

IP Data Collection and Processing

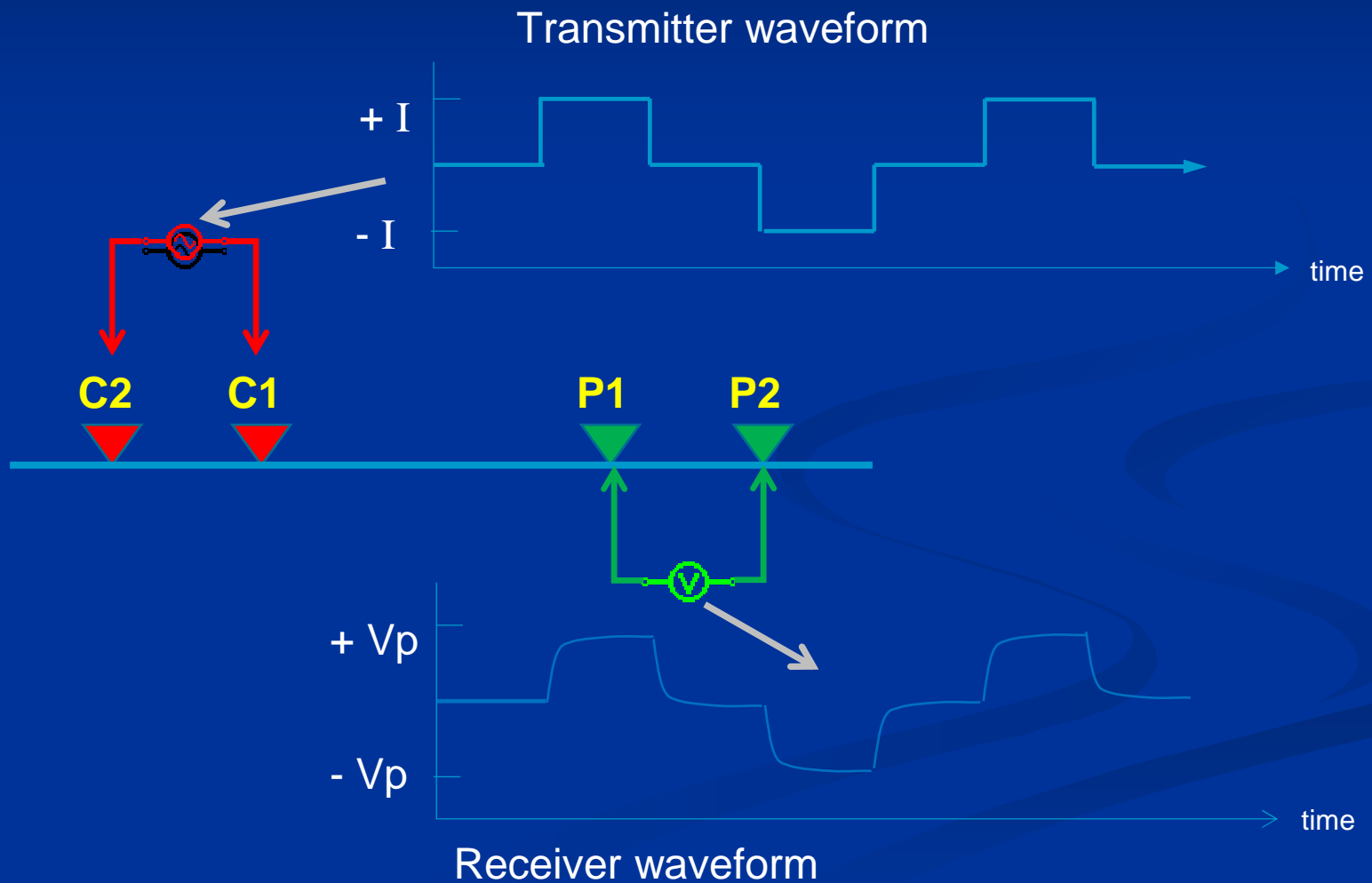
John Paine

ASEG 2015

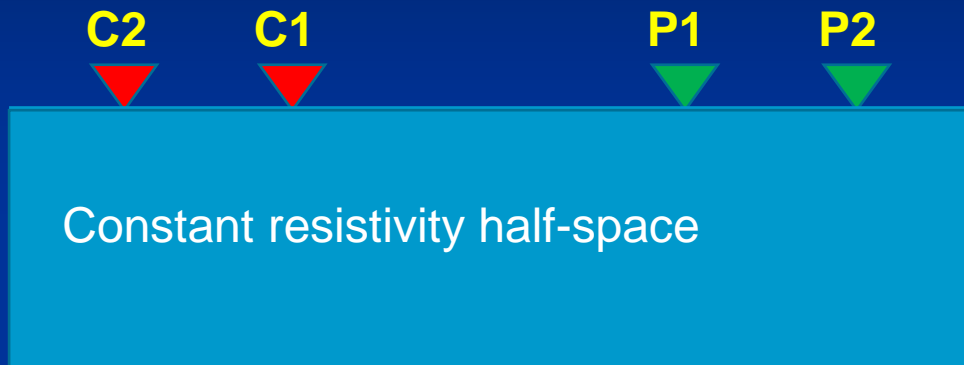
Topics

- Time domain IP theory
- Apparent resistivity
- Chargeability
- Time series data
- Problem data
- Dealing with tellurics
- Fixing field problems
- Deriving new data

Time Domain IP Theory



Time Domain Apparent Resistivity



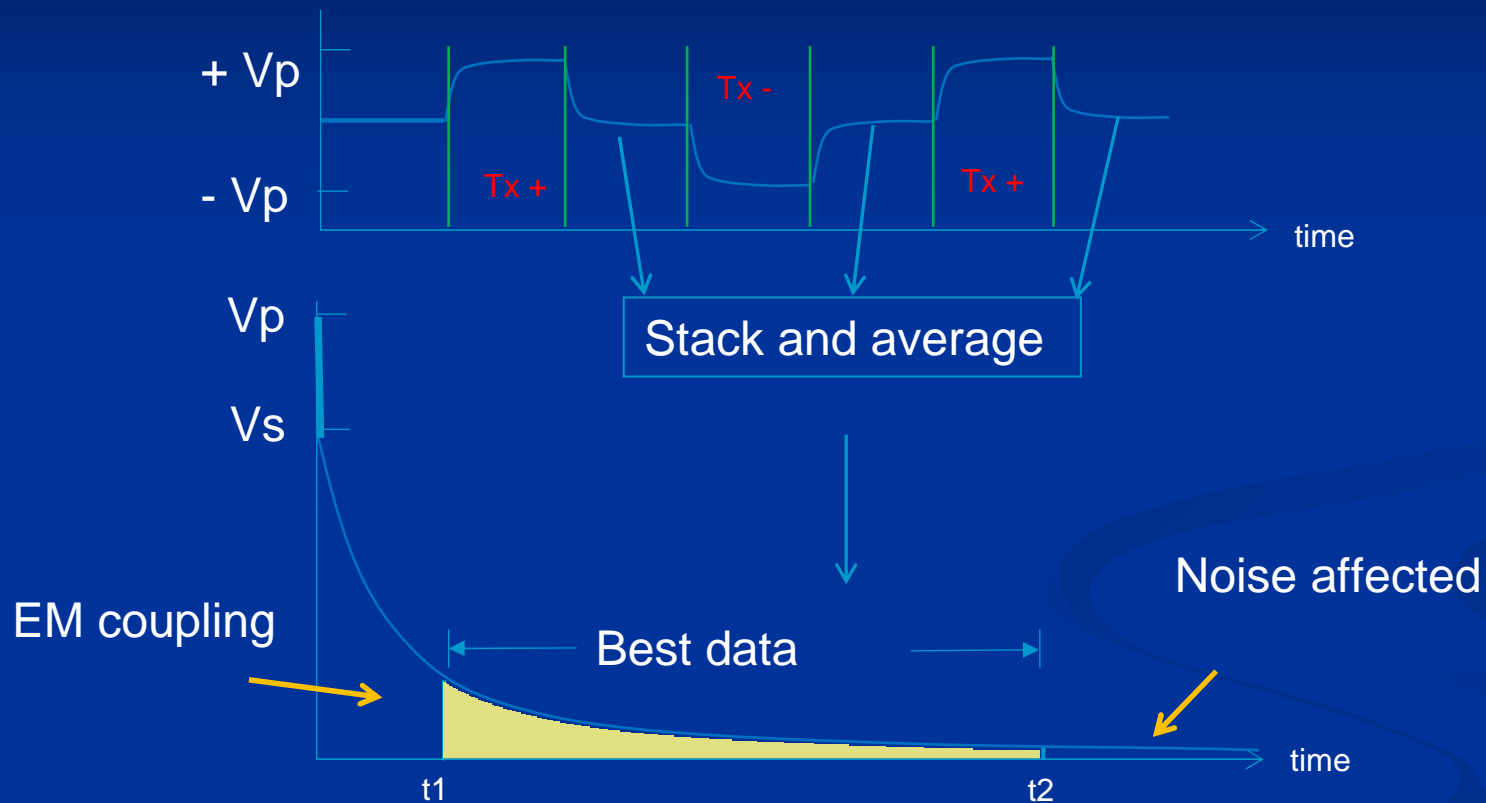
Transmitter current = I mAmp

Received primary voltage = V_p mV

Apparent half-space resistivity $\rho = k \cdot V_p / I$ Ωm

Geometric factor = $k = 2\pi / (1/r_{C1P1} - 1/r_{C1P2} - 1/r_{C2P1} + 1/r_{C2P2})$

