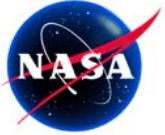


TOPEX Retracking Status and GDR Plan

OSTST 08

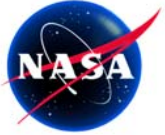
Phil Callahan
Kenneth Oslund
Ernesto Rodriguez

November 2008



Retracking Overview / History

- TOPEX standard processing did not include retracking
- Waveform leakages
 - Need correction to processing via “weights” on WF gates
 - Lead to North/South Ascending/Descending – range rate, “toward” / “away” – differences
- Alt-A PTR degradation – need to fit new PTR for each cycle
- Produced 2 yr of RGDR in 2007 for evaluation
- Other (Instrument Splinter)
 - Studies of Jason-1 retracking led to adoption of MLE-4 to eliminate attitude dependence in data with MLE-3
 - Revisited Jason-1 retracking – find only small changes from beginning of mission
 - Retracked 5 cycles of Jason-2 data
 - Current procedure does not work well for DEM mode (cycles 3, 5, 7)
 - Apparent difference in skewness between Jason-1 and Jason-2

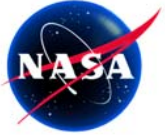


Current Status

- Programmatic: Extension of original OSTST grant to March 2009
- Ported Retracking code (and corrected some minor bugs) to SGI machine capable of retracking 1 yr in less than 3 days
- Developed procedure for fitting PTR cycle by cycle to onboard Cal-1 data

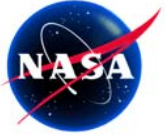
- Investigating Alt-A PTR degradation by looking at WF residuals
 - Changes in residuals suggest that weights may also need adjustment but need “correctness” criteria

- Began tests on Alt-B PTR and weights before starting systematic retracking
 - Expect to start by end of Nov (finish before end of year)



RGDR Plan

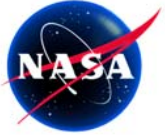
- Make new TOPEX RGDR consistent with Jason ver_C/D
 - Request GSFC produce new orbits based on Eigen-GL04C gravity model, including time varying components (seasonal inconsistency between TOEX, Jason)
 - Newest tide model(s) GOT4.7 and ?
 - Improved long period non-equilibrium tides
 - New dry tropo correction and associated MOG2D values
 - SSB fitted on Retracked Data (with quadrant corrections) – *Note that this requires making a full RGDR so that SSB does not pick up any orbit, tide, etc. errors*
- RGDR consists of
 - Copy of original GDR with new orbits, tides in those variables
 - Addition of
 - Retracking, TMR correction
 - Various other Jason fields: MSS, Geoid=EGM08, MOG2D
- ACCESS07 proposal for Web-based Altimeter Service to make product updatable on-line, at user request
 - Will be transformed from flat file to NetCDF



Backup Material

Details



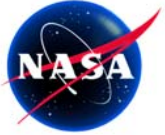


TOPEX Reprocessing – Jason GDR-C Comparison

Phil Callahan

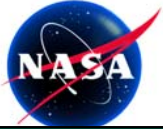
June 15, 2007





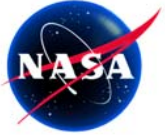
TOPEX Reprocessing Plan (June '07)

- For OSTST (2005-08) Callahan et al were selected to do retracking of TOPEX data and studies of EM Bias. Plan has evolved somewhat into producing an updated GDR = RGDR
 - Work has also included verifying Jason tracking and SSB
- Current Plan for Reprocessing TOPEX GDRs
 - Retrack all TOPEX data
 - Based on results for OST07 may delete MAP algorithm as time consuming and results appear to be too sensitive to waveform leakages
 - Send 2 yr of retracked data to CLS for SSB solution
 - Separate solutions for Alt-A/B. Need to check that SSB remains constant through Alt-A (i.e., changing PTR in retracking has removed error)
 - Update tide models to Jason standard
 - Get latest (assumed Jason compatible) orbits from GSFC
 - Get atmospheric data from CLS
 - TMR has been recalibrated by Brown & Desai
 - Possibly add some fields to RGDR to be similar to Jason GDR
- Submitted ACCESS07 proposal for web-based “Altimeter Service” to provide tools for updating GDRs by users based on “registered” improved components
- Following slides from CNES presentation at OST07 have replaced Jason Ver-A with TPX RGDR for comparison with Jason Ver-B, C



