

3D structure of the Campi Flegrei caldera central sector reconstructed through short-period magnetotelluric imaging.

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Section S2. Fit of the data curves for the whole MT dataset.

Section S1

This Supporting Information file contains details on the magnetotelluric prospection presented in the paper. Figure SM01 reproduces a few examples of the collected MT curves; Fig. SM02 shows the results of the dimensional data analysis, which has been performed by adopting the standard approach known as Phase Tensor analysis; Fig. SM03 depicts the result of a series of numerical tests to evaluate the effects of the topography and the near coastlines on the magnetotelluric data; Fig. SM04 summarizes the data dimensionality for each single period and for every magnetotelluric sounding.; Fig. SM05 shows a map of the nRMS.

Supplementary Figure captions.

Fig. SM01. Apparent resistivity (ρ , in $\log_{10}(\Omega\text{m})$) and phases (ϕ , in degrees) relative to the four modes of the impedance tensor $\mathbf{Z}$ for the magnetotelluric soundings MT1, MT9 and MT20 (see Figure 1 for site locations).

Fig. SM02. Maps of the Phase Tensor ellipses. The color of the phase tensor ellipses indicates the value of the Skew angle β (in degrees) (see [55]). The panels respectively refer to 0.001s, 0.01 s, 0.1 s and 1 s.

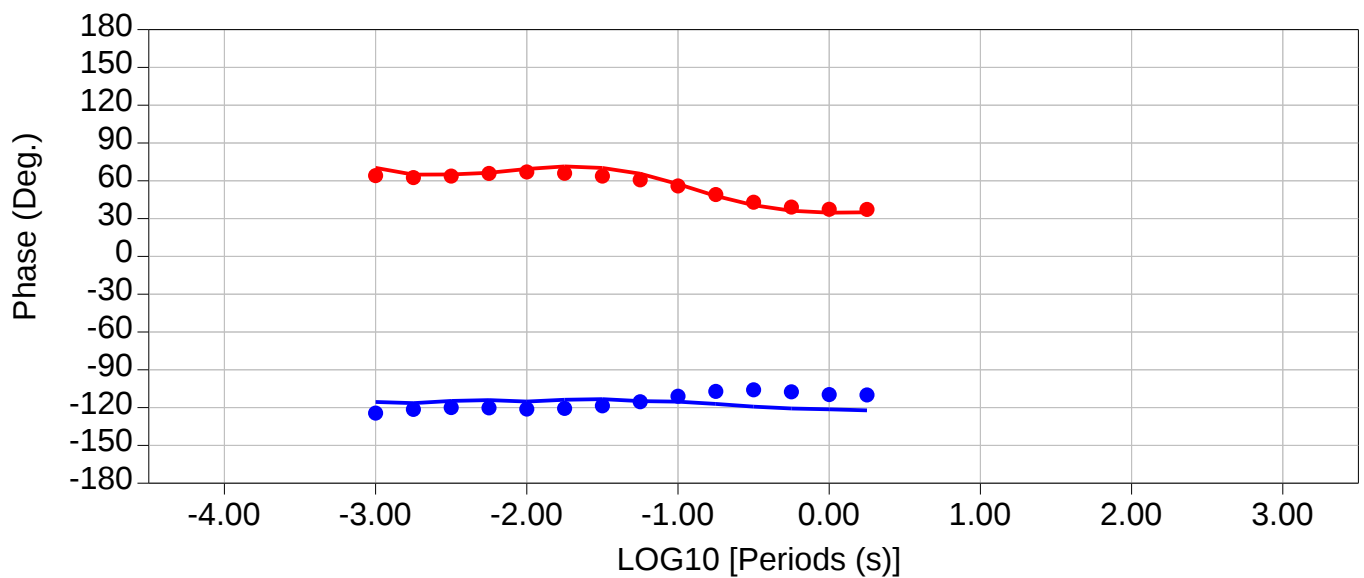
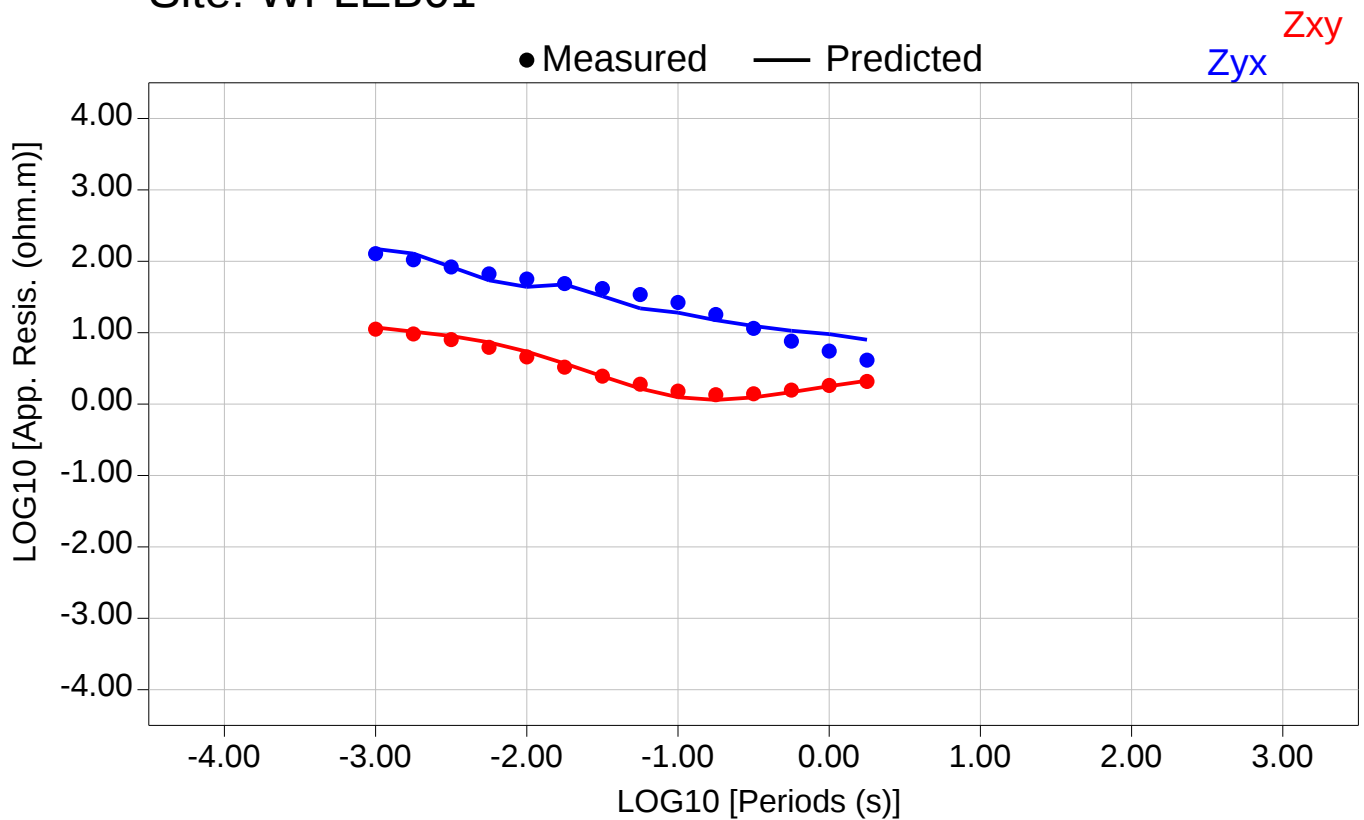
Fig. SM03. Dimensional analysis on the collected MT data. The MTPy code has been employed to determine which parts of the impedance tensor could be considered 1D, 2D or 3D, basing on the Phase Tensor values. In such a way, the data dimensionality for each frequency and each measurement site is represented by an array with values of 1, 2 or 3. A threshold value of has been considered for the skew angle b (5 degrees) and the ellipses eccentricity (0.1) respectively.

Fig. SM04. Results of the forward model study aimed to reconstruct the effects of the ground-level topography and seafloor bathymetry on the MT dataset. The real coastline and undulating topography of the Campi Flegrei caldera central sector has been superimposed over a $100 \Omega\text{m}$ homogeneous half space. The corresponding synthetic apparent resistivity ($\log_{10}(W\text{m})$) and phase (degrees) curves has been evaluated using the ModEM.

Fig. SM05. Map of the nRMS misfit values. A total nRMS of 1.7 was achieved.

Section S2.

Site: WFLEB01

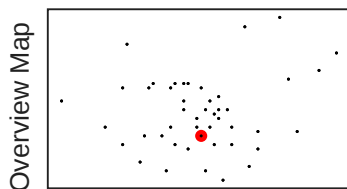


Overall RMS (Z+Tz)= 2.48

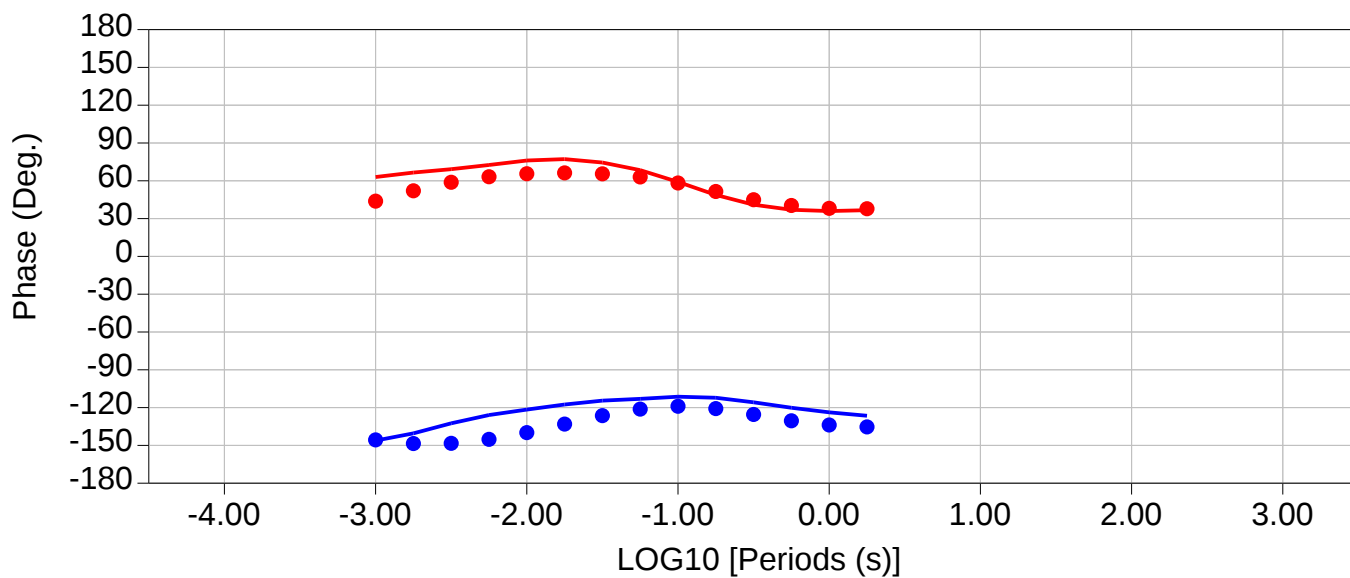
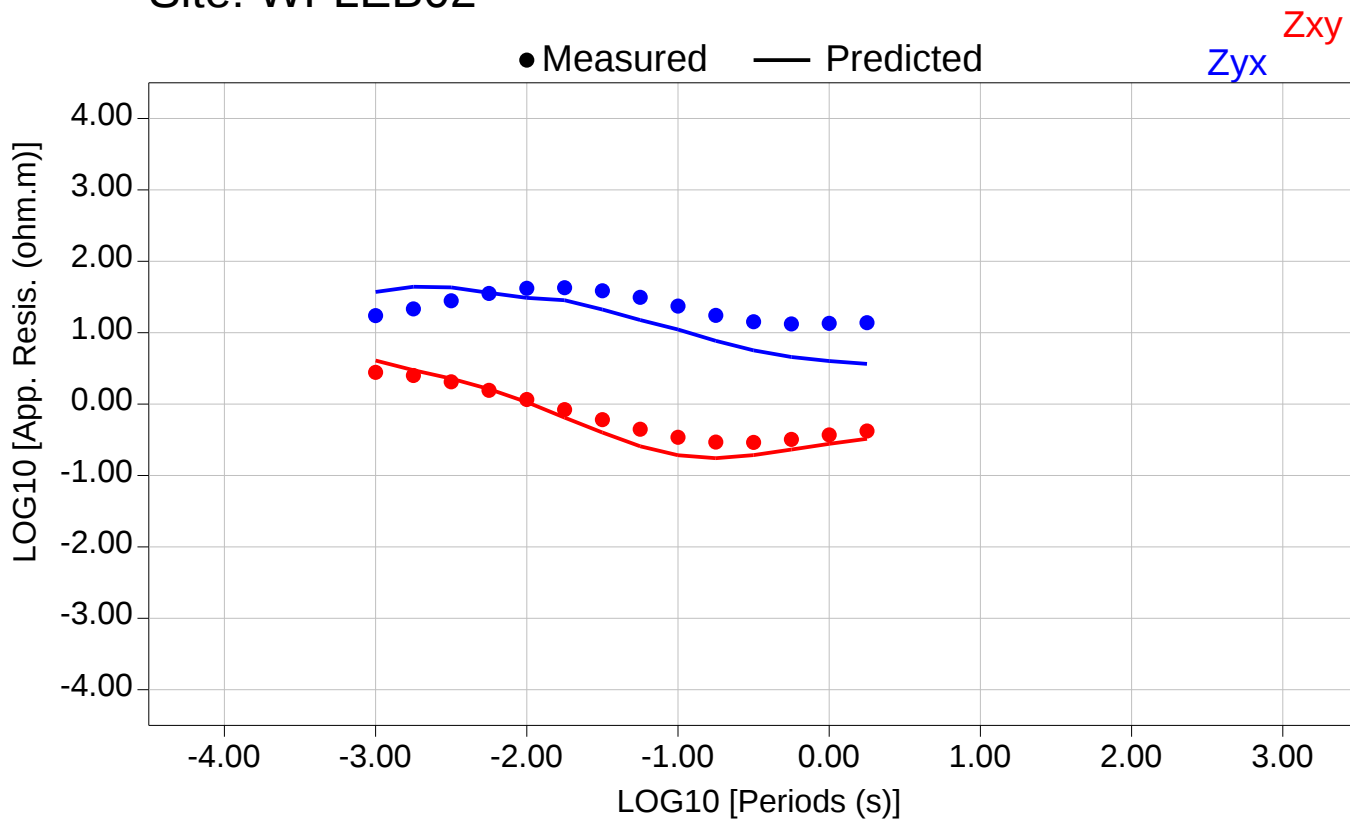
Total Z RMS = 2.48

Zxy RMS = 1.21

Zyx RMS = 3.30



Site: WFLEB02

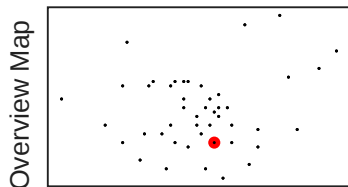


Overall RMS (Z+Tz)= 3.63

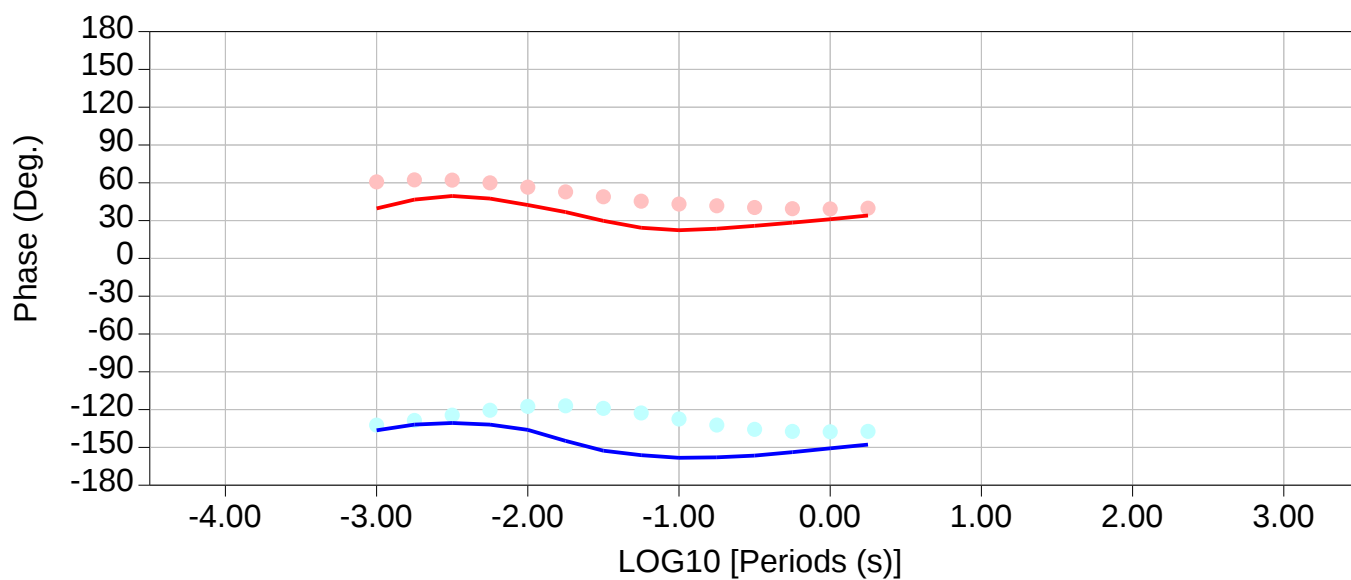
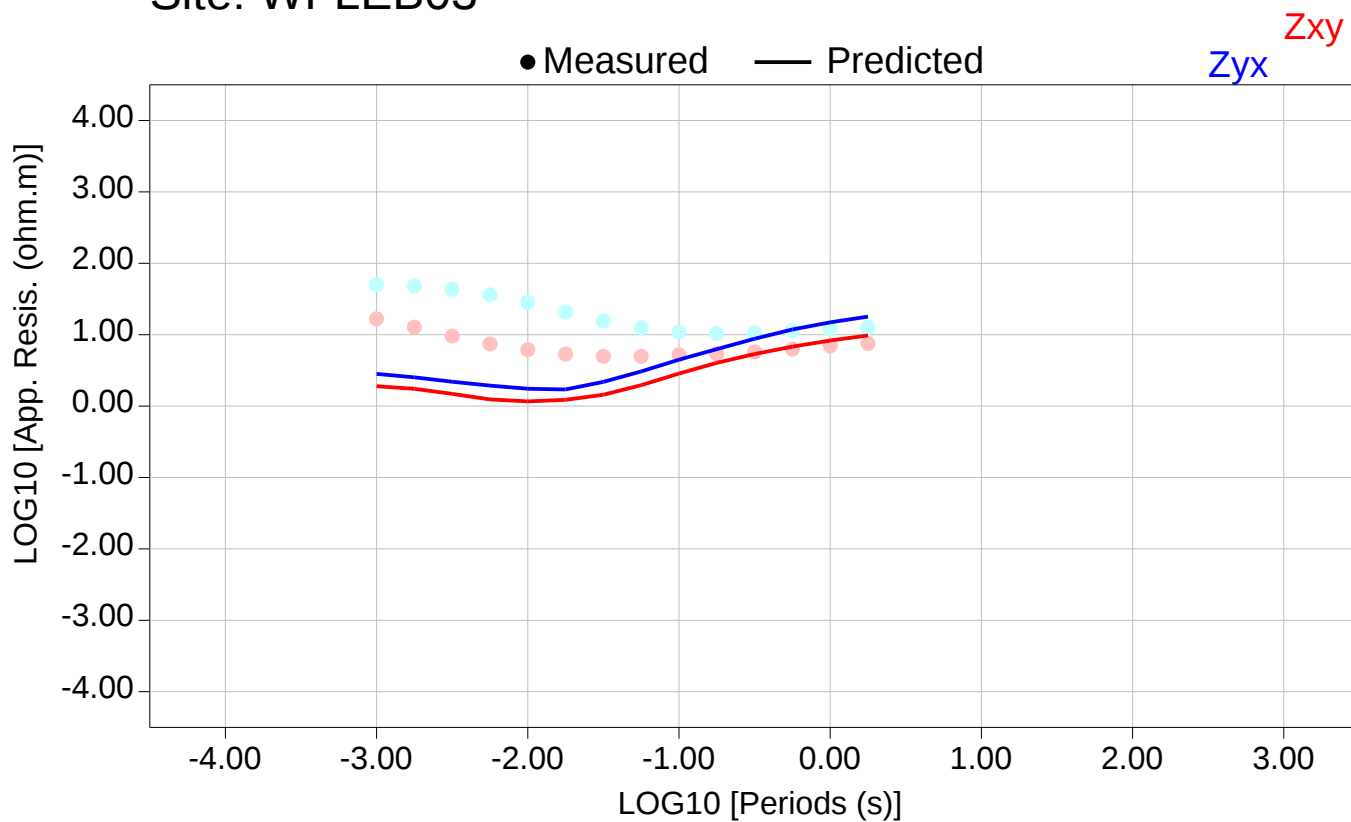
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Zxy RMS = 3.24

Zyx RMS = 5.55



Site: WFLEB03

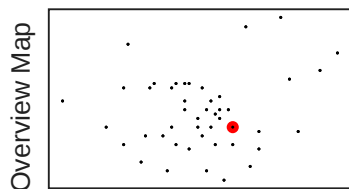


Overall RMS (Z+Tz)= 0.00

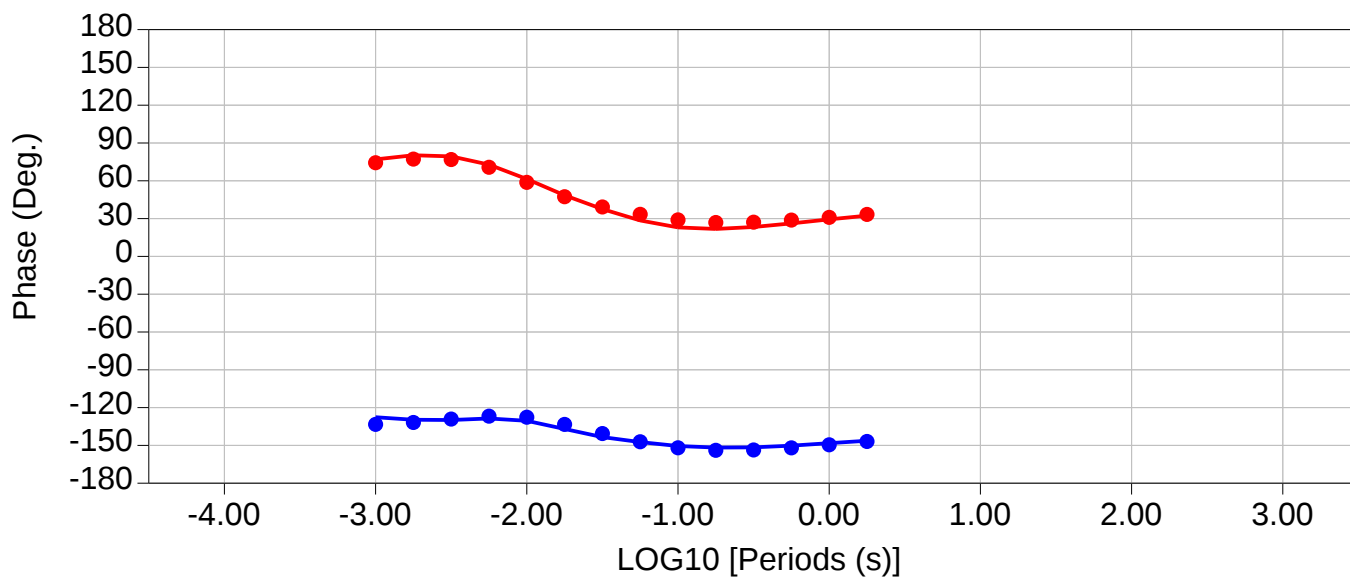
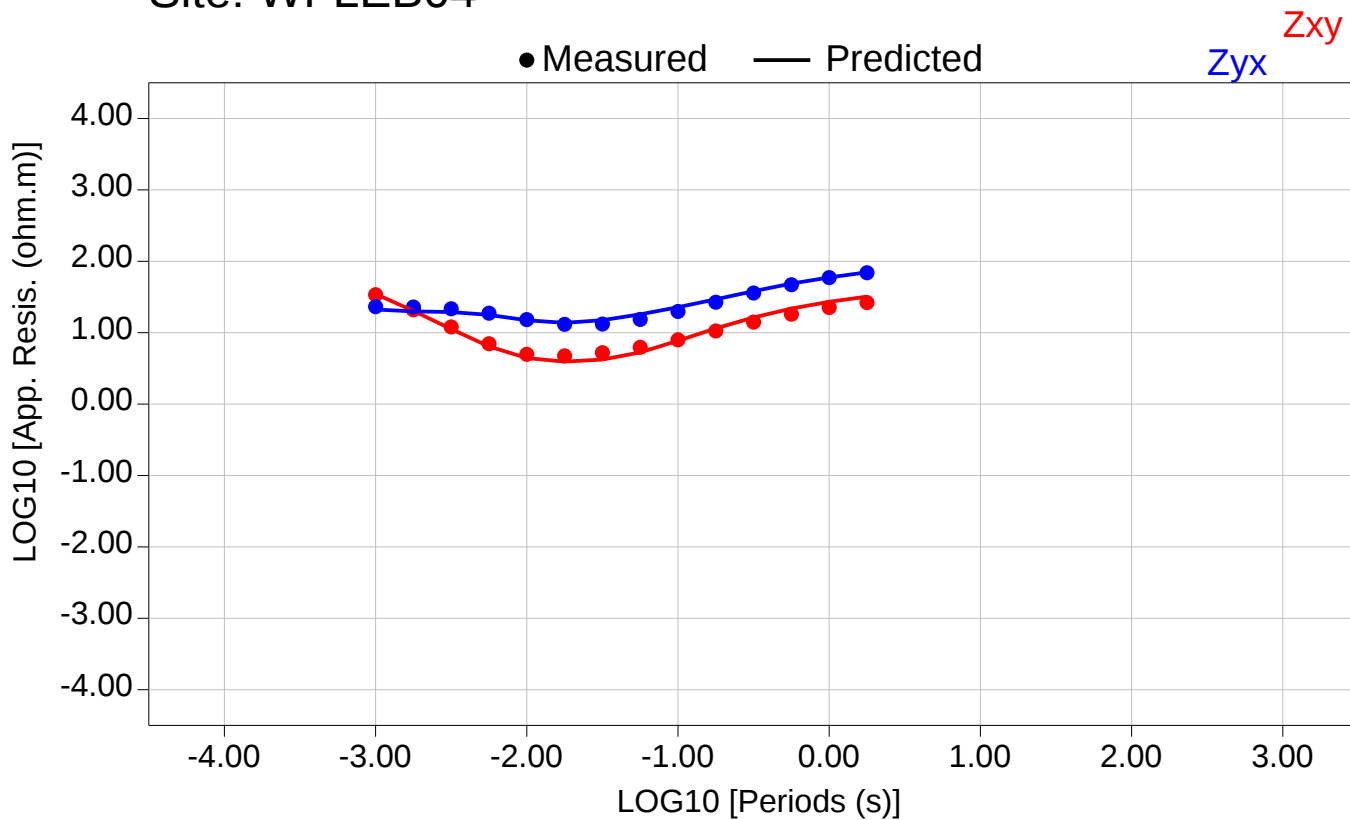
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Zxy RMS = 6.81

Zyx RMS = 8.74



Site: WFLEB04

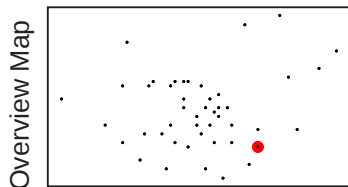


Overall RMS (Z+Tz)= 0.93

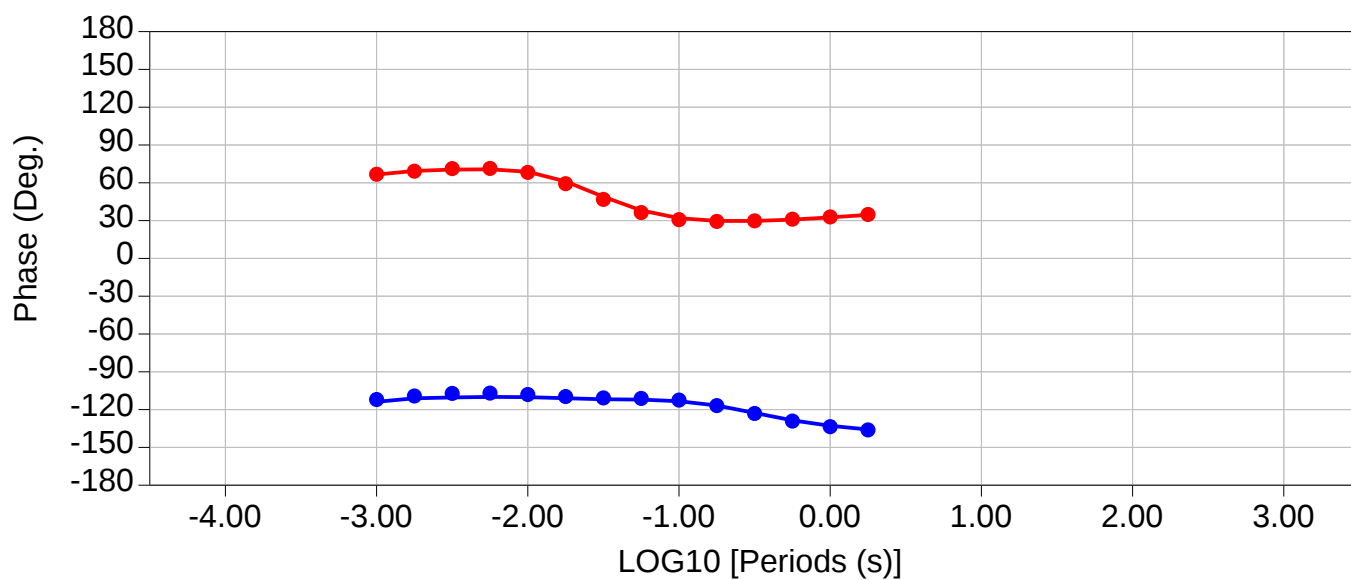
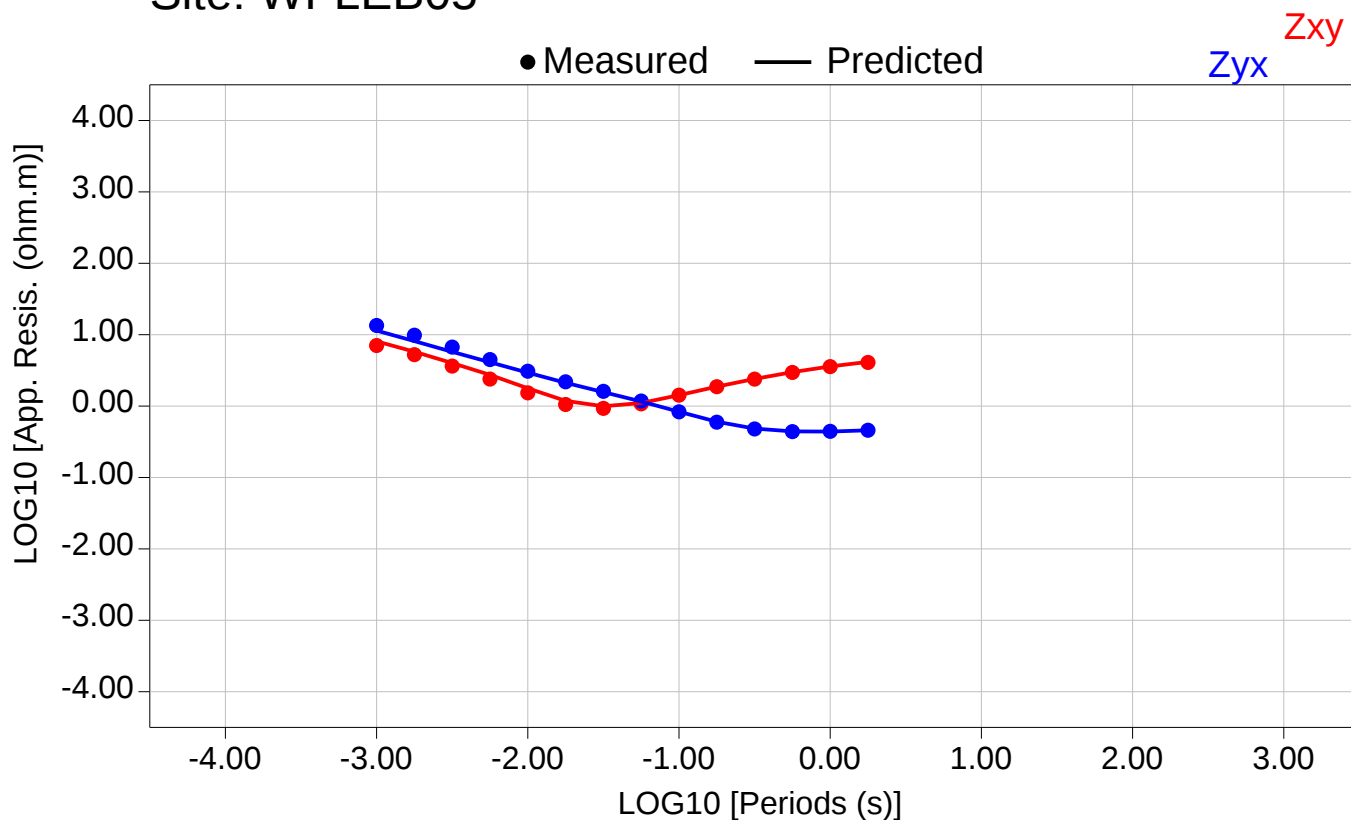
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Zxy RMS = 1.27

Zyx RMS = 0.90



Site: WFLEB05

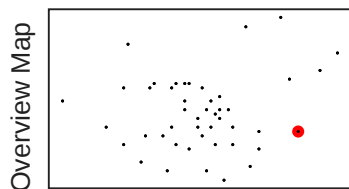


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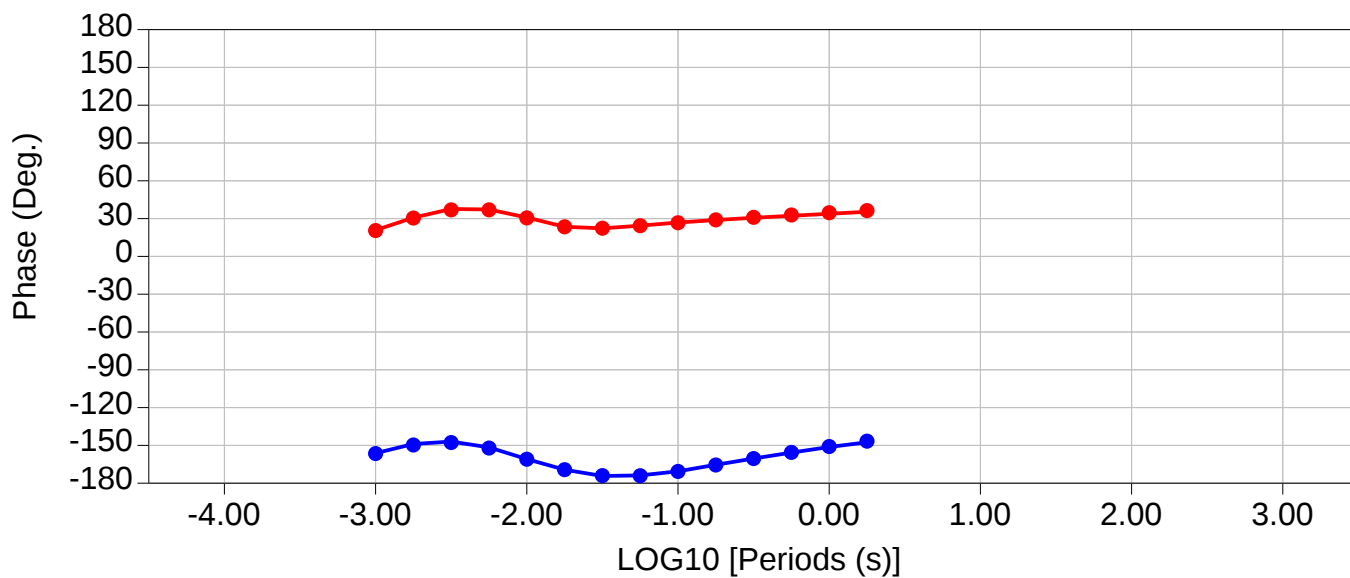
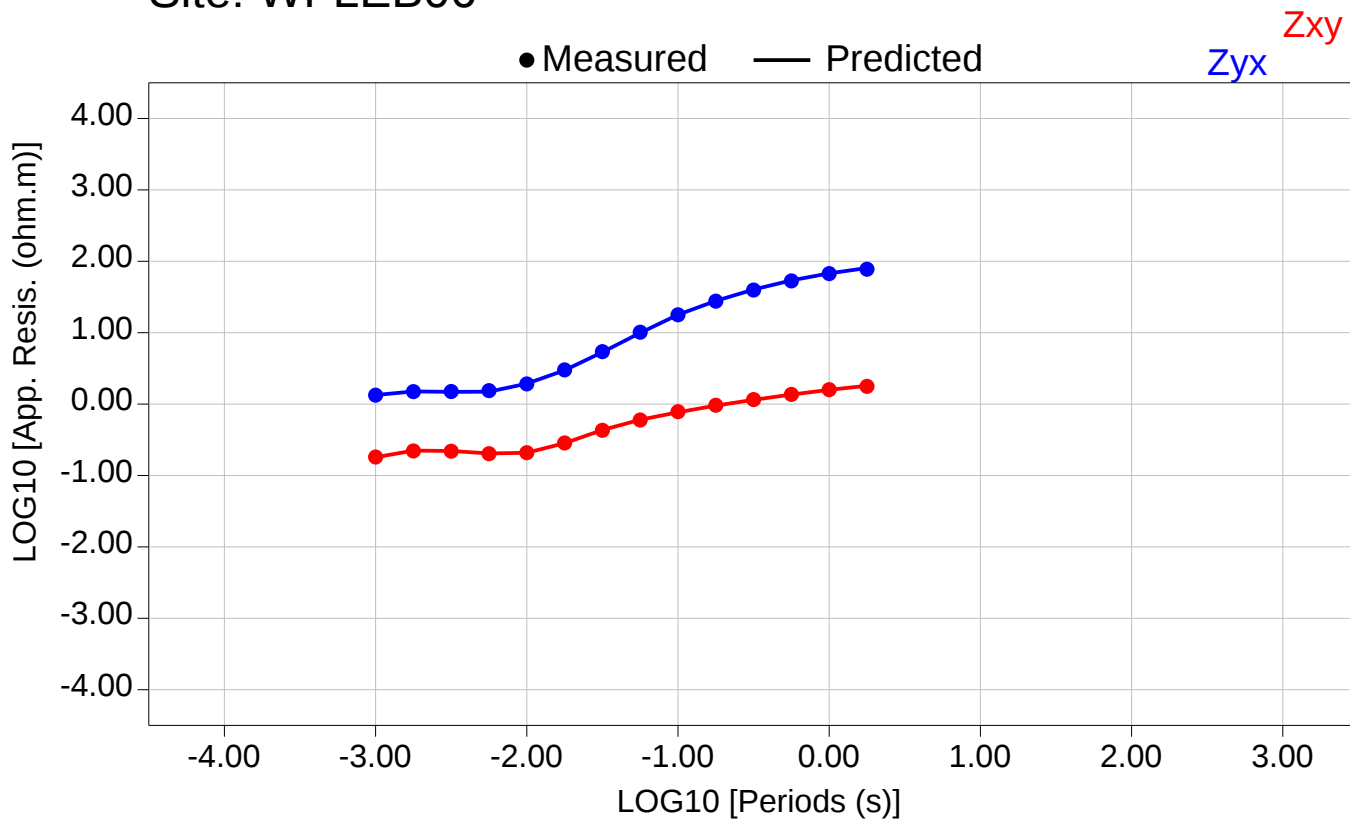
Total Z RMS = 0.50

