"X2ipi" tool box for DC and IP 2D measurements with SYSCAL and ELREC

A. Bobachev (INRA), with support of
A. Cataldi (TRX Consulting, Venezuela),
J.-F. Girard (BRGM),
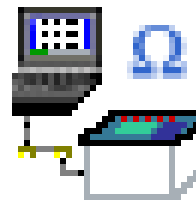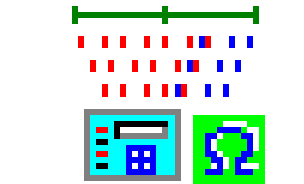R. Guerin (University Paris 6),
H. Robain (IRD),

2D resistivity imaging

Create a sequence of reading with **Electre III**, **Electre II**

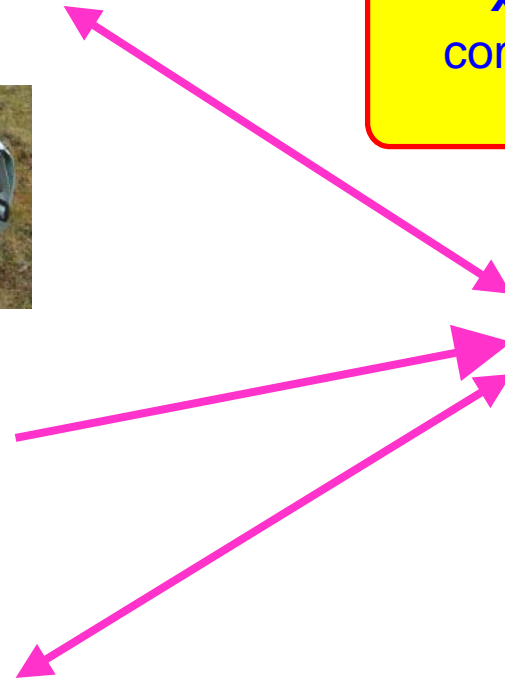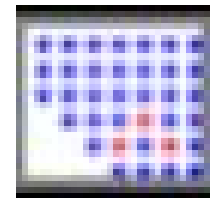Take reading in the fied with **Syscal or Elrec** equipments

Transfer and process data with **Prosys**

Interprete the data with **Res2Dinv**

"x2ipi" tool box, complementary software

x2ipi: sequences

- Compatible with **ElectreII** and **Electre** software
- Editing of sequences
    - Change "miltinode" number
    - Merger and separating sequences for different array type
    - Removing a faulty electrode
    - Removing measurement lines and particular quadripoles
    - Preparing a "Roll along" [*.seq] file
    - Preparing reciprocal array
- Create new sequences
- Create a sequence from data file (Res2dInv, Prosys)

Create new sequences

Using "x2ipi" for data processing

- Compatible with **Prosys, Electre** and **Res2Dinv** software
- Presentation of data
- Trimming bad measurements (manual, q-factor, voltage, current, IP, bad electrode)
- Merger and separating data for different array type
- Comparing data files
- Time lapse data processing
- "Median" filtration of data for "geological noise" elimination
- Export to different formats: Res2Dinv (standard or general data format), SensInv2D, Ipi2win)

