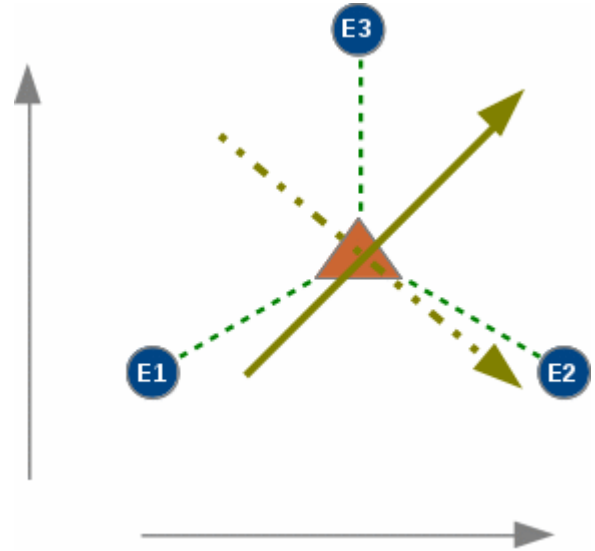
Multi Dipole CSAMT



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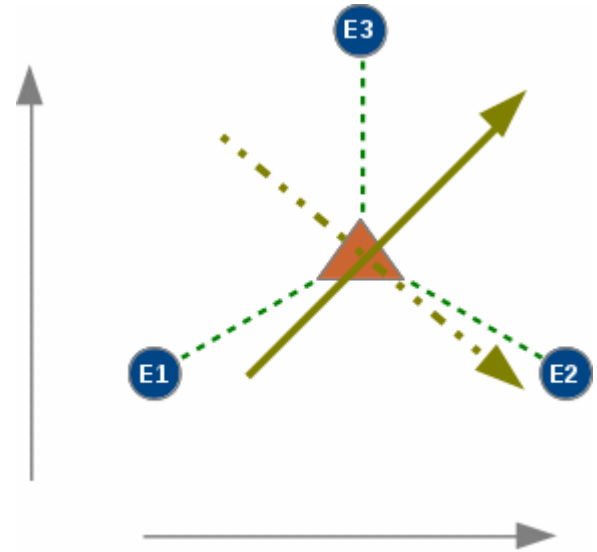
Multi Dipole CSAMT



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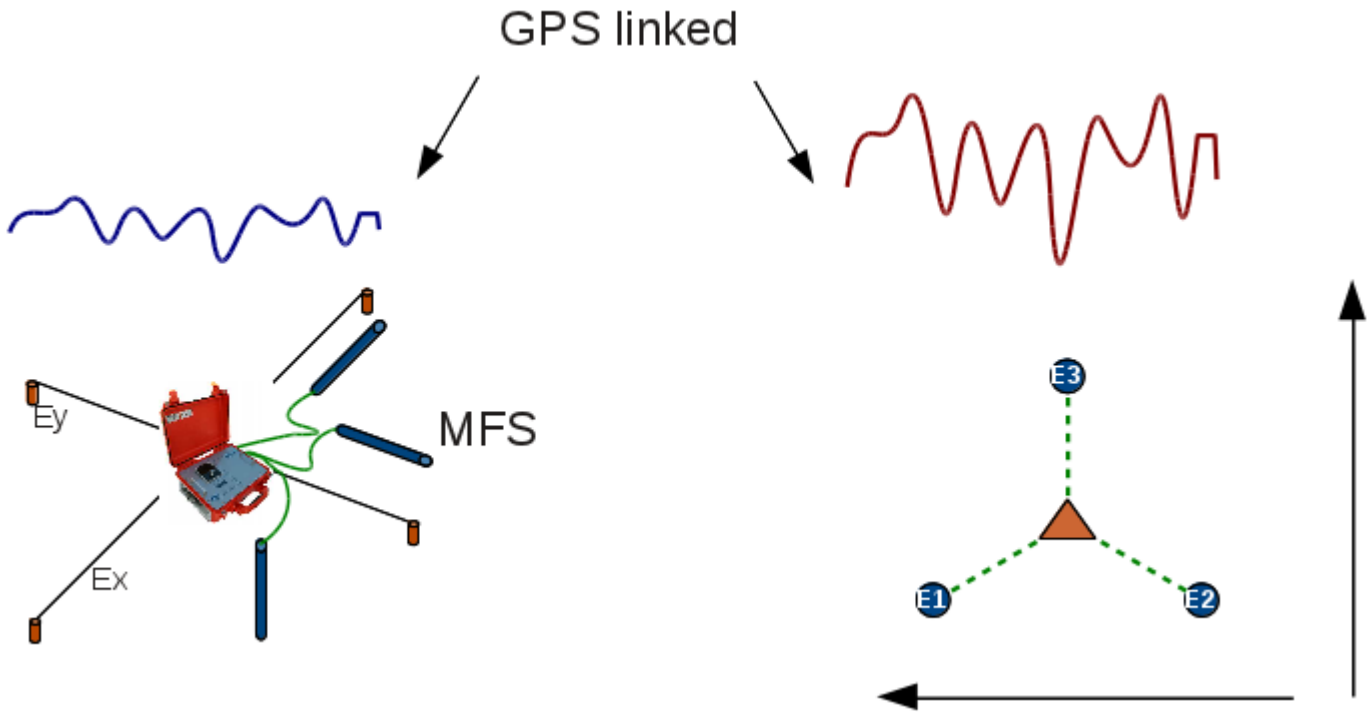
bernhard.friedrichs@metronix.de

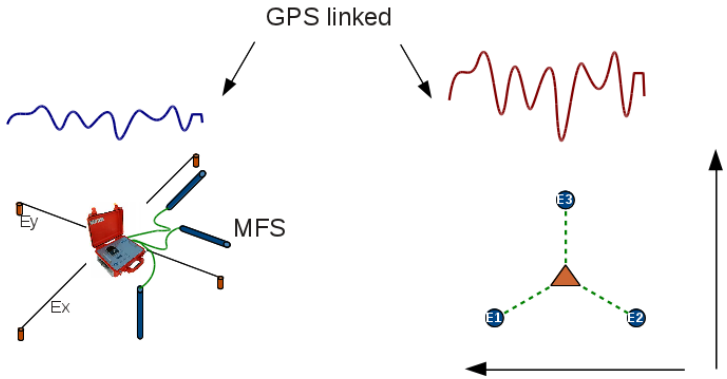
GPS Synced Signal

- Transmitter and receivers are using the **same** GPS module
- Transmitter optionally records the transmission currents



- using the **same** analog/digital conversion at transmitter and receiver allows convolution of RX and TX signals in the time domain