Zxy RMS = 0.66

Zyx RMS = 0.69



Site: WFLEB06

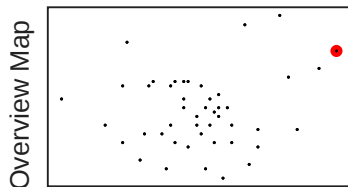


Overall RMS (Z+Tz)= 0.13

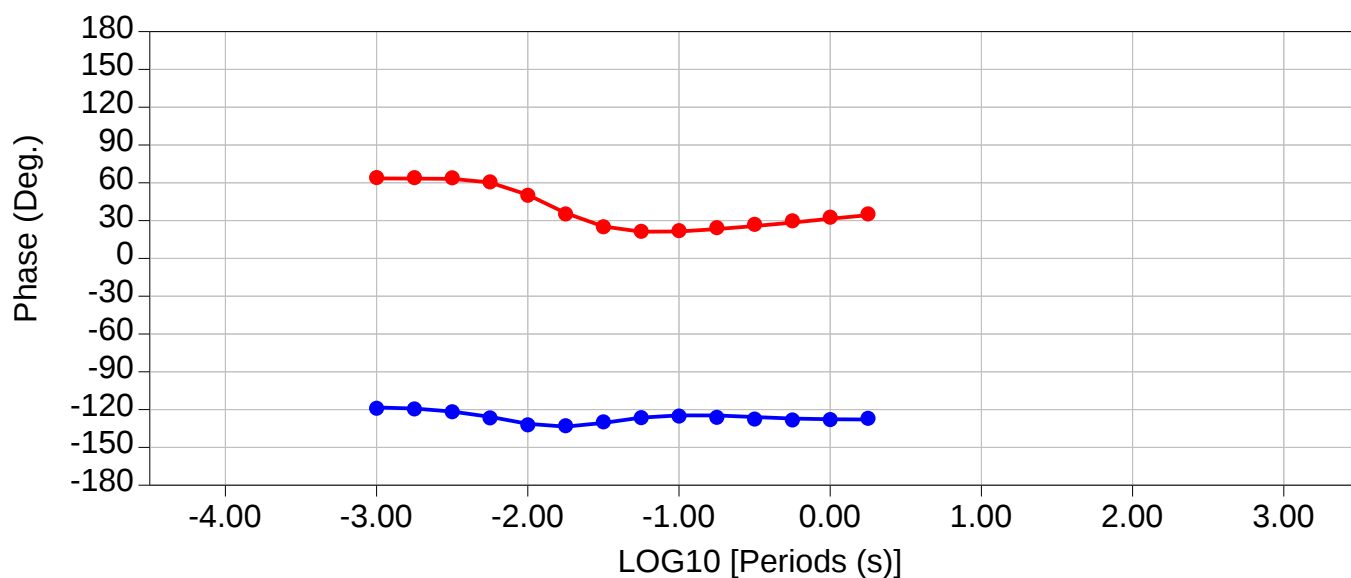
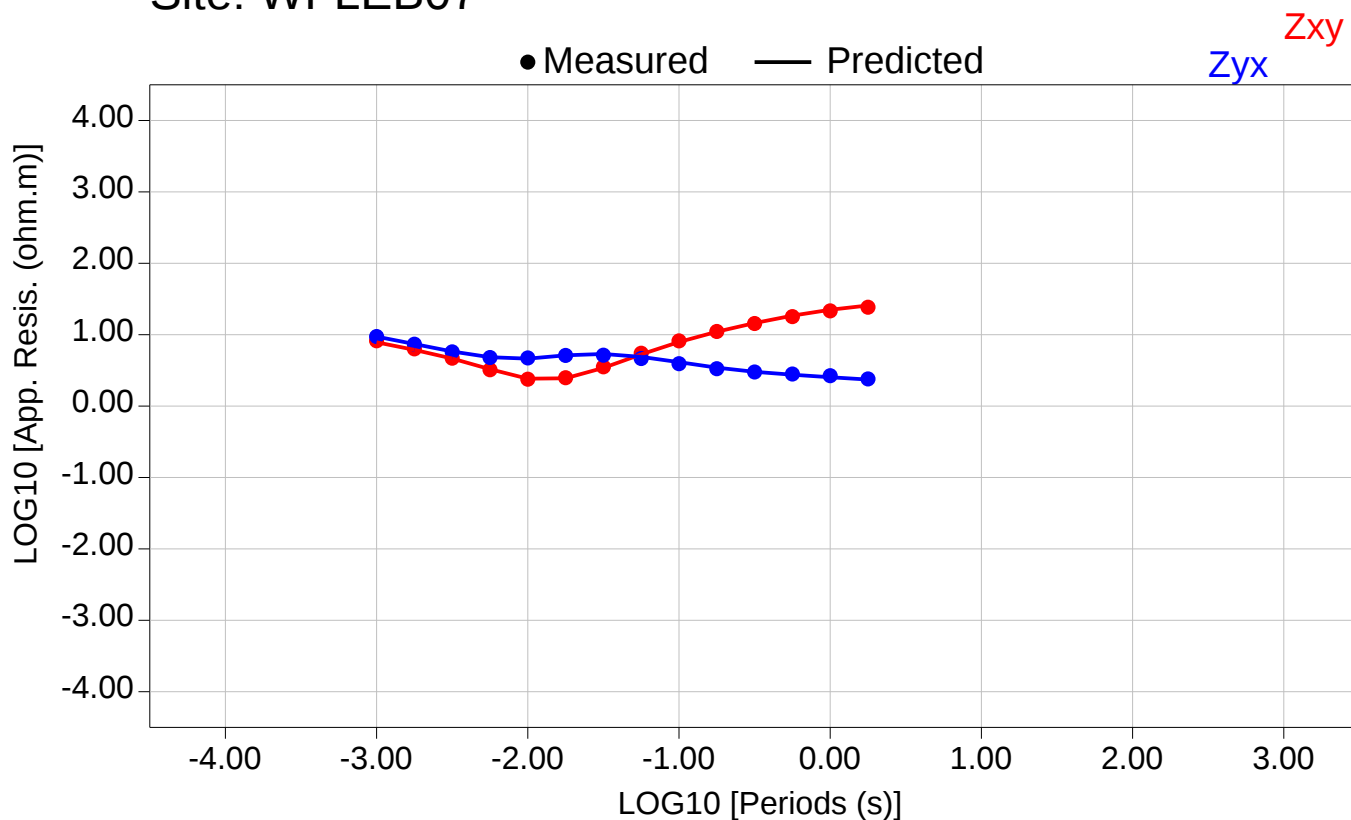
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Zxy RMS = 0.14

Zyx RMS = 0.17



Site: WFLEB07

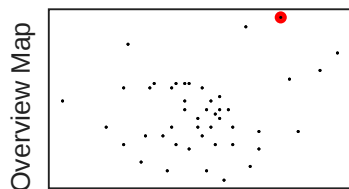


Overall RMS (Z+Tz)= 0.26

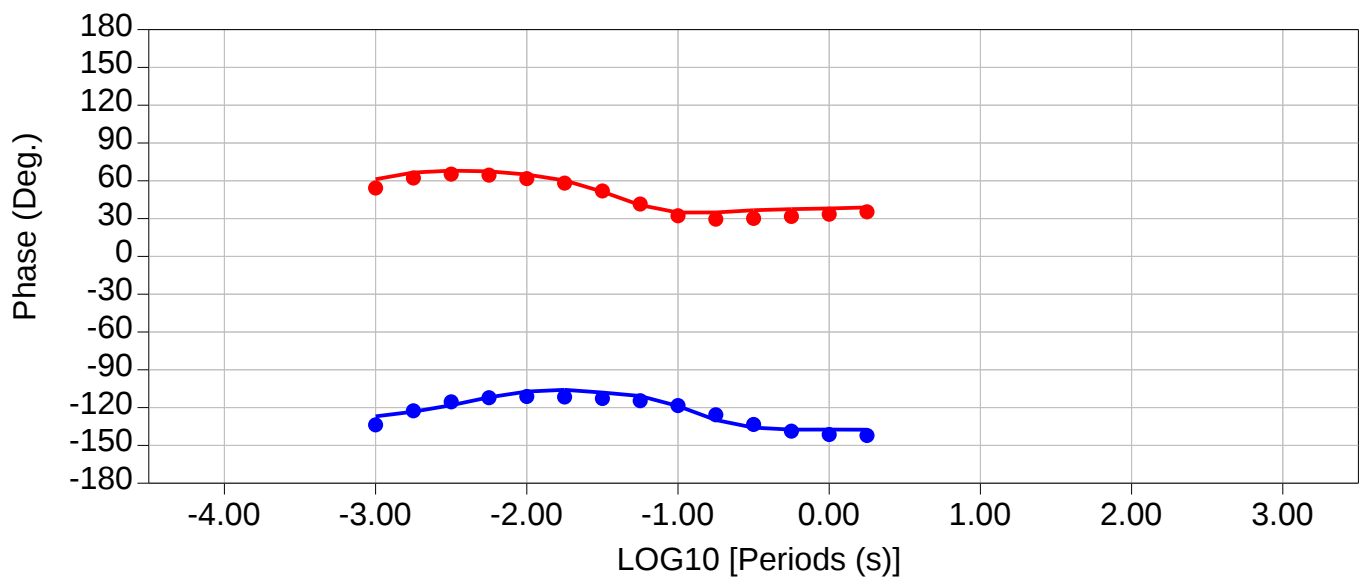
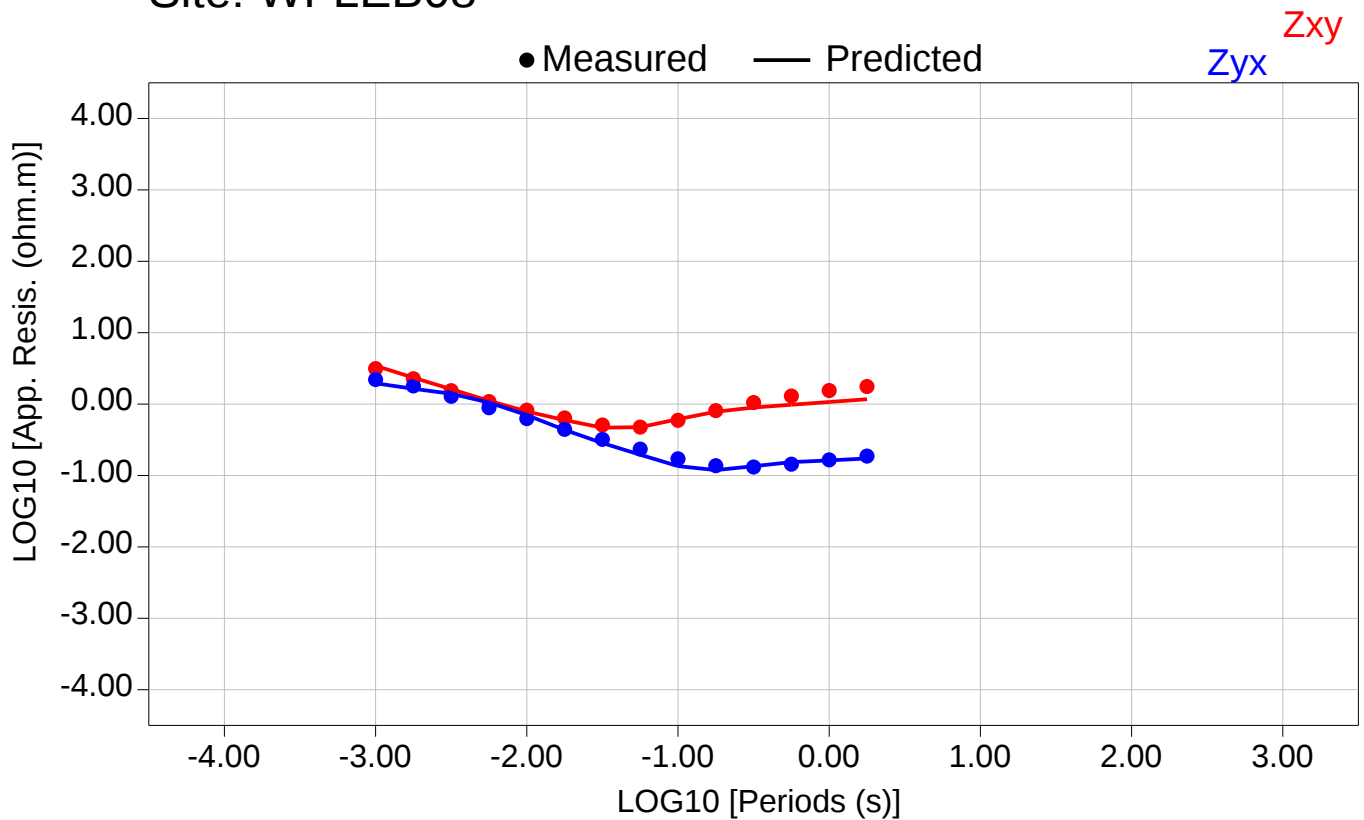
Total Z RMS = 0.26

Zxy RMS = 0.31

Zyx RMS = 0.30



Site: WFLEB08

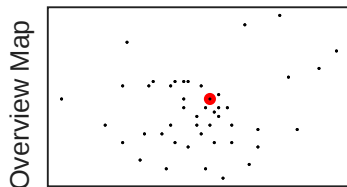


Overall RMS (Z+Tz)= 1.42

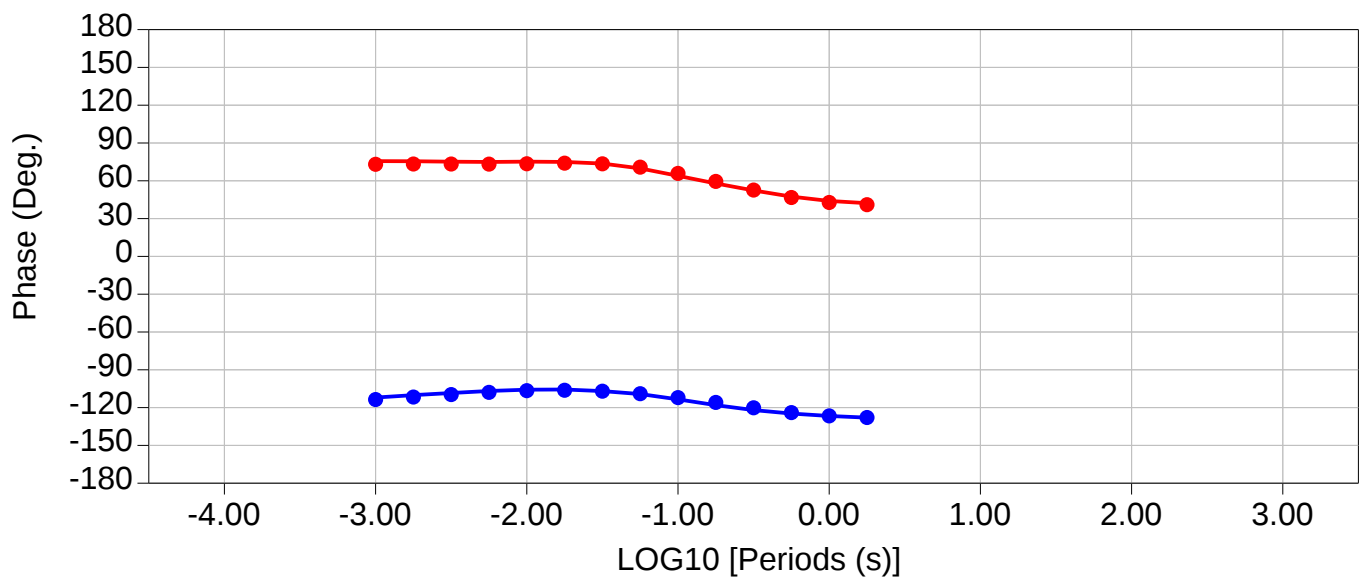
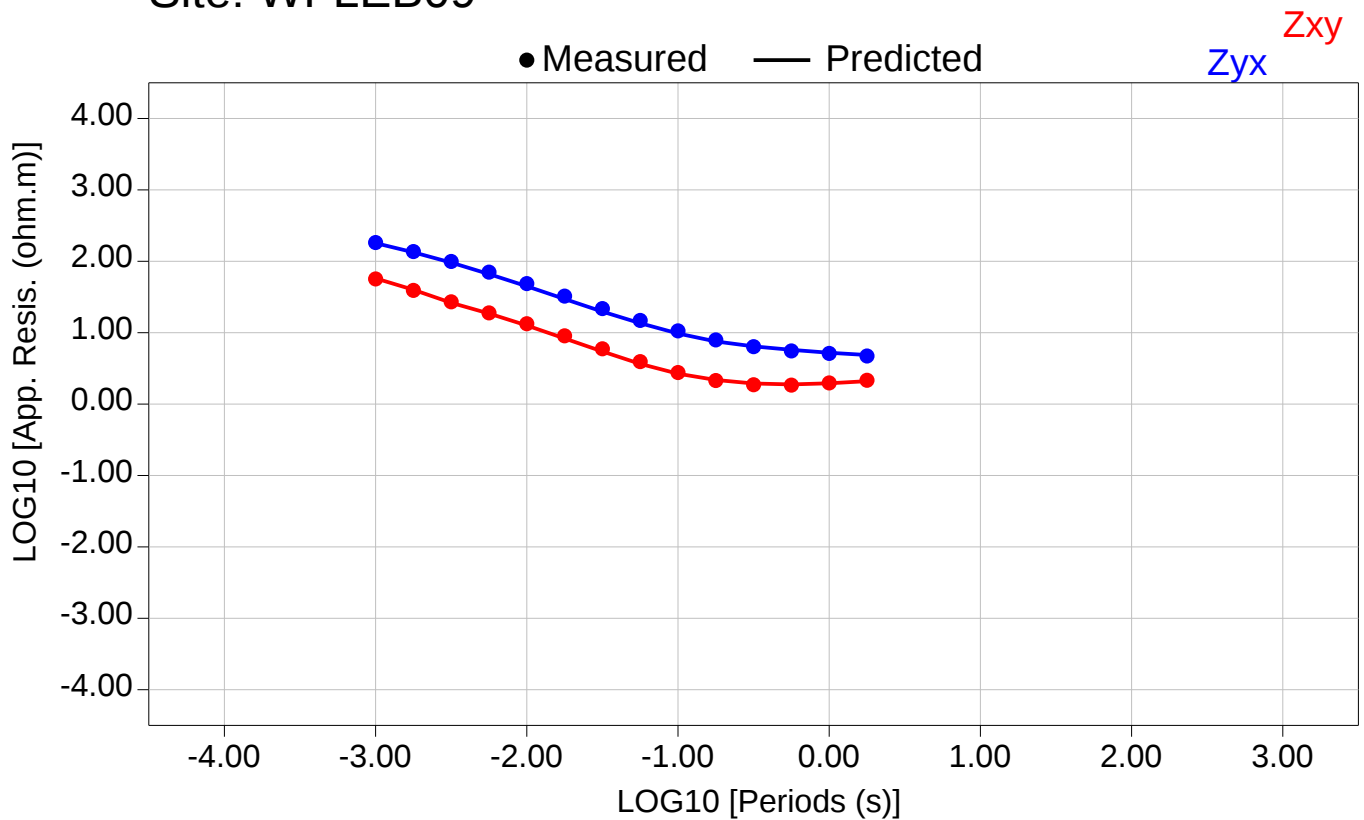
Total Z RMS = 1.42

Zxy RMS = 1.53

Zyx RMS = 1.24



Site: WFLEB09

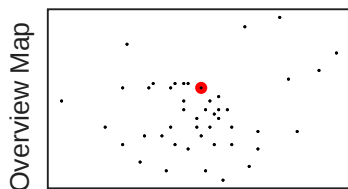


Overall RMS (Z+Tz)= 0.42

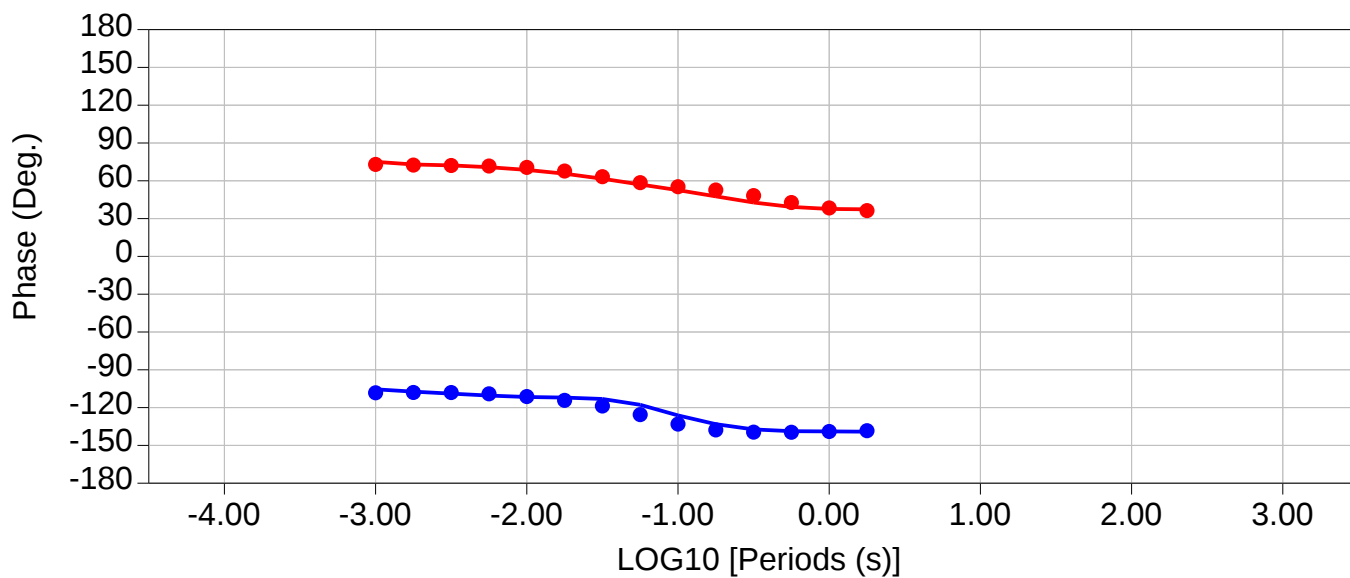
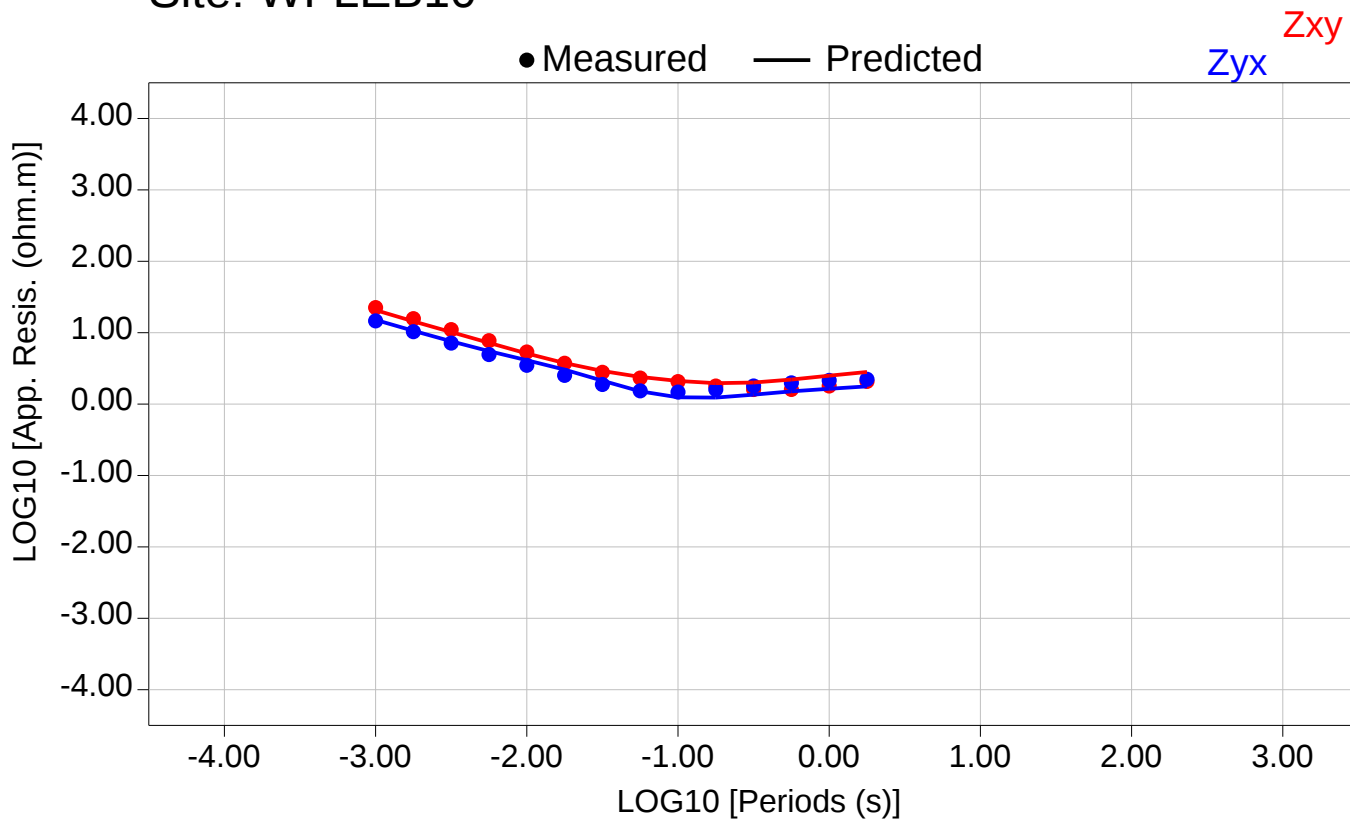
Total Z RMS = 0.42

Zxy RMS = 0.49

Zyx RMS = 0.51



Site: WFLEB10

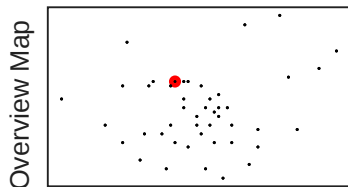


Overall RMS (Z+Tz)= 1.21

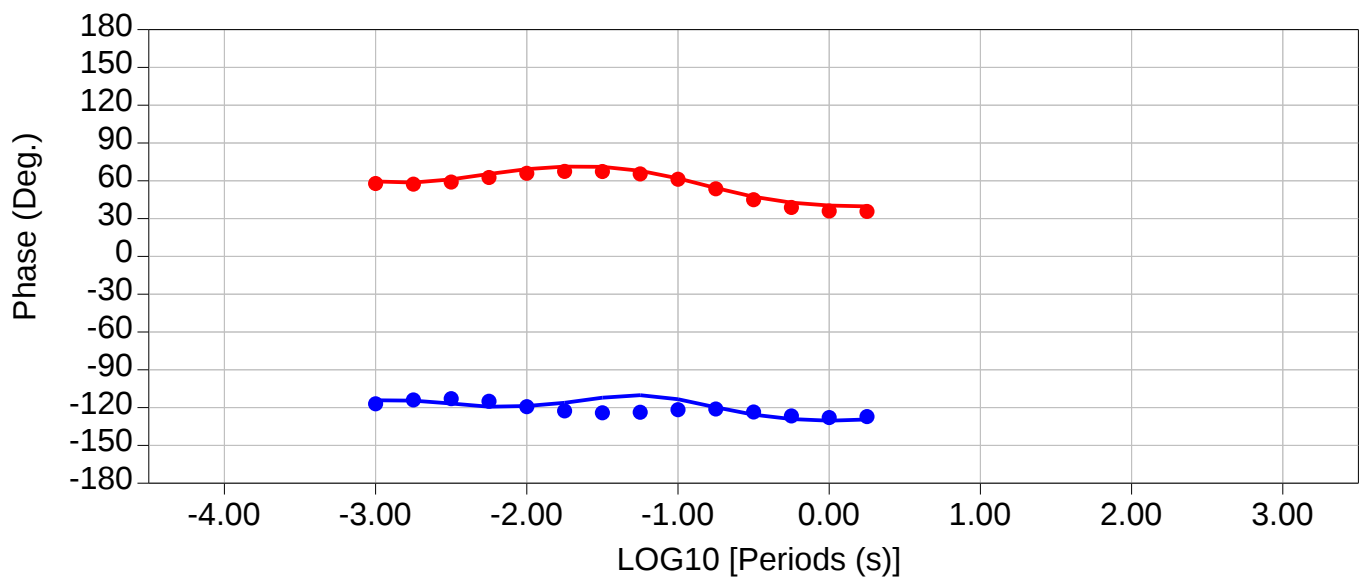
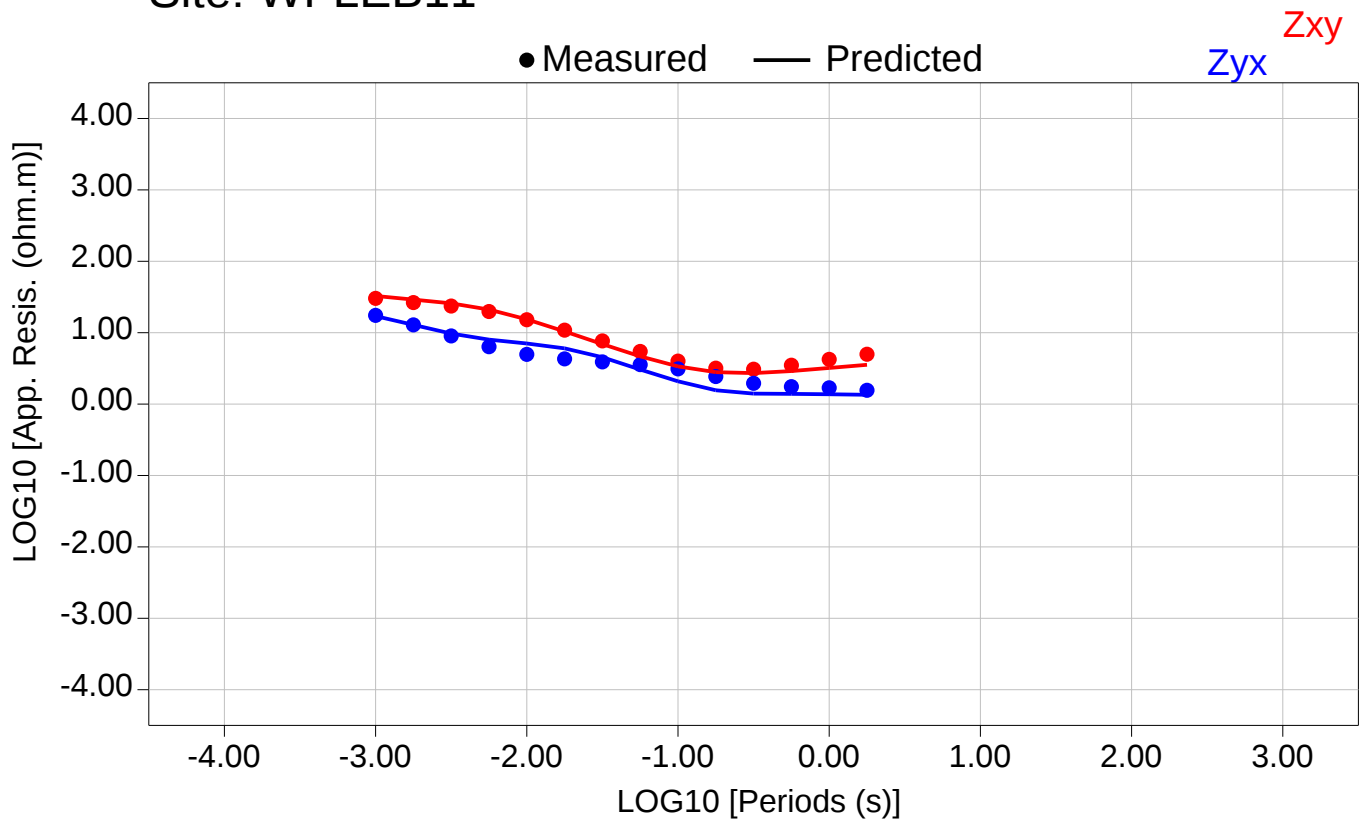
Total Z RMS = 1.21

