Kanako Ver.1.10 Manual

Contents

1. Introduction

As known worldwide, Japan is the country with the topography condition of the mainland formed area mountainous, about 70% of it has many steep slopes with weak geological condition. Therefore, debris flow is easily generated in various places whenever it rains heavily every year. An extensive lost of economic and human life has been put out. Such a miserable debris flow disaster is requested to be prevented and reduced socially and strongly. We can say that this case is one of the most important and challenging problems related to disaster prevention science.

One of the effective techniques to prevent and reduce disaster caused by debris flow is by conducting maintenance of Sabo dam. It is proved that the Sabo dam structure has directly prevented erosion. Actually, it will be easier to understand by demonstrating its power contribution in reducing the energy of debris flow and then controlling the surface erosion which is usually occurred in upstream area. It is important to plan the Sabo dam design (such as type, location, dimension, etc) is the most appropriate in each specific area in order to get an effective and efficient design that have enough effect.

Then, the simulation program, that placed the numerical simulation model, was proposed as a tool to verify the effect of erosion control by Sabo dam in sediment transport process during debris flow occurred. However, these programs did not get an enthusiastic response from the user because its performance and display had difficulty being understood, not more communicative and needed certain expertise to compile. Therefore, it is a fact that could not apply the numerical simulation program for oneself and prefer to order the calculation works to the consultant.

Debris flow simulation “kanako ver.1.10”, that mounted the user interface used easily this time, was developed based on the above-mentioned current state. It is flow and piling up model of debris flow, that used by this program, proposed by the depth and the upstream river channel. This model is one dimension model which considers only the direction of upstream and downstream of the river model, and the one that reproduce flow and piling up process of the debris flow in the area where Sabo dam was set up for the materials that consists of two size classification group, coarser and finer material. This generation of simulation program is easier to use and more communicative, the user can input or change the calculation condition according to their desire condition only by using mouse on the menu facilities or graphics displayed. On the other hand, simulation result can also be understood intuitively by user. As a result, it becomes possible to conduct a numerical simulation to calculate flow and piling up process of debris flow even if there was no advanced expertise.

2007.8

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2. Notice for using Kanako

2.1 Limit and assumptions of using Kanako

Kanako is using a one dimension model which considers only the direction of upstream and downstream of the river model, and the one that reproduce flow and piling up process of the debris flow in the area where Sabo dam was set up for the materials that consists of two size classification group.

As written below, there are some limit and assumptions on analysis using Kanako.

- The target is stony debris flow. And bed load is off the subject.
- In the simulation, only one Mountain River is the subject. We don't consider the confluence of Mountain Rivers.
- We consider only 2 kinds of material size of the debris flow.
- Considering slit type sabo dam, the model does not currently incorporate energy loss from the rapid narrowing of river width.
- In the calculation, a rectangular cross section is assumed.
- We don't consider sediment sorting in the stony debris flow.
- We don't consider the temporal and spatial change of grain size distribution in river bed. We don't consider the temporally and spatially change of grain size distribution in river bed.

Please notice that there are some limit and assumptions when using Kanako.

2.2 Operating instructions

2.2.1 License

Copyright for this software belongs to Laboratory of Erosion Control, Division of Forest Science, Graduate School of Agriculture, Kyoto University, & SABO Technical Center.

2.2.2 Restrictions

The user may not take any of following actions, without permission of the License owner (here in after called "Owner"):

(1) Copy, modify or otherwise duplicate the whole or a part of the Software

(2) Decompile or modify using reverse engineering, disassemble, or otherwise reprogram the Software;

(3) Distribute, sell, sublease or lease the Software to third parties;

2.2.3 Disclaimer

(1) The owner makes no warranty or representations that the Software will run uninterrupted or is error free.

(2) The owner shall not guarantee that the functions and performance of the Software will meet the requirements of the customer.

(3) The owner shall not be responsible for losses sustained by the customer or the recovery of damages incurred by a third party, or any other cost incurred in using the Software.

2.2.4 Change of Specifications

The specifications or design of the software and the contents of the instruction manual may be changed without notice by the owner.