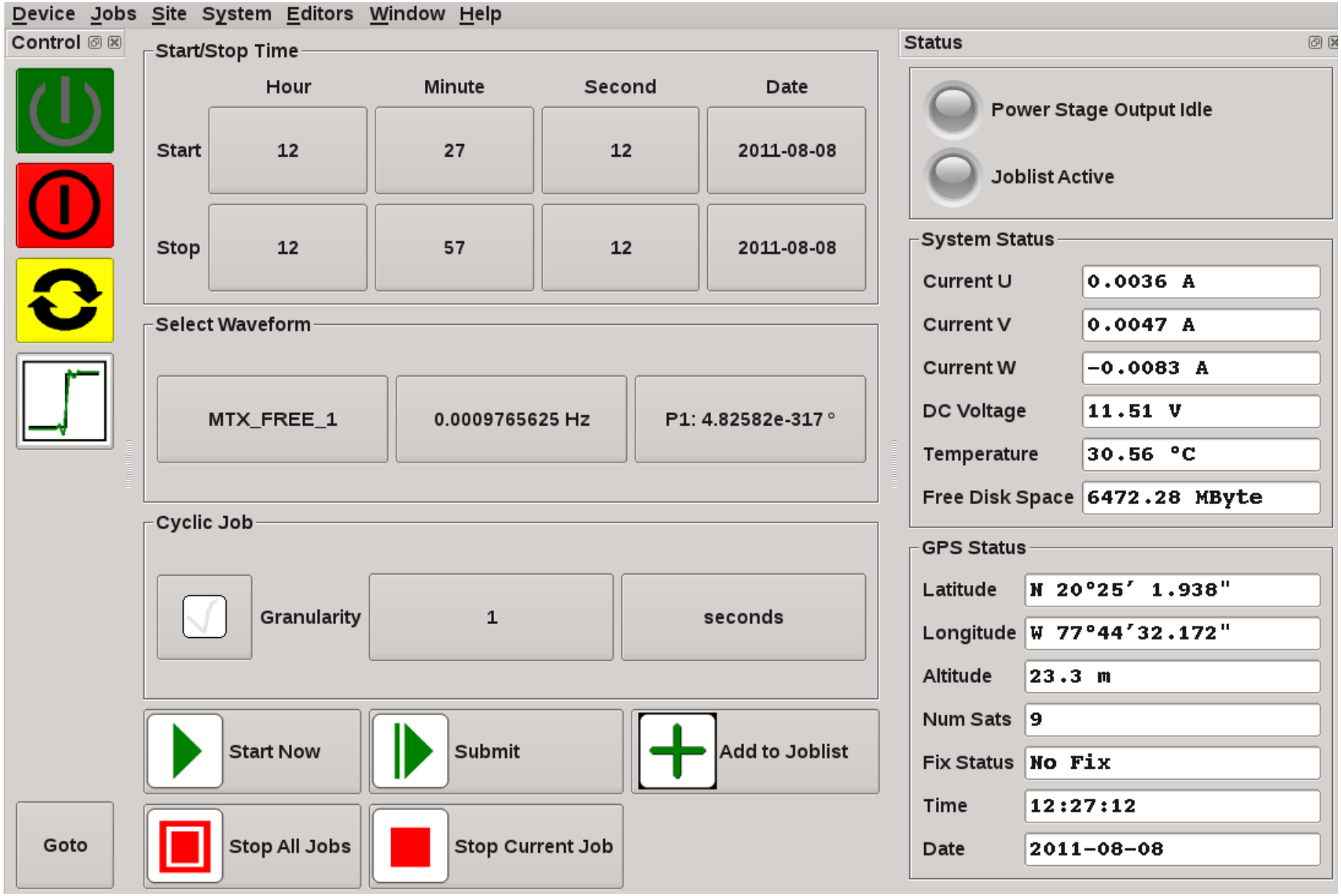
Job Lists



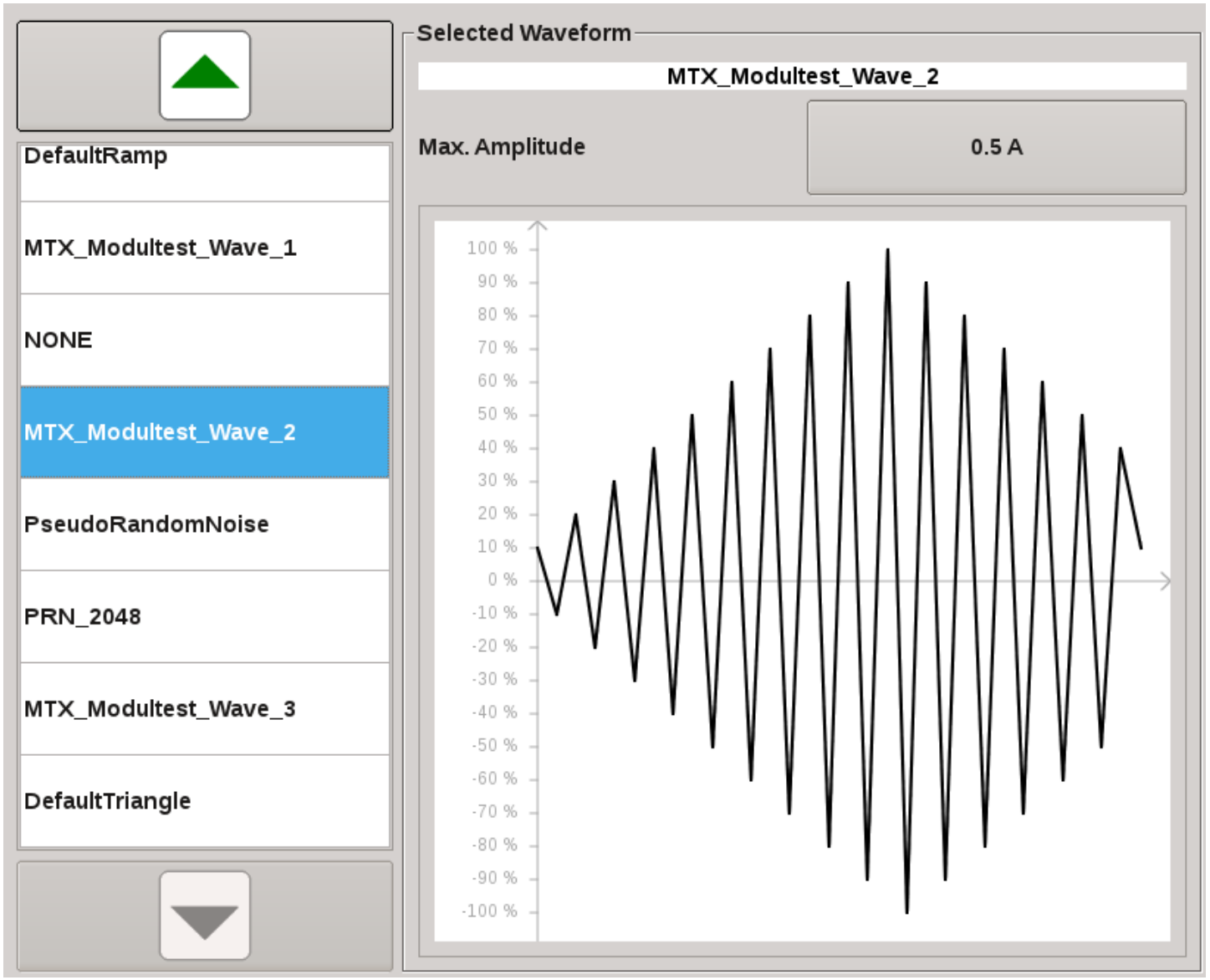
Transmitter (TX) and Receiver (RX) operate with the same job lists
This enables fully automatic recordings for fast production