Zxy RMS = 1.44

Zyx RMS = 1.52



Site: WFLEB11

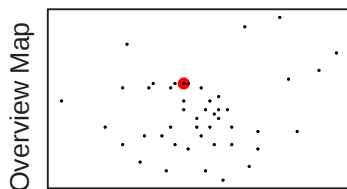


Overall RMS (Z+Tz)= 1.44

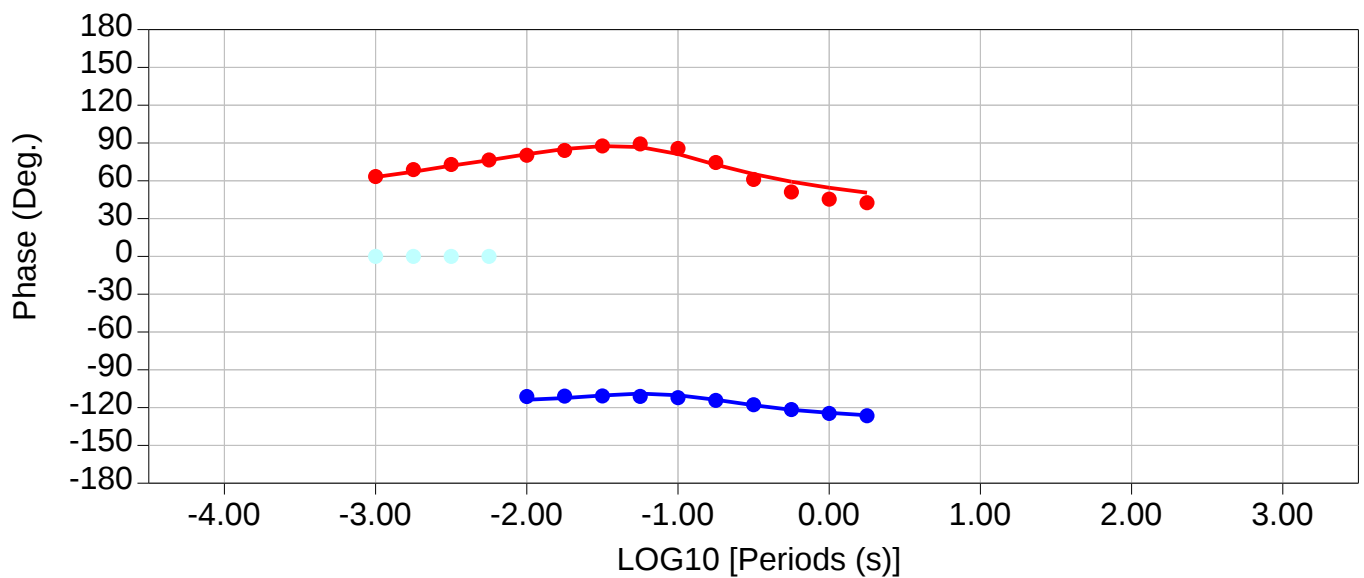
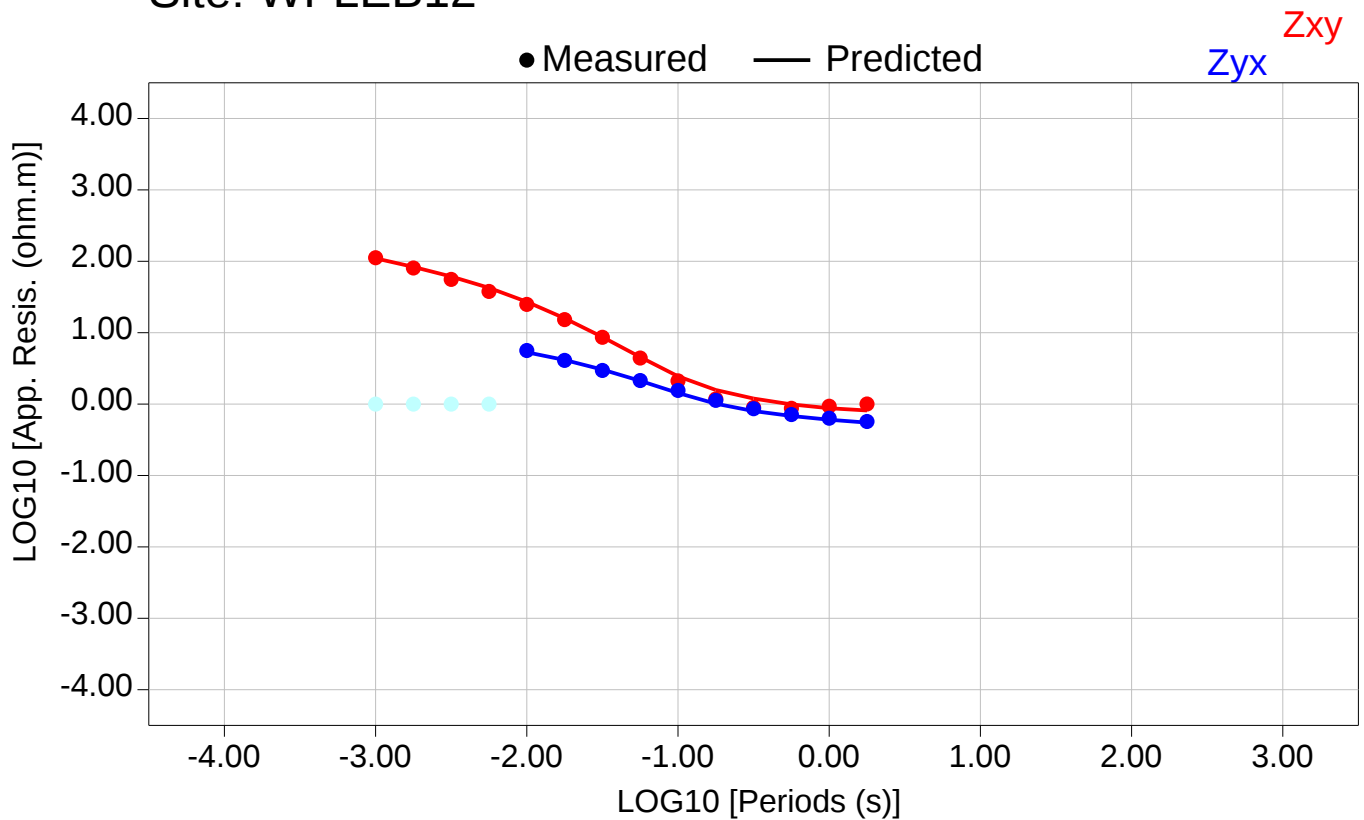
Total Z RMS = 1.44

Zxy RMS = 1.27

Zyx RMS = 2.31



Site: WFLEB12

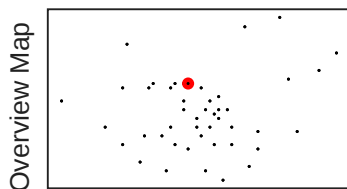


Overall RMS (Z+Tz)= 1.17

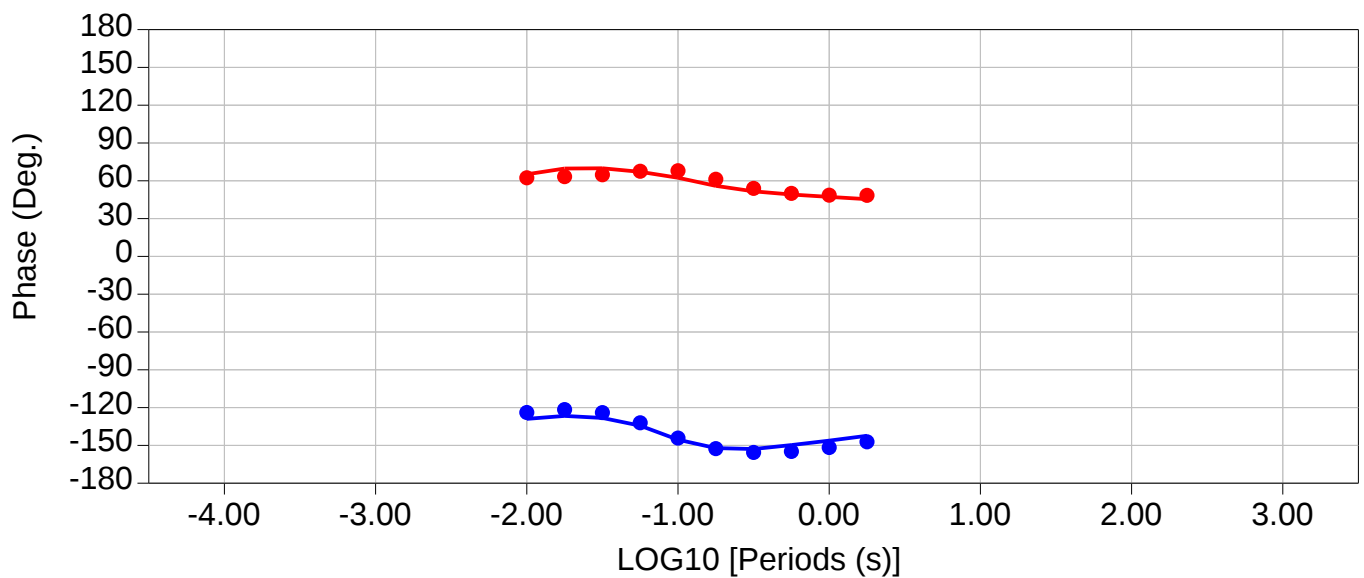
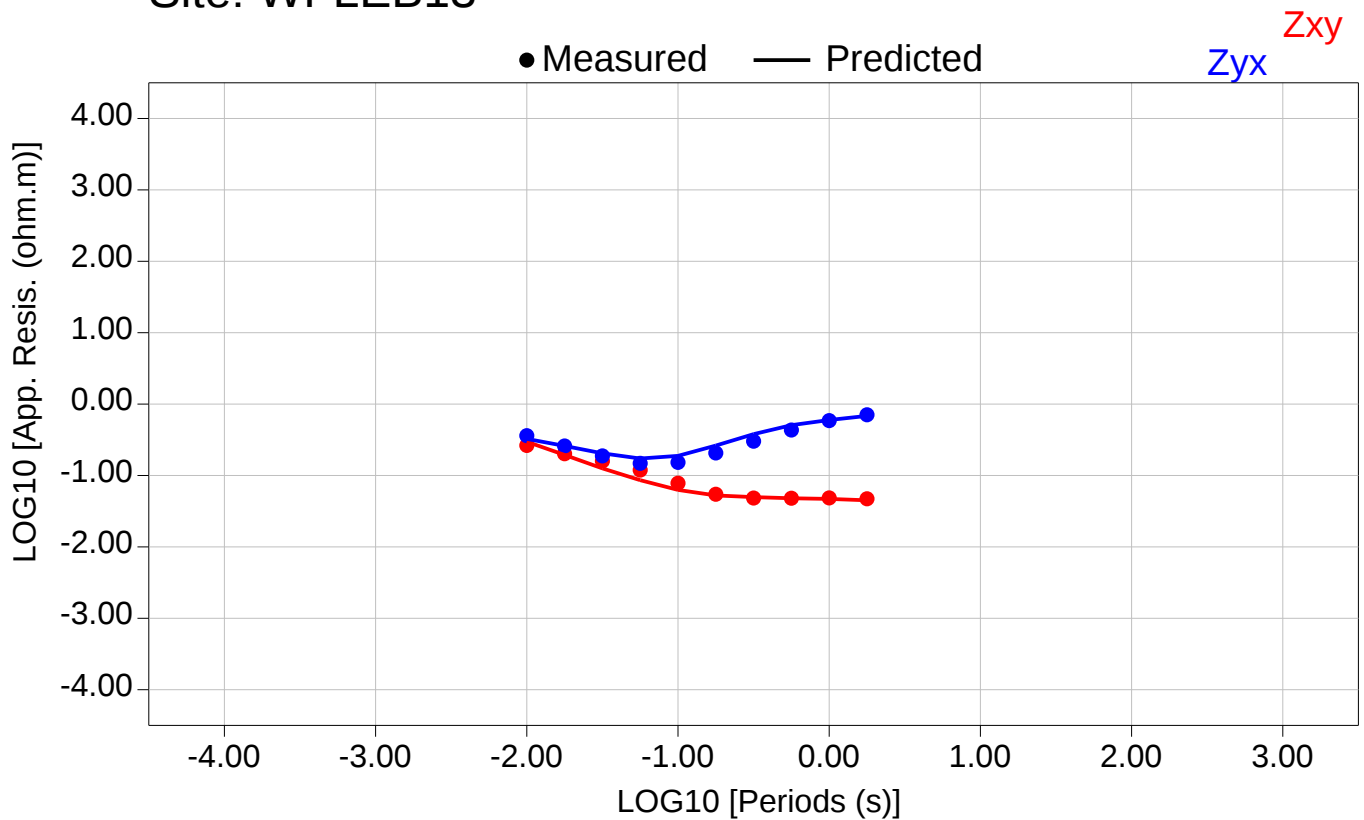
Total Z RMS = 1.17

Zxy RMS = 1.51

Zyx RMS = 0.52



Site: WFLEB13

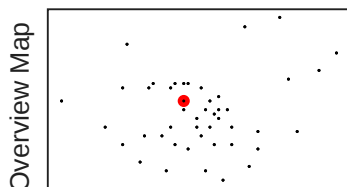


Overall RMS (Z+Tz)= 1.53

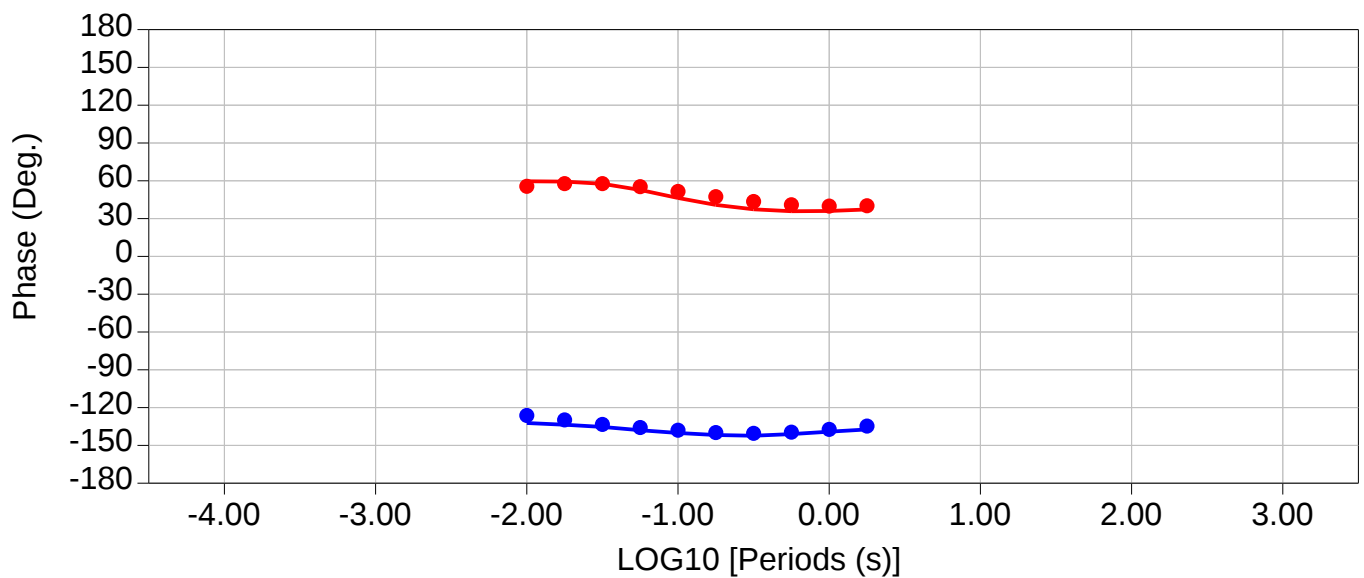
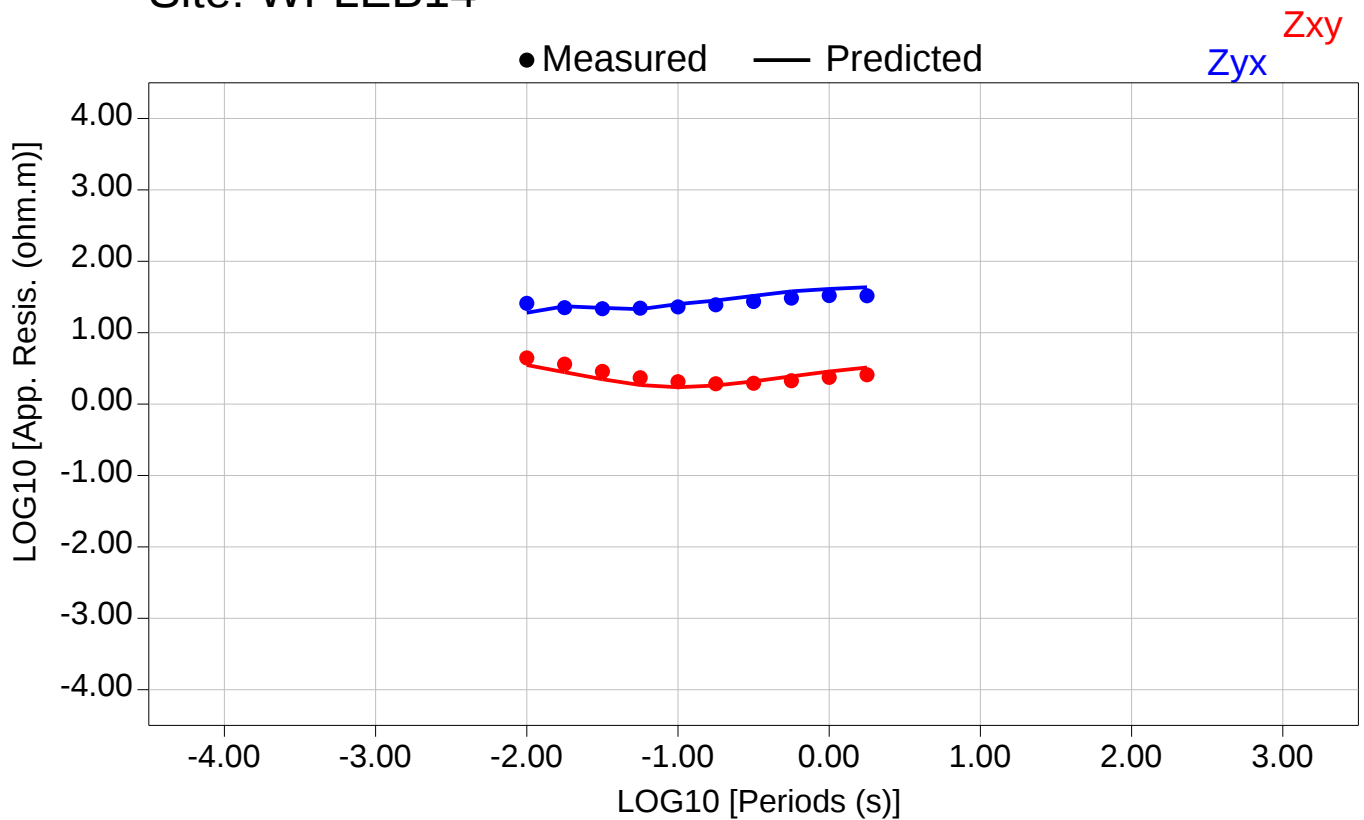
Total Z RMS = 1.53

Zxy RMS = 1.38

Zyx RMS = 1.49



Site: WFLEB14

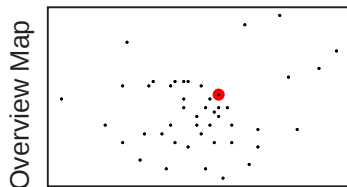


Overall RMS (Z+Tz)= 1.58

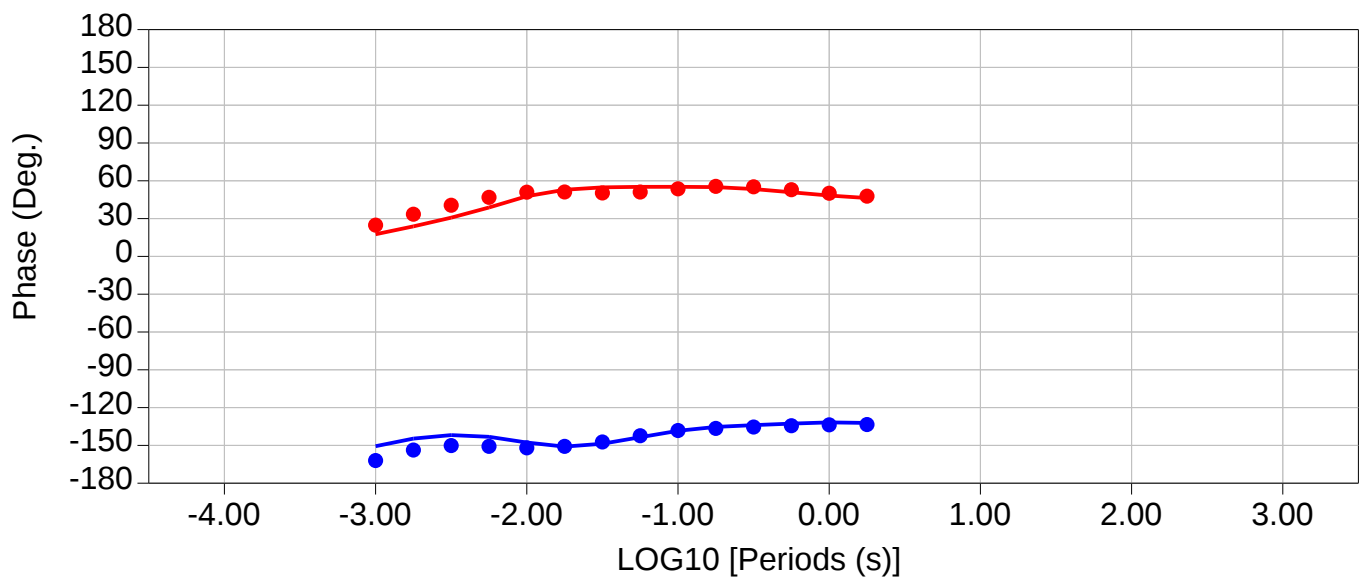
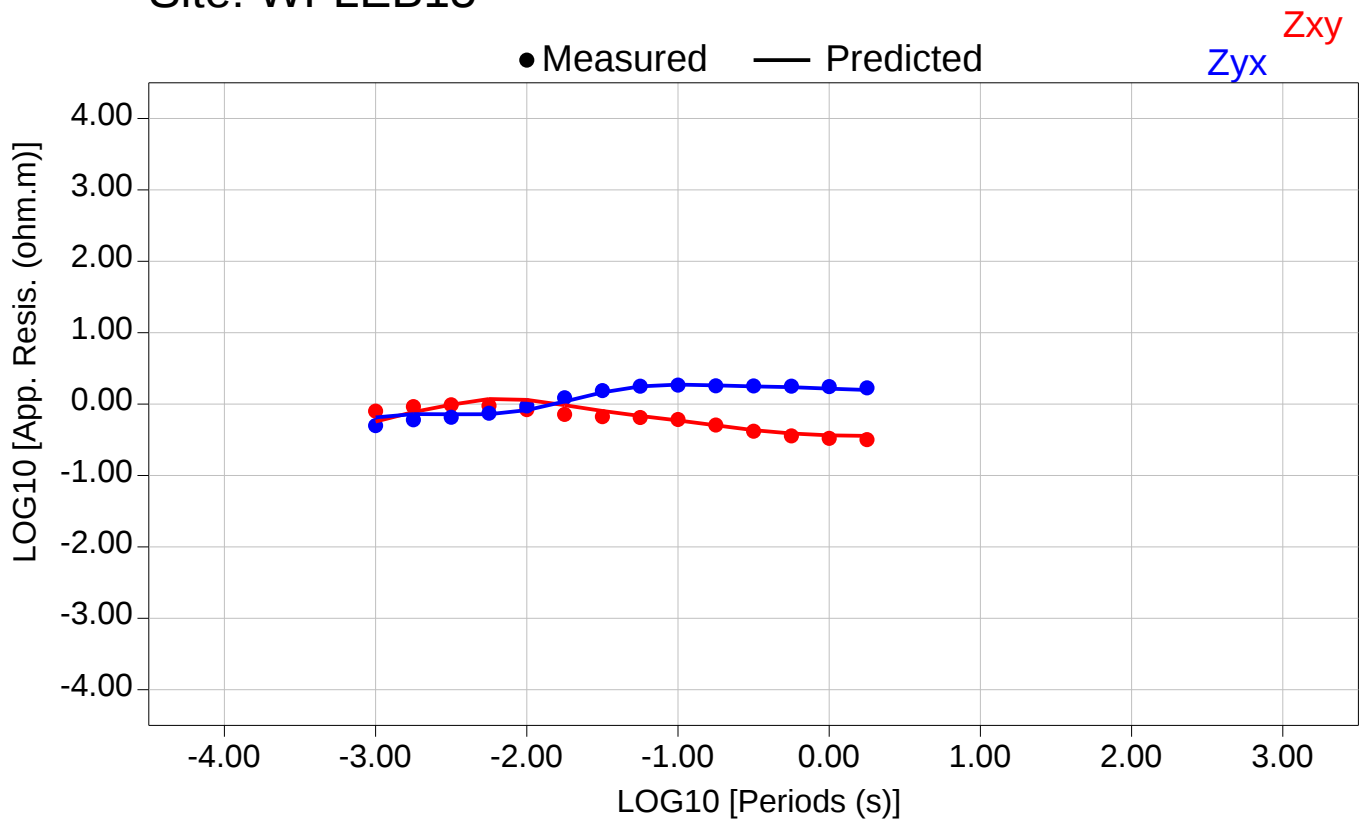
Total Z RMS = 1.58

Zxy RMS = 1.72

Zyx RMS = 1.48



Site: WFLEB15

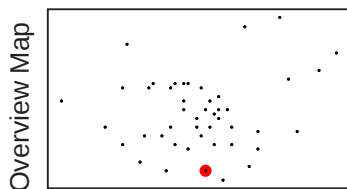


Overall RMS (Z+Tz)= 1.44

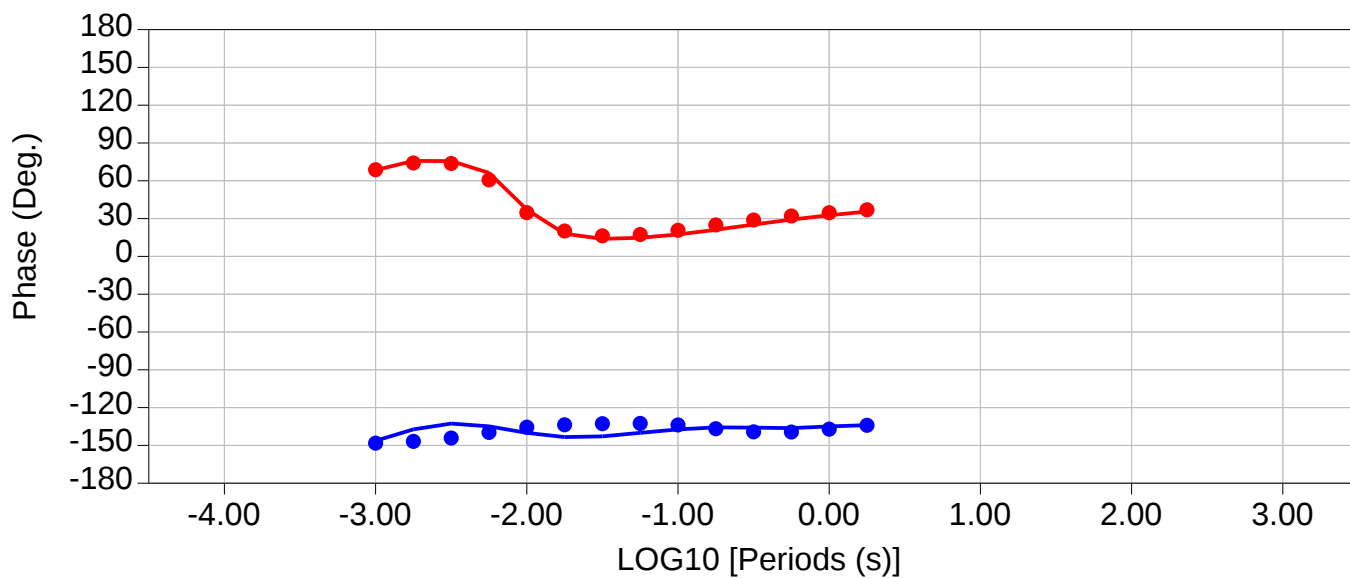
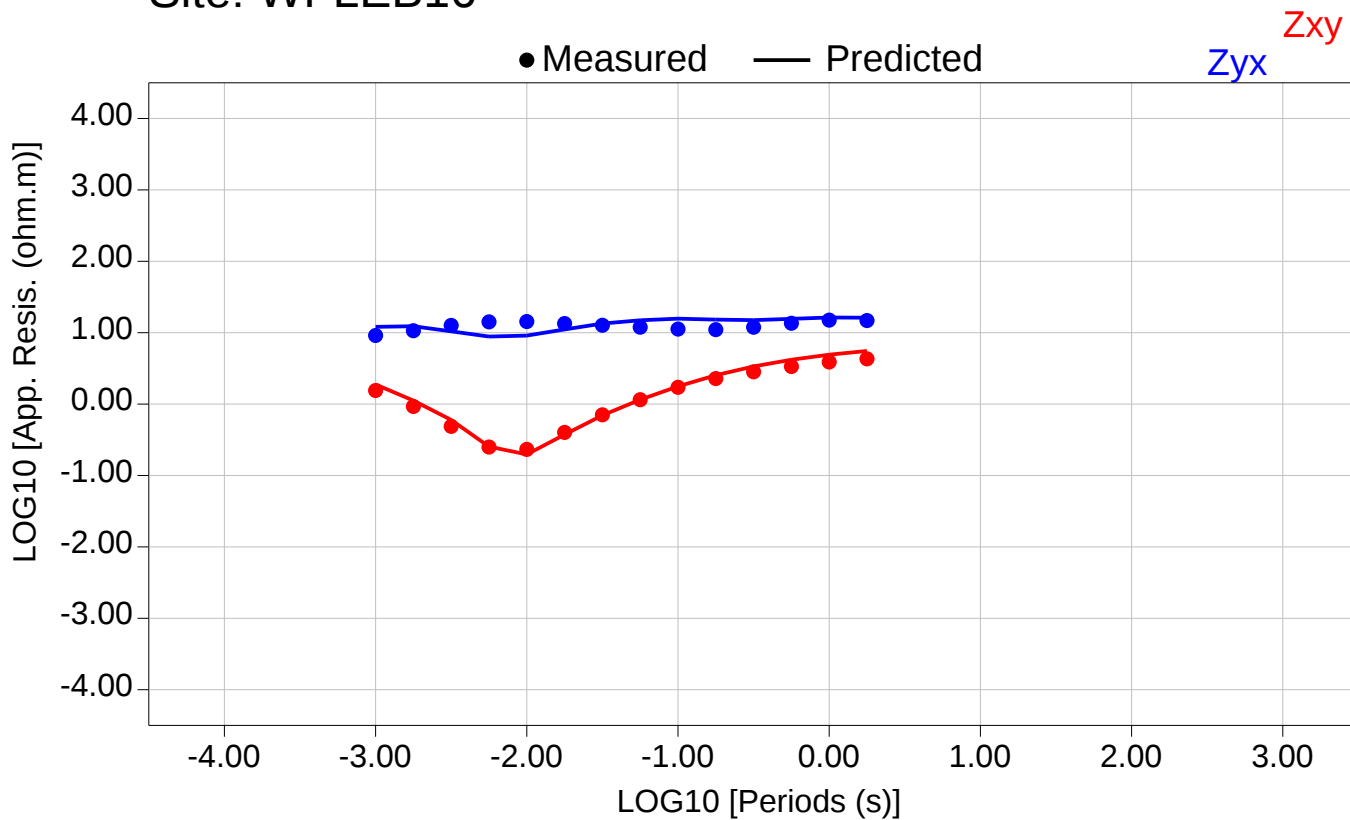
Total Z RMS = 1.44

Zxy RMS = 1.81

Zyx RMS = 1.53



Site: WFLEB16

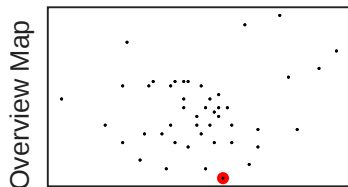


Overall RMS (Z+Tz)= 2.11

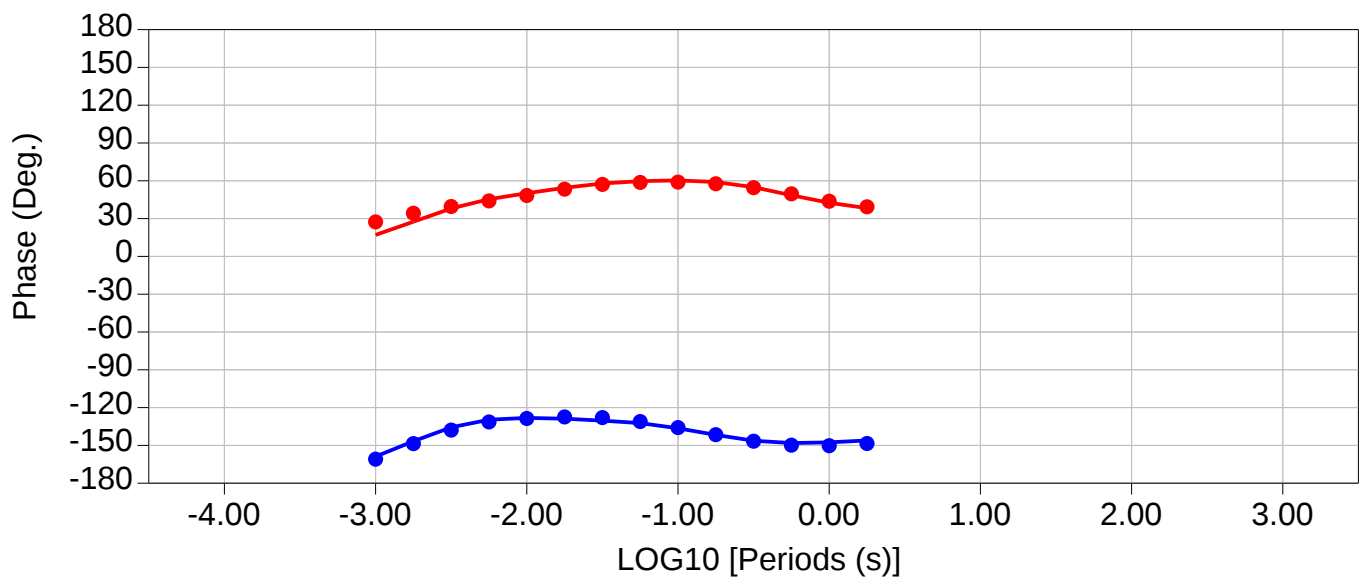
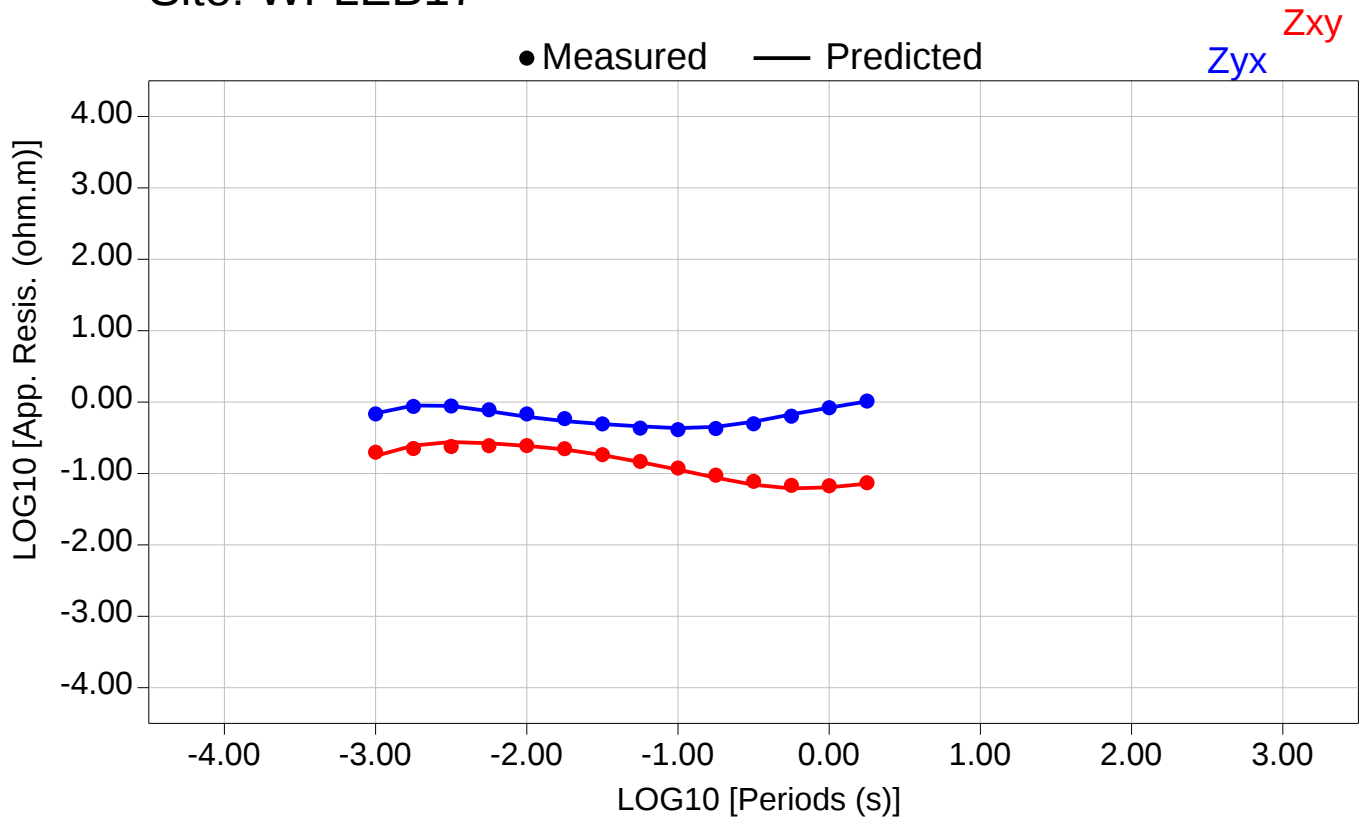
Total Z RMS = 2.11

