

SARPROZ

The SAR, InSAR, PSInSAR, ... PROcessor by periz

copyright: Daniele Perissin, 2009, tool.periz@gmail.com

Dragon 3 Land Training course, SAR Practical, day 6

Part III

The screenshot shows the SARPROZ software interface. The main window is titled "GEOCODING - H:\data4dragon\CUHK_TSX/". It features a central plot labeled "Ortofoto" showing a scatter plot of data points in a coordinate system with "North [m x 1.0]" on the y-axis (ranging from 50 to 550) and "East [m x 1.0]" on the x-axis (ranging from 50 to 300). A color scale at the bottom of the plot ranges from 0.5 (blue) to 0.9 (red). To the right of the plot are various control panels, including a "Parameter" list with radio buttons for options like "Coherence", "Height", "Def. trend", etc. A callout box with the text "Press 'Geocoding'" points to the "Geocoding" button in the right-hand panel. Below the main window, a terminal window displays the following text:

```

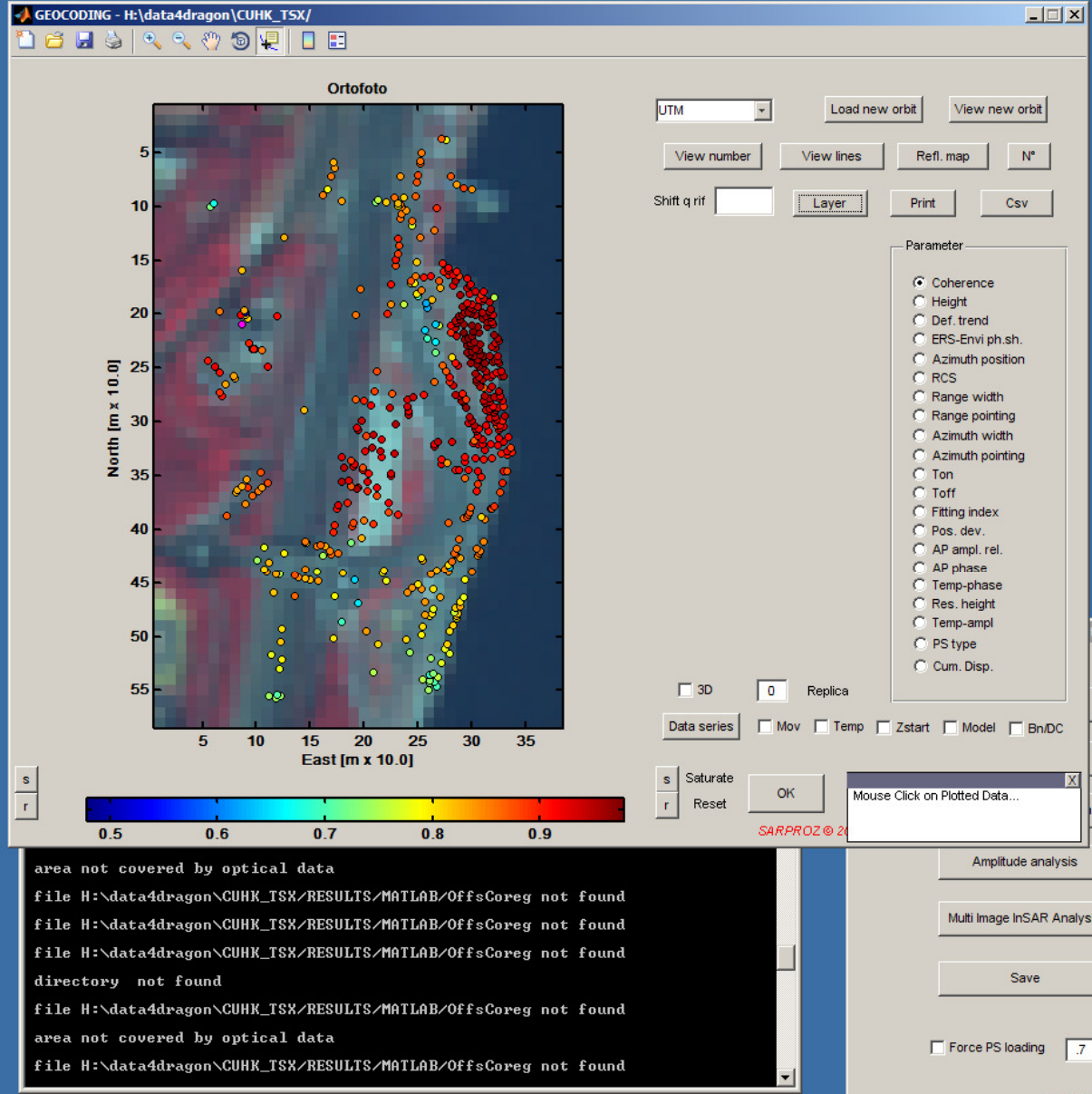
reading sparse file: H:\data4dragon\CUHK_TSX\RESULTS\PosMaster.mat
reading sparse file: H:\data4dragon\CUHK_TSX\RESULTS\PosMean.mat
reading sparse file: H:\data4dragon\CUHK_TSX\RESULTS\SigmaPosAz.mat
reading sparse file: H:\data4dragon\CUHK_TSX\RESULTS\MuPosAz.mat
reading sparse file: H:\data4dragon\CUHK_TSX\RESULTS\PosAzMaster.mat
reading sparse file: H:\data4dragon\CUHK_TSX\RESULTS\PosAzMean.mat
file H:\data4dragon\CUHK_TSX\RESULTS\MATLAB\OffsCoreg not found
directory H:\data4dragon\CUHK_TSX\..\GIS\ not found

