Complex river system erosion and deposition model NETSTARS V3.0 Windows interface user's manual

by

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1. Introduction

Many foreign models such as HEC-1, HEC-2, TABS-2 are the first release of the trial, after years of using the test, continuous debugging enhancements and revised several times before Windows work.

Model wrapper into the application of software tools can be used by practitioners to improve work efficiency.

The name of the window after the software of the above three models are HEC-HMS, HEC-RAS, SMS, and around the world, has a user, the first two as a free software, which you need to pay for its use of the copyright.

NETSTARS model, however, has been used in domestic water conservancy sector the time of the test for more than a decade, many research projects specify the option of using one of the models, and the user demand sound model window this test period of continued strengthen and increase the model function, it is quite consistent with the above model packing the evolution of the program, by the implementation of the project an opportunity to continue to maintain and strengthen this model.

This model, however, after several years of testing, the users also found several imperfections after execution plan efforts have been completed and preliminary planning window the hydrograph compare drawing, model input and output data pre-processing and post-processing program, the original Fortran drawing program rewritten to match the needs of the database format, bridge deck section added automated program developed calculation model, turn 2D and 3D display of the results program provides window function and operating environment that are easy to learn, so that more people can continue to use.

Most of the Windows interface drawing functions are completed by

the Project Director Xie Huimin; Huang Jianhao is responsible for virtual reality the VRML format conversion program development; The simple sub Yan assist the development of the Windows program architecture; Hydraulics Laboratory of National Taiwan University Professor Li Hongyuan and Professor Lai Jinsong is responsible for the model to strengthen the function of research and assist in the planning of the Windows system content.

The tools that use to develop visuals are Microsoft Visual Basic (VB). The visual program function menu of NETSTARS has refer to the interface of HEC-RAS, divides into eight items by demand: File, Edit, input data transform, input file processing, data preparation and simulation, data transfer into database, drawings display, explanation.

Data input we use each input file to a dialog window to complete the operation, each window read and input the value of each control card by tab, save a file for each tab, and then aggregate into input file.

Drawings display functions has generally reference the eight drawing program function of NETSTARS model's original DOS environment and rewrite, and consider the contents of the ACCESS database, divided into longitudinal section, cross-sectional, hydrograph, stream tube etc. project planning single station (reach) to multivariate and multi-station (reach) to single variables drawing functions, also consider adding the measured data to do comparison, every time before drawing we must rewrite a text file that is easy to read by program and then read and process and transferred to the database program by form program, in dialogue form choose data by demand to filter out the data and do the drawing.

These drawing menu can provide model simulation results drawing comparison, print, cut to the clipboard for other files to edit and use, by the

view of users, each 1D drawing area have added some flexibility Slider that can adjust the range of output image until satisfied. Also the image provides a real position corresponding value of mouse, to help drawing readers to judgment data and decision analysis effectively.

Section includes four main input file for water management file, sediment transport files, suspension contained file, side-stream file input file processing, Each file has a tab dialog window to switch the input data, and can be done to add, delete and modify, Access to these text files stored, leave the dialog window for the input file format, and provides a text editor to edit, recognized and then take advantage of the ready simulation data will be temporary files to the replacement of the original input file, provide analog.

Beginners from left to right in order to use the function menu function, that is, from the Open a new project working directory path and began to read the four input files, Then you can use the editing tools to edit various files or input data using the input file window interface finishing finished can prepare input file to working directory replace the original input file, and then carried out the simulation, and then convert the output text data to the database, including calendar line , longitudinal and cross-sectional data into the database, and then drawing menus for a variety of drawing operations.

2. Model Description

NETSTARS model as a quasi-two-dimensional erosion and deposition, where the main tributary of the complex river system, steep slopes, gentle slope, hydraulic jump quantitative flow and variable flow of water management and the corresponding bed evolution characteristics can analog while by flow tube reallocation the sediment transport calculus reaction riverbed cross-section of irregular changes. The general river sediment transport model most of the total sediment transport amount of formula to calculate the amount of sediment transport, so there will be a large error in the imbalance of sediment flow state, the model uses goes on to set out and the suspension contained separate calculation reflect Suspended solids control imbalance sediment transport conditions. Water management and distribution of sediment transport capacity of processing nodes, are applicable to the general network river and hydraulic model test simulation of erosion and deposition.

The model water management the analog sub quantitative flow backwater calculus with variable flow three algorithms, quantitative flow model (Steady-Energy) based on one-dimensional energy equation with the continuous relationship between nodes difference method to obtain the water level and flow values, mainly taken from BRALLUVIAL model about water management part of the theory; Variable flow model (Unsteady-Momentum) based de Saint Venant one-dimensional channels slow variable flow continuous and momentum equations together with the theory and solution of water management node continuous relationship difference method for solving the water level and flow rate value, mainly uses CHARIMA model; Backwater algorithmic aspects, using GSTARS model part of the hydrological process changes made to

join the network node, with steep slopes and water jump function, its broader application.

Sediment transport simulation, flow with the flow management theory into multiple streams tube, the water level of the river network hydraulic simulation proceeds, Assumptions points each flow tube known cross-section delivery capacity of the same, and calculated the amount of sediment transport, and then substituted into the output the the sand continuity equation solving each flow tube bed evolution situation. The flow of each time period is not fixed, so each time the flow tube assigned boundary will be different, so you can simulate horizontal Riverbed Erosion. Amount of sediment transport and can be divided into direct calculation of the total amount of sediment transport and bed load, suspended sediment transport formula contained calculated separately and then combined the two methods for the total amount of sediment transport, especially in the high suspended loads of rivers or unbalanced input the obvious area of sand phenomenon that need to use the latter to calculate in order to meet the physical phenomenon.

The water management calculus backwater calculus can be used to calculate the flow conditions (water jump) subcritical flow supercritical flow, or a mixture of both. If the number of the flow tube Option 1, the bed change the outcome of the calculation will be similar to the HEC-6 model. Containing the flow of the river side of the main tributaries and local points system flow conditions and relative should be the seabed changes can take advantage of NETSTARS simulation. Node processing is the focus of the river system simulation, many reach (links) connected by nodes (nodes) to form a stream network system, and also through the node to pass each reach water management and sediment transport

characteristics.

NETSTARS has GSTARS shunt tube function to perform the calculation of sediment transport. The number of the flow tube that is selected, the user input should be the same number of tubes in the calculation process mid-stream. Natural river sediment movement types by their nature can be divided into the passage of time as set (Bed load), suspended sediment (suspended load) and rinse upload (Wash load), which goes on to set out and suspended is set collectively known as the bed material uploaded (Bed Material load).

The bed material load calculation (that is, the total amount of sediment transport), the program has 15 formulas available options include:（a）Yang's（b）Ackers & White（c）Engelund-Hansen （d）Van Rijn, etc wherein (b) and (c) applicable particle size range is 0.0625mm-2mm; (a) can be used for gravel (Gravel), maximum particle diameter of 10mm; (D) the applicable size range 0.0625mm-10mm, calculated in excess of a range of particle size, (a) more than 150mm and less than 0.06mm lose the amount of sand control starting conditions, the the interval calculation results error is larger, Appropriate parameters to determine whether it should calculate the amount of sediment transport in the 10mm-150mm; (b) particle size less than 0.0005ft, the error of the calculation of the amount of sediment transport than 2mm parameters should be calculated to determine whether amount of sediment transport; (c) and (d) in the particle diameter of more than 150mm and a diameter smaller than 0.06mm sediment volume is controlled by the starting conditions, the results obtained error is also greater.

Lapse contained computing model, there are 11 formula can be used, including (1) Meyer-peter & Muller (2) Van Rijn (3) Schoklitsch etc.

(1)Parameter controls whether the calculated amount of sediment transport, (2) and (3) particle size control conditions (c).In this case also the starting conditions of the sediment control measure sediment transport formula for the operator. The above formulas are derived via experimental or field data regression type of experience, so depending on the particle size of the case to determine the percentage composition of the selection of such formulas. Diameter composition same time due to the screening effect of the hydraulic, at different times are different, with analog filters and Armour role in the function of the present model.

Wetted perimeter area in the calculation process is likely to occur the range of erosion and deposition, lowest scour elevation of each cross-section, the width and the highest siltation elevation can be controlled in the input data, in order to prevent the special of erosion (such as the bottom of manmade structures)or siltation (such as desalting work) conditions.

Most rivers upstream boundary into the measured amount of sand little information, to adopt the traffic, the amount of sediment transport rate curve up. Downstream boundary suspended sediment concentration by concentration gradient or concentration values to control; downstream boundary of the amount of sediment transport by sediment transport formula obtained, and do not need to be controlled. Model test parameters watercourses Manning n value, the number of flow tube, and the amount of upstream sediment transport rate curve, the layer thickness can be erosion, sediment transport formula. Following our model assumptions and limitations:

1. The model is not applicable to lateral movement of sediments due to secondary currents in river bends.

2. The model is not able to simulate secondary currents.
3. The model should not be used to predict variations of the bed forms.
4. The cross section of the stream submerged under water is considered as a movable bed. In each time step of sediment computations, the bed of each stream tube is assumed to be uniformly raised or lowered according to computational results of scour and deposition, and subdividing of stream tubes is then performed to redefine stream tube boundaries based on the new channel geometry. By this approach, variations of the channel bed in the transverse direction are reflected.
5. Sediment transport formulas for total load are, in general, suitable for estimating total sediment load under equilibrium conditions. This model is able to estimate suspended load and bed load separately. The advection-diffusion equation is employed to govern the mechanism of suspended sediment movement. NETSTARS is capable of simulating spatial and temporal variations of concentration of the suspended sediments under no equilibrium conditions.
6. The roughness coefficient may be inputted as a given value, or estimated by the model using semi-empirical formula. Due to lack of information on roughness coefficient, one may make a quick and easy estimate and obtain the value through a calibrating process.
7. Require high precision and tune small t, the boundary conditions are used in all calculations, the program will automatically hydrograph do linear interpolation calculation.

2-1-1 Basic equations

- Water management calculus

Water management simulation sub quantitative flow the backwater calculus with variable flow algorithms, quantitative flow model (Steady-Energy) based on one-dimensional energy equation with the difference method to obtain the water level and flow value node continuous relationship;

Backwater calculus is also a one-dimensional energy equation, adding an appropriate equation energy loss than the force hydraulic jump node recursive solution solving flat to cross water level value; variable flow model (Unsteady-Momentum) based on one de Saint Venantdimensional channels slow variable flow continuity and momentum equations coupled with the node solving continuous relationship between differential

To solve the water level and discharges, model can also be used in variable flow of the Research and Development of the quantitative flow simulation, the main concept is the Department of a time period, by the iteration of the flow at the river end to be equal. The flow calculation was taken from the part BRALLUVIAL model about water management part of the theory, with GSTARS model water management part of the same deal with the steep slopes and water jump function, its broader application. Following only variable flow equation the variable relationship needs to solve.

River variable flow hydraulic calculations based on the de Saint Venant derived one-dimensional channels slow variable flow continuity and momentum equations are simultaneously solved the equation

Continuity equation:

$$\frac{\partial A}{\partial t}+\frac{\partial Q}{\partial x}=q \tag{2-1}$$

Momentum equation:

$$\frac{\partial Q}{\partial t} + \frac{\partial}{\partial x}\left(\beta \frac{Q^2}{A}\right) + gA\frac{\partial y}{\partial x} + g\,A\,Ş - \frac{Q}{A}q = 0 \qquad (2\text{-}2)$$

Where,

A =River through water cross-sectional area=f(y) (m^2);

Q = Flow (cms);

t = time (sec);

x = along the flow direction of the horizontal coordinate (m);

q = the length of the side of the unit reaches into the flow (cms / m);

α = momentum correction factor;

g = gravitational acceleration ();

y = water level (m);

Sf = friction slope;

K = conveyance capacity (cms);

n = Manning coefficient;

R = hydraulic radius;

One of the basic assumptions of de Saint Venant equations:

1. Water for one-dimensional flow speed on the entire cross-section and the surface of the water line on the same section level;
2. Road bend degree not ignore the role of the vertical acceleration of the distribution of hydrostatic pressure is applied to the river each calculated point;
3. Flow resistance formula (resistance laws) can be similar quantitative to consider variable flow boundary friction and turbulence phenomena
4. Average gradient of the river bed of small

5. The density of the water body is assumed to be uniformly distributed

■ Lose sand calculus:

Simulation of sediment transport in the water level of the river network hydraulic simulation proceeds, flow, known conditions required, and with the flow management theory into multiple streams tub, Assumptions points each flow tube known cross-section delivery capacity of the same, and calculated the amount of sediment transport, and then substituted into the output the the sand continuity equation solving each flow tube bed evolution situation.

The flow of each time period is not fixed, so each time the flow tube assigned boundary will be different, so you can simulate horizontal Riverbed Erosion. The amount of sediment transport and can be divided into direct calculation of the total amount of sediment transport and bed load and suspended sediment transport formula contained calculated separately and then merge the two methods for the total amount of sediment transport, especially in the high suspended loads of rivers or unbalanced sediment transport obvious area that needs to use the latter to calculate in order to meet the physical phenomenon.

Containing the riverbed upload (bed load) and suspended sediment (suspended load) as the amount of sand into the output, sediment continuity equation can be reduced to the form

$$(1-p)\frac{\partial A_{dt}}{\partial t}+\frac{\partial}{\partial x}\sum_{k=1}^{Nsize} q_t C_k+\frac{\partial Q_b}{\partial x}=0 \qquad (2\text{-}3)$$

Where

A_{dt} = Flow tube unit length bed sediment siltation rate ($m^2/\sec$)

$Q_b=\sum_{k=1}^{Nsize} Q_{bk}$ = Riverbed contained within the flow tube transfer rate to

the riverbed contained formula ($m^3/\sec$);

Nsize table sediment number of packets.

p = Bed porosity.

q_t = Flow tube flow ($m^3/\sec$)

C_K = Particle size of the suspended sediment concentration in the flow tube (m^3/m^3), convection diffusion equation of suspended sediment, can be expressed by the following formula:

$$\frac{\partial (C_k A_t)}{\partial t} + \frac{\partial}{\partial x}(C_k q_t) = \frac{\partial}{\partial x}\left(A_t k_x \frac{\partial C_k}{\partial x} \right) + S_k + h k_z \frac{\partial C_k}{\partial z}\Bigg|_r^l \qquad (2\text{-}4)$$

Among q = Flow(cms); = longitudinal and transverse dispersion coefficient, its value is calculated by the input or empirical formula decision; A = Flow tube through water-sectional area; h = average flow tube water depth (m); l and r pipe flow around the boundary, S_k = suspended sediment source (or referred to as a reaction of the convection-diffusion equation) can be divided into siltation source(S_{dk}) and resuspension source (S_{ek})

$$S_k = S_{ek} + S_{dk} \qquad (2\text{-}5)$$

Resuspension volume S_{ek} can be represented by the formula

$$S_{ek} = \rho B_t W_k \beta_k C_{ek} \qquad (2\text{-}6)$$

ρ = Sediment specific gravity

B_t = Flow tube width (m)

Wk = diameter of the sedimentation velocity (m / sec);

βk = particle size weight percent occupied

C_{ek} = Suspended solids concentration near the bed

Siltation can be expressed as follows:

$$S_{dk} = -B_t W_k C_{dk} \tag{2-7}$$

C_{dk}= Siltation Suspended solids concentration can be calculated by the following formula:

$$C_{dk} = [3.25 + 0.55\ln(\frac{W_k}{\kappa u_*})]C_k \tag{2-8}$$

κ = Van Karman constant = 0.4.

The calculation process maximum particle size the multiples parameter Alt to control each calculated from the riverbed scour depth, in order to avoid the riverbed violent movements resulting numerical divergence.

2-1-2 Numerical Methods

■ Water management calculus

The following briefly describes variable flow calculation method the backwater calculus and quantitative flow model, the detailed procedure of Reference Li Hengyang et al (1997). Variable flow equation based de Saint Venant one-dimensional channels slow variable flow continuity and momentum equation together with node continuous relationship difference method for solving the water level and flow rate values.

Control equation for non-linear simultaneous equations, numerical methods for solving model unconditional stability characteristics of PolyOne mantes four-point difference method (Preissmann four point finite difference scheme), calculate the path, calculated point nodelink process control equation linear representation for solving the water level and flow of each period and place.

Quantitative flow conditions of sub-the quantitative flow model and backwater calculus of two kinds, quantitative flow model is similar to the variables of the overall solution, theoretical flow backwater algorithms by a designated control points to the designated direction according to the flow conditions little by little, the projected water level valuebecause the river the calculus often encountered in the case of changes in flow conditions, most of the quantitative flow conditions to backwater calculus more stable.

■ Sediment transport calculations

Sediment transport part of the two types of calculations, a total amount of sediment transport algorithm, another separate calculations. The total amount of sediment transport algorithm principle mining sediment transport formula results into the sediment continuity equation

to solving the bed change;

Separate calculation method is basically in order to truly reflect the basic characteristics of the sediment movement (especially in the imbalance of sediment transport), and the river bed load and suspended upload to calculate separately calculated from sediment transport amount and concentration into the sediment continuity equation solving riverbed cross-section changes in circumstances.

This method divides the total amount of sediment into the river bed load and suspended contained two parts riverbed containing riverbed uploaded formula suspended loads directly resolve Suspended solids concentration of the convection-diffusion equation, the proportion of suspended sediment in natural rivers due to general 80% or more, therefore method reflects the phenomenon of unbalanced output sand, the existing model is less some.

Suspended sediment and bed sets separate calculation formula method seeking the total amount of sediment transport are two ways the first division of the flow tube and particle size grouping further detail computation, one-dimensional transport in a single-class tube calculus, solving network type concentration of each flow tube, and suspended loads calculated fashion to consider the exchange of substances between the flow tube,

The transverse transport phenomena also consider the convection-diffusion equation; can be fully reaction Suspended solids concentration due to turbulence and velocity perturbations diffusion, flow tube shunt tube hybrid switching situations.

Based on the point of view of the Cunge the 1975, adopted the split operator method is divided into four parts Suspended solids

convection-diffusion equation are solved, namely convection, vertical diffusion and horizontal diffusion and reaction of four steps, each step in solving a new value, as the next step known values continue calculus to the completion of a distance so far, that a calculus from the completion of the next time from the known value replaced by the final value of the correction to continue calculus. Detailed numerical process can refer to Hong-Yuan Lee (1997).

Overall, separate calculation method is divided into four steps can be solved:

- Step (a), Suspended solids convection-diffusion equation is divided into four parts by the boundary and known conditions for solving separately correction flow tube and the concentration gradient value.
- Suspended solids concentration obtained in step (b), in addition to the steps of (a) still needs to count, so the first flow tube bed load formula, and then converted into the unit into the subsequent steps.
- Step (c) to step (a), (b) the seeking of correction value and correct bed height.
- Step (d), the first calculation of the hydraulic flow water level and the shunt tube every calculus time Repeat steps (a), (b), (c), until the time expires.

1-1-3 Boundary conditions and model parameters

Example, the simulation analysis of reach for a cross-section of the Cho-shui River mouth to the first cross-section of 86 the Changyun Bridge downstream, so select this paragraph basic information to establish the model of use of the boundary conditions, need hydrograph upstream and downstream needs water levelhydrograph, a review of the plan to flood

level, the upper reaches of the 100-year frequency the design flood amount 24000cms, the downstream mining design the storm surge bits 3.96 meters, quantitative flow calculus.

Downstream river embankment lines northward, the upstream flow remains unchanged, the the downstream estuary group calculated water level as a boundary condition, so in addition to control river erosion and deposition conditions, also considering the river northward movement of the storm surge bit tothe character was originally planning to plan the flood level of the essentials.

Channel stability calculations, we planned short-term 100-year flood and the long-term 10-year general flood event simulation with sand mining or not clear or not and dike lines northward or fish pond, a total of 16 cases to be described river erosion and deposition circumstances of each case.

Therefore different from the boundary conditions in the long-term and short-term event processing, short-term events upstream boundary estuary group using HEC-1 the model operator to Changing Bridge, the 100-year frequency rainfall flood hydrograph peak value of about 22000cms than plana slightly lower flow downstream boundary water level using the storm surge given a water level of 3.96 meters. The test validation event upstream boundary in the long-term event about the five-year history of repeated twice, a total of about ten years, including the exclusion of Typhoon Herb event is modeled, and then, it is assumed that a given water level downstream estuarine tidal station 1.0 meters when the benchmark, according to traffic changes flexibly adjust to about 3.0 meters as the water level downstream boundary conditions.

Model parameters need to test authentication to use the hydraulic parameters of the model for Manning n value in each section, and some

adjustment of the initial setting of the stage-discharge, sediment transport parameters can scour layer thickness, sediment transport formula, select the calculation way and the flow tube number.

3. Overview of System Planning

Aspects of data input, each input file to complete the operation in a dialog window, each window to read tab and enter the value of each control card, each tab each save a file, and finally compiled for the input file.

The beginning of this window system design is to improve NETSTARS model's affinity of drawing interface. The original drawings interface is DOS environment, because of the use of Windows in the last few years, makes DOS environment has slowly disappeared from computer users mind. Because of the trend, through the grant program of NSC, import visual interface to enhance the opportunity for users to continue using. The planning system has mainly use the eight drawing program that is existing in DOS model, planning these drawing function menu.

These drawing menu can provide model simulation results drawing compare, print, cut to the clipboard for other files to edit and use, by the view of users, each 1D drawing area have added some flexibility Slider that can adjust the range of output image until satisfied.

Also the image provides a real position corresponding value of mouse, to help drawing readers to judgment data and decision analysis effectively. All the features of this program by the Project Director Xie Huimin planning, assist in the completion of the detailed program and structure by simple sub Yan, Huangjian Hao, Zhou Yixuan, drawing the special features of the forum program written by the project leader, collaborative Modelrator, National Taiwan University, Tainan Hydraulics Laboratory Hong-Yuan LeeProfessor Lai Jinsong professor responsible for the model to strengthen the function of research and assist in the planning of the

Windows system content.

Dialog window drawing functions, of drawing functions written by the project leader and transferred to the database, in which the profile of the riverbed and the water line changes, changes in cross-sectional riverbed and the water, 2D graphics display, 3D data conversion(Huang Jianhao assist) and demonstrated.

Another model input file at the main program written by Zhou Yixuan window and tab. In order to model has pre-processing and post-processing functions, also developed two ARCVIEW expansion module, the NETSTARS section data are converted from DTM Data Extraction. After Input format and simulation results and turn into GIS point data, make it into 2D image graphics and output 3D text file to turn into the VRML format to provide a virtual reality display browse, the function operation of this software’s expansion module has another manual describes the way to use.

4. Menu and toolbar design

NETSTARS Windows program menu demand, reference HEC-RAS the interface, the first plan of eight items: File, Edit, input data into the input file processing, data preparation and simulation, the data is transferred to the database, graphics display, indicating that. After further requirement expansion, a large part of the application system contains a menu with the toolbar, status bar and other basic objects, the program is no exception taking into account these features, therefore, at least one layer of the menu inside the drop-down menu options, up to four, some of the more important items made toolbar convenient direct press use, each toolbar item has prompted the mouse moved to this location to clear the use of tools button. About ICON most of the network collected only the pattern of water droplets of the main program is a self-designed project leader. The initial condition for open NETSTARS Windows program is shown in Figure 4-1.

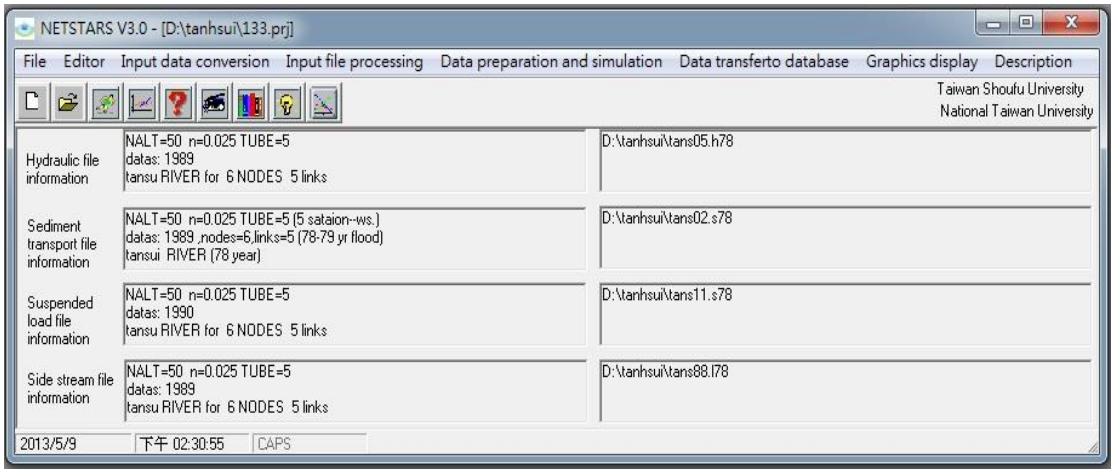

Figure 4-1 The initial situation of opening NETSTARS Windows program

The File menu includes the planned new project, open the project, archiving, Save As, close the project, print, leaving seven, Including archiving, Save, print the current role. As shown in Figure 4-2.

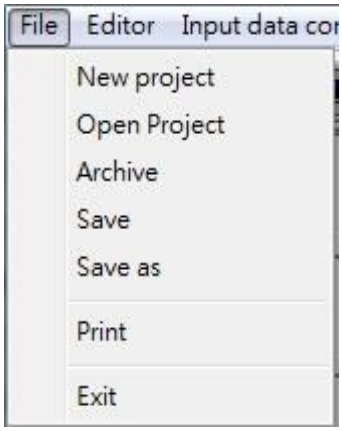

Figure 4-2 File menu content architecture icon

The edit menu that was planed including windows Notebook, Simple editor, UltraEdit, Crimson Editor, Editpad lite and Do report by word. The Notepad, UltraEdit and Word is to callout the preset program location in windows, and the remaining three are automatically placed into execution program during installing. Show as Figure 4-3.

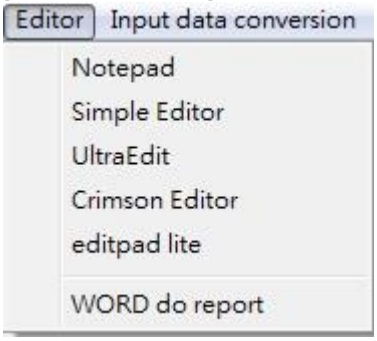

Figure 4-3 Architecture icons in Edit menu

"The input conversion" menu includes the planned cross-section extraction (GIS) pre-treatment instructions, the section extraction data transfer input format conversion section, particle size data, hydrological data, test data, two turn single row of six, planning the first two have a role, as shown in Figure 4-4.

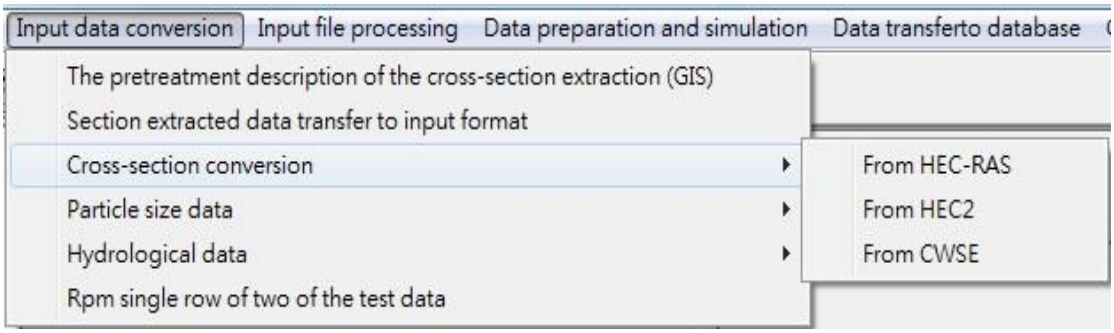

Figure 4-4-1 Section conversion content architecture icon of input data conversion menu

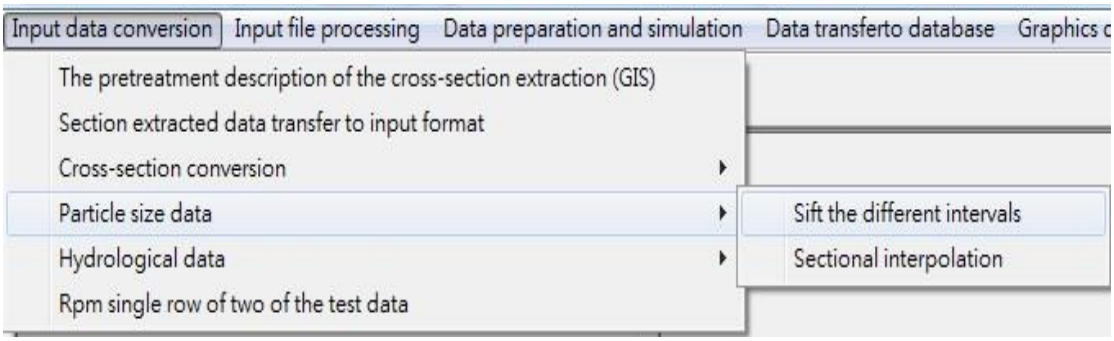

Figure 4-4-2 Particle size data content architecture icon of input data conversion menu

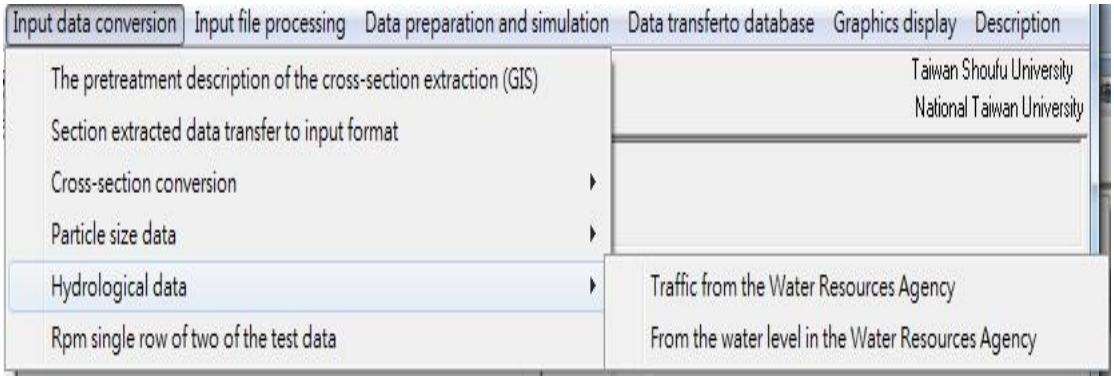

Figure 4-4-3 Hydrological data content architecture icon of input data conversion menu

"Input file process" menu that planned including Project and input file named, Hydrologic file, Sediment transport files and Suspend load files, Lateral flow file, such as shown in Figure 4-5.

