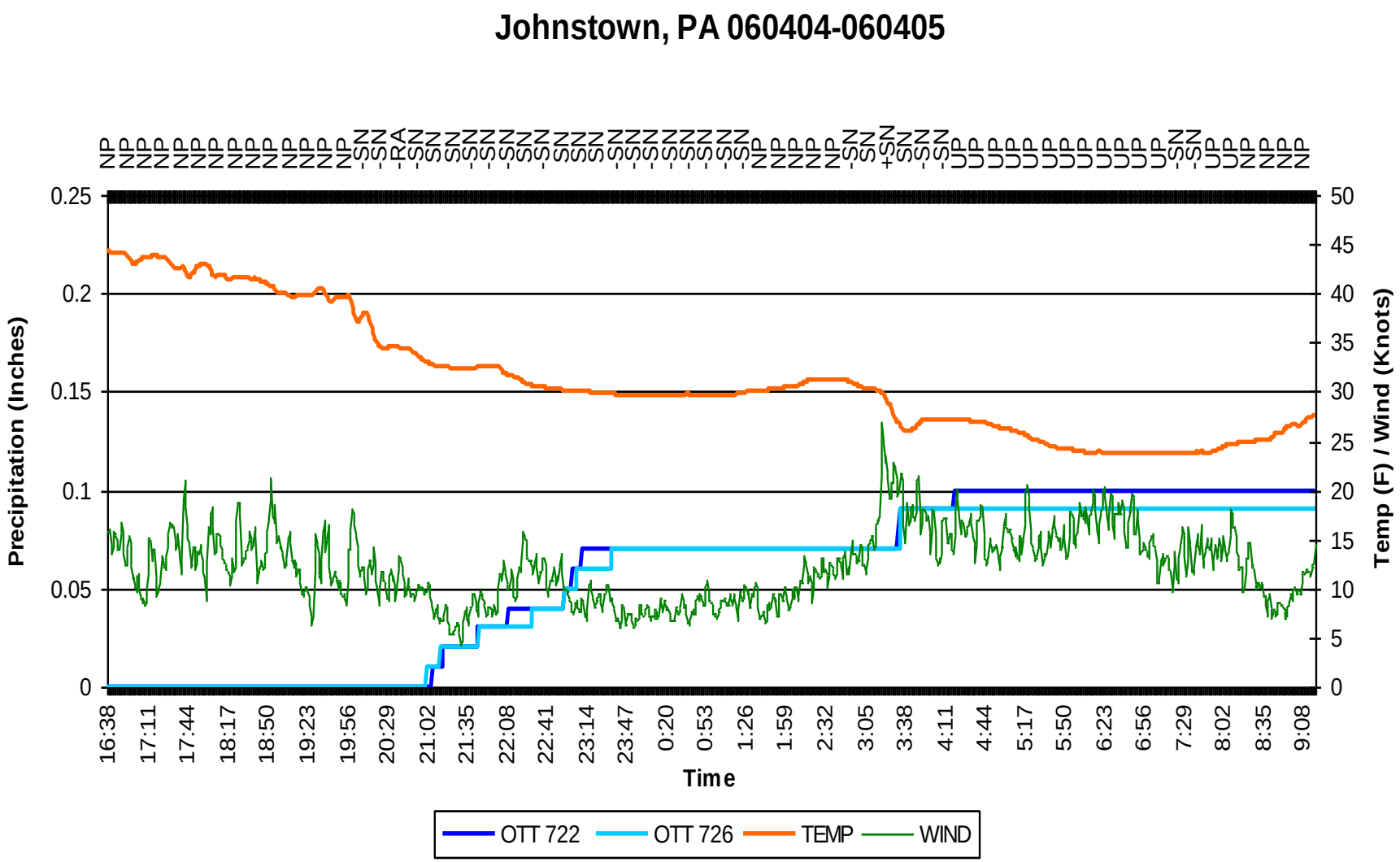
Sensor Number	Sensor Function	Configuration	Catch Before	% of DFIR	Uncorrected - DFIR	Catch After	% of DFIR	Corrected - DFIR
705	Test	Tretyakov with outer Alter (Lexan)	**1.37**	**87**	**-0.21**	--	--	--
715	Test	Tretyakov	0.96	61	-0.62	1.41	89	-0.17
722	Test	Tretyakov	0.98	62	-0.60	1.50	95	-0.08
726	Test	Tretyakov	1.01	64	-0.57	**1.53**	**97**	**-0.05**
292	Reference	Tretyakov inside a Large DFIR	1.58	--	--	--	--	--