3. Installation and Startup

3.1 Operating Environment

The operating environment for software installation is as follows:
- CPU: Intel Pentium or equivalent
- Memory: 128 MB or more
- Operating System: Microsoft Windows 98/2000/XP
- Hard Disk: Needs free space of at least 600 MB

-Necessary software: **Microsoft .NET Framework Version 1.1**

Sometimes, PC on Windows XP, kanako can not start.
And almost that happens because the version of .NET Framework is old or not installed.
Maybe error message as
"mscoree.dll could not be found", "mscoree.dll could not be loaded" will be displayed.
In this case, please install NET Framework1.1.
To install "NET Framewrok1.1", go to Microsoft website, and download
"Microsoft .NET Framework Version 1.1 Redistributable Package"

3.2 Installation

Download the “bin file” and save it on your computer. Then follow the normal procedure for software installation.
When you start ‘kanako’, default file and exe file must be set in the same folder. And it is better to keep default file unchanged, so when you want to change some parameters, please copy and make another file.
To start up, double click the exe file.

4. Set the calculation parameters

4.1 Setting of riverbed profile and width of river

When the program is started, the screen in Fig-1 is displayed. The first graphic showed at the upper part is profile of riverbed, the vertical axis (A, see Fig-1) is showing the altitude and the horizontal axis (B, see Fig-1) is showing the distance from the most upstream point. Below riverbed profile is displayed width of river in each point corresponding to B-axis(C, see Fig-1). Both of the units are meters.