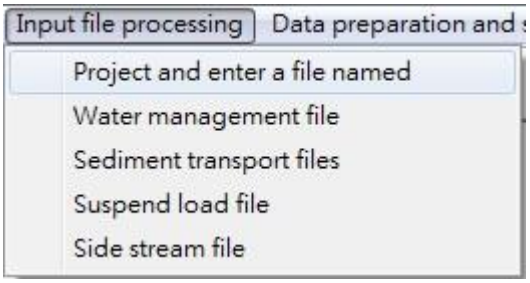

Figure 4-5-1. Content architecture icon of Input file processing menu

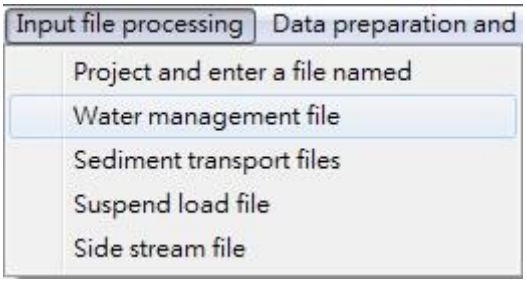

Figure 4-5-2 Input file processing menu - Hydrologic file

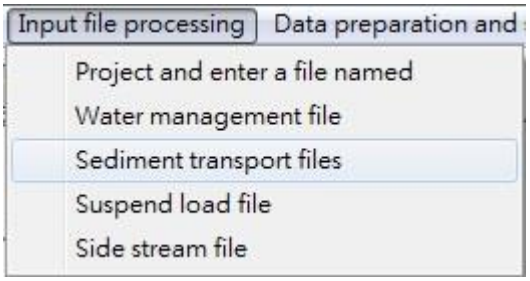

Figure 4-5-3 Input file processing menu - Sediment transport files

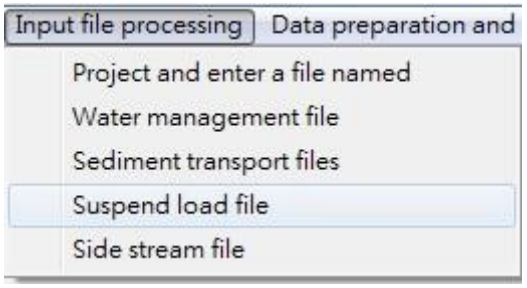

Figure 4-5-4 Input file processing menu – Suspend Load file

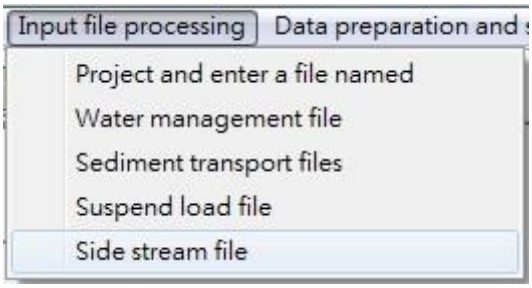

Figure 4-5-5 Input file processing menu – Lateral flow file

Data preparation and simulation menu planning including Border

access to input data, Prepare simulation data, Perform simulation, such as shown in Figure 4-6.

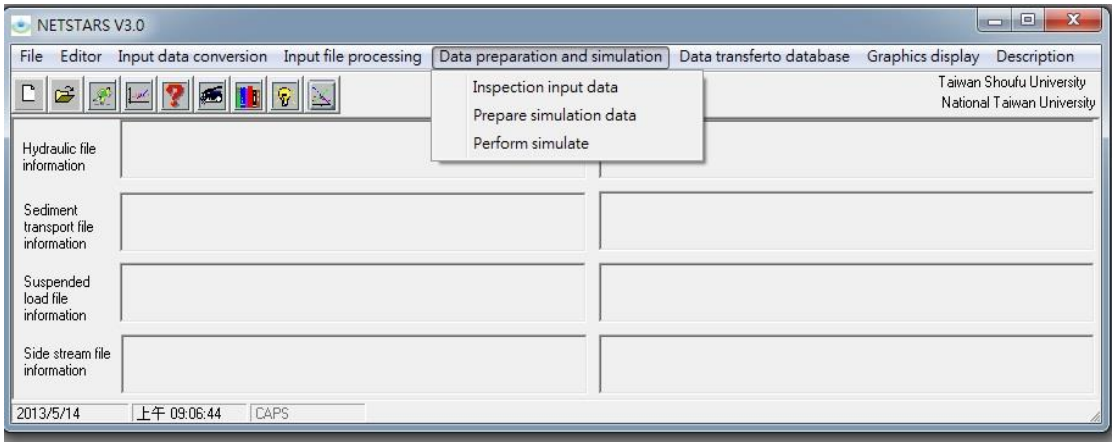

Figure 4-6 Content architecture icon of Conditions set and Emulation Menu

The planning data is transferred to the database menu includes hydrograph data transferred to the database, profile data file generated profile data into the database, cross-sectional data files, cross-sectional data transferred to the database, the flow tube data files, the flow tube data transferred to the database, seven, of which the first five have been completed, as shown in Figure 4-7.

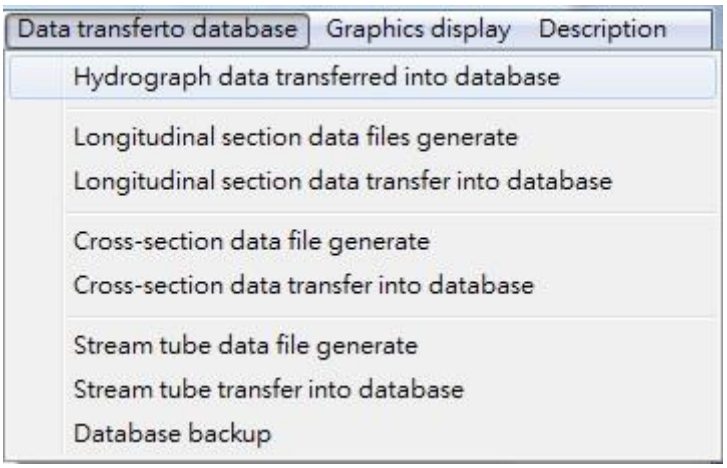

Figure 4-7 Content architecture icon of Menu data transfer into database

The drawing shows the planned menu includes river systems planning diagram, a single cross-section output comparison, reaches the output

compare four, two of the four has been completed, the third function has completed hydrograph changes in comparison, riverbed changes, reaches the output compare the current role. Shown in Figure 4-8.

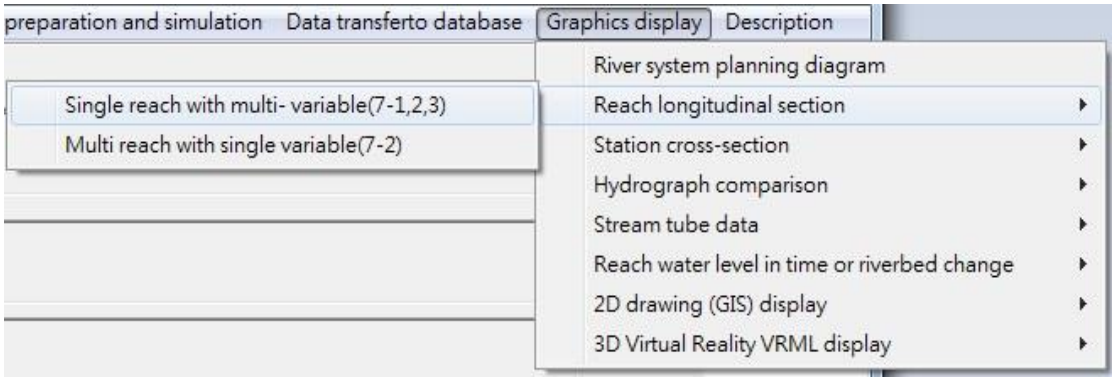

Figure the 4-8-1 Graphics display menu reaches longitudinal section content architecture icon

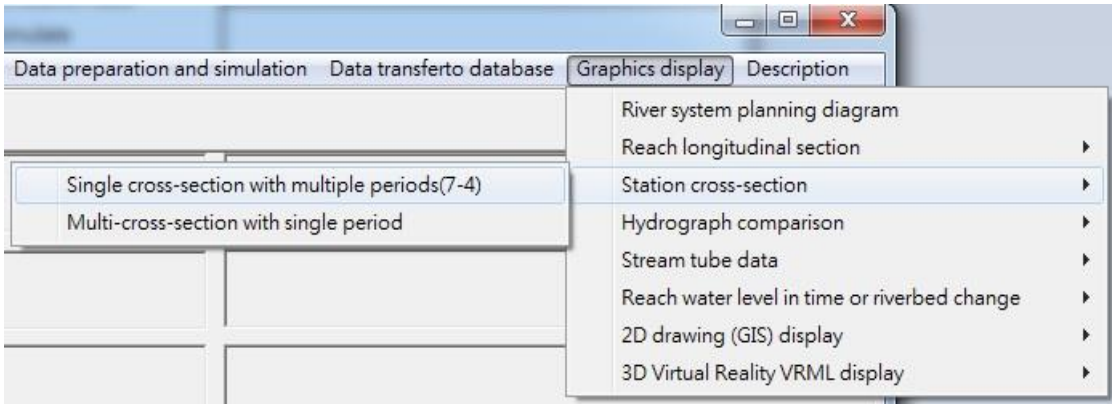

Figure 4-8-2 Graphics display menu station cross-sectional content architecture icon

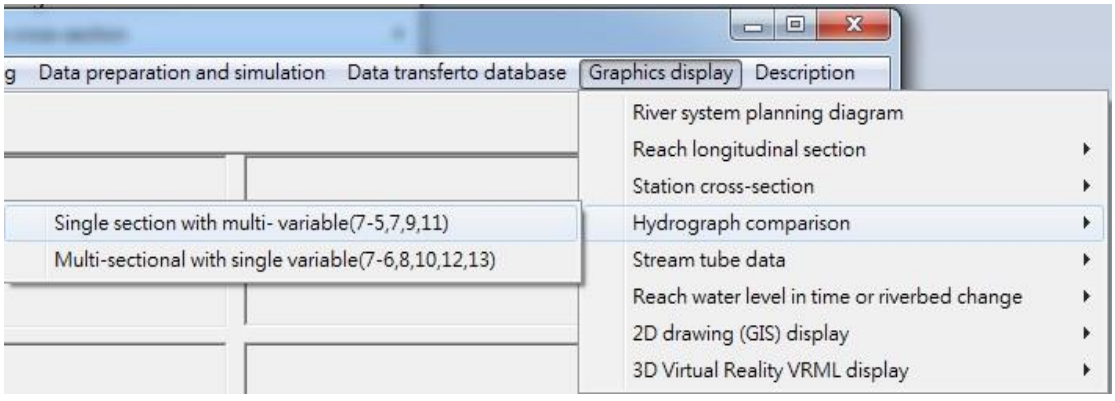

Figure 4-8-3 Graphics display menu hydrograph compare content

architecture icon

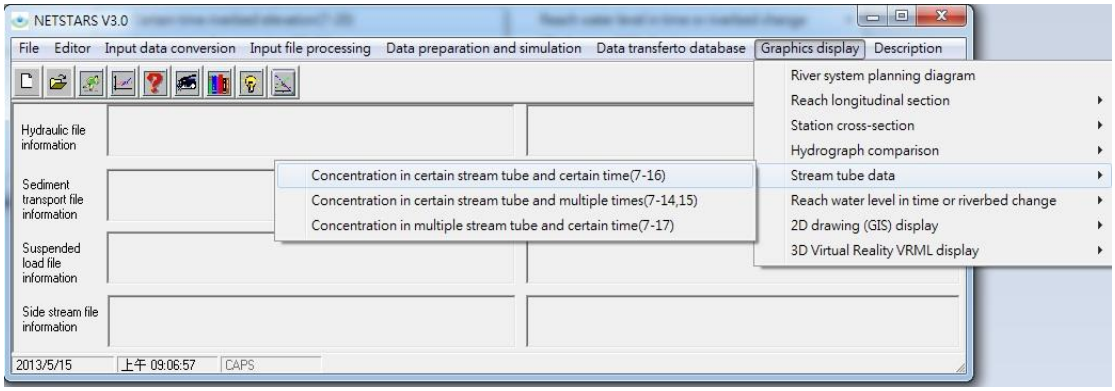

Figure the 4-8-4 Graphics display menu tube data content architecture icon

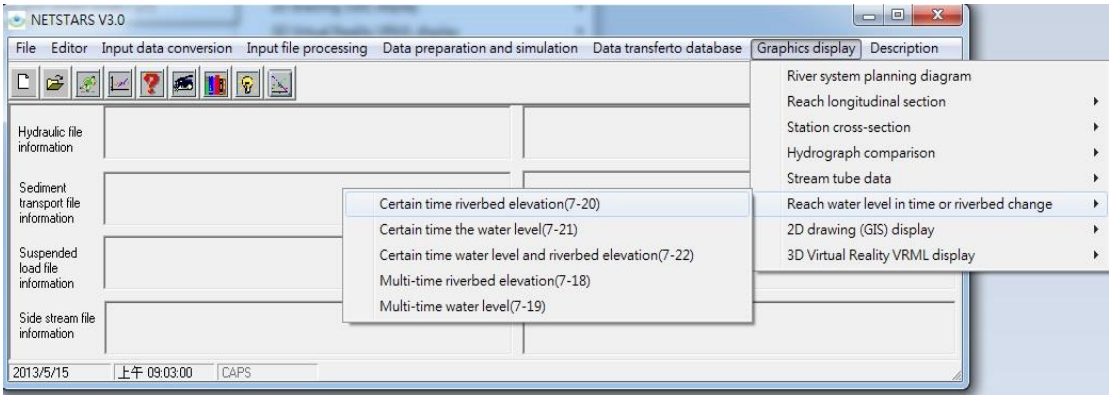

Figure 4-8-5 Graphics display menu reach water level in time or bed changing content architecture icon

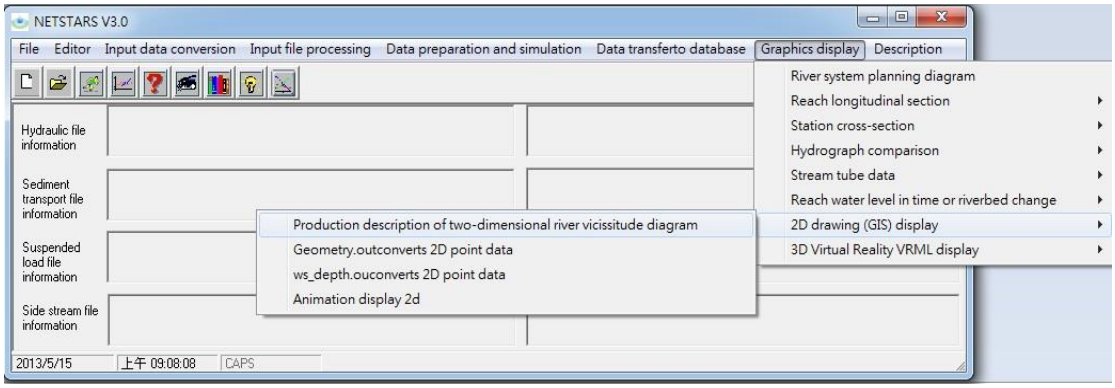

Figure 4-8-6 Graphics display menu 2Dgraphic (GIS result animation) show content architecture icon

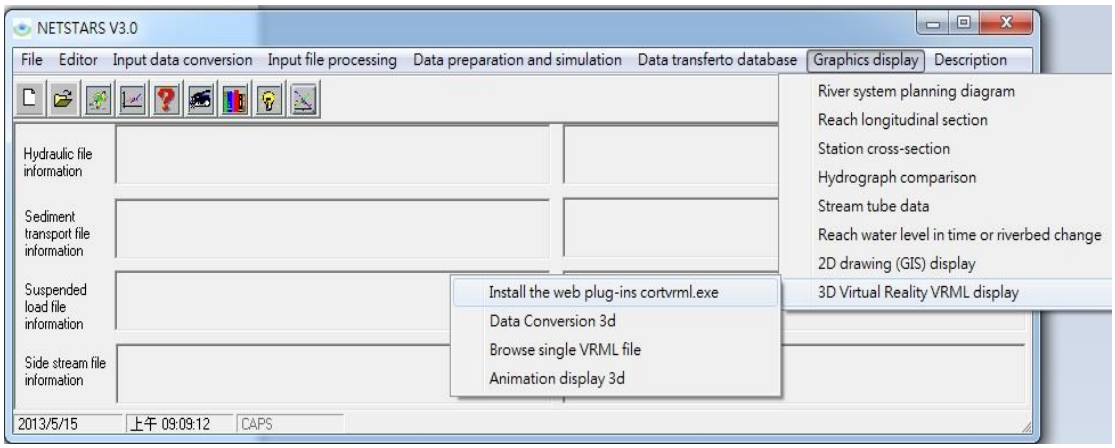

Figure the 4-8-7 Graphics display menu 3D Virtual Reality VRML display content architecture icon

The description Menu that was planned, including Operation manual PDF, Operation manual chm, Technical manual PDF, Technical documentation chm, About, all of these are completed, such as shown in Figure 4-9.

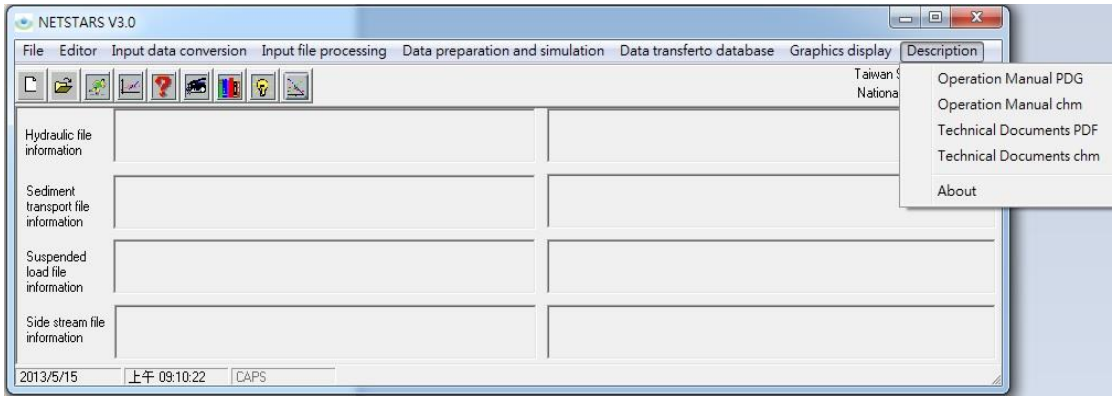

Figure 4-9 description menu content architecture icon

5. The instructions of the various functions

After re-entering the Windows system, you must give a project name, which records some of the project file name and reference the location of the graphics, information, so we must first to build good NETSTARS model input and output data saved to a planned directory.

Again can file menus to select a new project, enter the name of the dialog box, fill in the project and select save output into the file name of the project file name and river system planning diagram position, press the Save Project information willstorage the two files nets.dat and path.txt writing important information, and provide other forms necessary read. Shown in Figure 5-1.

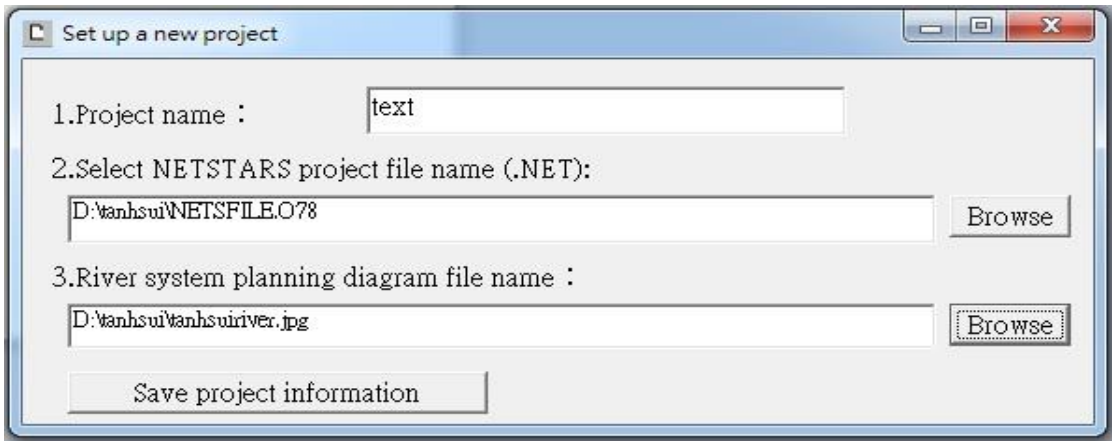

Figure 5-1 Set the new project form example icon

If the project has been established, you can directly select the Open Project to open an old project, will the project within the file information displayed further to confirm the action.

Identified under or updated storage nets.dat and path.txt two files at the same time, the important information is written to provide other forms necessary read. Select the name of the project dialog box shown in Figure 5-2.

Confirm the ad hoc the content standard single example as shown in

Figure 5-3. The information in the open eight field in the bottom of the menu on the left to display the message of each corresponding file right path location where the file is located and. shown in Figure 5-4.

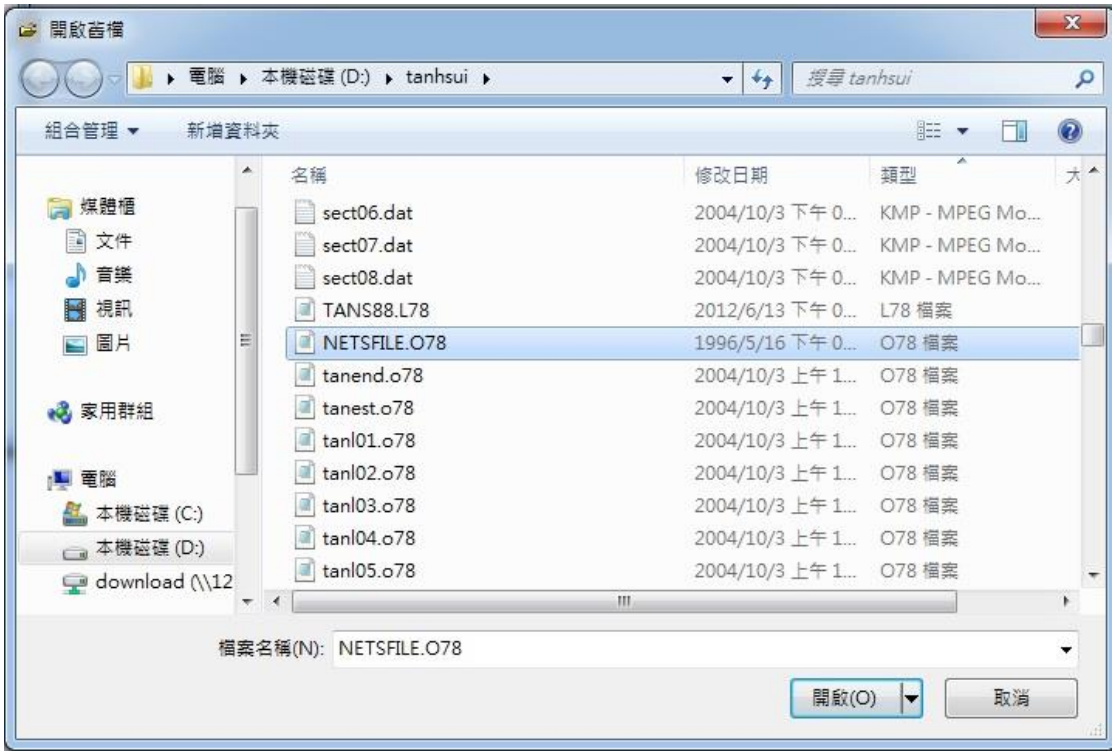

Figure 5-2 dialog box, select the name of the project sample icon

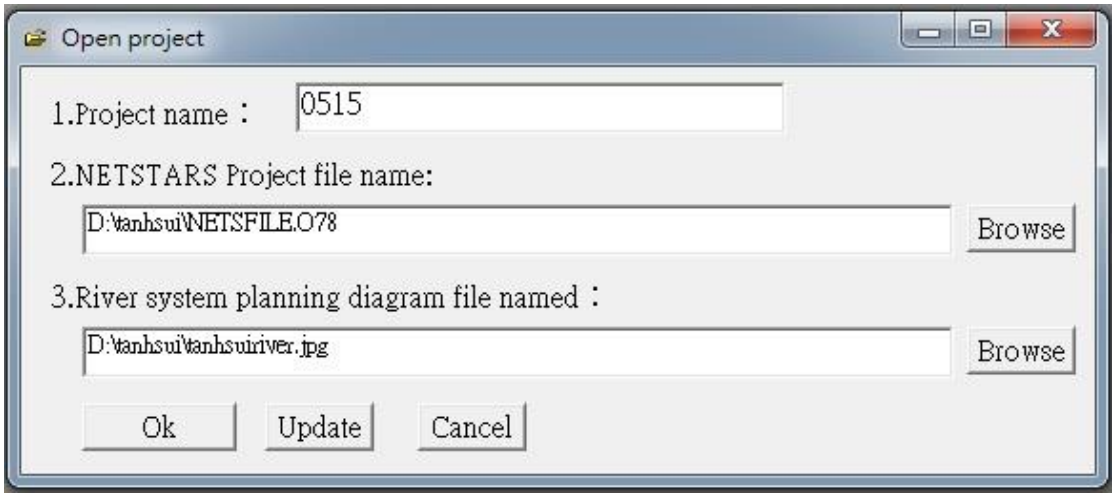

Figure 5-2 dialog box, select the name of the project sample icon

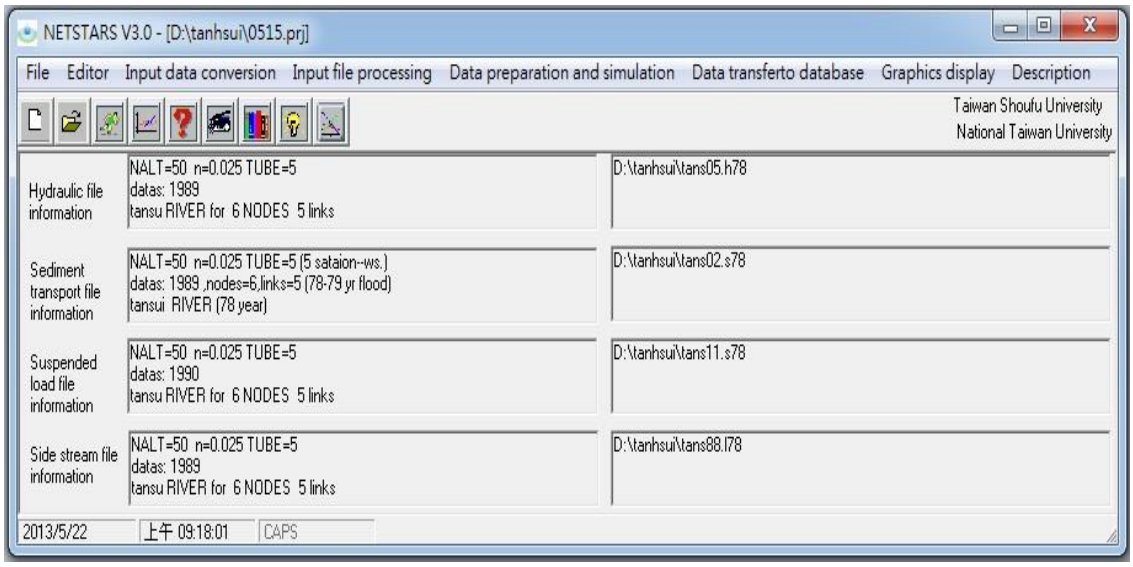

Figure 5-4 Information icon is displayed after setting a new project or open a project

The edit parts into the editor to provide the necessary text editor, text editor homemade Editor can simply save the text as shown in Figure 5-5.

Addition of UltraEdit the Crimson Editor Editpad Lite Figure 5-6,5-7 and 5-8, respectively, as shown, a trial version of the former, the latter two for free software, word and Notepad text of this compared to the windows within linked to the software to set the position of connection to start execution.