Table 1 Sensor Differences of Liquid Water Equivalent

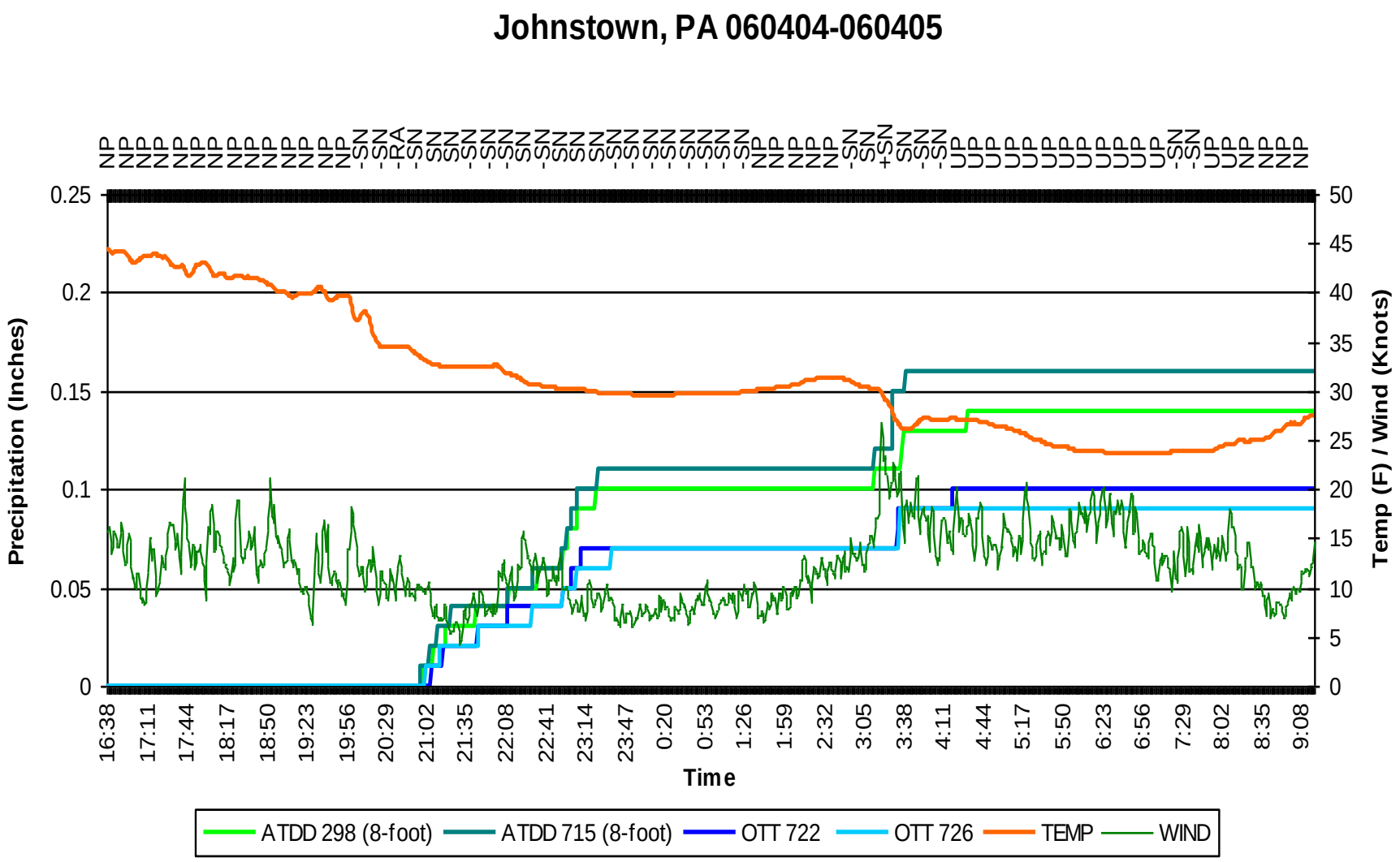
Note: The bold numbers indicate the best performers in each category – not including the DFIR gauge