Zxy RMS = 1.39

Zyx RMS = 2.39



Site: WFLEB17

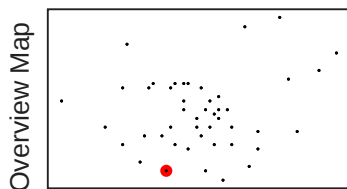


Overall RMS (Z+Tz)= 0.77

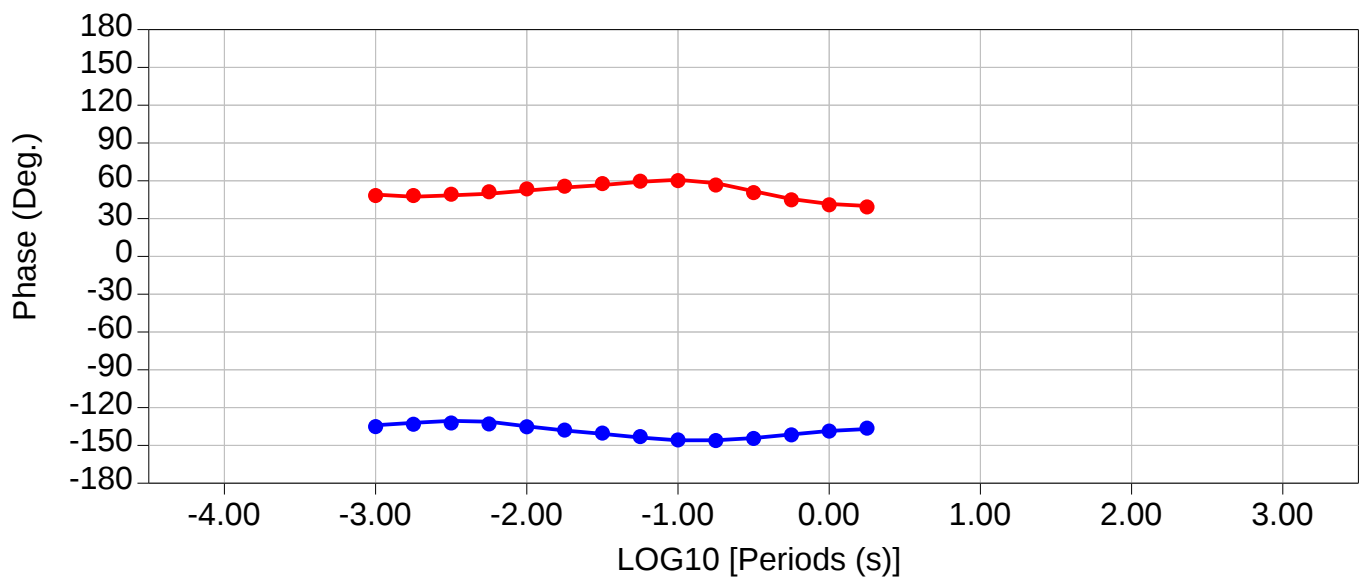
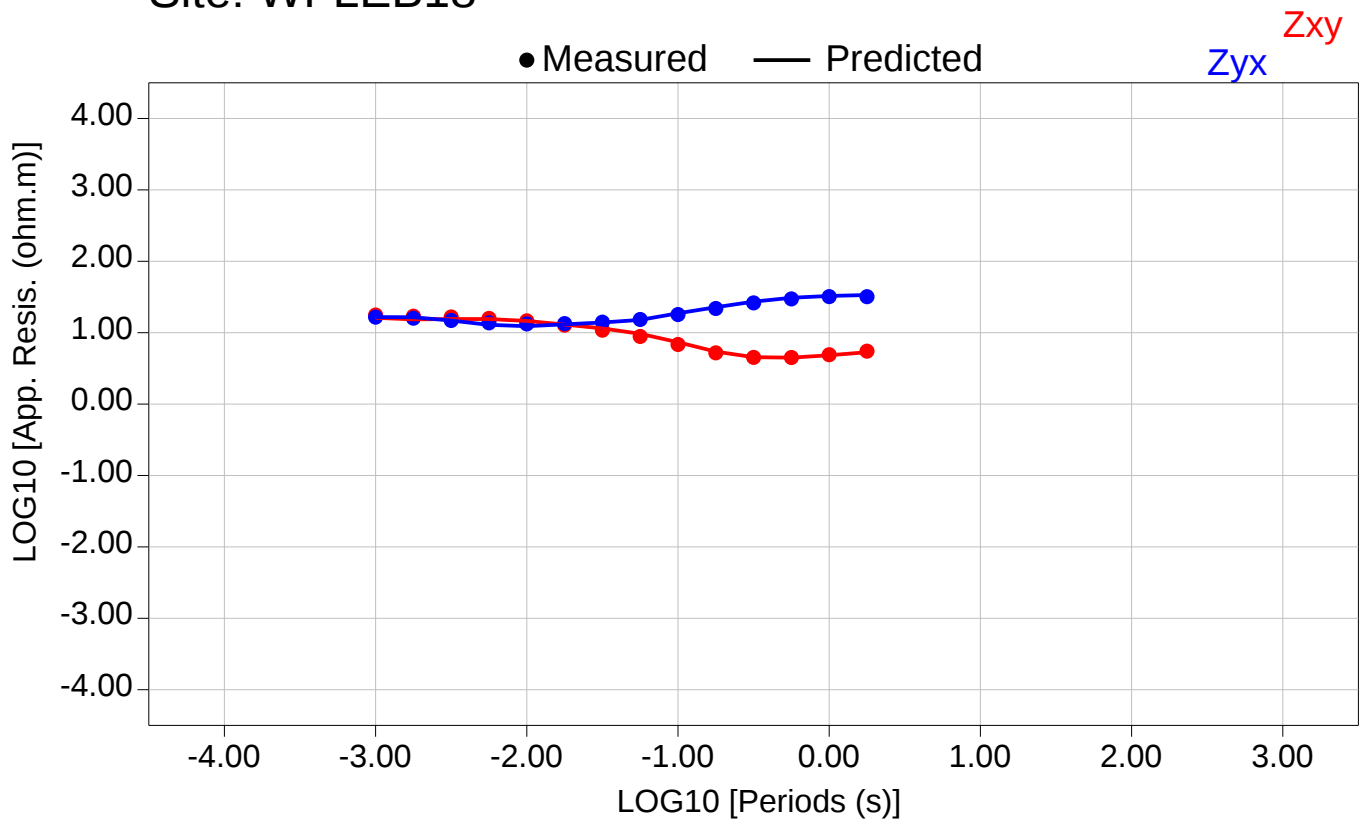
Total Z RMS = 0.77

Zxy RMS = 1.01

Zyx RMS = 0.55



Site: WFLEB18

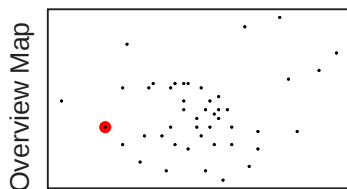


Overall RMS (Z+Tz)= 0.39

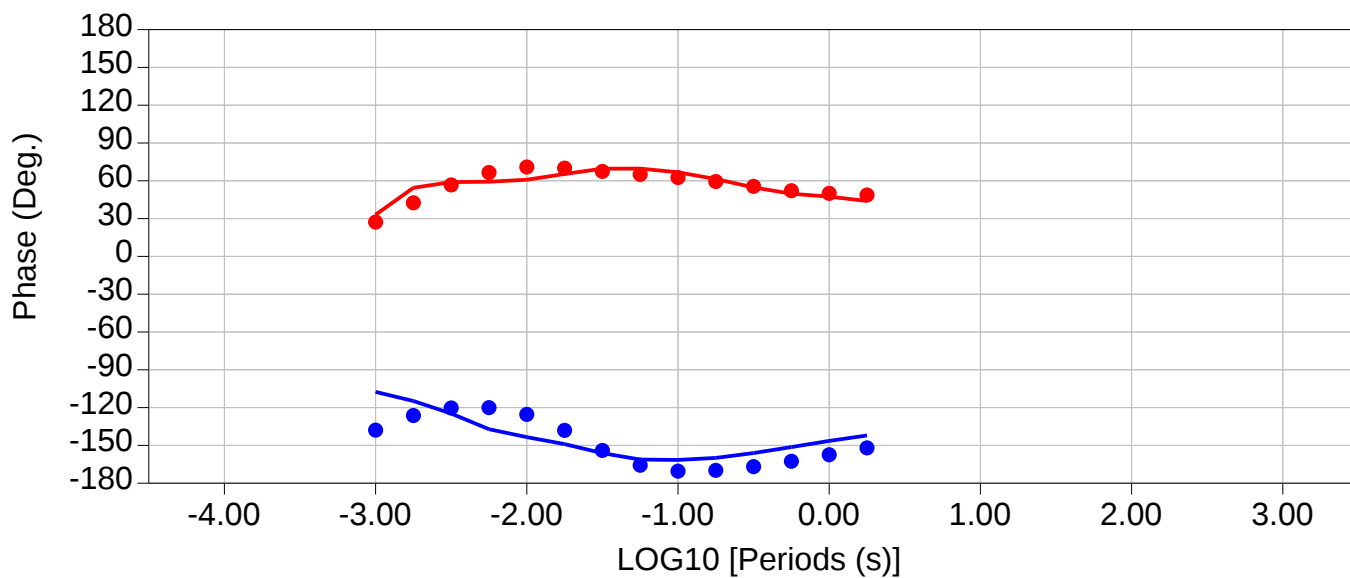
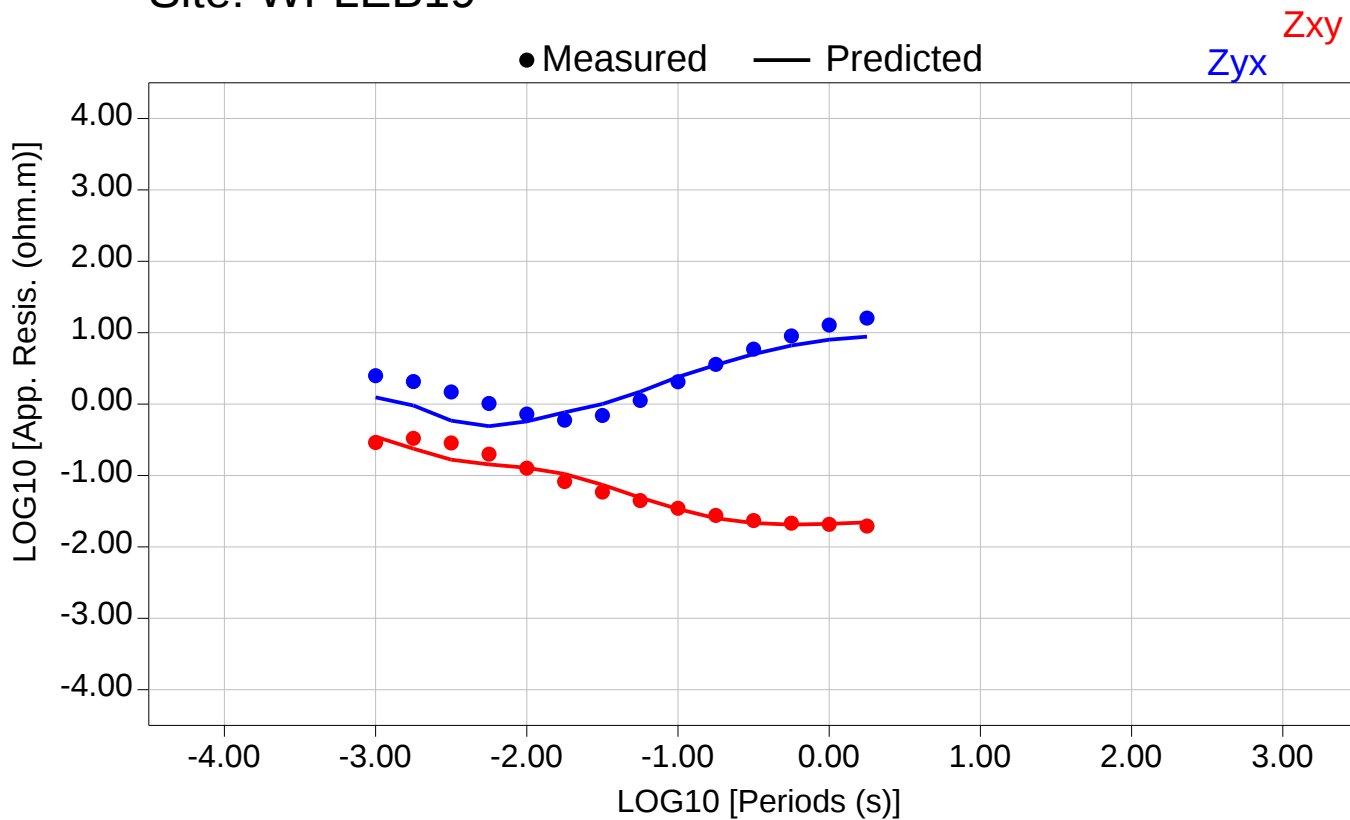
Total Z RMS = 0.39

Zxy RMS = 0.47

Zyx RMS = 0.35



Site: WFLEB19

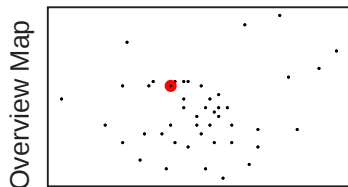


Overall RMS (Z+Tz)= 2.65

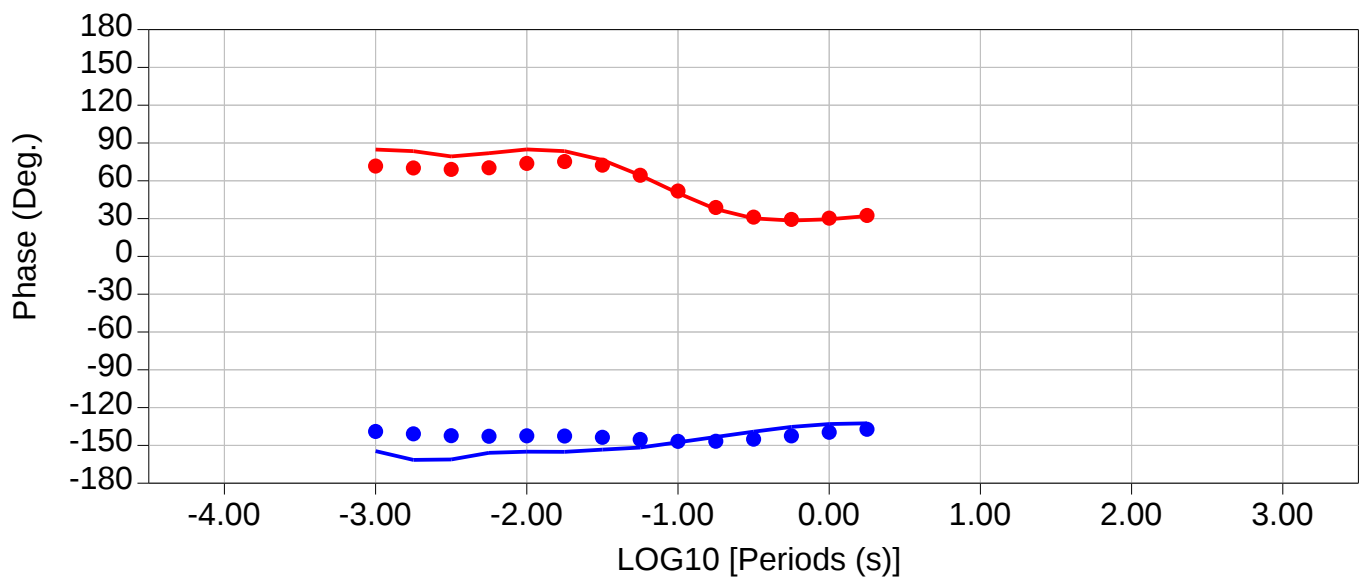
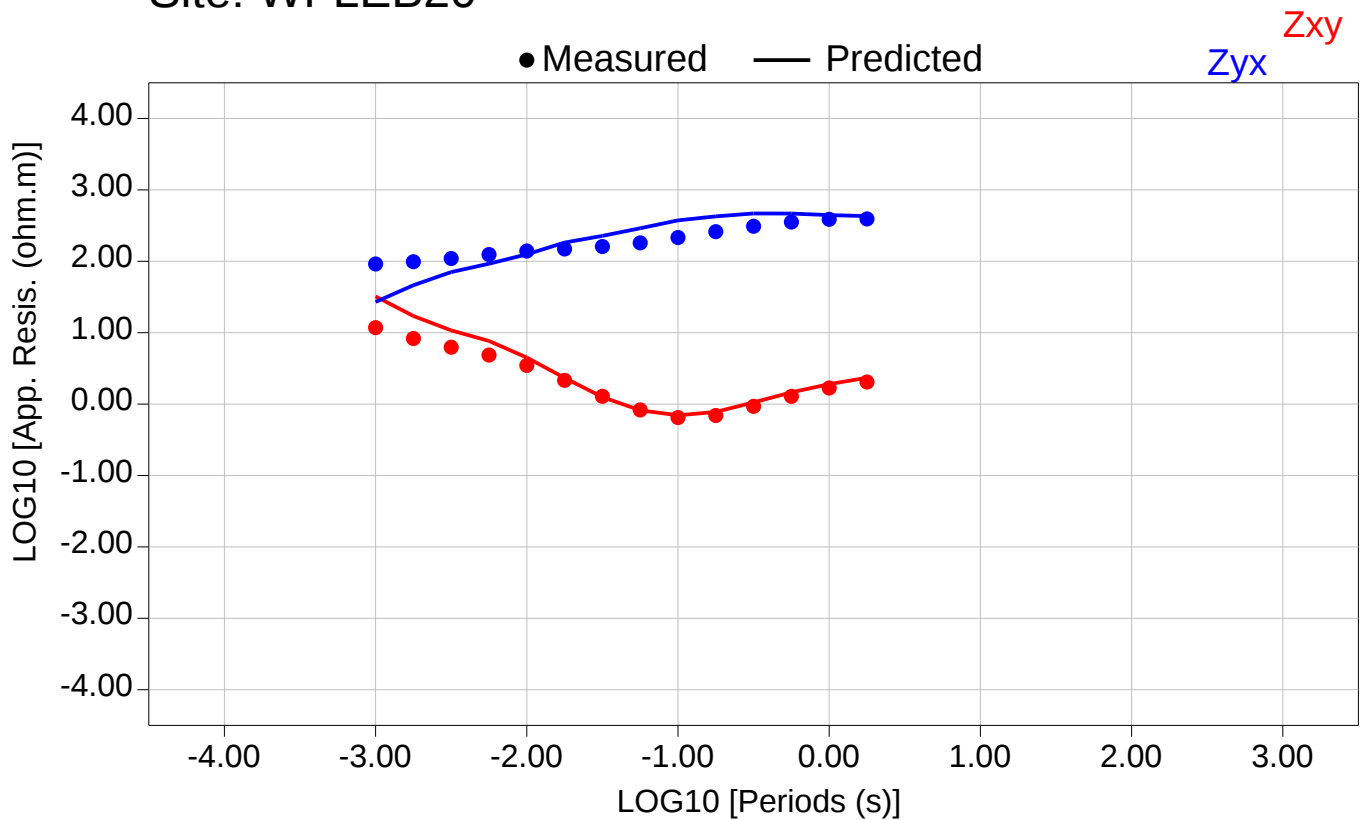
Total Z RMS = 2.65

Zxy RMS = 2.01

Zyx RMS = 4.23



Site: WFLEB20

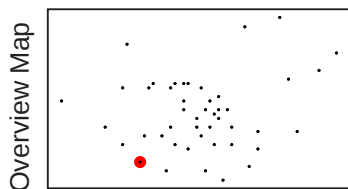


Overall RMS (Z+Tz)= 3.06

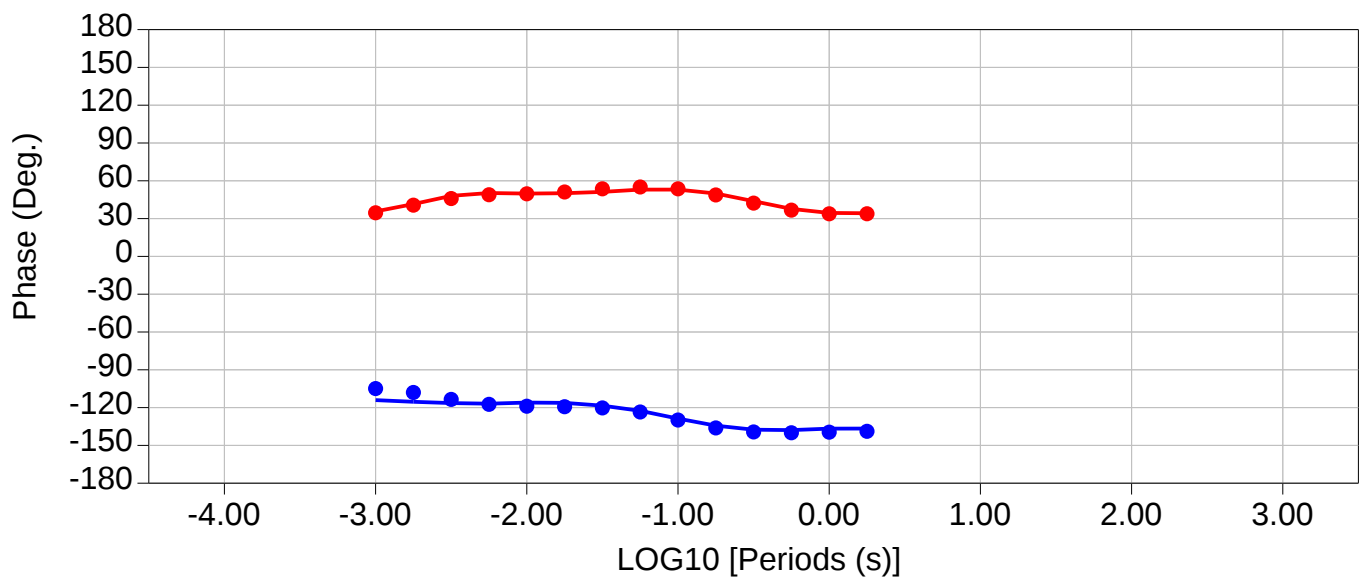
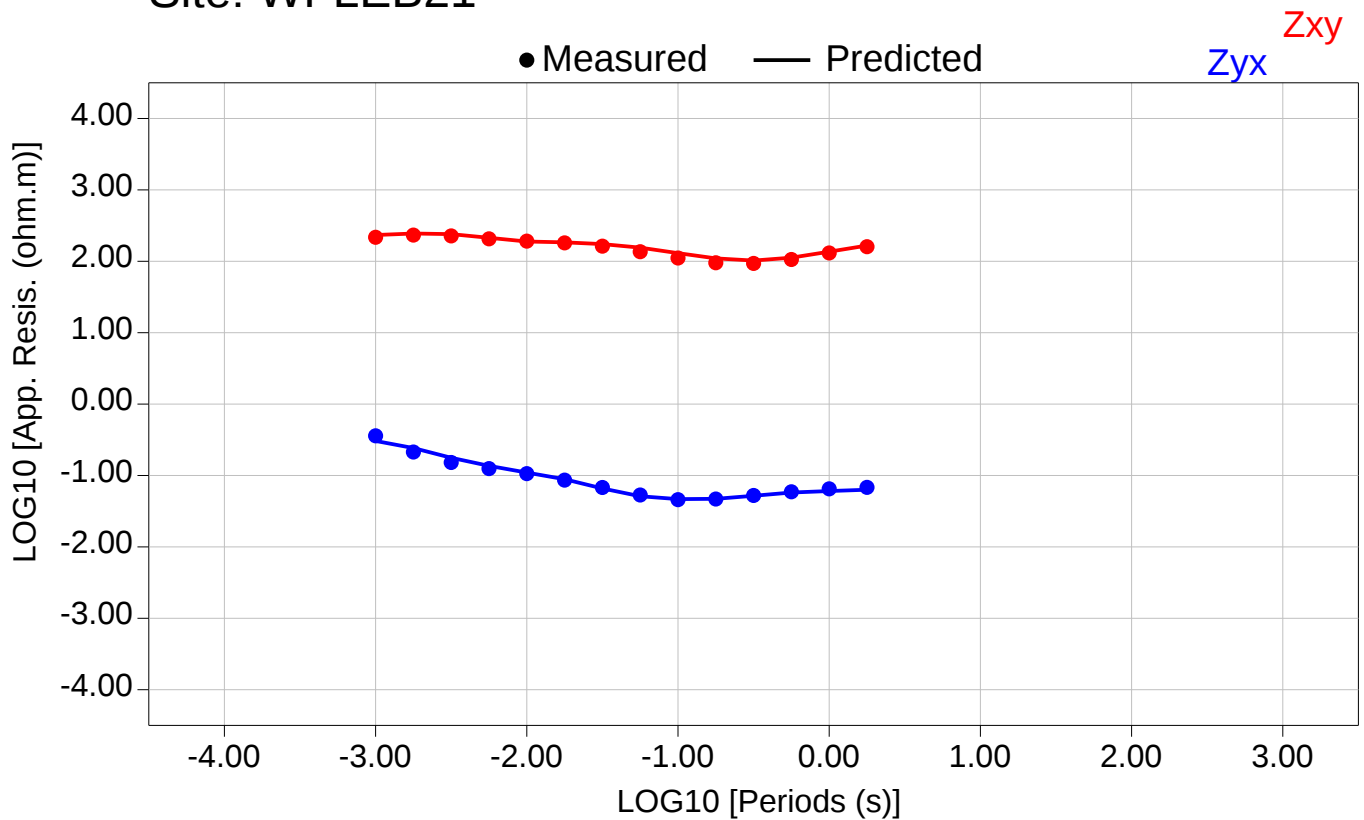
Total Z RMS = 3.06

Zxy RMS = 4.06

Zyx RMS = 4.16



Site: WFLEB21

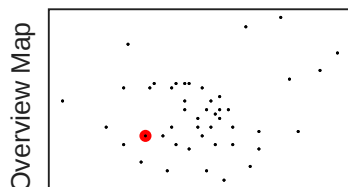


Overall RMS (Z+Tz)= 1.01

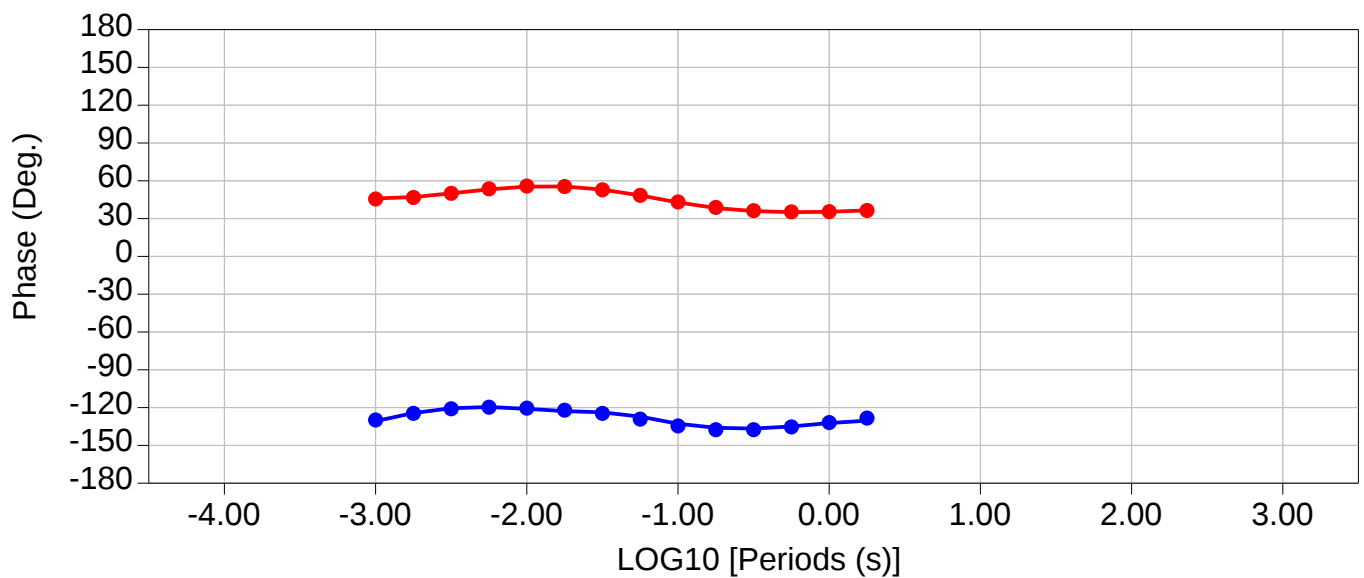
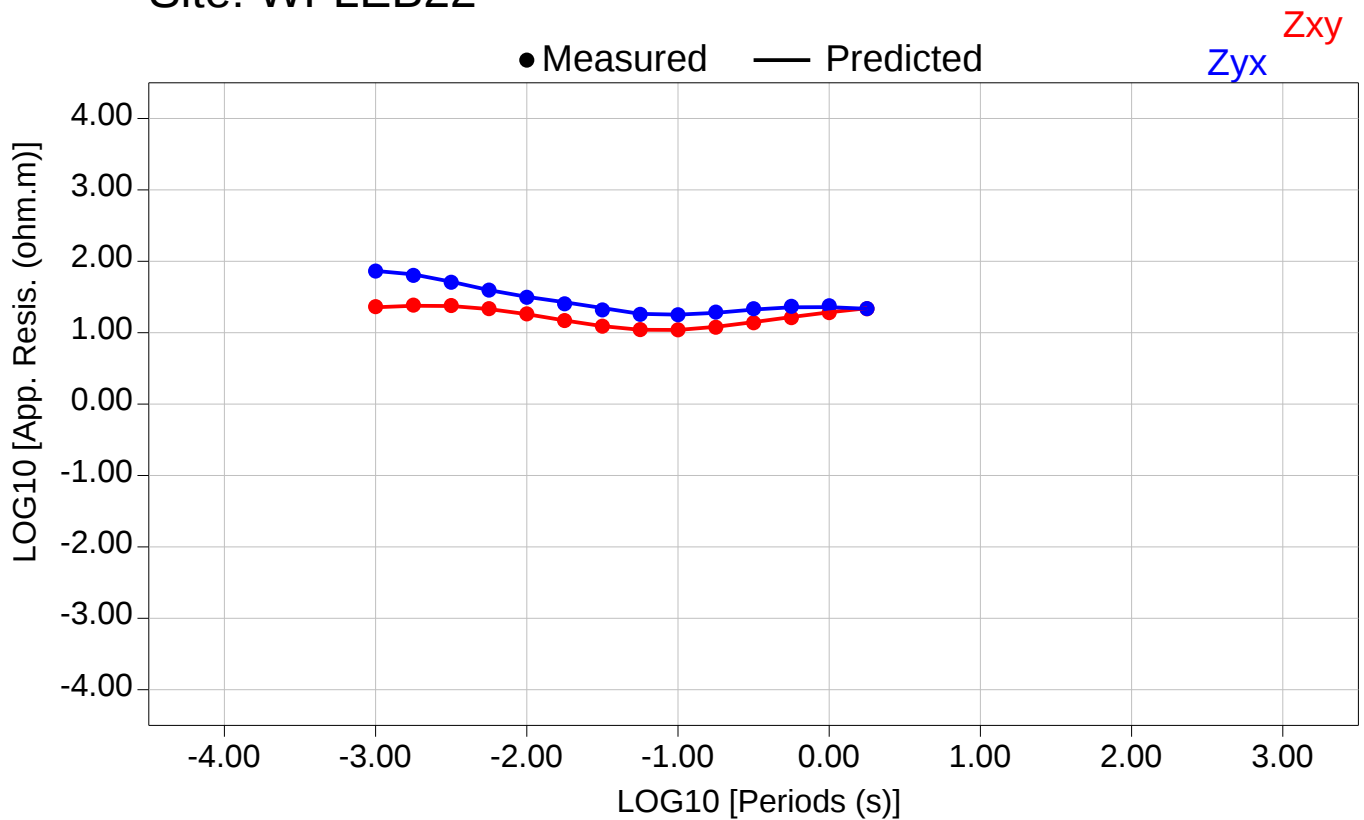
Total Z RMS = 1.01

Zxy RMS = 0.69

Zyx RMS = 1.08



Site: WFLEB22

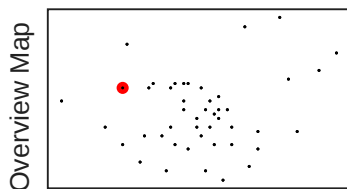


Overall RMS (Z+Tz)= 0.21

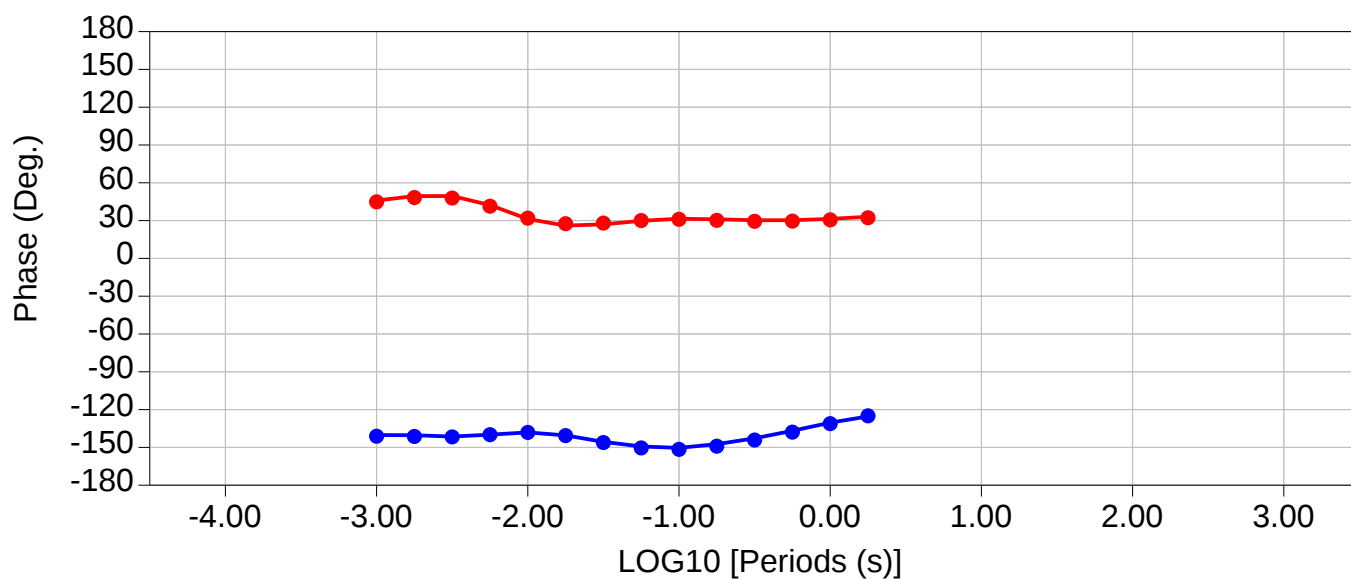
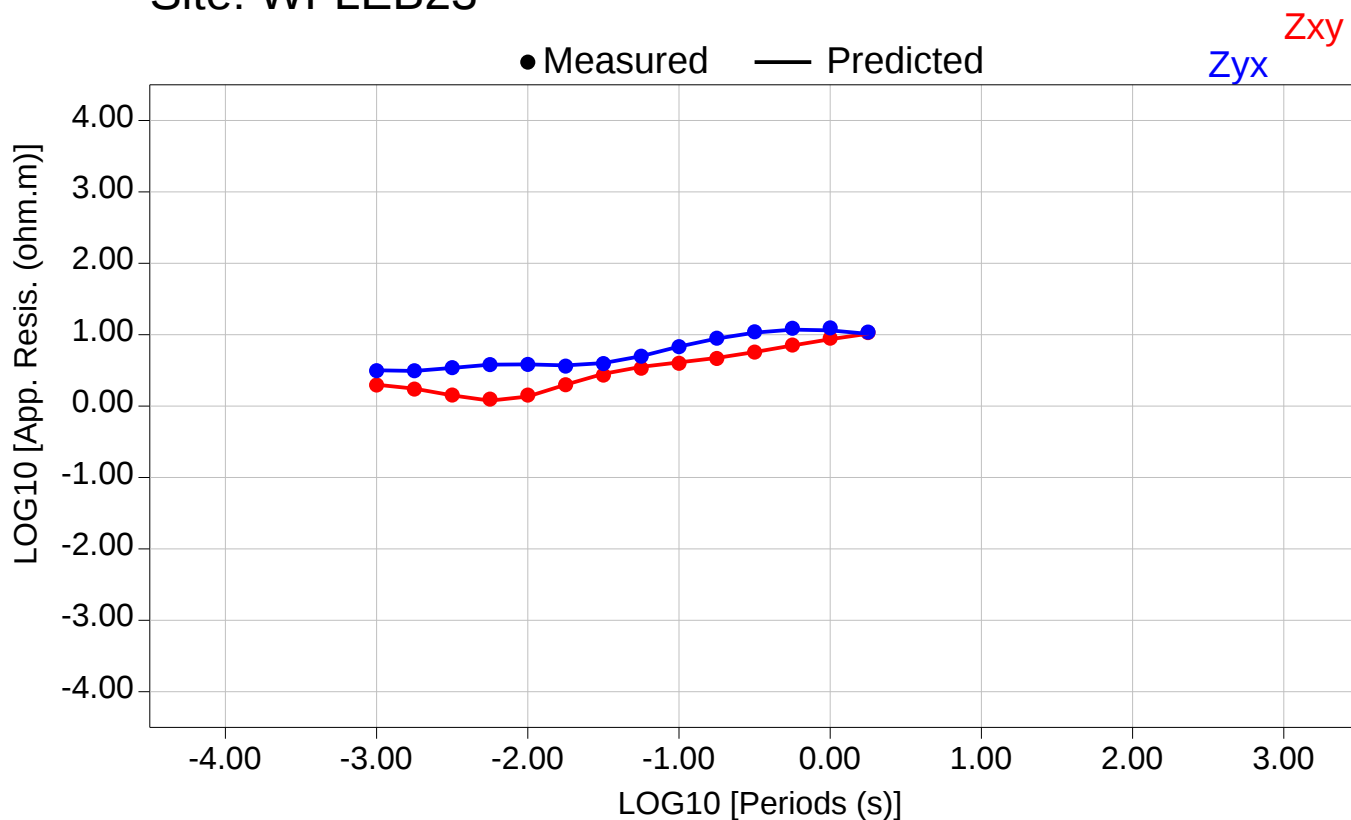
Total Z RMS = 0.21