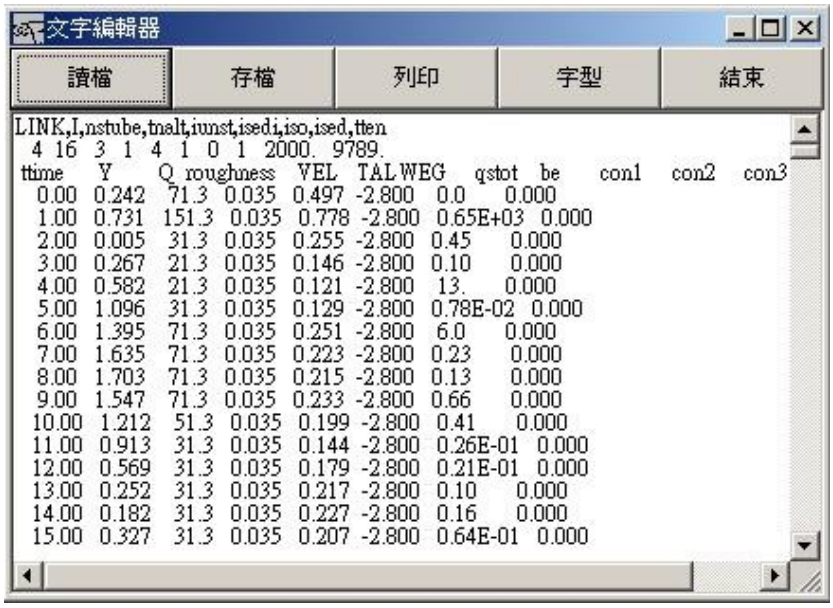

Figure 5-5 homemade editor to open the file icon

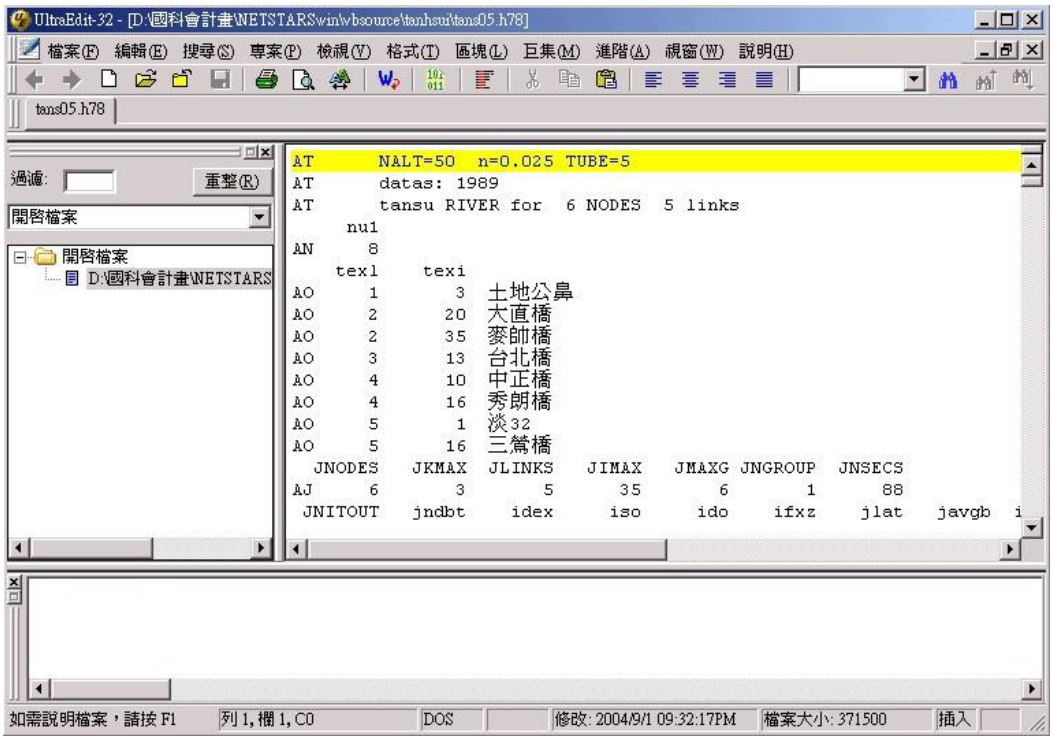

Figure 5-6 UltraEdit to open the file icon

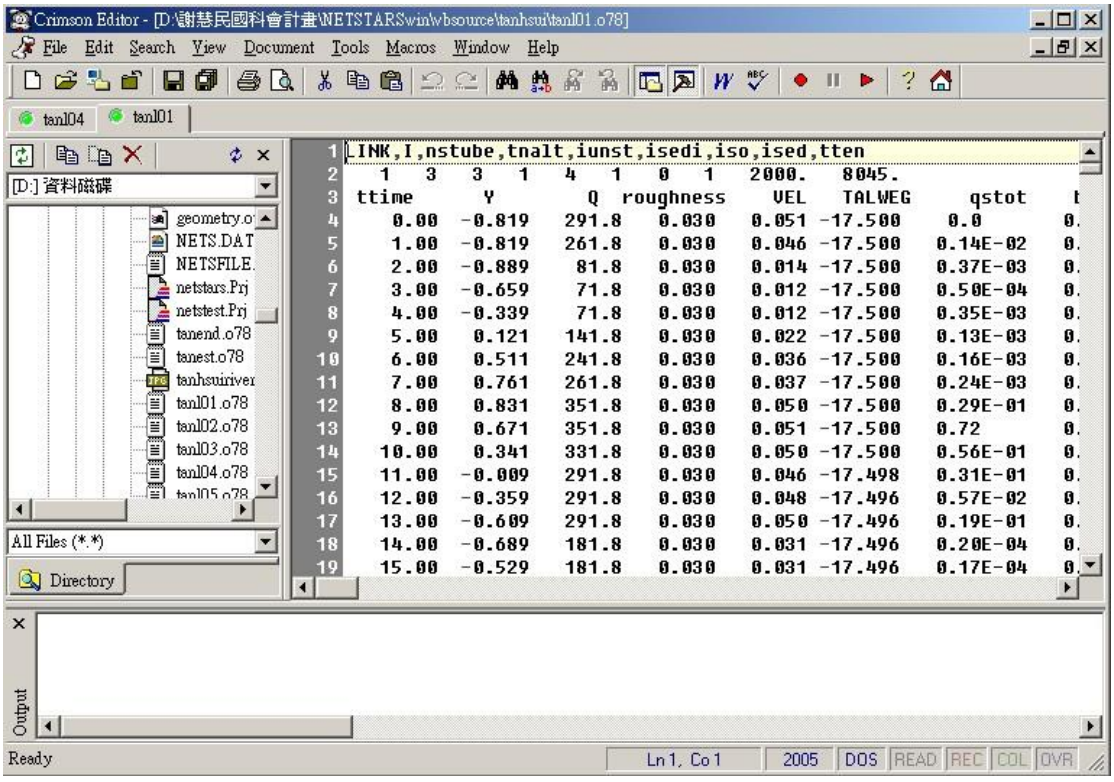

Figure 5-7 Crimson Editor to open the file icon

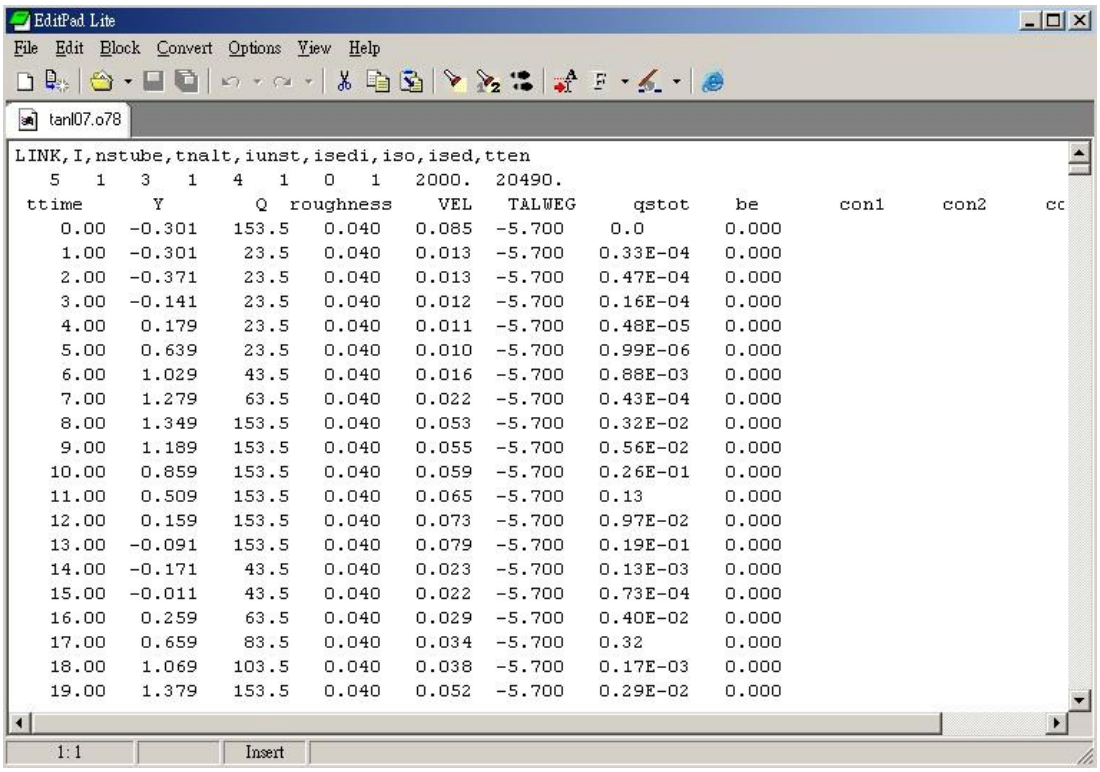

Figure 5-8 EditPad Lite Open File icon

Input data into the part of the two can perform, the first the section extraction step instructions for entering ARCVIEW window, as shown in Figure 5-9,this part of the work must draw on ARCVIEW plug-in module Spatial analyst and developed NETSGISPRO module. The second implementation results convert into a GIS point data set, as shown in Figure 5-10. Press the OK button will go to perform the converter trandtm.exe to transfer the data into NETSTARS model section input file format, which is processed before the model data functions.

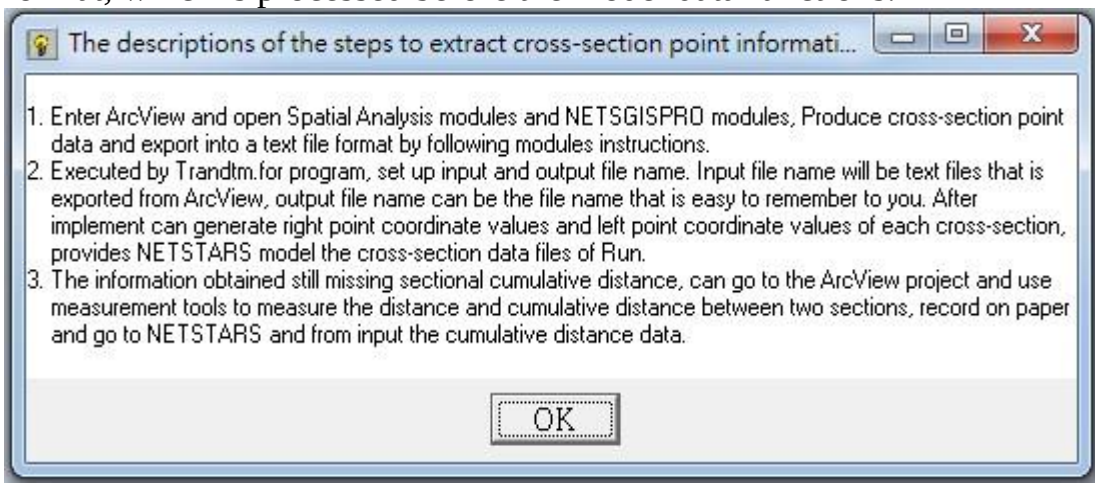

Figure 5-9 Cross-section extraction (GIS) pre-treatment help icon

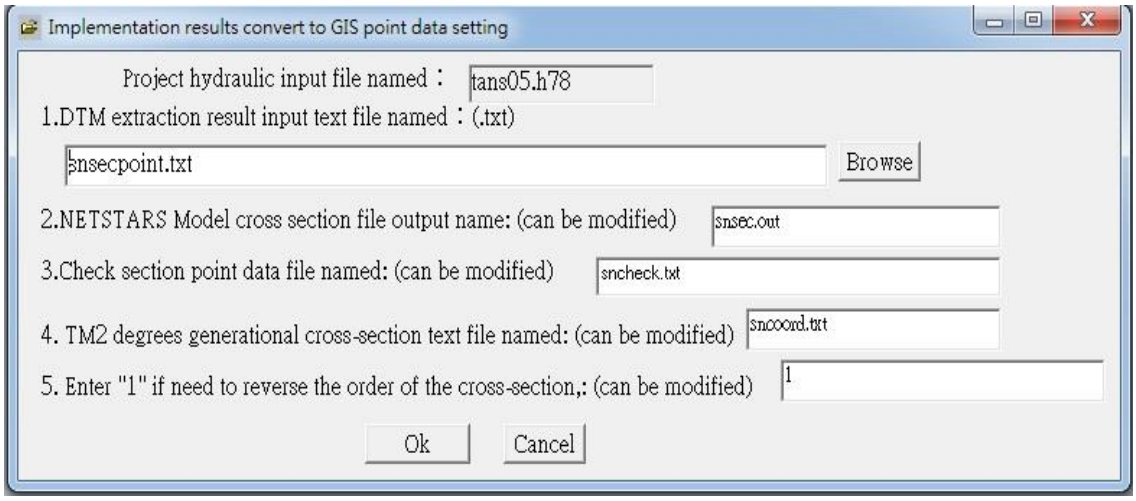

Figure 5-10 The section extracted data transfer input format icon

About the part of input file processing, the first one is project and enter file name, a dialog box appears after the function execution, and prompt input file name is decide by the file name of NETS.DAT's content, can open the project file name to see all of the input filename, has total of five prompts content, as shown in Figure 5-11.

The second one is hydrological file, a dialog box appears after the function execution, can modify the data according to different file, hydrological file TT card modify and operating steps instructions is show in Figures 7-11 to 7-12, alter the column data, and press modify completed button to complete saving data.

Water management file AN card modify the steps results in Figure 5-14 to Figure 5-15, in addition to modify the function and nul value increases and decreases, and pay attention to increase and reduce the nul value must be the same with the following data items, otherwise the error message window appears.

Water management files the AJ card Modifying steps results in Figure 5-16, AJ card addition to JNODES & JLINKS & JNSECS and after card associated with sex, and synchronization updates the value with the

relevant card value, data storage action to make changes to its residual value. The hydraulic profiles the AI card modify steps achievements Figure 5-17 column of data to make changes and press the Modify button to complete the data storage action.

Water management files AT card to modify the procedure results in Figure 5-18, addition the Ttend value CQ card simultaneously update the rest can be conducted after the change is complete, press the modify button to complete the data storage action.

Hydraulic file AP & AB & AC & the AM card modify steps achievements Figure 5-19 to Figure 5-22, a column of data to make changes, and press the Modify button, complete data storage action. Water management of BE & BP card file to modify the results of the procedure in Figure 5-23 to Figure 5-24, change the column data, and press the Modify button to complete the data storage action.

The water management file the BL cards modify steps achievements Figure 5-25 to 5-27, BL card use to reduce the button function delete action column a value, can also increase the rows and columns value, to increase column after AJ cardafter the the correlation value jlink synchronous update, delete, and likewise, modify BL card, synchronized storage the AJ card within value.

The hydraulic file BN_BK card modify steps results in Figure 5-28 to Figure 5-33, increase BN_BK card button automatically added NODE, should pay attention to the column input value NODE menu items must be the same for the two, and can not bewill appear blank otherwise modify the error message is displayed, the model of operation using the drop-down menu to view, add or delete information action,

Card delete button will delete the dialog menu NODE and press Y

option, delete NODE action. And to increase and reduce value the NODE with AJ cards related JNODE synchronization update, delete likewise synchronized storage, after modifying BN_BK card, the the AJ card within value.

Modify steps BS_BR card results shown in Figure 5-34 to 5-38, as BS_BR increase or delete a number, due to two-card items interrelated, so the need for NS_GR within the same increase, and delete items action.

Increased NS_GR must for BS_BR increase delete, archive or delete items, otherwise an error message. No Data such as NS_GR cards, presents prohibited select state increased with the delete button. The water management file NS_GR card modify the results of steps shown in Figure 5-39 to Figure 5-41,increase cross-section NS_GR card information can not be blank and canceled otherwise require re-enter the value, at the same time to complete the items or delete the increased BS_BR with NS_GR together, AJ correlation value JNSECS update. Finally, to be within the value of BS_BR with NS_GR card stored separately NS_GR the stored together with the the AJ card within values together to complete the save action.

Water management the TQ & DT card file to modify the results of the procedure in Figure 5-42 to Figure 5-43, change the column data, and press the Modify button to complete the data storage action. The achievements of the water management files CQ card modify the steps shown in Figure 5-44 to Figure 5-47 CQ the card using the drop-down menu to access, modify and delete action through an increase in the button itself increase the cross-section information, delete function similar. Note text field can not be blank No error message, the modify, AT within Ttend's synchronous changes and together with storage.