Data presentation

Reciprocal Schlumberger array optimized for Syscal Pro
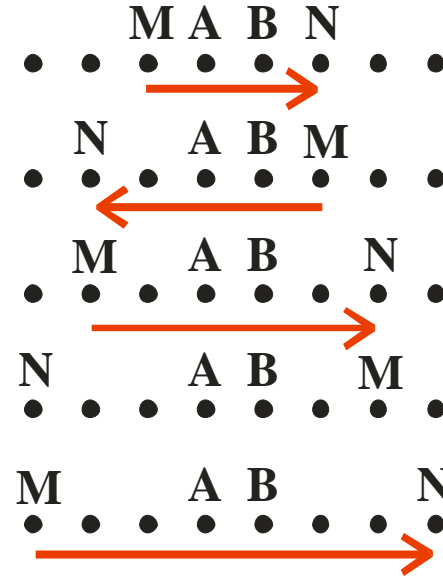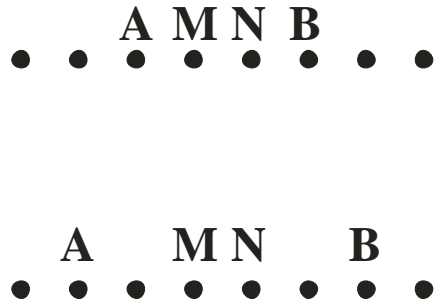
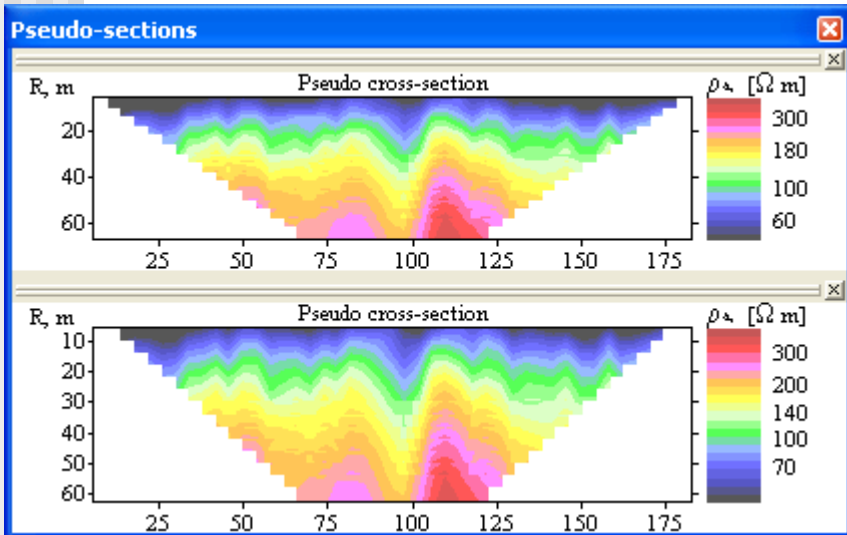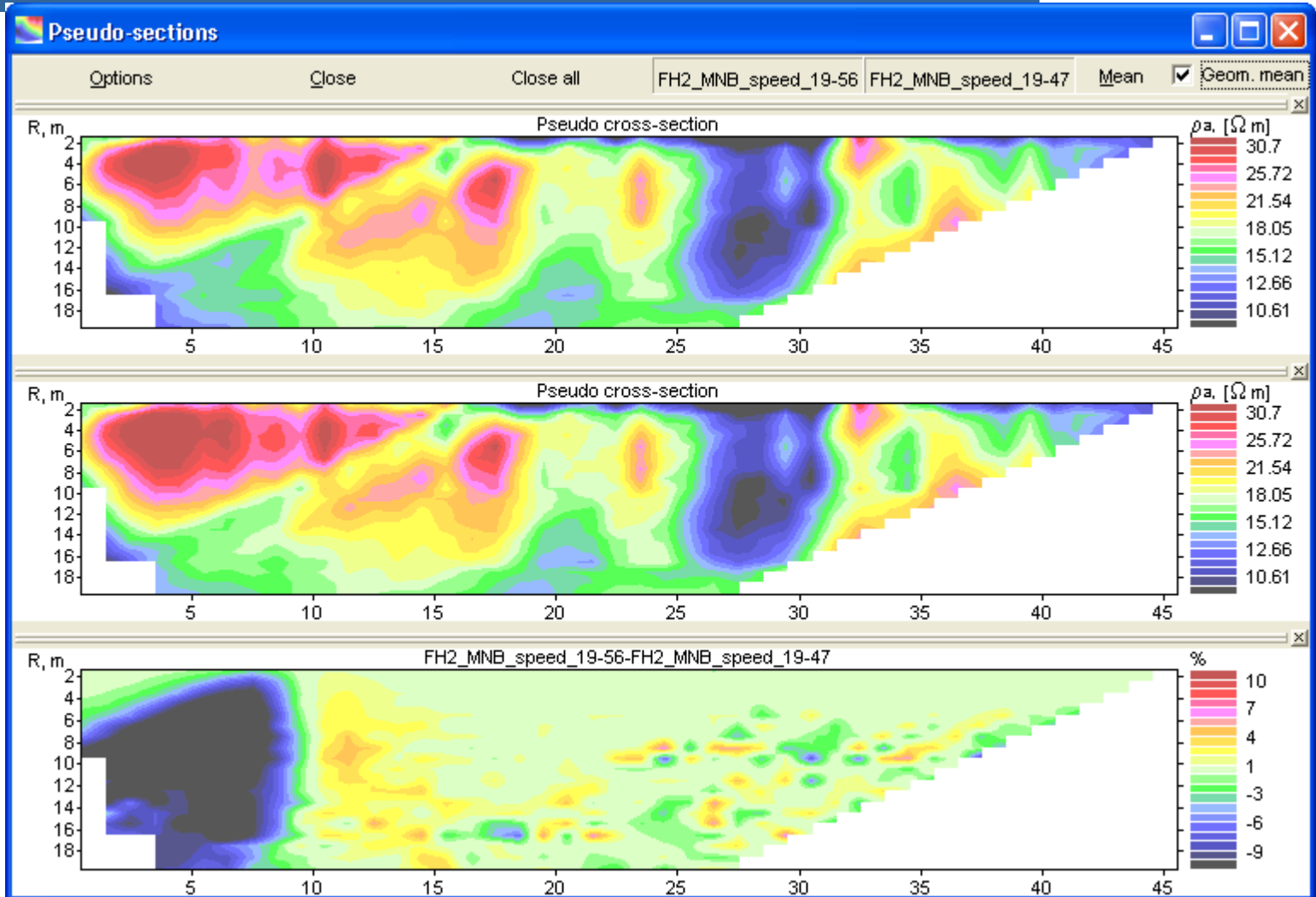**Schlumberger array**