```

Through the "Layer" button, select "HONG_KONG" in the "GIS" folder

The screenshot displays the SARPROZ software interface. On the left, an 'Ortofoto' plot shows a scatter of colored data points on a grid with 'North [m x 1.0]' on the y-axis (50 to 550) and 'East [m x 1.0]' on the x-axis (50 to 300). A color scale at the bottom ranges from 0.5 to 0.9. The main control panel includes buttons for 'Layer', 'Print', 'Csv', 'View lines', 'Refl. map', 'N°', 'Load new orbit', and 'View new orbit'. A 'Parameter' list on the right includes options like 'Coherence', 'Height', 'Def. trend', etc., with 'Coherence' selected. A 'Browse For Folder' dialog is open, showing a tree view with 'GIS' expanded and 'HONG_KONG' selected. Below it, a 'Data series' panel has checkboxes for 'Mov', 'Temp', 'Zstart', 'Model', and 'Br/DC'. A 'Mouse Click on Plotted Data...' dialog is also visible. At the bottom, a command window shows file paths and error messages.

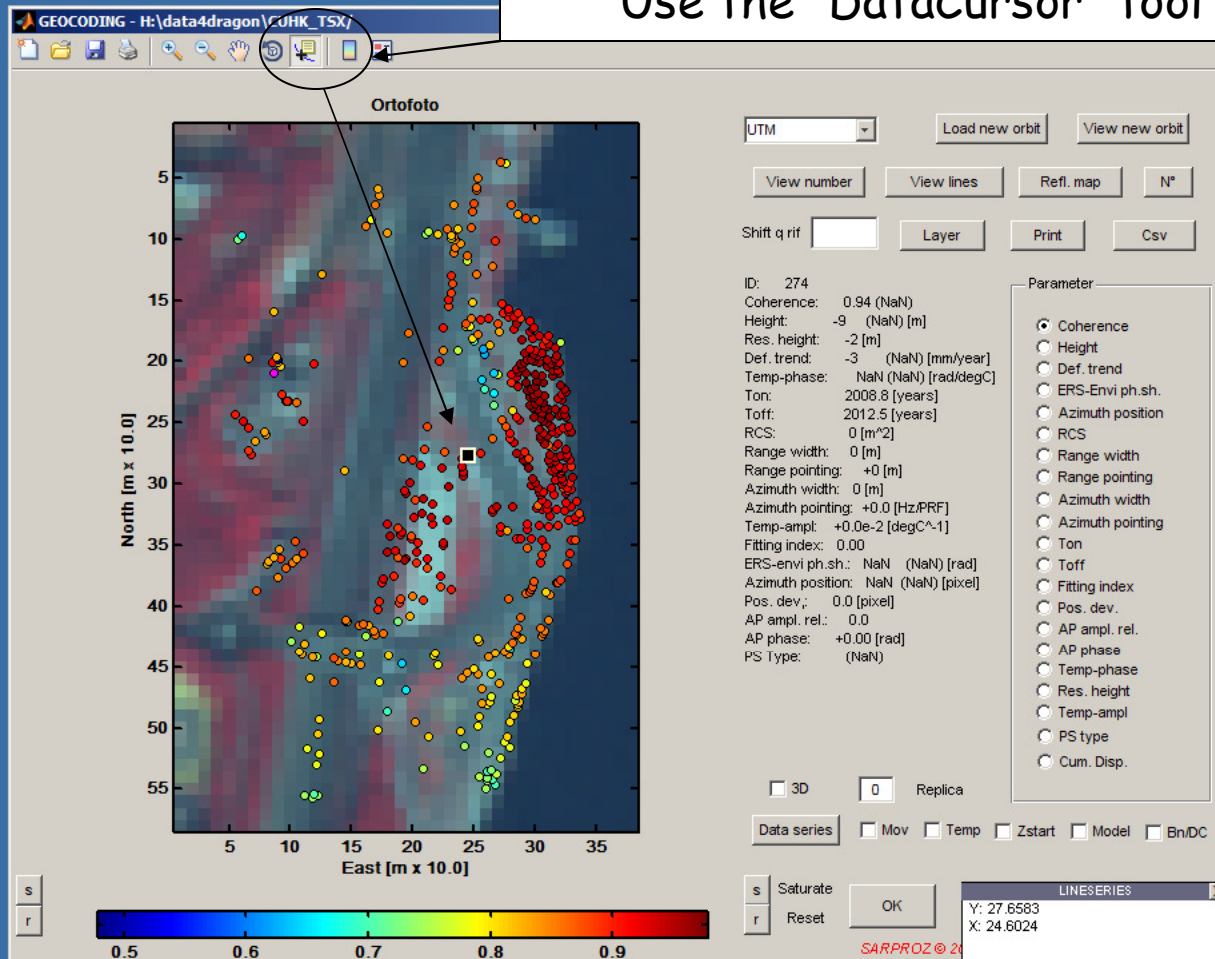
```
reading sparse file: H:\data4dragon\CUHK_TSX\RESULTS\PosMaster.mat