Zxy RMS = 0.12

Zyx RMS = 0.35



Site: WFLEB23

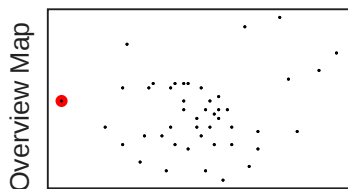


Overall RMS (Z+Tz)= 0.34

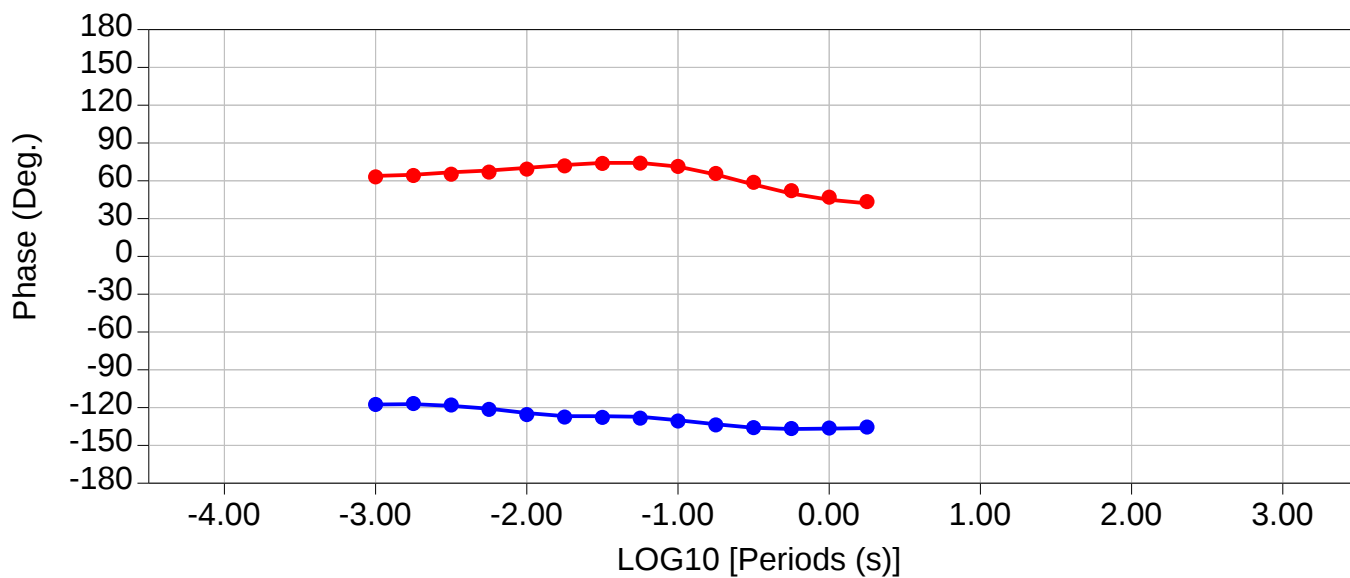
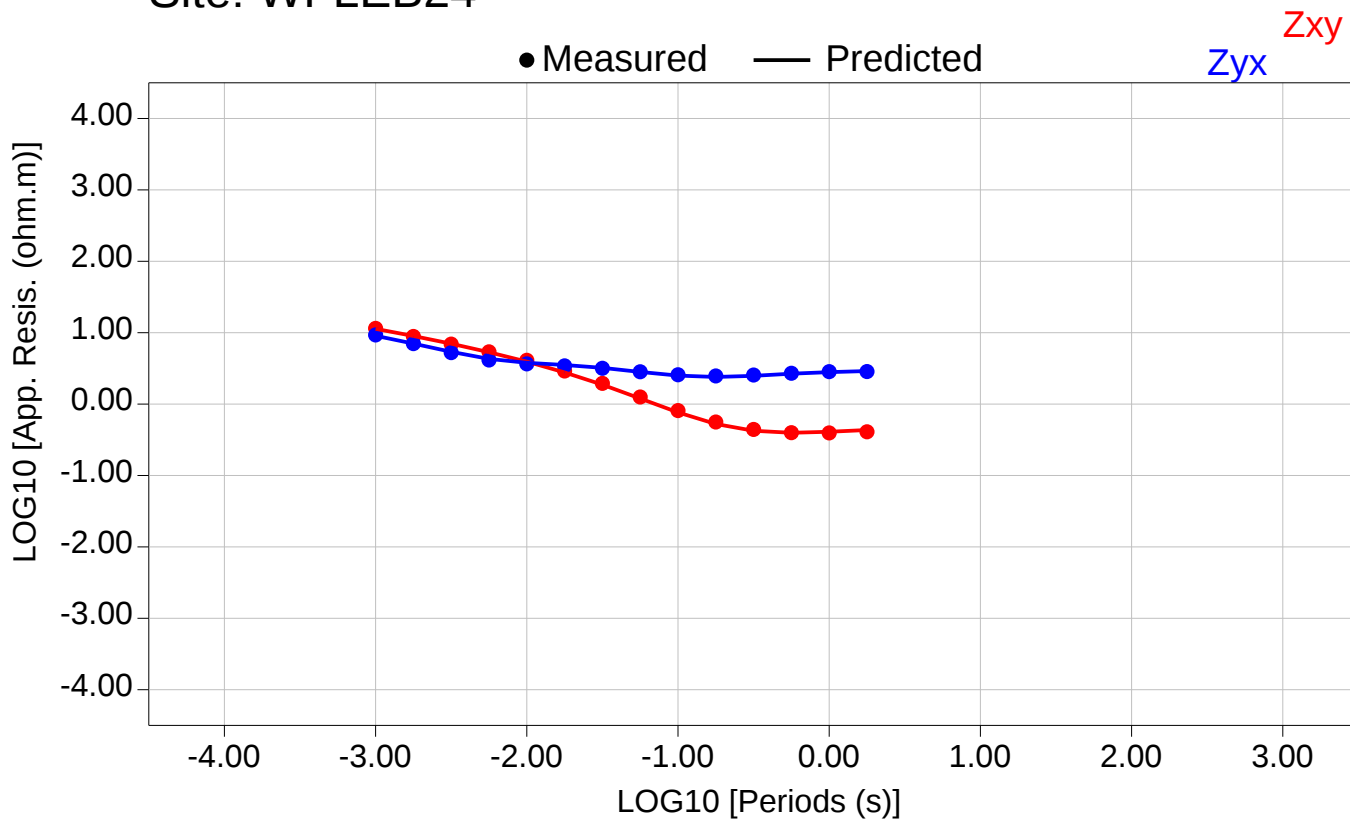
Total Z RMS = 0.34

Zxy RMS = 0.32

Zyx RMS = 0.31



Site: WFLEB24

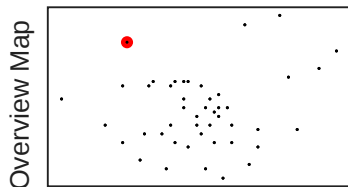


Overall RMS (Z+Tz)= 0.28

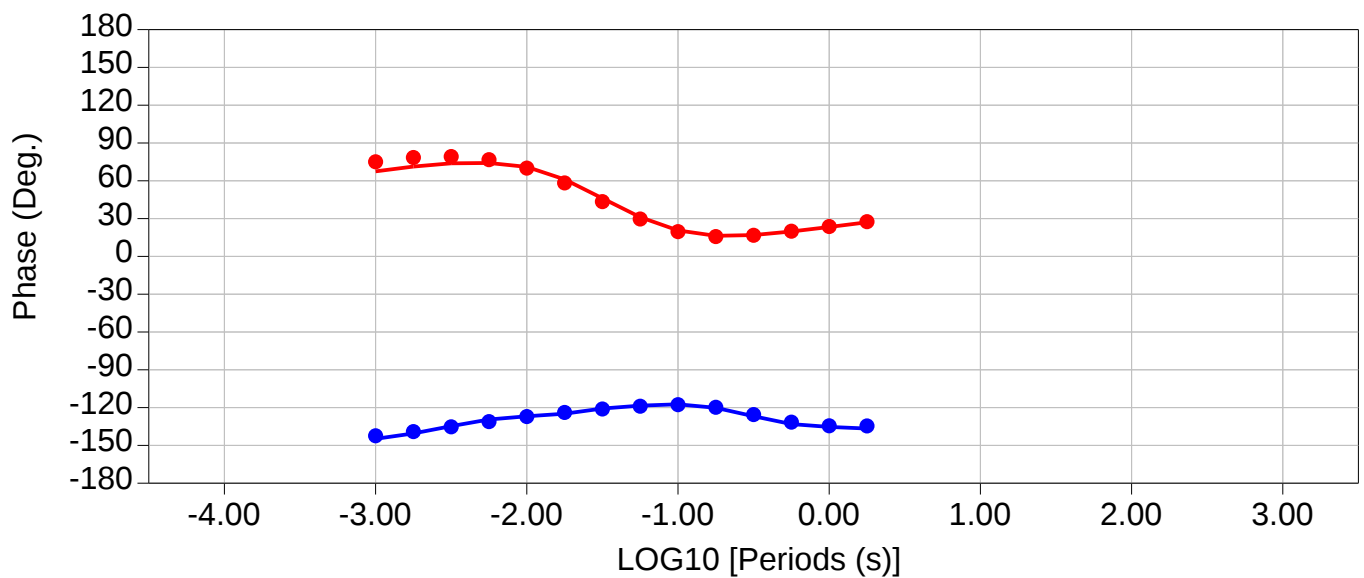
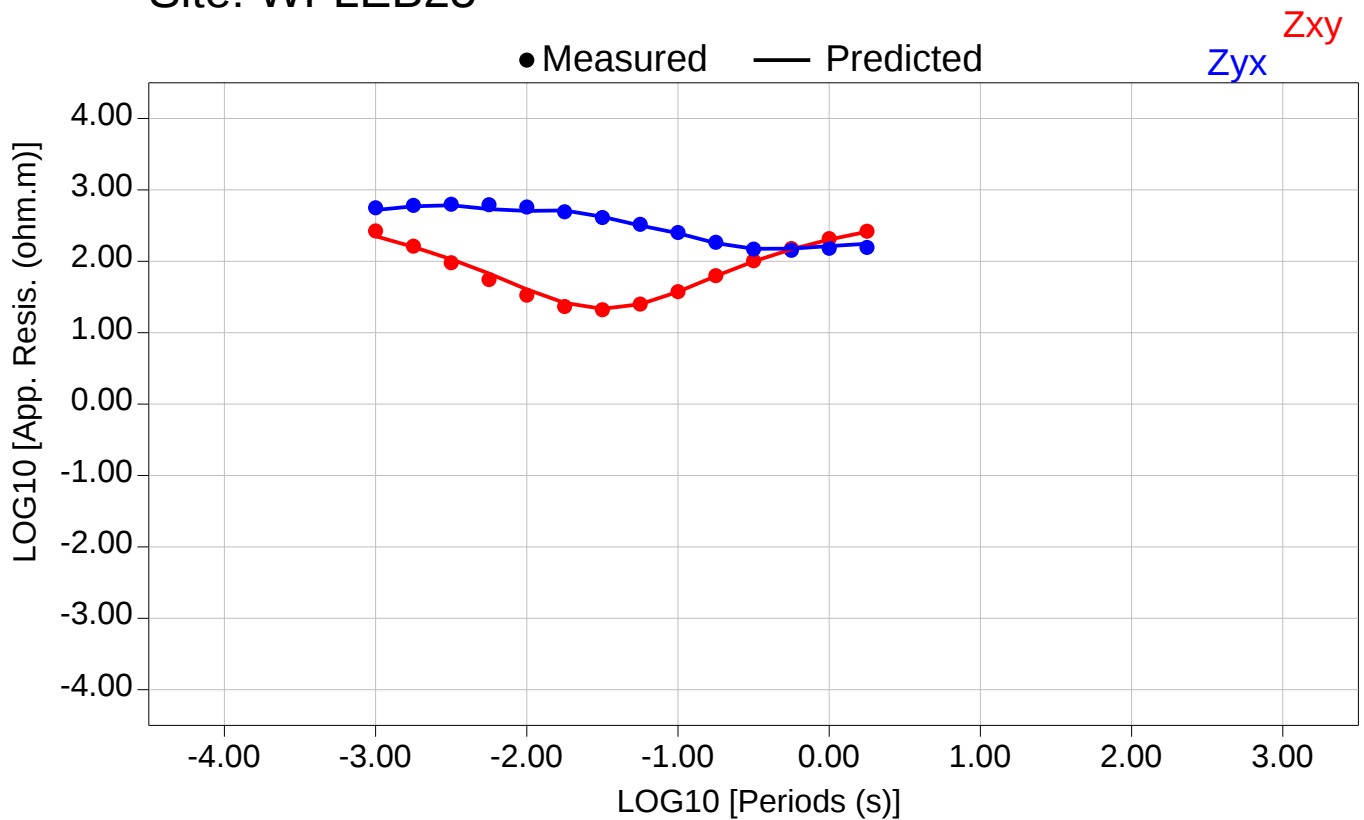
Total Z RMS = 0.28

Zxy RMS = 0.42

Zyx RMS = 0.24



Site: WFLEB25

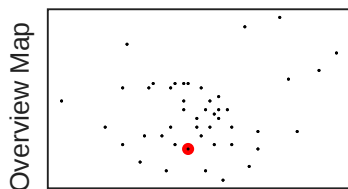


Overall RMS (Z+Tz)= 1.25

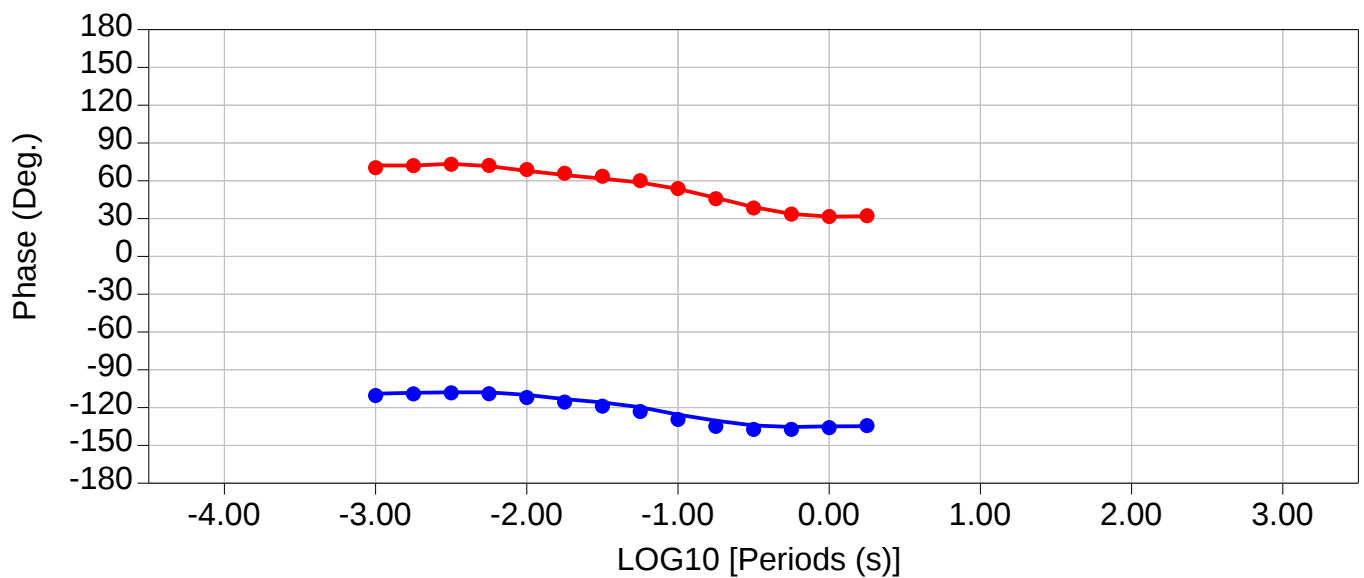
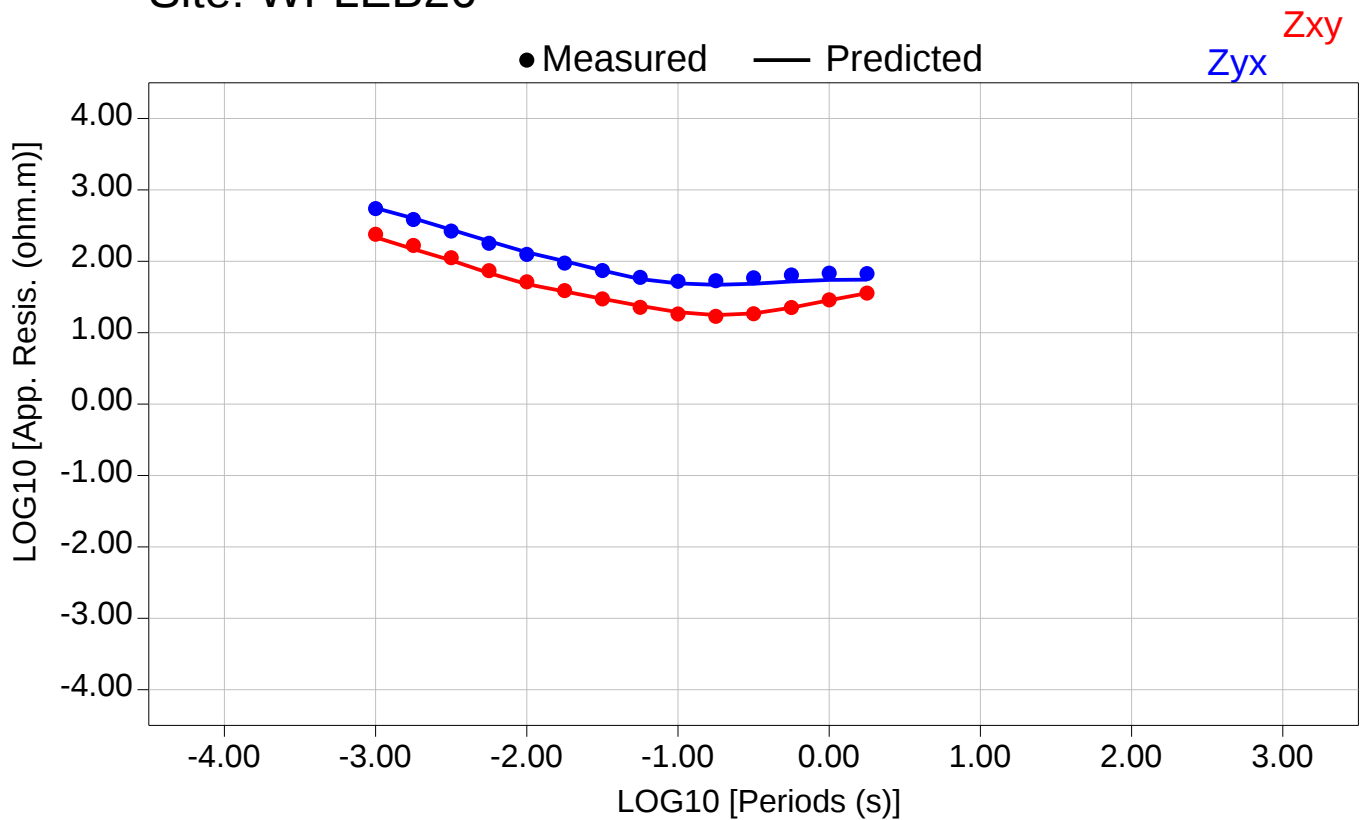
Total Z RMS = 1.25

Zxy RMS = 1.10

Zyx RMS = 0.58



Site: WFLEB26

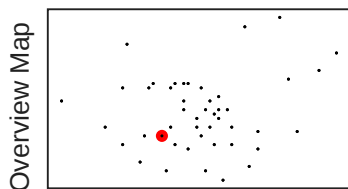


Overall RMS (Z+Tz)= 0.66

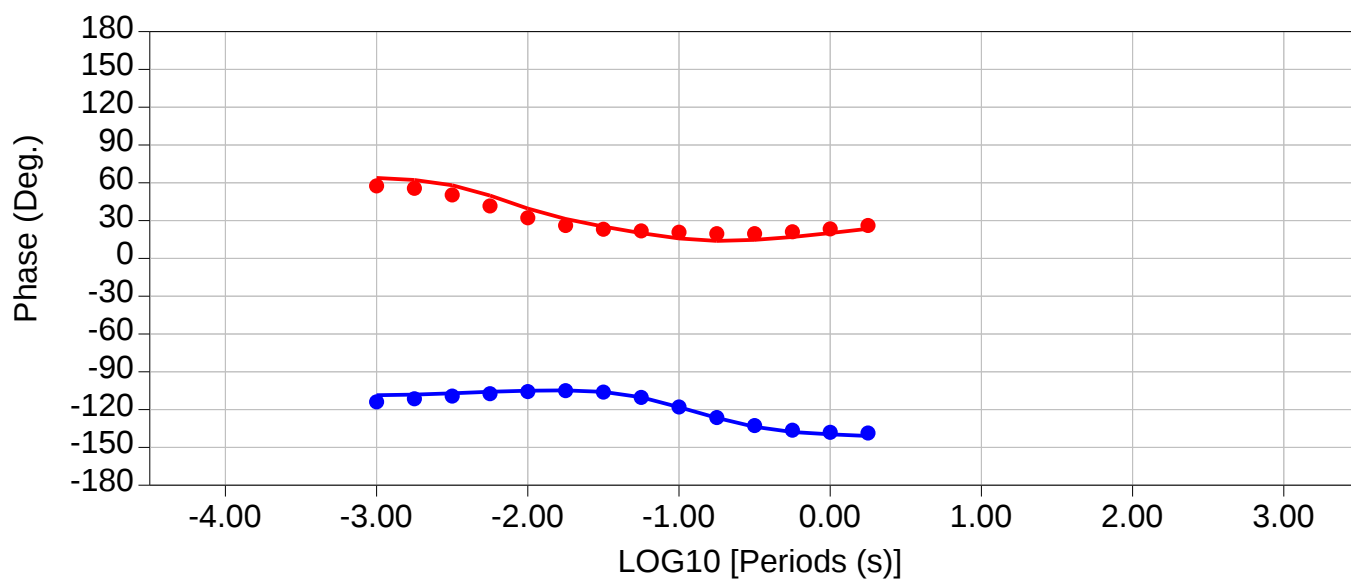
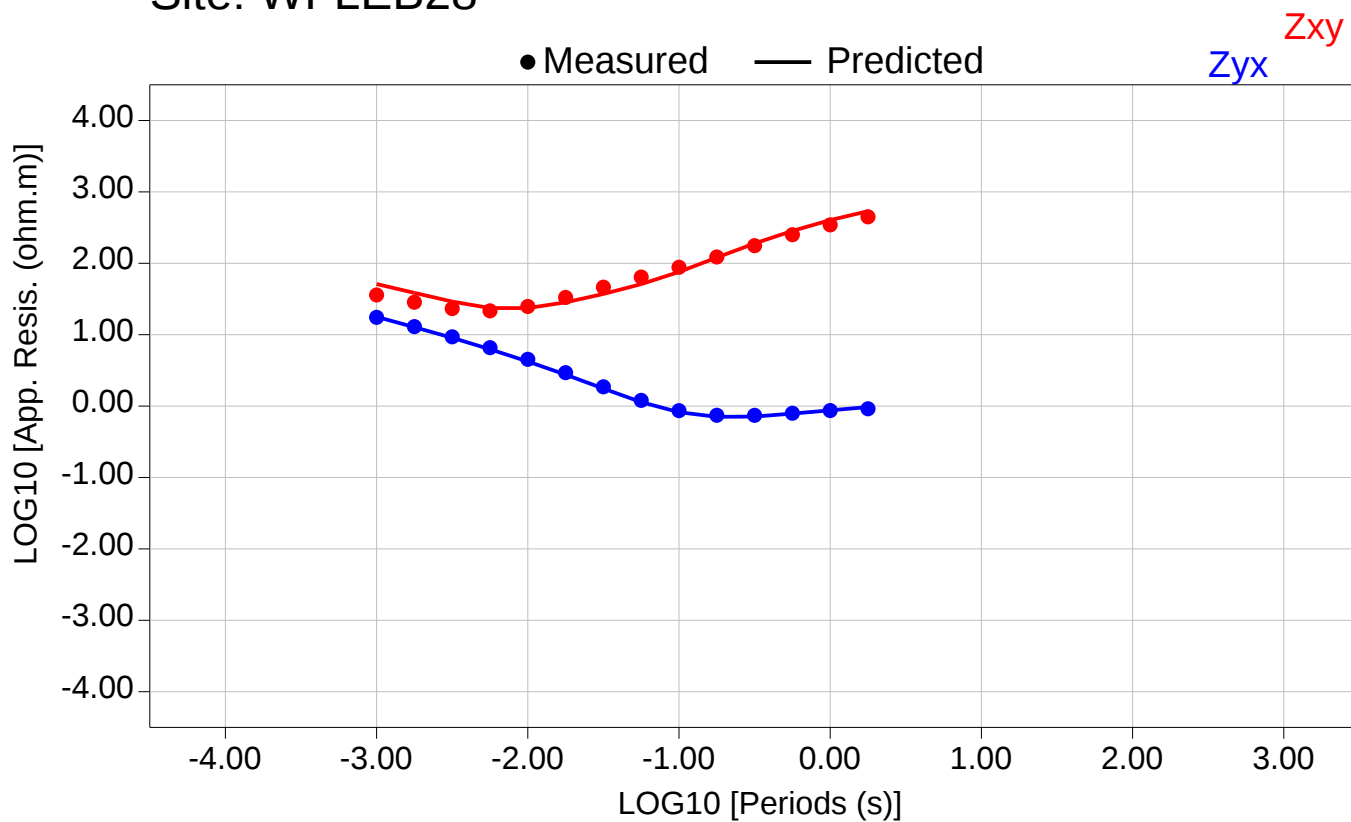
Total Z RMS = 0.66

Zxy RMS = 0.48

Zyx RMS = 1.02



Site: WFLEB28

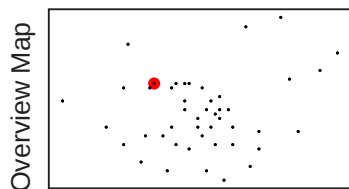


Overall RMS (Z+Tz)= 1.08

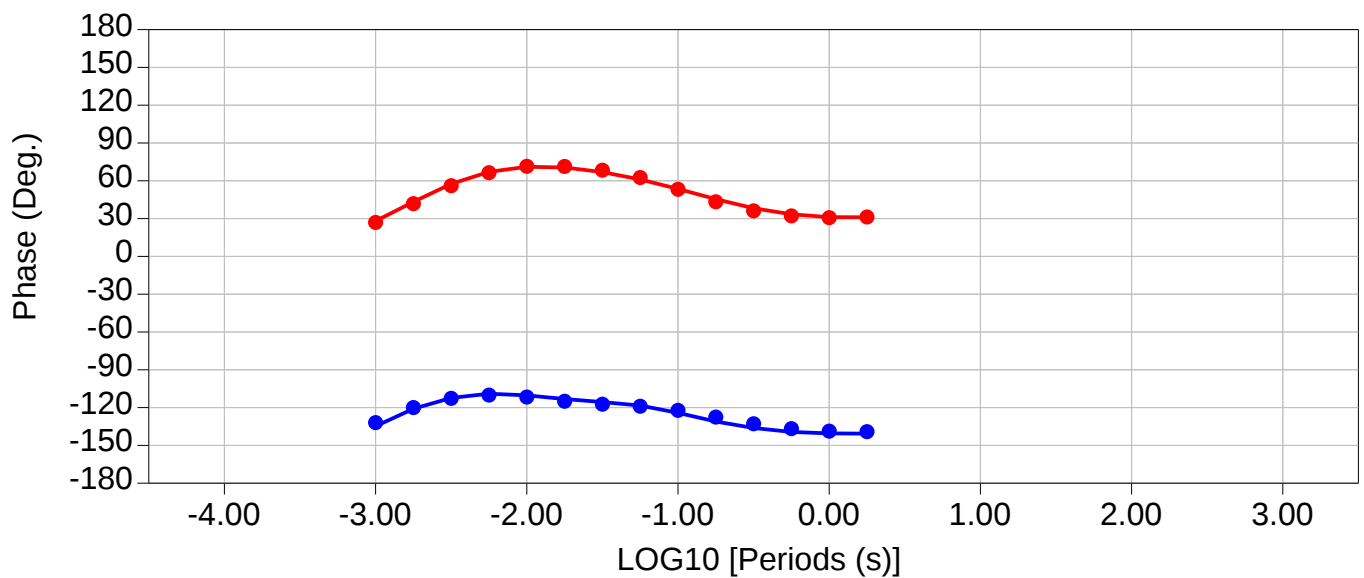
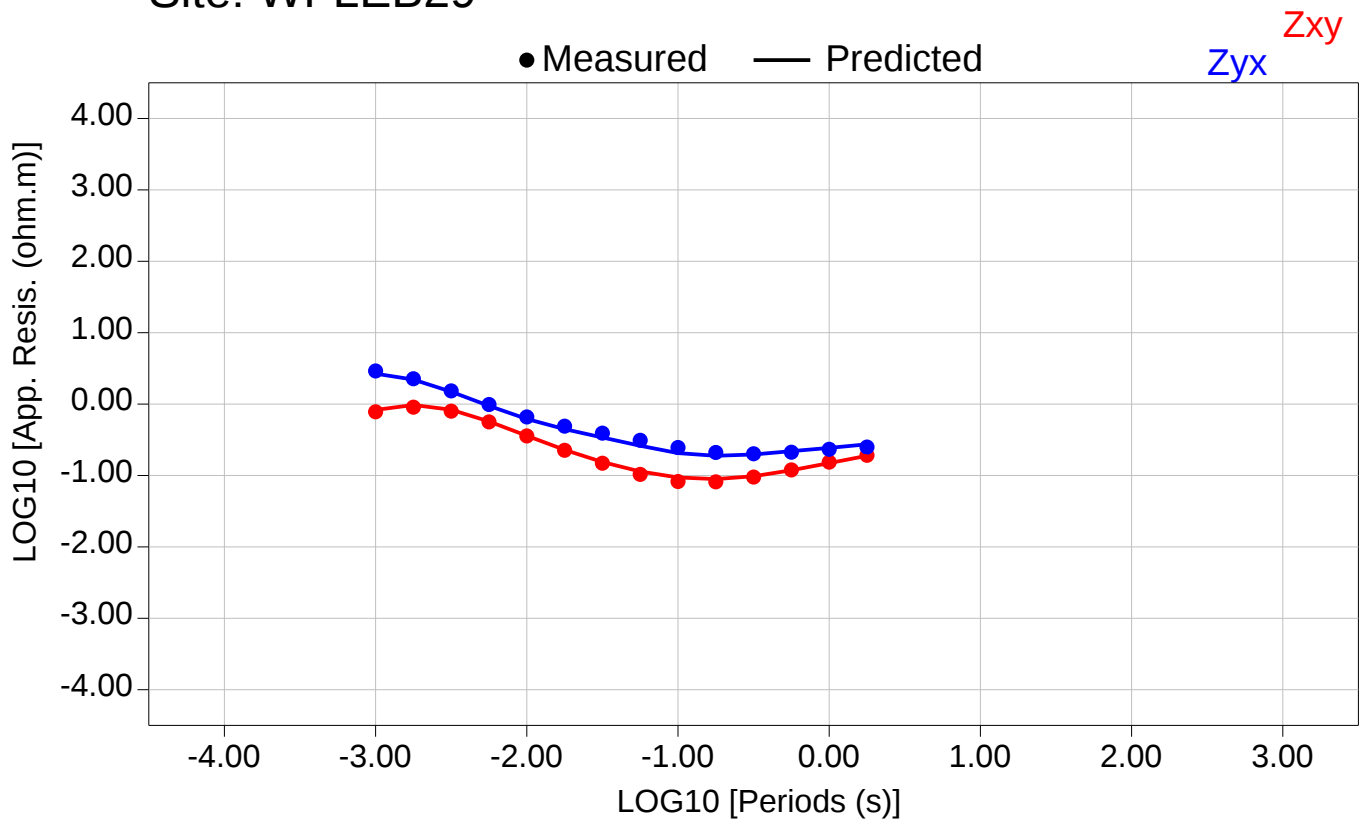
Total Z RMS = 1.08

Zxy RMS = 1.96

Zyx RMS = 0.60



Site: WFLEB29

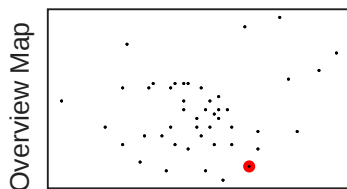


Overall RMS (Z+Tz)= 0.55

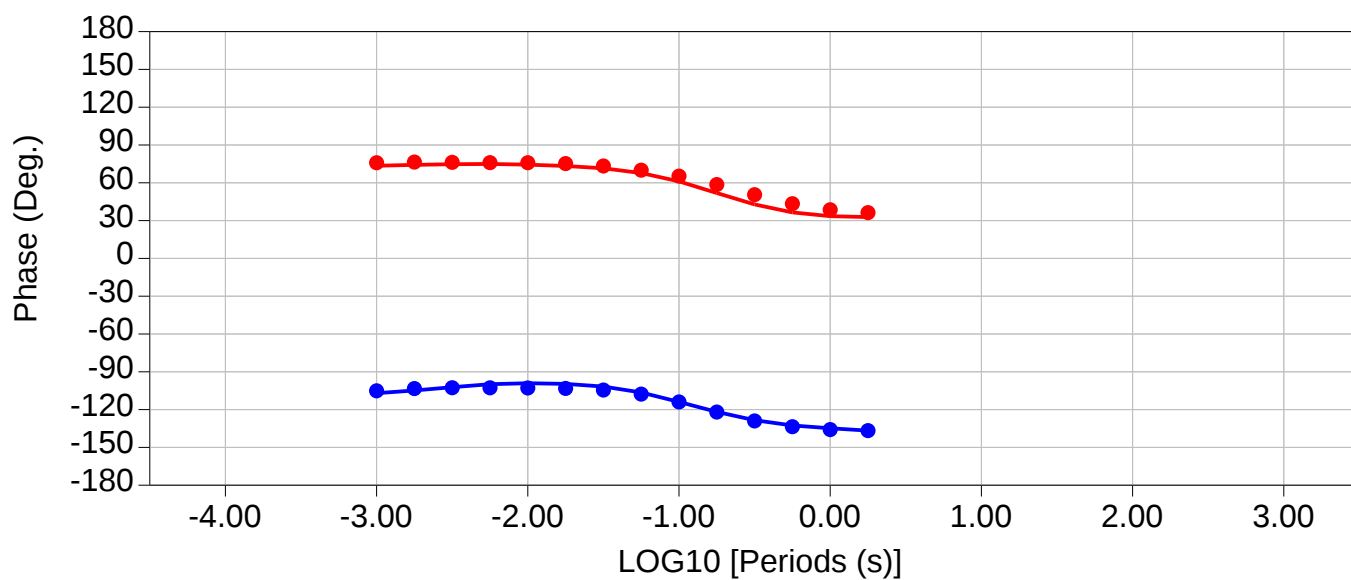
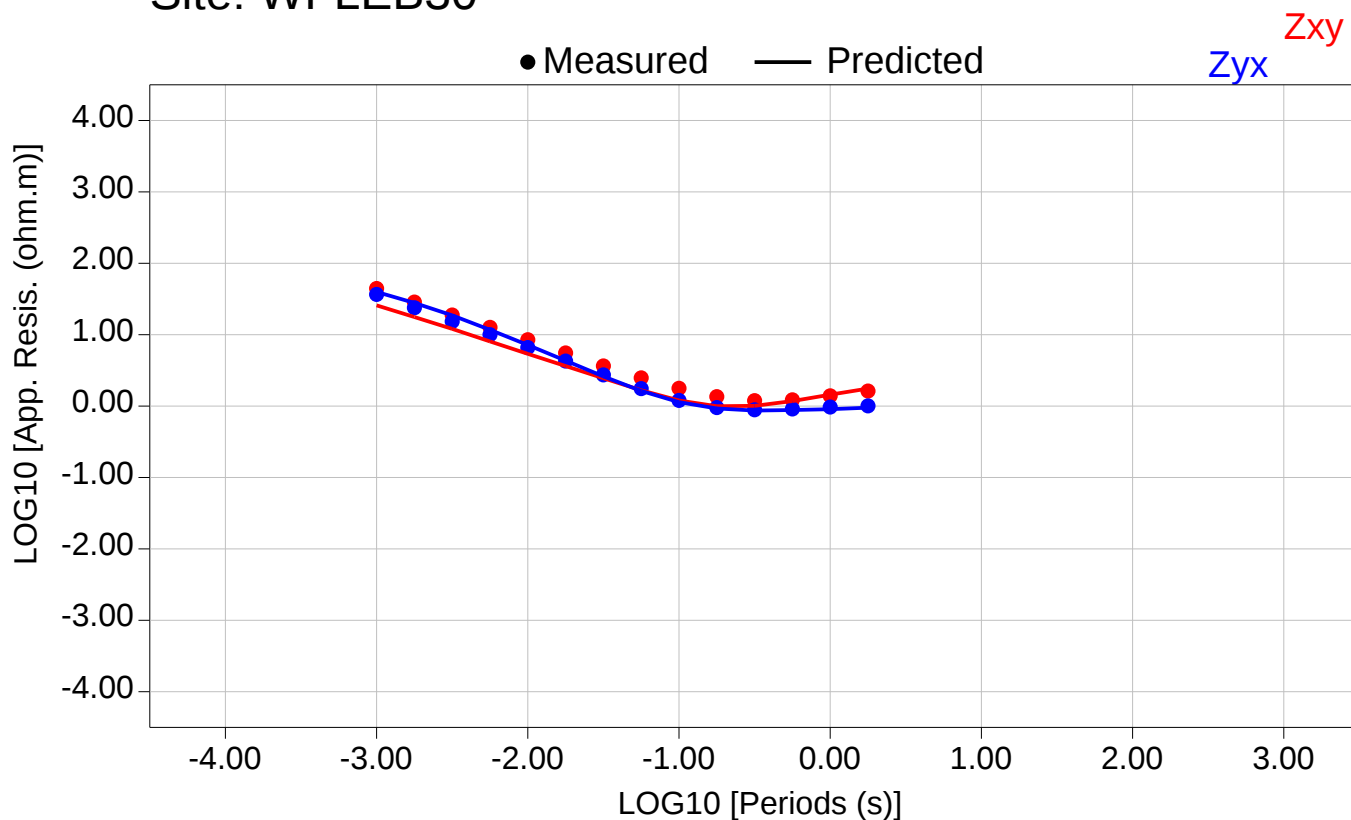
Total Z RMS = 0.55