Asymmetrical array

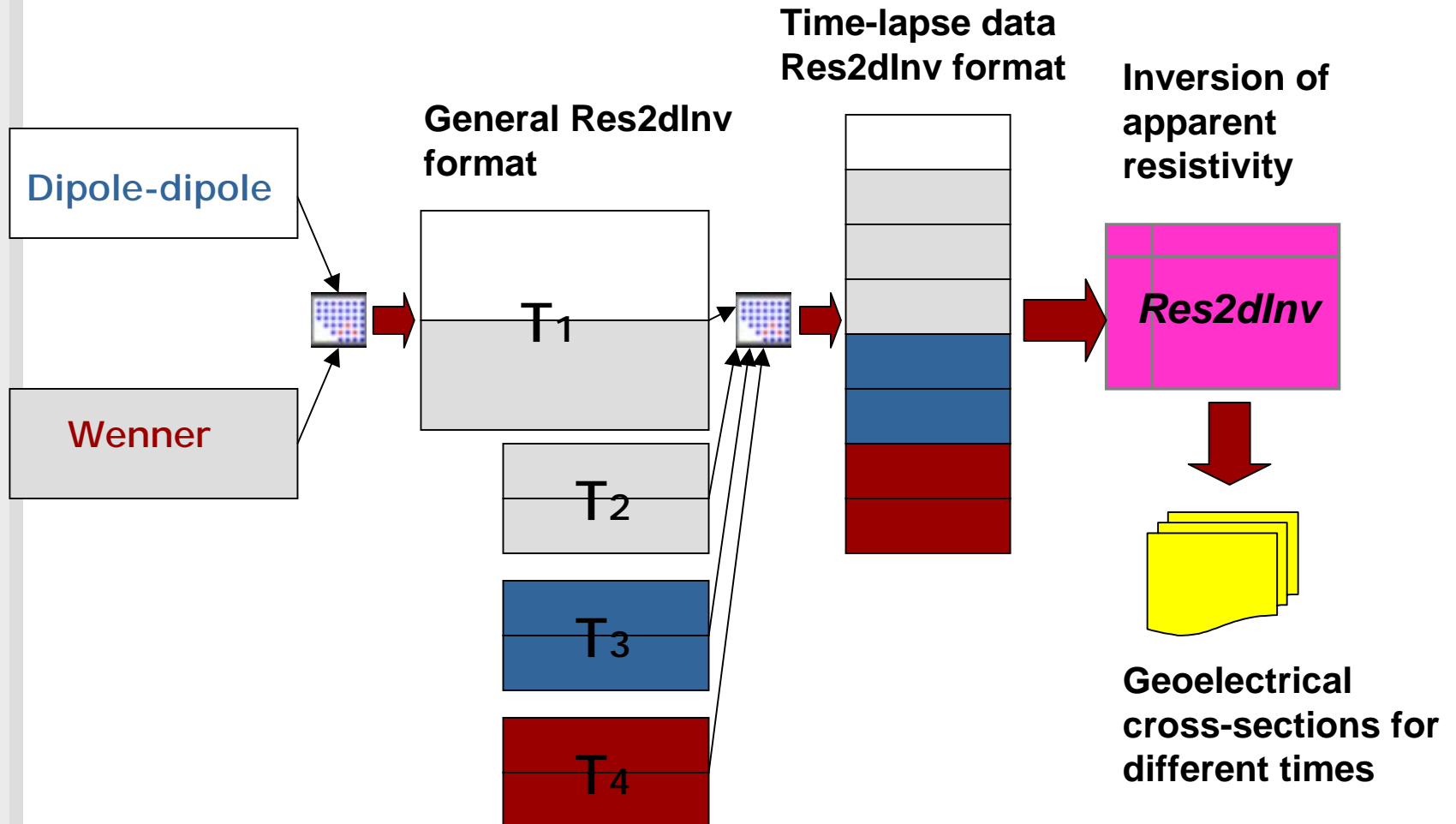*Data of Henri Robain, IRD*

Data comparing (*data by R.Guerin*)

Preparation of data file for time lapse 2D inversion

Dipole-dipole

Wenner

General Res2dInv format

T_1

T_2

T_3

T_4

Time-lapse data Res2dInv format

Inversion of apparent resistivity

Res2dInv

Geoelectrical cross-sections for different times

"Median" processing

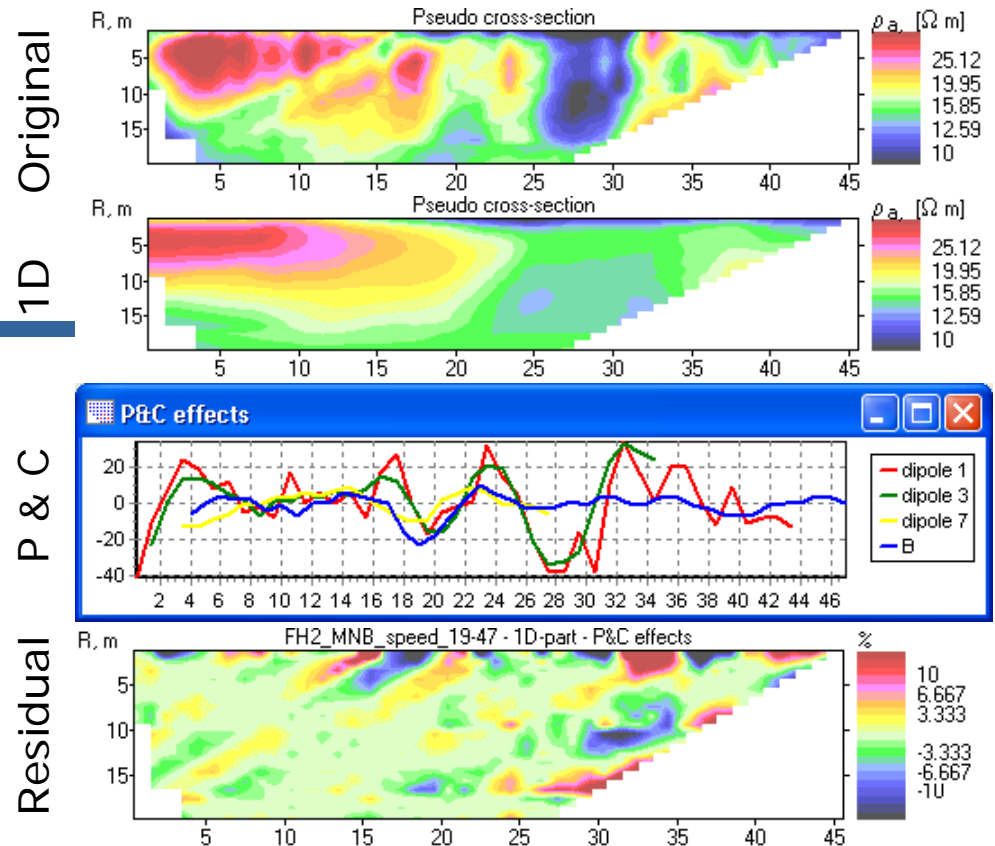$$\rho_a(x,r) = \rho_a^{1D}(x,r) \cdot P(x_{MN}) \cdot C^A(x_A) \cdot C^B(x_B) \cdot \delta(x,r)$$