reading sparse file: H:\data4dragon\CUHK_TSX\RESULTS\PosMean.mat
reading sparse file: H:\data4dragon\CUHK_TSX\RESULTS\SigmaPosAz.mat
reading sparse file: H:\data4dragon\CUHK_TSX\RESULTS\MuPosAz.mat
reading sparse file: H:\data4dragon\CUHK_TSX\RESULTS\PosAzMaster.mat
reading sparse file: H:\data4dragon\CUHK_TSX\RESULTS\PosAzMean.mat
file H:\data4dragon\CUHK_TSX\RESULTS\MATLAB\OffsCoreg not found
directory H:\data4dragon\CUHK_TSX\..\GIS/ not found
```



Low resolution optical background

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Use the "DataCursor" tool to select a point



A list of parameters of the selected point is shown

```
area not covered by optical data
file H:\data4dragon\CUHK_TSX\RESULTS\MATLAB\OfsCoreg not found
file H:\data4dragon\CUHK_TSX\RESULTS\MATLAB\OfsCoreg not found
file H:\data4dragon\CUHK_TSX\RESULTS\MATLAB\OfsCoreg not found
directory not found
file H:\data4dragon\CUHK_TSX\RESULTS\MATLAB\OfsCoreg not found
area not covered by optical data
file H:\data4dragon\CUHK_TSX\RESULTS\MATLAB\OfsCoreg not found
```