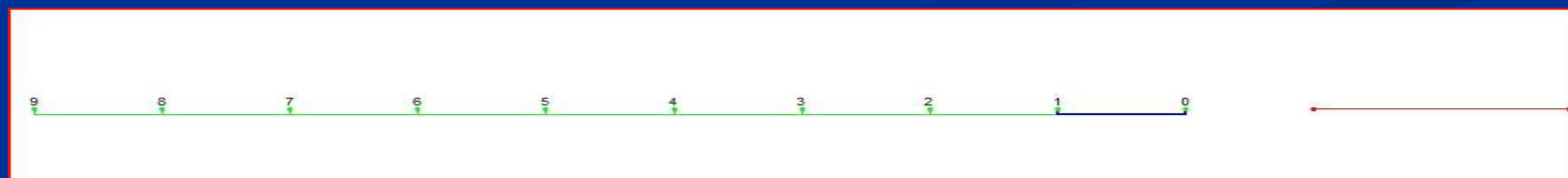
Time Domain Chargeability



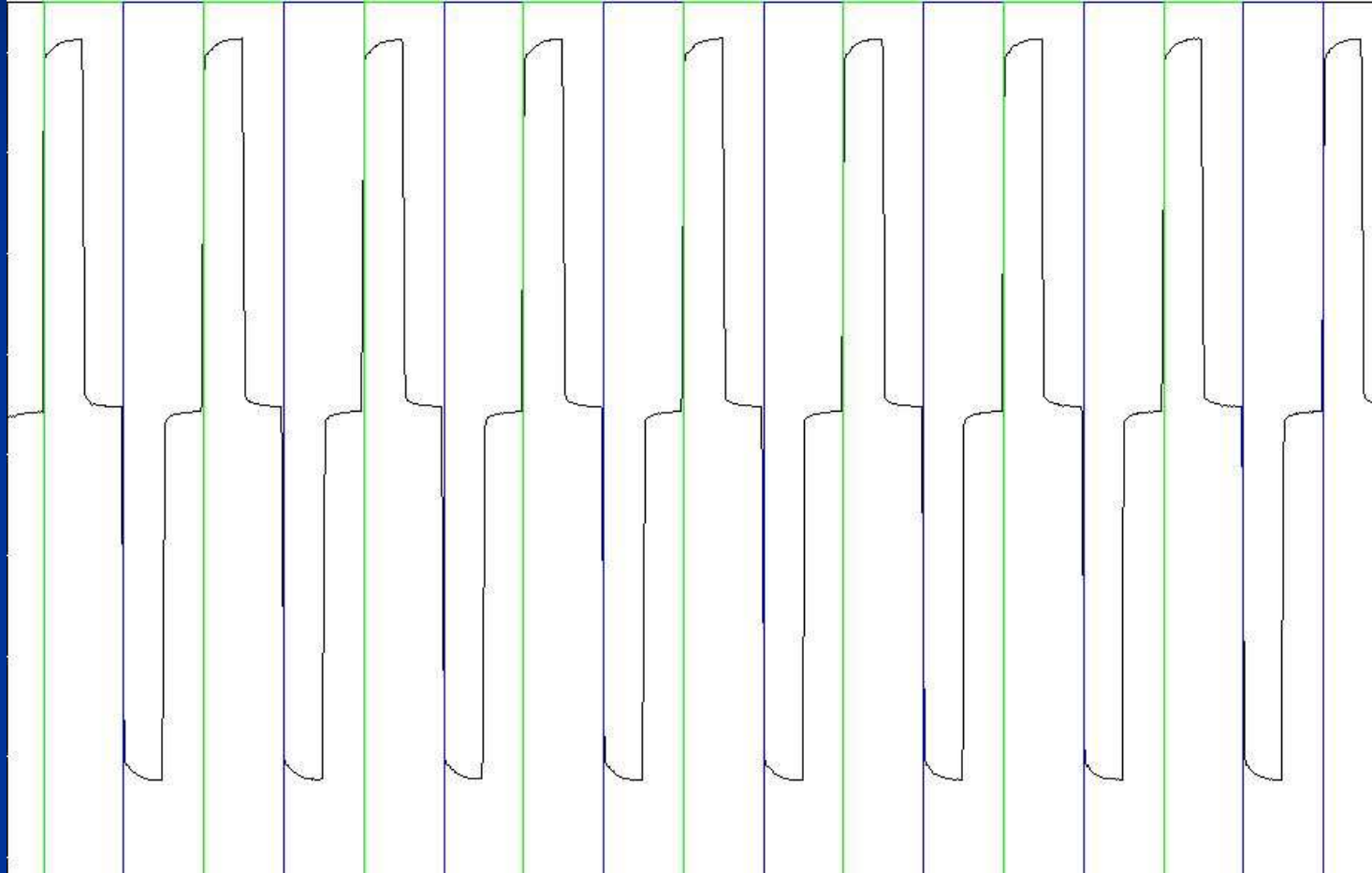
$$\text{Apparent Chargeability } M_a = A/V_p = \int_{t_1}^{t_2} V(t)dt / V_p$$

