

2011 PSU Stream 1.5 Report: A4PS

Performance of ARW-EnKF with Assimilation of TDR Data

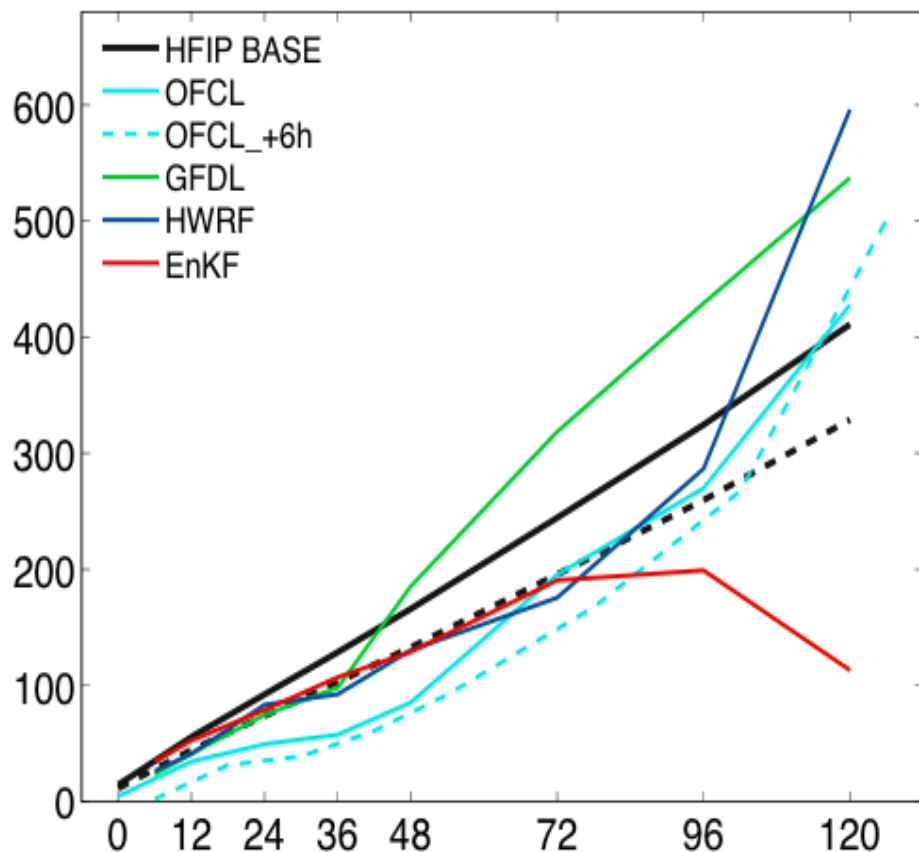
Yonghui Weng and Fuqing Zhang

Penn State University

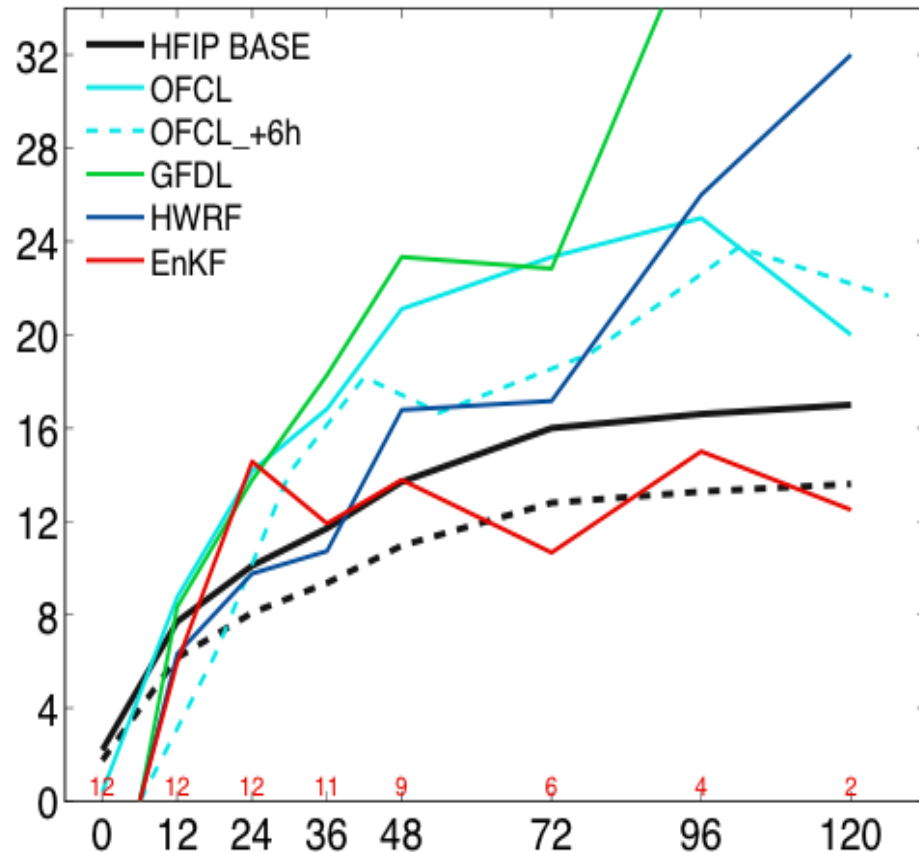
EnKF Performance Assimilating Airborne Radar OBS

Mean Absolute Error for 12 P3 TDR Missions of 2011 (7 Irene + 5 Rina)