$$\tilde{\rho}_a(x,r) = \rho_a^{1D}(x,r) \cdot \tilde{P}(x_{MN}) \cdot \tilde{C}^A(x_A) \cdot \tilde{C}^B(x_B) \cdot \tilde{\delta}(x,r)$$

*M. Ritz, H. Robain, E. Pervago, Y. Albouy, C. Camerlynck, M. Descloitres and A. Mariko. **1999**. "Improvement to resistivity pseudosection modelling by removal of near-surface inhomogeneity effects: application to a soil system in south Cameroon". **Geophysical Prospecting**, 47, pp. 85 -101*

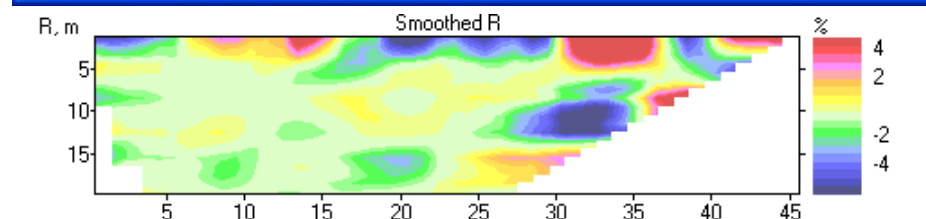# Median processing
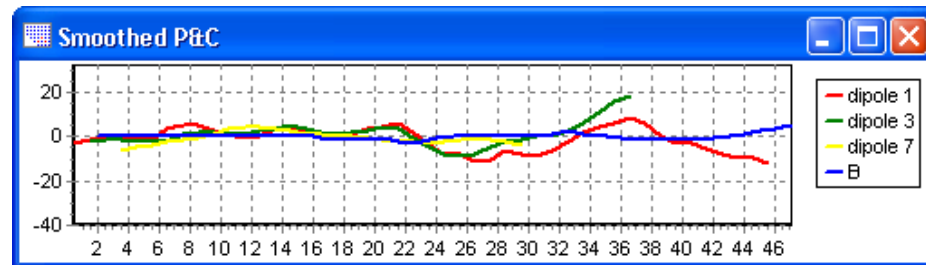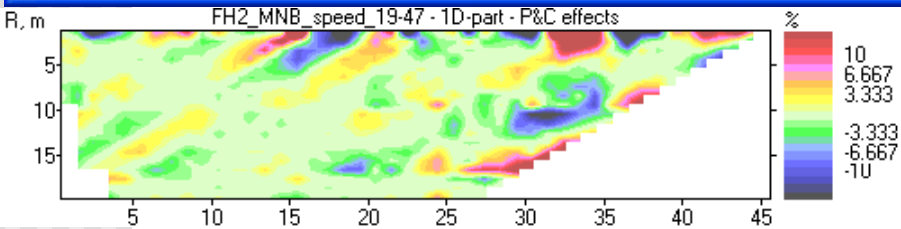# Step 1. Decomposition
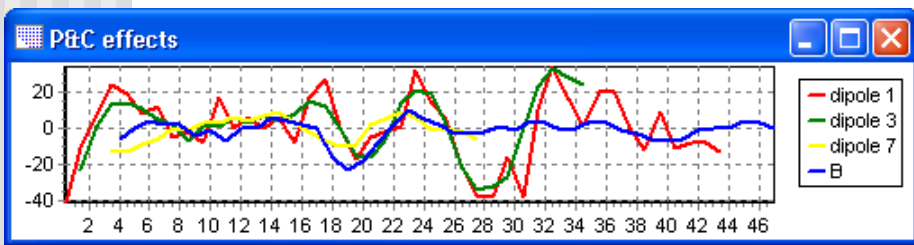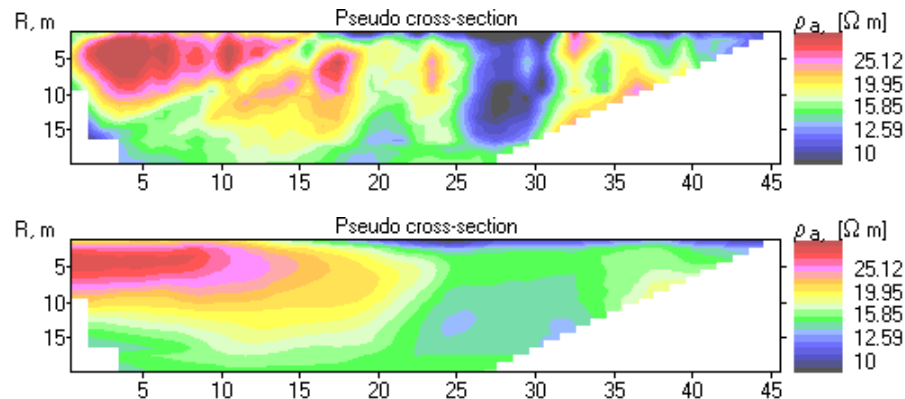
Original