Zxy RMS = 0.53

Zyx RMS = 0.83



Site: WFLEB30

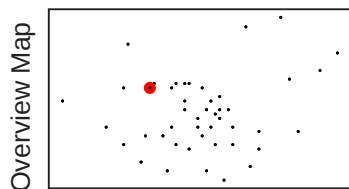


Overall RMS (Z+Tz)= 1.52

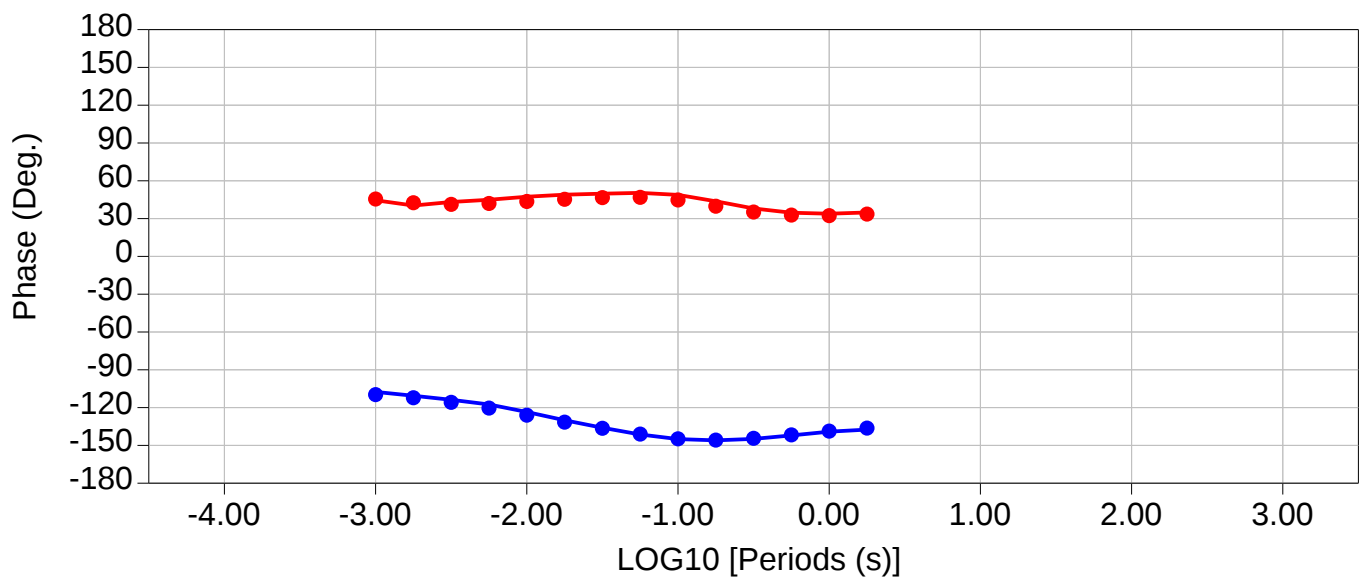
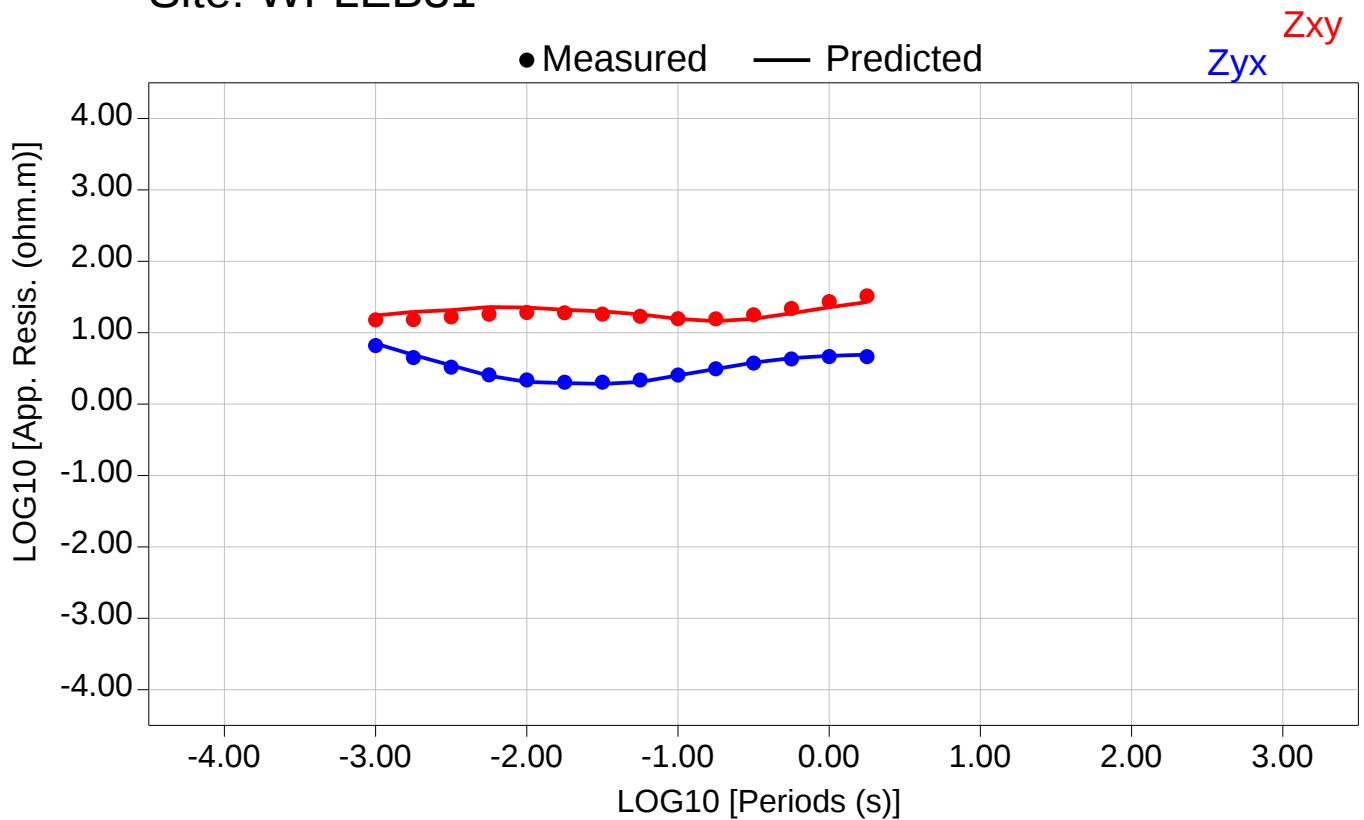
Total Z RMS = 1.52

Zxy RMS = 2.55

Zyx RMS = 0.84



Site: WFLEB31

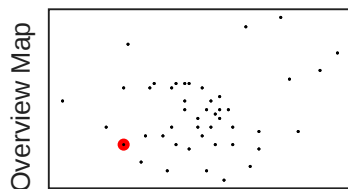


Overall RMS (Z+Tz)= 0.98

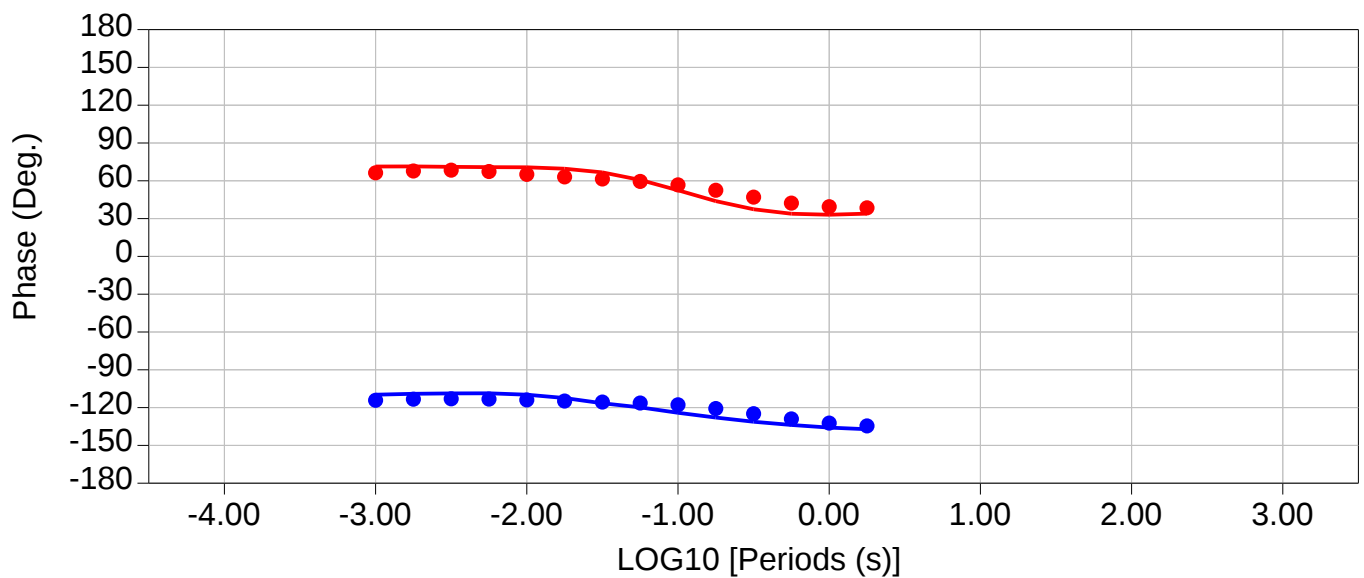
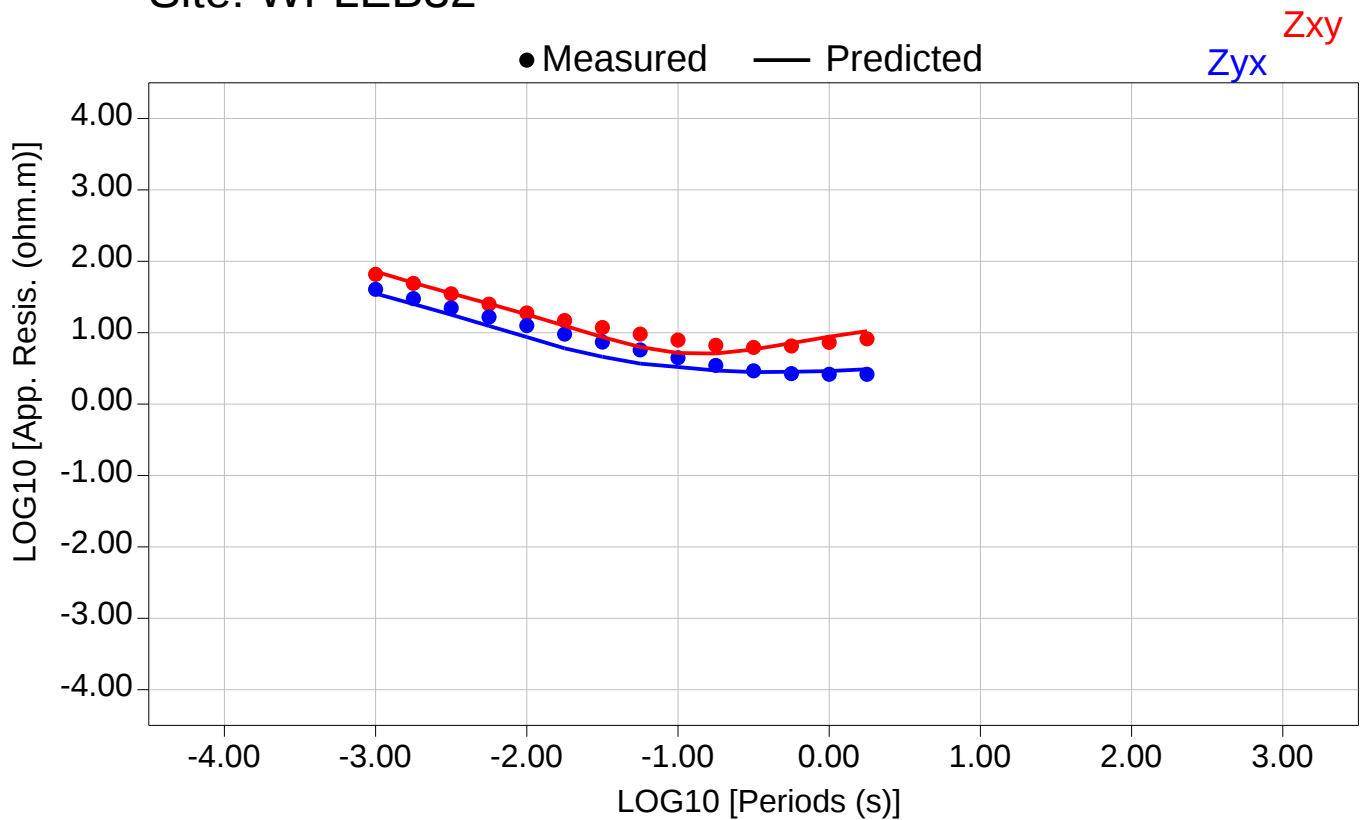
Total Z RMS = 0.98

Zxy RMS = 1.35

Zyx RMS = 0.50



Site: WFLEB32

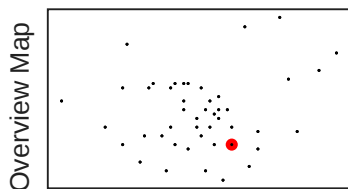


Overall RMS (Z+Tz)= 1.94

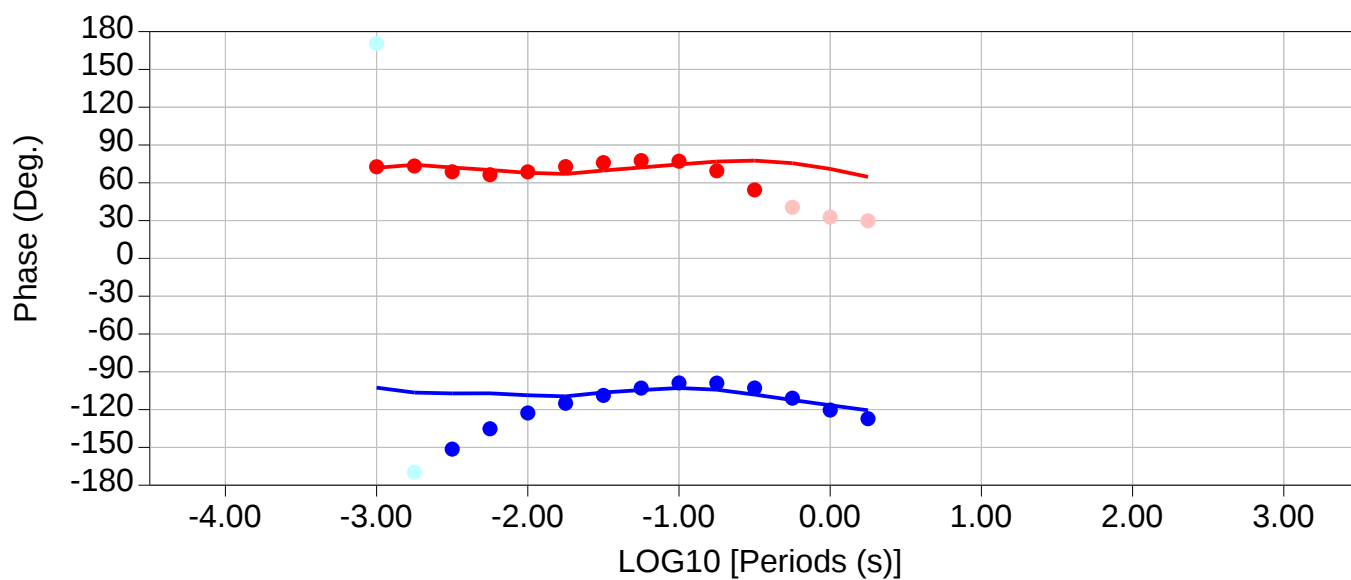
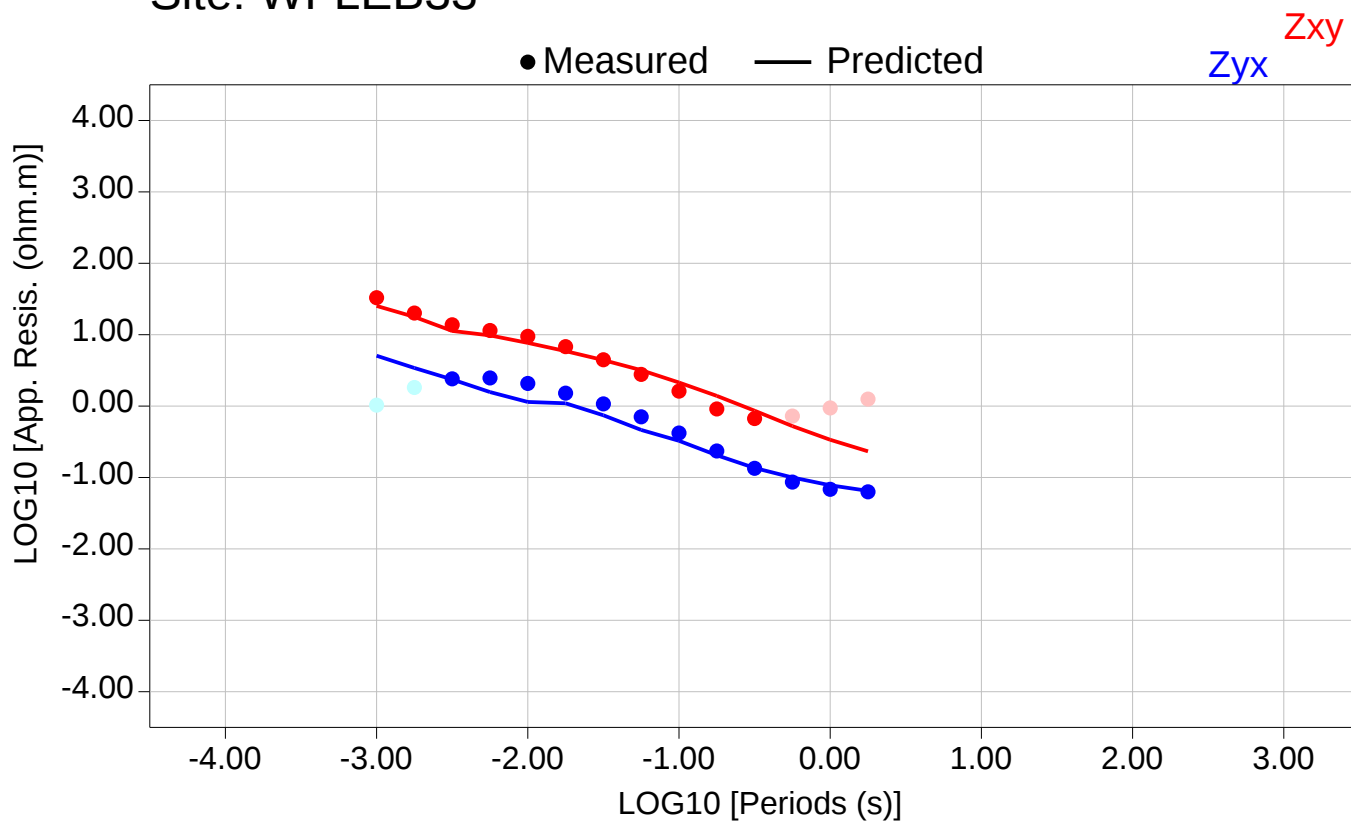
Total Z RMS = 1.94

Zxy RMS = 2.03

Zyx RMS = 2.11



Site: WFLEB33

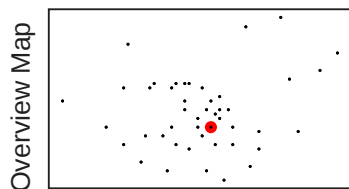


Overall RMS (Z+Tz)= 4.37

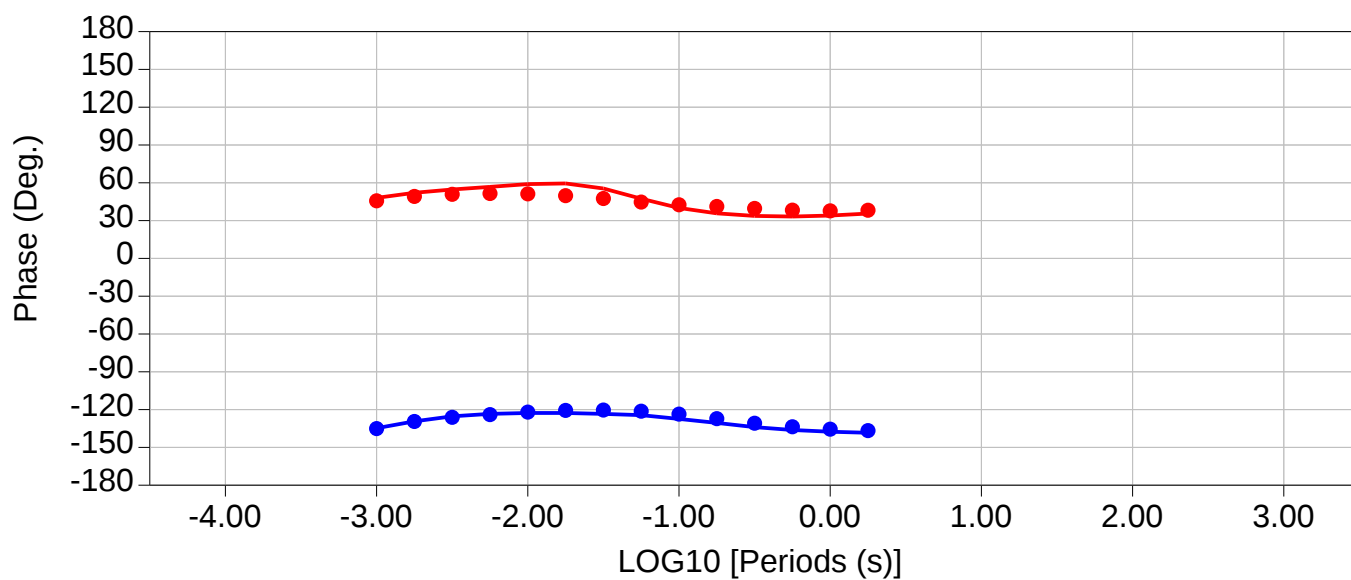
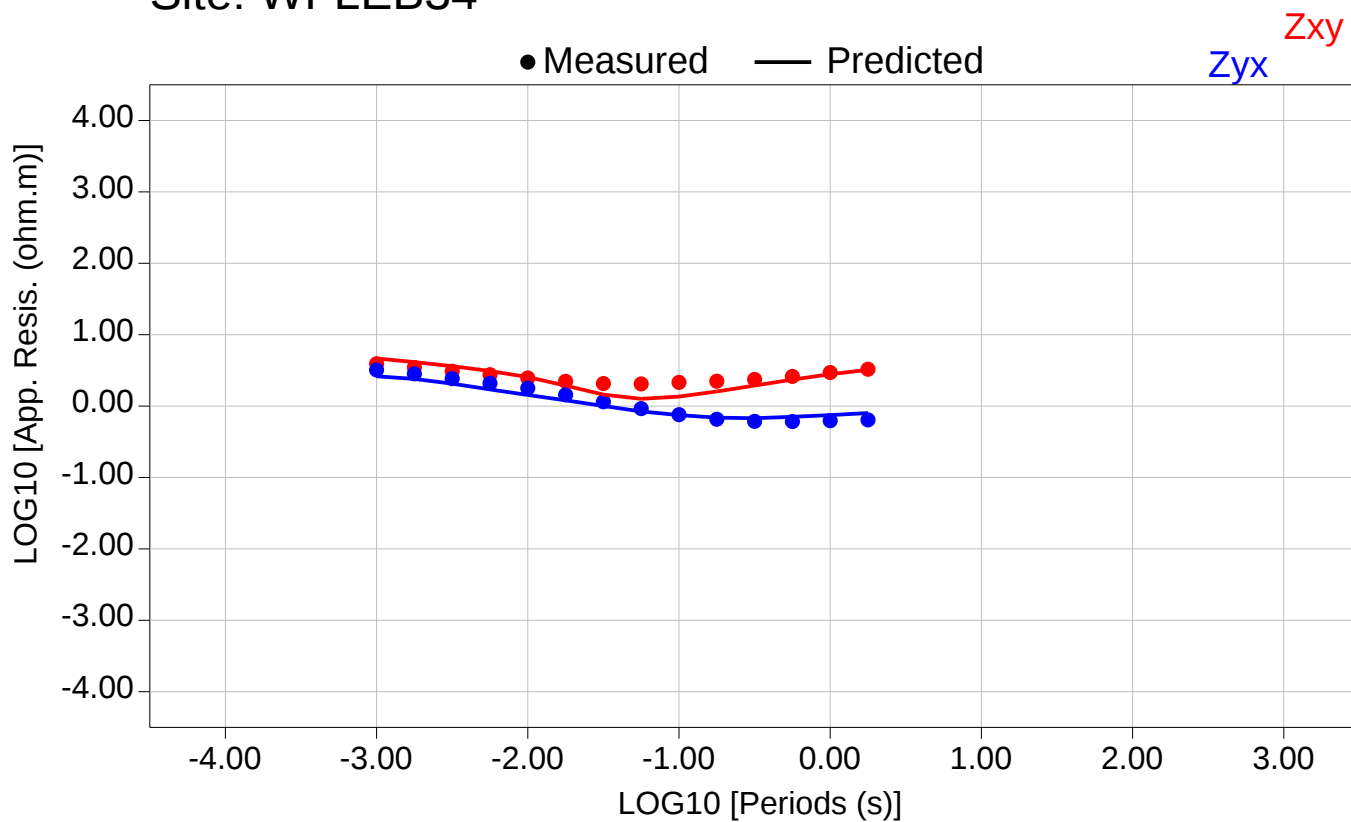
Total Z RMS = 20.71

Zxy RMS = 6.10

Zyx RMS = 10.94



Site: WFLEB34

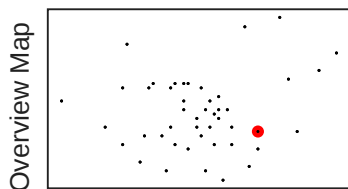


Overall RMS (Z+Tz)= 1.31

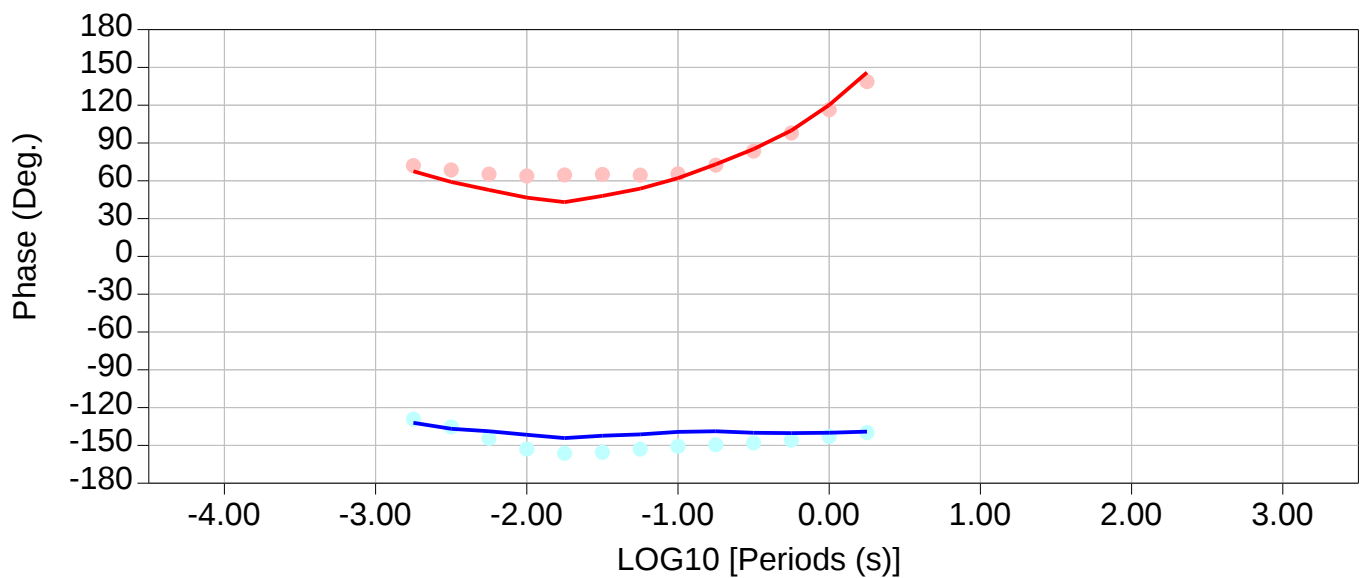
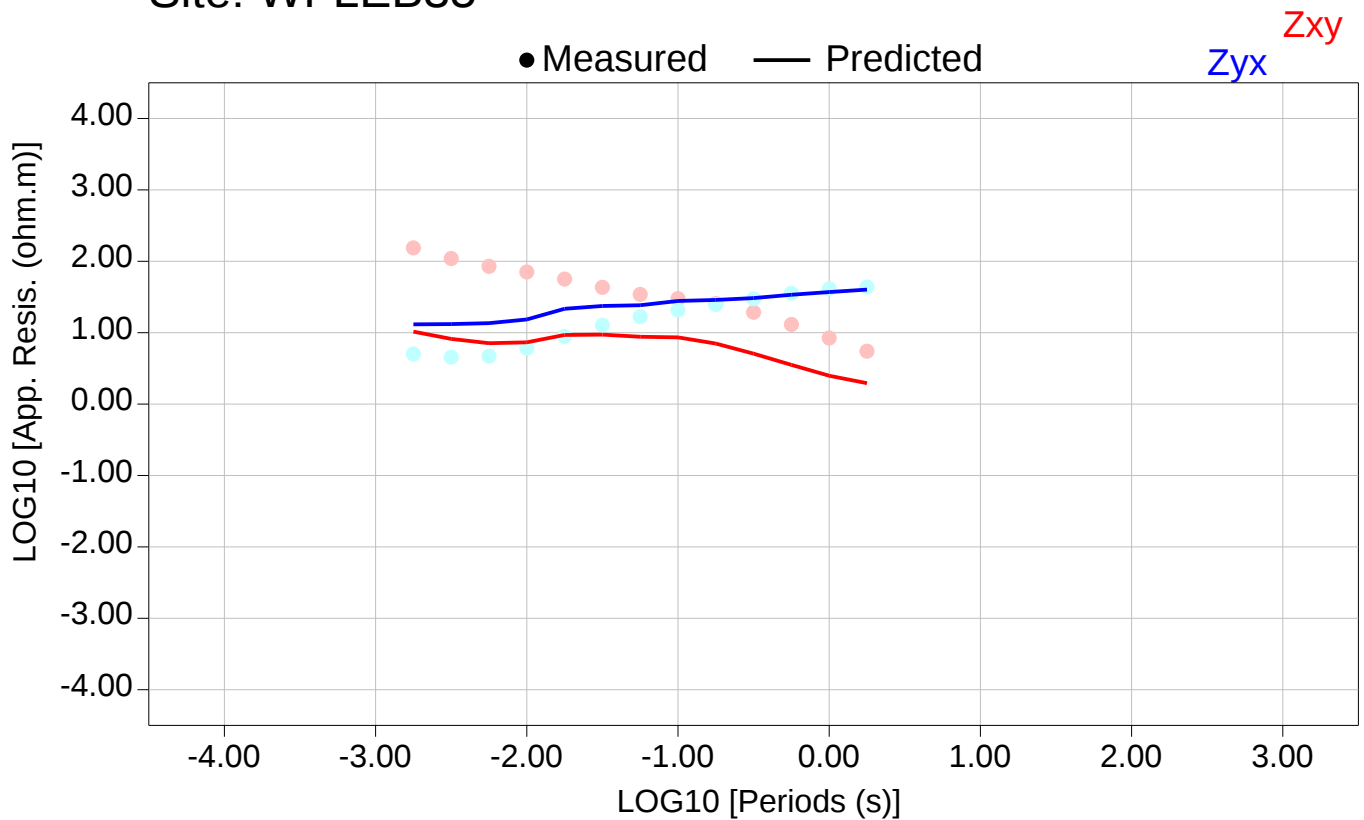
Total Z RMS = 1.31