10 min 4096 Hz	10 min , 8Hz	50/50s Tx 1, Tx 2
10 min 4096 Hz	10 min , 32 Hz	50/50s Tx 1, Tx 2
6 min 4096 Hz	6 min, 128 Hz	50/50s Tx 1, Tx 2
3 min 16 kHz	3 min, 512 Hz,	25/25s Tx 1, Tx 2
3 min 16 kHz	3 min, 2048 Hz,	25/25s Tx 1, Tx 2
1 min 64 kHz	1 min, 4096 Hz,	25/25s Tx 1, Tx 2
1 min 64 kHz	1 min, 8192 Hz,	25/25s Tx 1, Tx 2

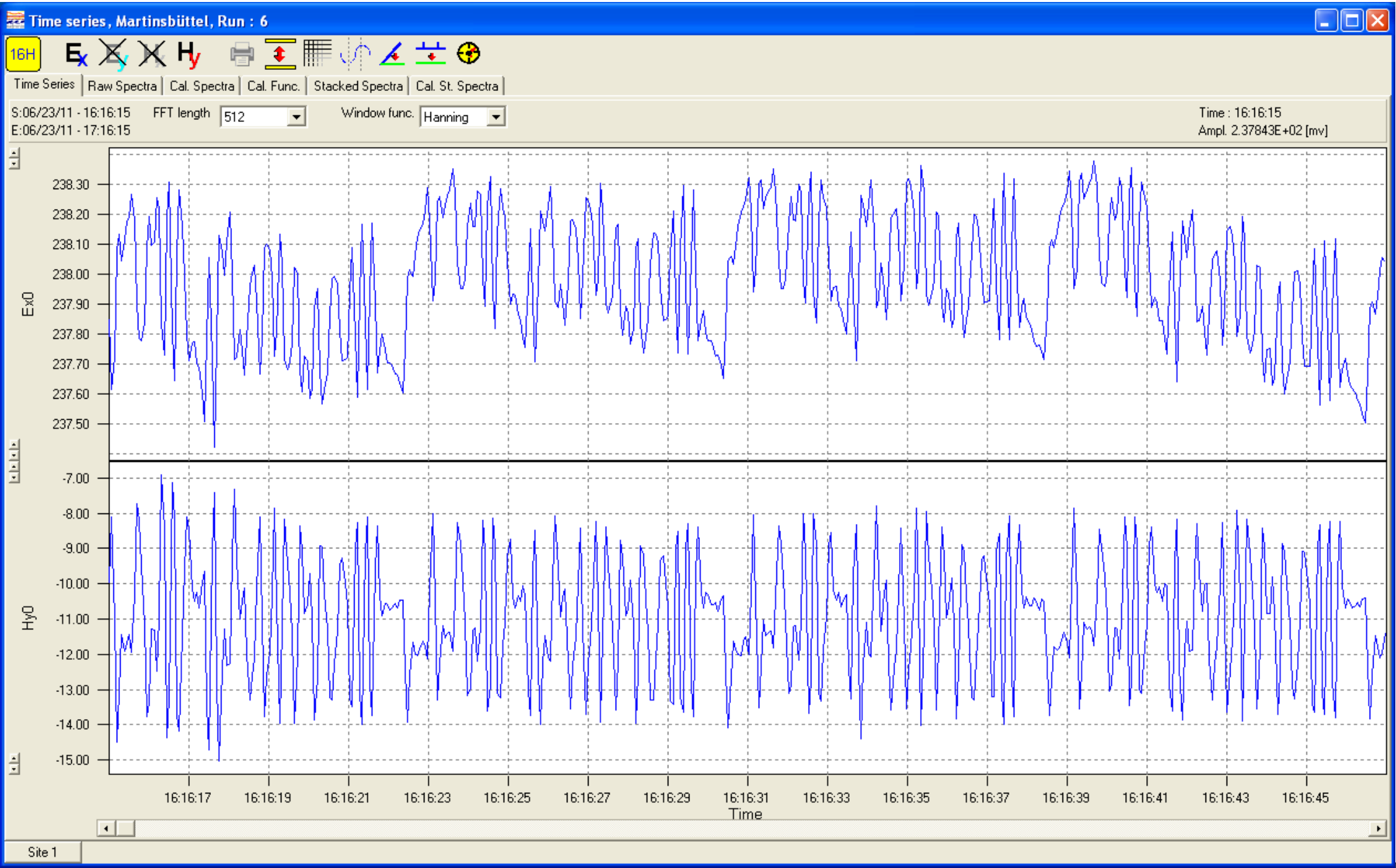
Modern Interface



Arbitrary Waveforms

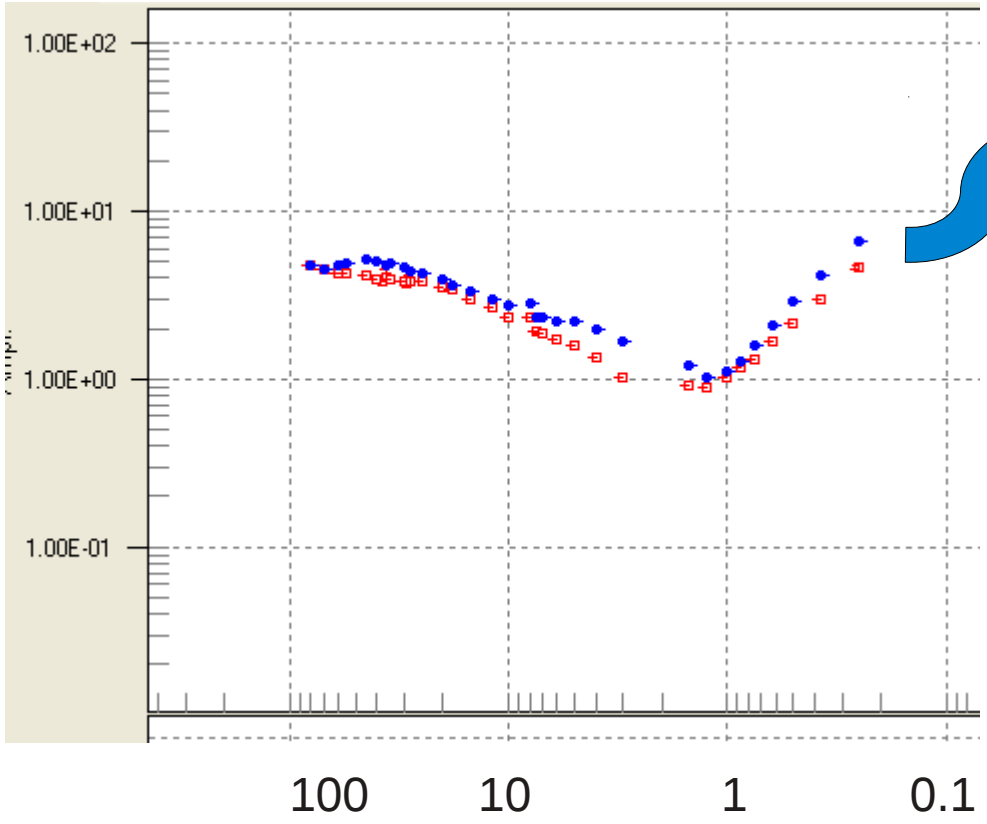


PRBS


Time series, Martinsbüttel, Run : 6
16H
Time Series
Raw Spectra
Cal. Spectra
Cal. Func.
Stacked Spectra
Cal. St. Spectra
S:06/23/11 - 16:16:15
E:06/23/11 - 17:16:15
FFT length
512
Window func.
Hanning
Time : 16:16:15
Ampl. 2.37843E+02 [mv]
Ex0
238.30
238.20
238.10
238.00
237.90
237.80
237.70
237.60
237.50
Hy0
-7.00
-8.00
-9.00
-10.00
-11.00
-12.00
-13.00
-14.00
-15.00
16:16:17
16:16:19
16:16:21
16:16:23
16:16:25
16:16:27
16:16:29
16:16:31
16:16:33
16:16:35
16:16:37
16:16:39
16:16:41
16:16:43
16:16:45
Time
Site 1