1D

P & C

Residual

$$\rho_a(x,r) \Rightarrow \rho_a^{1D}(x,r)$$

$$\left[\rho_a(x,r)/\rho_a^{1D}(x,r)\right] \Rightarrow P(x_{MN})$$

$$\left[\rho_a(x,r)/\left(\rho_a^{1D}(x,r)\cdot P(x_{MN})\right)\right] \Rightarrow C^A(x_A); C^B(x_B)$$

$$\left[\rho_a(x,r)/\left(\rho_a^{1D}(x,r)\cdot P(x_{MN})\cdot C^A(x_A)\cdot C^B(x_B)\right)\right] \equiv \delta(x,r)$$
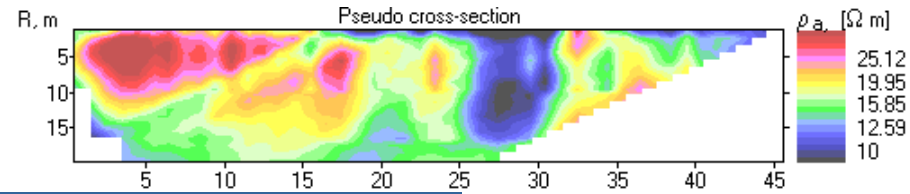
Data by Roger Guerin, Paris 6

Median processing
Step 2. Smoothing
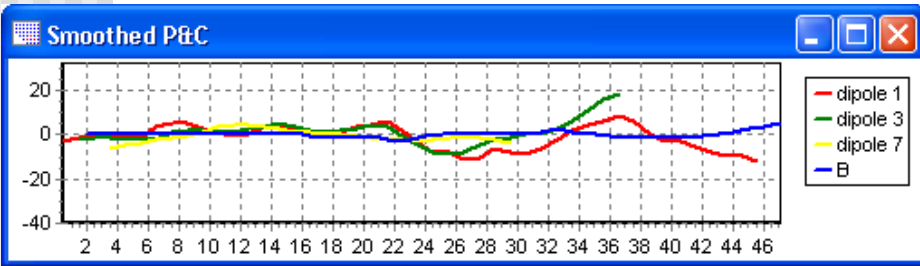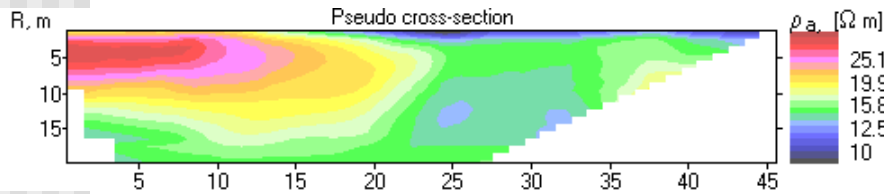

Parameters for smoothing

Data by Roger Guerin, Paris 6
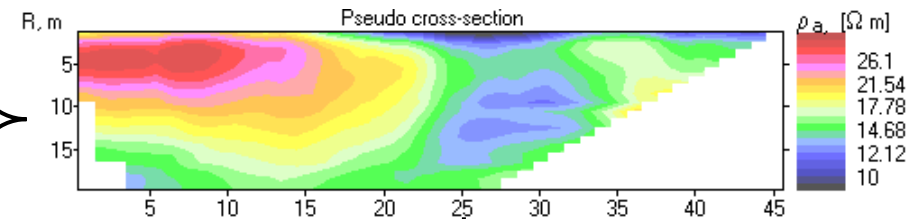
Median processing
Step 3. Reconstruction

Original data

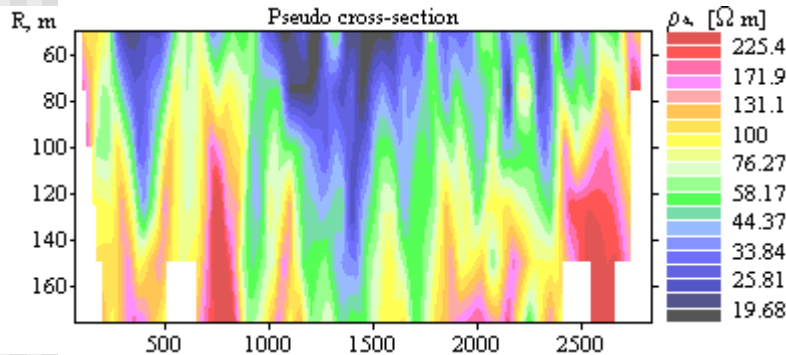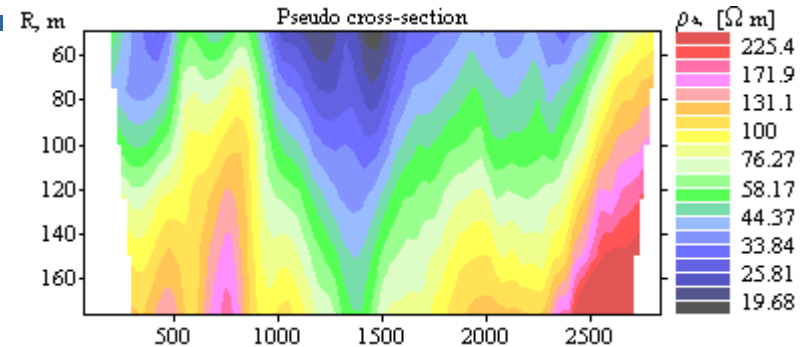Smoothed components