Newmont "standard" $t_1 = 590\text{ms}$, $t_2 = 1450\text{ms}$

Time Domain IP Data Collection

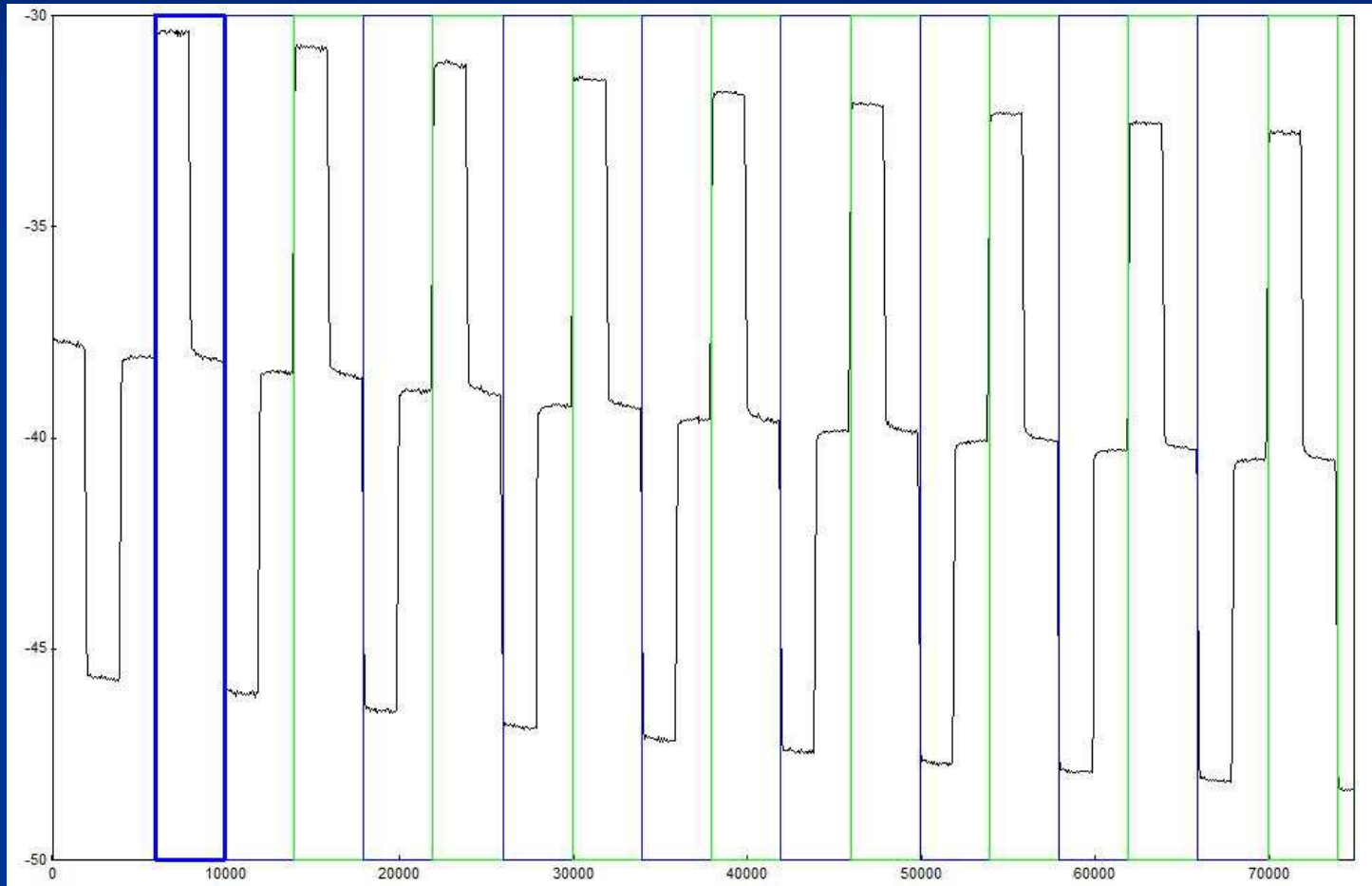


Time Domain IP Practice



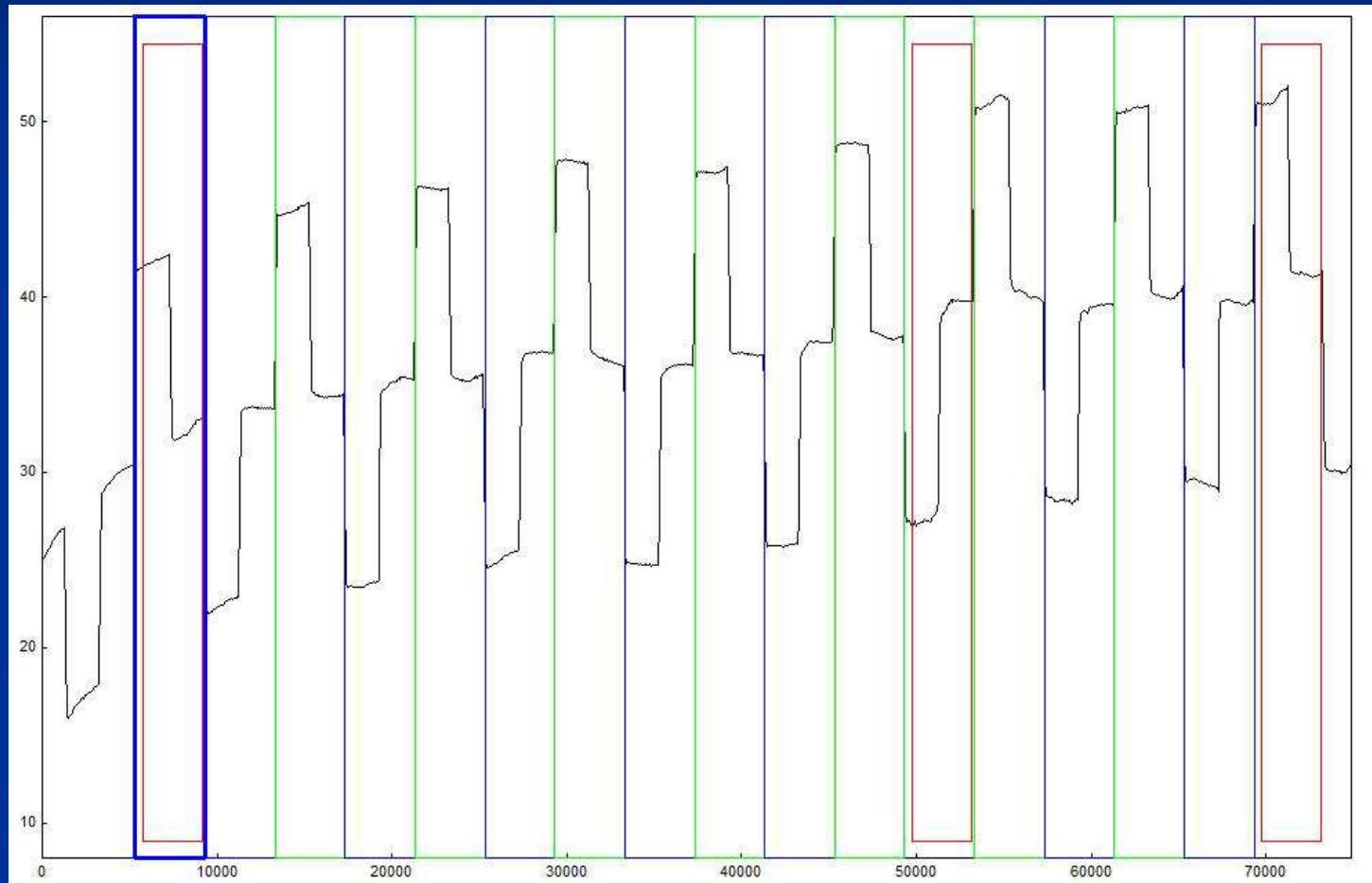
Good data quality

Time Domain IP Practice



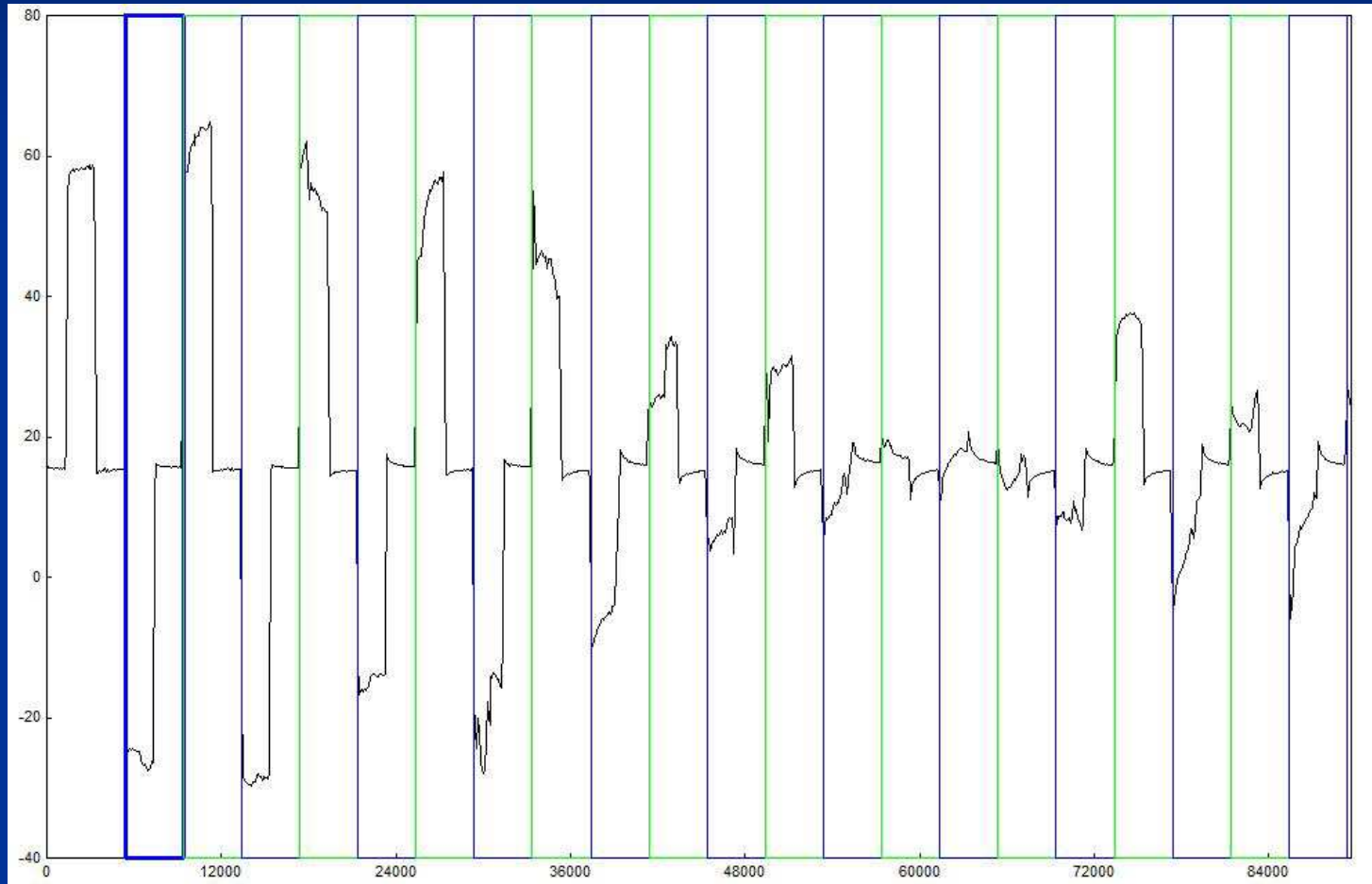
Reasonable data quality