PRBS

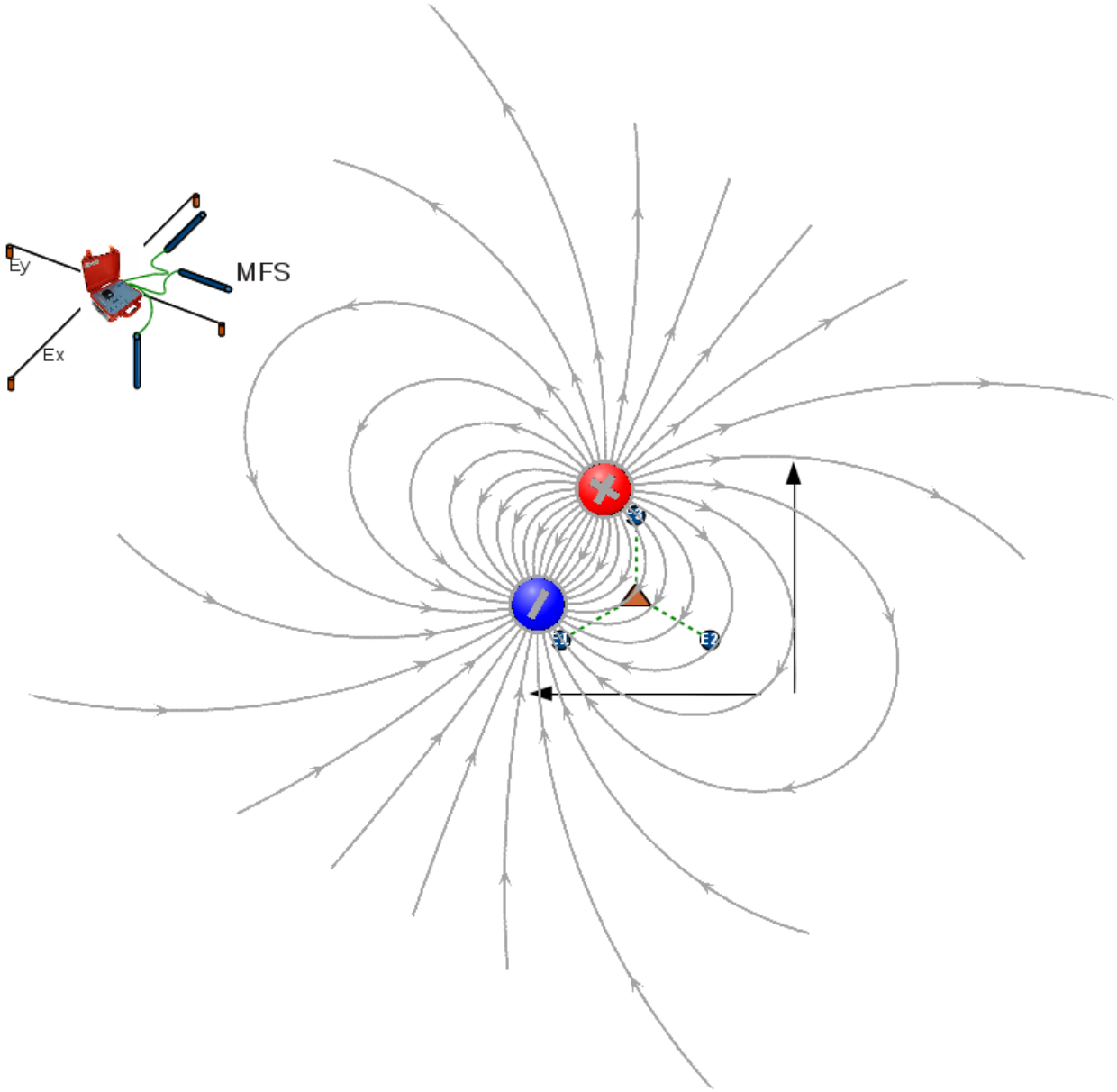
far field

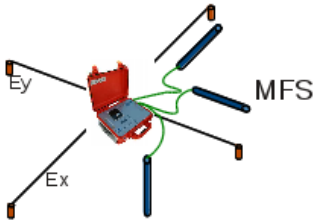


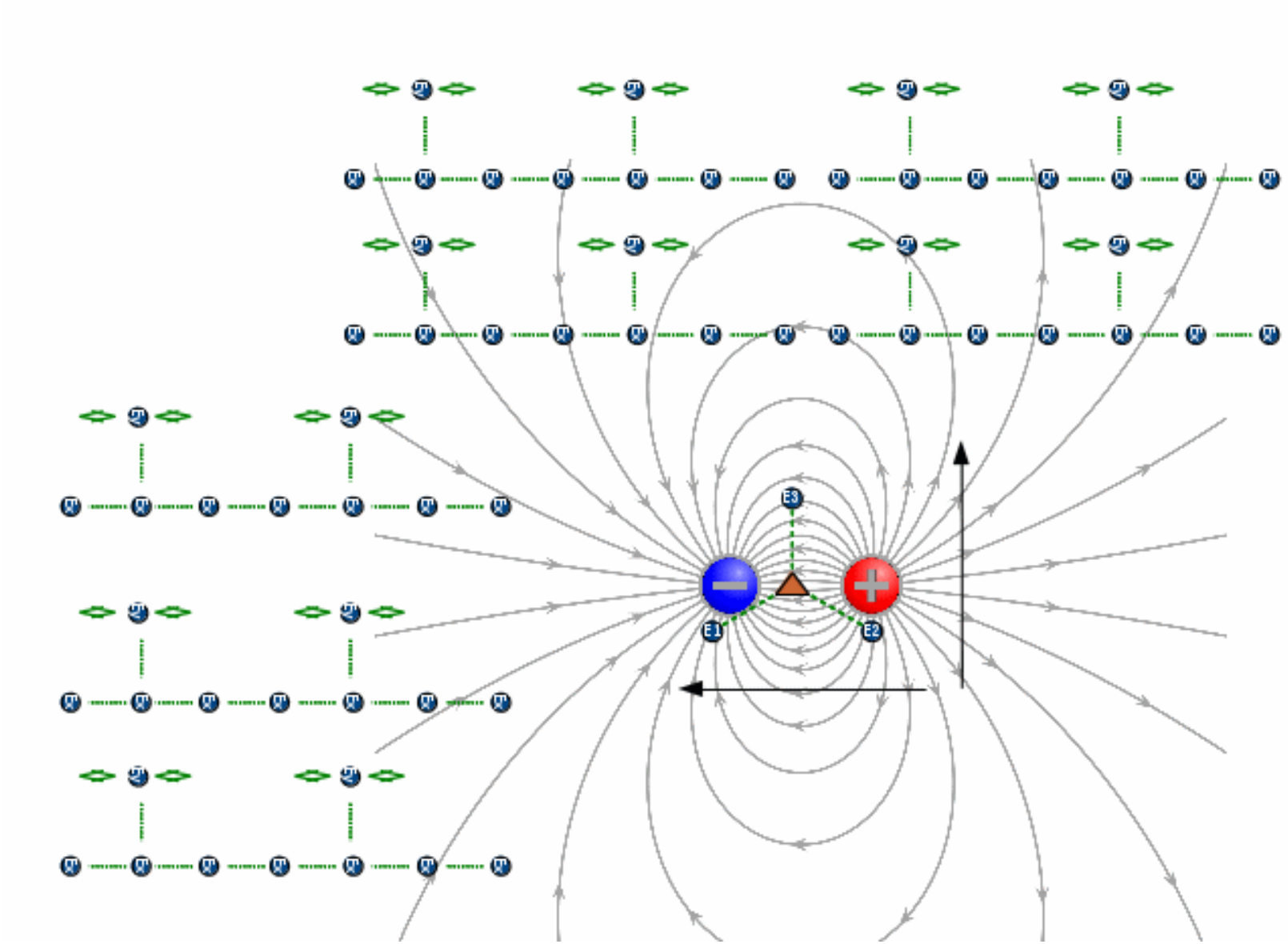
near field

PRBS – pseudo random binary sequence – used with MT standard interpretation

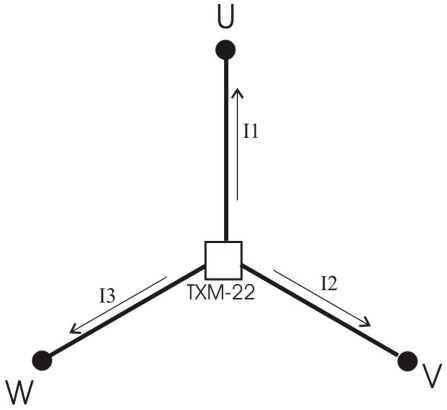
Alternating Dipoles



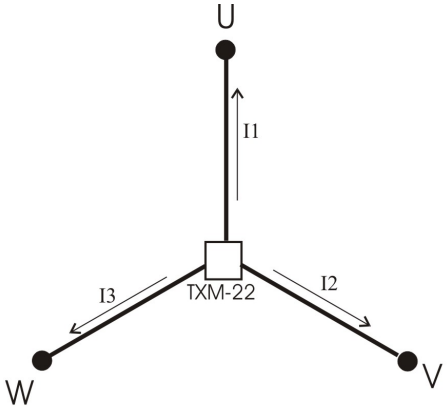

Ey
MFS
Ex


E3
E1
E2

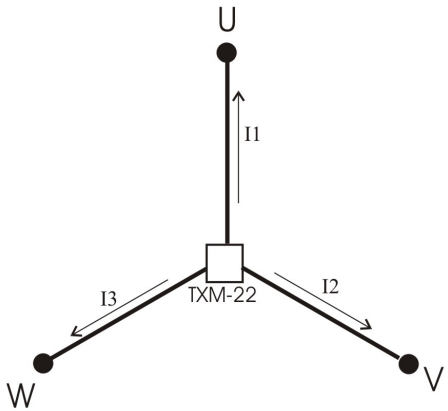
Generate Polarizations