ABS Error of position (km) for 2011–2011–homogeneous



ABS Error of maxWSP (kts) for 2011–2011–homogeneous

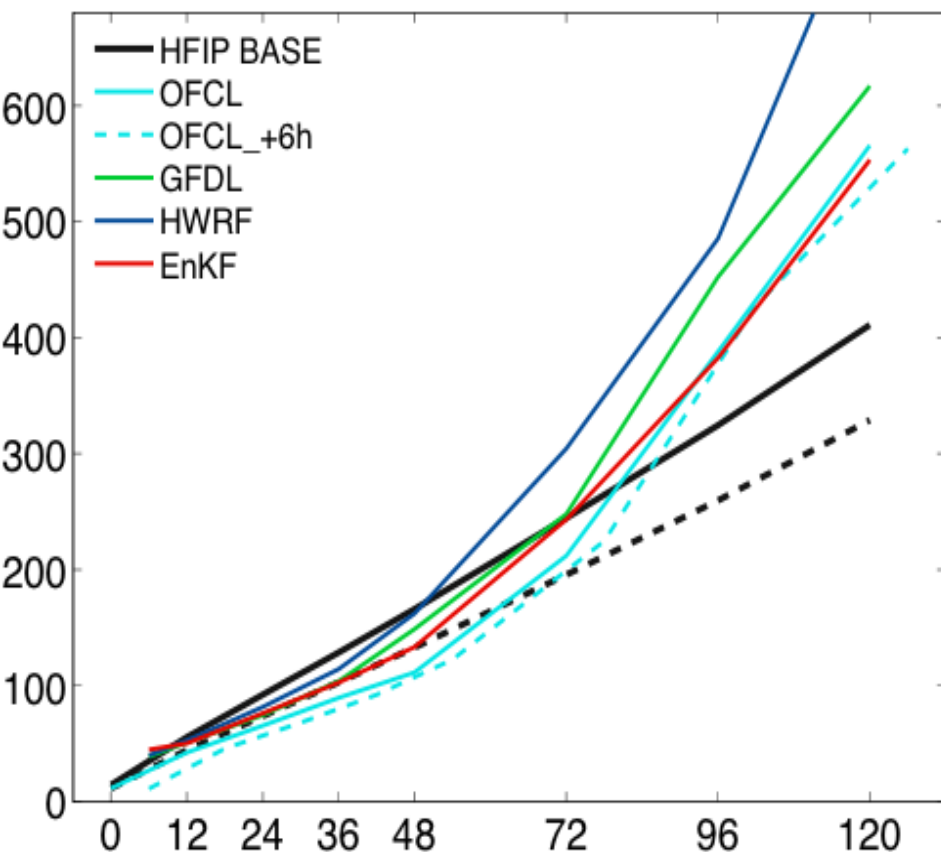


A4PS: PSU 4.5km single forecast initialized with EnKF analyses

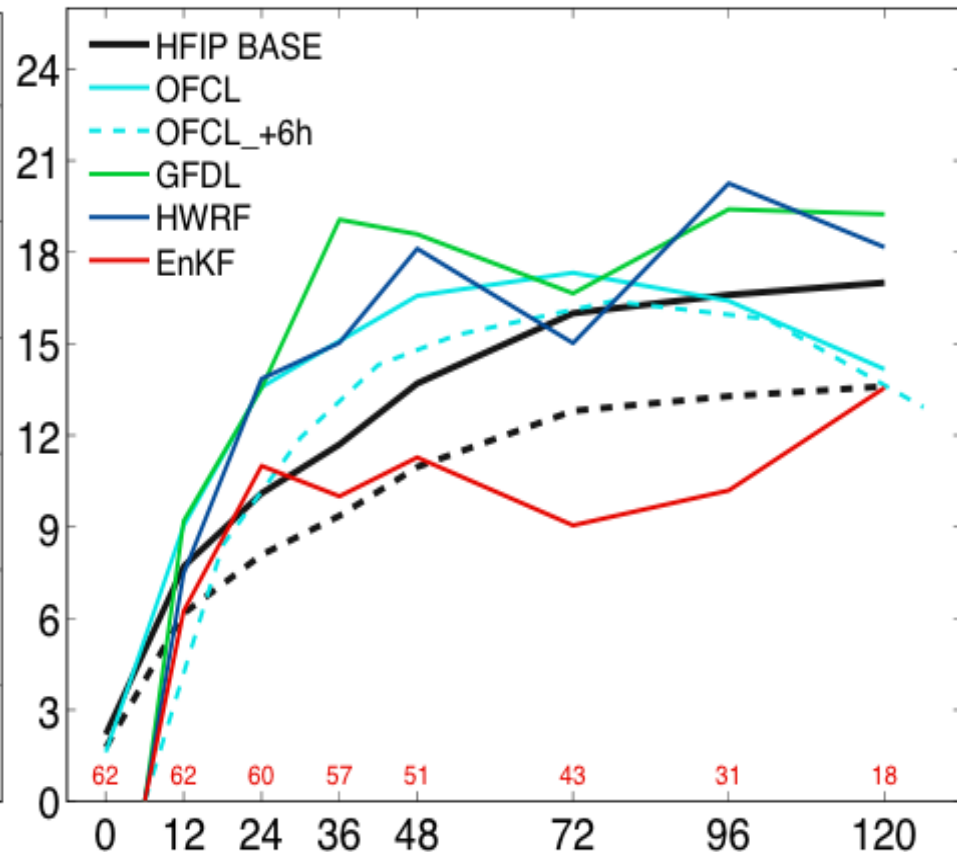
EnKF Performance Assimilating Airborne Radar OBS

Mean Absolute Error for 73 P3 TDR missions during 2008-2011

ABS Error of position (km) for 2008–2011–homogeneous



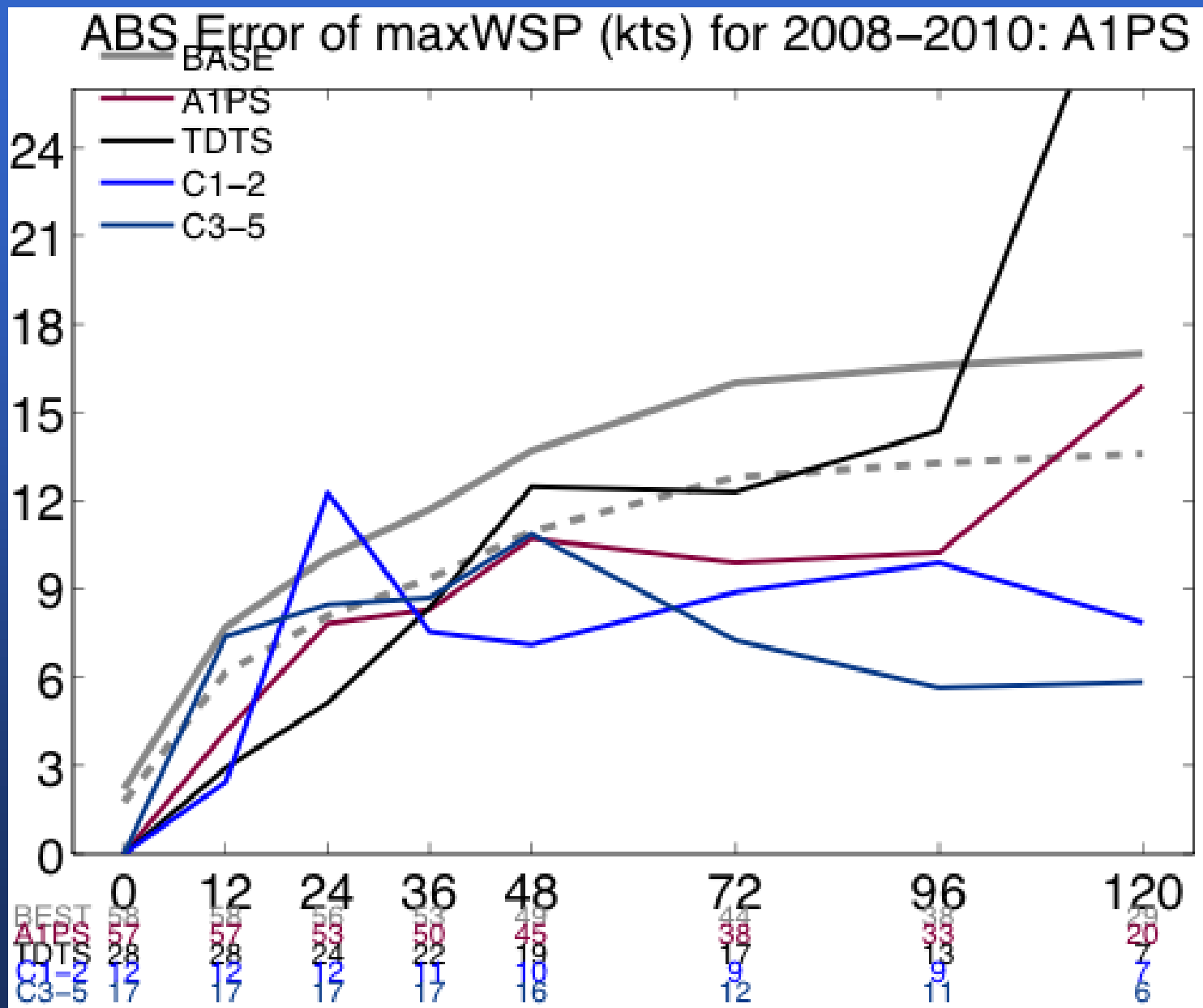
ABS Error of maxWSP (kts) for 2008–2011–homogeneous



With bias correction of intensity error

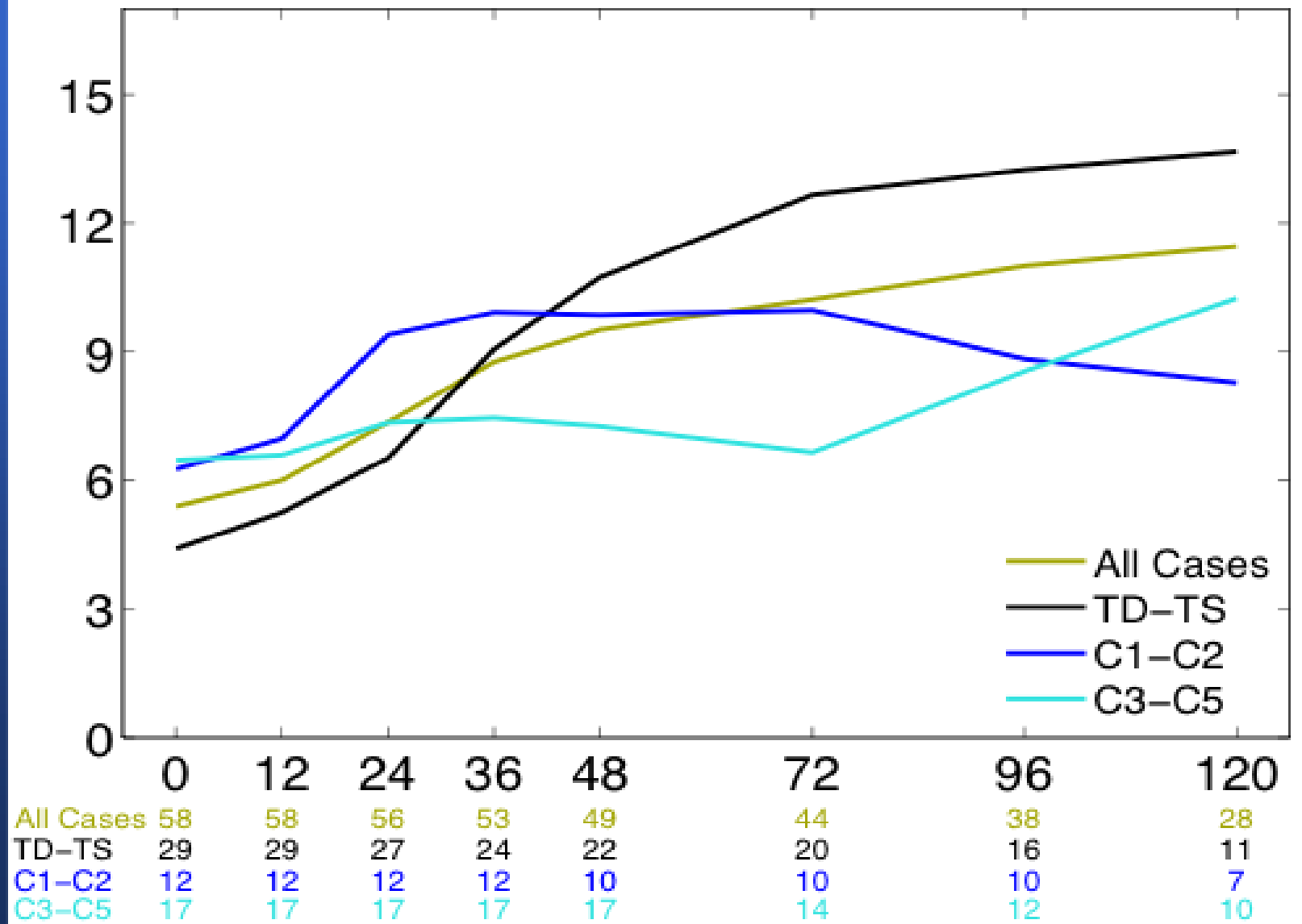
$$Corrected\ WSP = WSP - \left(\frac{30h - t}{30h} \times Bias_at_initial_time \right)$$