Time Domain IP Practice



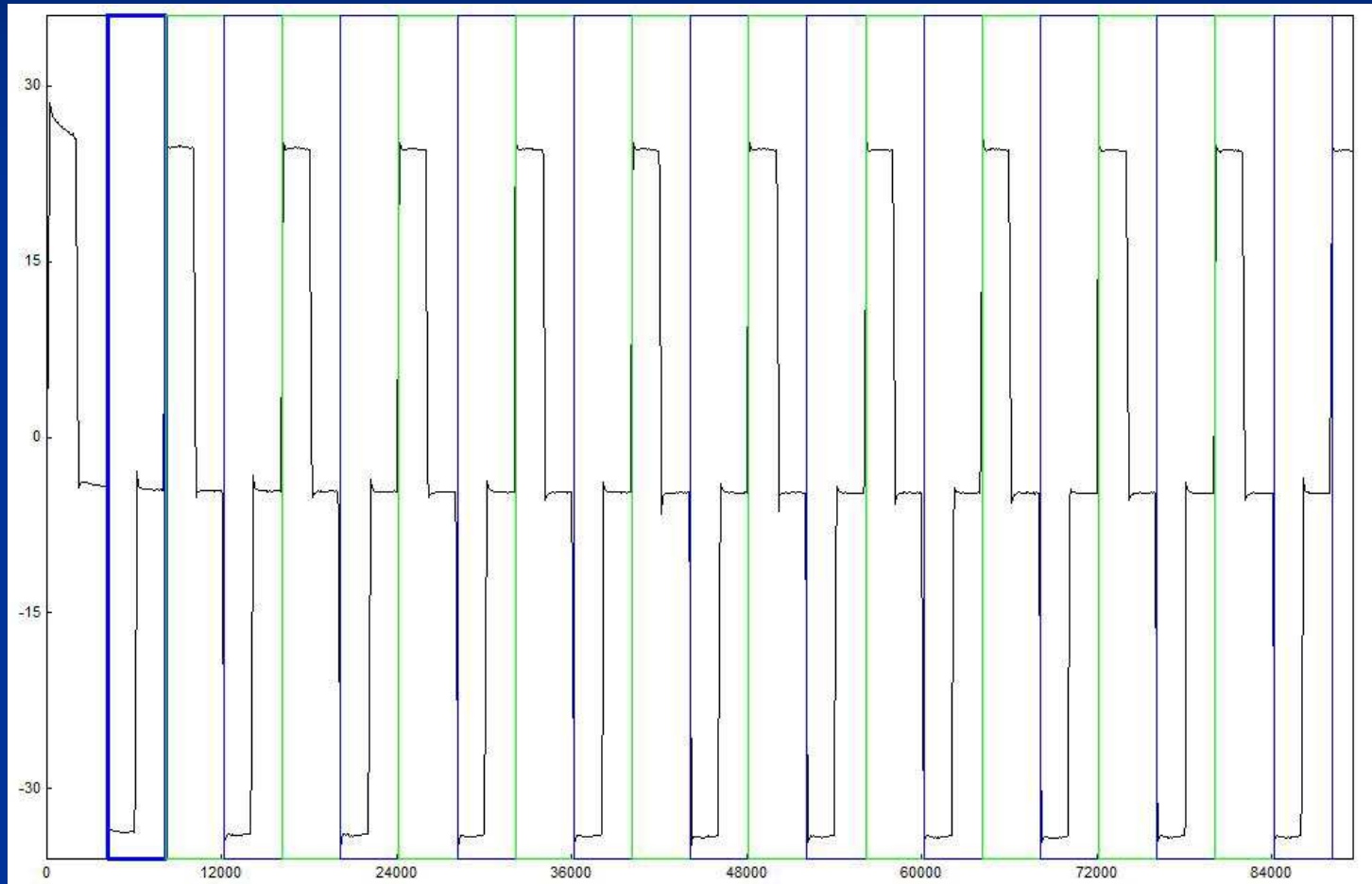
Poor data quality

Time Domain IP Practice



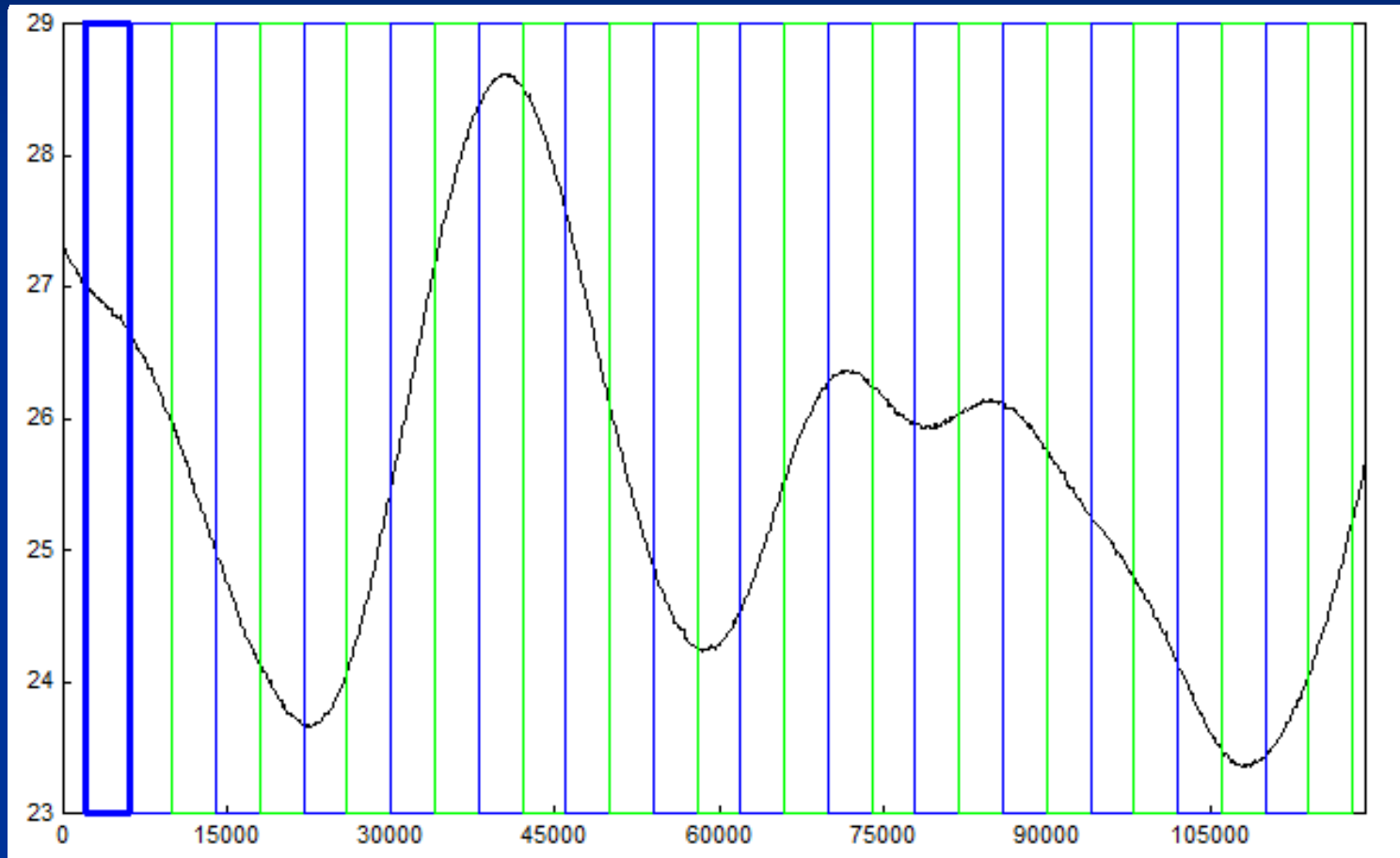
Very poor data quality

Time Domain IP Practice



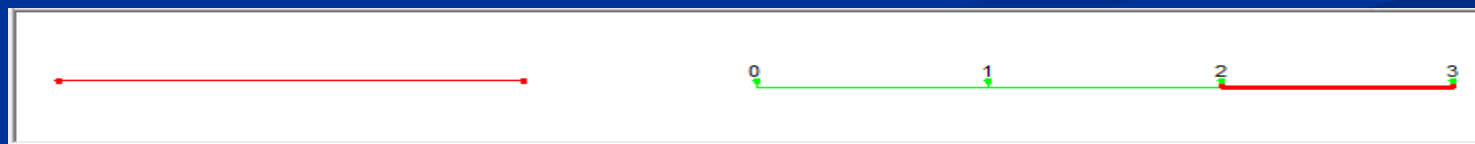
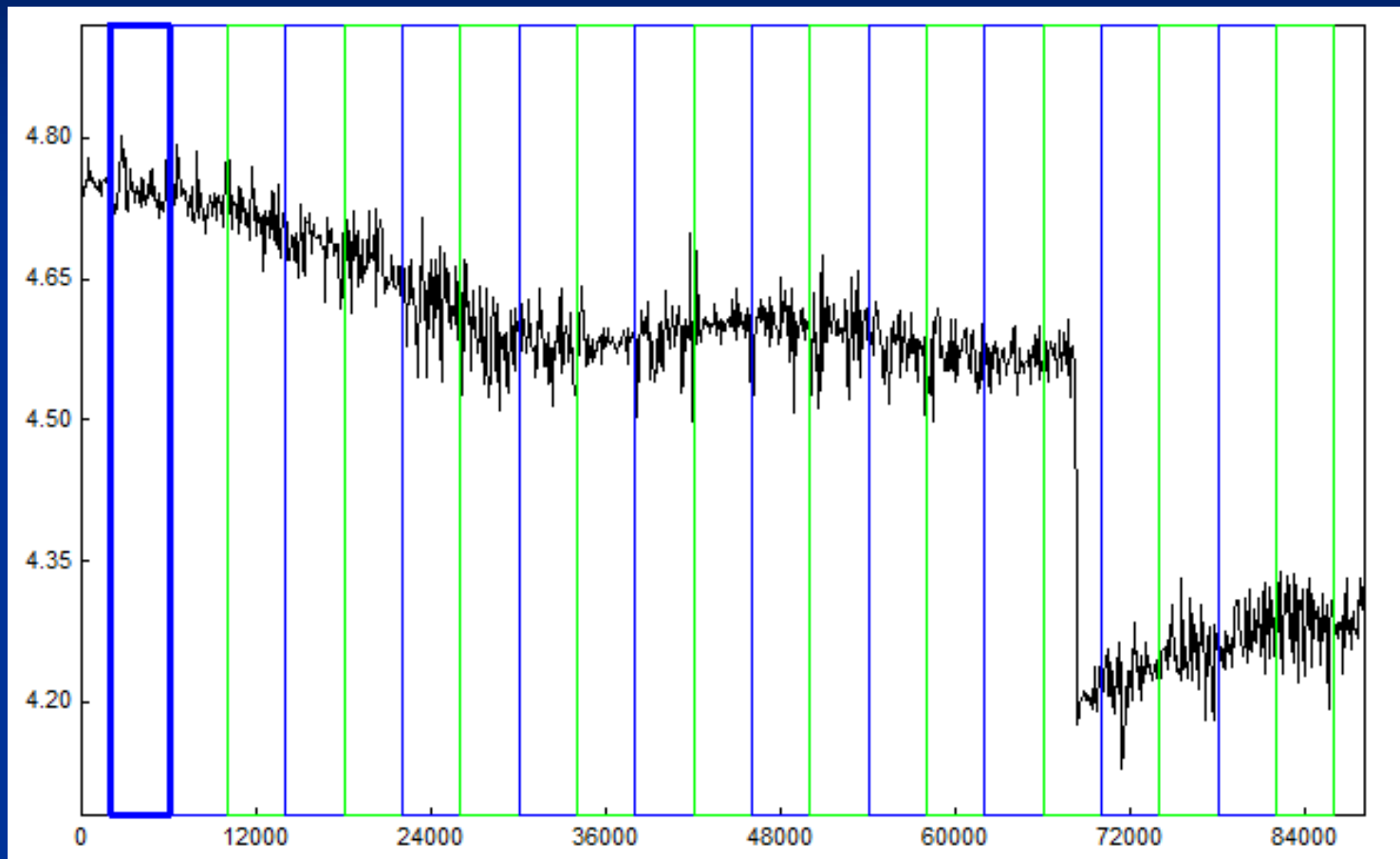
Very strong negative EM coupling