Phi = 0°:
I1 = -0.5*I2=-0.5*I3
Resulting direction:

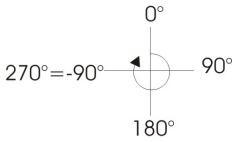


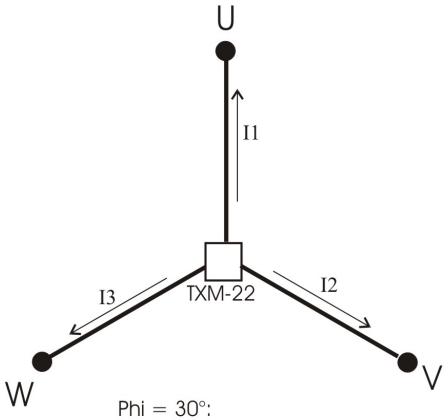
Phi = 120°:
I2 = -0.5*I1=-0.5*I3
Resulting direction:



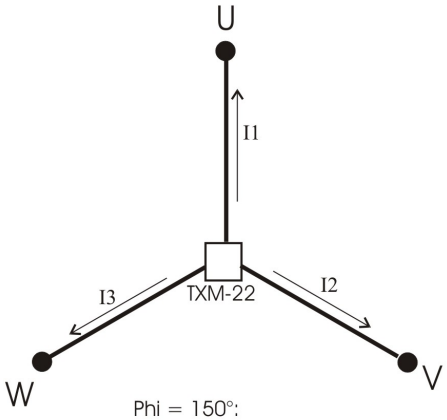
Phi = 240°= -120°
I3 = -0.5*I1=-0.5*I2
Resulting direction:

Coordinate System:

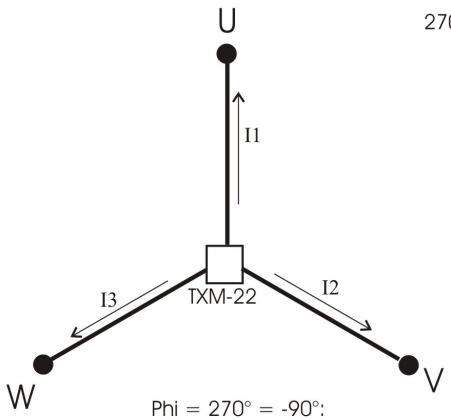




Phi = 30°:
I1 = -I3
I2 = 0
Resulting direction:

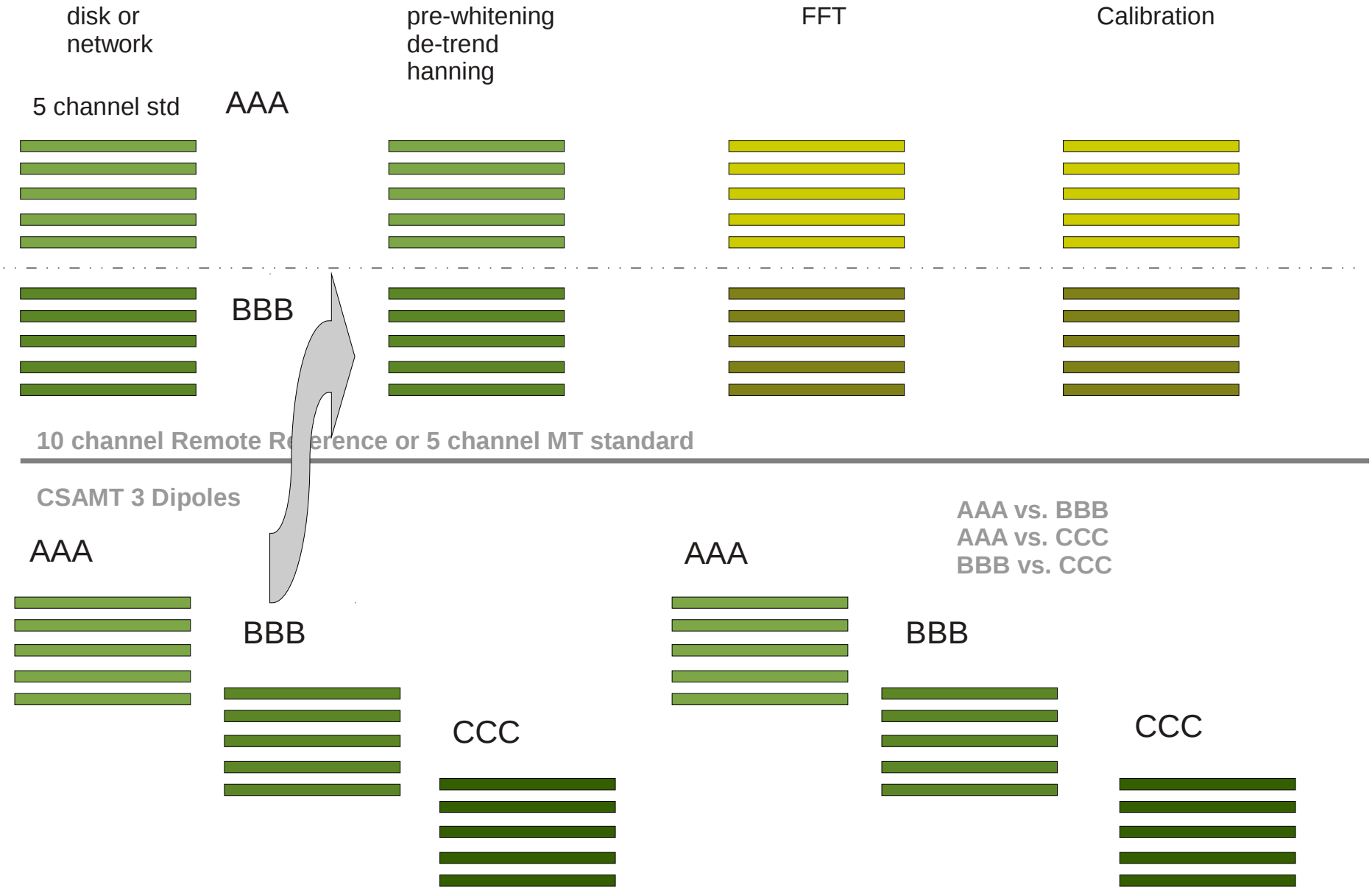


Phi = 150°:
I1 = -I2
I3 = 0
Resulting direction:



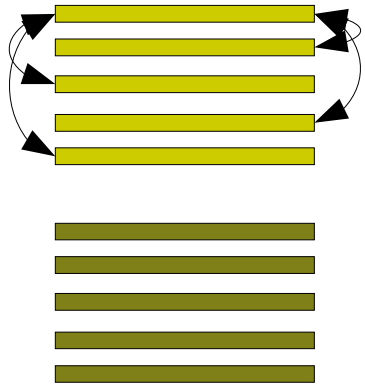
Phi = 270° = -90°:
I2 = -I3
I1 = 0
Resulting direction:

Multi Dipole - Multi Tensor



Multi Dipole - Multi Tensor

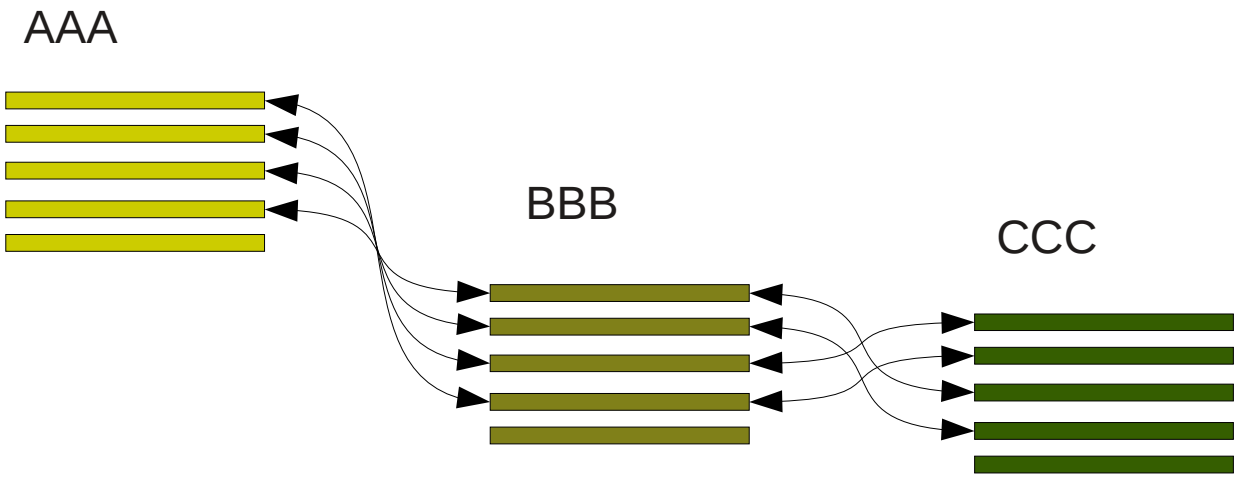
Ex Ey Hx Hy Hz



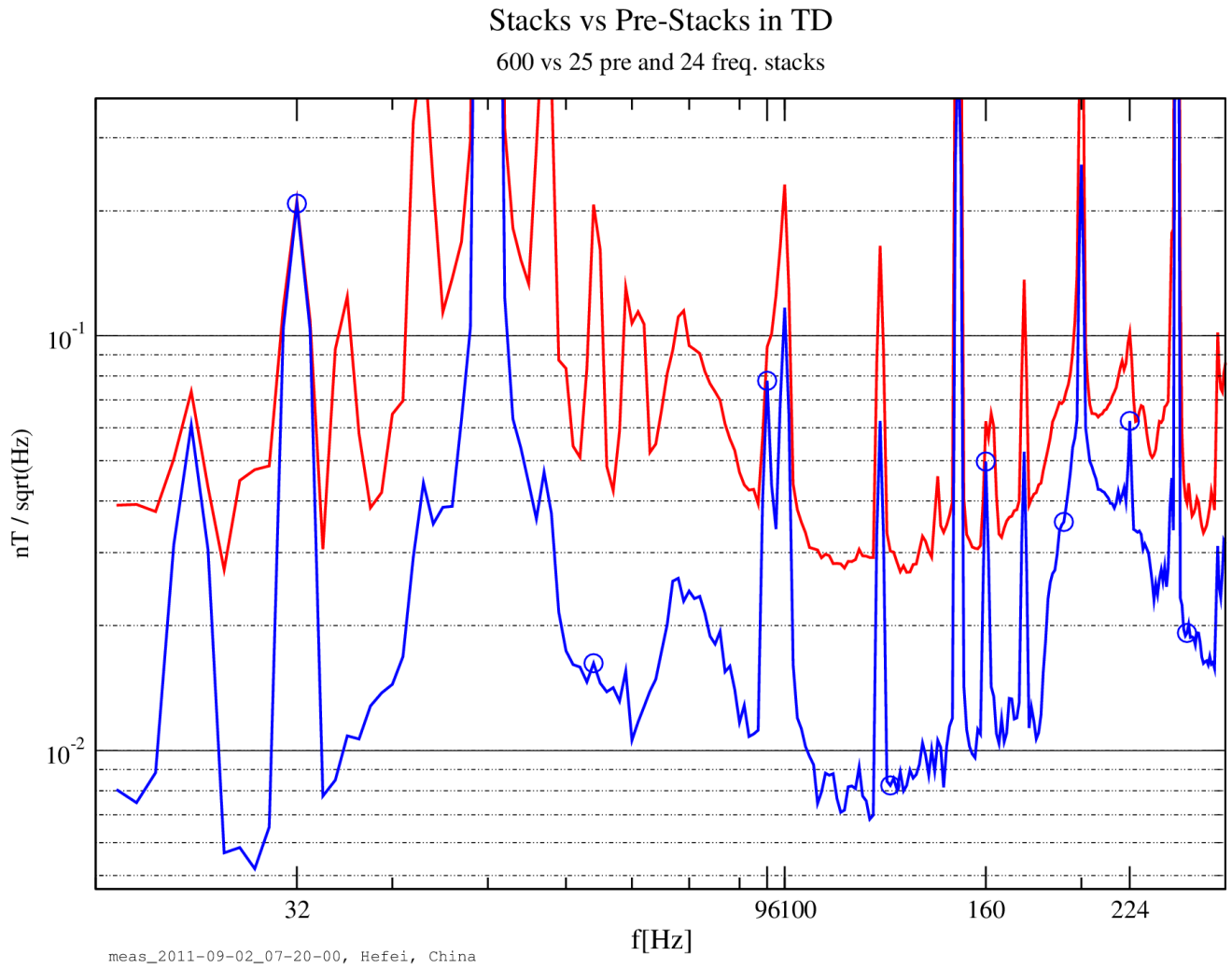
Software handles up to 6 dipoles
→ this results into 15 MT tensors
→ and lead to 45 results for **ONE** EMAP site

10 / 5 channel, auto- and cross spectra

CSAMT 3 Dipoles, cross spectra



pre-stack in TD



CSEM

- Controlled Source Electromagnetics
- Recording of E and H current flows
- Short and medium distances to the TX
- Vertical E current flows
- Higher resolution of resistive layers compared to MT

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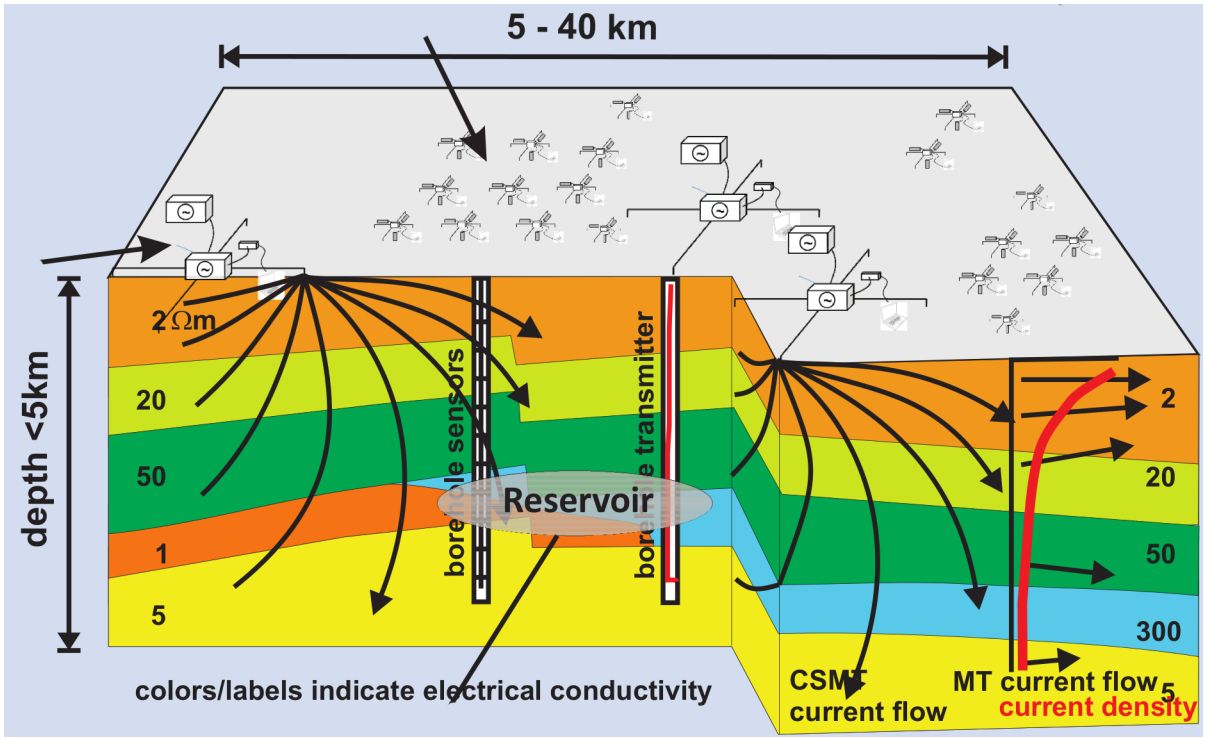
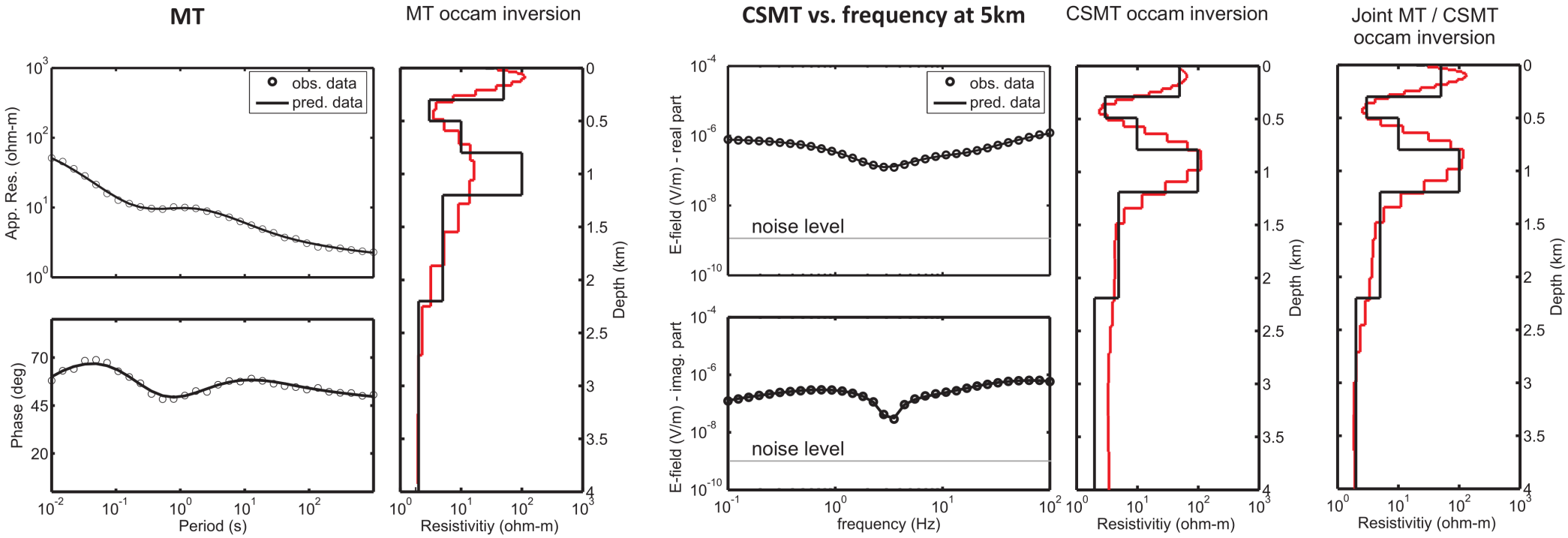
Horizontal and vertical current flows