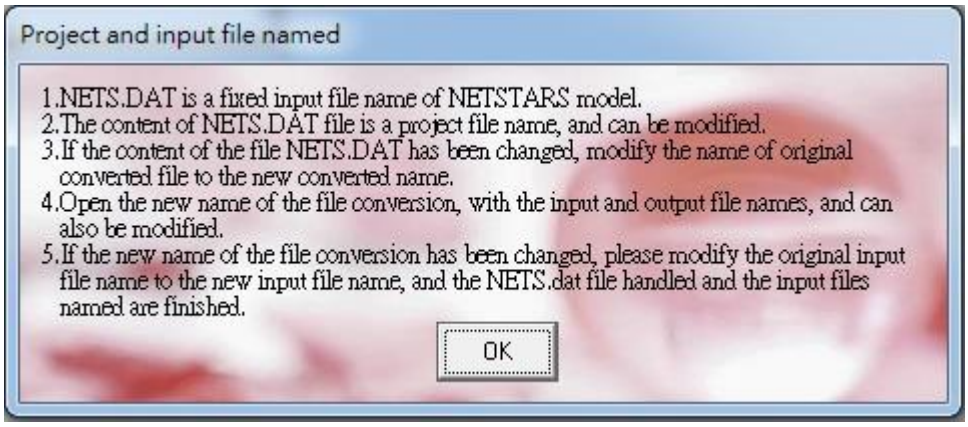

Figure 5-11 professional and input file named diagram

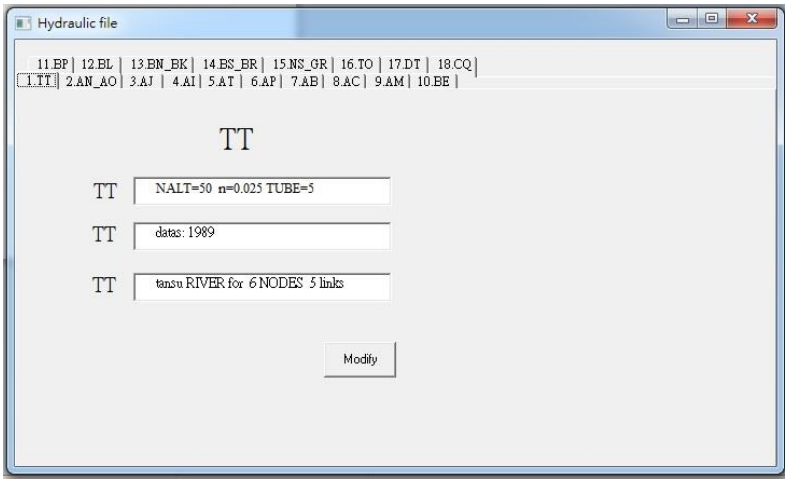

Figure 5-12 TT card schematic diagram

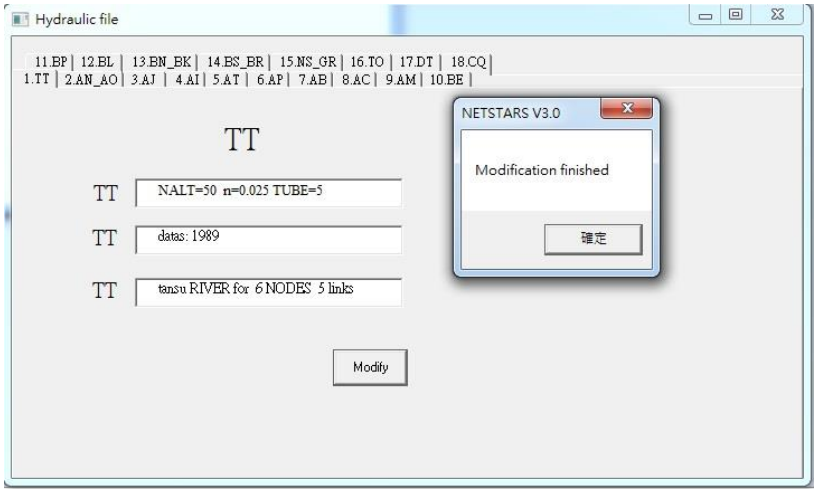

Figure 5-13 modification is completed schematic

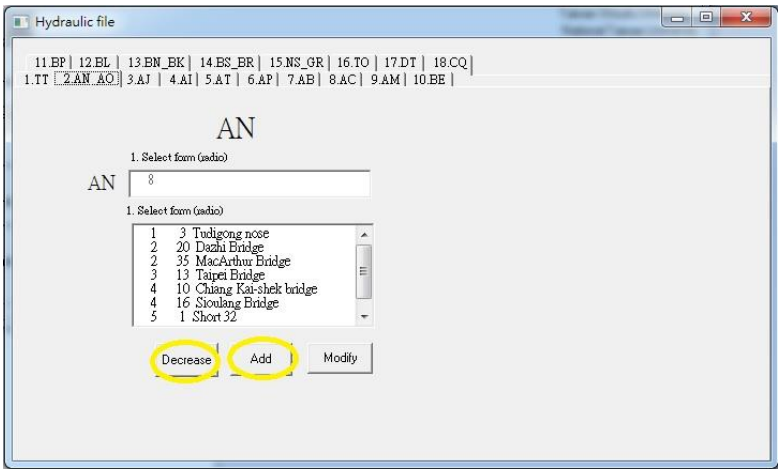

Figure 5-14 AN card function diagram

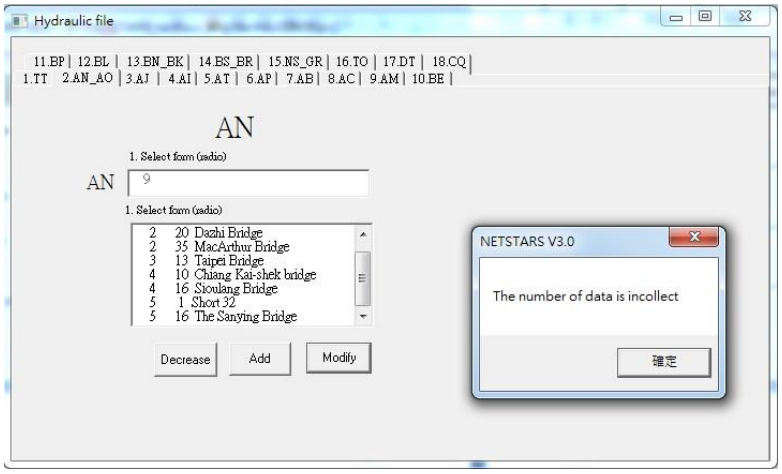

Figure 5-15 Error shown in Figure

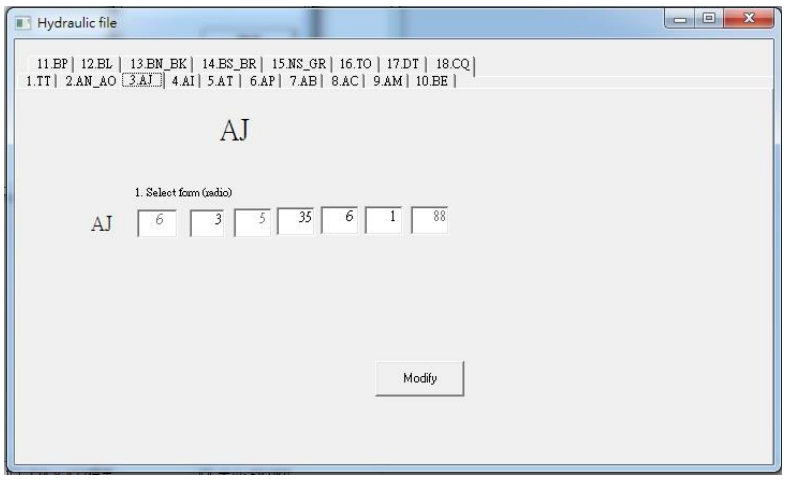

Figure 5-16 AJ card schematic diagram

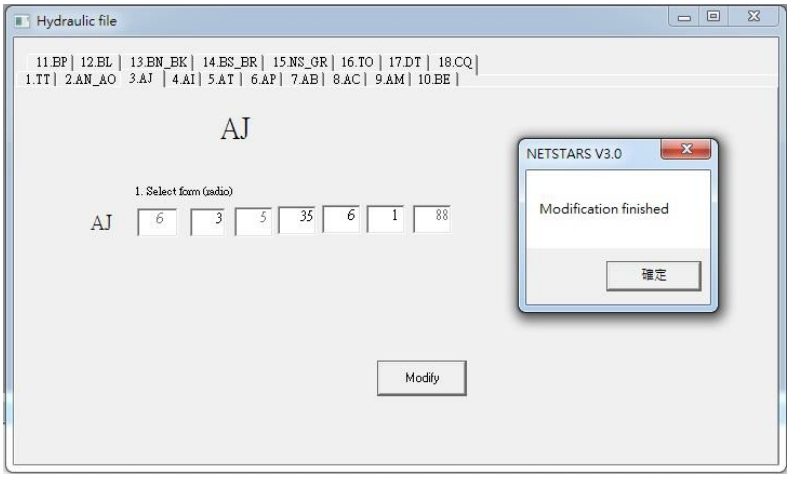

Figure5-17 AI card schematic diagram

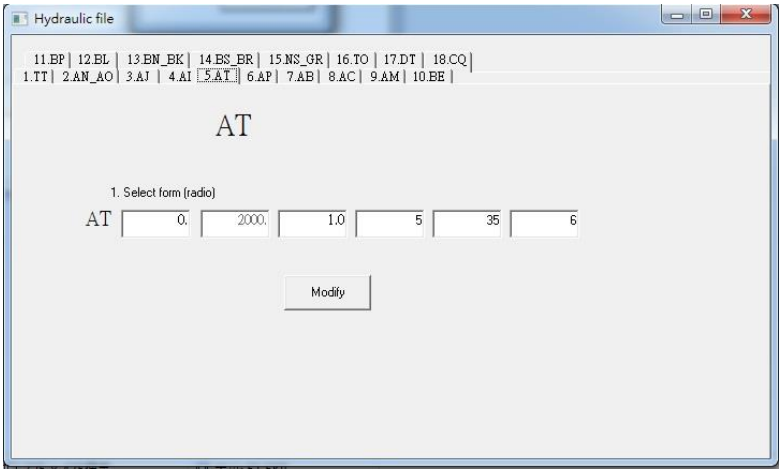

Figure 5-18 AT card schematic diagram

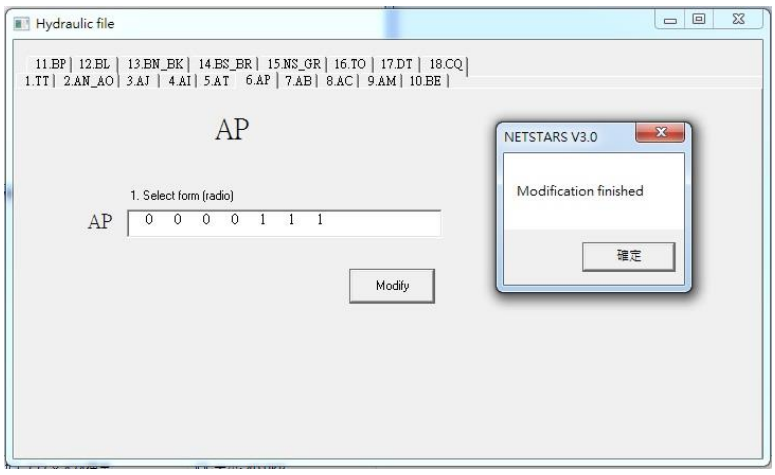

Figure 5-19 AP card schematic diagram

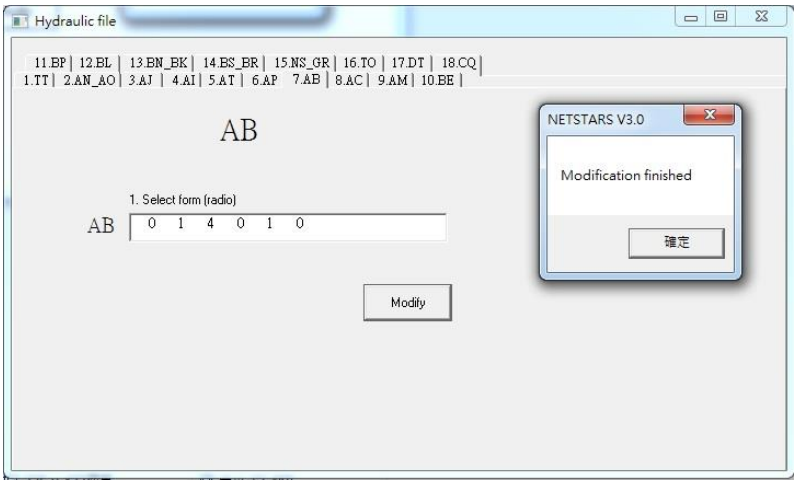

Figure 5-20 AB card schematic diagram

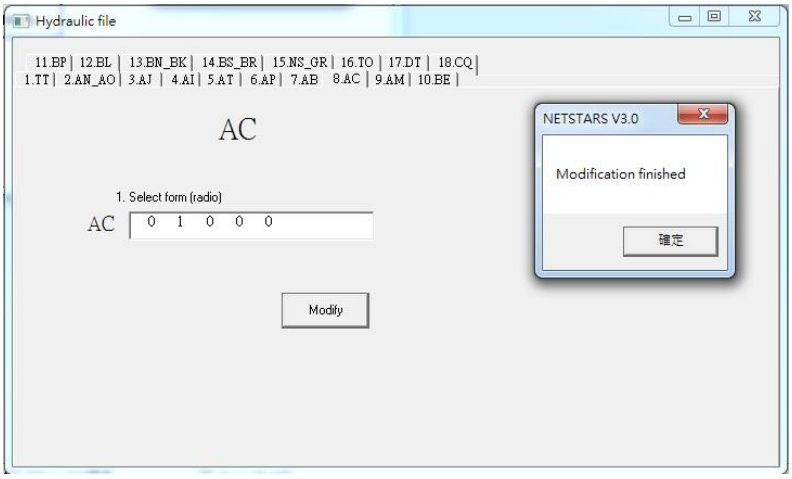

Figure 5-21 AC card schematic diagram

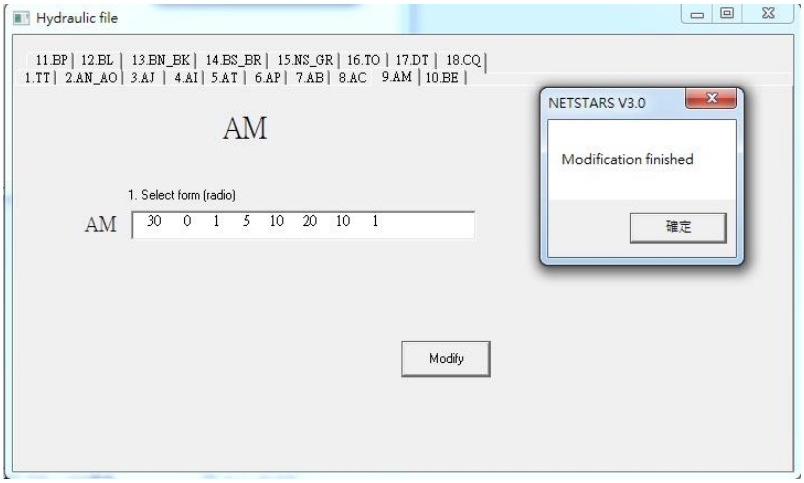

Figure 5-22 AM card schematic diagram

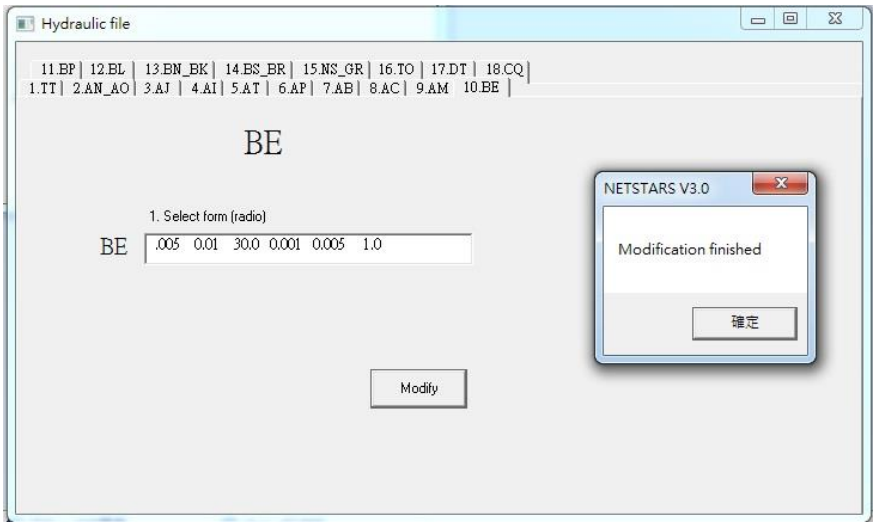

Figure 5-23 BE functional diagram

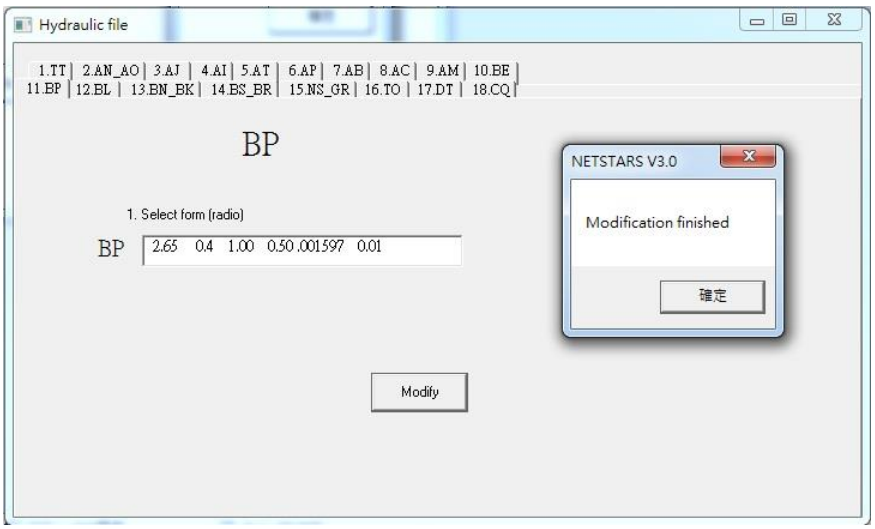

Figure 5-24 BP functional diagram

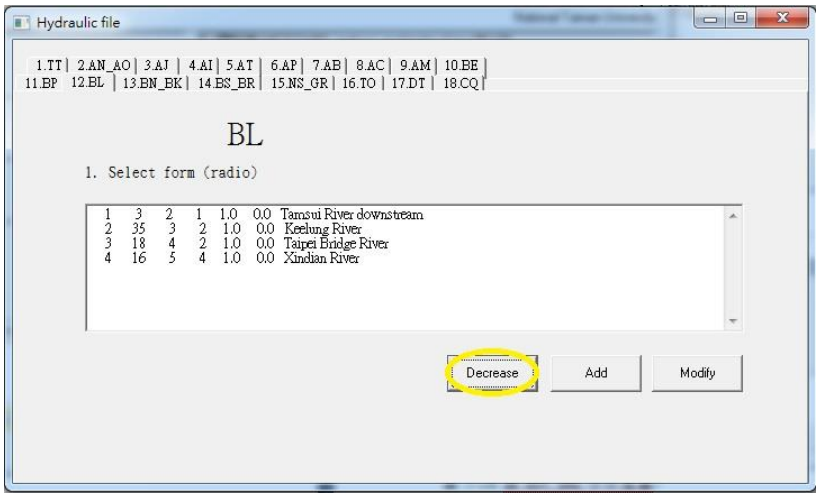

Figure 5-25 BL functional diagram

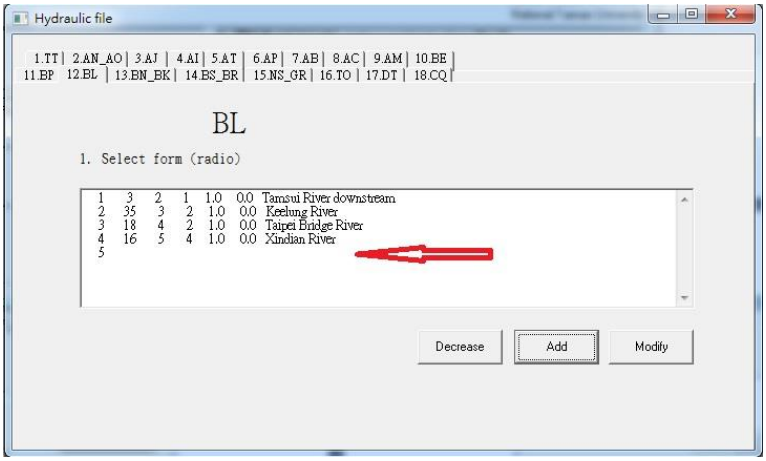

Figure 5-26 add items demonstration Figure

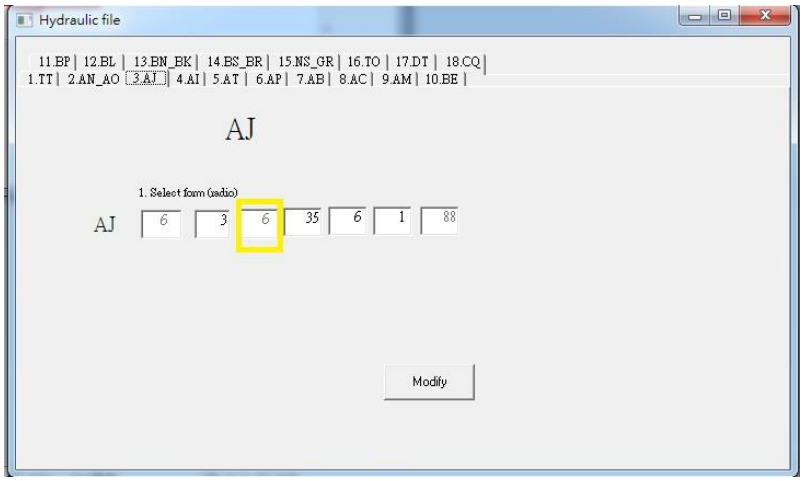

Figure 5-27 and AJ card JLNKS synchronous update

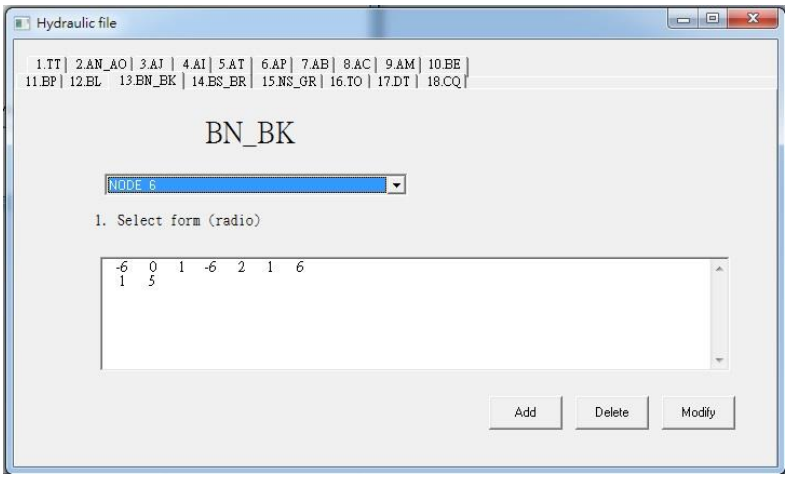

Figure 5-28 Schematic diagram with BN_BK card

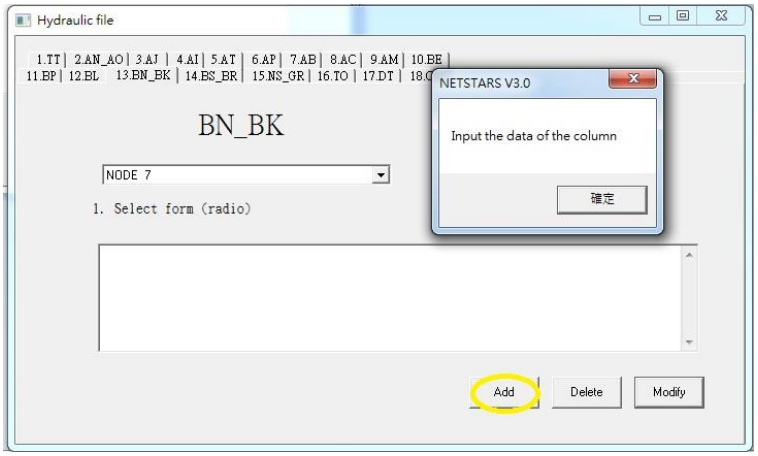

Figure 5-29 in Functional diagram

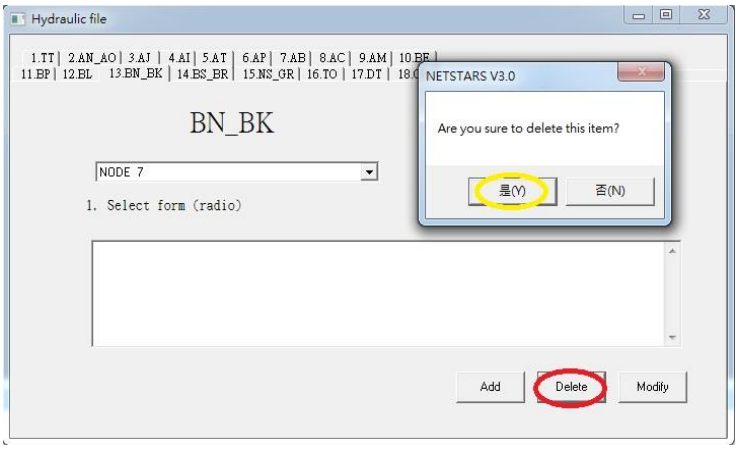

Figure 5-30 for the deletion demonstration

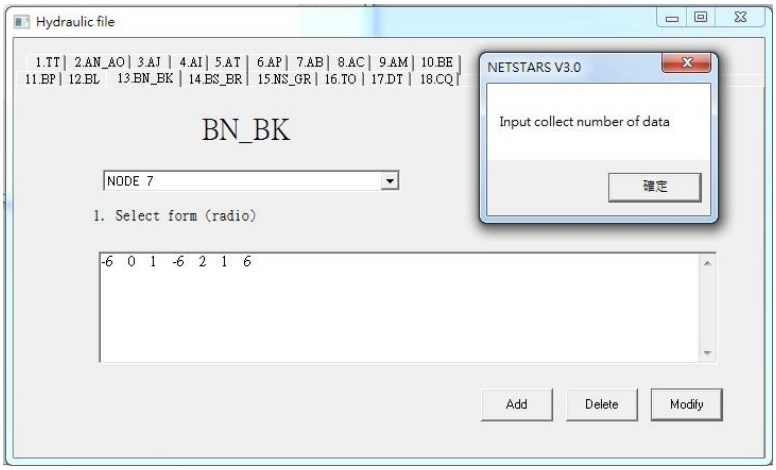

Figure 5-31 data error is shown in Figure

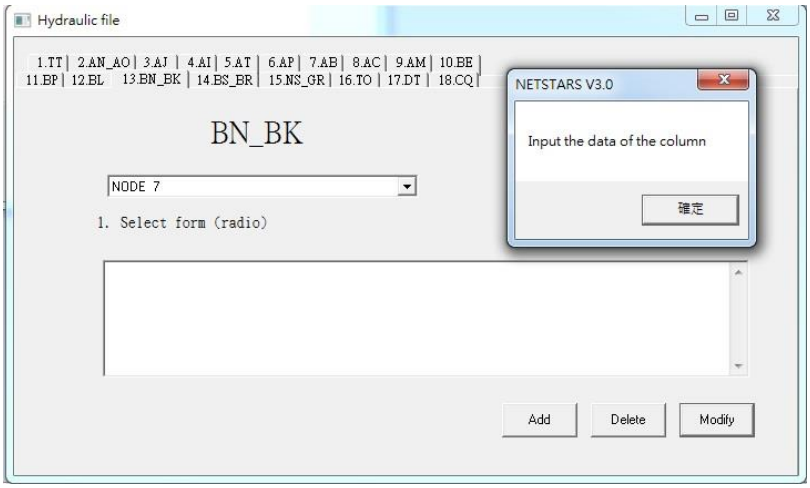

Figure 5-32 Error shown in Figure

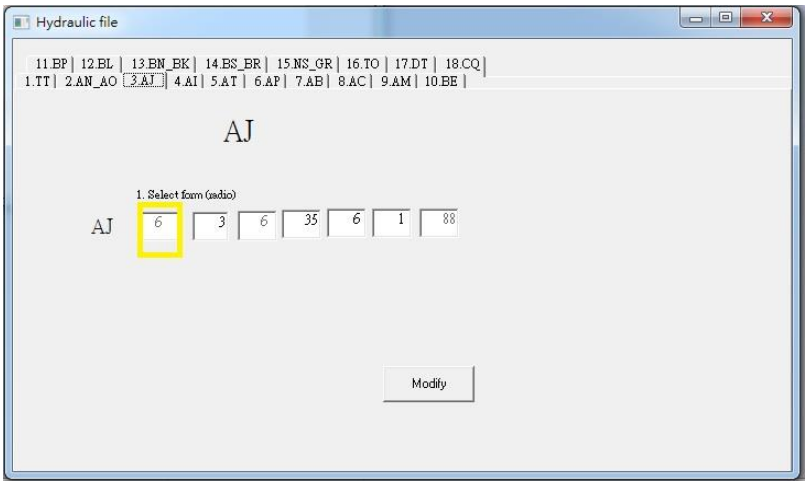

Figure 5-33 With the AJ card JNODES synchronous update stored

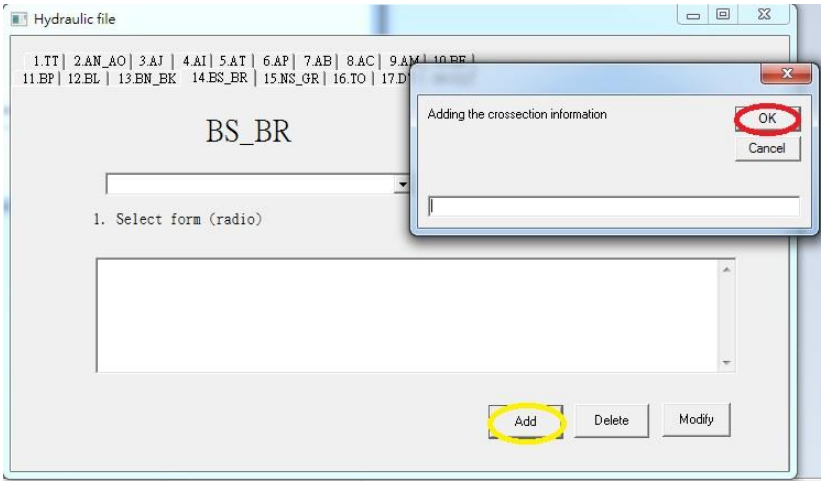

Figure 5-34 With the Card add items demonstration Figure

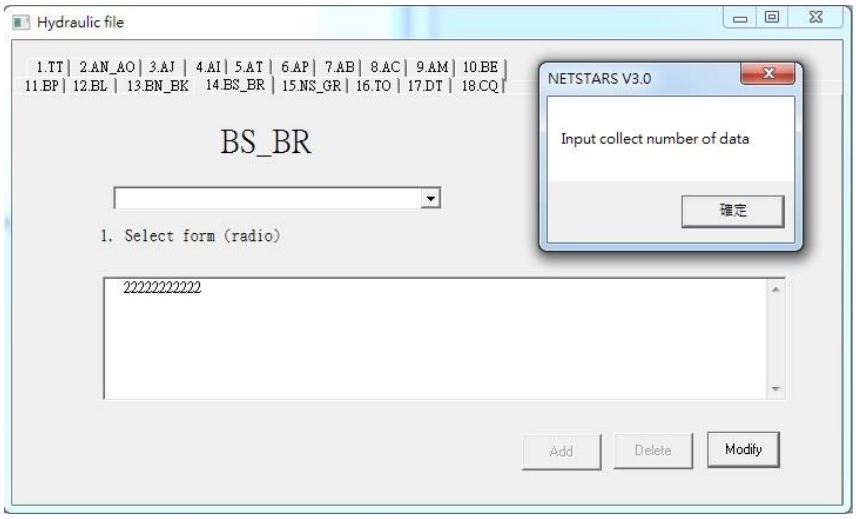

Figure 5-35 data error is shown in Figure

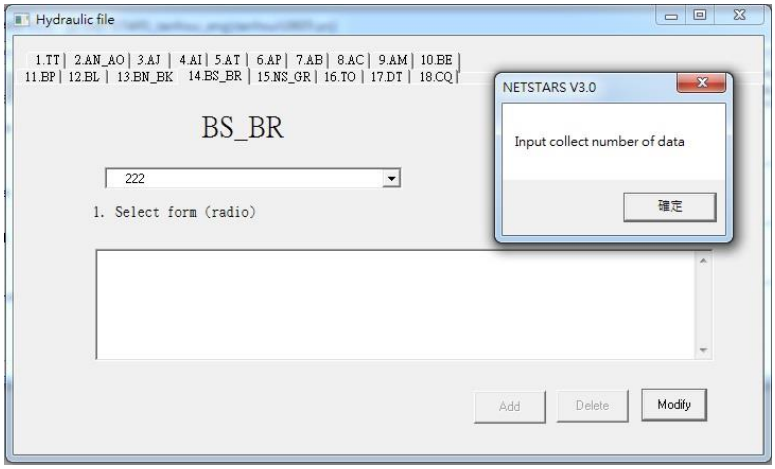

Figure 5-36 data error is shown in Figure

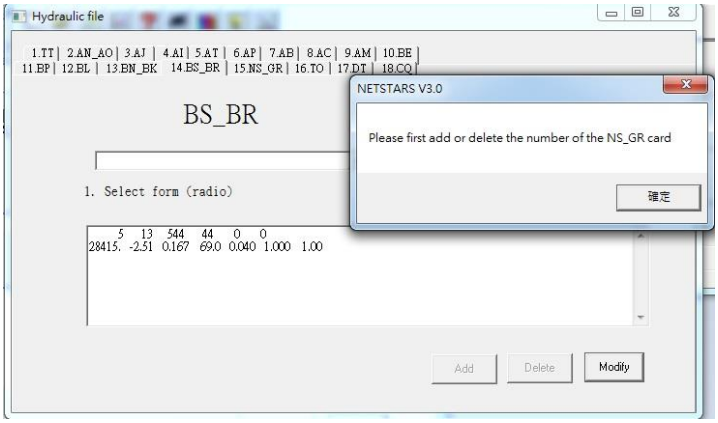

Figure 5-37 data error is shown in Figure

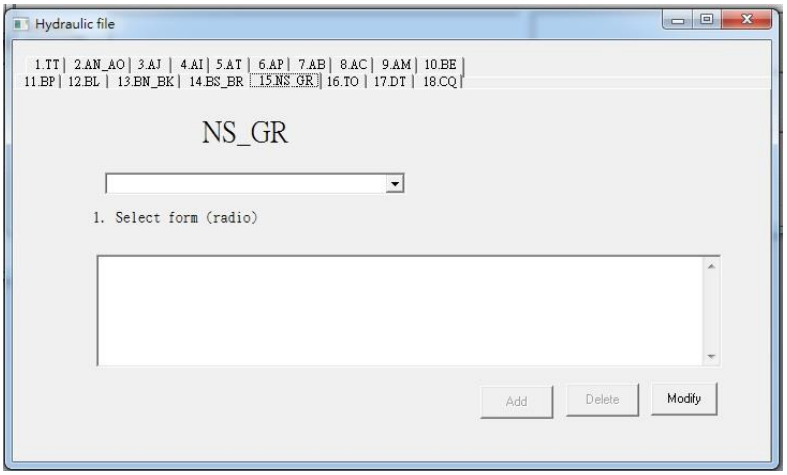

Figure 5-38 NS_GR card increase in the initial state failure diagram and delete functions

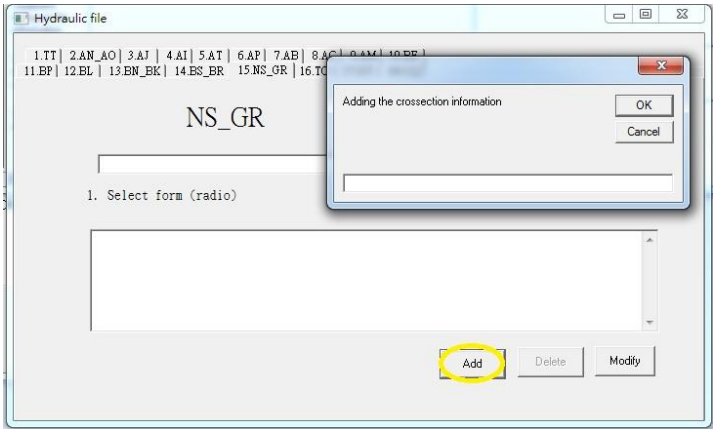

Figure 5-39 NS_GR card model Figure

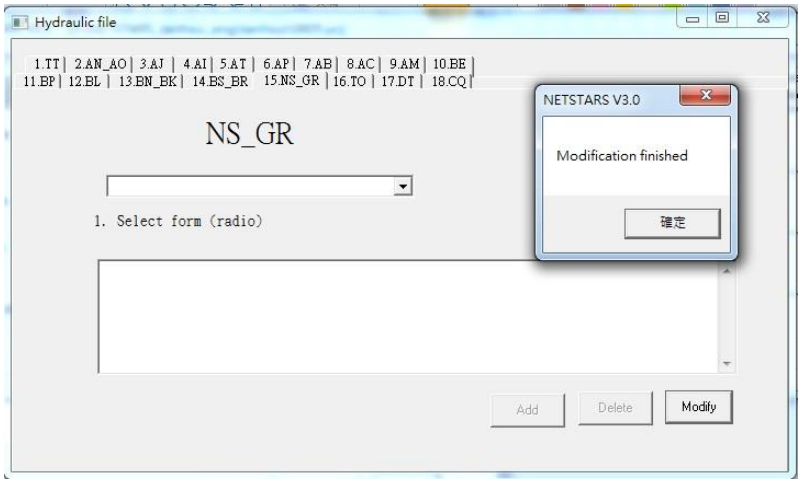

Figure 5-40 data error is shown in Figure

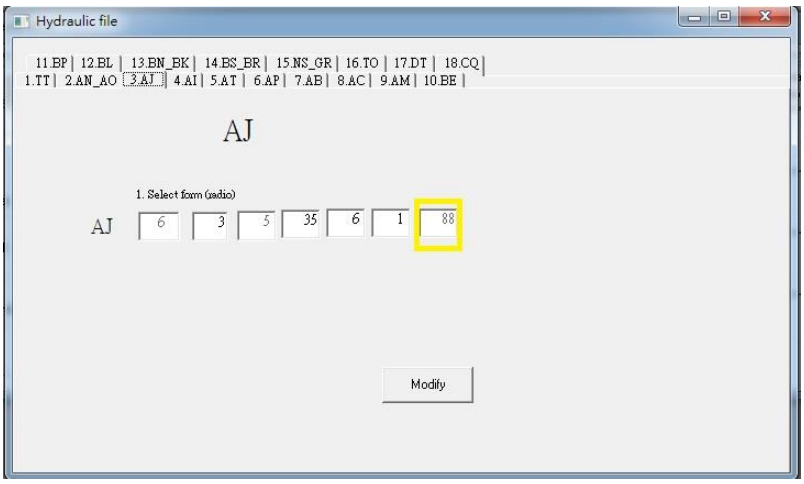

Figure 5-41 AJ card JNSECS synchronous update stored

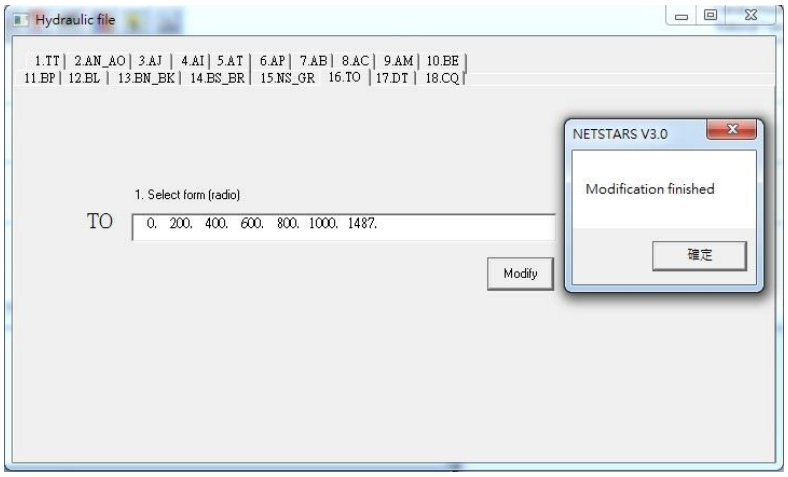

Figure 5-42 TO modifications completed diagram

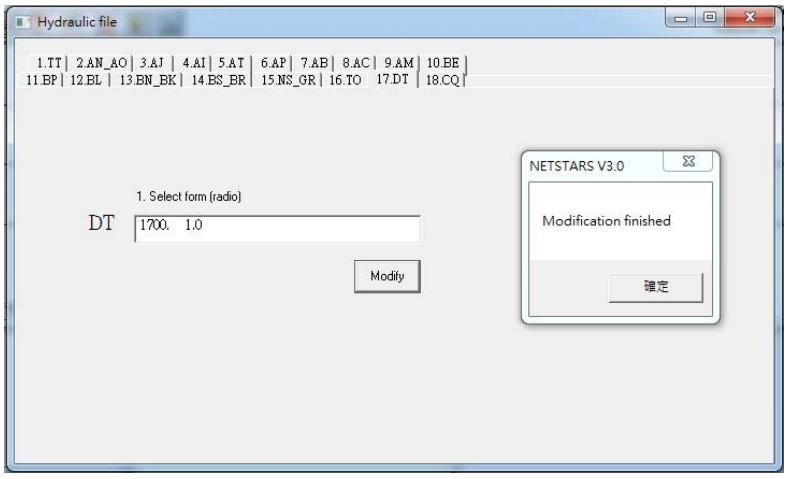

Figure 5-43 TO modifications completed diagram

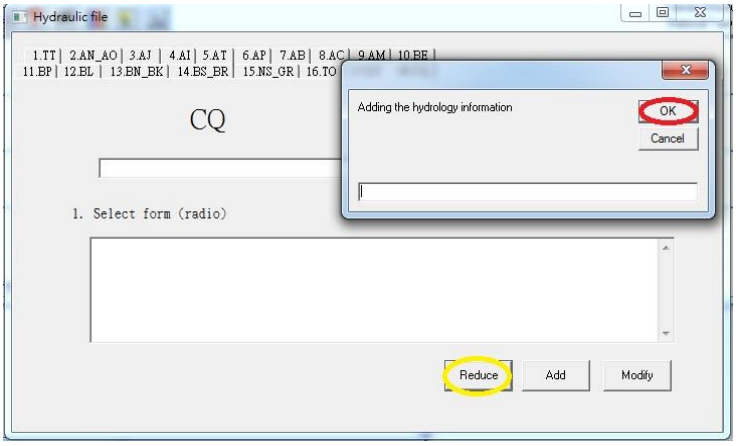

Figure 5-44 CQ increase items demonstration Figure

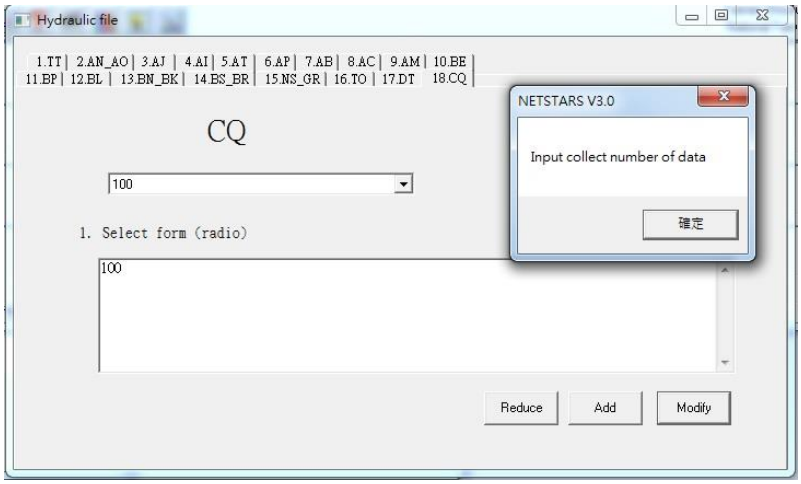

Figure 5-45 data errors schematic diagram

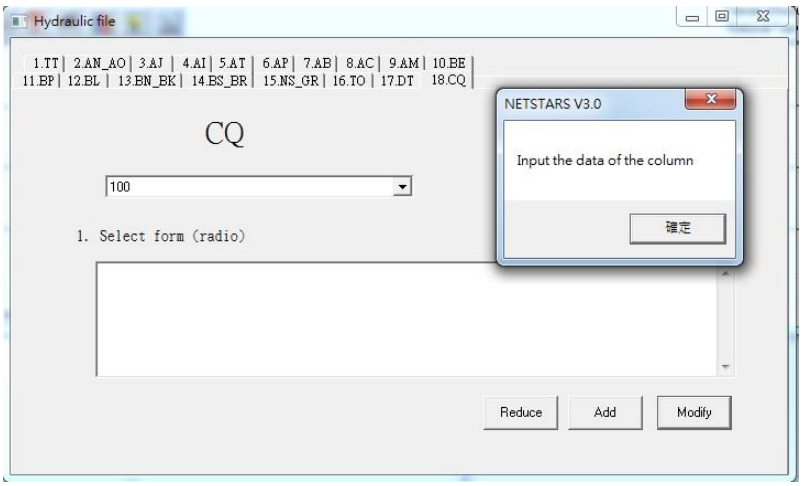

Figure 5-46 data errors schematic diagram

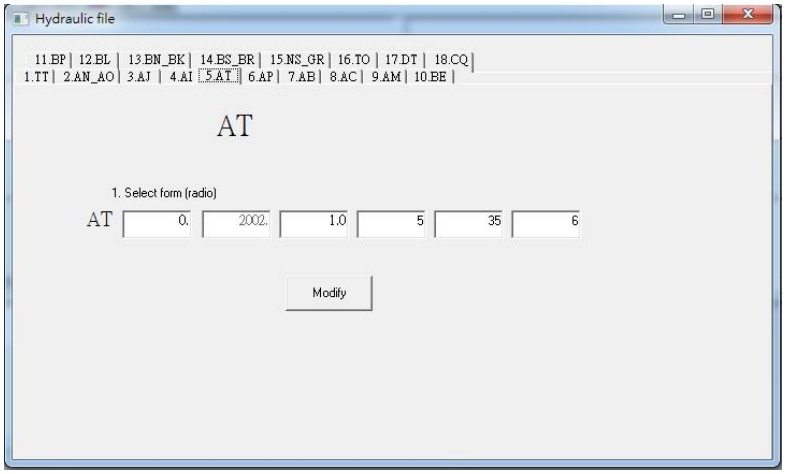

Figure 5-47 synchronization with AT card tTend,, update, and storage

The second one is sediment transportation file, can modified different file, **sediment transport files ST card** & PR Card & NT card & IT Card & SE cards modify the outcome of the steps in Figure 5-48 to 5-51,column of data to make changes, press modify the Finish button to complete the stored data action. SG card modify steps explanation is shown in Figures 5-52 to 5-56, If items in column has been increases or decreases, items in SG card will increase or decrease at the same time when the value increased or decreased, and when SG card is modified, it will be save in the same time,

The limit of increased and delete in SG card: When adding every single data in SG card, column value cannot be blank, and every column can only have one item, or will shows error message. SP card & SN Card & BC card is omitted, and function is same as SG, except input column cannot not be blank, column value of SP Card & SN Card is limited to two, BC Card is one.