Time Domain IP Practice

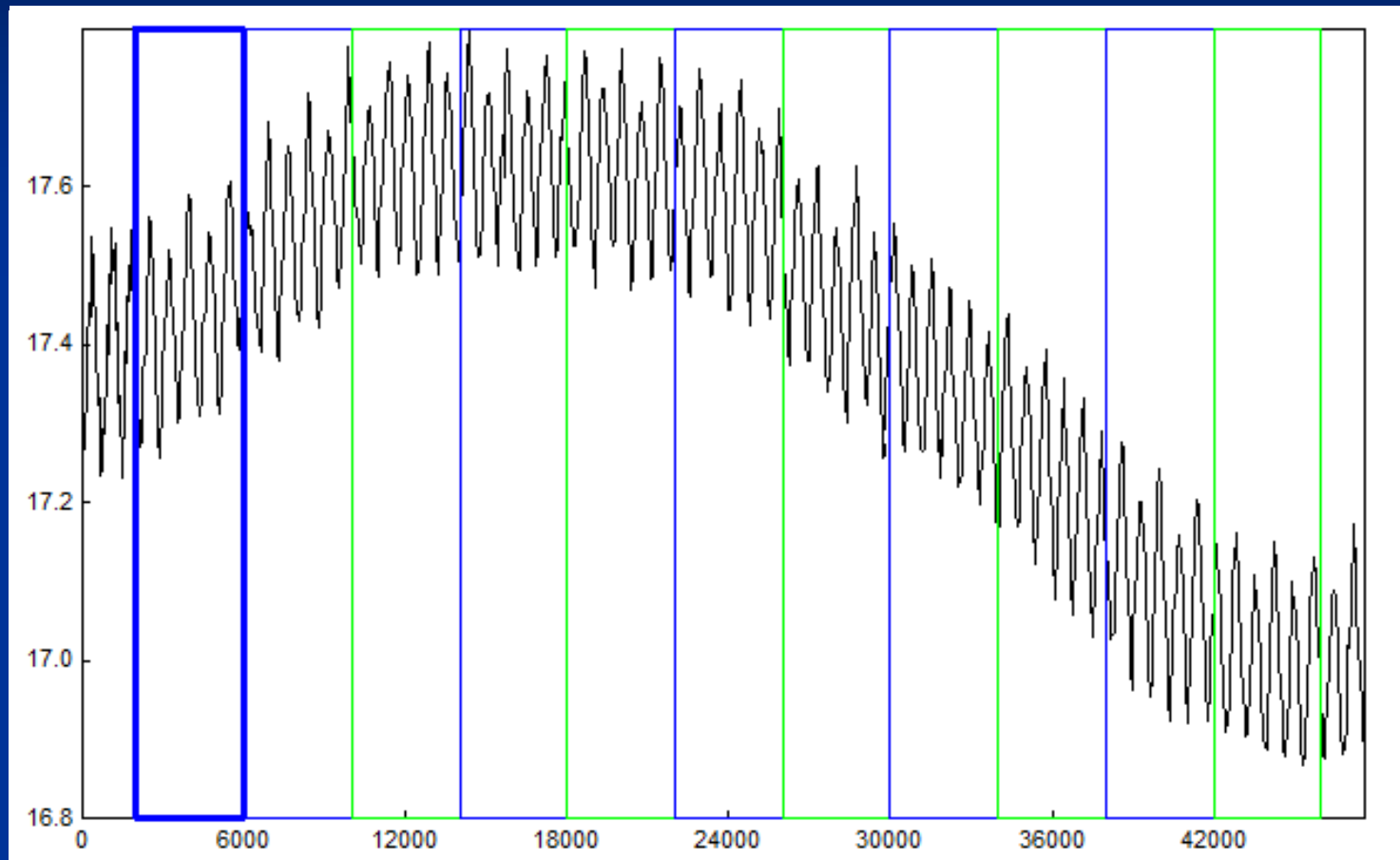


StrongTelluric

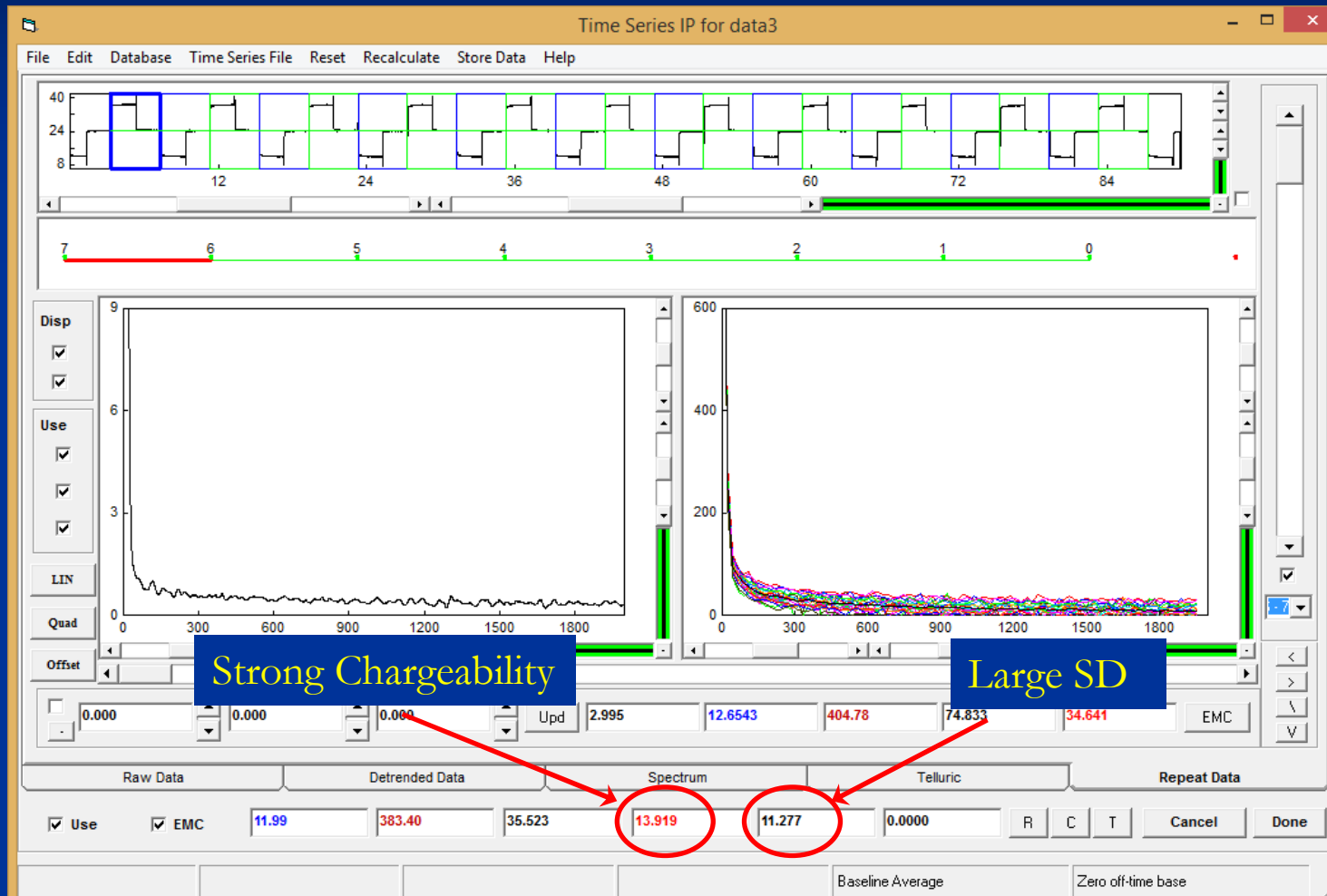
Time Domain IP Practice - Noise



Time Domain IP Practice - Noise

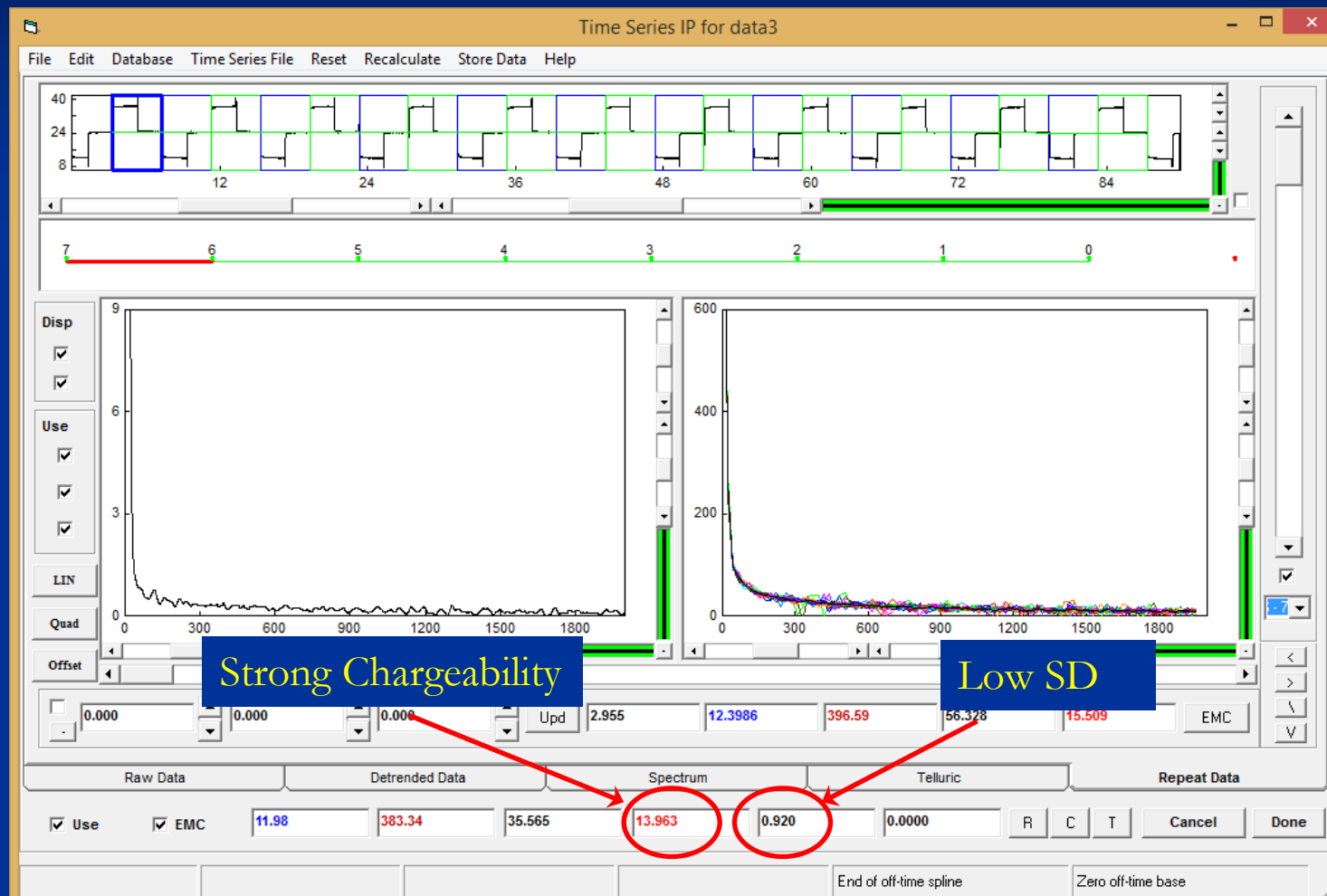


Telluric Processing



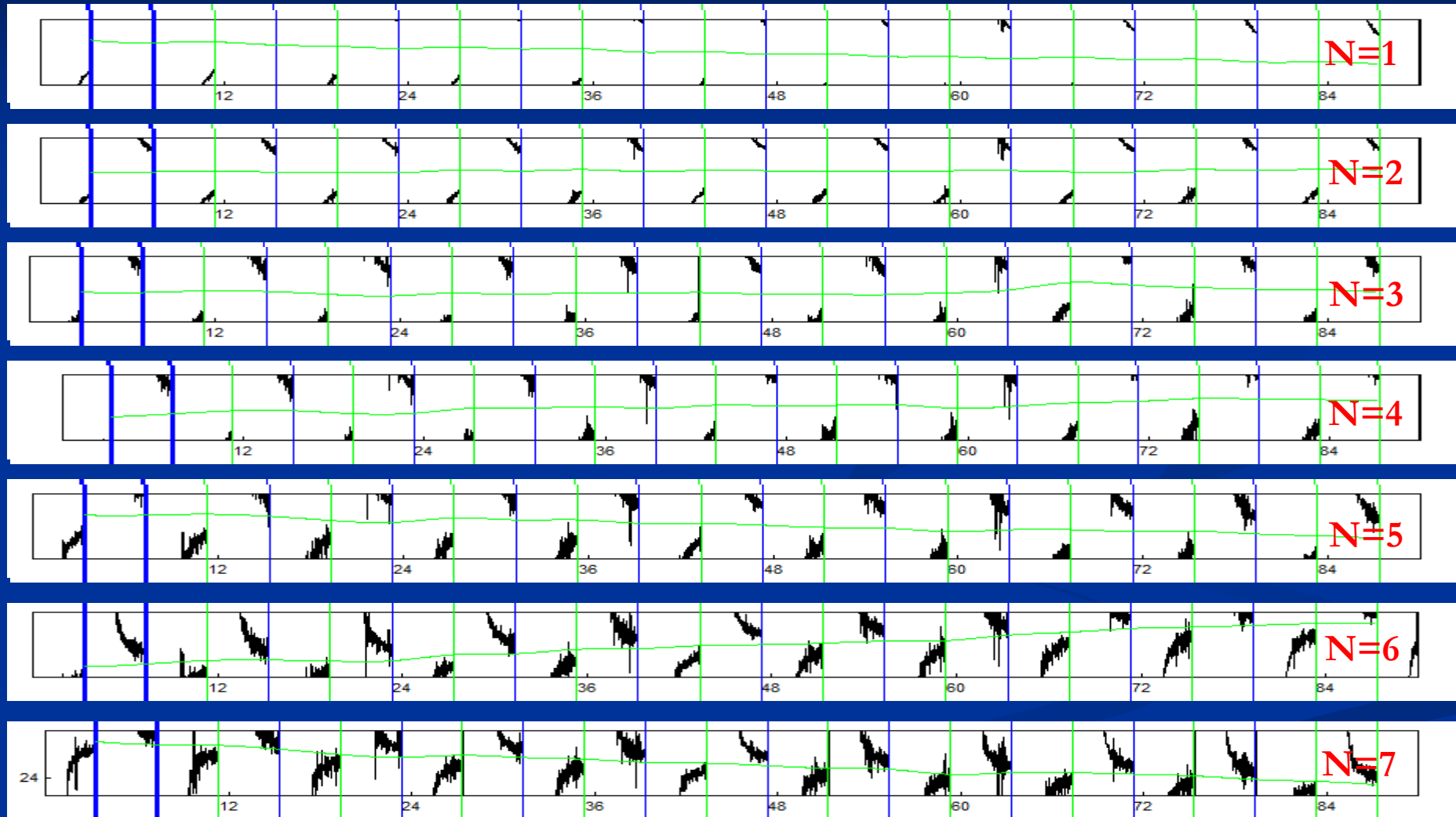
Standard processing

Telluric Processing



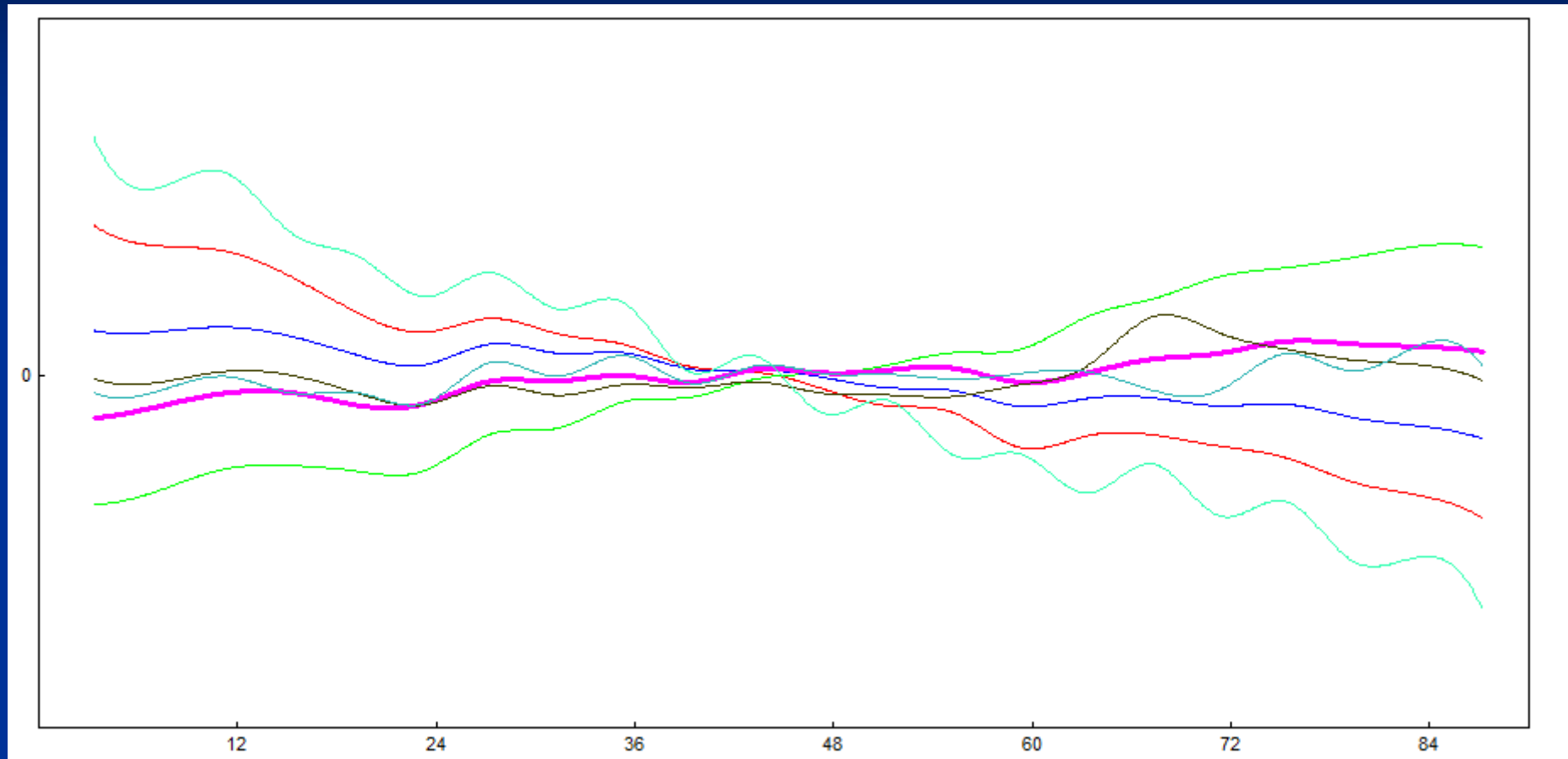
Telluric removal processing

Telluric Processing



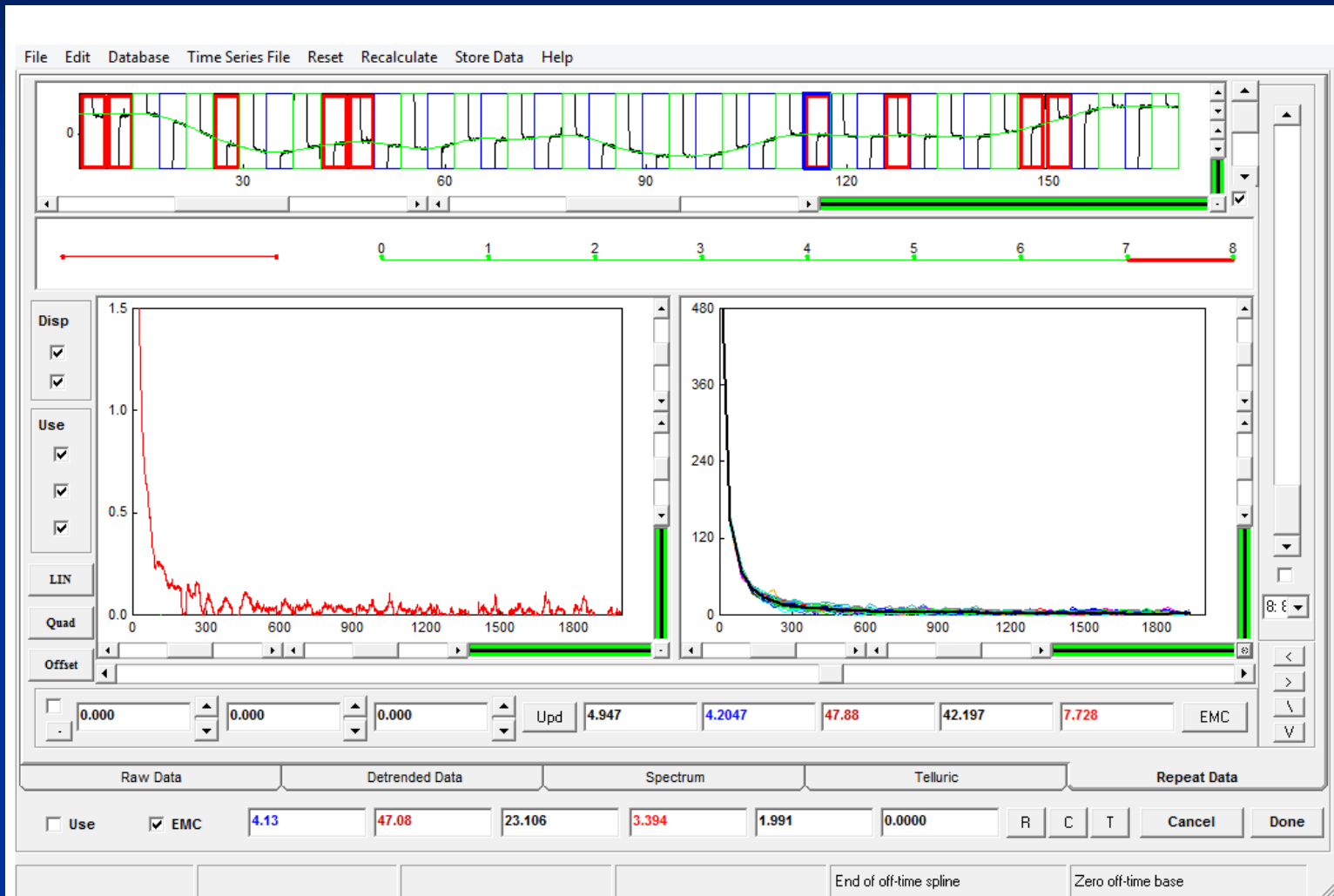
Telluric removal processing

Telluric Processing



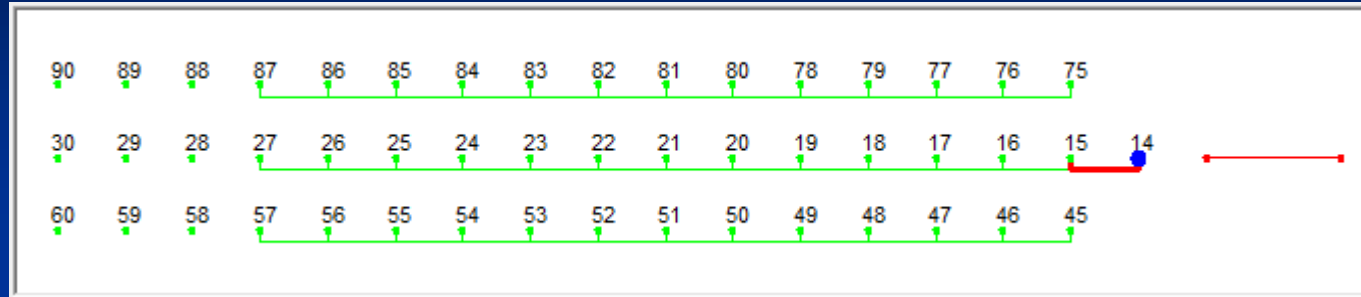
Telluric removal processing

Telluric Processing