Forecast Error as a Function of Initial Intensity



Ensemble Spread As a Function of Initial Intensity

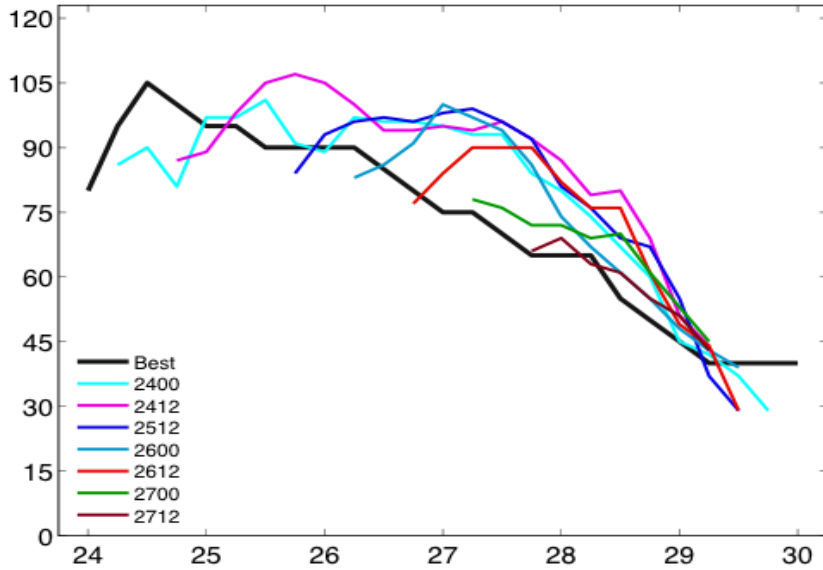
Spread of maxWSP (kts) for 2008–2010: P400



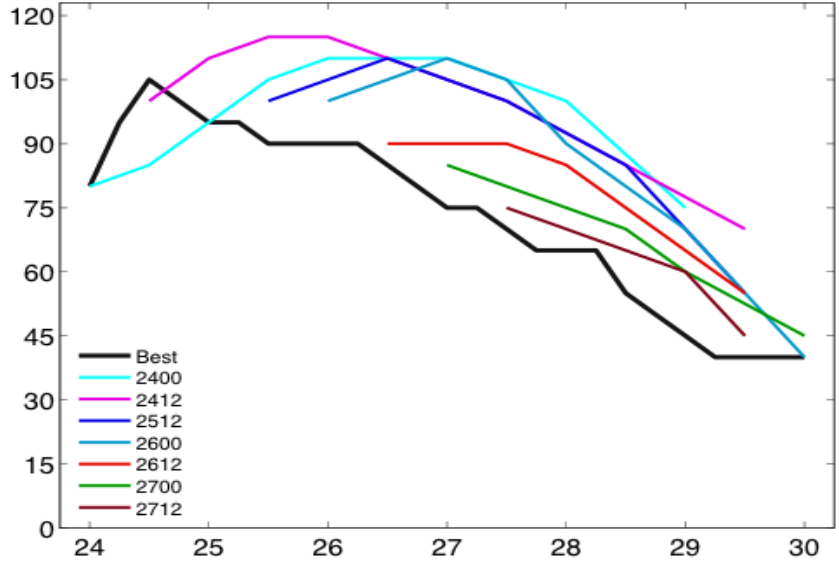
Irene (2011): HFIP Stream1.5 with WRF-EnKF

Realtime assimilation of airborne Vr obs (7 missions)