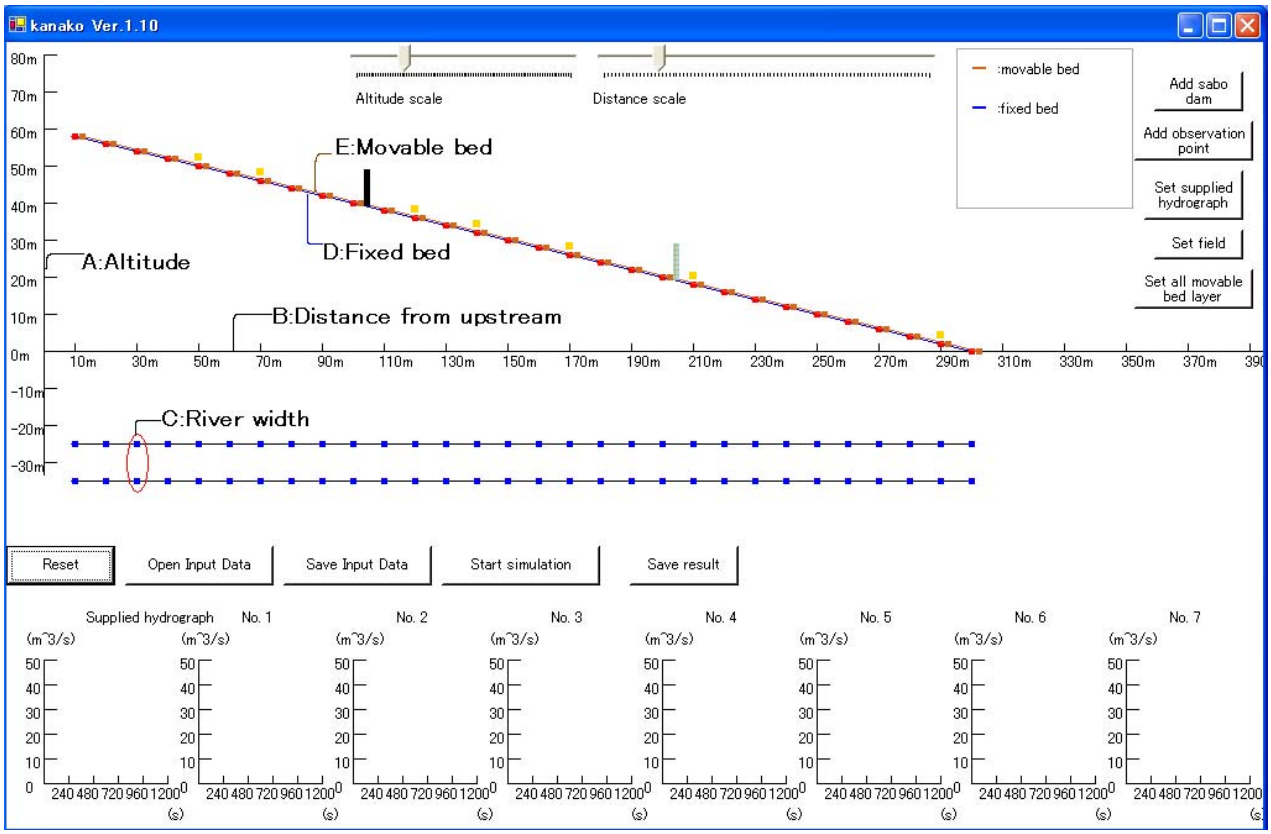


Fig-1: Start Screen

There are 2 line displayed on the riverbed profile, brown line and blue line. The brown line represents surface of moveable bed (E, see Fig-1), can be changed by dragging up and down the brown point along the profile. The blue line shows surface of fixed bed (D, see Fig-1), and also can be modified by dragging the red point. The layer between fixed bed and moveable bed surface is humus-decay accumulative layer. In addition, also by repeating the same act on blue point along river width it is input.

When red or brown point is dragged, the guide that shows current position (distance from the most upstream point, altitude) is displayed on the right side of the point (A, see Fig-2 and Fig-3). The guide will automatically disappear when dragging is stopped.

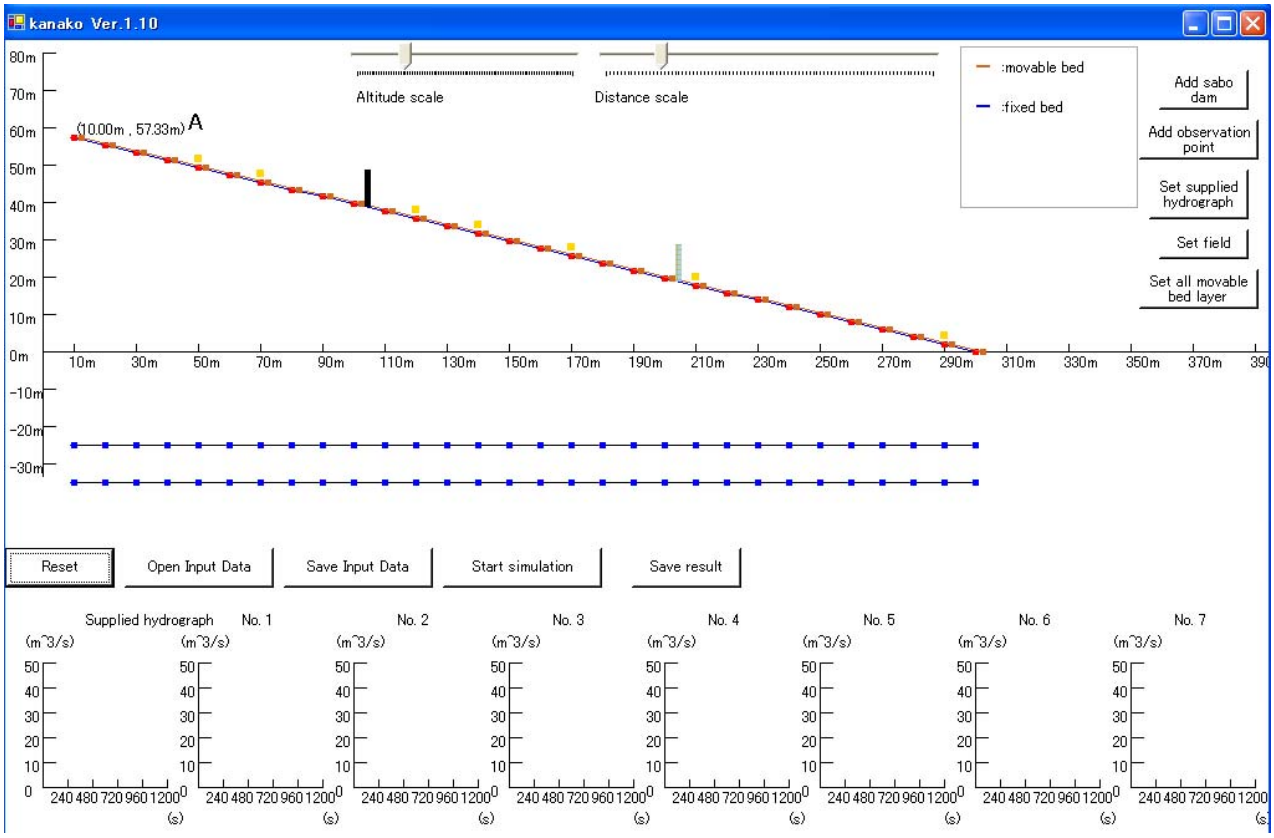


Fig-2: Input Screen (Dragging the red point on the left end)