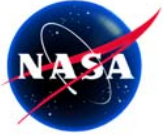
Instrumental parameters and Environmental corrections

Model	TOPEX RGDR (Mar '07)	Jason Version "b"	Jason Version "C"
Altimeter retracking	Rodriguez LSE, MAP (MAP may be dropped from final)	MLE4 & 2nd order echo model	MLE4 & 2nd order echo model
Altimeter Instrument Corrections	Consistent with LSE retracking	Consistent with MLE4 retracking algorithm.	Consistent with MLE4 retracking algorithm.
Microwave Radiometer Parameters	Calibration update by Brown & Desai	Using calibration parameters derived from cycles 1-115.	New JMR characterization file
Dry Troposphere Range Correction	From CLS (should be compatible with Jason)	From ECMWF atmospheric pressures and model for S1 and S2 atmospheric tides.	From ECMWF atmospheric pressures (+S1 & S2) corrected for spurious oscillations
Wet Troposphere Range Correction from Model	From CLS (should be compatible with Jason)	From ECMWF model.	From ECMWF model.
Dual ionospheric correction	[Will be Recomputed from retracking with new SSB]		Updated taking into account new SSB on both bands
Back up model for Ku-band ionospheric range correction.	Copied from MGDR-B [Will be updated to GIM if provided by CLS]	Derived from DORIS measurements.	Derived from JPL GIM maps.
Sea State Bias Model	MGDR-B [Will be updated by CLS based on 2yr of retracked data with models available fall '07]	Empirical model derived from cycles 11-100 of MLE3 altimeter data with version "b" geophysical models"	Empirical model derived from cycles 11-100 (TBC) of MLE4 altimeter data with version "b" geophysical models".
Altimeter Wind Speed Model	Jason ver. B, Vandemark et al. model via equations	Derived from version "a" Jason-1 GDR data.	Derived from version "a" Jason-1 GDR data. ??
Rain Flag	TPX algorithm with corrected TMR [Will add Jason type]	Derived from version "a" Jason-1 GDRs (cycles 1-30).	Derived from version "B" Jason-1 GDRs. Using AGC
Ice Flag	TPX algorithm from MGDR-B	Climatology table	Climatology table (improve using Y. Faugere proposal)



Other Geophysical Corrections Evolution

Model	TOPEX RGDR (Mar '07)	Jason Version "b"	Jason Version "C"
Mean Sea Surface	CLS01	CLS01	CLS01
Along Track Mean Sea Surface	None (should be added)	None (set to default)	CLS model
Geoid	EGM96	EGM96	EGM96
Bathymetry	None	DTM2000.1	DTM2000.1
Inverse Barometer Correction	Provided by CLS (should be compatible with Jason)	Computed from ECMWF atmospheric pressures after removing S1 and S2 atmospheric tides.	Computed from ECMWF atmospheric pressures (+S1 & S2) corrected for spurious oscillations
Tide Solution 1	GOT00.2 + ? (S1 ocean tide; S1 load tide ignored – check)	GOT00.2 + S1 ocean tide. S1 load tide ignored.	GOT00.2 + S1 ocean tide. S1 load tide ignored.
Tide Solution 2	FES2004 + ? (check)	FES2004 + S1 and M4 ocean tides. S1 and M4 load tides ignored.	FES2004 + S1 and M4 ocean tides. S1 and M4 load tides ignored. K2, S1 and loading tide updated
Equilibrium long-period ocean tide.	From Cartwright and Taylor tidal potential.	From Cartwright and Taylor tidal potential.	From Cartwright and Taylor tidal potential.
Non-equilibrium long-period ocean tide.	Mm, Mf, Mtm, and Msqm from FES2004 (check)	Mm, Mf, Mtm, and Msqm from FES2004.	Mm, Mf, Mtm, and Msqm from FES2004.
Solid Earth Tide	From Cartwright and Taylor tidal potential.	From Cartwright and Taylor tidal potential.	From Cartwright and Taylor tidal potential.
Pole Tide	Equilibrium model	Equilibrium model.	Equilibrium model.
Wind Speed from Model	None (could be added if CLS provides)	ECMWF model	ECMWF model