GEOCODING - H:\data4dragon\CUHK_TSX/

Ortofoto

UTM [m] Load new orbit View new orbit

View number View lines Refl. map N°

Shift q rif Layer Print Csv

ID: 274
 Coherence: 0.94 (NaN)
 Height: -9 (NaN) [m]
 Res. height: -2 [m]
 Def. trend: -3 (NaN) [mm/year]
 Temp-phase: NaN (NaN) [rad/degC]
 Ton: 2008.8 [years]
 Toff: 2012.5 [years]
 RCS: 0 [m²]
 Range width: 0 [m]
 Range pointing: +0 [m]
 Azimuth width: 0 [m]
 Azimuth pointing: +0.0 [Hz/PRF]
 Temp-ampl: +0.0e-2 [degC⁻¹]
 Fitting index: 0.00
 ERS-envi ph.sh.: NaN (NaN) [rad]
 Azimuth position: NaN (NaN) [pixel]
 Pos. dev.: 0.0 [pixel]
 AP ampl. rel.: 0.0
 AP phase: +0.00 [rad]
 PS Type: (NaN)

Parameter

- Coherence
- Height
- Def. trend
- ERS-Envi ph.sh.
- Azimuth position
- RCS
- Range width
- Range pointing
- Azimuth width
- Azimuth pointing
- Ton
- Toff
- Fitting index
- Pos. dev.
- AP ampl. rel.
- AP phase
- Temp-phase
- Res. height
- Temp-ampl
- PS type
- Cum. Disp.

3D 0 Replica

Data series Mov Temp Zstart Model Bn/DC

Saturate OK

Reset

Mouse Click on Plotted Data...

Amplitude analysis

Multi Image InSAR Analysis

Save

Force PS loading .7 Coherence Thr. OK

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Choose a different parameter to visualize with colors, e.g. Height

```

area not covered by optical data
file H:\data4dragon\CUHK_TSX\RESULTS\MATLAB\OffsCoreg not found
file H:\data4dragon\CUHK_TSX\RESULTS\MATLAB\OffsCoreg not found
file H:\data4dragon\CUHK_TSX\RESULTS\MATLAB\OffsCoreg not found
directory not found
file H:\data4dragon\CUHK_TSX\RESULTS\MATLAB\OffsCoreg not found
area not covered by optical data
file H:\data4dragon\CUHK_TSX\RESULTS\MATLAB\OffsCoreg not found

```

ta4dragon\CUHK_TSX/

View SLC View AP SLC

Create movie

Read and Plot Interfs

Sub-cell positioning

Geocoding

Load

OK

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The screenshot displays the SARPROZ software interface. On the left, an 'Ortofoto' map shows a color-coded area with a grid of points. The axes are labeled 'North [m x 10.0]' (ranging from 5 to 55) and 'East [m x 10.0]' (ranging from 5 to 35). A color scale at the bottom indicates values from -16 to 0. The right side of the interface contains a parameter list with 'Def. trend' selected. Below this is a 'Data series' section with checkboxes for 'Mov', 'Temp', 'Zstart', 'Model', and 'Bn/DC'. At the bottom, a console window shows several error messages: 'area not covered by optical data' and 'file H:\data4dragon\CUHK_TSX\RESULTS\MATLAB\OffsCoreg not found'. A 'Deformation Trend' callout box points to the 'Def. trend' parameter.

Deformation Trend

UTM Load new orbit View new orbit

View number View lines Refl. map N°

Shift q rif Layer Print Csv

ID: 274
 Coherence: 0.94 (NaN)
 Height: -9 (NaN) [m]
 Res. height: -2 [m]
 Def. trend: -3 (NaN) [mm/year]
 Temp-phase: NaN (NaN) [rad/degC]
 Ton: 2008.8 [years]
 Toff: 2012.5 [years]
 RCS: 0 [m²]
 Range width: 0 [m]
 Range pointing: +0 [m]
 Azimuth width: 0 [m]
 Azimuth pointing: +0.0 [Hz/PRF]
 Temp-ampl: +0.0e-2 [degC⁻¹]
 Fitting index: 0.00
 ERS-envi ph.sh.: NaN (NaN) [rad]
 Azimuth position: NaN (NaN) [pixel]
 Pos. dev.: 0.0 [pixel]
 AP ampl. rel.: 0.0
 AP phase: +0.00 [rad]
 PS Type: (NaN)

Parameter

- Coherence
- Height
- Def. trend
- ERS-Envi ph.sh.
- Azimuth position
- RCS
- Range width
- Range pointing
- Azimuth width
- Azimuth pointing
- Ton
- Toff
- Fitting index
- Pos. dev.
- AP ampl. rel.
- AP phase
- Temp-phase
- Res. height
- Temp-ampl
- PS type
- Cum. Disp.