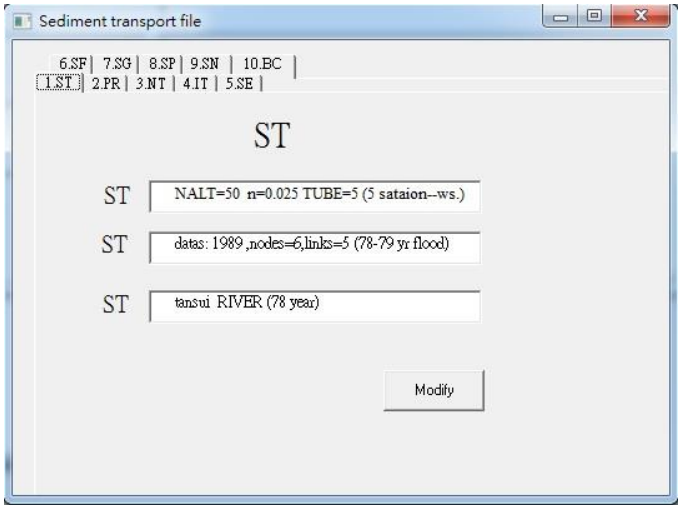

Figure 5-48 ST card schematic diagram

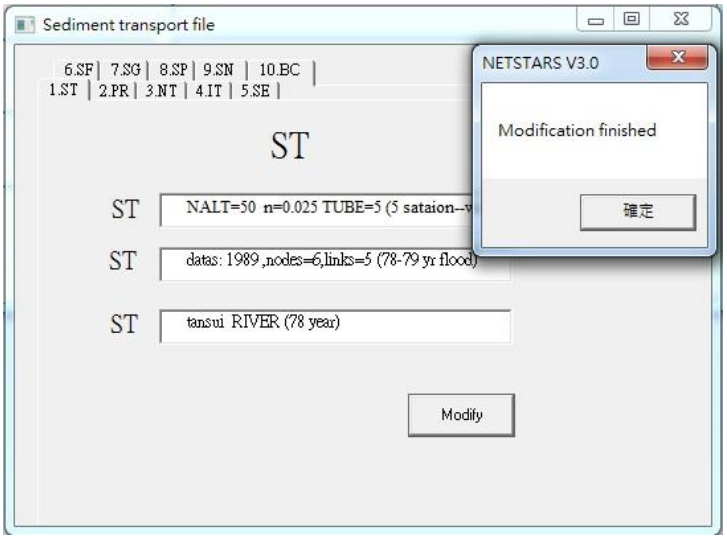

Figure 5-49 ST card modification is completed schematic

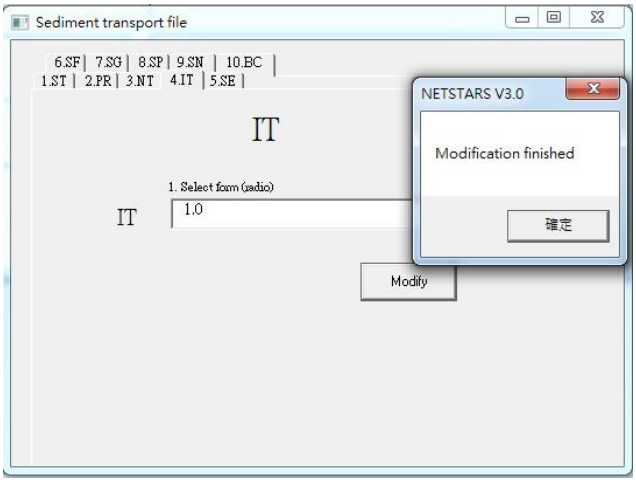

Figure 5-50 IT card modification is completed schematic

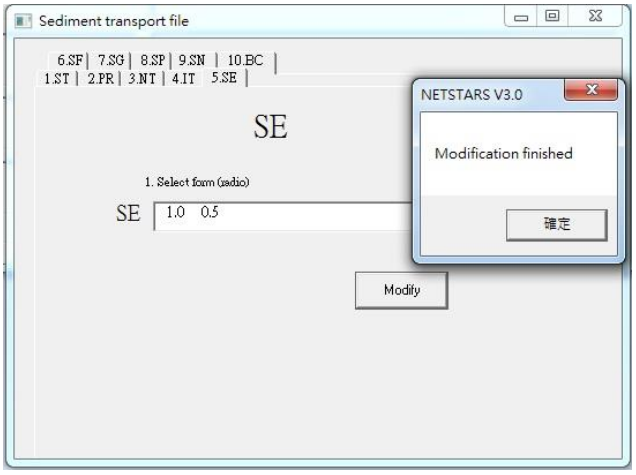

Figure 5-51 IT card modification is completed schematic

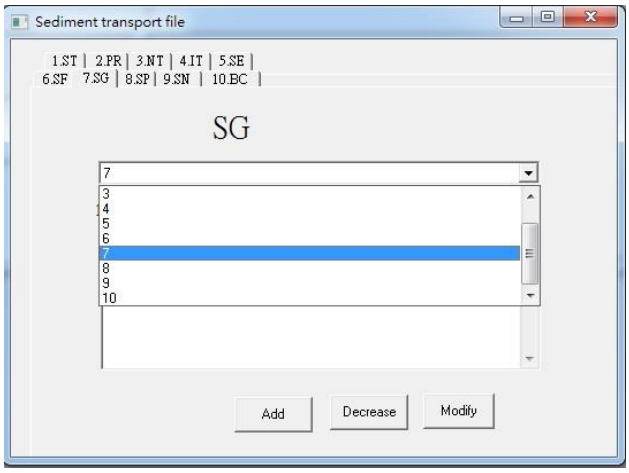

Figure 5-52 SG card schematic diagram

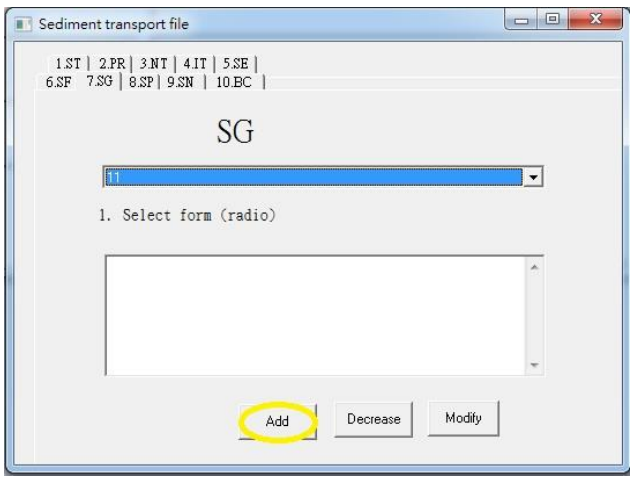

Figure 5-53 SG card function schematic diagram

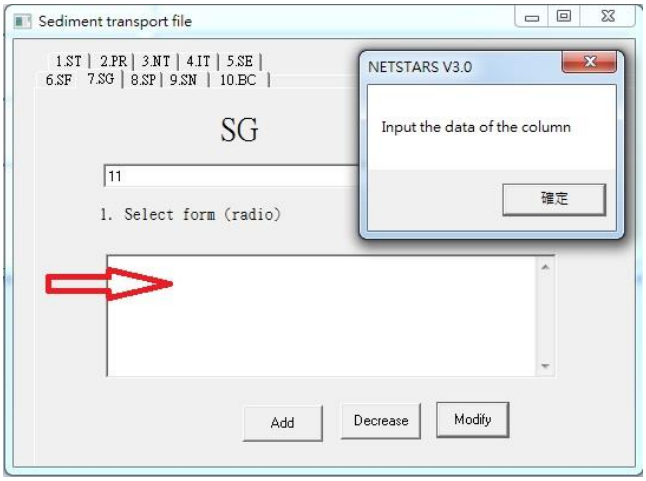

Figure 5-54 SG card error display I

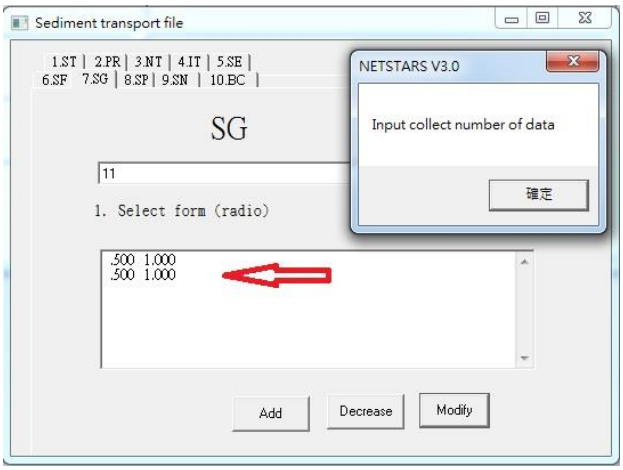

Figure 5-55 SG card error display II

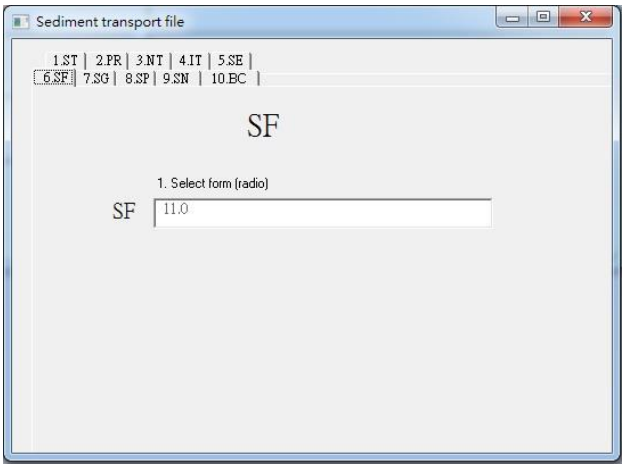

Figure 5-56 updated simultaneously with the SG card and storage

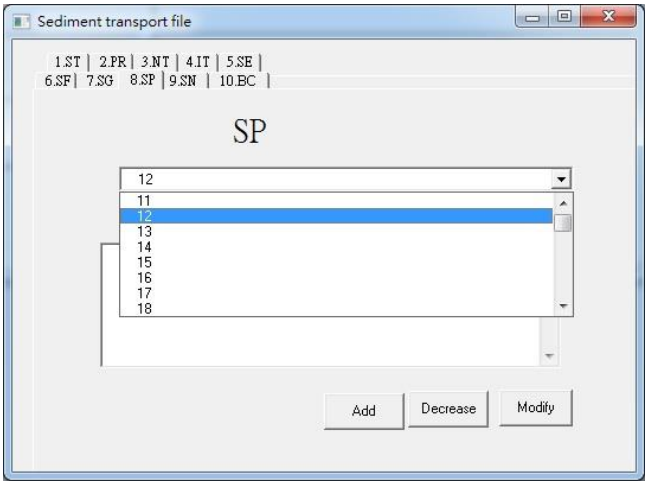

Figure 5-57 SP card schematic

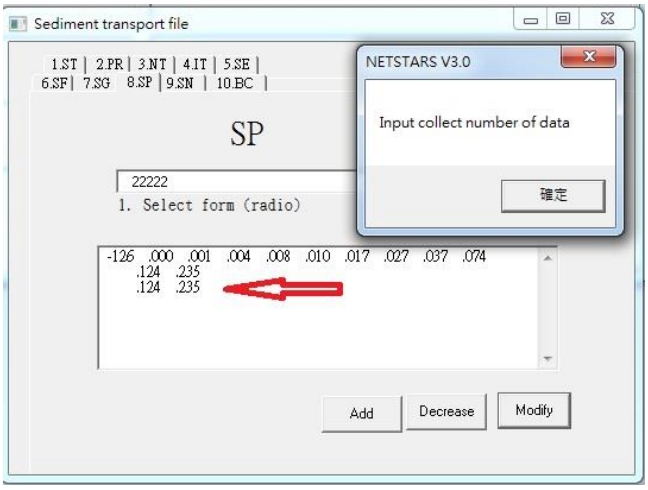

Figure 5-58 SP card error

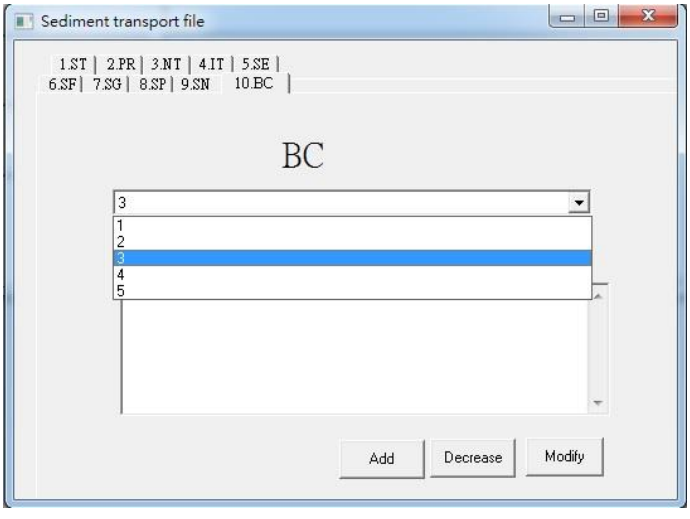

Figure 5-59 Schematic Diagram of BC Card

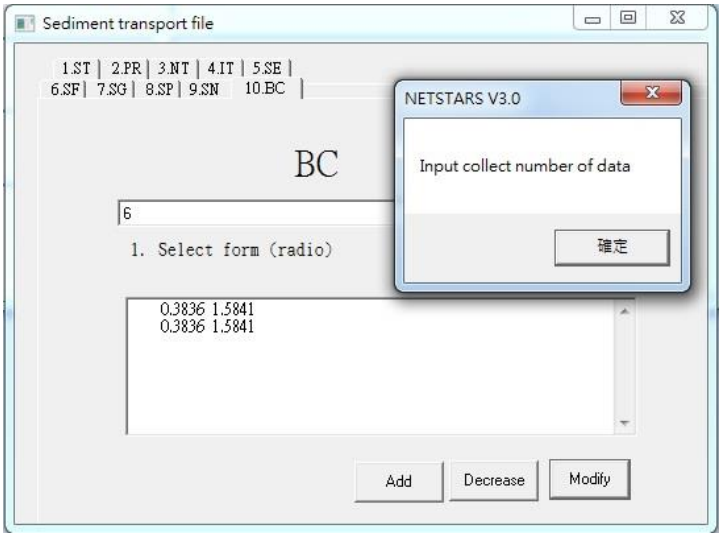

Figure 5-60 BC card error

Third one is suspended load files, can modified different file, suspended load modify steps explanation is shown in Figures 5-61, change column data, and press the modify complete button to complete saving information. **CC & CF card** operation steps explanation is shown in Figures 5-62 to 5-64 except to modify data and saving, and input column must not be blank, under the items in card the column value limit is one.

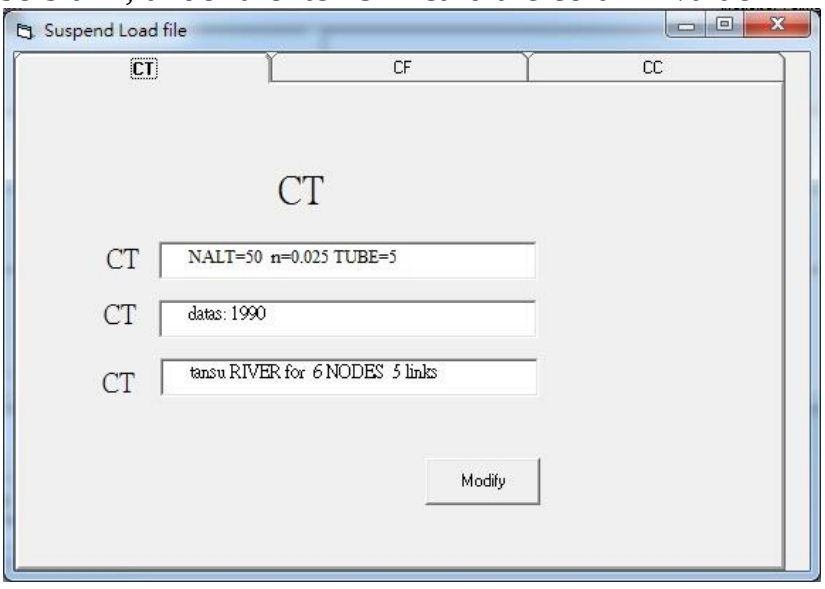

Figure 5-61 CT card schematic diagram

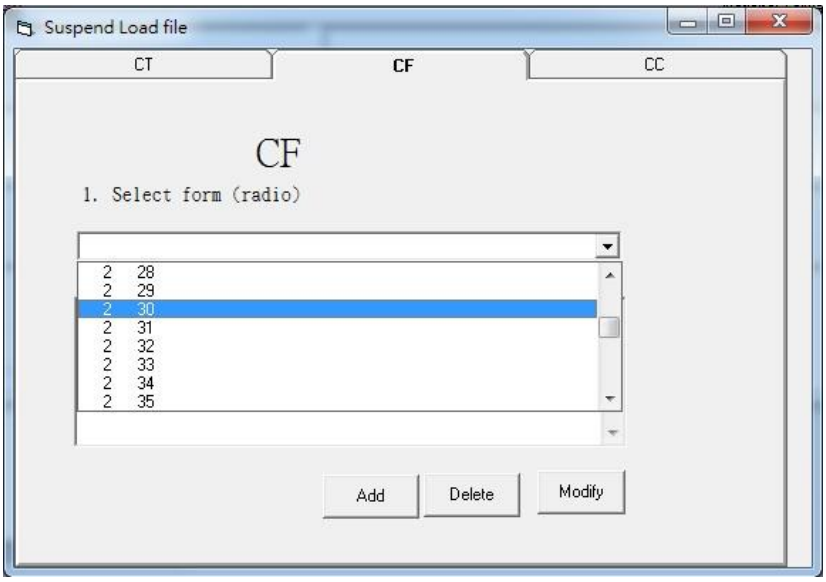

Figure 5-62 CT card schematic diagram

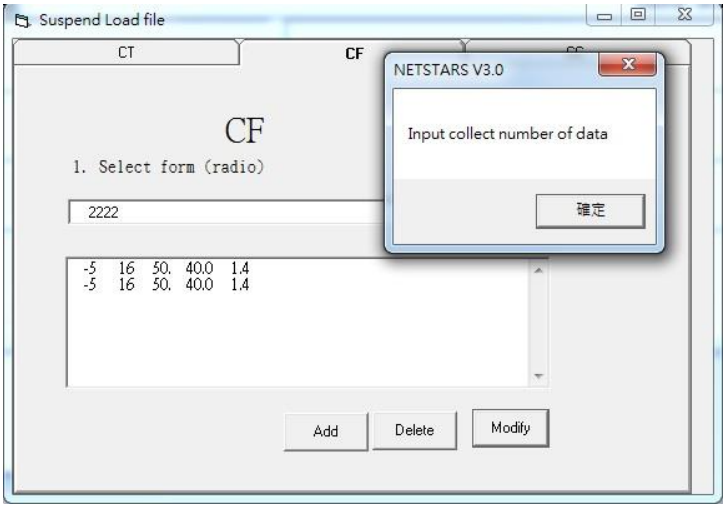

Figure 5-63 CF error display

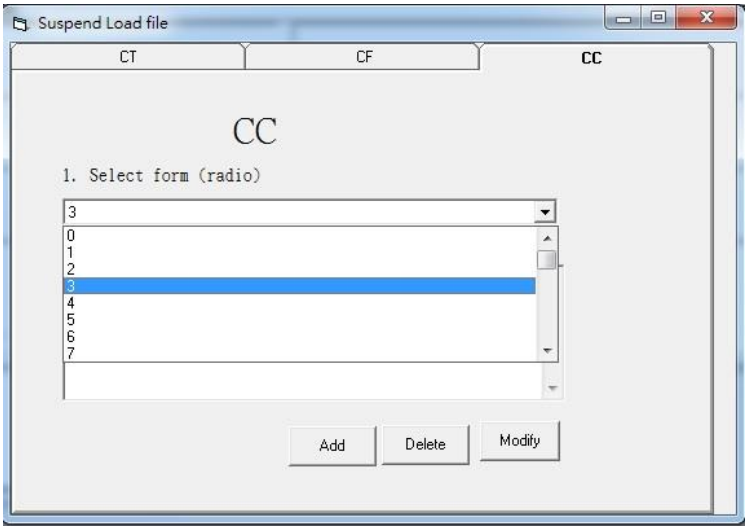

Figure 5-64 CC card schematic diagram

Fourth one is lateral flow file, can modified different file, lateral flow file LI card modify steps explanation is shown in Figure 7-26, alter the column data, and press modify completed button to complete saving data.

LA & LI cards operation steps explanation is shown in Figure 5-66 to 5-67, if LA card has add or remove items LI card will update, delete and save in the same time, except the field of LI card cannot be blank, items limit is one.

Figure 5-65 LT card schematic diagram

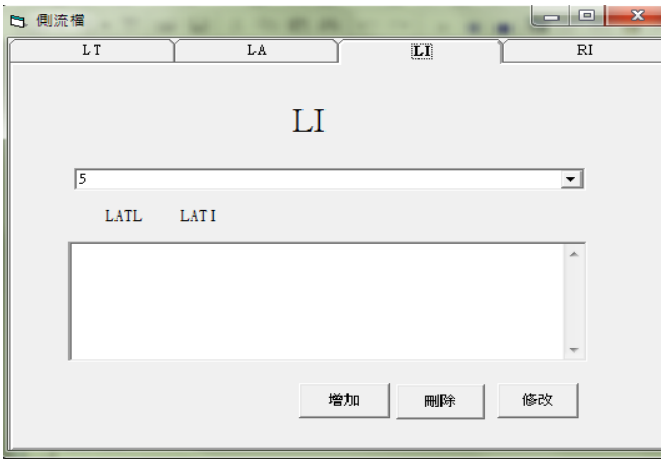

Figure 5-66 LI card schematic diagram

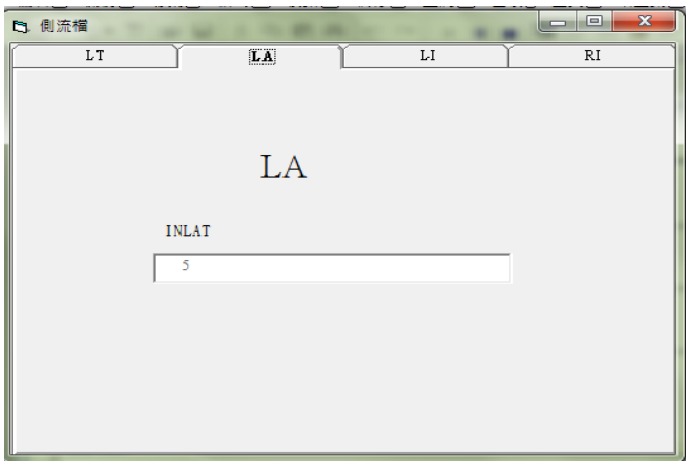

Figure 5-67 LA card and LI card update and save synchronous

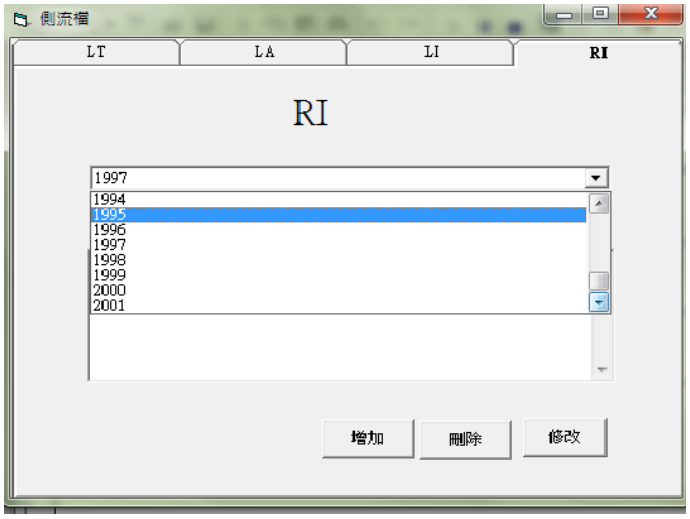

Figure 5-68 RI card schematic diagram

Inspect input data under information and simulation menu, can inspect the completeness of files in each input data, can also modify and compare the files in each data, to inspect the results please see Figure 5-69 and Figure 5-70. After complete inspect data, then we can start preparing simulation data, it will overwrites the old data, and make a backup for previous file, the operating results is shown in Figure 5-71. Execute simulation result is shown in Figure 5-72.

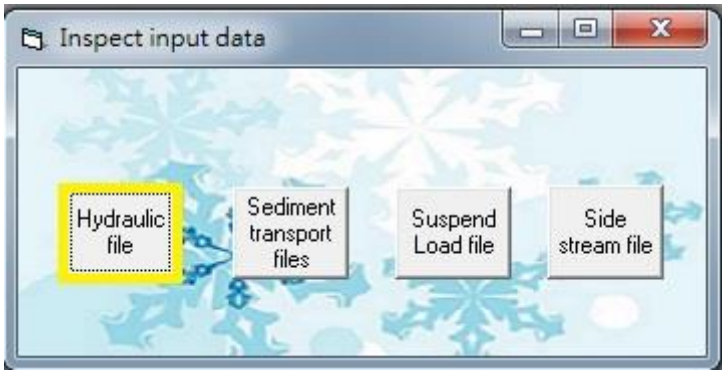

Figure 5-69 Data inspection schematic diagram

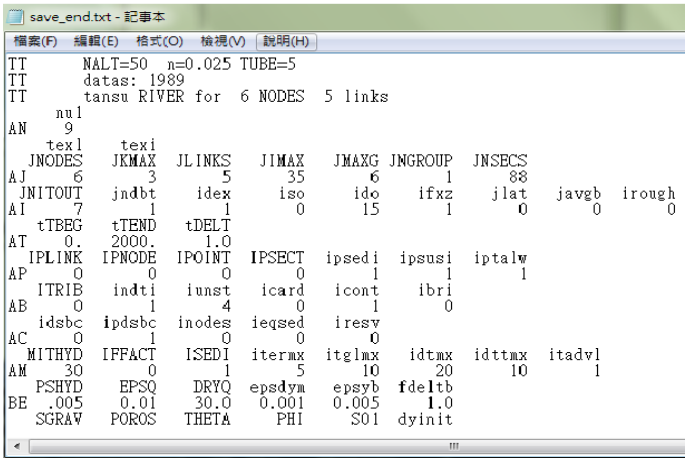

Figure 5-70 Open File schematic diagram

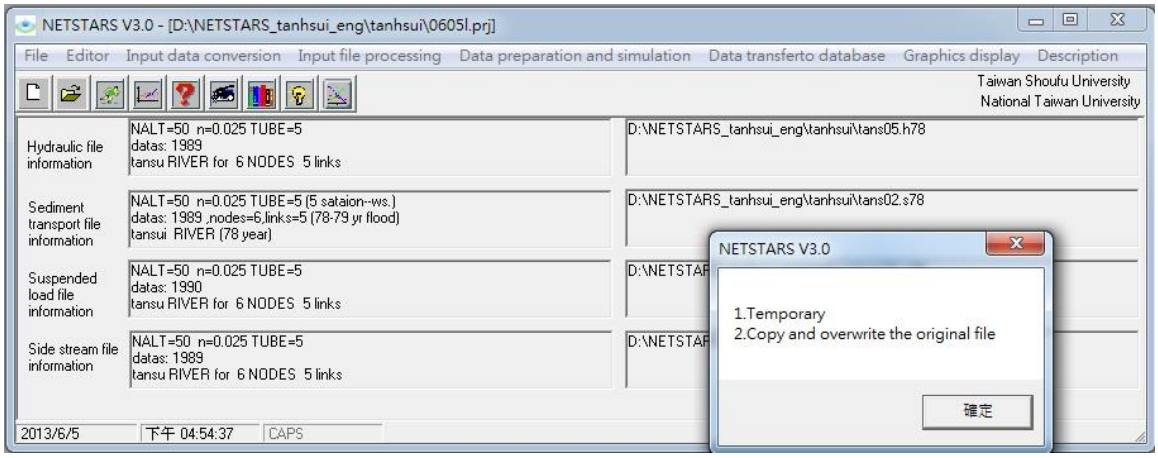

Figure 5-71 Execution results of preparing simulation data

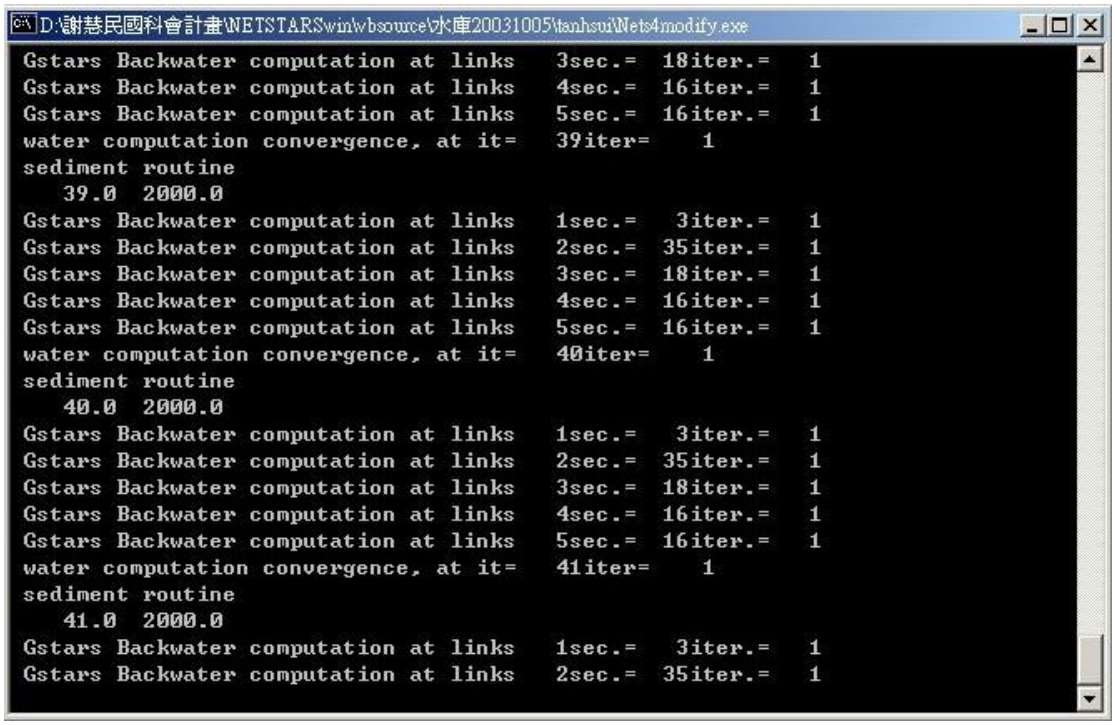

Figure 5-72 Execution simulation files execute sample icon

Part of the data into the database, drawing impressions must first perform the work, and is divided into the hydrograph, longitudinal, cross-sectional flow tube data processing and is transferred to the database. Profile data processing program pllink10.exe; The cross-sectional data handler plsec10.exe Both programs use written in FORTRAN language, execution will generate a text file, and then use the second function to read a text file into a database.