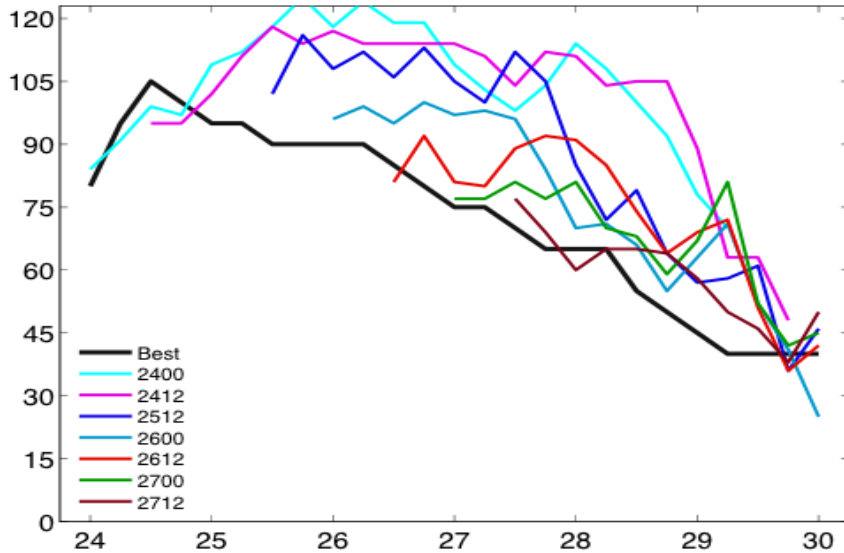
A4PS al09IRENE Vmax



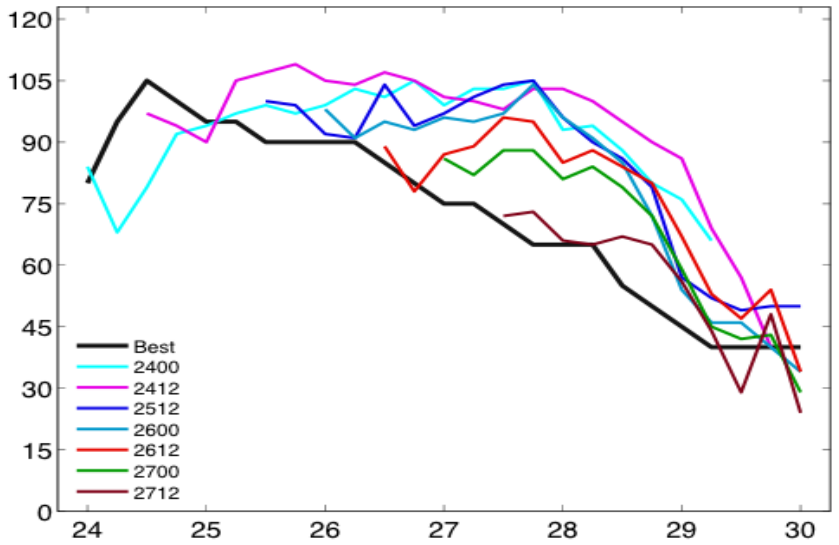
OFCL al09IRENE Vmax



GFDL al09IRENE Vmax

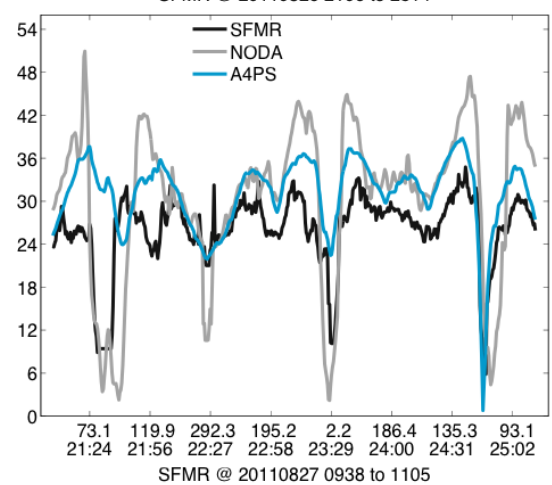
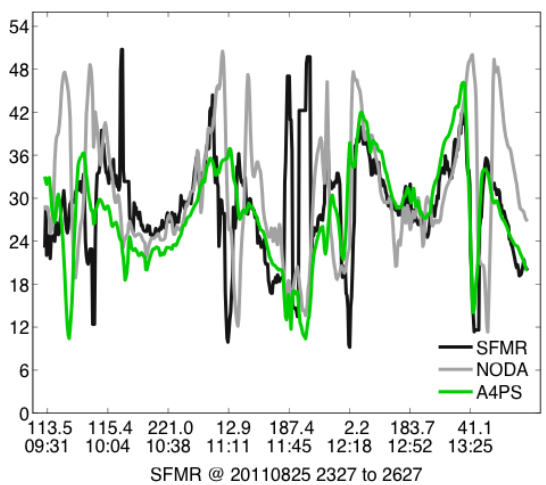
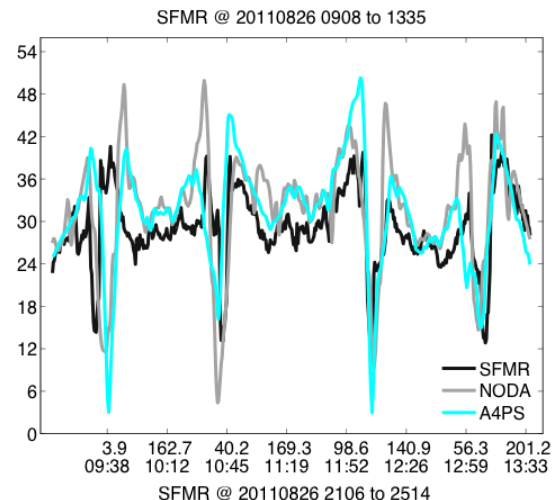
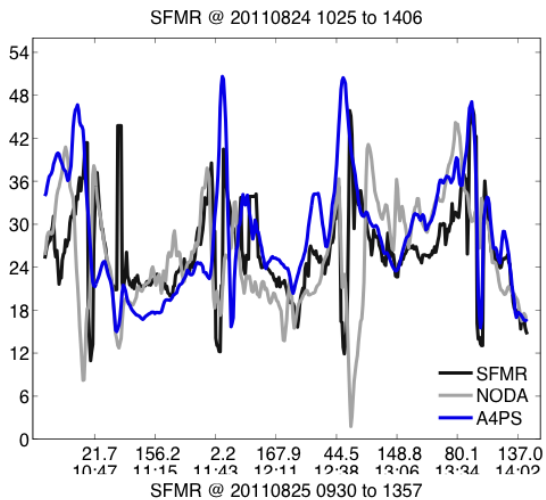
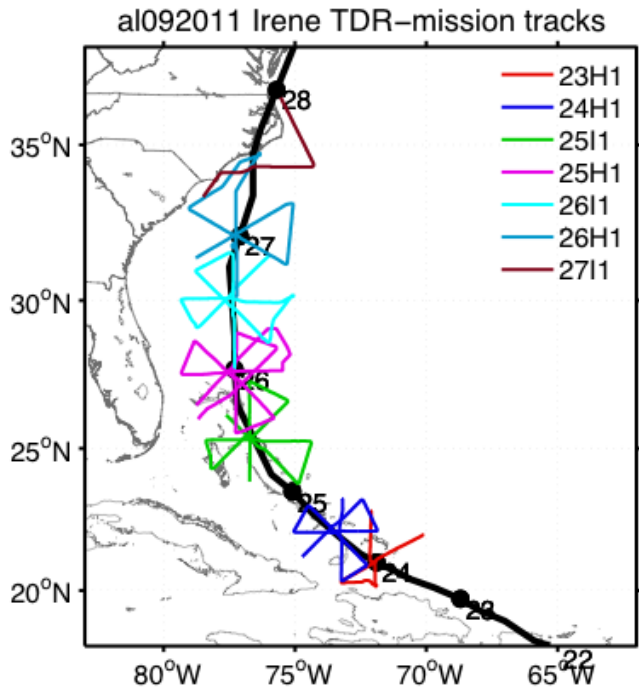


HWRP al09IRENE Vmax

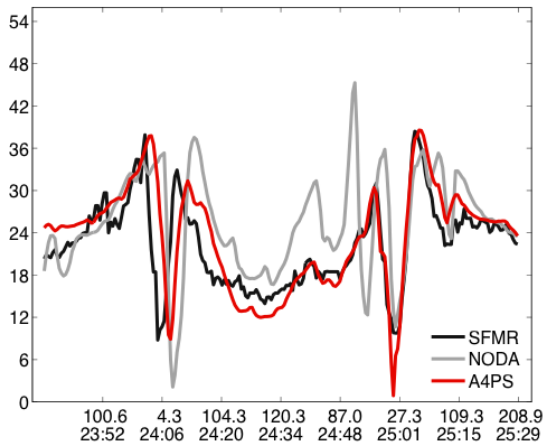


Compare to SFMR

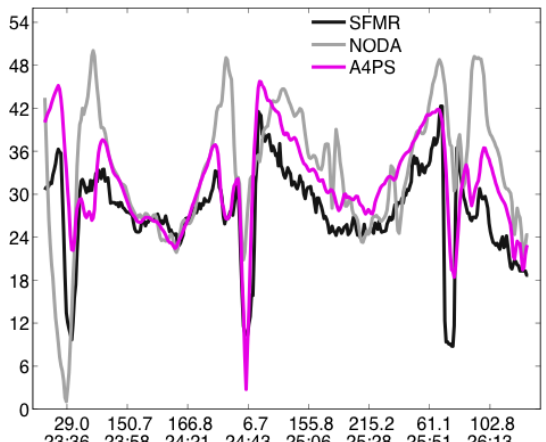
(all legs, with simple QC for SFMR)



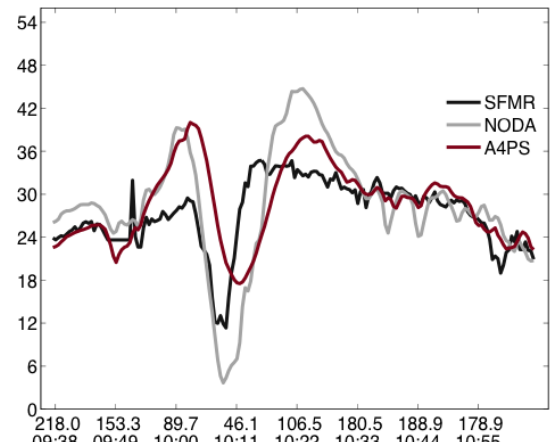
SFMR @ 20110823 2339 to 2529



SFMR @ 20110825 2327 to 2627

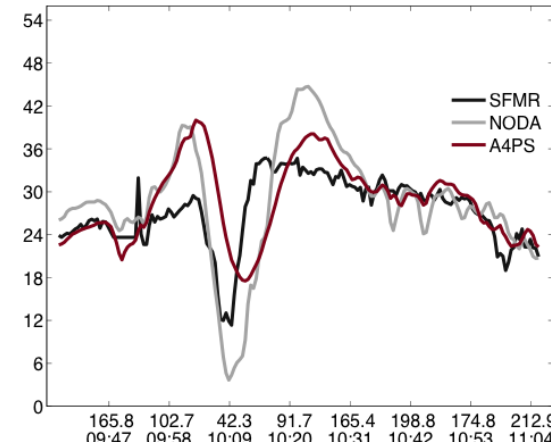
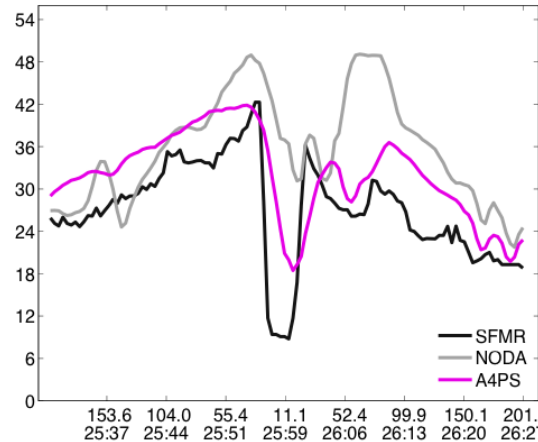
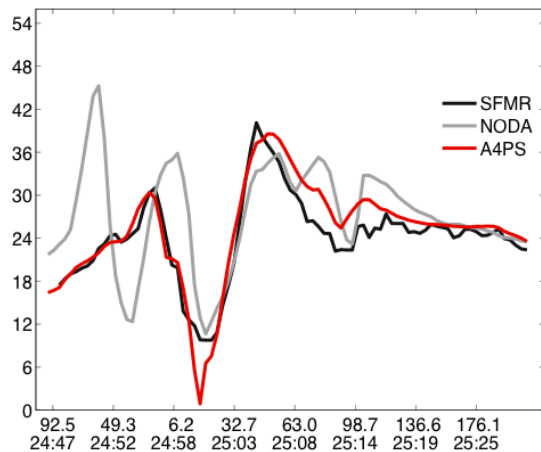
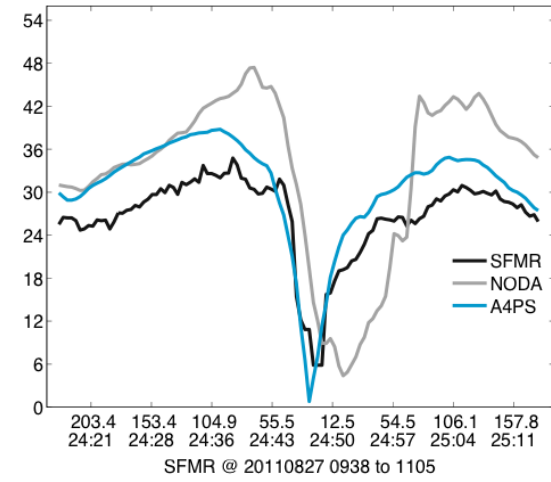
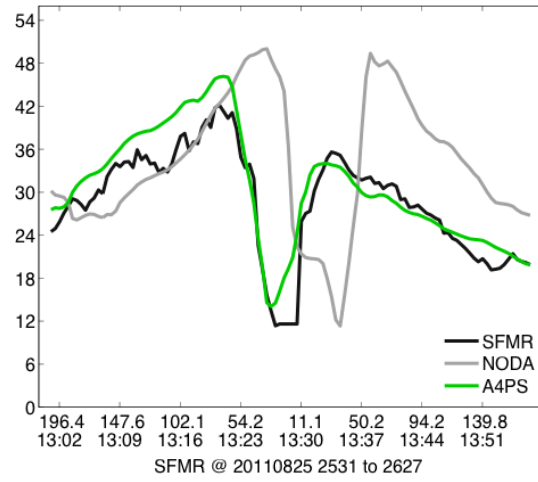
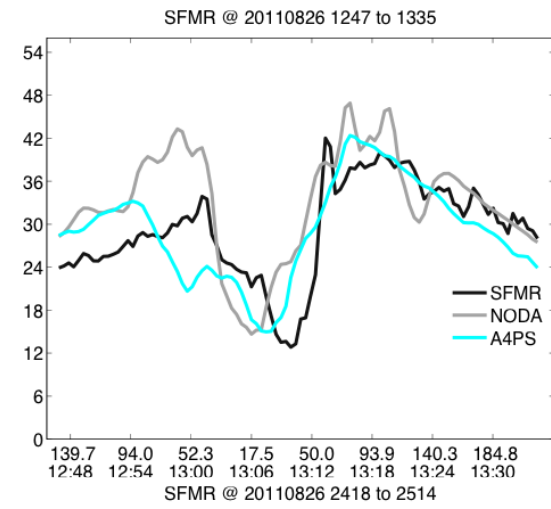
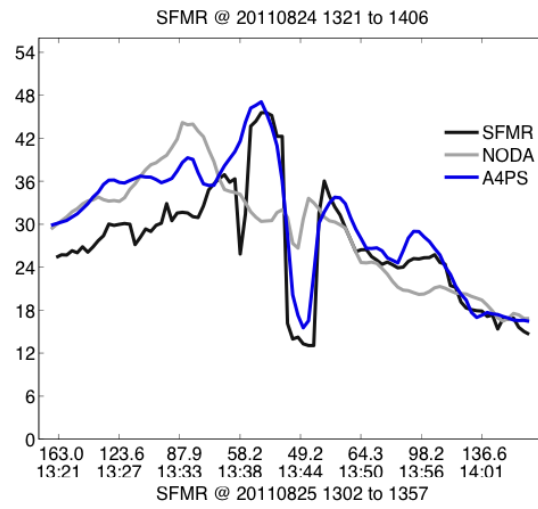
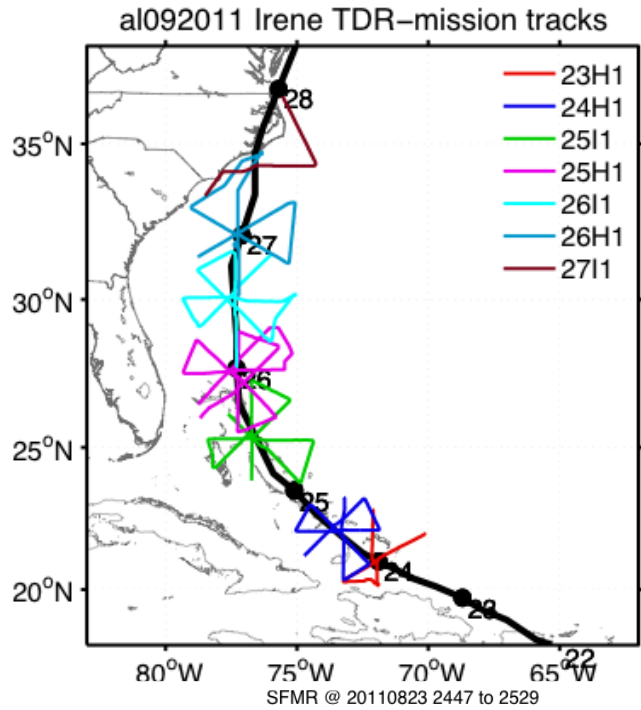