Zxy RMS = 2.05

Zyx RMS = 1.25



Site: WFLEB35

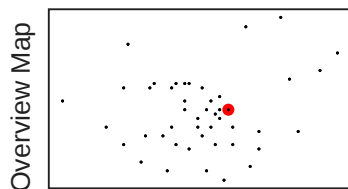


Overall RMS (Z+Tz)= 3.78

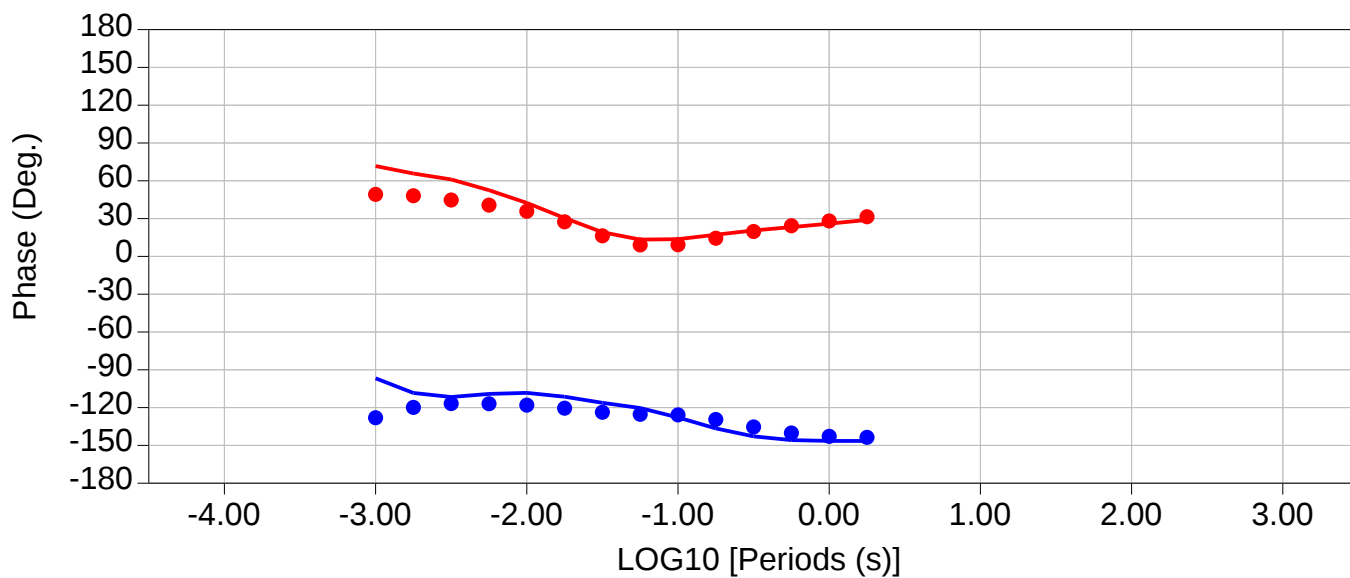
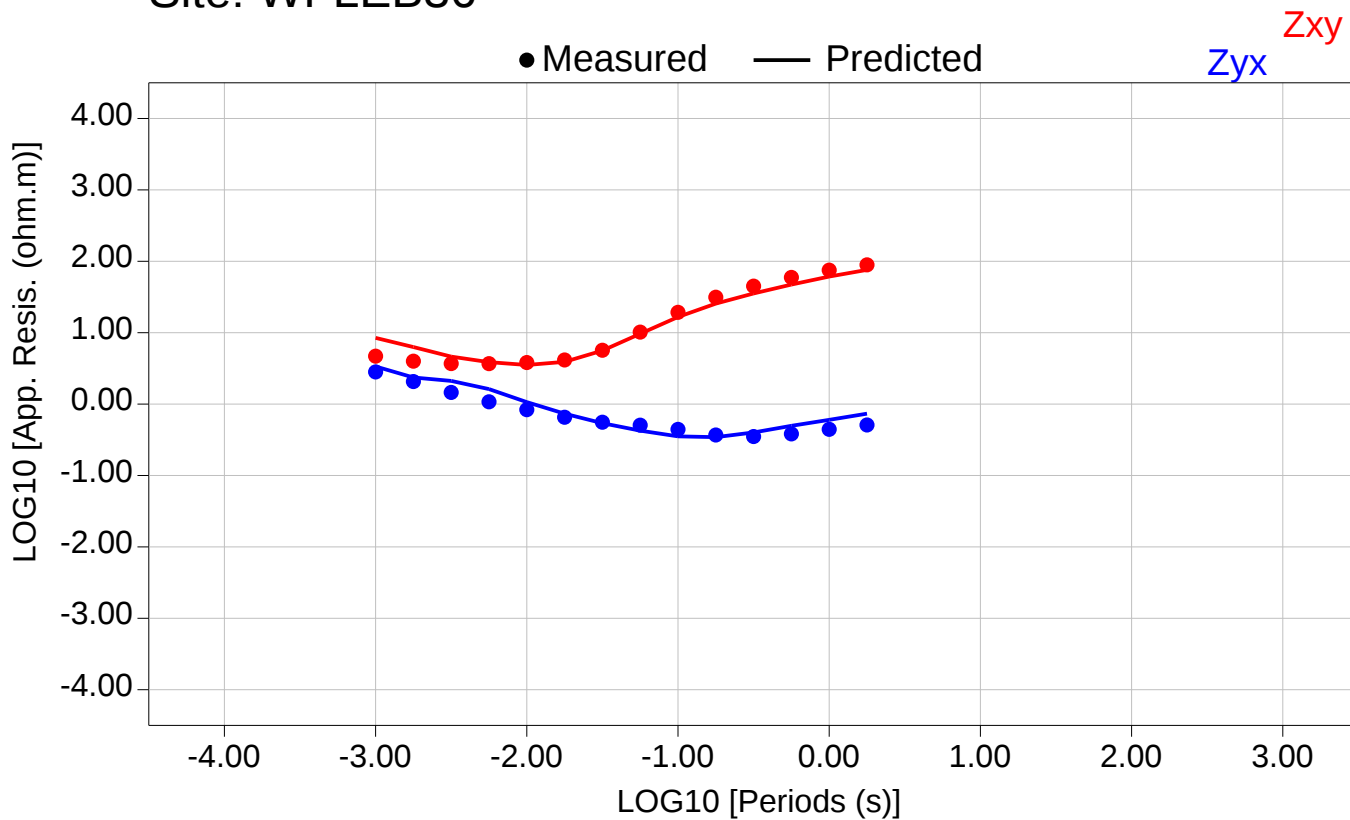
Total Z RMS = 6.19

Zxy RMS = 8.21

Zyx RMS = 6.35



Site: WFLEB36

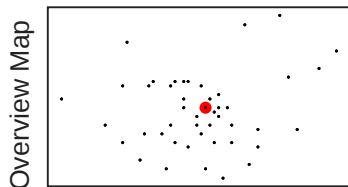


Overall RMS (Z+Tz)= 2.73

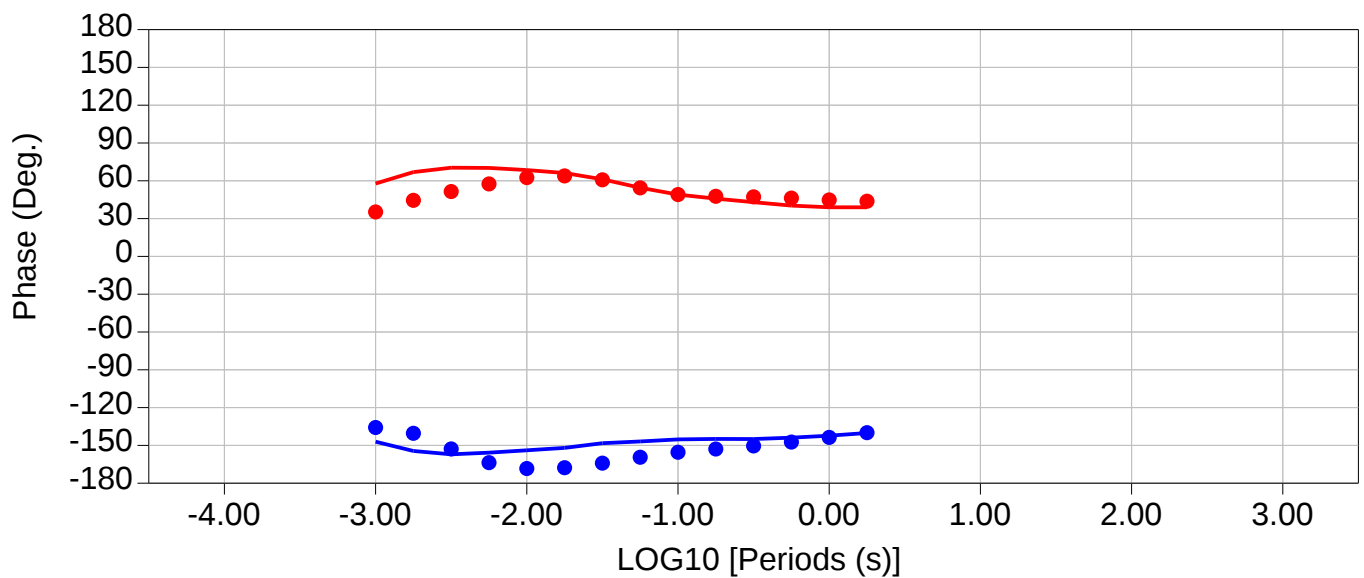
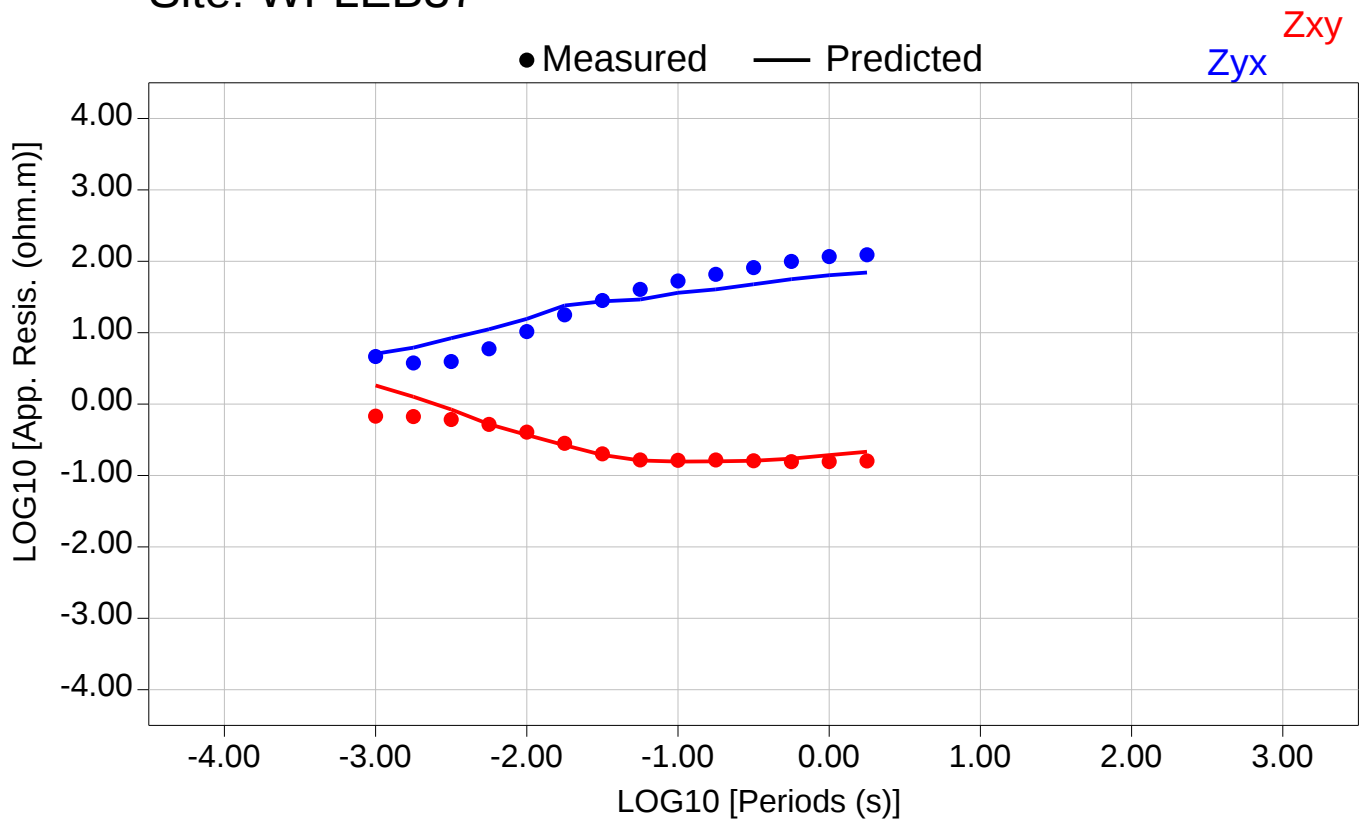
Total Z RMS = 2.73

Zxy RMS = 3.26

Zyx RMS = 3.31



Site: WFLEB37

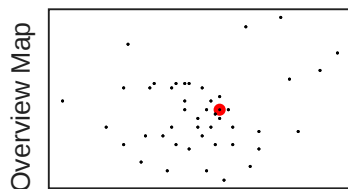


Overall RMS (Z+Tz)= 3.37

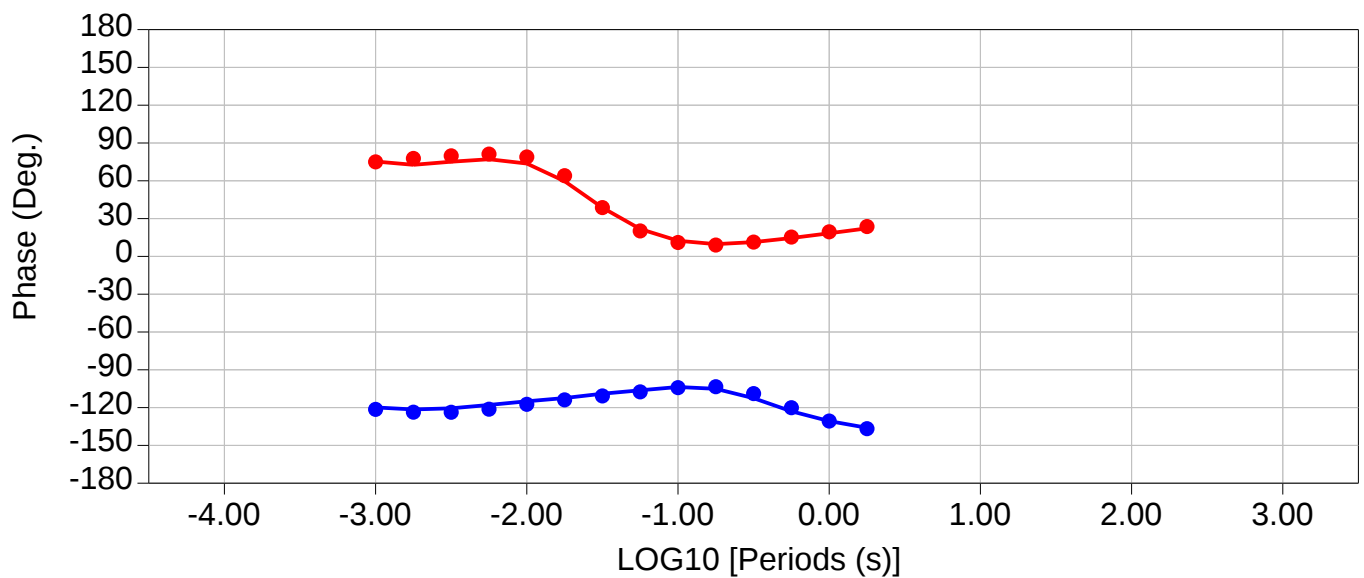
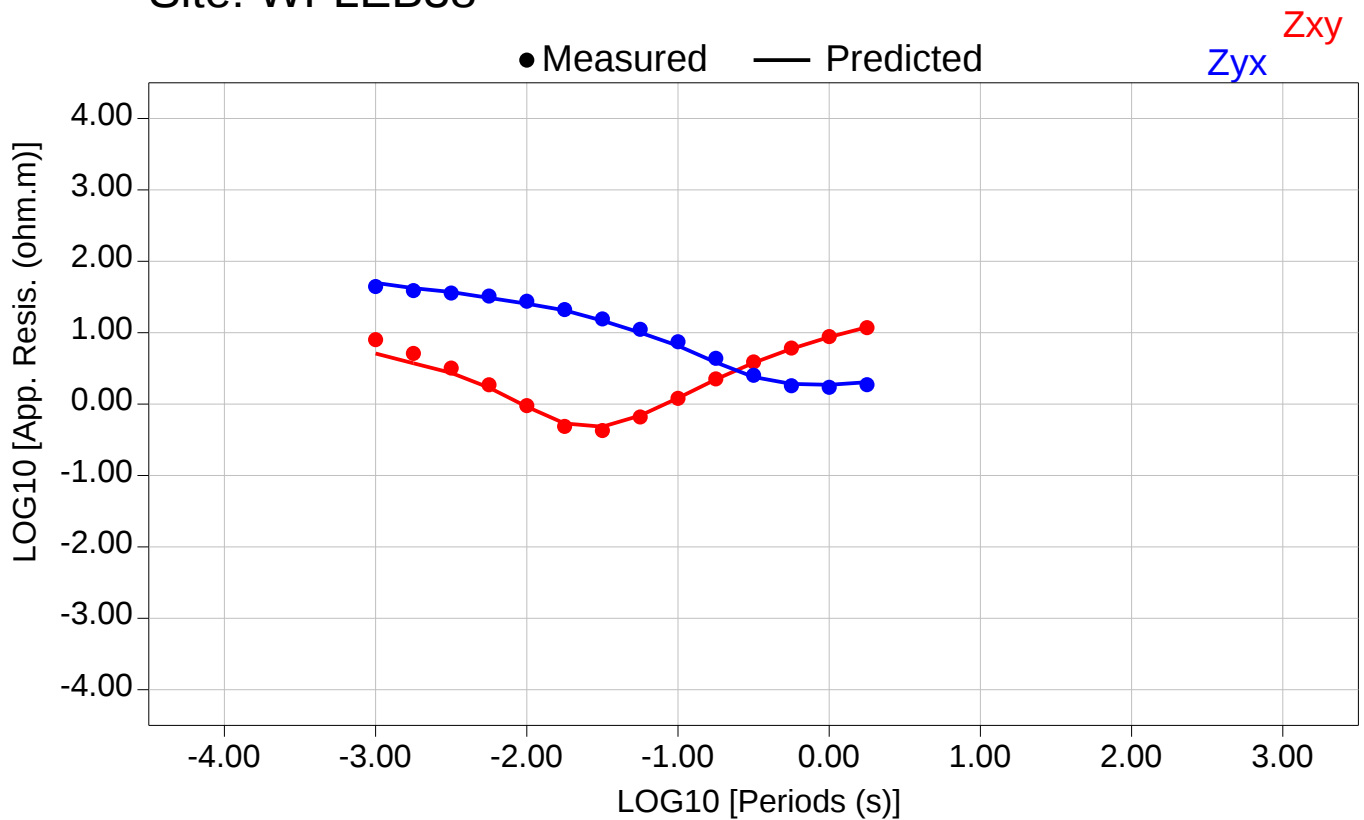
Total Z RMS = 3.37

Zxy RMS = 4.33

Zyx RMS = 4.36



Site: WFLEB38

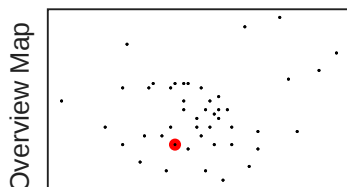


Overall RMS (Z+Tz)= 1.27

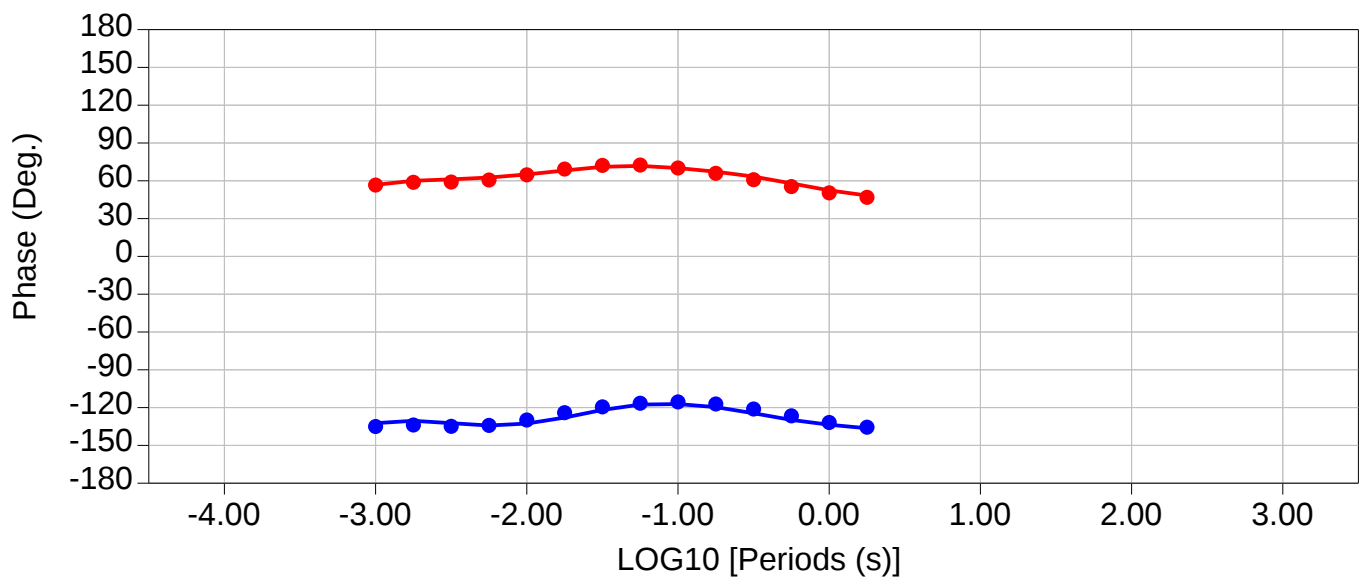
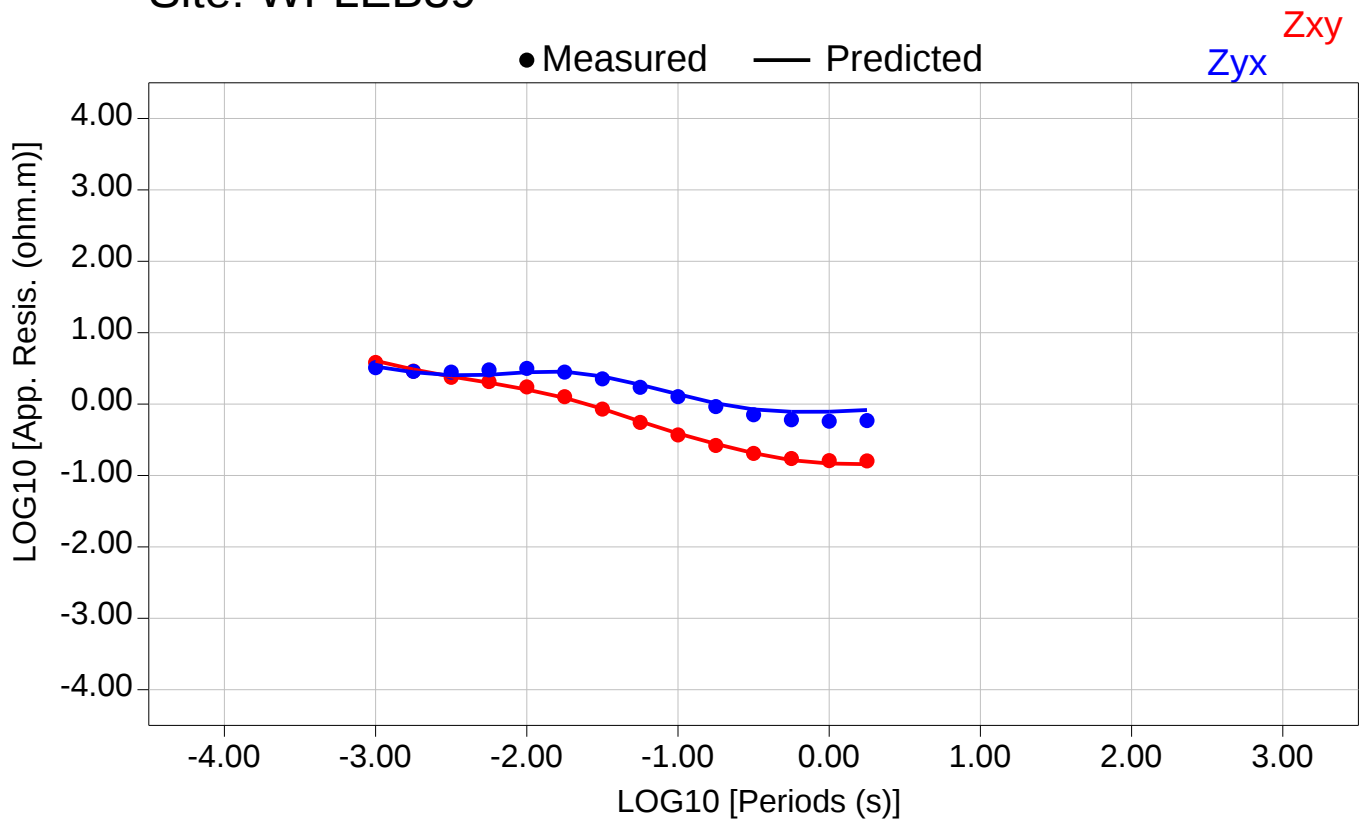
Total Z RMS = 1.27

Zxy RMS = 1.26

Zyx RMS = 0.80



Site: WFLEB39

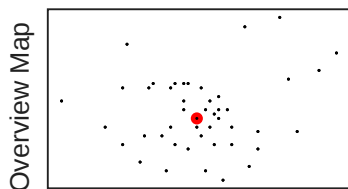


Overall RMS (Z+Tz)= 1.22

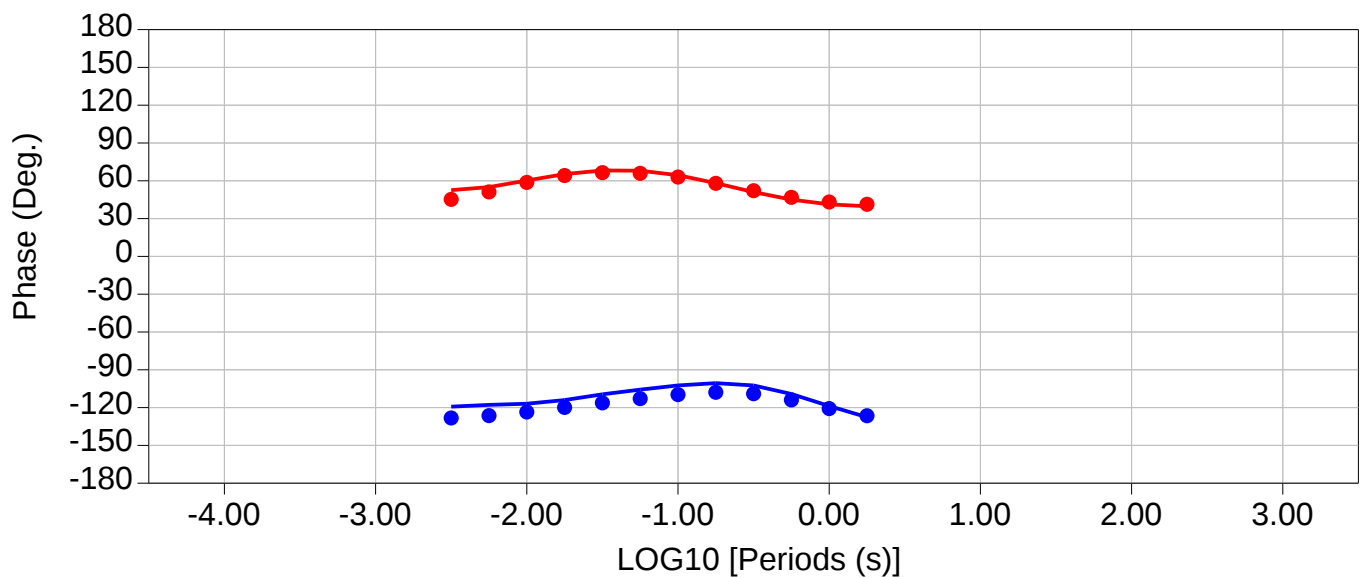
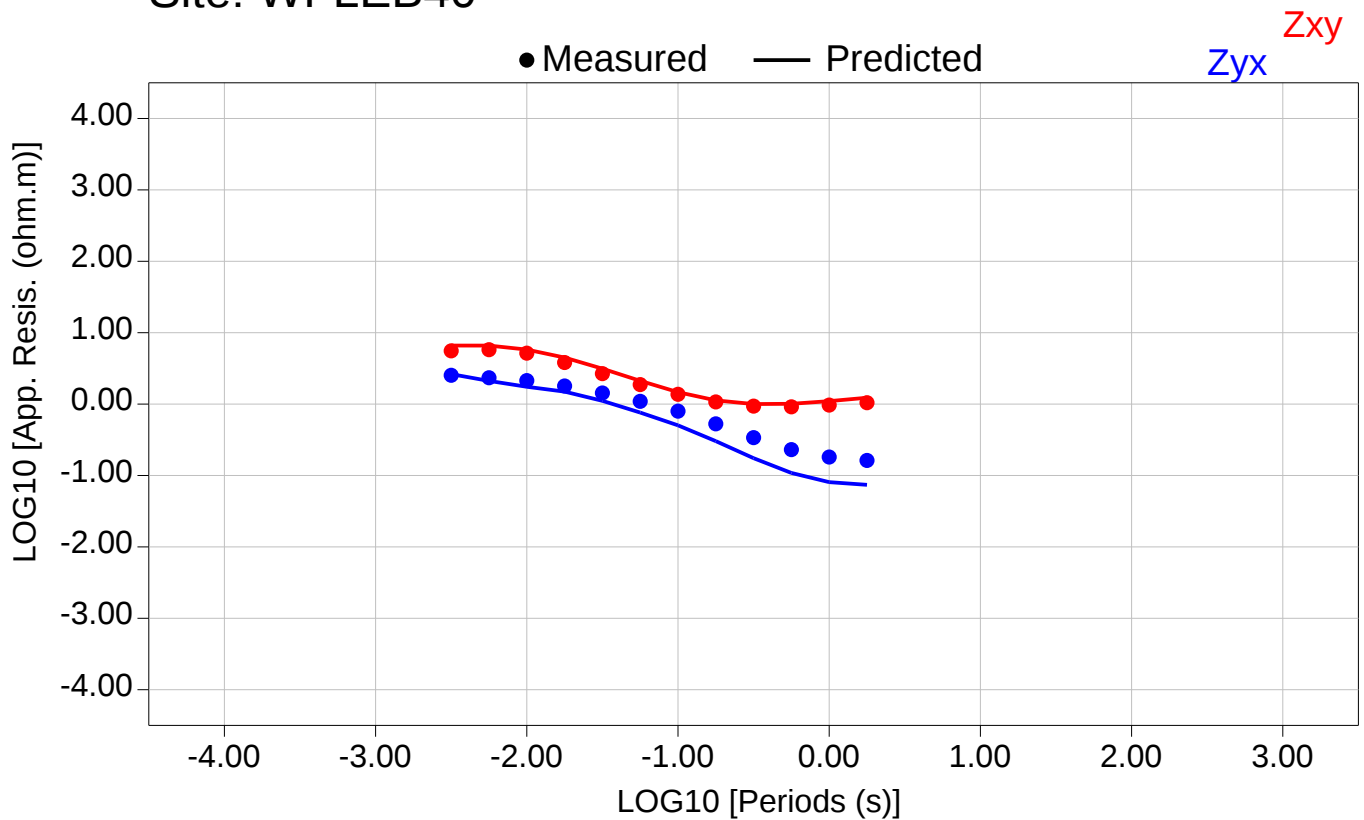
Total Z RMS = 1.22

Zxy RMS = 0.55

Zyx RMS = 1.40



Site: WFLEB40

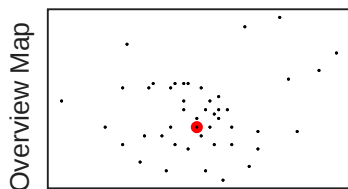


Overall RMS (Z+Tz)= 2.21

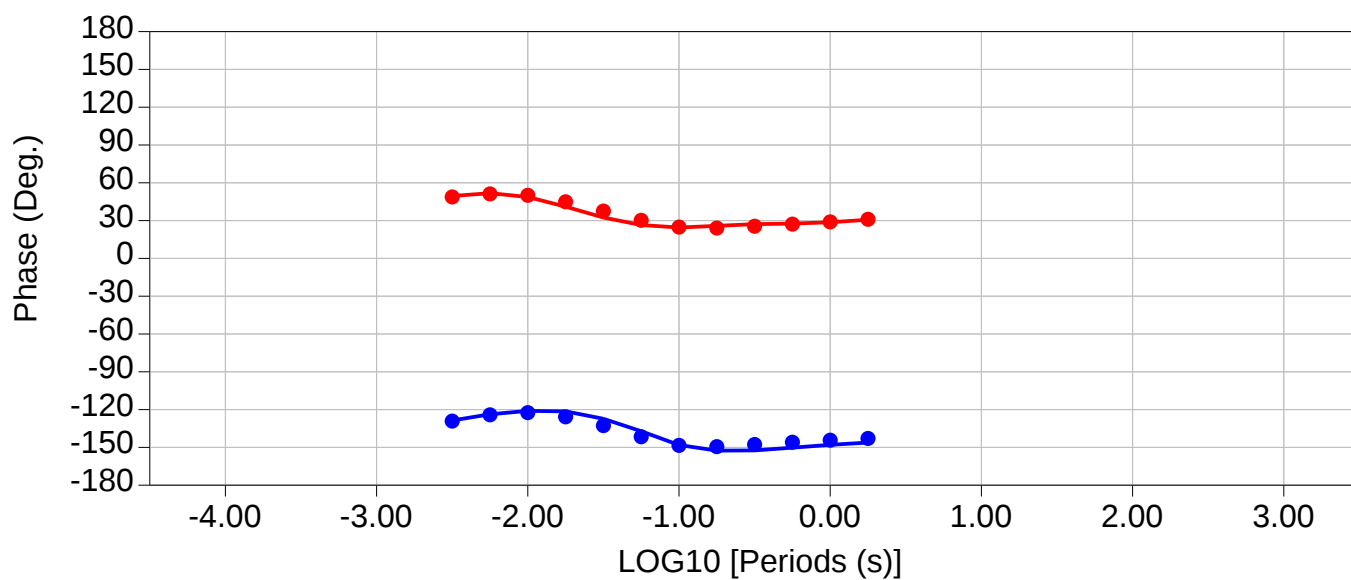
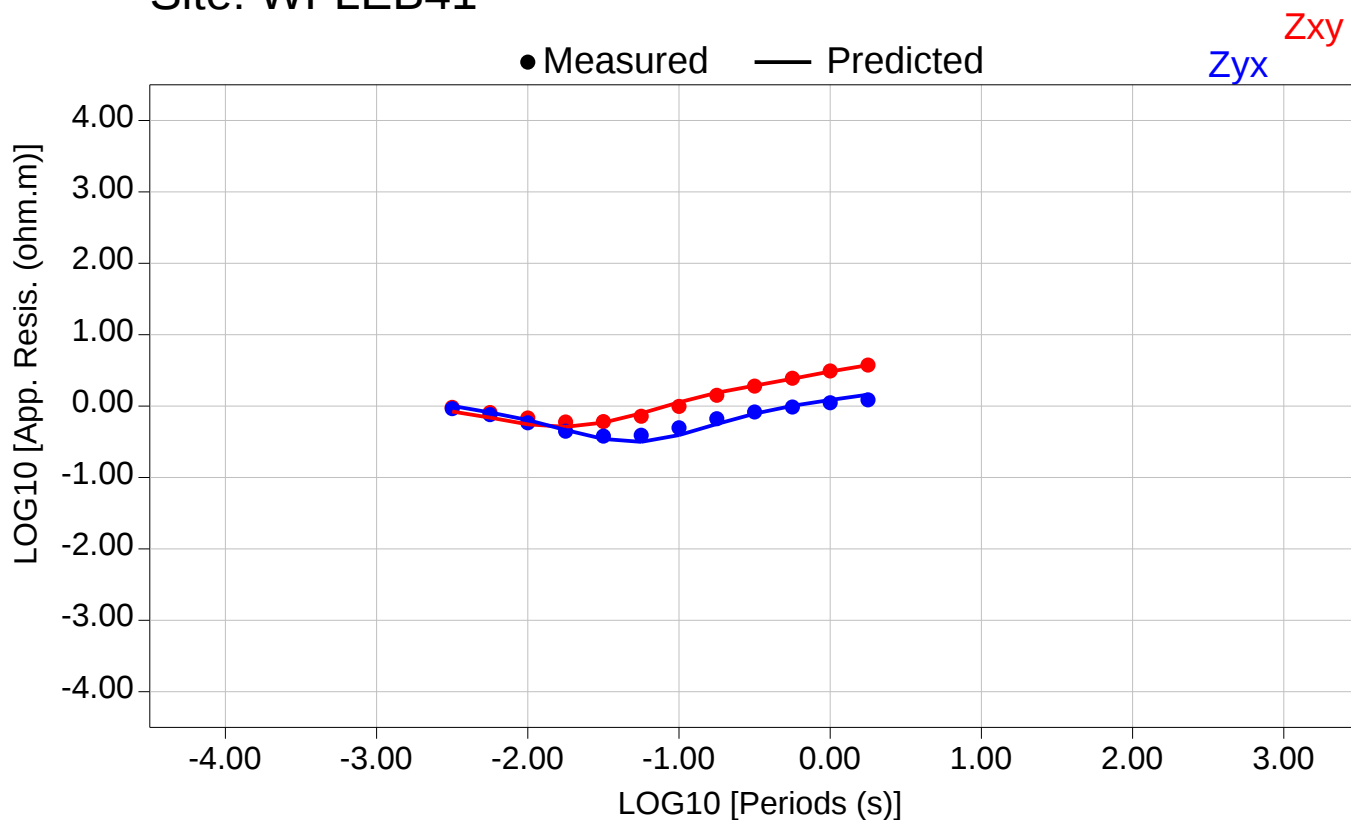
Total Z RMS = 2.21