Recalculation 1D part

Smoothed data

Removed part

Data by Roger Guerin, Paris 6
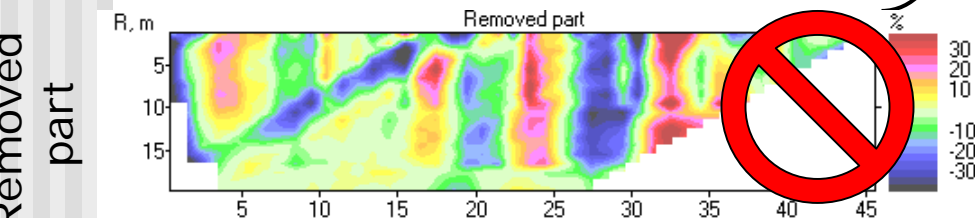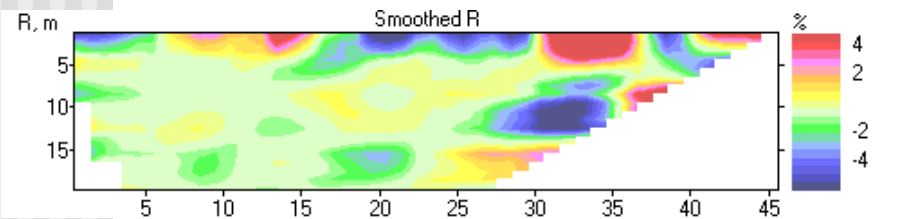
Median processing for apparent resistivity
Example by A. Cataldi (TRX Consulting, Venezuela), *Elrec*
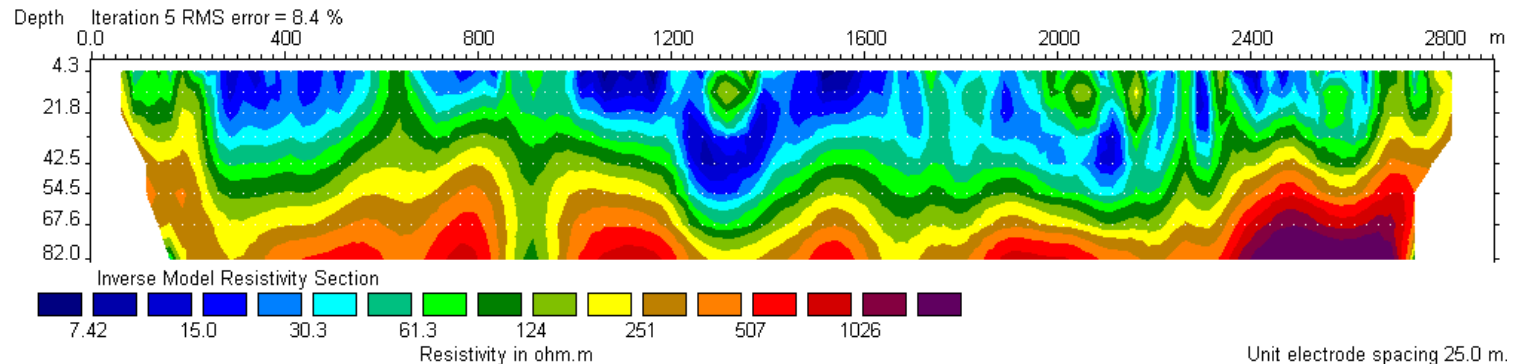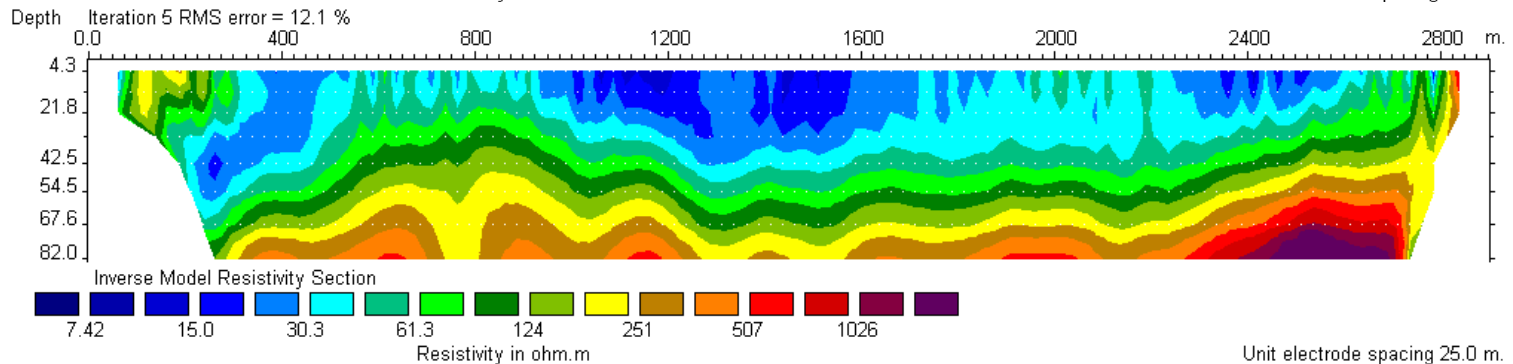
Median processing for IP