SFMR @ 20110827 0938 to 1105

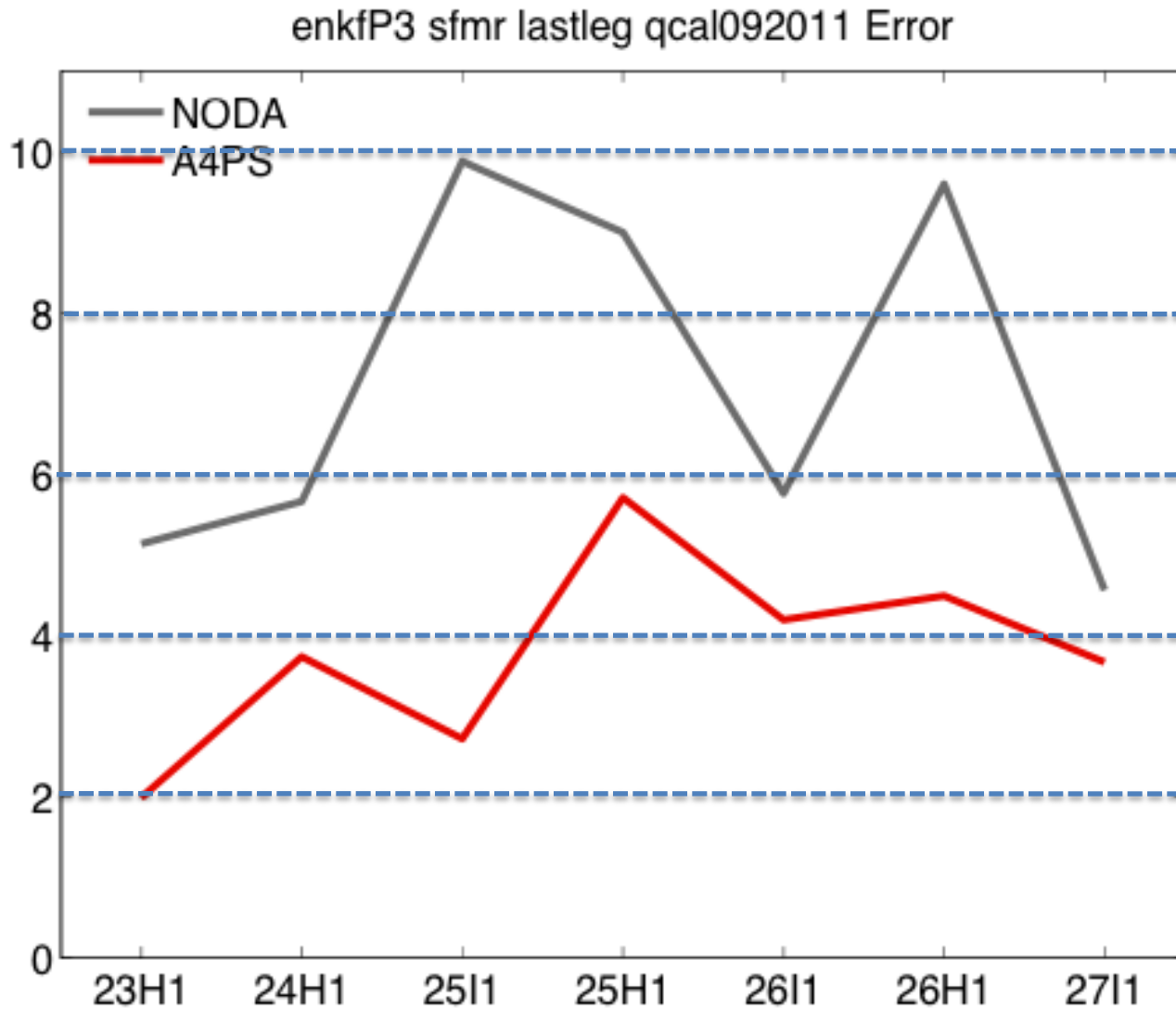


Compare to SFMR

(last legs, with simple QC for SFMR)