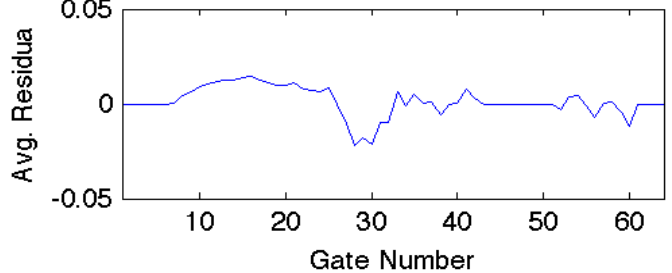


Effect of Different Cycle PTRs (Cyc 049/233)

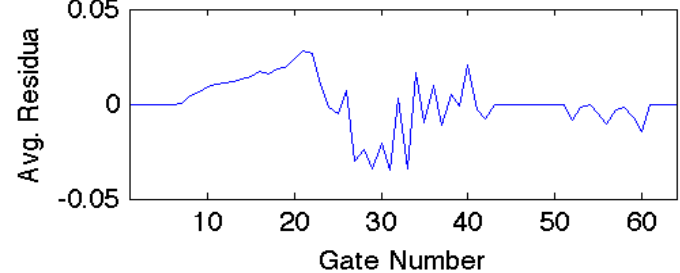
Cyc 233 P 021 PTR v7

Cyc 049 P 021 PTR v7

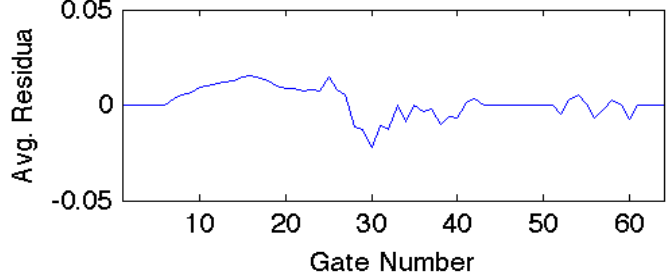
Mean of Residual for "Ise swhK" between 0.9 and 3.
Normalized by Half Max Value of the Waveform



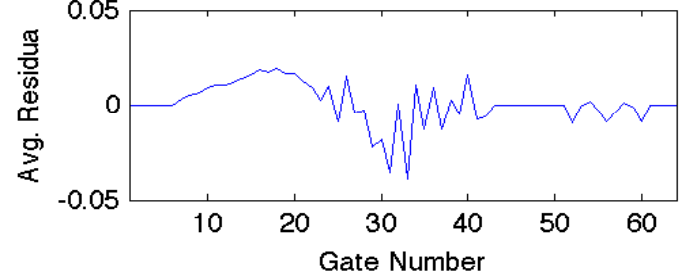
Mean of Residual for "Ise swhK" between 0.9 and 3.
Normalized by Half Max Value of the Waveform



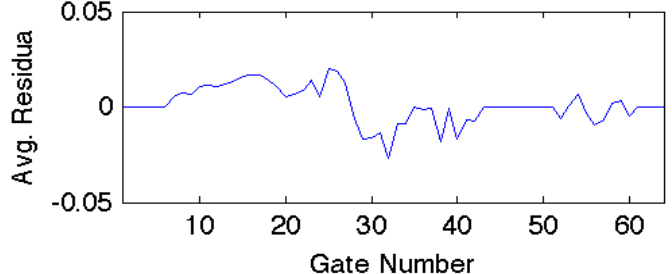
Mean of Residual for "Ise swhK" between 3.1 and 6.
Normalized by Half Max Value of the Waveform



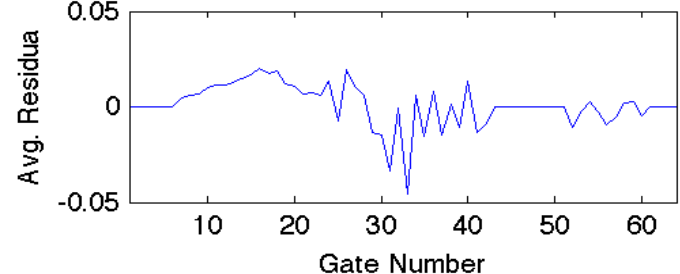
Mean of Residual for "Ise swhK" between 3.1 and 6.
Normalized by Half Max Value of the Waveform

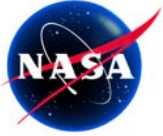


Mean of Residual for "Ise swhK" between 6.2 and 2
Normalized by Half Max Value of the Waveform