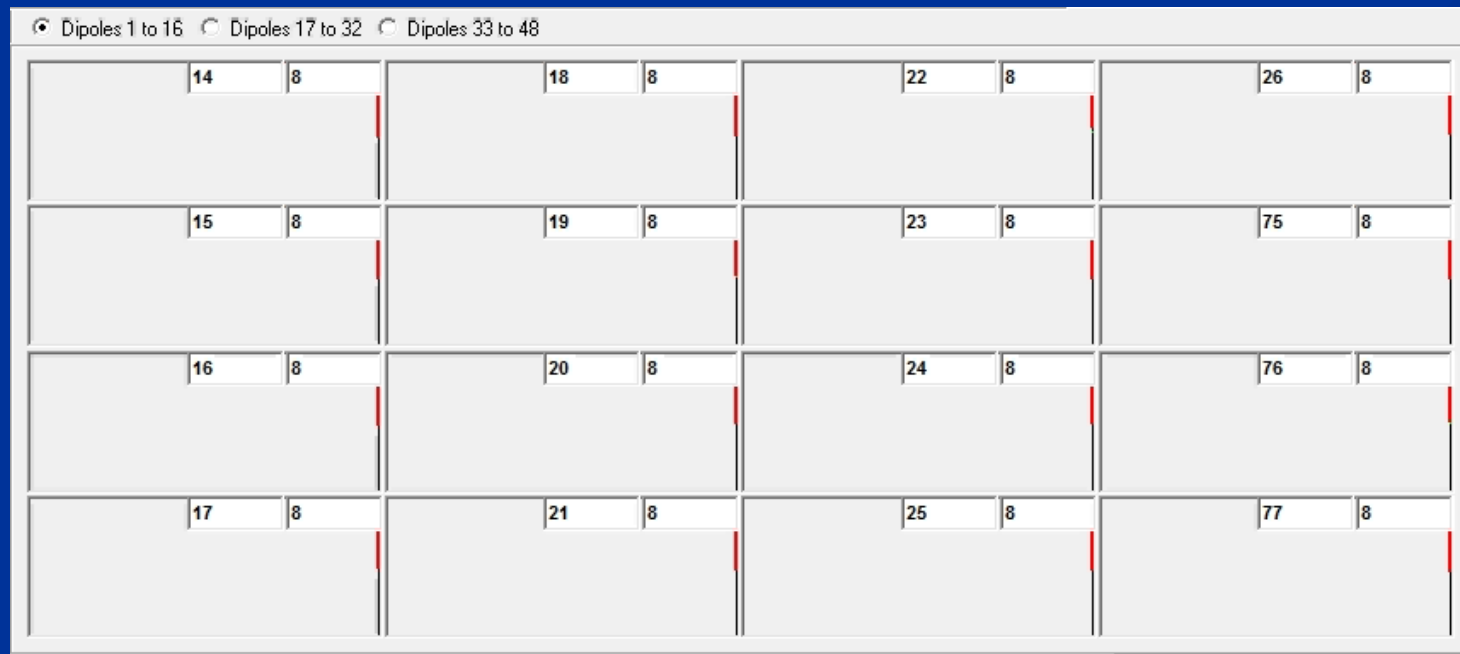


Bad cycles and Telluric removal processing

Fixing Field Problems

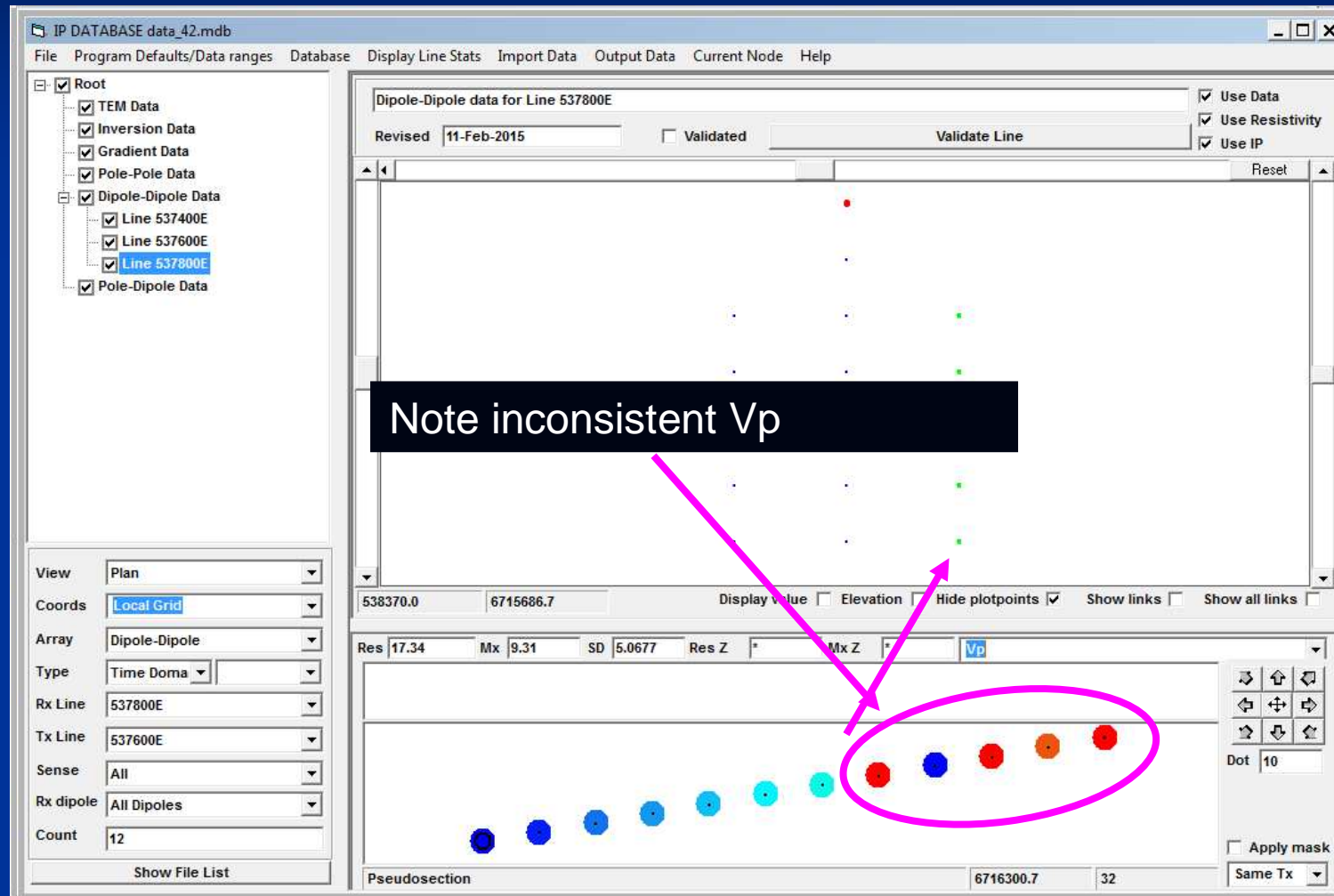


Electrode layout



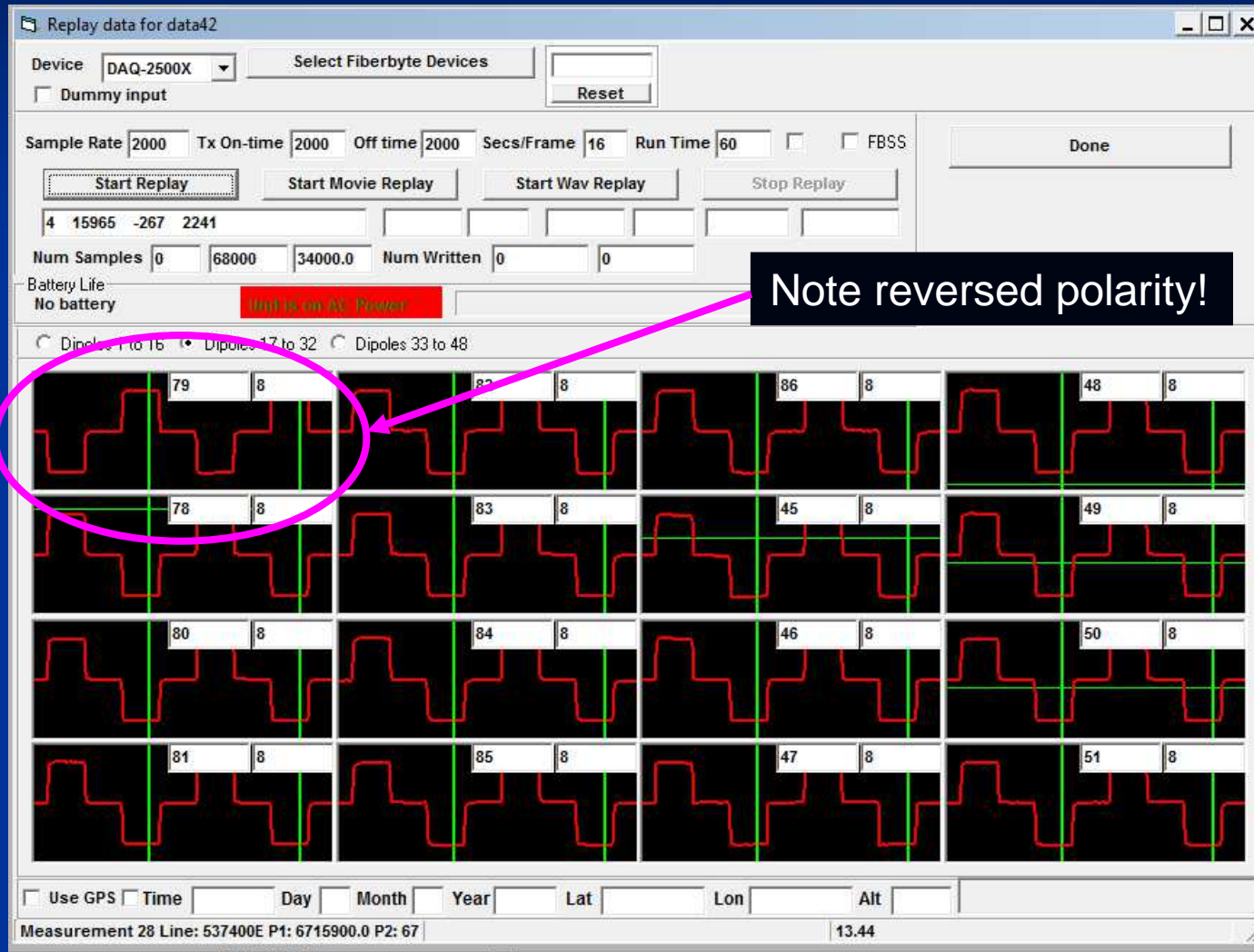
Data Collection

Fixing Field Problems



Processed Vp data

Fixing Field Problems



Fixing Field Problems

Define Survey Information for data42
Configure GPS COM Port Test GPS connection

	First pot number	Second pot number	Length
Measurement 11	11: 537600E, 6715200	12: 537600E, 6715100	100.0
Measurement 12	12: 537600E, 6715100	13: 537600E, 6715000	100.0
Measurement 13	13: 537600E, 6715000	14: 537600E, 6714900	100.0