3D 0 Replica

Data series Mov Temp Zstart Model Bn/DC

Saturate OK
 Reset

Mouse Click on Plotted Data...

Amplitude analysis

Multi Image InSAR Analysis

Save

Force PS loading 7 Coherence Thr. OK

View SLC View AP SLC

Create movie

Read and Plot Interfs

Sub-cell positioning

Geocoding

Load

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```

area not covered by optical data
file H:\data4dragon\CUHK_TSX\RESULTS\MATLAB\OffsCoreg not found
file H:\data4dragon\CUHK_TSX\RESULTS\MATLAB\OffsCoreg not found
file H:\data4dragon\CUHK_TSX\RESULTS\MATLAB\OffsCoreg not found
directory not found
file H:\data4dragon\CUHK_TSX\RESULTS\MATLAB\OffsCoreg not found
area not covered by optical data
file H:\data4dragon\CUHK_TSX\RESULTS\MATLAB\OffsCoreg not found

```

Plot the time series (residuals)

The screenshot displays the SARPROZ software interface. On the left, an 'Ortofoto' (orthophoto) is shown with a color scale for velocity in mm/year, ranging from -16 (red) to 0 (blue). A black box highlights a specific point on the map. To the right, a parameter list for ID: 199 is displayed, including values for Coherence, Height, Res. height, Def. trend, Temp-phase, Ton, Toff, RCS, Range width, Range pointing, Azimuth width, Azimuth pointing, Temp-ampl, Fitting index, ERS-envi ph.sh., Azimuth position, Pos. dev., AP ampl. rel., AP phase, and PS Type. Below the parameters, there are checkboxes for '3D', 'Replica', 'Data series', 'Mov', 'Temp', 'Zstart', 'Model', and 'BnDC'. A 'LINE SERIES' dialog box is open, showing coordinates Y: 32.9112 and X: 22.8032. In the top right, a 'Figure 23' window shows two time series plots. The top plot is titled 'From: 2008.8, To: 2012.5, ktemp: 0.0e-2 [degC^-1]' and shows Amplitude vs. Temporal Baseline [years]. The bottom plot is titled 'ID: 199, Vel: -1 [mm/year], KTemp: [rad/degC]' and shows [mm] vs. Temporal Baseline [years]. At the bottom right, a 'PROCESSING' window contains various analysis buttons like 'Select Area', 'InSAR analysis', 'Amplitude analysis', 'Multi Image InSAR Analysis', 'Save', 'View SLC', 'View AP SLC', 'Create movie', 'Read and Plot Interfs', 'Sub-cell positioning', 'Geocoding', 'Load', and 'OK'. A 'Coherence Thr.' is set to 0.7. A console window at the bottom left shows error messages: 'area not covered by optical data' and 'file H:\data4dragon\CUHK_TSX\RESULTS\MATLAB\OffsCoreg not found'. The SARPROZ logo and copyright notice 'SARPROZ © 2009, the SAR PROcessor by periz' are visible at the bottom.

Change the selected point and plot the time series (residuals)

The screenshot displays the SARPROZ software interface. On the left, an 'Ortofoto' (orthophoto) is shown with a grid of points. A color scale at the bottom indicates velocity in mm/year, ranging from -16 (red) to 0 (blue). A text box at the top left contains the instruction: "Change the selected point and plot the time series (residuals)".

The central panel shows a list of parameters for a selected point (ID: 371):

- Coherence: 0.64 (NaN)
- Height: -6 (NaN) [m]
- Res. height: +1 [m]
- Def. trend: -17 (NaN) [mm/year]
- Temp-phase: NaN (NaN) [rad/degC]
- Ton: 2008.8 [years]
- Toff: 2012.5 [years]
- RCS: 0 [m²]
- Range width: 0 [m]
- Range pointing: +0 [m]
- Azimuth width: 0 [m]
- Azimuth pointing: +0.0 [Hz/PRF]
- Temp-ampl: +0.0e-2 [degC^-1]
- Fitting index: 0.00
- ERS-envi ph.sh.: NaN (NaN) [rad]
- Azimuth position: NaN (NaN) [pixel]
- Pos. dev.: 0.0 [pixel]
- AP ampl. rel.: 0.0
- AP phase: +0.00 [rad]
- PS Type: (NaN)

Below the parameters, there are checkboxes for '3D', 'Replica', 'Data series', 'Mov', 'Temp', 'Zstart', 'Model', and 'Bn/DC'. A 'LINE SERIES' dialog box is open, showing coordinates: Y: 20.9136, X: 26.6761.

On the right, a 'Figure 23' window displays two time series plots:

- The top plot is titled "From: 2008.8, To: 2012.5, ktemp: 0.0e-2 [degC^-1]". The y-axis is 'Amplitude' (0 to 10) and the x-axis is 'Temporal Baseline' (2008.5 to 2012.5). It shows a series of red dots with a slight downward trend.
- The bottom plot is titled "ID: 371, Vel: -17 [mm/year], KTemp: [rad/degC]". The y-axis is '[mm]' (-5 to 5) and the x-axis is 'Temporal Baseline [years]' (2008.5 to 2012.5). It shows a series of red stars with a slight downward trend.

At the bottom right, there is a control panel with buttons for 'Select Area', 'View SLC', 'View AP SLC', 'InSAR analysis', 'Create movie', 'Read and Plot Interfs', 'Parse Points Selection', 'Sub-cell positioning', 'Geocoding', 'Amplitude analysis', 'Multi Image InSAR Analysis', 'Save', 'Load', 'Force PS loading', 'Coherence Thr.', and 'OK'. A copyright notice at the bottom reads: "SARPROZ © 2009, the SAR PROcessor by perIZ".

At the bottom left, a terminal window shows the following output:

```

directory not found
file H:\data4dragon\CUHK_TSX\RESULTS\MATLAB\OffsCoreg not found
area not covered by optical data
file H:\data4dragon\CUHK_TSX\RESULTS\MATLAB\OffsCoreg not found
loading the dataset by considering the images graph
loading the dataset by considering the images graph
loading the dataset by considering the images graph
loading the dataset by considering the images graph

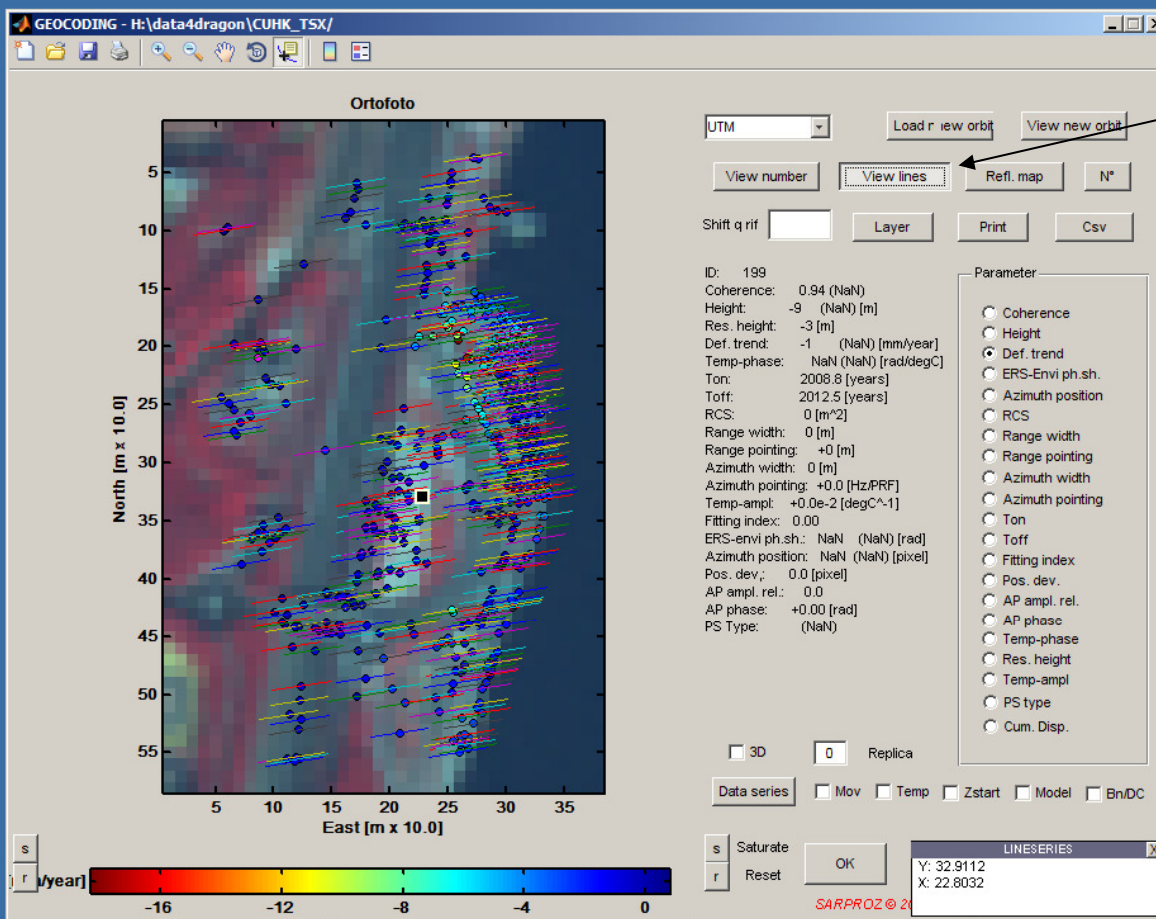
```

Add Movement and Model and plot the time series again

The screenshot displays the SARPROZ software interface with the following components:

- Ortofoto:** A spatial plot showing North [m x 10.0] on the y-axis (5 to 55) and East [m x 10.0] on the x-axis (5 to 35). A color scale at the bottom indicates displacement in [mm/year] from -16 to 0.
- Parameter List:**
 - ID: 371
 - Coherence: 0.64 (NaN)
 - Height: -6 (NaN) [m]
 - Res. height: +1 [m]
 - Def. trend: -17 (NaN) [mm/year]
 - Temp-phase: NaN (NaN) [rad/degC]
 - Ton: 2008.8 [years]
 - Toff: 2012.5 [years]
 - RCS: 0 [m²]
 - Range width: 0 [m]
 - Range pointing: +0 [m]
 - Azimuth width: 0 [m]