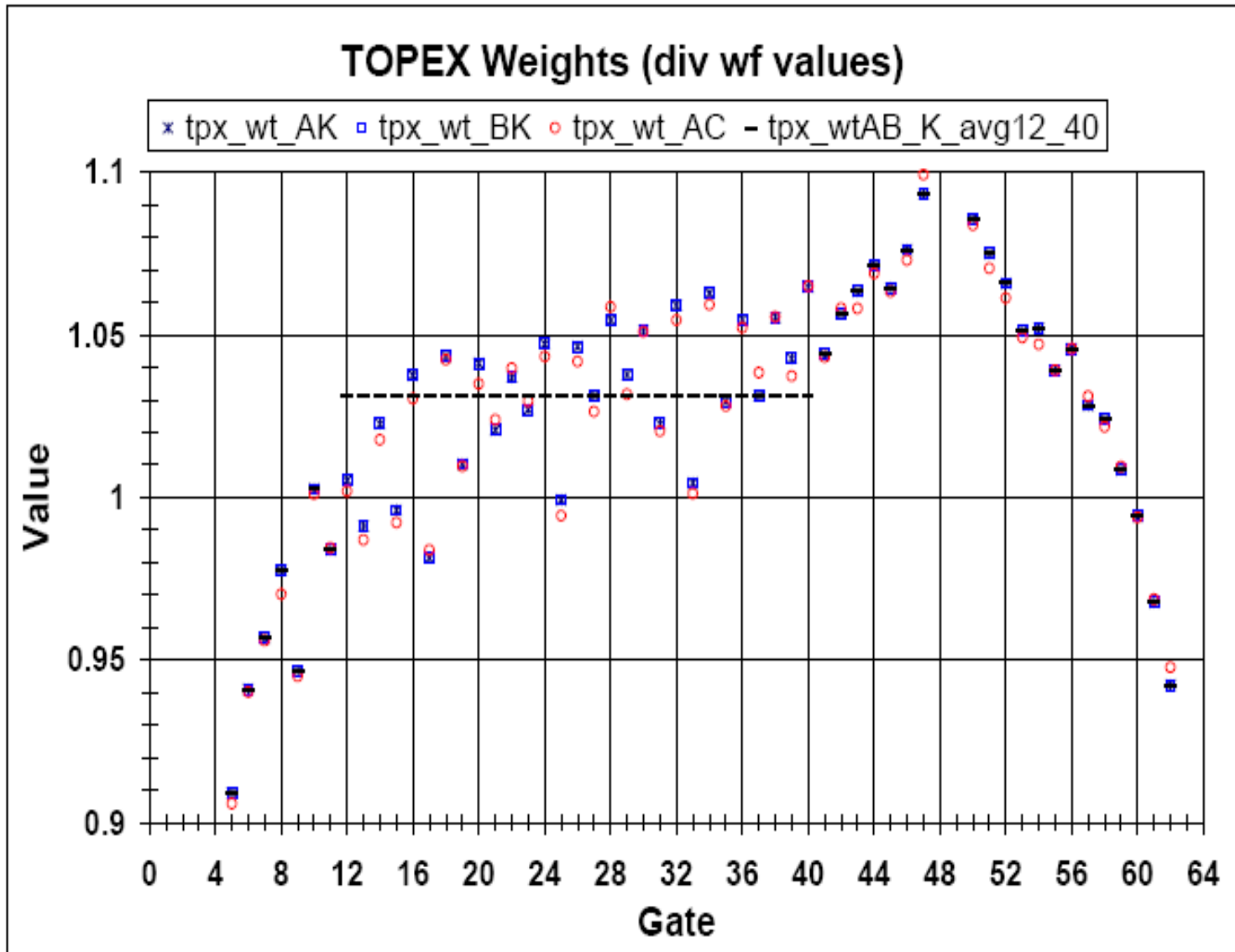


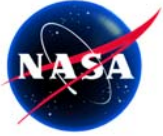
Mean of Residual for "Ise swhK" between 6.2 and 2
Normalized by Half Max Value of the Waveform