Measurement 14	18: 537800E, 6716100	19: 537800E, 6716000	100.0
Measurement 15	19: 537800E, 6716000	20: 537800E, 6715900	100.0
Measurement 16	20: 537800E, 6715900	21: 537800E, 6715800	100.0
Measurement 17	21: 537800E, 6715800	22: 537800E, 6715700	100.0
Measurement 18	22: 537800E, 6715700	23: 537800E, 6715600	100.0
Measurement 19	23: 537800E, 6715600	24: 537800E, 6715500	100.0
Measurement 20	24: 537800E, 6715500	25: 537800E, 6715400	100.0

Add new measurement Append rest of line
Delete measurement Add multiple dipoles

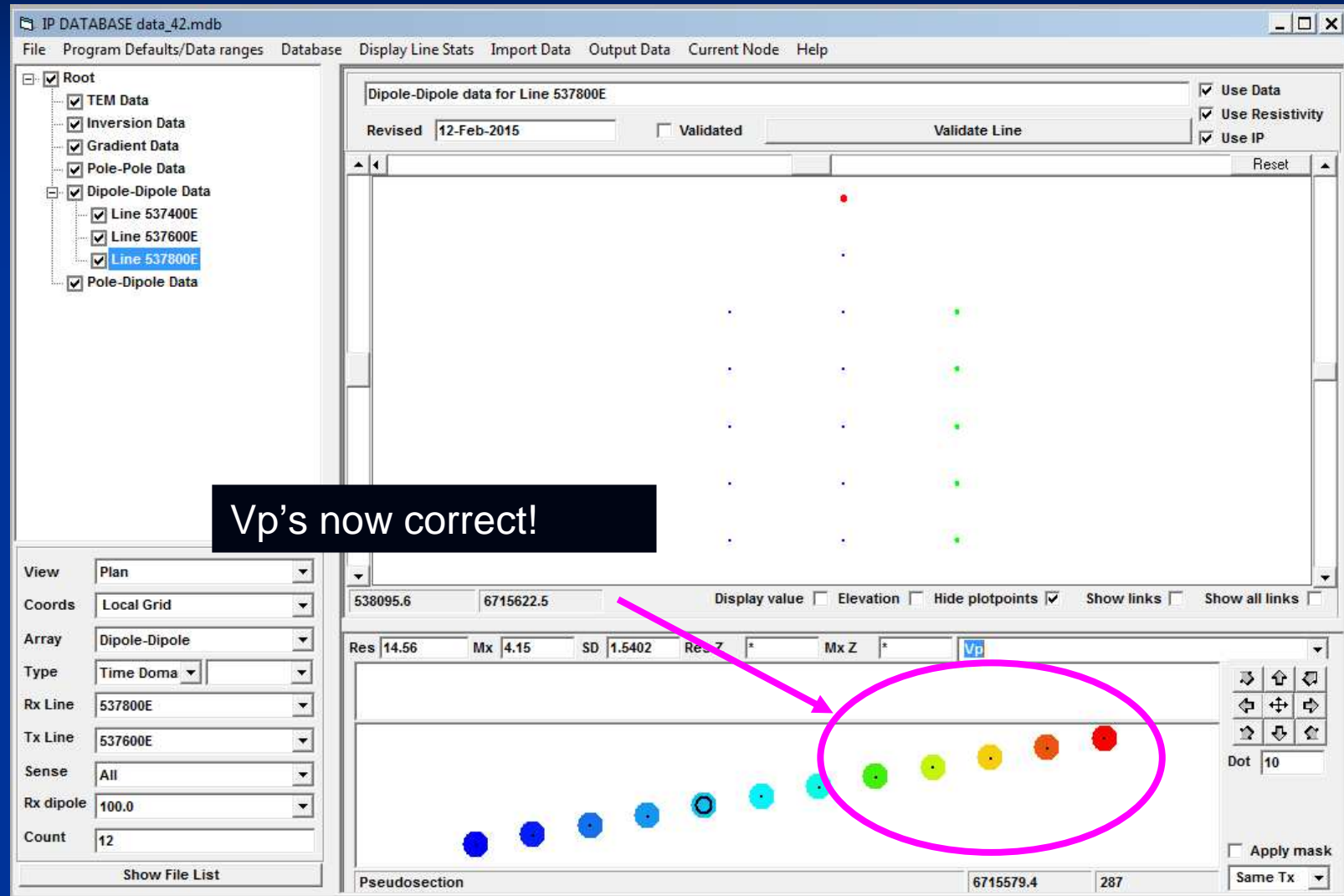
Survey and Transmitter Pot Locations Recorded data