The plan to use a Microsoft Access database to store data, tables, fields, and data programmatically generated in real time, The hydrograph turn to Database dialog box shown in Figure 5-73, There are three steps to be the order of drawing The first step is to read the output file name, the second step is to convert the file name is the name of the table, the third step is to open the database and generates the table and set the field namefill in the information. The third step would be to wait a little longer time, the database open there is some new tables, the data are arranged and not in accordance with the written order, and thus in the Paint must re-find

information sort time to draw results .

Database was as shown in Figure 5-74, the contents of the table as shown in Figure 5-75. Profile data file generated the function implementation process is shown in Figure 5-76, you can enter the longitudinal section measurement file. The profile transfers the data to the database dialog box shown in Figure 5-77, similar to the three-step conversion with the hydrograph. The cross-sectional data files generated function performs the process shown in Figure 5-78, you can enter the cross-sectional measurements file. The cross-section transfers the data to the database dialog box shown in Figure 5-79, with the hydrograph similar three-step conversion.

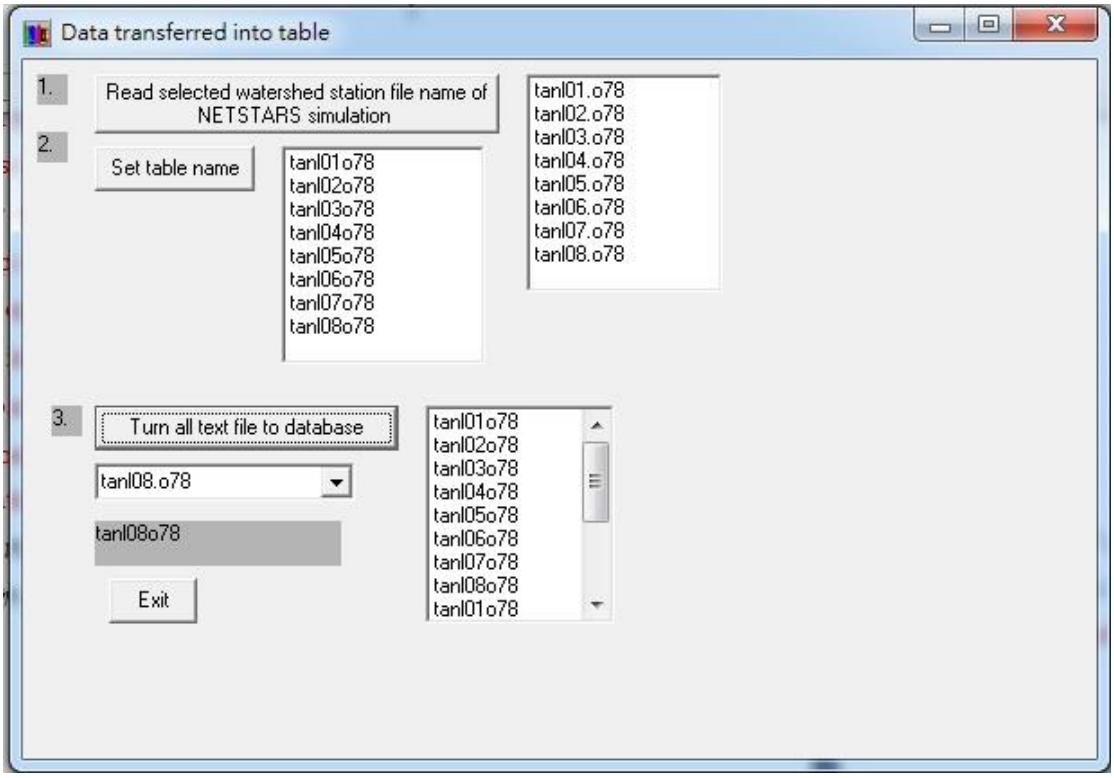

Figure 5-73 hydrograph transfer the data to the database dialog box results of the implementation of icon

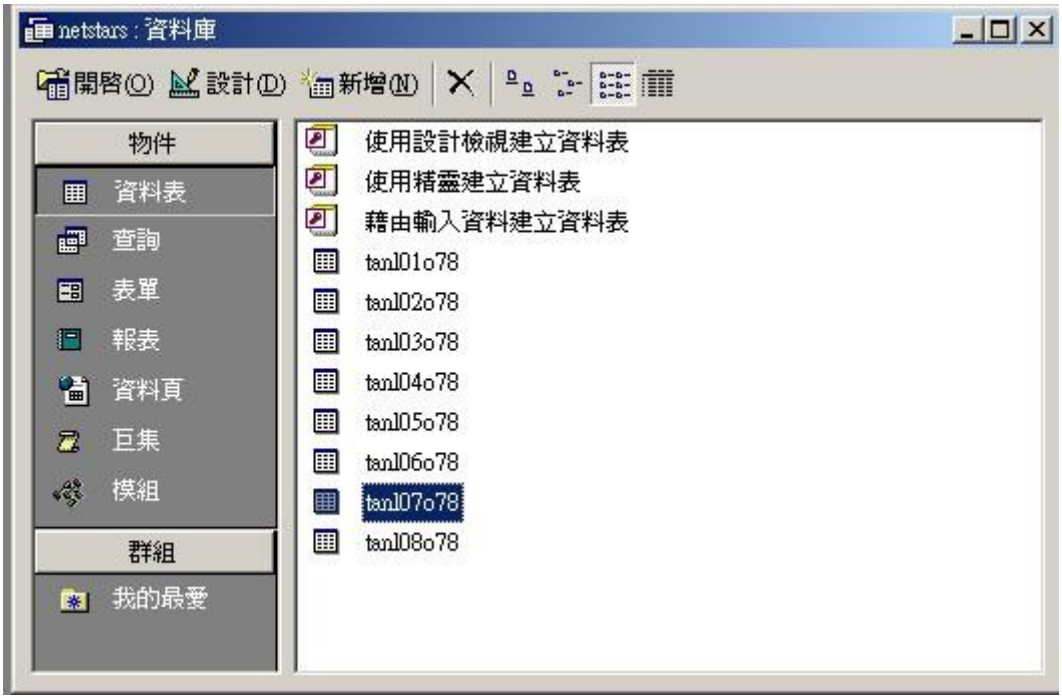

Figure 5-74 Table transferred database content icon

tanl03o78 : 資料表

	ttime	Y	Q	roughness	VEL	TAL WEG	qstot	be	con1	con2
▶	0	0.603	67	0.05	0.49	-0.9	0	0		
	1	0.818	87	0.05	0.545	-0.9	4700	0		
	2	0.109	27	0.05	0.321	-0.9	420	0		
	3	0.24	27	0.05	0.275	-0.9	110	0		
	4	0.564	27	0.05	0.204	-0.9	5.9	0		
	5	1.045	87	0.05	0.473	-0.9	1500	0		
	6	1.49	127	0.05	0.547	-0.9	2800	0		
	7	1.624	127	0.05	0.515	-0.9	1700	0		
	8	1.679	127	0.05	0.503	-0.9	1400	0		
	9	1.563	127	0.05	0.529	-0.9	1900	0		
	10	1.402	127	0.05	0.571	-0.9	3200	0		
	11	1.151	107	0.05	0.548	-0.9	2700	0		
	12	1.06	107	0.05	0.577	-0.9	3600	0		
	13	1.027	107	0.05	0.588	-0.9	3900	0		
	14	1.02	107	0.05	0.59	-0.9	3900	0		
	15	1.035	107	0.05	0.585	-0.9	3500	0		
	16	1.074	107	0.05	0.572	-0.9	2900	0		
	17	1.687	177	0.05	0.698	-0.9	6900	0		
	18	1.784	177	0.05	0.67	-0.9	5000	0		
	19	1.889	177	0.05	0.643	-0.9	3800	0		
	20	2.248	237	0.05	0.753	-0.9	8200	0		
	21	2.205	237	0.05	0.764	-0.9	8800	0		
	22	1.629	157	0.05	0.635	-0.9	3700	0		
	23	1.153	107	0.05	0.547	-0.9	1900	0		
	24	0.775	77	0.05	0.497	-0.9	1300	0		
	25	0.865	71	0.05	0.431	-0.9	540	0		
	26	0.979	101	0.05	0.571	-0.9	2700	0		
	27	0.516	61	0.05	0.479	-0.9	1300	0		
	28	0.504	61	0.05	0.484	-0.9	1400	0		
	29	0.506	61	0.05	0.483	-0.9	1300	0		
	30	0.525	61	0.05	0.475	-0.9	1200	0		
	31	0.98	101	0.05	0.57	-0.9	2500	0		
	32	1.851	201	0.05	0.741	-0.9	7600	0		
	33	2.281	251	0.05	0.788	-0.9	9400	0		
	34	2.367	251	0.05	0.765	-0.9	8100	0		

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Figure 5-75 transferred to the database table content icon

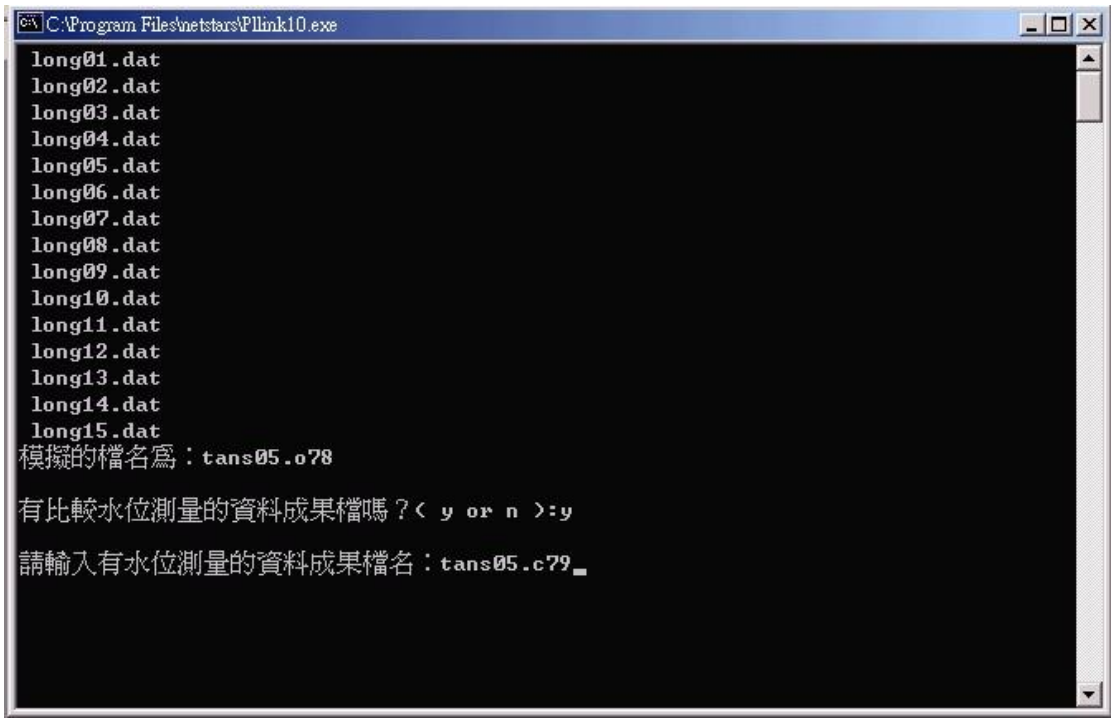

Figure 5-76 longitudinal data files generated during the execution of icon

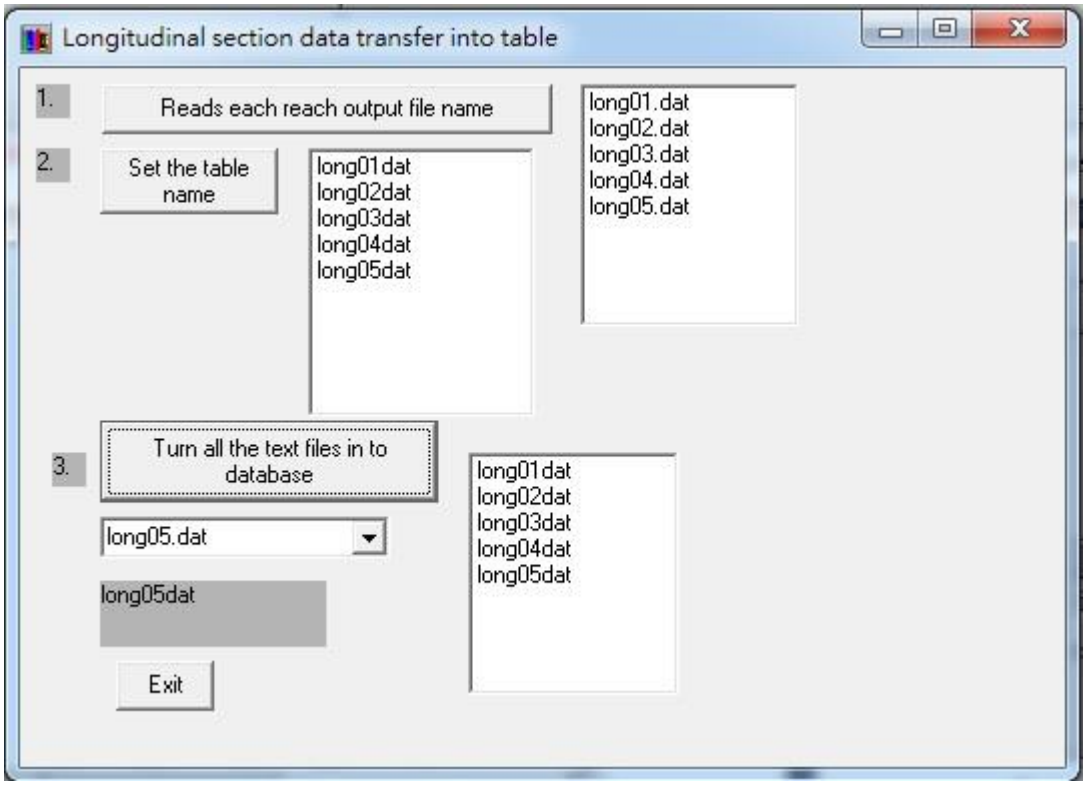

Figure 5-77 longitudinal transfer data to the database dialog box icon

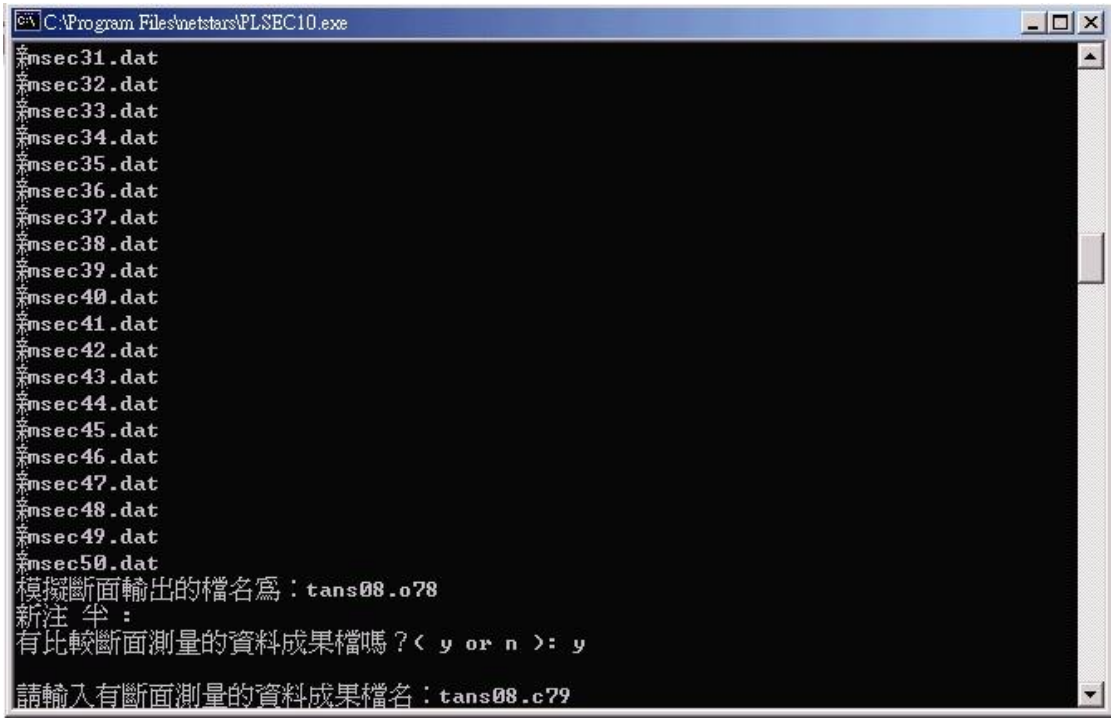

Figure 5-78 cross-sectional data files generated during the execution of icon

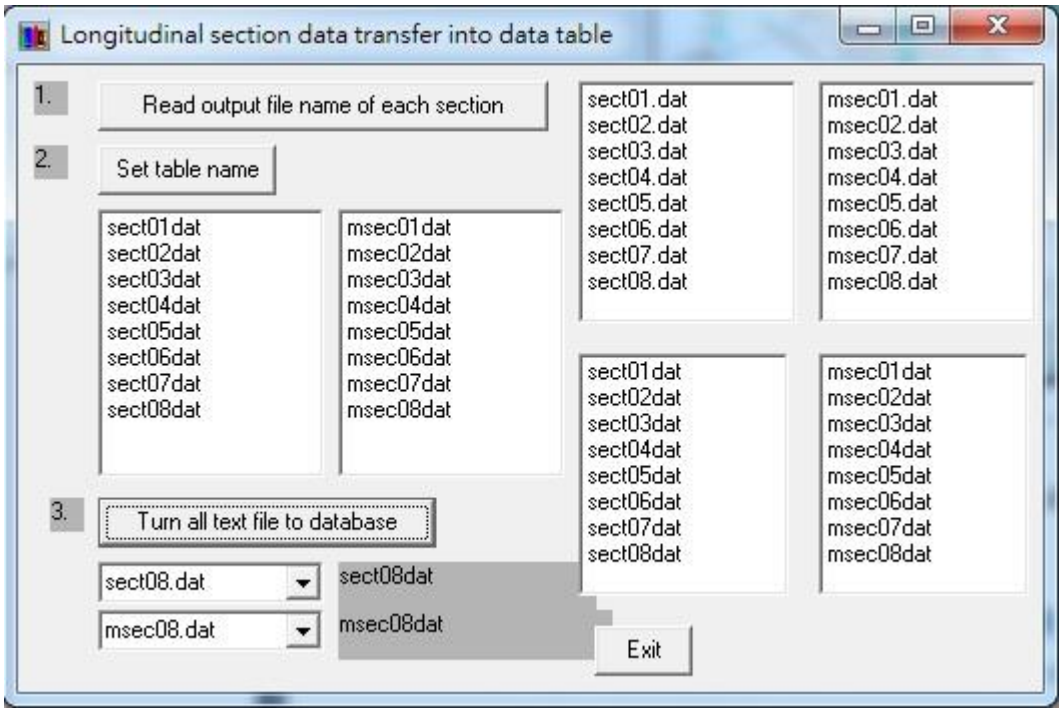

Figure 5-79 cross-sectional data transfer to the database dialog box icon

The first function of graphics display function is the river system planning schematic diagram, here will reference to the pictures link selected by project to paste it into the window, for observe section

distributions at any time, such as Figure 7-34. This can be a scan image or a overlay result image which is produced by GIS.

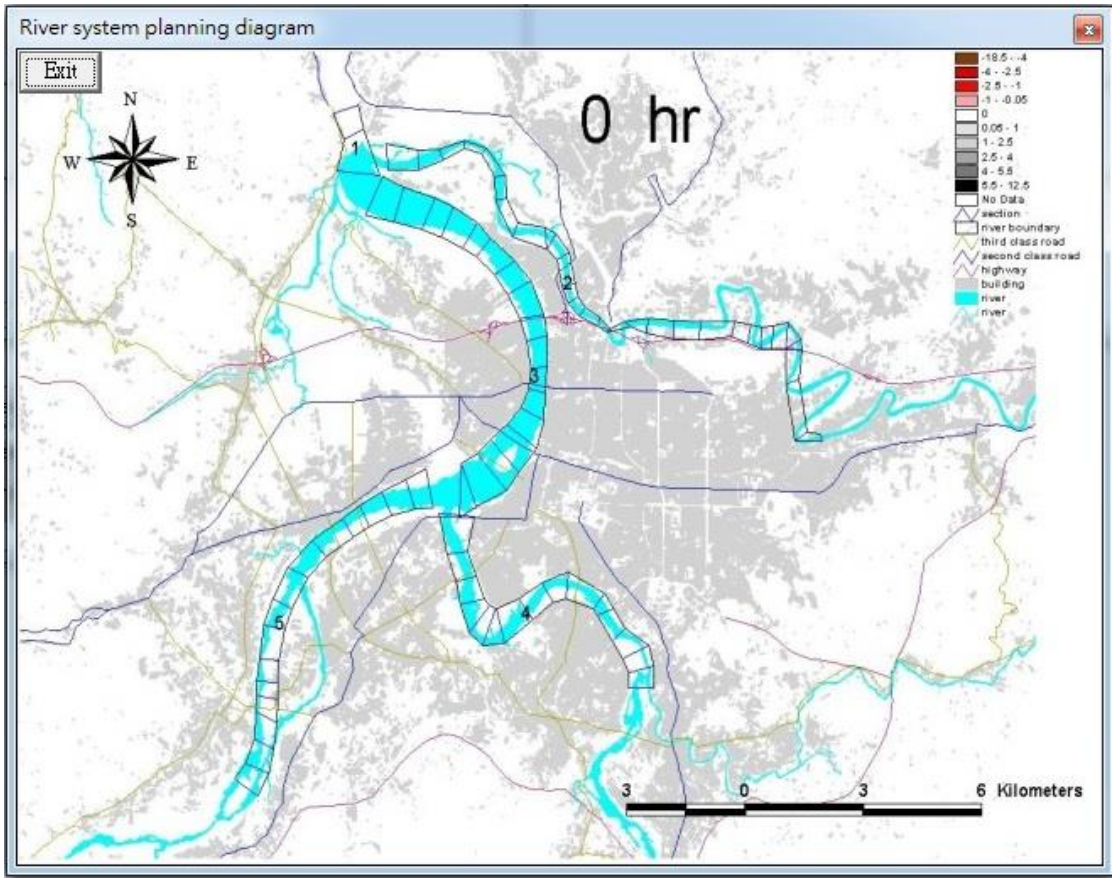

Figure 5-80 river system planning a schematic diagram of an example icon

In the second function of drawing display, there is a final result comparison diagram of drawing some result value of single reach, these results are projects such as the water level Y, flow Q and riverbed lowest point elevation TALWEG when simulation and measurement.

When radio select data tables (ie, a selected link data files) and multi-select output items, will see some process result comparison of this reach, the clicked dialog box is shown in Figure 7-35. After click the drawing button of dialog box will go to the graphical display screen, and will load all the selected corresponding information drawing.

If the point is too dense and hard to see the change, can drag the Slider which is below the diagram and pull it to the position you want, then the

vertical and horizontal coordinate values will adjust with the changes of the range, pull the left Slider to the right can increase the left transverse coordinate value, pull the right Slider to the left can increase the right transverse coordinate value, decrease and vice versa. Coordinate position at the right top will change when mouse is moving, you can move the mouse to change the coordinate position on the top right, you can move the coordinate position of mouse to read the value of a point on the curve, this is helpful for judging and comparing data, these functions are the results of transform the window coordinates and real coordinates.

Adjust the result image that is ready to output, such as show in Figure 5-82 below. You can also press the print button and output the result to printer and print. For the convenient of writing report, in the window there is a function which is drag the drawn graphics to the clipboard, after execution then open a new window and put the graphic in new window, such as shown in Figure 7-37, you can also open Microsoft Word and paste it into the file.

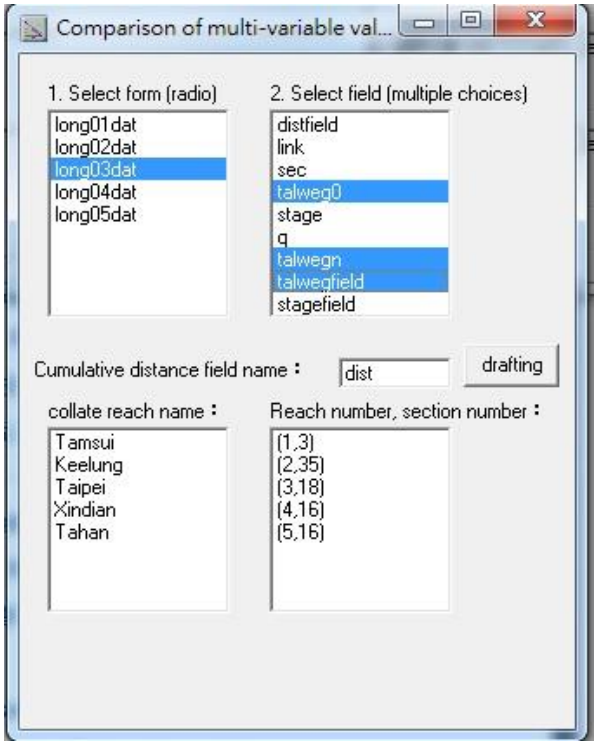

Figure 5-81 The radio-select dialog box icon of some results comparison of a single reach.