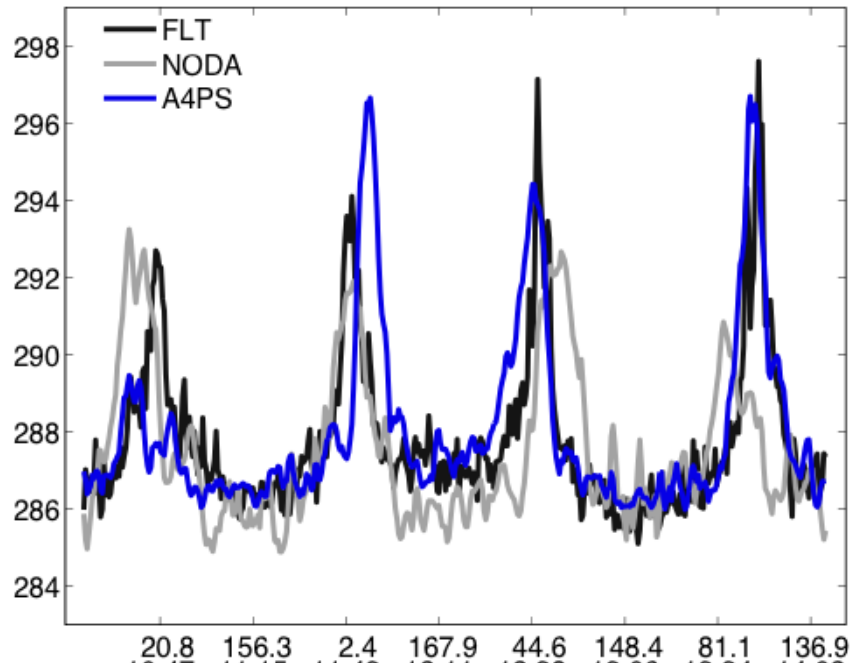


Compare to SFMR: Mean Absolute Error for Each Mission

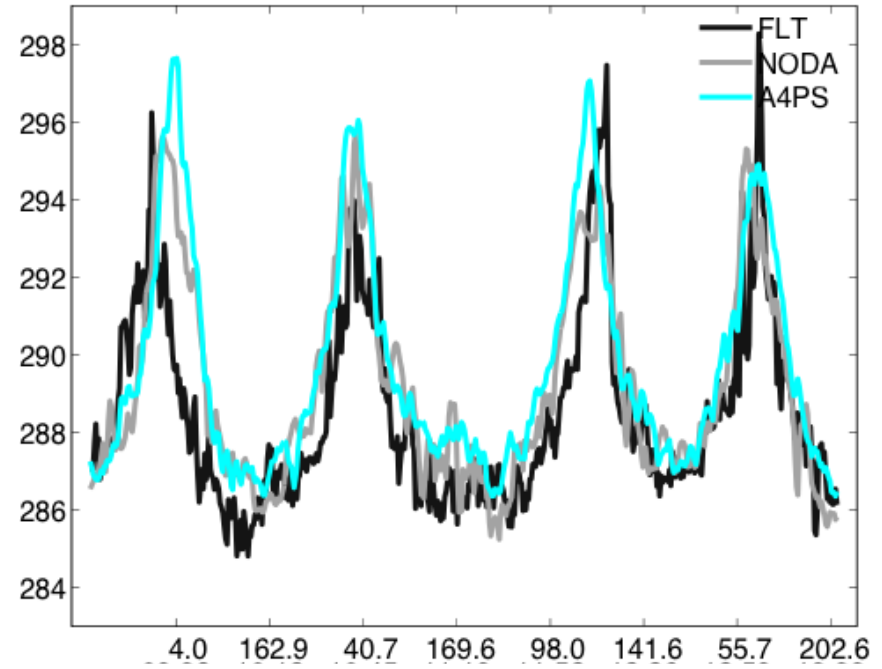


Compare to Flight-level in-situ Temperature Measurements

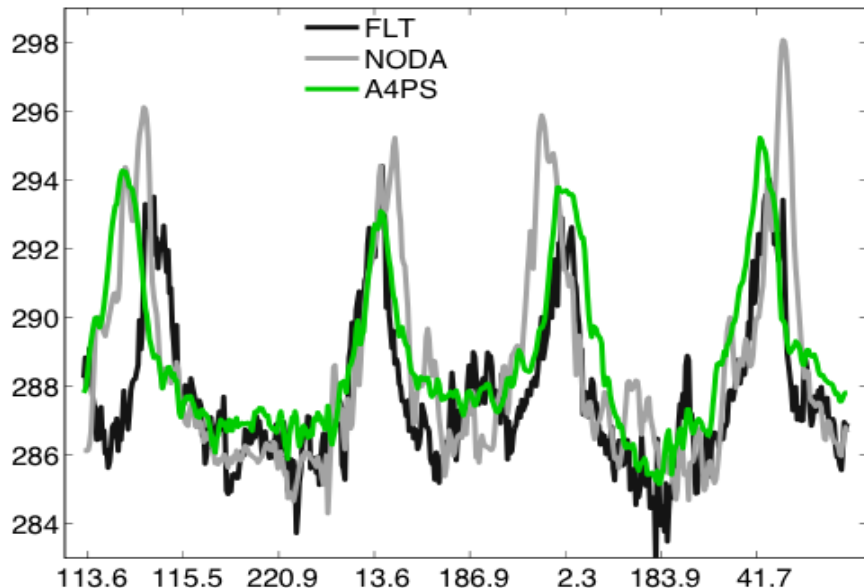
FLT t @ 20110824 1025 to 1406



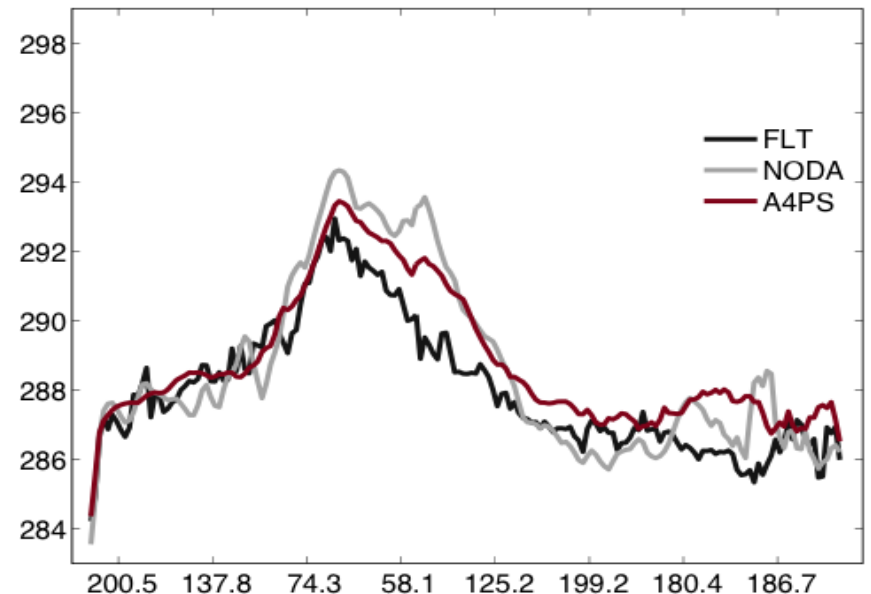
FLT t @ 20110826 0908 to 1335



FLT t @ 20110825 0930 to 1357



FLT t @ 20110827 0938 to 1105



Assimilation of Satellite Winds from John Knaff

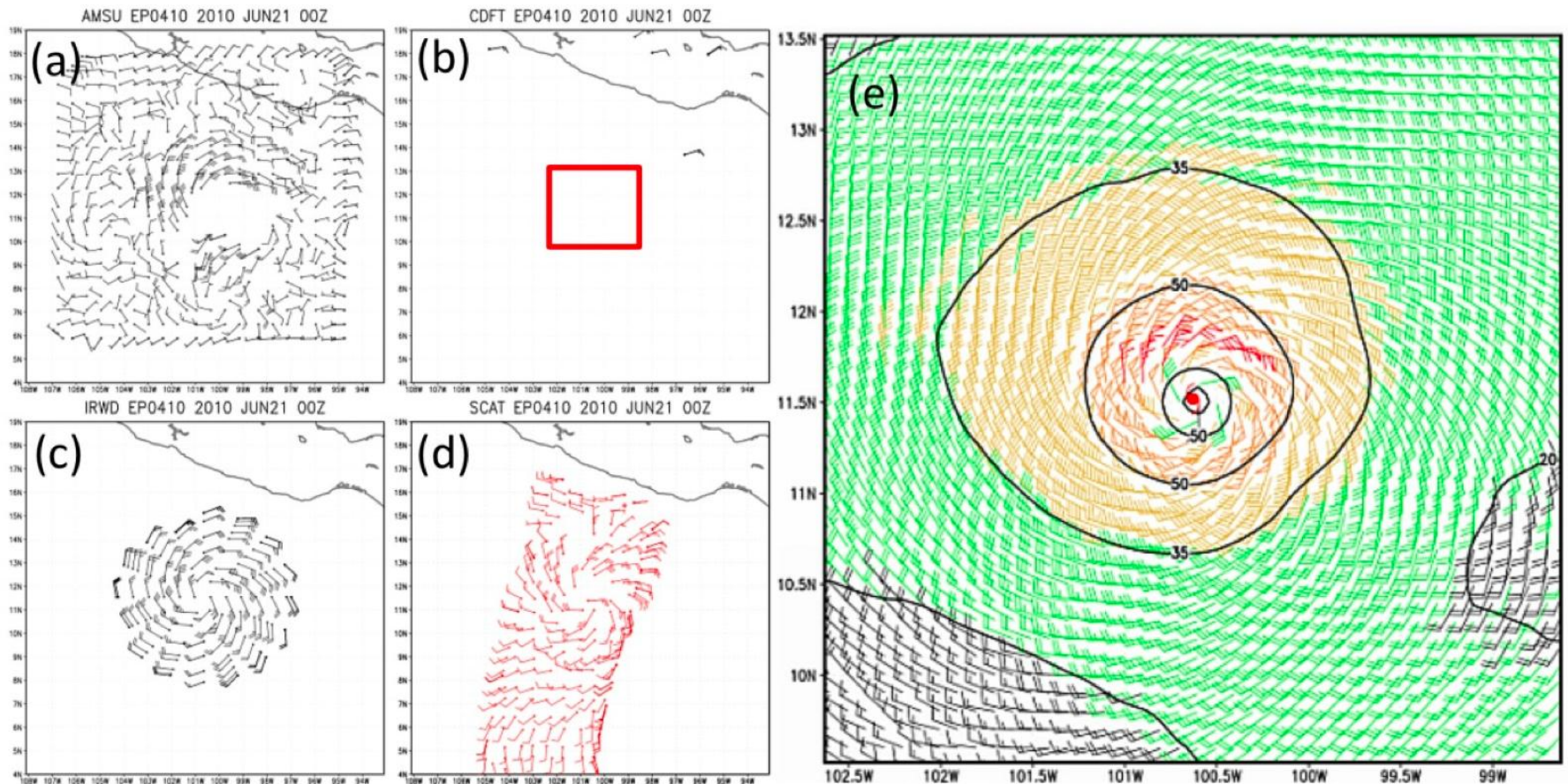
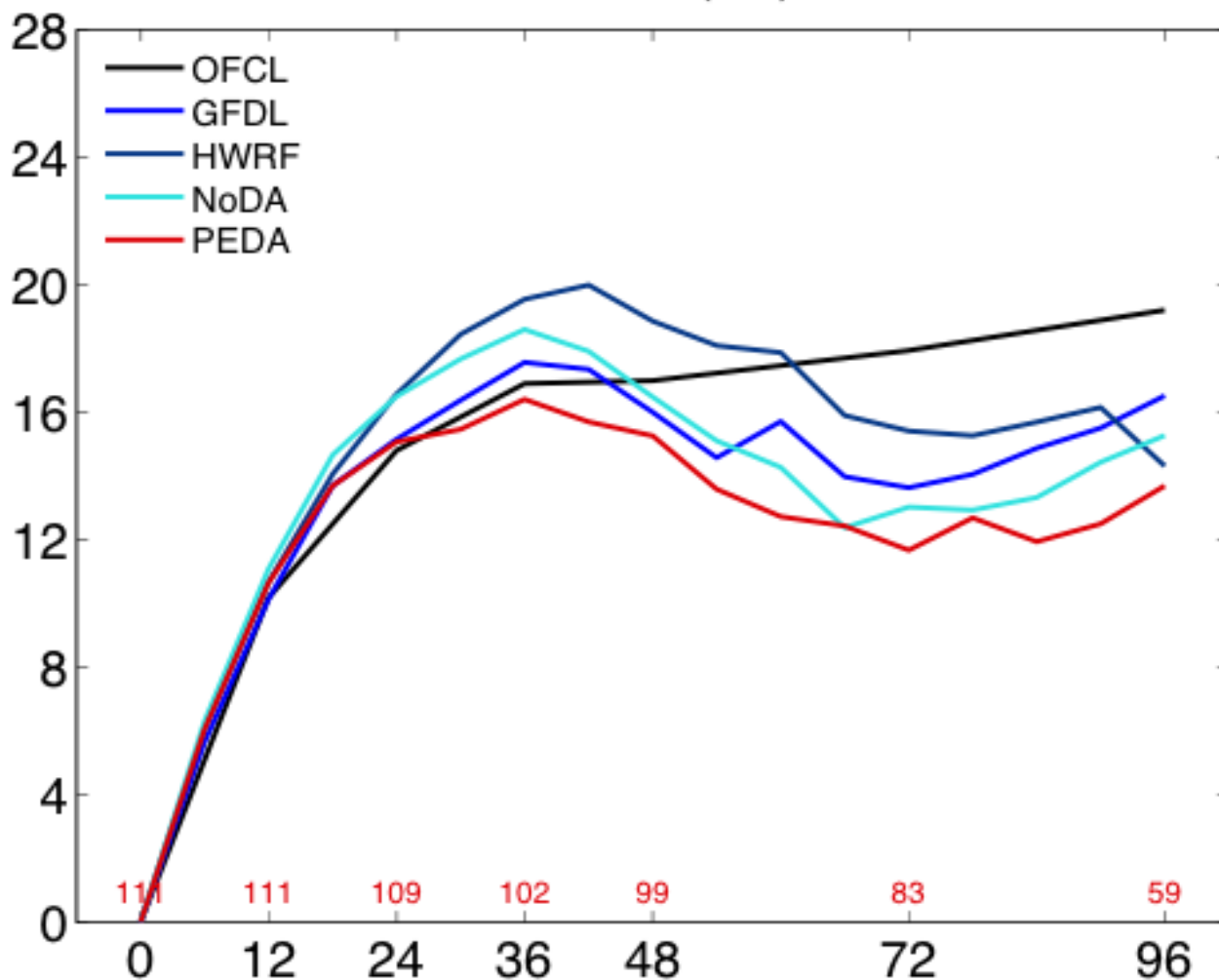