Zxy RMS = 1.16

Zyx RMS = 3.39



Site: WFLEB41

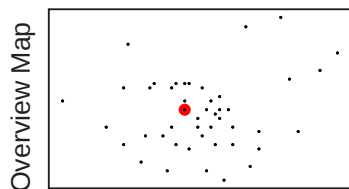


Overall RMS (Z+Tz)= 0.94

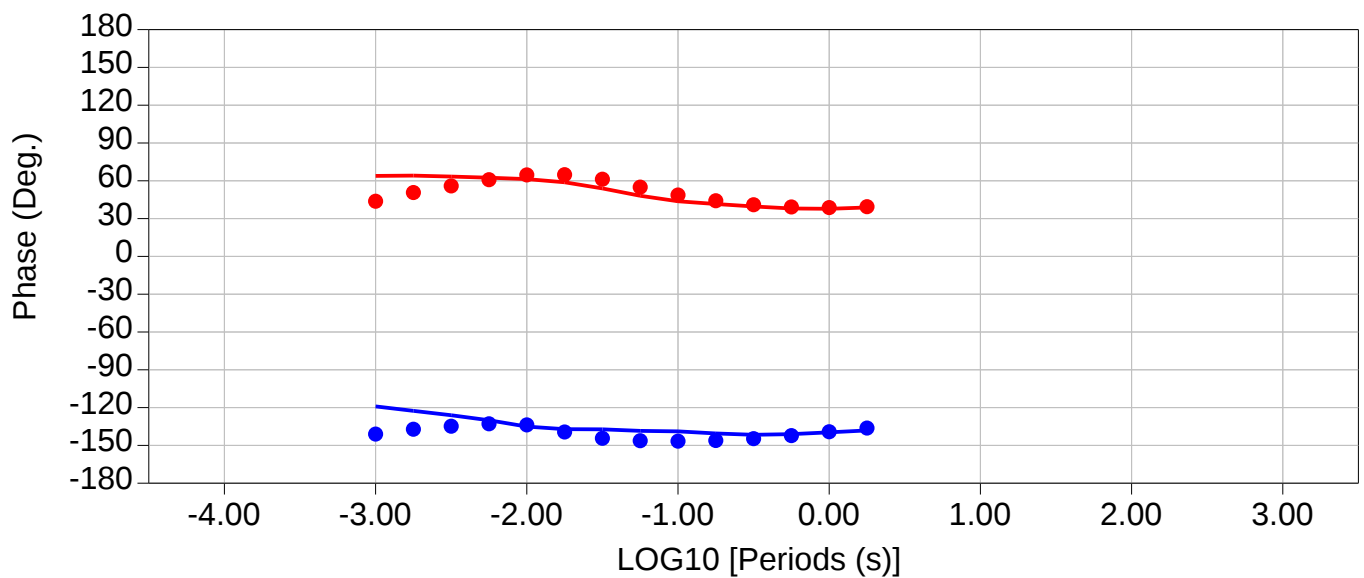
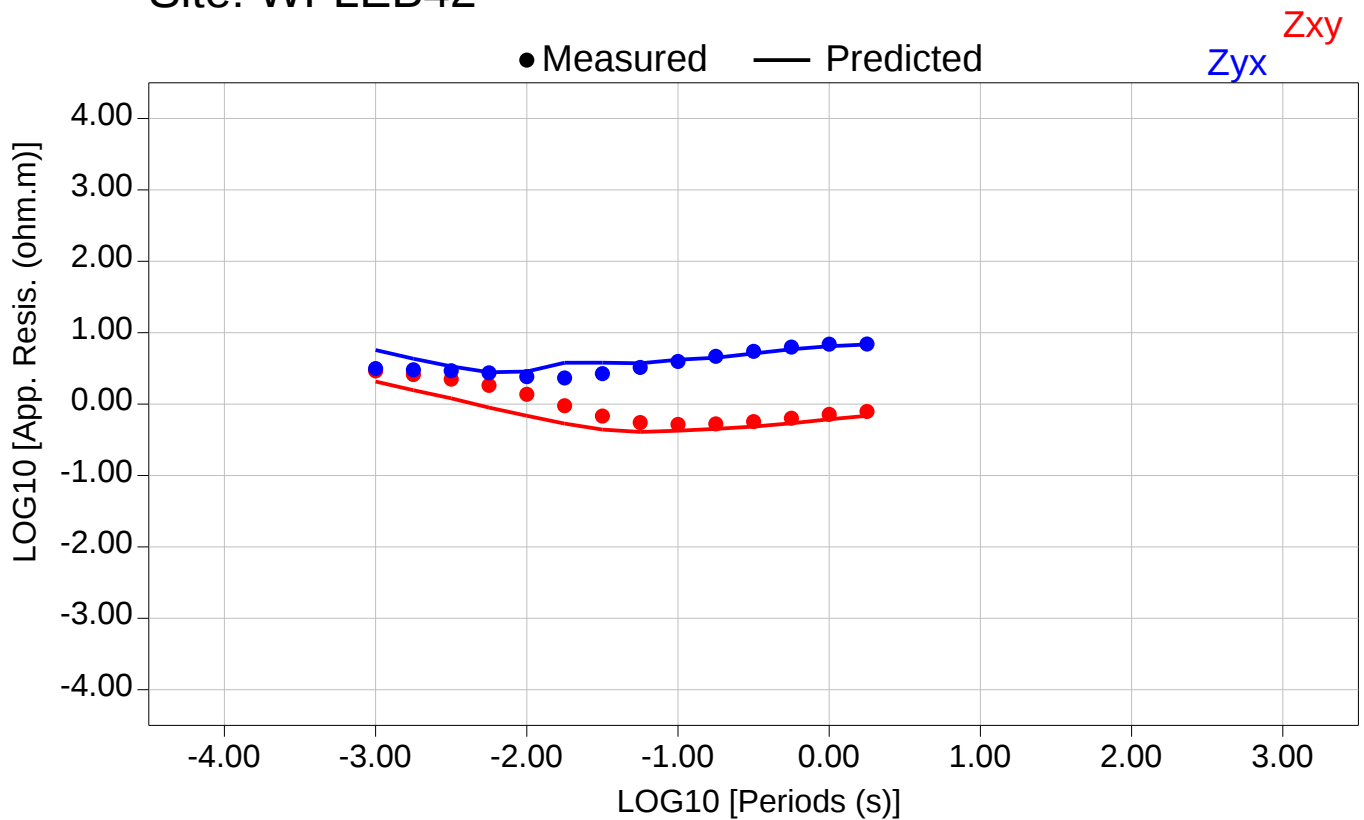
Total Z RMS = 0.94

Zxy RMS = 0.95

Zyx RMS = 1.24



Site: WFLEB42

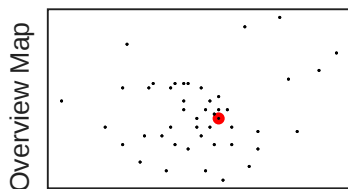


Overall RMS (Z+Tz)= 2.75

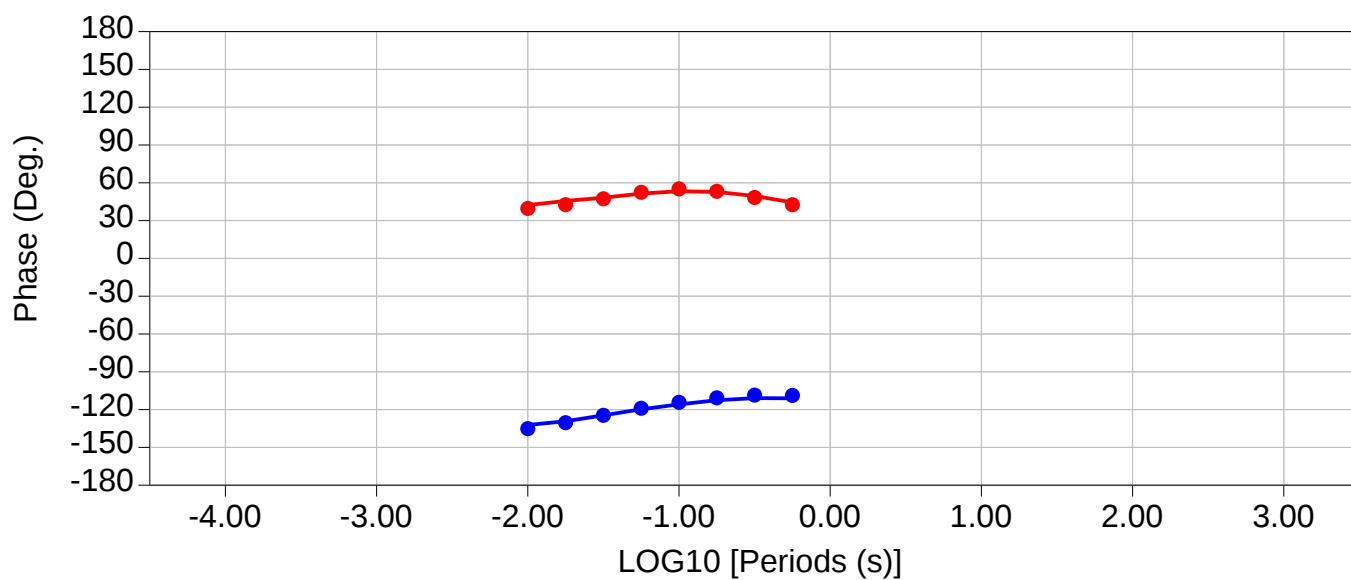
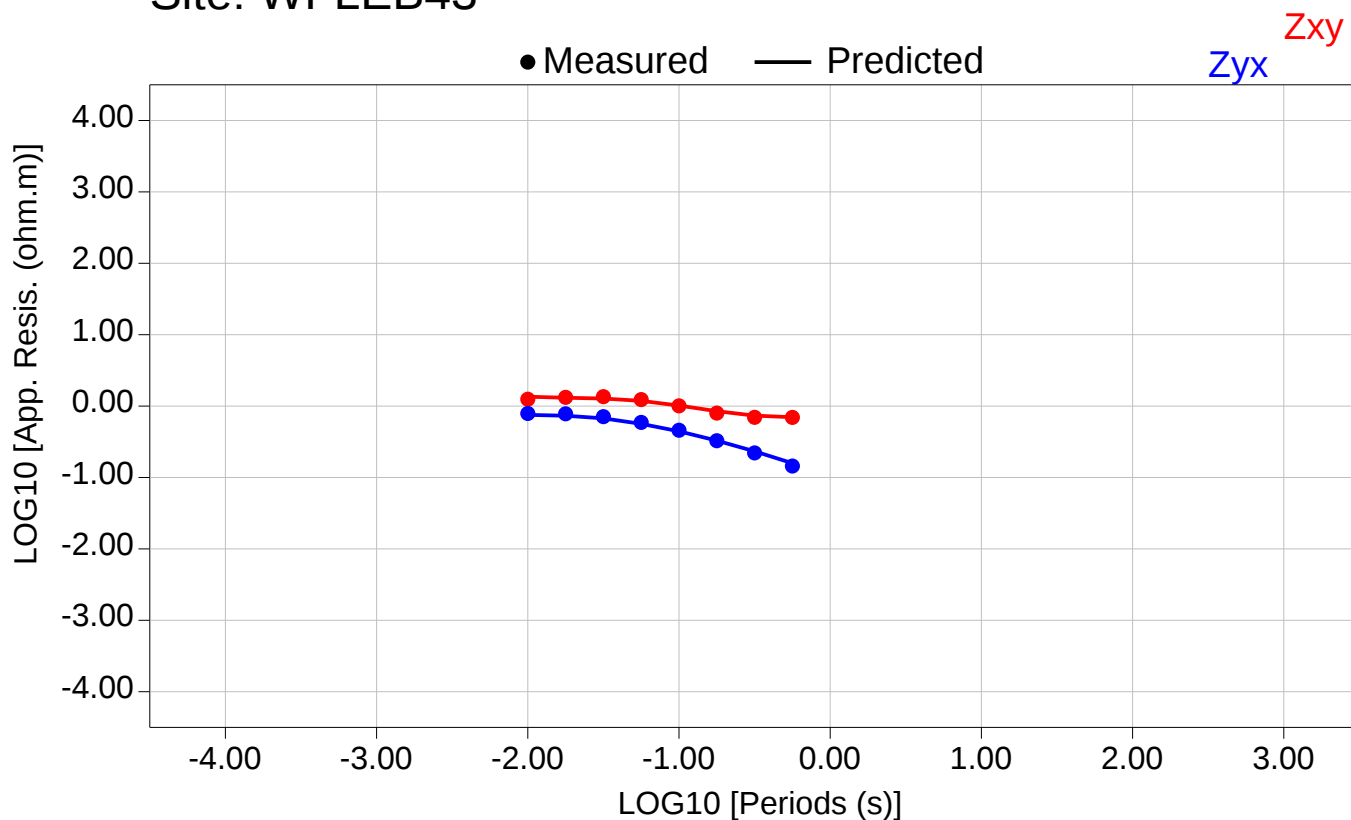
Total Z RMS = 2.75

Zxy RMS = 3.13

Zyx RMS = 3.09



Site: WFLEB43

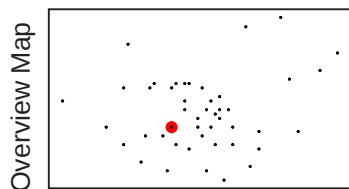


Overall RMS (Z+Tz)= 0.57

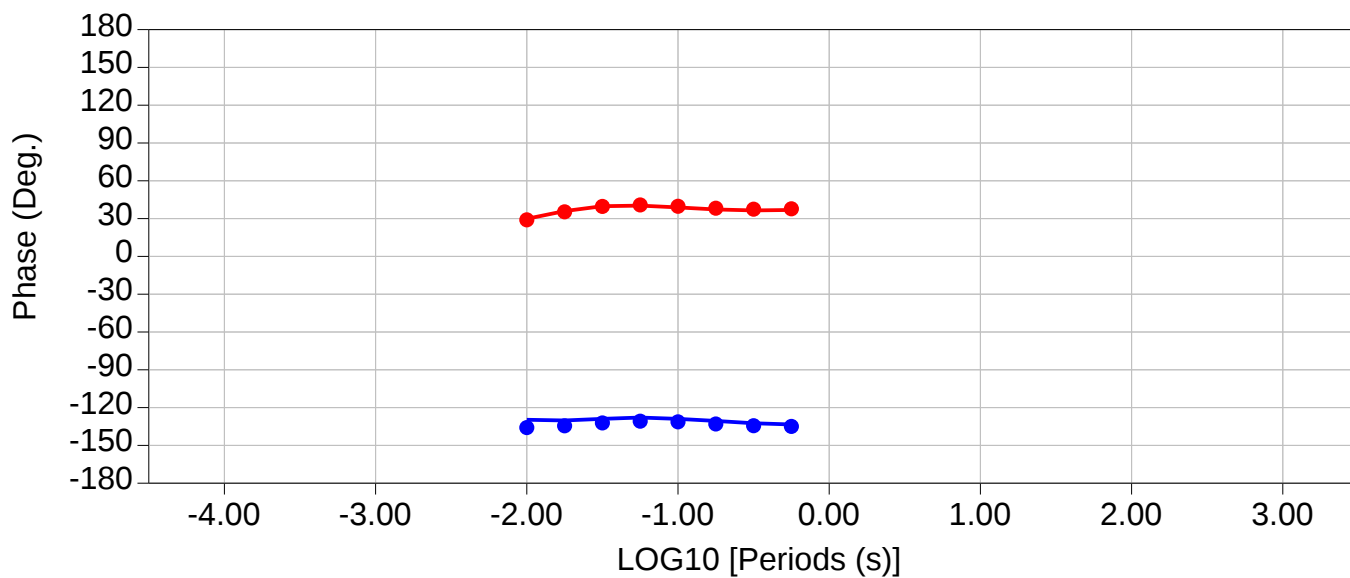
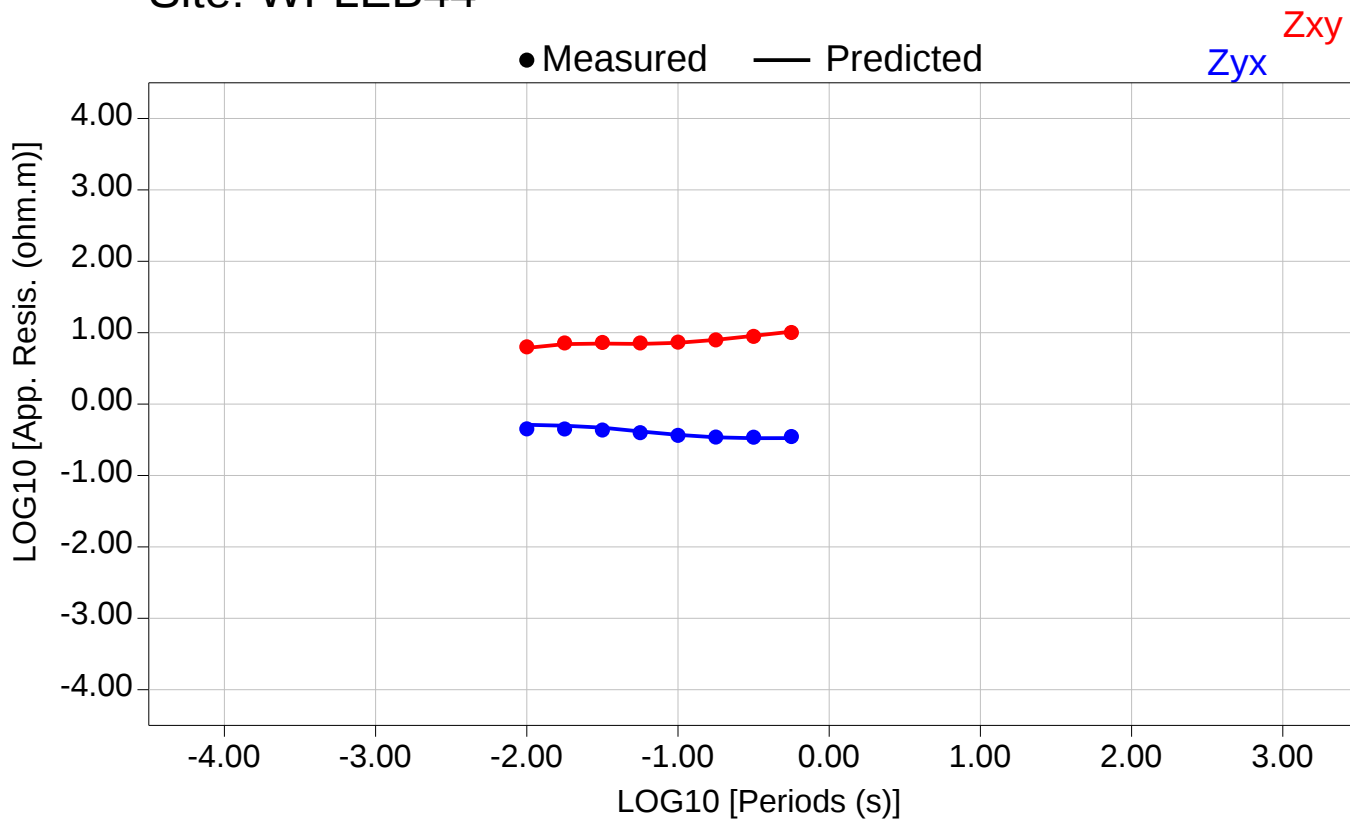
Total Z RMS = 0.57

Zxy RMS = 0.57

Zyx RMS = 0.60



Site: WFLEB44

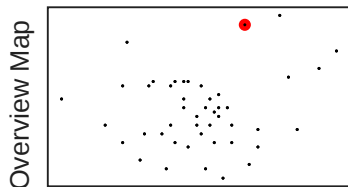


Overall RMS (Z+Tz)= 0.73

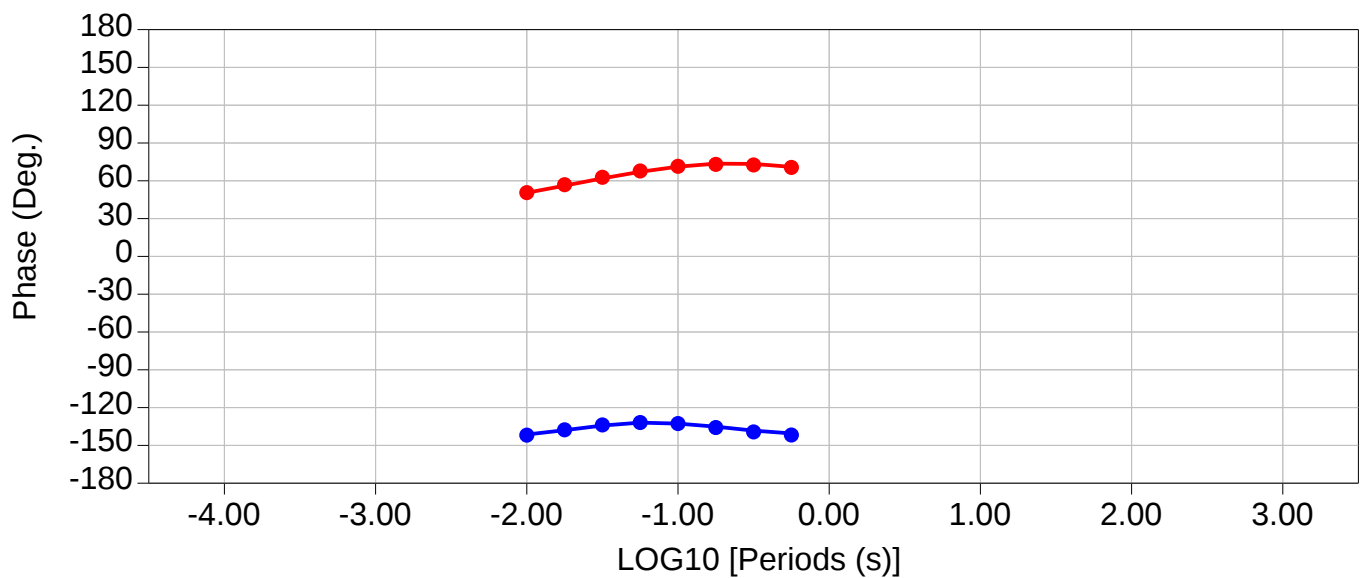
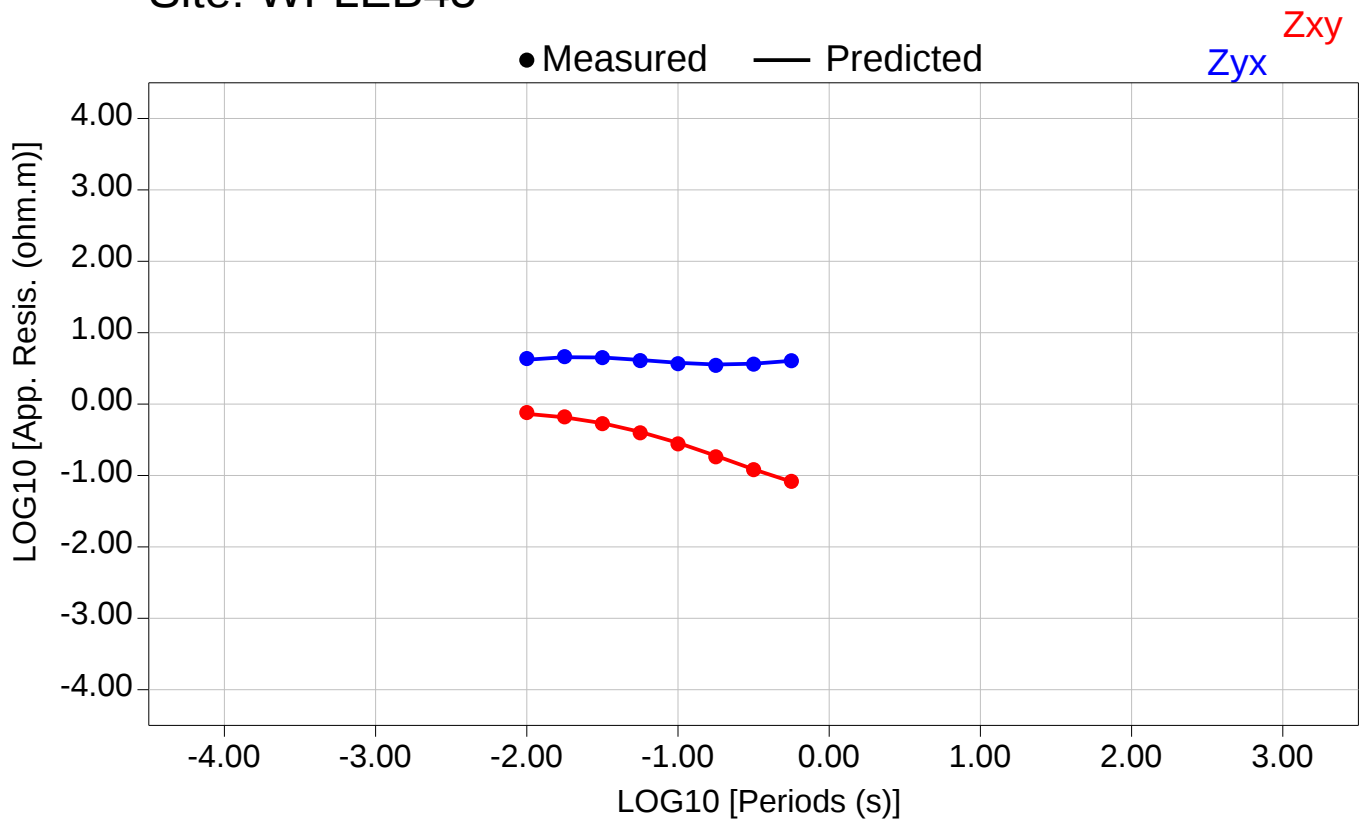
Total Z RMS = 0.73

Zxy RMS = 0.28

Zyx RMS = 1.00



Site: WFLEB45

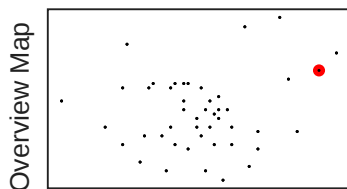


Overall RMS (Z+Tz)= 0.24

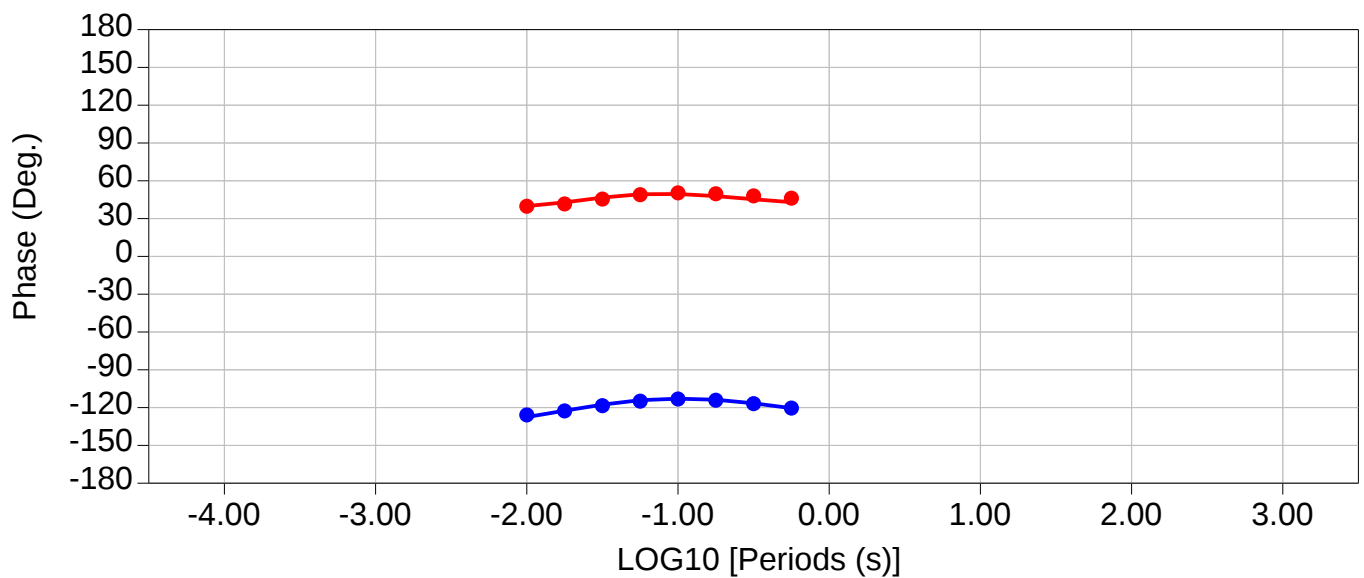
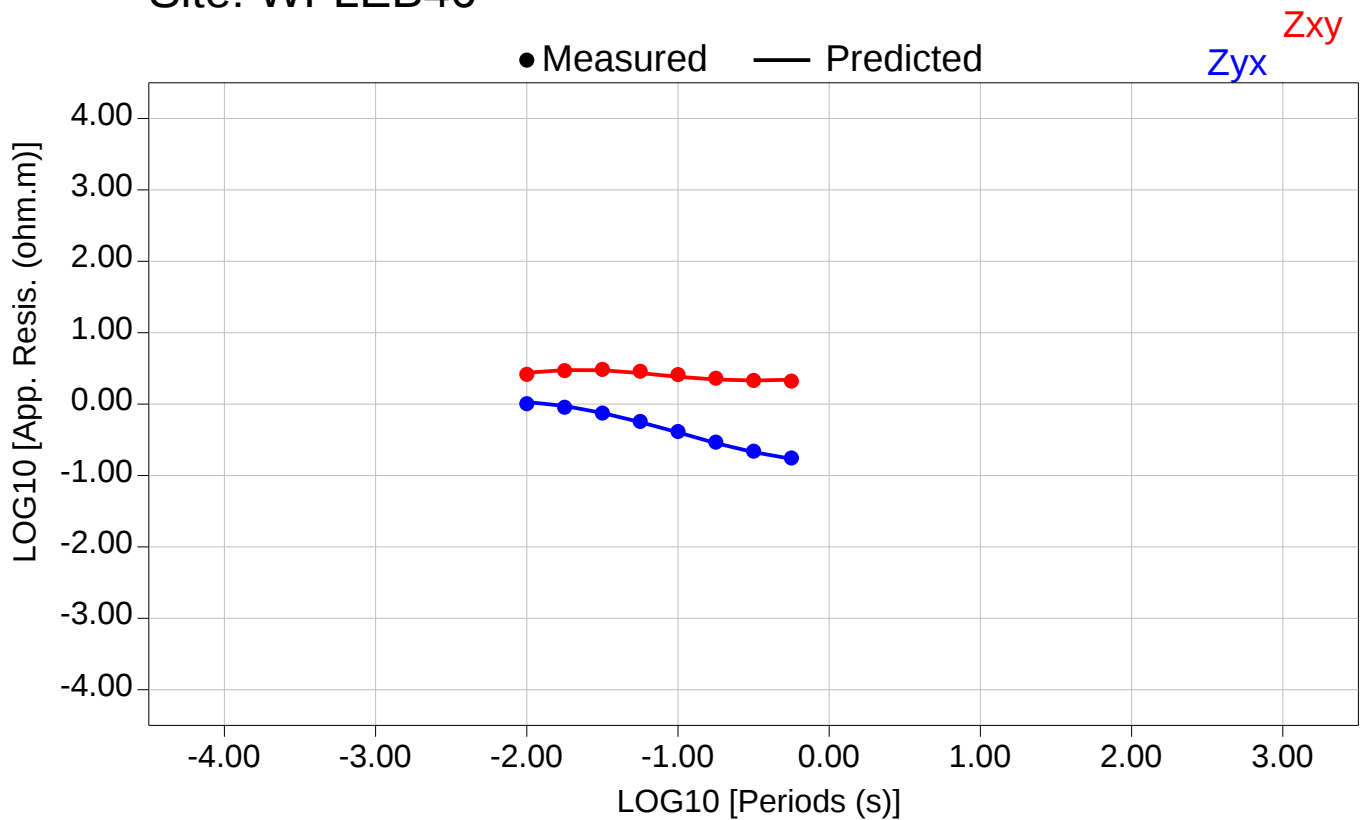
Total Z RMS = 0.24

Zxy RMS = 0.24

Zyx RMS = 0.23



Site: WFLEB46

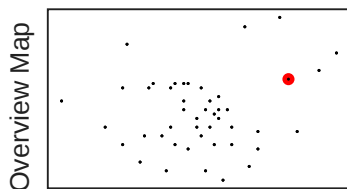


Overall RMS (Z+Tz)= 0.43

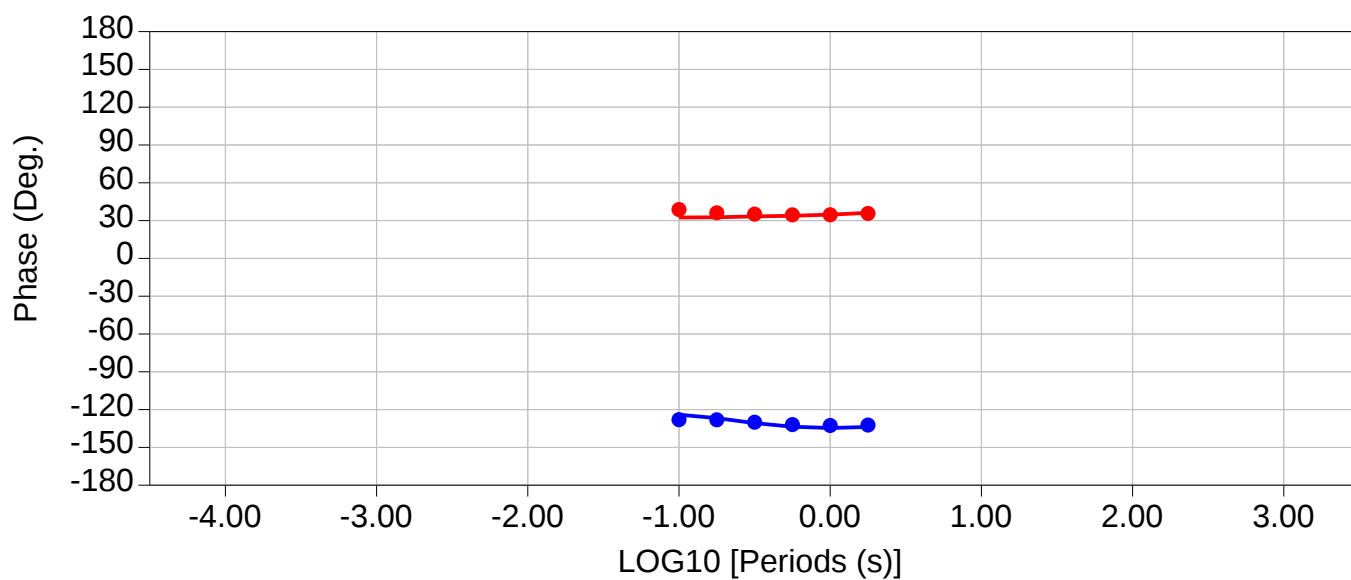
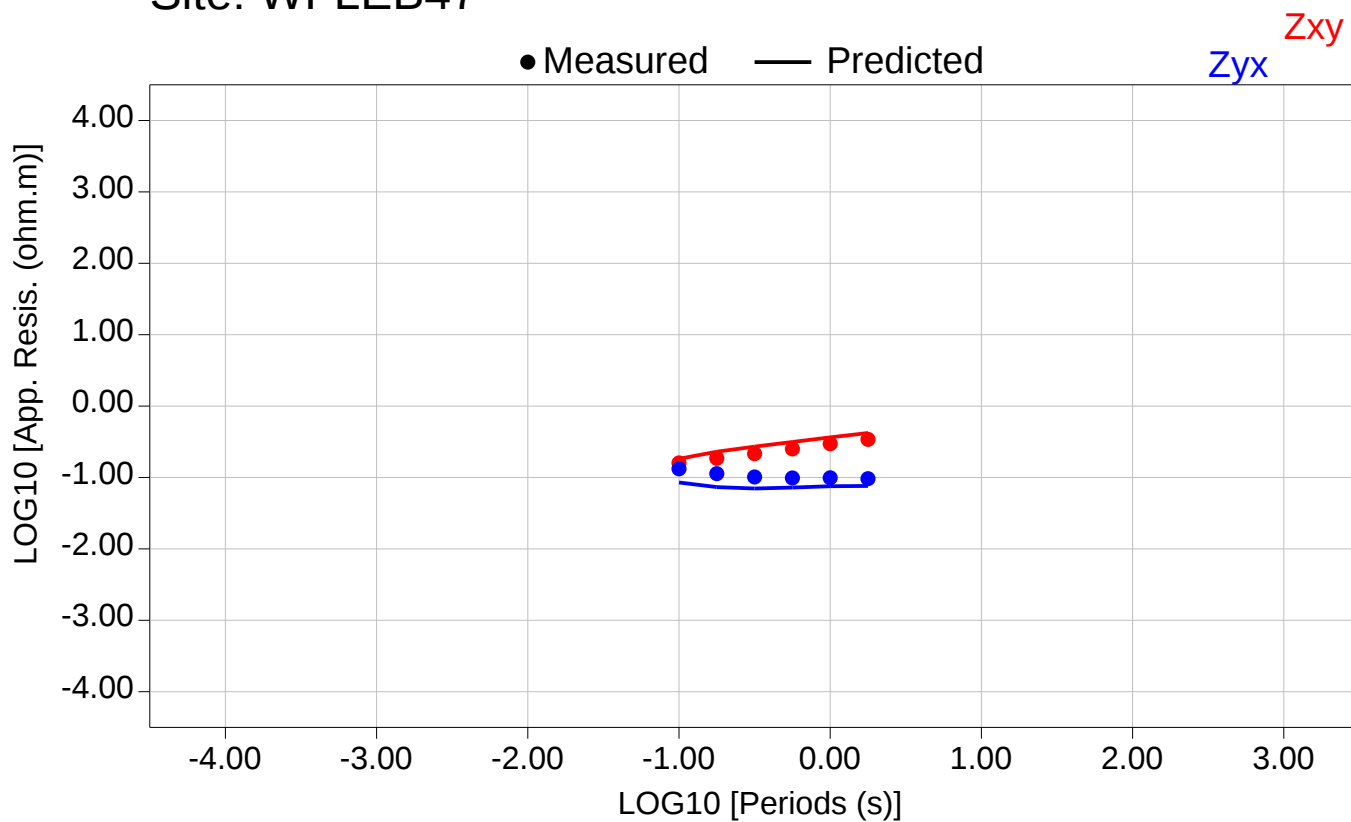
Total Z RMS = 0.43

Zxy RMS = 0.53

Zyx RMS = 0.30



Site: WFLEB47



Overall RMS (Z+Tz)= 2.04

Total Z RMS = 2.04

Zxy RMS = 1.71

Zyx RMS = 2.32