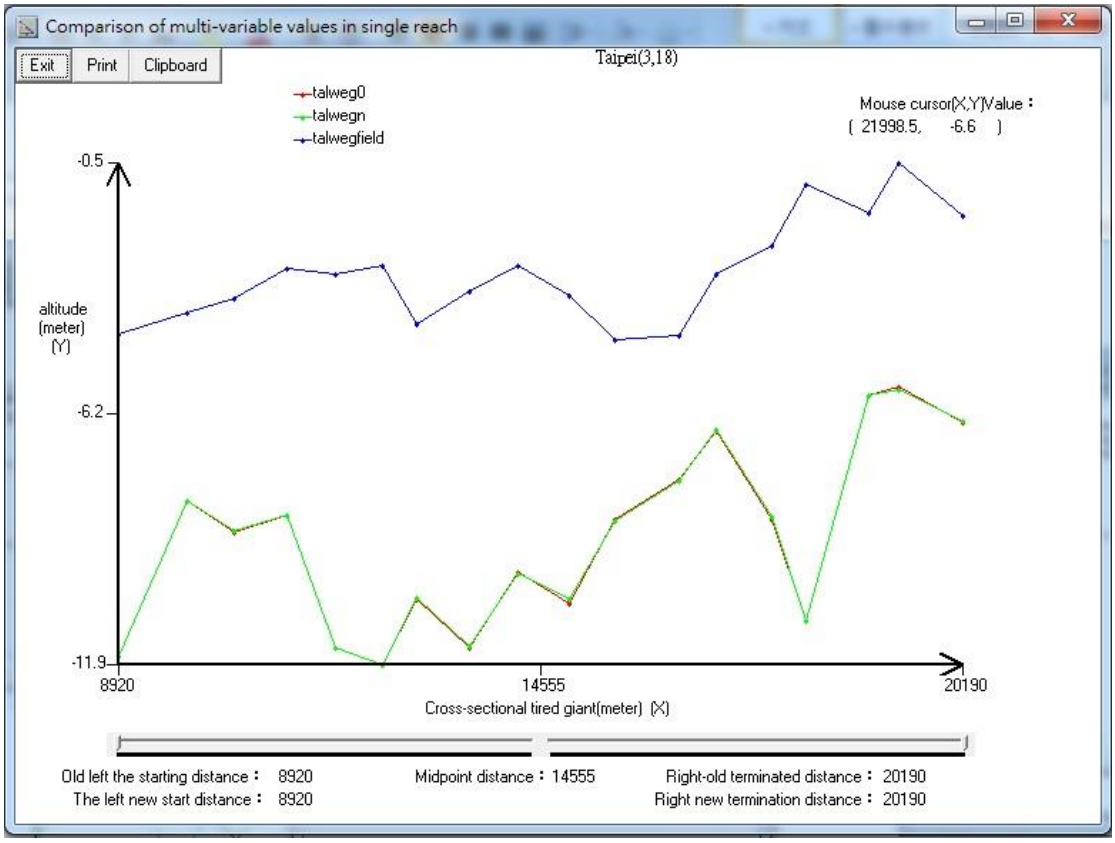

Figure 5-82 The operating outcome icon of certain results values compare of single reach

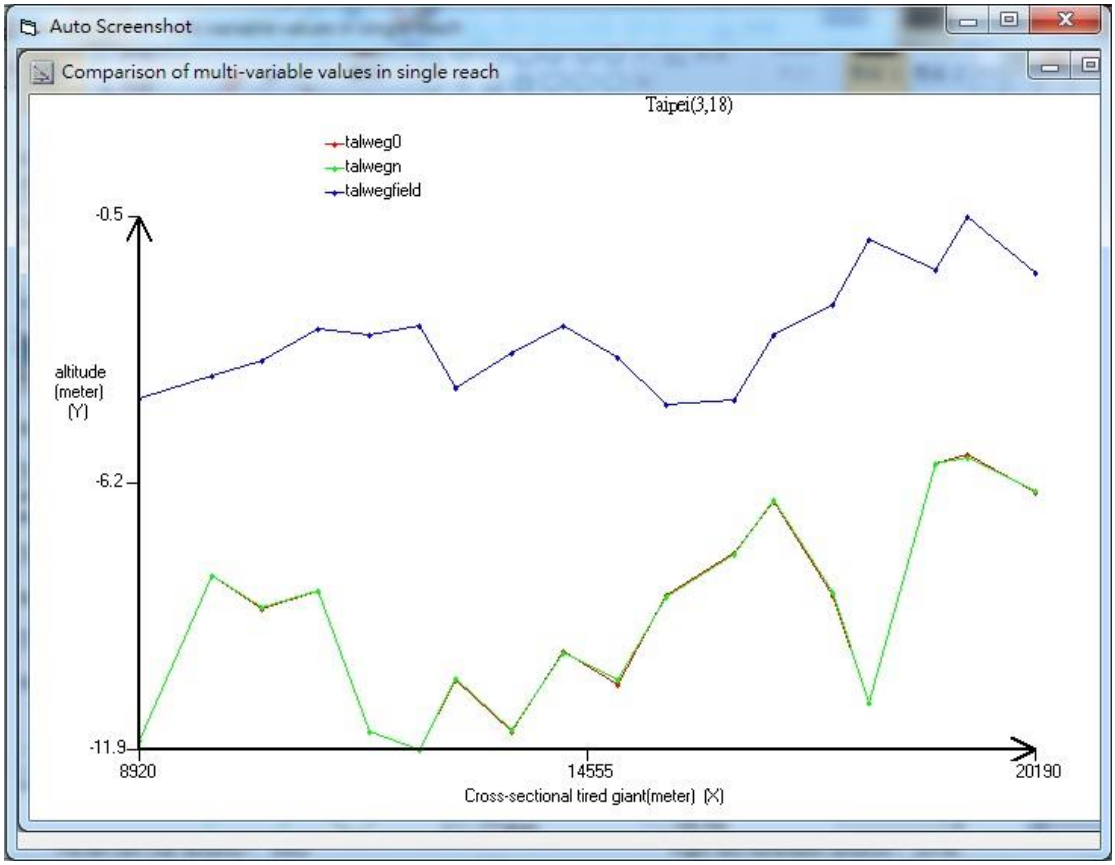

Figure 5-83 The screen of certain results values compare of single reach paste to the clipboard

There is a function in the second function of drawing, which is draw certain results values compare of multi reach, these results are projects such as the water level Y, flow Q and riverbed lowest point elevation TALWEG when simulation and measurement.

When multi select data tables (ie, selected multiple link) and radio select a output items, will see this process result comparison of multiple link, the clicked dialog box is shown in Figure 5-84. After click the drawing button of dialog box will go to the graphical display screen, and will load all the selected corresponding information drawing.

If the points are too dense and hard to see the change, can drag the Slider which is below the diagram and pull it to the position you want, then the vertical and horizontal coordinate values will adjust with the changes

of the range, pull the left Slider to the right can increase the left transverse coordinate value, pull the right Slider to the left can increase the right transverse coordinate value, decrease and vice versa.

Coordinate position at the right top will also change when mouse is moving, you can move the mouse to change the coordinate position on the top right, you can move the coordinate position of mouse to read the value of a point on the curve, this is helpful for judging and comparing data, these functions are the results of transform the window coordinates and real coordinates

Adjust the result image that is ready to output, such as show in Figure 5-85 You can also press the print button and output the result to printer and print. For the convenient of writing report, in the window there is also a function which is drag the drawn graphics to the clipboard, after execution then open a new window and put the graphic in new window, such as shown in Figure 5-86, you can also open Microsoft Word and paste it into the file.

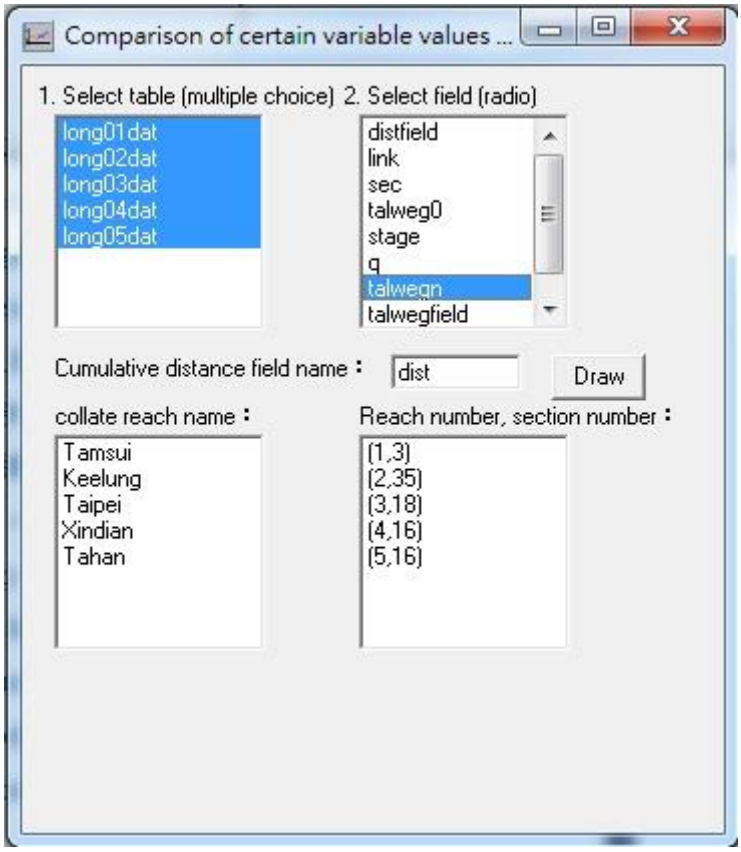

Figure 5-84 The radio-select dialog box icon of one of the result comparison of multi reach.

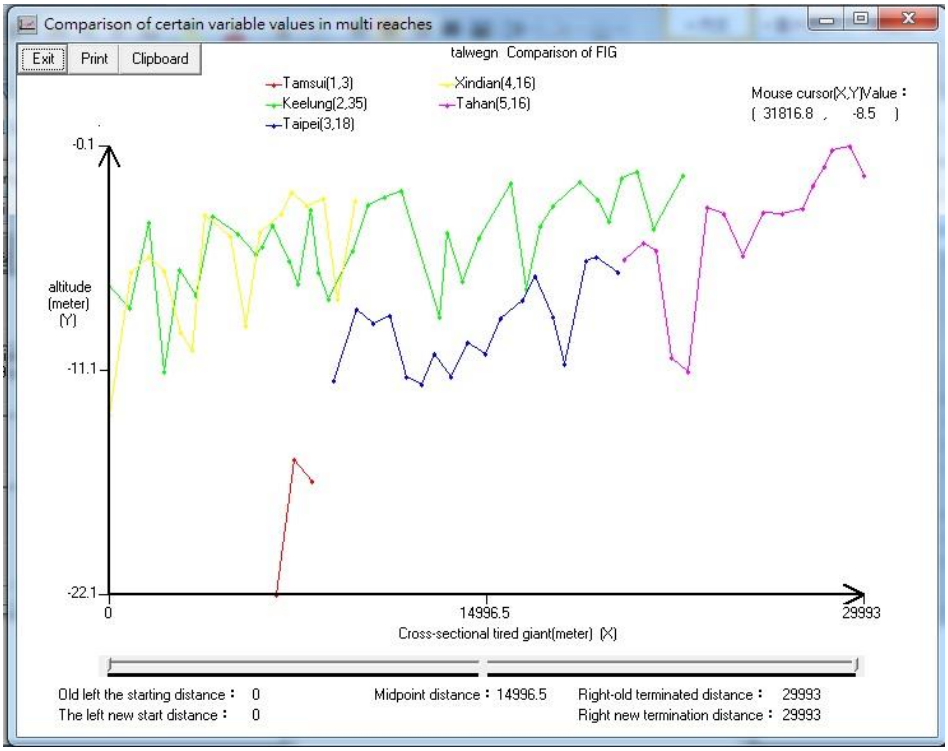

Figure 5-85 The operating outcome icon of one of the results values

comparison of multi reach

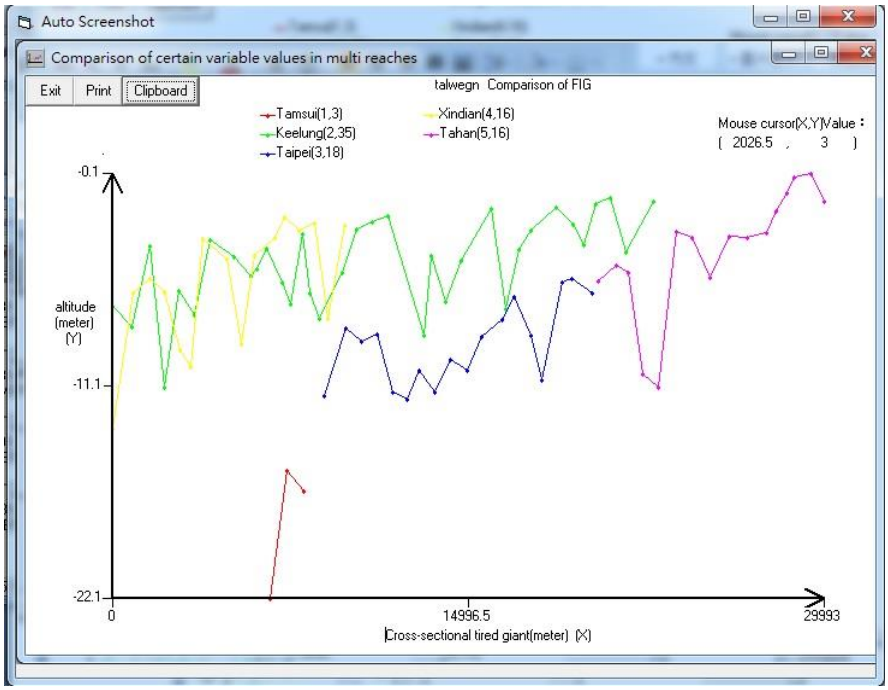

Figure 5-86 reach a results value comparison chart paste it into the scrapbook picture

There is a function in the third function of drawing, which is the certain output time results comparison chart of drawing a single section value of some of the results, these results are projects such as the water level Y, flow Q and riverbed lowest point elevation TALWEG when simulation and measurement. When radio select data tables (ie, a selected link data files) and multi-select output items, will see some process result comparison of this reach, the clicked dialog box is shown in Figure 5-87. The results of Slider adjusted and ready to output is shown in Figure 7-42, and it also has clipboard function

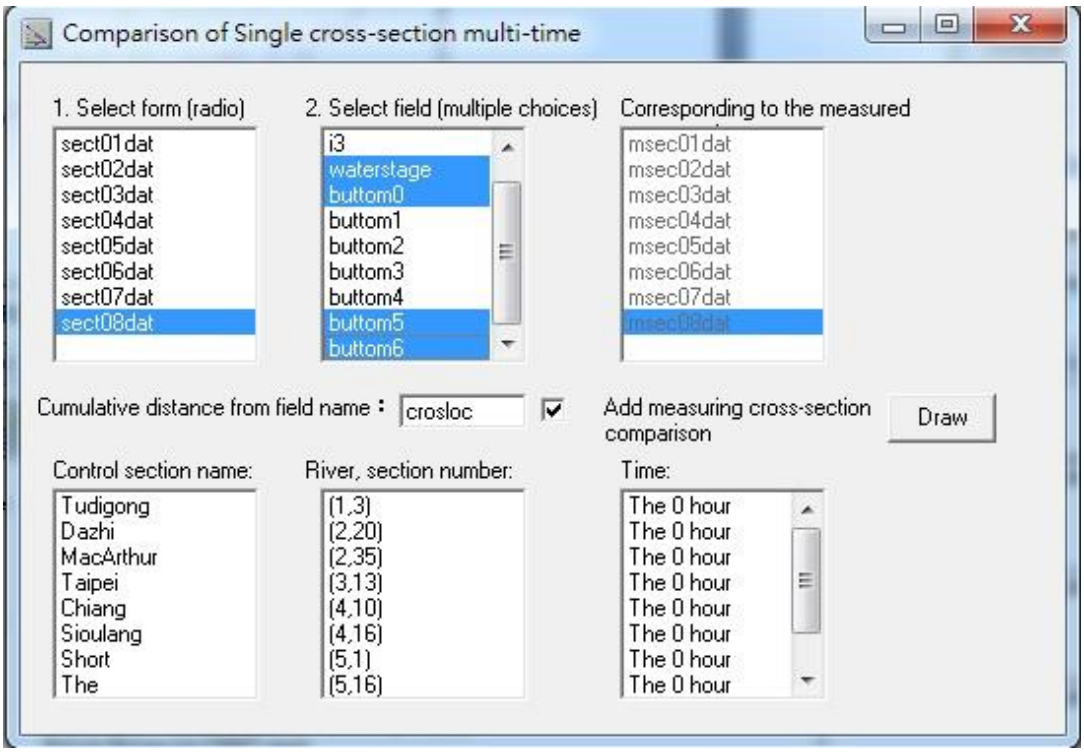

Figure 5-87 Menu dialog box icon of comparison of drawing a single cross-section of certain outcomes value (including measured)

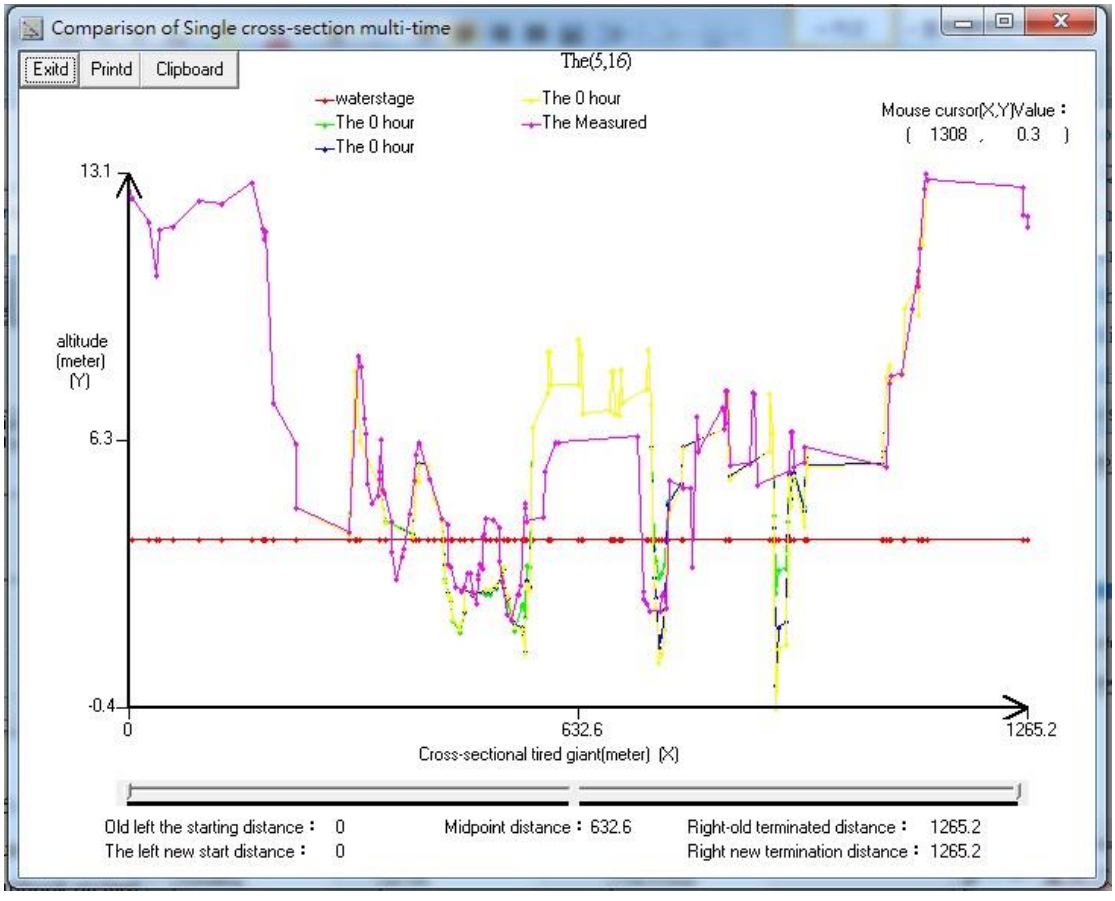

Figure 5-88 Menu dialog box icon of comparison of a single cross-section

value of certain outcomes (including measured)

There is a function in the third function of drawing, which is the certain output time results comparison chart of drawing a multi section value of one of the results, these results are projects such as the water level Y, flow Q and riverbed lowest point elevation TALWEG when simulation and measurement.

When multi select data tables (ie, multiple selected link) and radio-select output items, will see process result comparison of multi link, the clicked dialog box is shown in Figure 7-43. After click on the drawing button of the dialog box will go to the graphic display screen, and will load in the entire selected corresponding data plotter. The results of Slider adjusted and ready to output is shown in Figure 7-44, and it also has clipboard function.

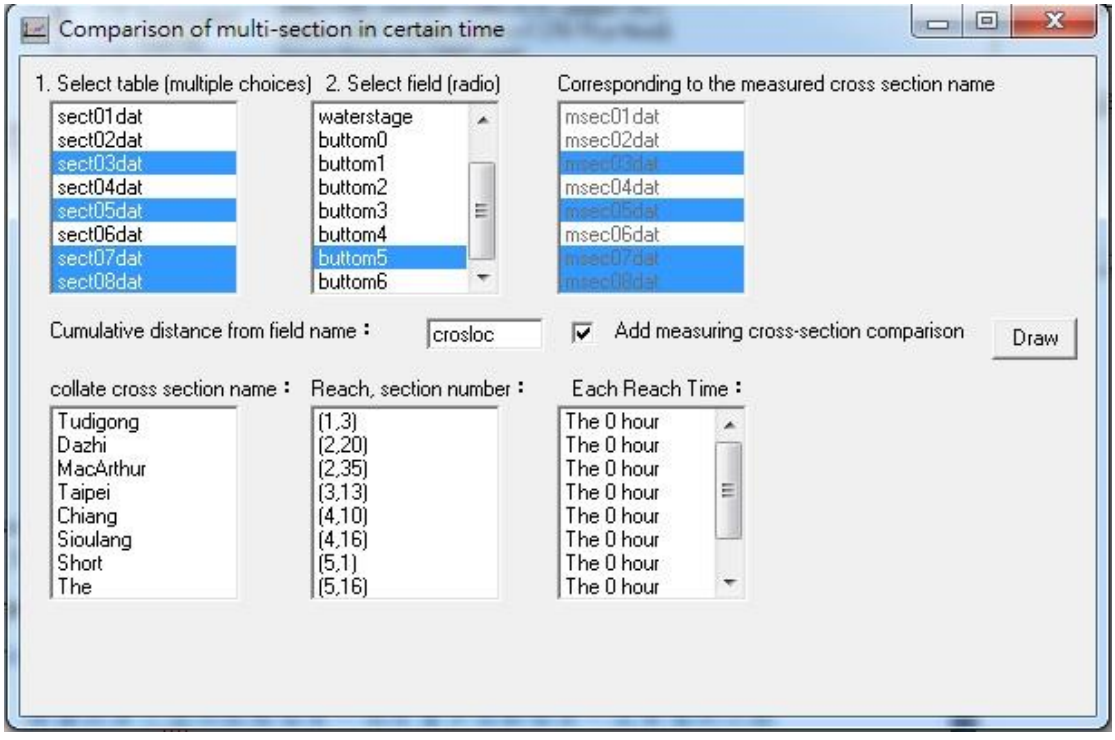

Figure 5-89 Menu dialog box icon of comparison of drawing multi reach of certain outcomes value

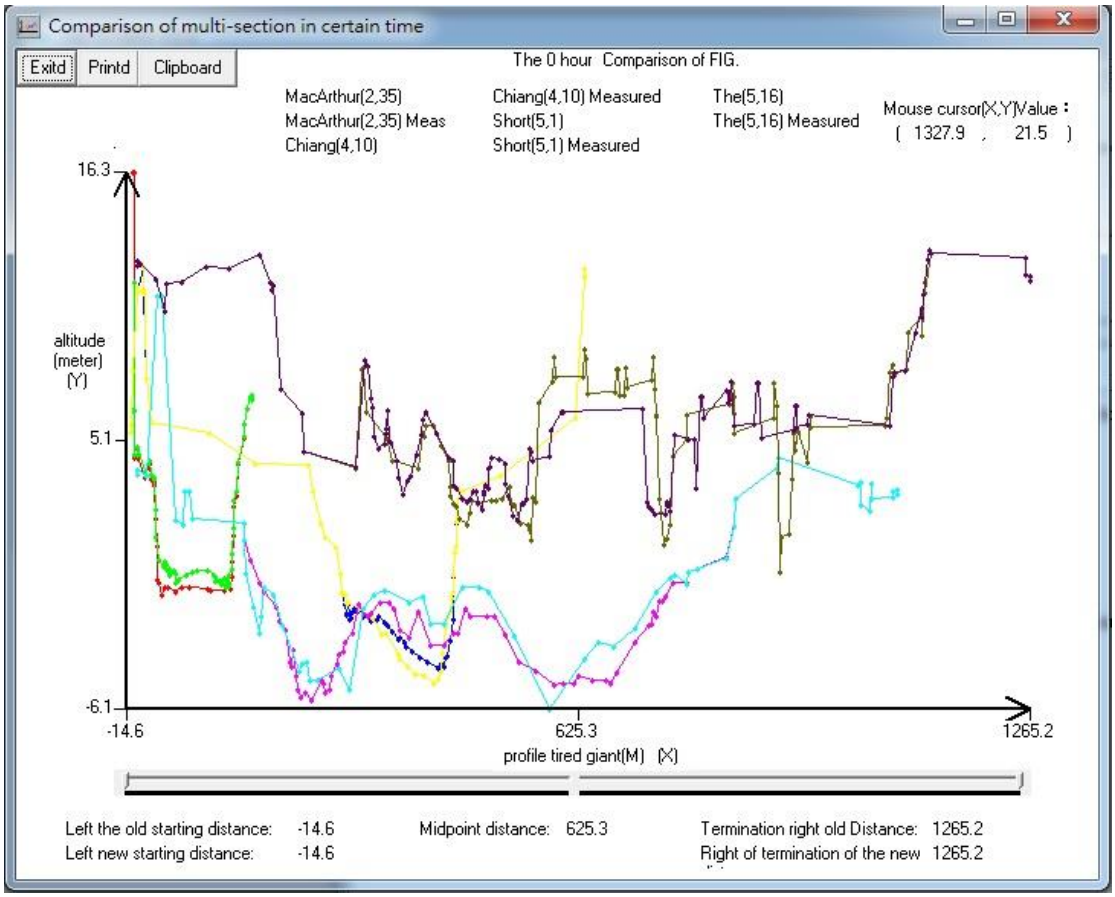

Figure 5-90 Menu dialog box icon of comparison of multi reach of certain outcomes value

In the fourth function of graphics display, there is a function that draws the hydrograph comparison chart of single cross-section's some results, these results are water level Y flow Q, roughness, flow velocity 'VEL', riverbed lowest point elevation 'TALWEG', amount of sediment transportation 'qstot', the difference values of average time spacing of riverbed elevation 'be', the concentration of each stream tube 'con1-3', and average concentration 'avgcon' …etc.

When radio data table (the selected cross-section), and multi-select the result project, we will see certain hydrograph comparison results of this cross-section, the clicked dialog box is shown in Figure 5-91. Click the drawing button of dialog box will get into the graphic display screen, and will load in all the selected corresponding information graphic. The result

icon of the output result that is ready and adjusted by Slider is shown in Figure 5-92, and also has clipboard function.

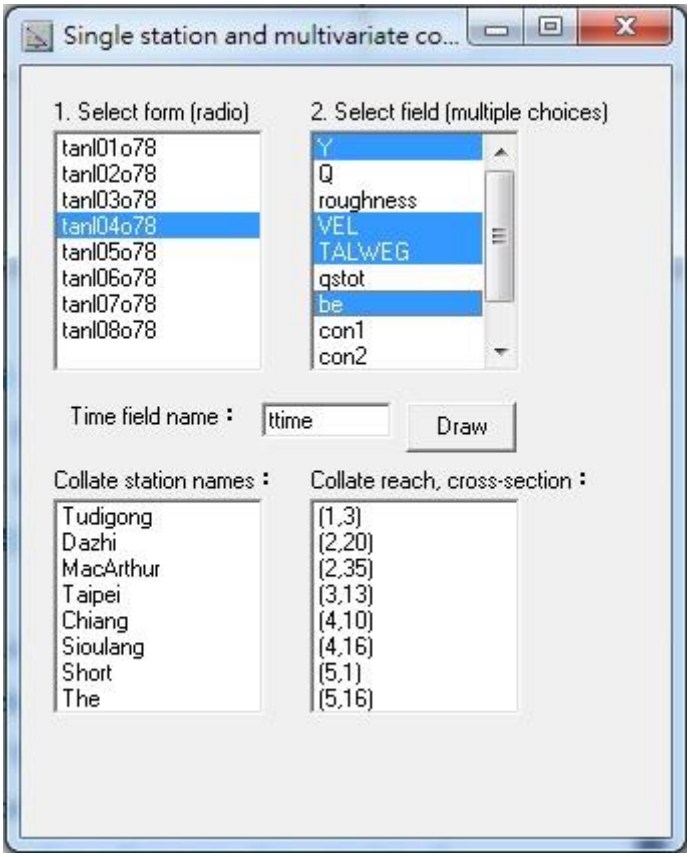

Figure 5-91 Menu dialog box icon of draw single cross-section's some result value comparison

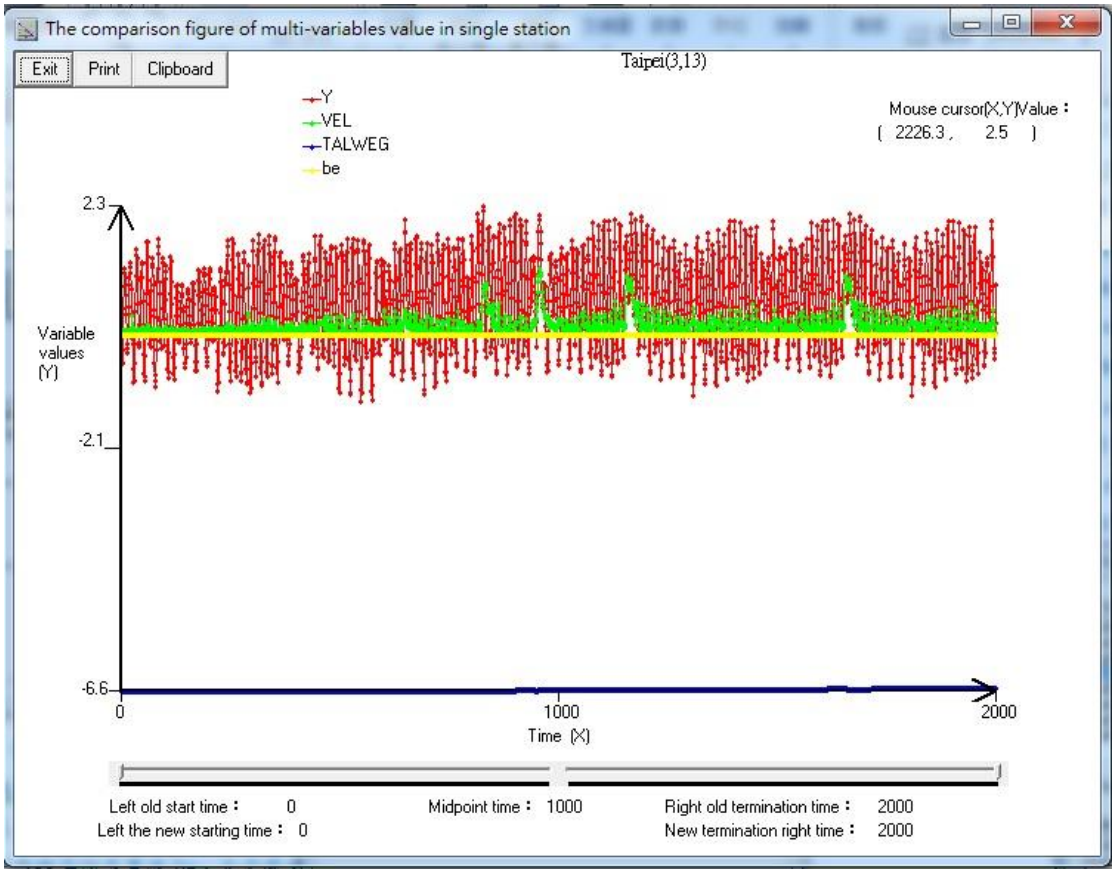

Figure 5-92 operation result icon of some result value comparison of single cross-section

In the fourth function of graphics display, there is a function that draws the hydrograph comparison chart of multi cross-section's certain results, these results are water level Y, flow Q, roughness, flow velocity 'VEL', riverbed lowest point elevation 'TALWEG', amount of sediment transportation 'qstot', the difference values of average time spacing of riverbed elevation 'be', the concentration of each stream tube 'con1-3', and average concentration 'avgcon' …etc

When multi-select data table (the selected multi cross-section), and radio-select the result project, we will see certain hydrograph comparison results of this cross-section, the clicked dialog box is shown in Figure 5-93. The result icon of the output result that is ready and adjusted by Slider is shown in Figure 5-94, and also has clipboard function.