TOPEX Waveform Weights

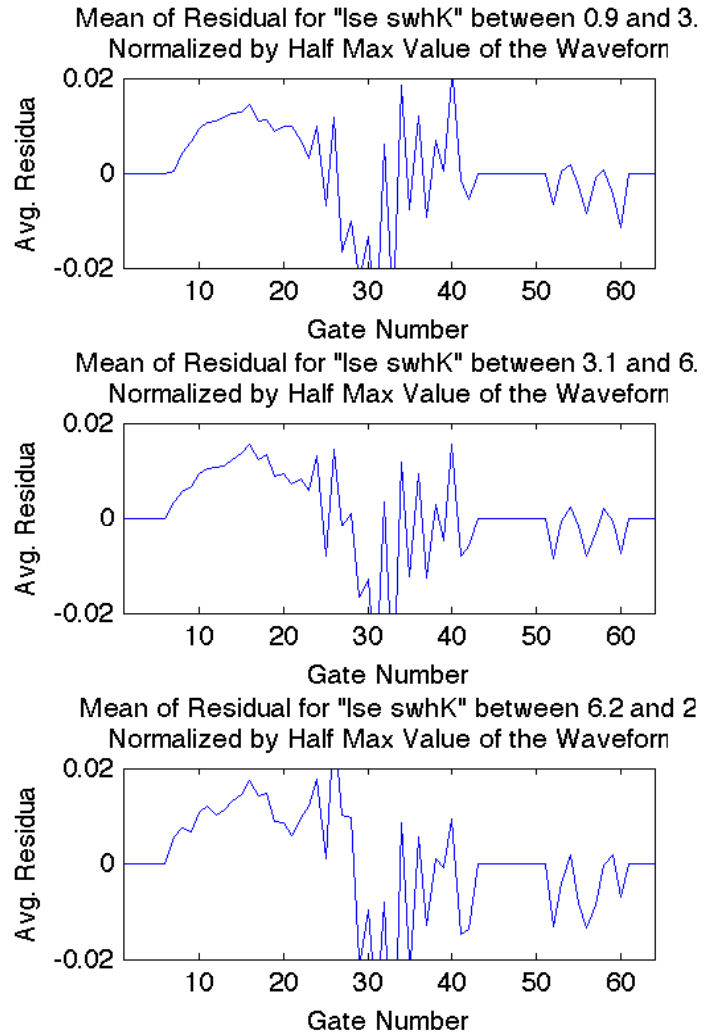
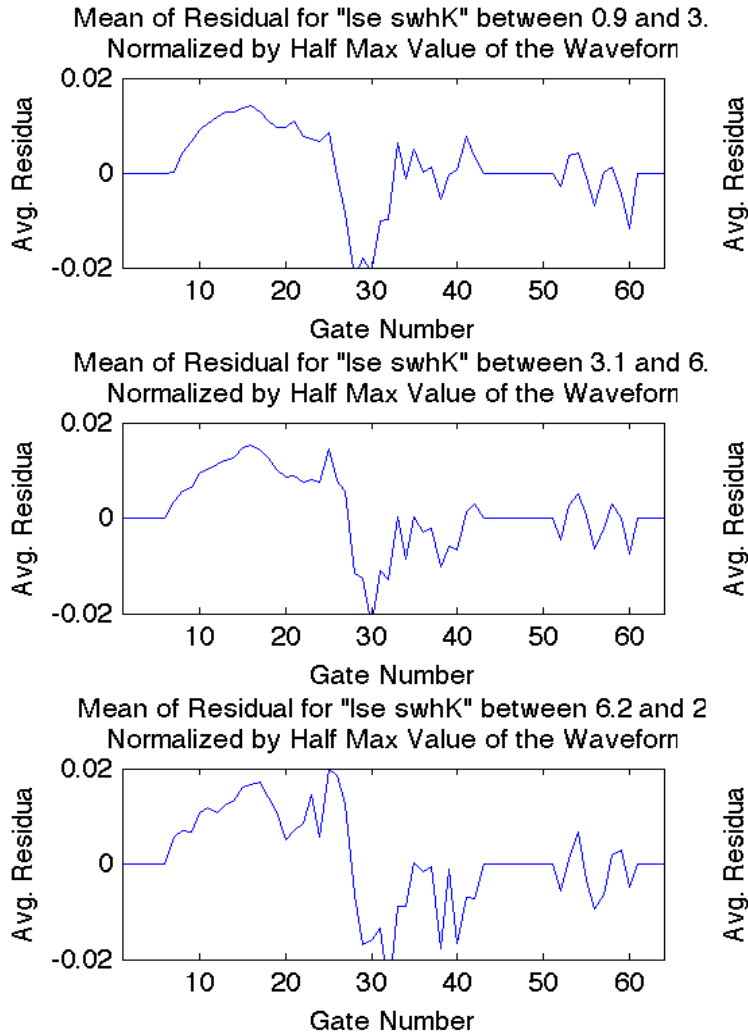