Model by M. Becken, R. Streich, O. Ritter (Univ. Potsdam & GFZ Potsdam)

APEX TOOL GROUP

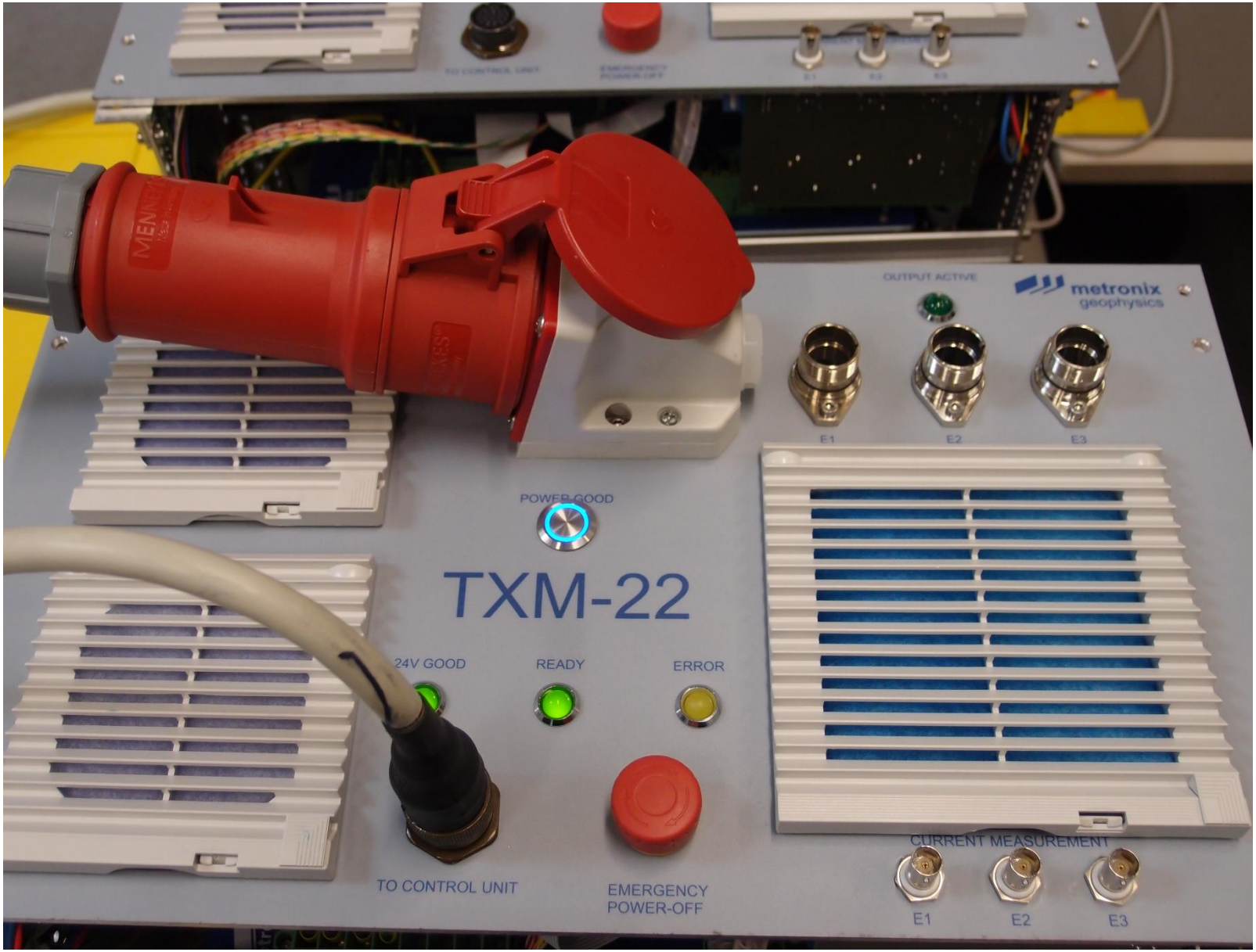


Model by M. Becken, R. Streich, O. Ritter (Univ. Potsdam & GFZ Potsdam)

Hardware - Generator

Hardware - TXB

TXM-22 (during production)



Cables: 900 - 2400m

ADU-07e

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APEX TOOL GROUP

Summary

- The TXM-22 / TX is the first transmitter with free waveform transmission
- The optional realtime module measures the transmission currents with *zero sample delay* compared to the ADU-07e recorders
- The TXM-22 / TXB operates with same job lists as the ADU-07e: TX and RX can be fully automatized

Summary

- The TXM-22 / TXB is the first transmitter who can rotate the transmission dipole
  rotation can be done that way that the receiver gets the best signal strength
- For 3D area measurements the dipole fits for all stations
- For a single station multiple dipoles can be recorded (max. 6 dipoles and 15 MT tensors)