- 91 hours of snow data

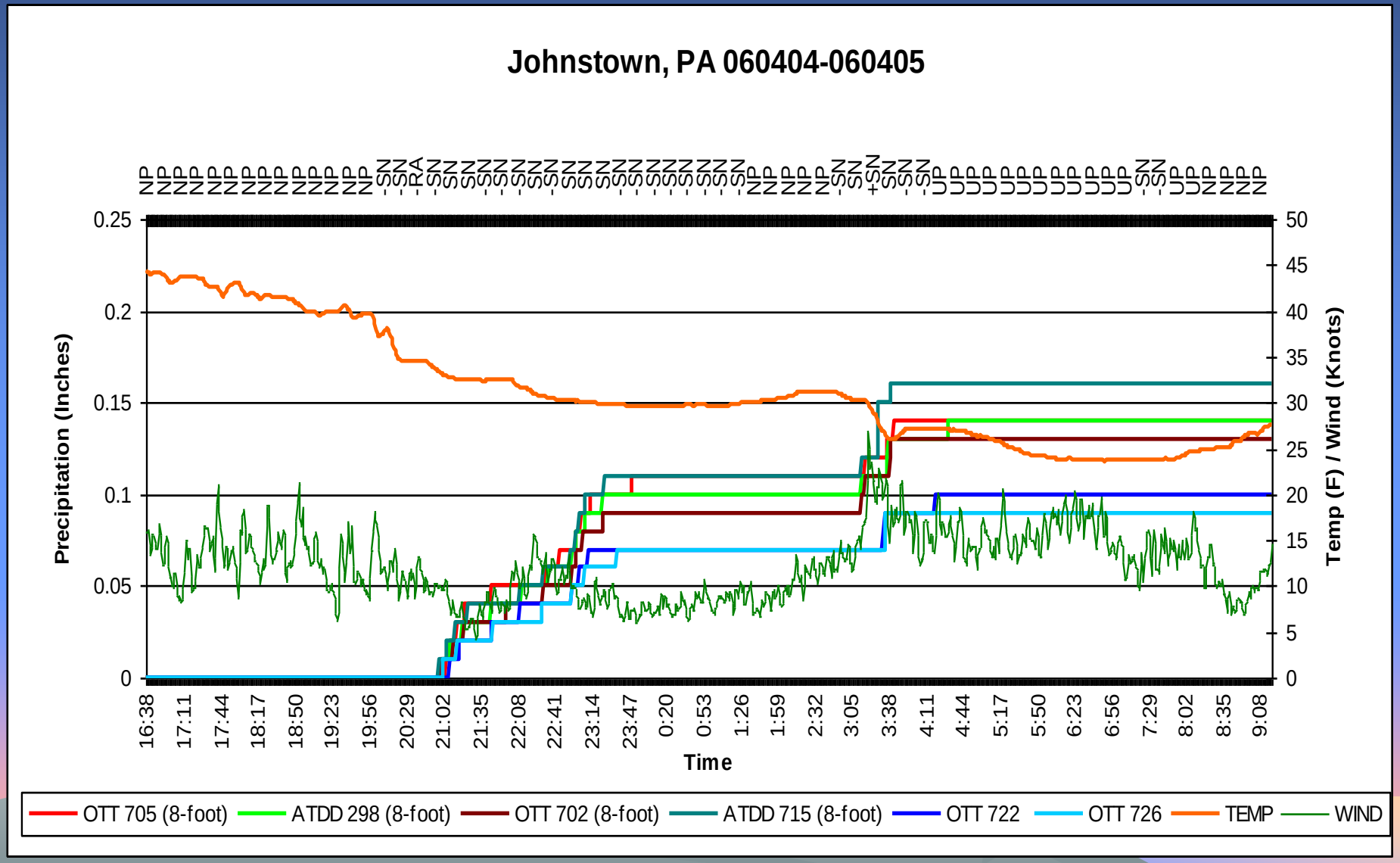
Case Study


Johnstown, PA 060404-060405
Precipitation (Inches)
Temp (F) / Wind (Knots)
Time
OTT 722
OTT 726
TEMP
WIND