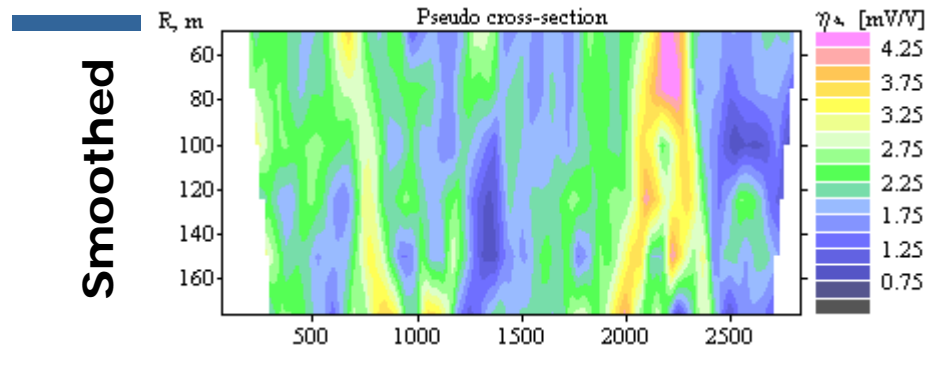# Example by A. Cataldi (TRX Consulting, Venezuela), *Elrec*
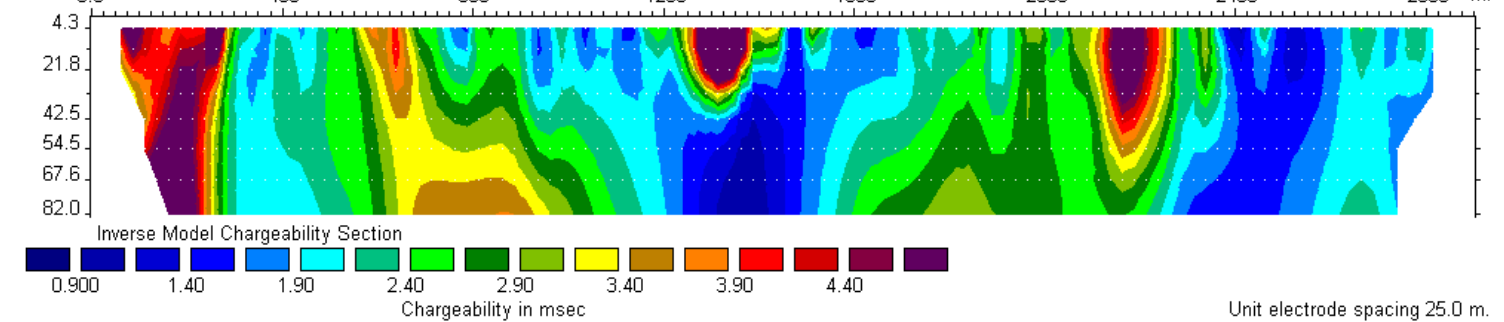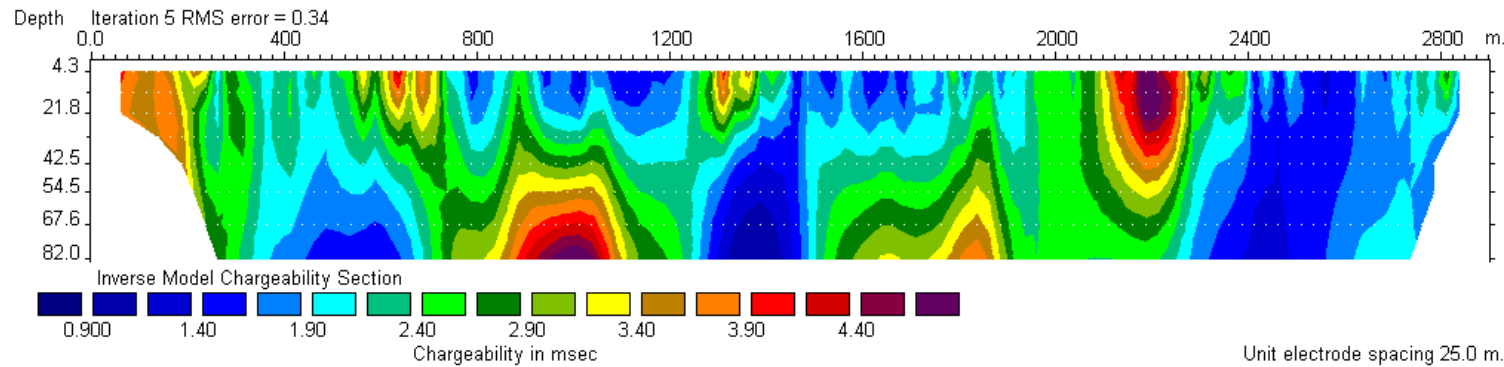
Example of data processing (data by J.-F. Girard (BRGM))
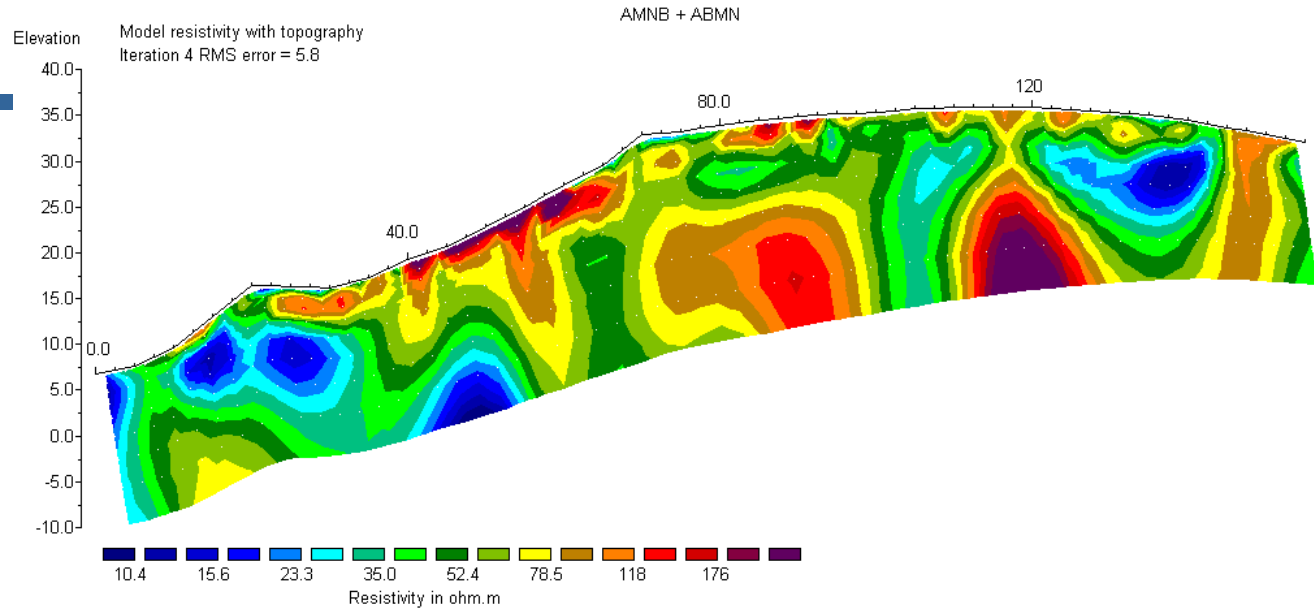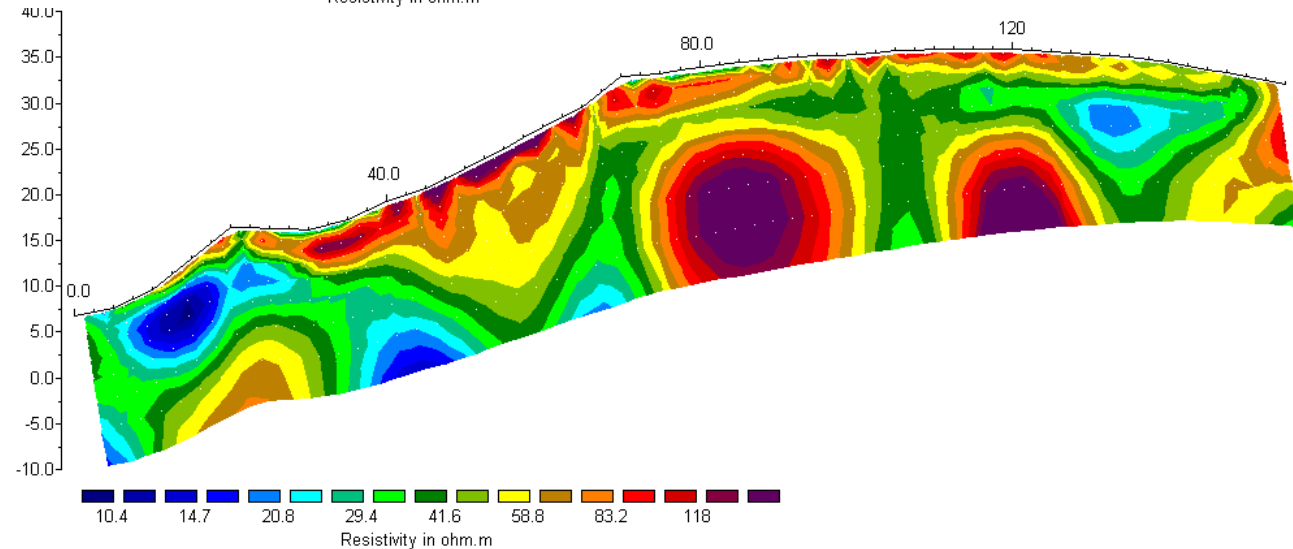
Conclusions

- **"x2ipi"** tool box is supplementary software for 2D DC and IP data processing with some unique features (smoothing data by Median-algorithm, work with data in General format of Res2dInv etc.)

- **"x2ipi"** is compatible with **ElectreII**, **Prosys** and **Res2dinv** software

- **"x2ipi"** can increase the efficiency of **Syscal** and **Elrec** units application

http://geophys.geol.msu.ru/x2ipi/x2ipi.html