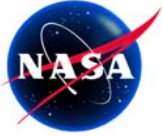


Effect of Different Weights (PTR v7)

Cyc 233 P 021 Nom Wt

Cyc 233 P 021 Avg Wt



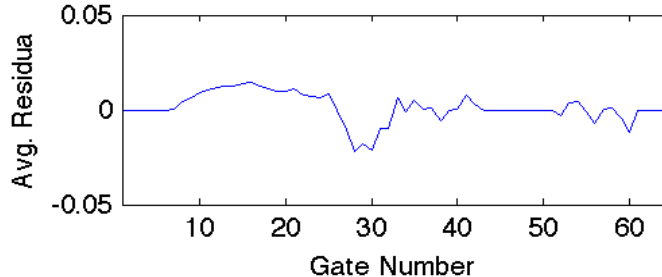


Effect of Different PTR Fits (Cyc 233)

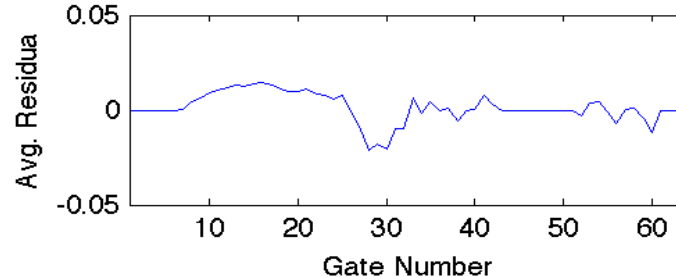
Cyc 233 P 021 PTR v7

Cyc 233 P 021 PTR v5

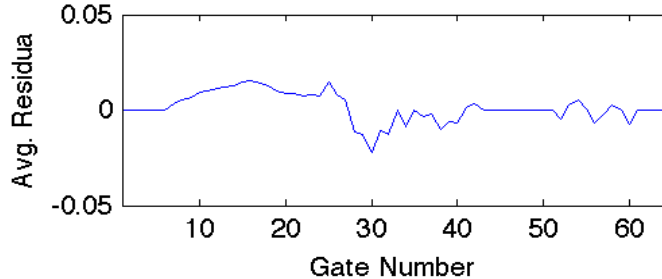
Mean of Residual for "Ise swhK" between 0.9 and 3.
Normalized by Half Max Value of the Waveform



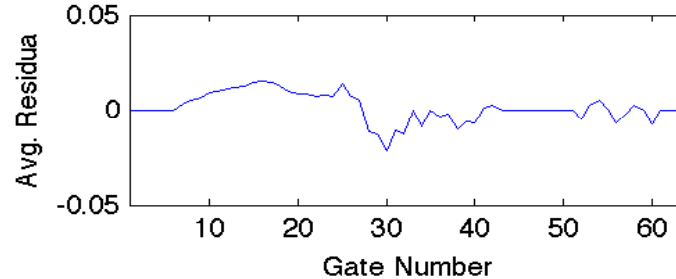
Mean of Residual for "Ise swhK" between 0.9 and 3.
Normalized by Half Max Value of the Waveform



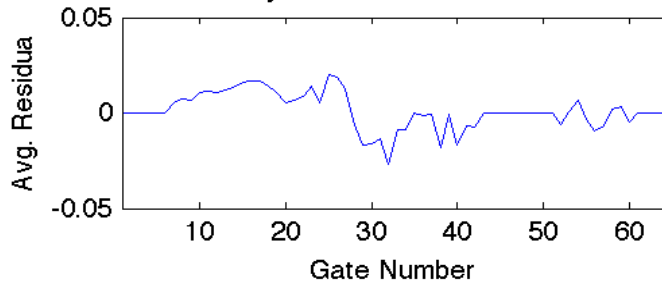
Mean of Residual for "Ise swhK" between 3.1 and 6.
Normalized by Half Max Value of the Waveform



Mean of Residual for "Ise swhK" between 3.1 and 6.
Normalized by Half Max Value of the Waveform



Mean of Residual for "Ise swhK" between 6.2 and 2
Normalized by Half Max Value of the Waveform



Mean of Residual for "Ise swhK" between 6.2 and 2
Normalized by Half Max Value of the Waveform