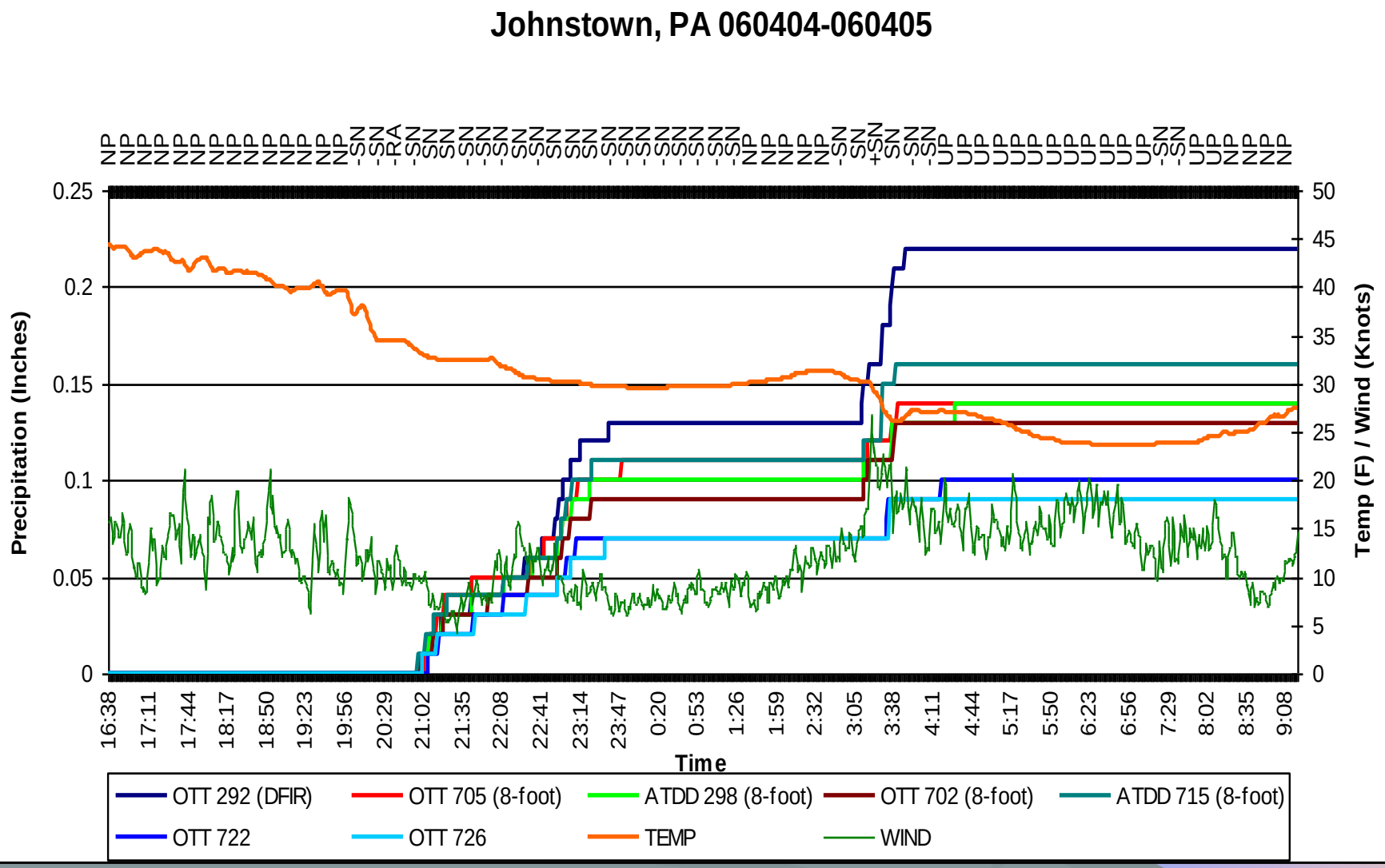
Case Study


Johnstown, PA 060404-060405
Precipitation (Inches)
Temp (F) / Wind (Knots)
Time
0.25
0.2
0.15
0.1
0.05
0
50
45
40
35
30
25
20
15
10
5
0
16:38
17:11
17:44
18:17
18:50
19:23
19:56
20:29
21:02
21:35
22:08
22:41
23:14
23:47
0:20
0:53
1:26
1:59
2:32
3:05
3:38
4:11
4:44
5:17
5:50
6:23
6:56
7:29
8:02
8:35
9:08
ATDD 298 (8-foot)
ATDD 715 (8-foot)
OTT 722
OTT 726
TEMP
WIND

Case Study


Johnstown, PA 060404-060405
Precipitation (Inches)
Temp (F) / Wind (Knots)
Time
OTT 705 (8-foot)
ATDD 298 (8-foot)
OTT 702 (8-foot)
ATDD 715 (8-foot)
OTT 722
OTT 726
TEMP
WIND

Case Study


Johnstown, PA 060404-060405
Precipitation (Inches)
Temp (F) / Wind (Knots)
Time
OTT 292 (DFIR)
OTT 705 (8-foot)
ATDD 298 (8-foot)
OTT 702 (8-foot)
ATDD 715 (8-foot)
OTT 722
OTT 726
TEMP
WIND

Conclusions

- Catch from 8-foot Alter shields increased by 0.38 inches over production AWPAGs
- Catch from 8-foot Alter shields report 0.21 inches less than DFIR
- Transfer function applied to production AWPAG

Future

- Continue to develop and test transfer function to increase the catch in gauges
- Transfer function applied to outer 8-foot Alter shield
- Poster session – Chris Greeney – AWPAG specification results
- Questions / Comments

jennifer.dover@noaa.gov