Figure 9. Examples of wind products generated for Hurricane Celia (EP0410) on 21 June 2010 at 00UTC (a) AMSU, (b) CDFT, (c) IRWD, (d) ASCT and (e) MTCSSA. The red frame shown in (b) is the plotted area of MTCSSA wind in (e). (J. Knaff, 2011)

Performance with MTCSWA winds from John Knaff for all 2010 Atlantic hurricanes (\geq Cat 1) every 6 hr

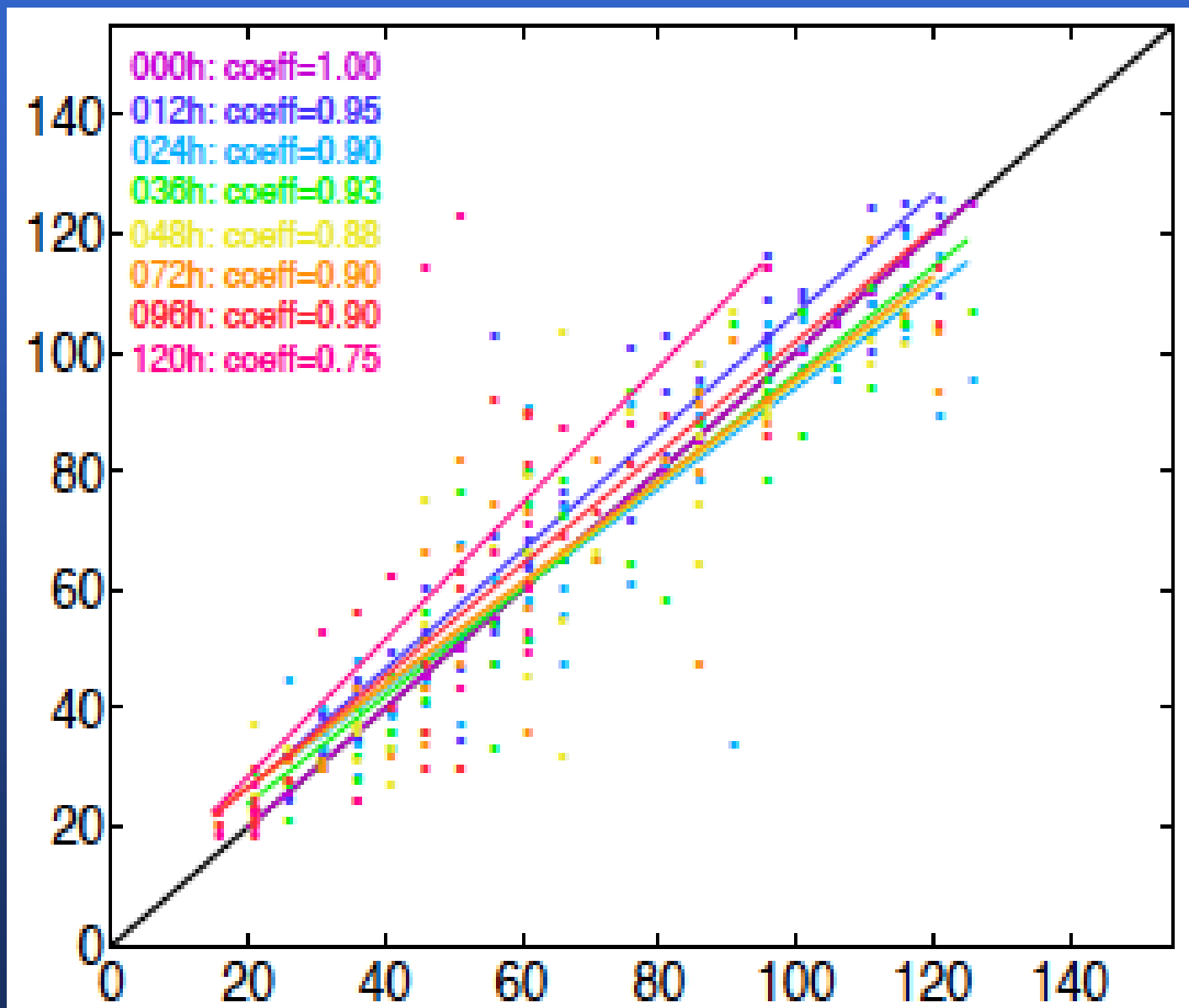
Mean Absolute intensity error with 60-h bias correction