Cancel Done

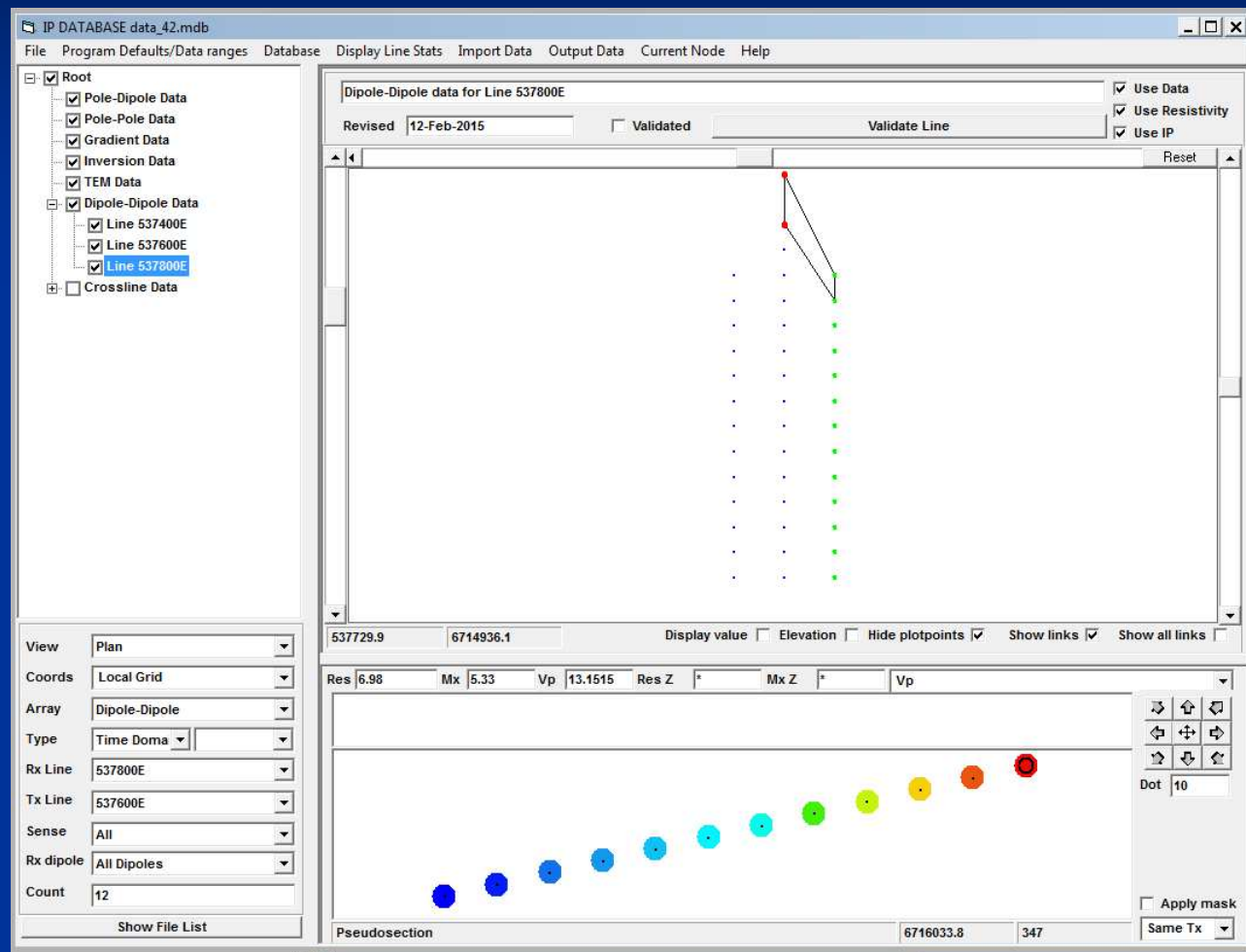
Note rev

versed stations!

Fixing Field Problems



Calculating new measurements



Normal Offset dipole measurements

Calculating new measurements

Define Survey Information for data42
Configure GPS COM Port Test GPS connection

	First pot number	Second pot number	Length
Measurement 1	18: 6716100N, 537800 (75)	34: 6716100N, 537400 (45)	400.0
Measurement 2	19: 6716000N, 537800 (76)	35: 6716000N, 537400 (46)	400.0
Measurement 3	20: 6715900N, 537800 (77)	36: 6715900N, 537400 (47)	400.0
Measurement 4	21: 6715800N, 537800 (78)	37: 6715800N, 537400 (48)	400.0
Measurement 5	22: 6715700N, 537800 (79)	38: 6715700N, 537400 (49)	400.0
Measurement 6	23: 6715600N, 537800 (80)	39: 6715600N, 537400 (50)	400.0
Measurement 7	24: 6715500N, 537800 (81)	40: 6715500N, 537400 (51)	400.0
Measurement 8	25: 6715400N, 537800 (82)	41: 6715400N, 537400 (52)	400.0
Measurement 9	26: 6715300N, 537800 (83)	42: 6715300N, 537400 (53)	400.0
Measurement 10	27: 6715200N, 537800 (84)	43: 6715200N, 537400 (54)	400.0

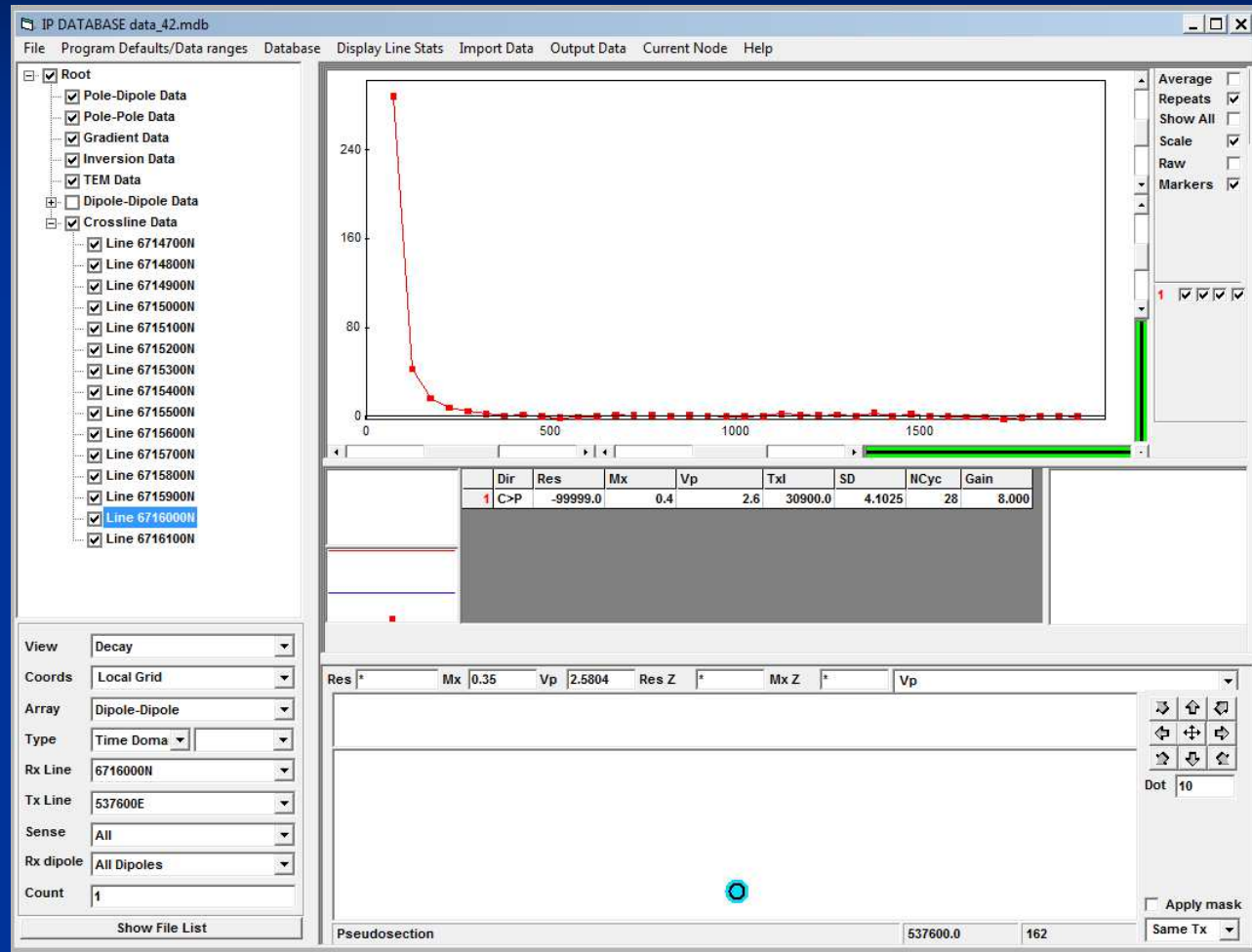
Add new measurement Append rest of line
Delete measurement Add multiple dipoles

Survey and Transmitter Pot Locations Recorded data

Cancel Done

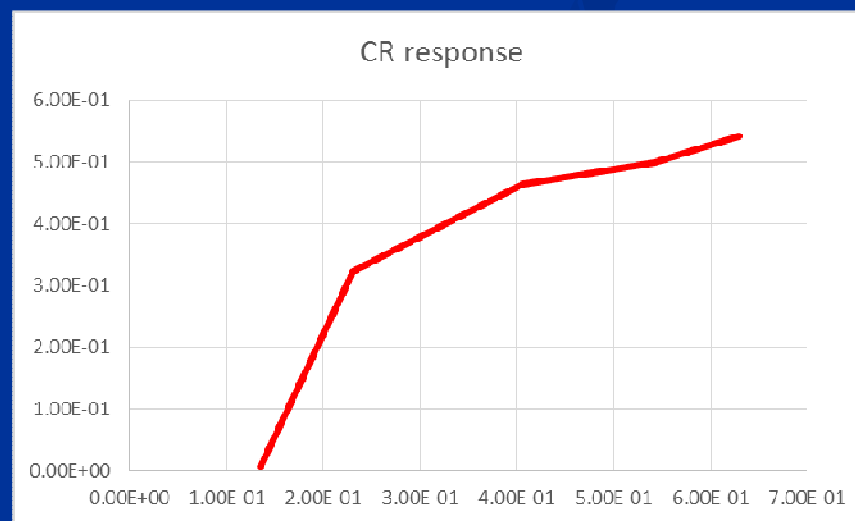
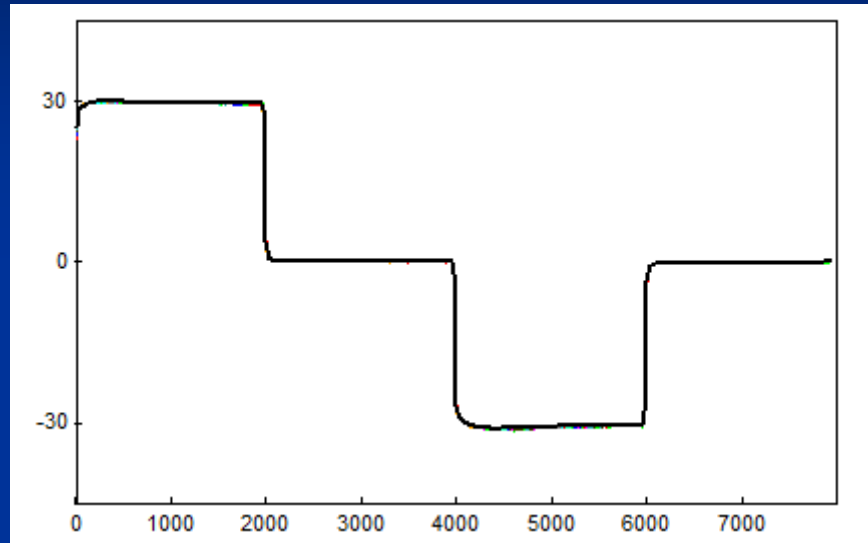
Define measurements to calculate cross-line dipoles

Calculating new measurements



Define measurements to calculate cross-line dipoles

Calculating new measurements CR



Conclusions

- Aids in collecting best possible data
- Helps detect and fix problems in the field
- Helps fix operator errors after data is collected
- Provides scope for improving data quality
- Allows new data processing methods to be applied to previously collected data