 - Azimuth pointing: +0.0 [Hz/PRF]
 - Temp-ampl: +0.0e-2 [degC^-1]
 - Fitting index: 0.00
 - ERS-envi ph.sh.: NaN (NaN) [rad]
 - Azimuth position: NaN (NaN) [pixel]
 - Pos. dev.: 0.0 [pixel]
 - AP ampl. rel.: 0.0
 - AP phase: +0.00 [rad]
 - PS Type: (NaN)
- Data series:** A row of checkboxes for '3D', '2', 'Replica', 'Mov', 'Temp', 'Zstart', 'Model', and 'Bn/D'. The 'Mov' and 'Model' checkboxes are checked.
- Figure 23:** Two time series plots for ID: 371, Vel: -17 [mm/year], KTemp: [rad/degC].
 - The top plot shows Amplitude vs. Temporal Baseline [years] from 2008.5 to 2012.5.
 - The bottom plot shows displacement [mm] vs. Temporal Baseline [years] from 2008.5 to 2012.5, with a blue trend line.
- Processing Panel:** A vertical stack of buttons including 'Select Area', 'View SLC', 'View AP SLC', 'InSAR analysis', 'Create movie', 'Parse Points Selection', 'Read and Plot Interfs', 'Amplitude analysis', 'Sub-cell positioning', 'Multi Image InSAR Analysis', 'Geocoding', 'Save', 'Load', 'Force PS loading', 'Coherence Thr.', and 'OK'.
- Terminal:** A black window at the bottom left showing the following text:


```
file H:\data4dragon\CUHK_TSX\RESULTS\MATLAB\OffsCoreg not found
area not covered by optical data
file H:\data4dragon\CUHK_TSX\RESULTS\MATLAB\OffsCoreg not found
loading the dataset by considering the images graph
loading the dataset by considering the images graph
loading the dataset by considering the images graph
loading the dataset by considering the images graph
loading the dataset by considering the images graph
```

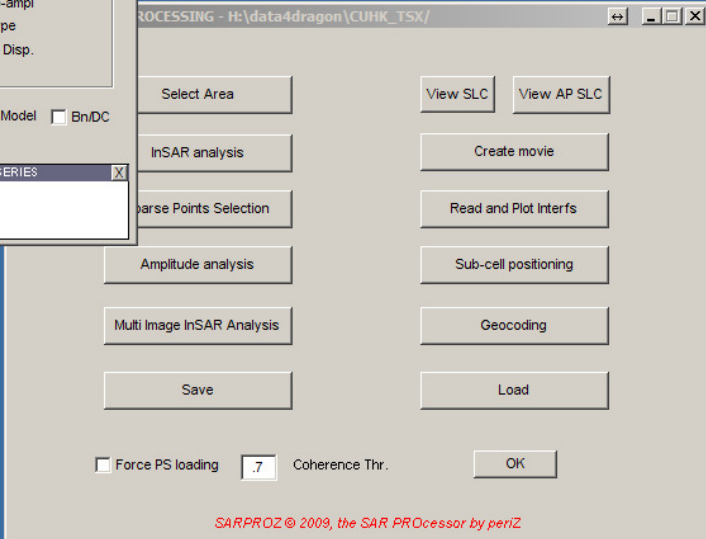


Press "View Lines" to see the Line Of Sight (LOS) of the satellite

```

area not covered by optical data
file H:\data4dragon\CUHK_TSX\RESULTS\MATLAB\OffsCoreg not found
loading the dataset by considering the images graph
loading the dataset by considering the images graph
loading the dataset by considering the images graph
loading the dataset by considering the images graph
loading the dataset by considering the images graph
loading the dataset by considering the images graph

```



The screenshot displays the SARPROZ software interface. The main window, titled "GEOCODING - H:\data4dragon\CUHK_TSX", features a large plot on the left labeled "Ortofoto". This plot shows a map of a region with a color scale for displacement in [year] ranging from -16 (red) to 0 (blue). The axes are North [m x 10.0] (5 to 55) and East [m x 10.0] (5 to 35). Numerous red and yellow circular markers are overlaid on the map, each containing a number. To the right of the plot is a control panel with buttons for "View number", "View lines", "Refl. map", "N*", "Layer", "Print", and "Csv". A text box with arrows points to the "Refl. map" button, containing the text "Press 'Refl Map' to see geocoded intensity". Below the plot is a metadata list for ID: 199, including parameters like Coherence, Height, Res. height, Def. trend, Temp-phase, Ton, Toff, RCS, Range width, Range pointing, Azimuth width, Azimuth pointing, Temp-ampl, Fitting index, ERS-envi ph.sh., Azimuth position, Pos. dev., AP ampl. rel., AP phase, and PS Type. Below the metadata are checkboxes for "3D", "Replica", "Data series", "Mov", and "Temp", along with "Saturate" and "Reset" buttons. A smaller window titled "Figure 21" is open, showing a zoomed-in version of the "Ortofoto" plot with a black background. A text box with arrows points to this window, containing the text "Plot numbers". At the bottom left, a text area shows the following log output:

```

area not covered by optical data
file H:\data4dragon\CUHK_TSX\RESULTS\MATLAB\OffsCoreg not found
loading the dataset by considering the images graph
loading the dataset by considering the images graph
loading the dataset by considering the images graph
loading the dataset by considering the images graph
loading the dataset by considering the images graph

```

At the bottom right, another control panel contains buttons for "Amplitude analysis", "Sub-cell positioning", "Multi Image InSAR Analysis", "Geocoding", "Save", "Load", "Force PS loading", "Coherence Thr.", and "OK". The SARPROZ logo and version information "SARPROZ © 2009, the SAR PROcessor by periz" are visible at the bottom of the interface.