ABS Error of maxWSP (kts) for 2010–2010



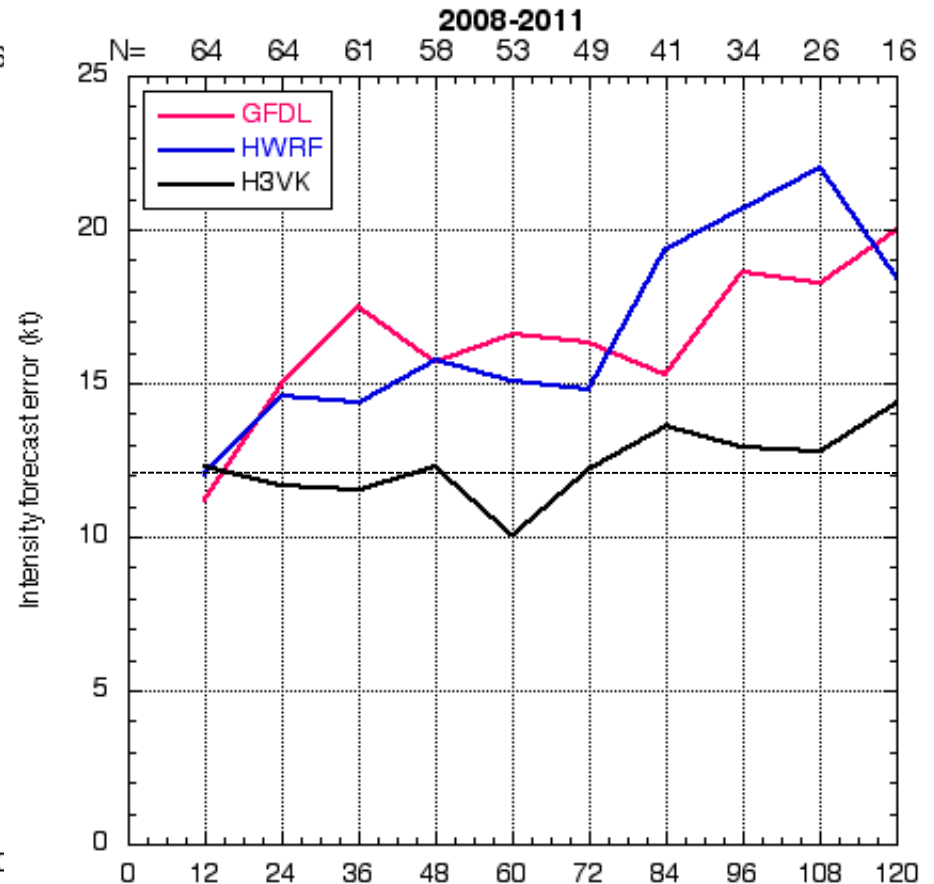
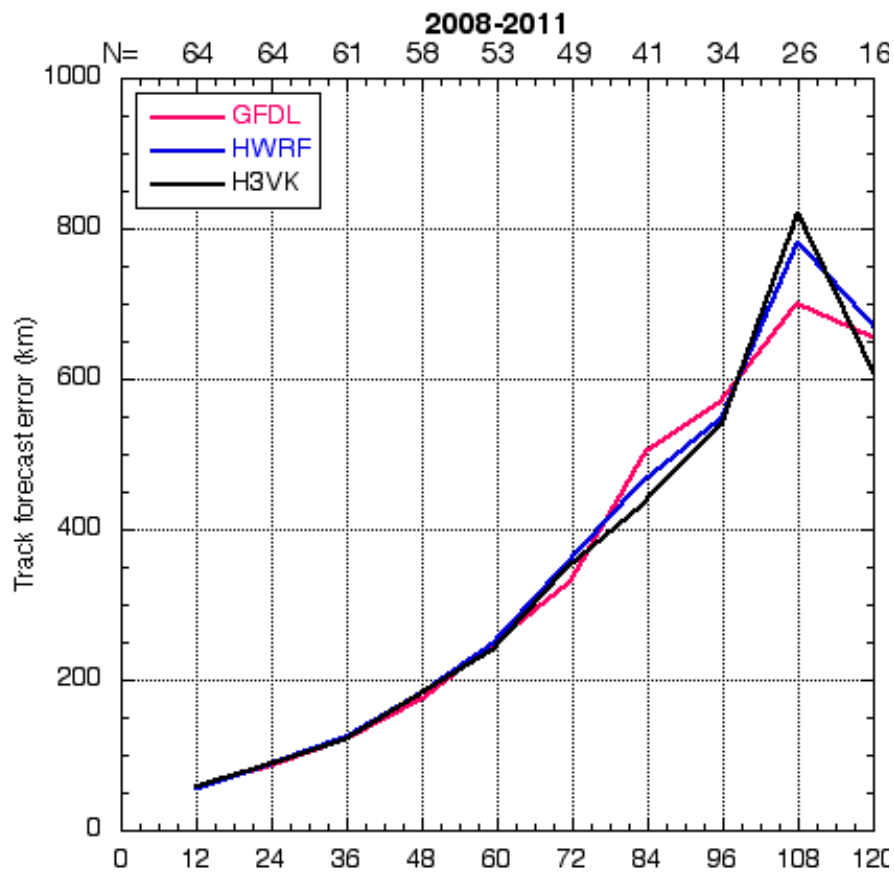
WRF-EnKF Performance Airborne Vr for 2008-2010

1.5-km EnKF Predicted versus Best-track Maximum Wind Speed Error (kts)





VORTEX-SCALE DA WITH NOAA/AOML/HRD's HEDAS 2008-2011 REAL-TIME & RETRO RUNS

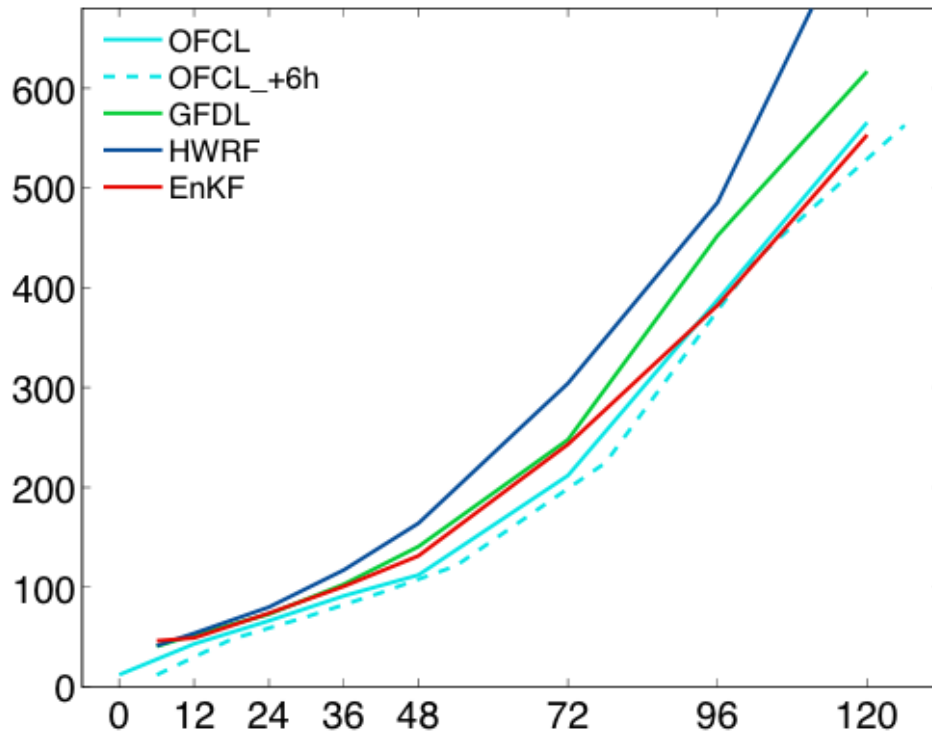


Courtesy of Altug Aksoy and Sim Aberson at NOAA/AOML Hurricane Research Division

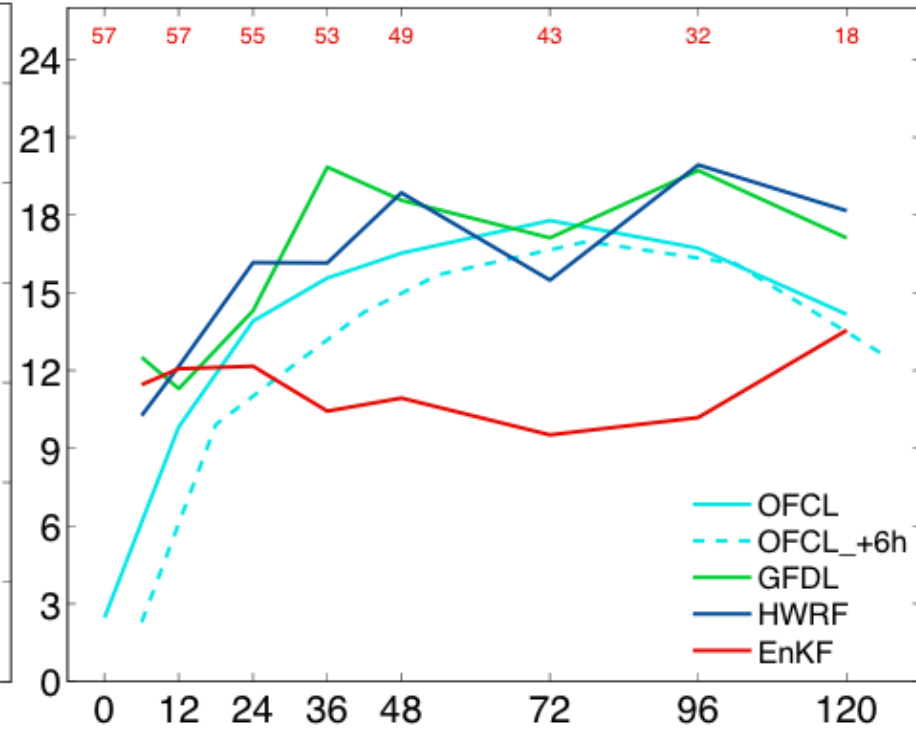
EnKF Performance Assimilating Airborne Radar OBS

Mean Absolute Error and Ensemble Spread for 66 missions during 2008-2011

ABS Error of position (km) for 2008–2011–homogeneous



ABS Error of maxWSP (kts) for 2008–2011–homogeneous



A4PS: PSU 4.5km single forecast initialized with EnKF analyses