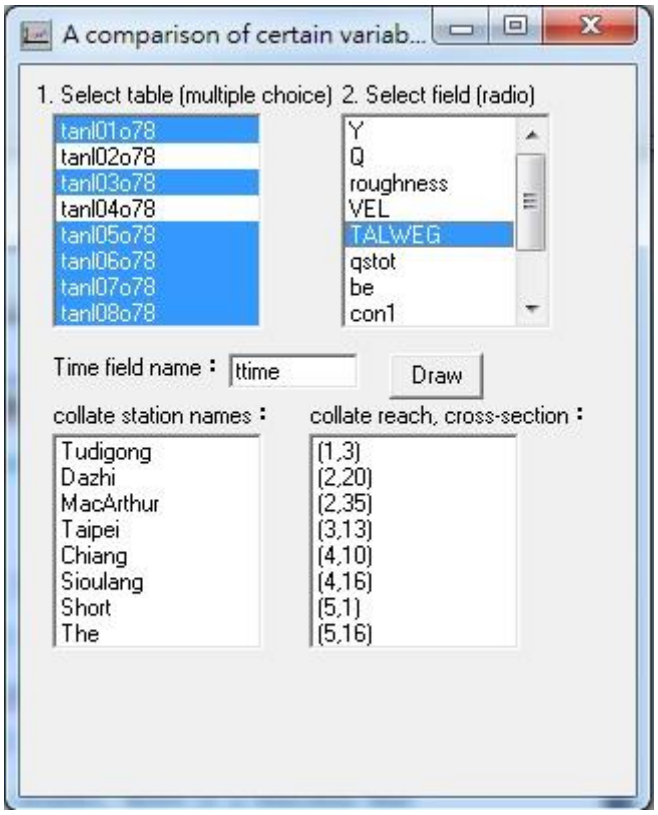

Figure 5-93 the menu dialog icon of result value comparison of draw multiple cross-section

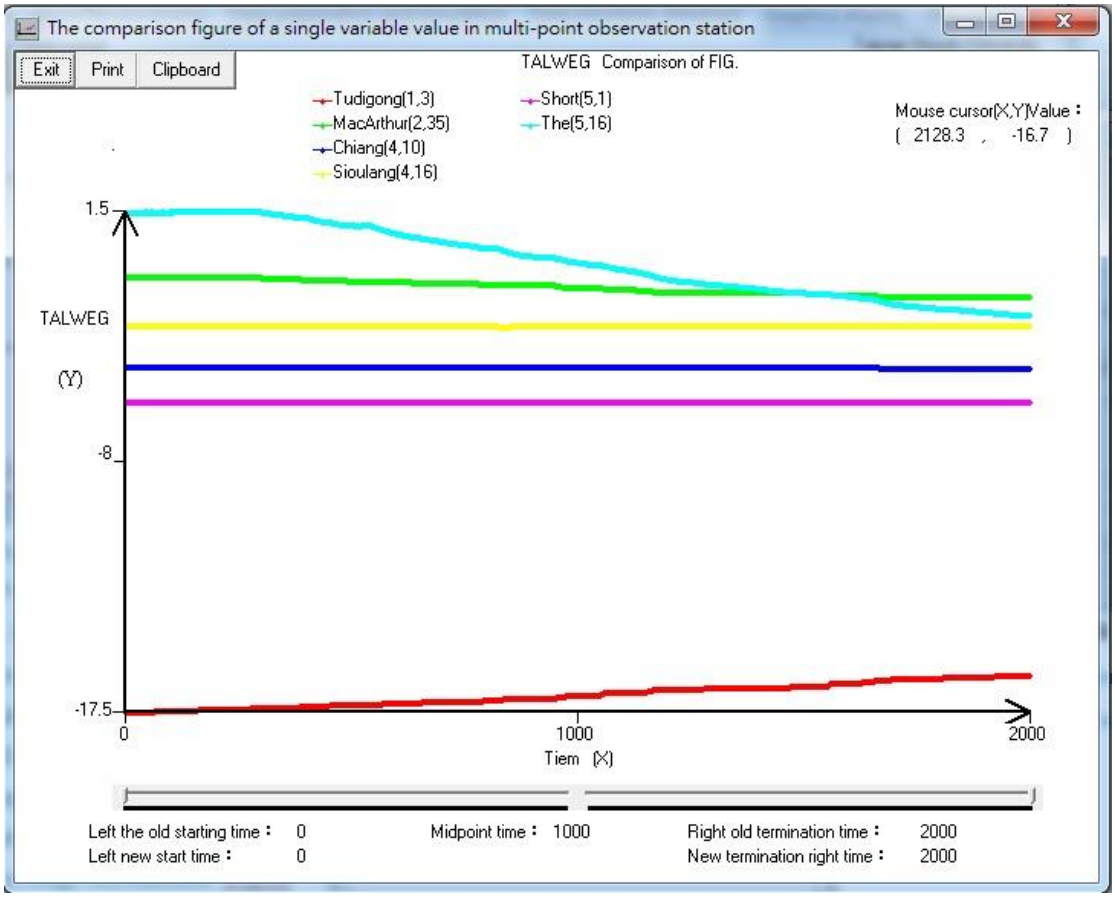

Figure 5-94 operation result icon of a result value comparison of multi cross-section

Drawing the show's fifth and six function has no effect, the the seventh function inside the first sub-function two-dimensional river transition diagram to illustrate how ArcView Expansion Module, shown in Figure 5-95, this part of thethe work must draw on the plug module Spatial analyst and developed NETSGEO2D module ARCVIEW to complete.

The second sub-function is NETSTARS model output the achievements geometry.out into information that can be read by the GIS file settings dialog window, perform the Fortran write the program after netsgismodi.exe and transfer the data into a text file format (Figure 5-96):

X Y Z Secno Pt

_____ _____ _____ _____ _____

| | | | |

| | | | |

GIS data files can be read the third child function as NETSTARS model drawing the show's seventh feature output the achievements ws_depth.out into settings dialog window, after the implementation of the Fortran program written netsgis_ws.exe also convertAs the text file format, ARCVIEW load operation, the Run dialog window shown in Figure 5-97 below. The fourth sub-functions 2D picture animation show, this is you can choose the directory file animation aside program, the operating results of Figure 5-98 shows.

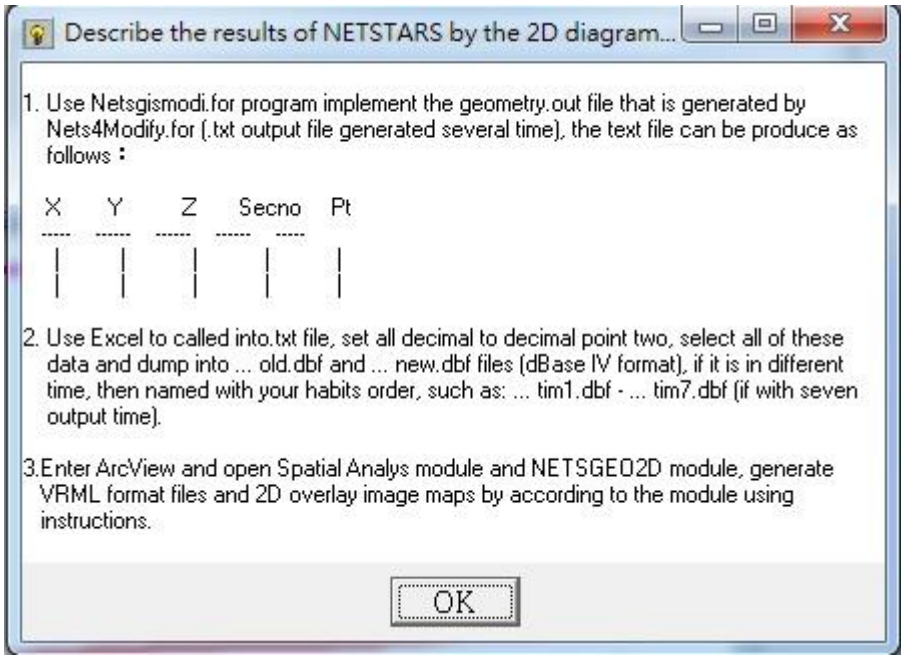

Figure 5-95 2D river transition diagram how ArcView extension module help icon

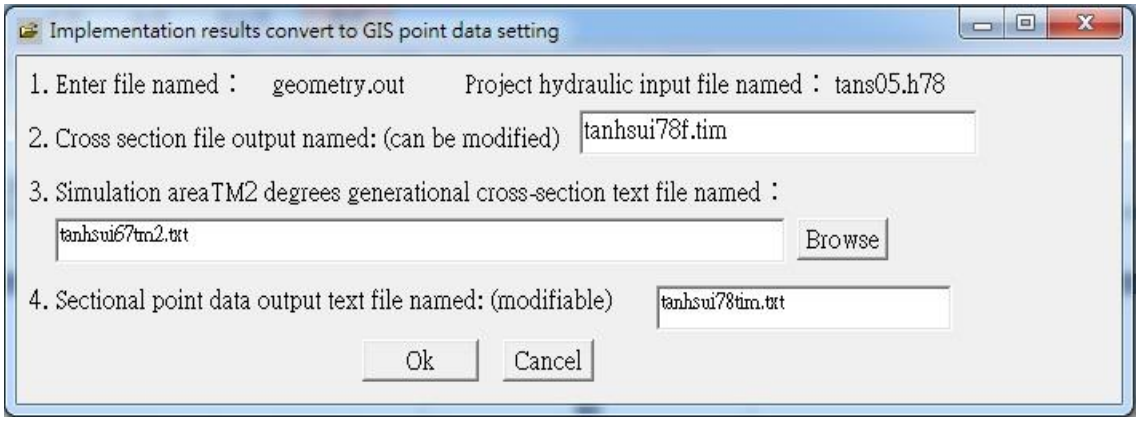

Figure 5-96 turn the information of geometry.out that can be read by the GIS File Settings dialog window

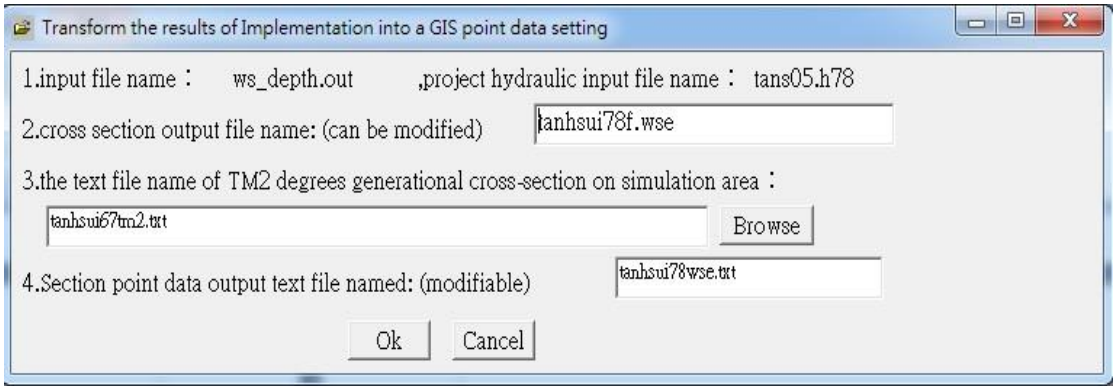

Figure 5-97 ws_depth.out converted into information that can be read by

the GIS Settings dialog window

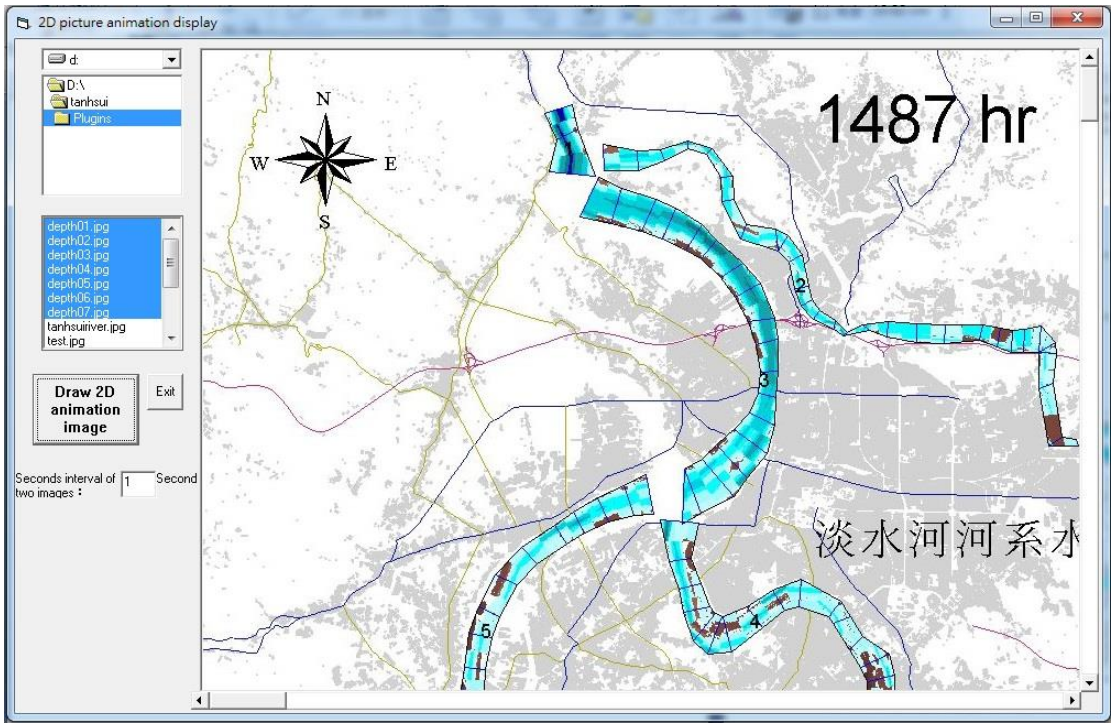

Figure 5-98 2D Image animation display screen

The graphics display eighth function inside the first sub-function plug-in installed VRML web browsing, as shown in Figure 5-99. The second sub-functions output ARCVIEW 2D data files converted to VRML format, the execution time required to select the source of GRID file Select file dialogue window after selecting the file, press the On information appears, press the Convert button to perform the conversion process shown in Figure 5-100.

The third sub-function in the eighth function of drawing display is to select the dialog window of browse VRML file, such as shown in Figure 5-101. The results of execution browse riverbed changes is shown in Figure 5-102. Set exaggeration proportion can highlight the unevenness of the terrain.

Figure 5-99 Installing VRML Web browser plug-in icon

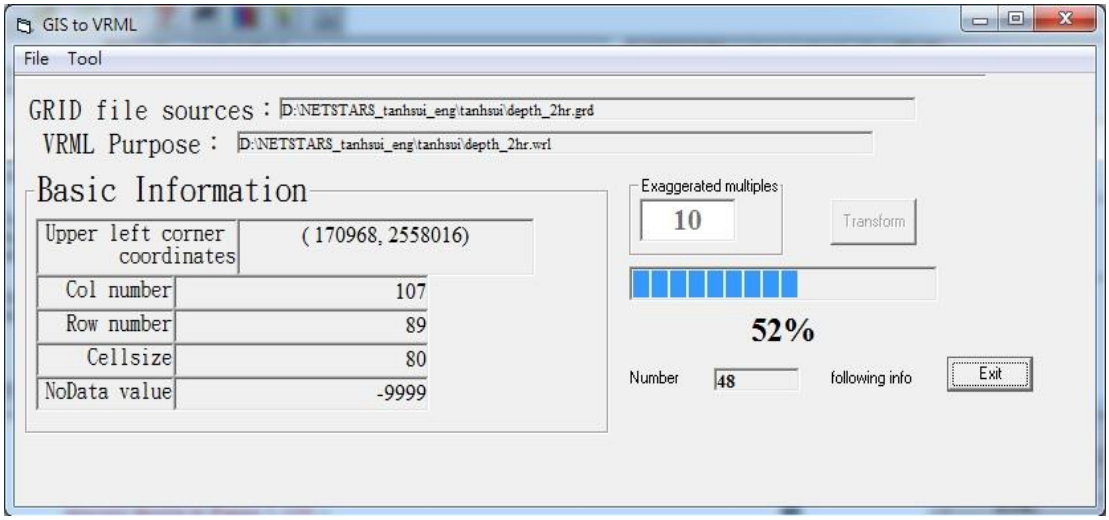

Figure 5-100 ArcView output 2D data files into VRML format during the execution of

Figure 5-101 select the view VRML file dialog window

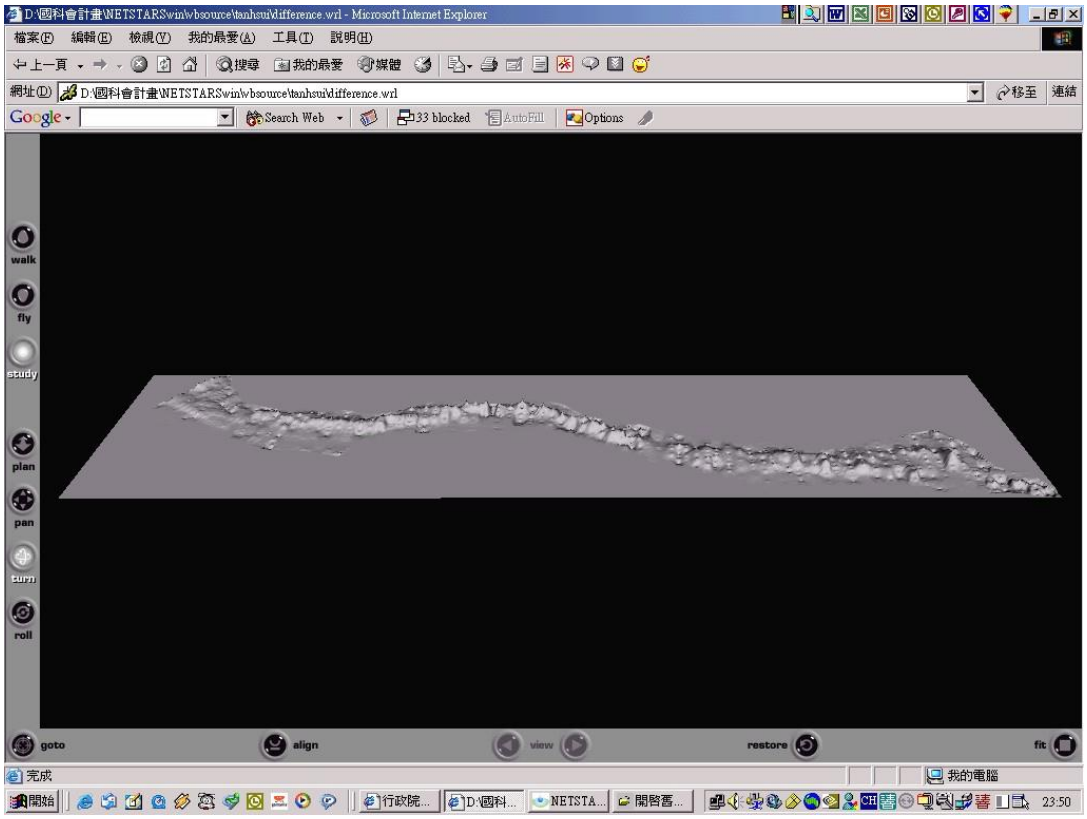

Figure 5-102 Virtual Reality VRML plug-in browser riverbed changes the result of the operation icon

Help Menu has four functions, two for operating manual, two technical manuals, the last one is about the use of the operating manual as Windows software process description; the technical manuals for NETSTARS theory, examples illustrate the input card informationthe description output information technology file,

These files using the network to text fast fill will convert the webpage file integration for a HELP format file. Chm, the program can directly call open reading, in which the results of the implementation of the PDF files of the operating manual as shown in Figure 5-103; technical manual chum file The results shown in Figure 5-104. About description of the version, author, time, teaching website hyperlinks etc., as shown in Figure 5-105, as showed in Figure 5-106 Linked Websites.

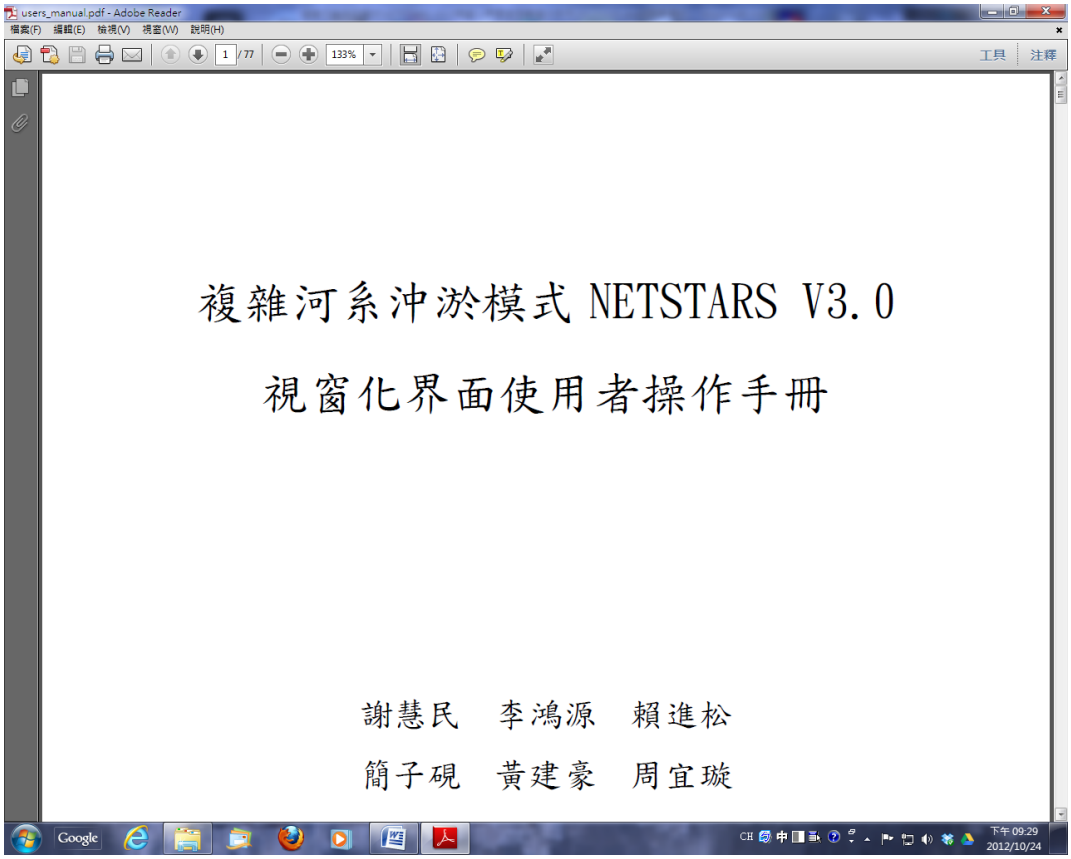

Figure 5-103 operating manual PDF file execution result screen

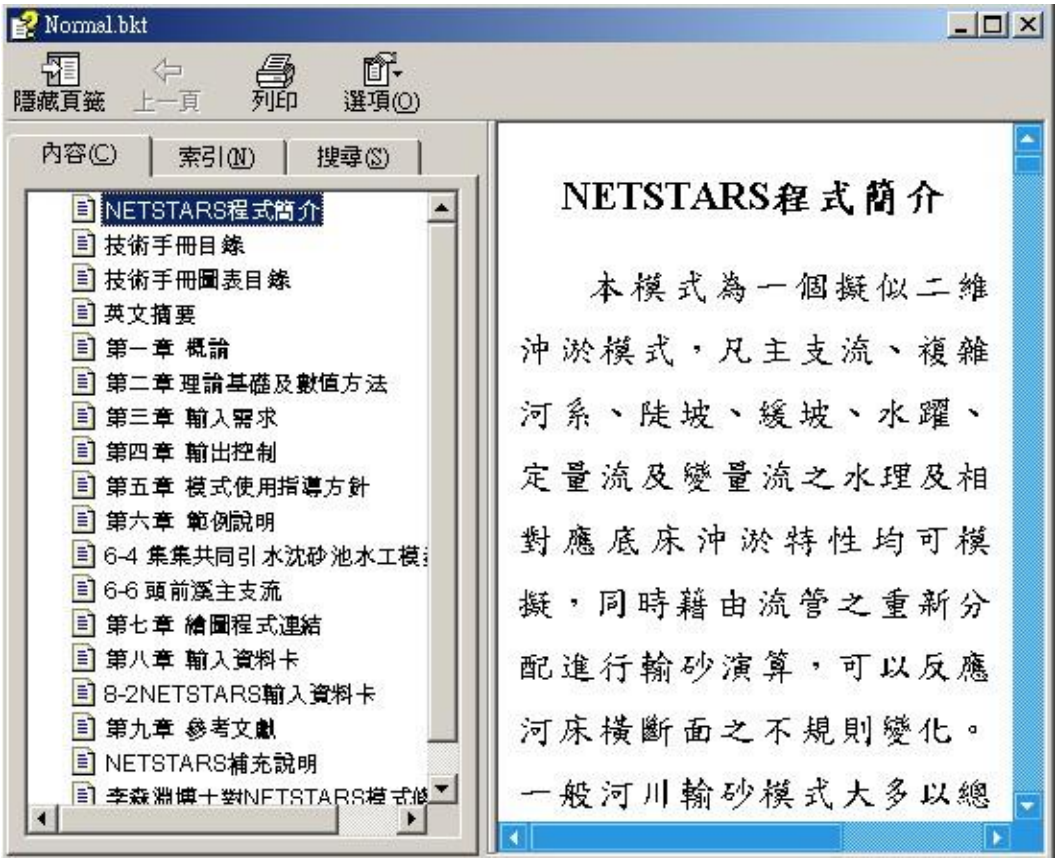

Figure 5-104 Technical Manual chm file execution result screen

Figure 5-105 on results screen

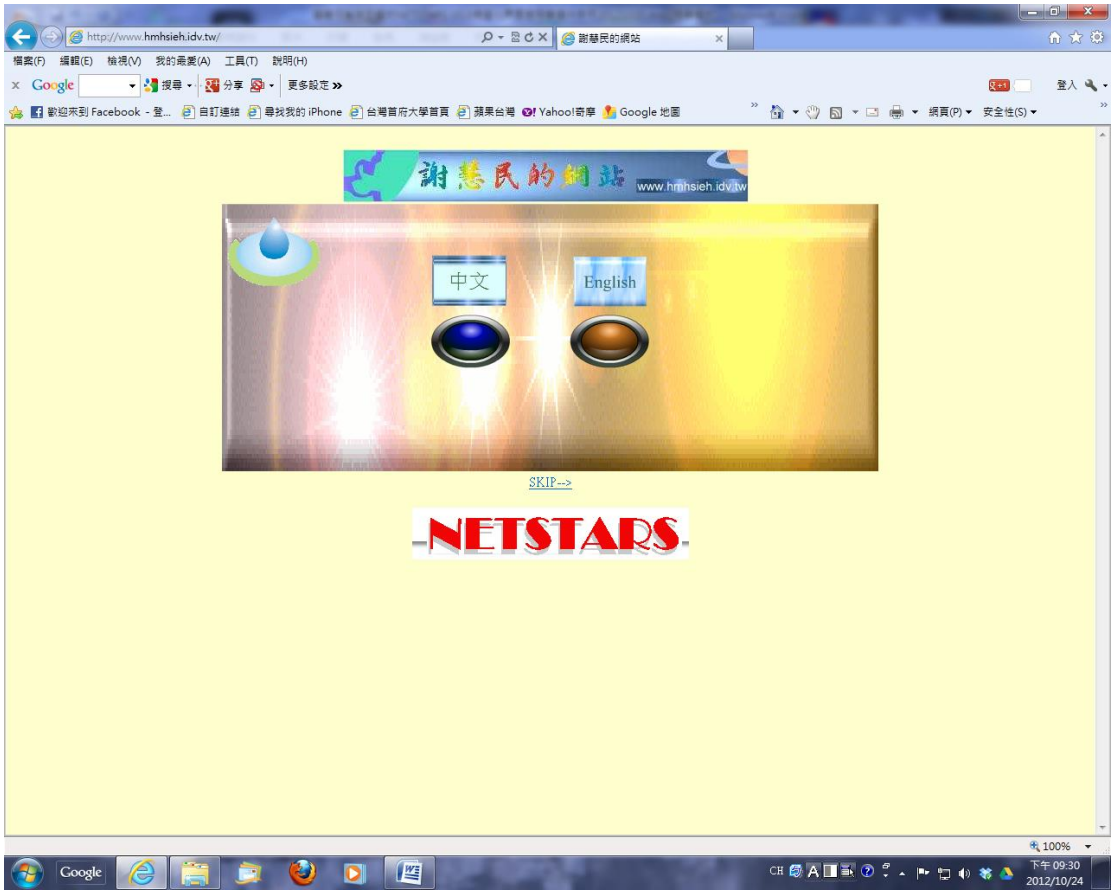

Figure 5-106 links to web sites results screen

6. Conclusions and Recommendations

The NETSTARS model window user interface, in the original drawing functions added to the input interface of the input file window tab called NETSTARS V3.0, the four main input file is divided into four functional menu,

Each function corresponds to an input file window tabs, each tab as a control card, and copied to the project directory can be simulated for the input file format, the program features options when editing is complete modify exit, immediately deposit. Drawing functions include: river 1D longitudinal section, cross-sectional and hydrograph data drawing comparison, 2D the riverbed changes Animation, 3D virtual reality display, otherwise develop two ARCVIEW V3.2 plug strengthen information processing. This operating manual will help NETSTARS V3.0 Windows program users to learn quickly.