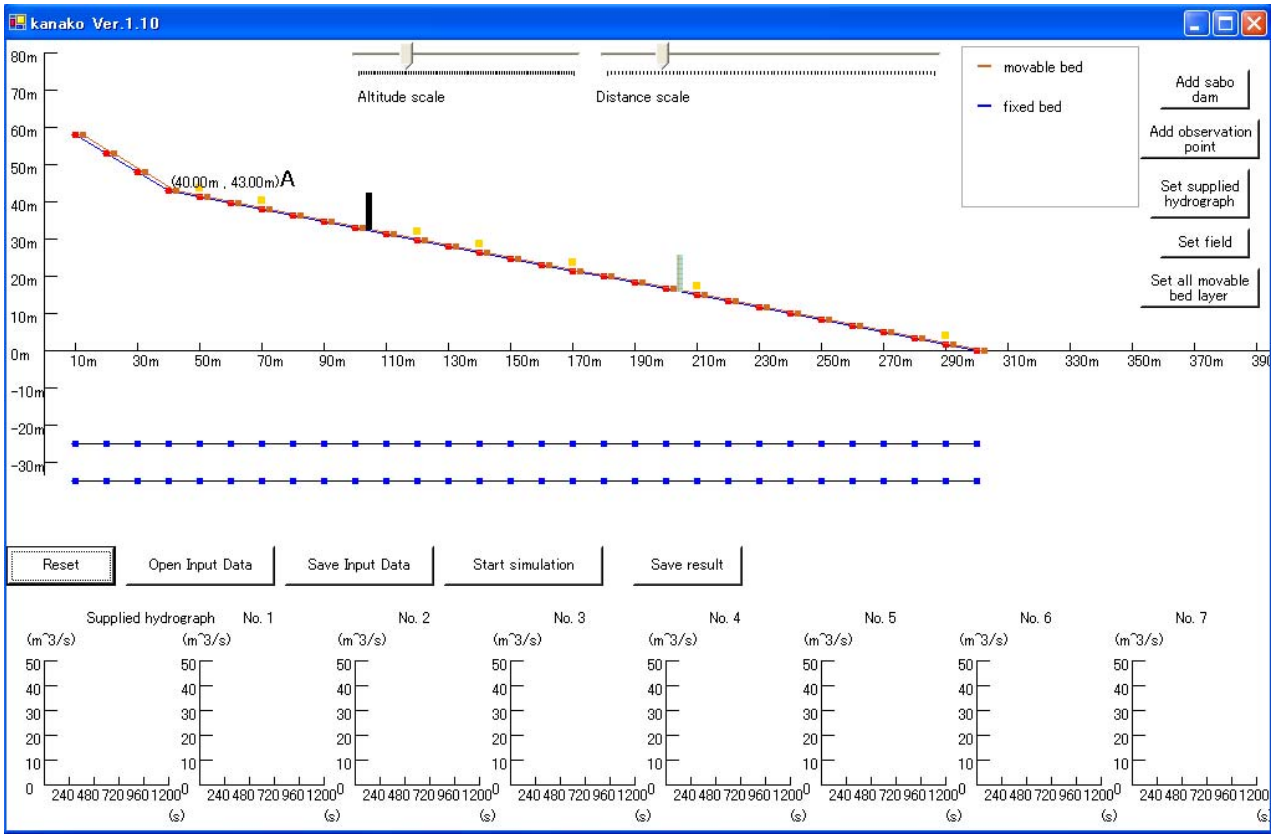


Fig-3: Input Screen (Dragging the red point 4th from the left)

The similar guide also will be displayed when we apply the same process on the blue point of river width as mention before (see Fig-4). This time, the guide shows (distance from the most upstream point, river width).

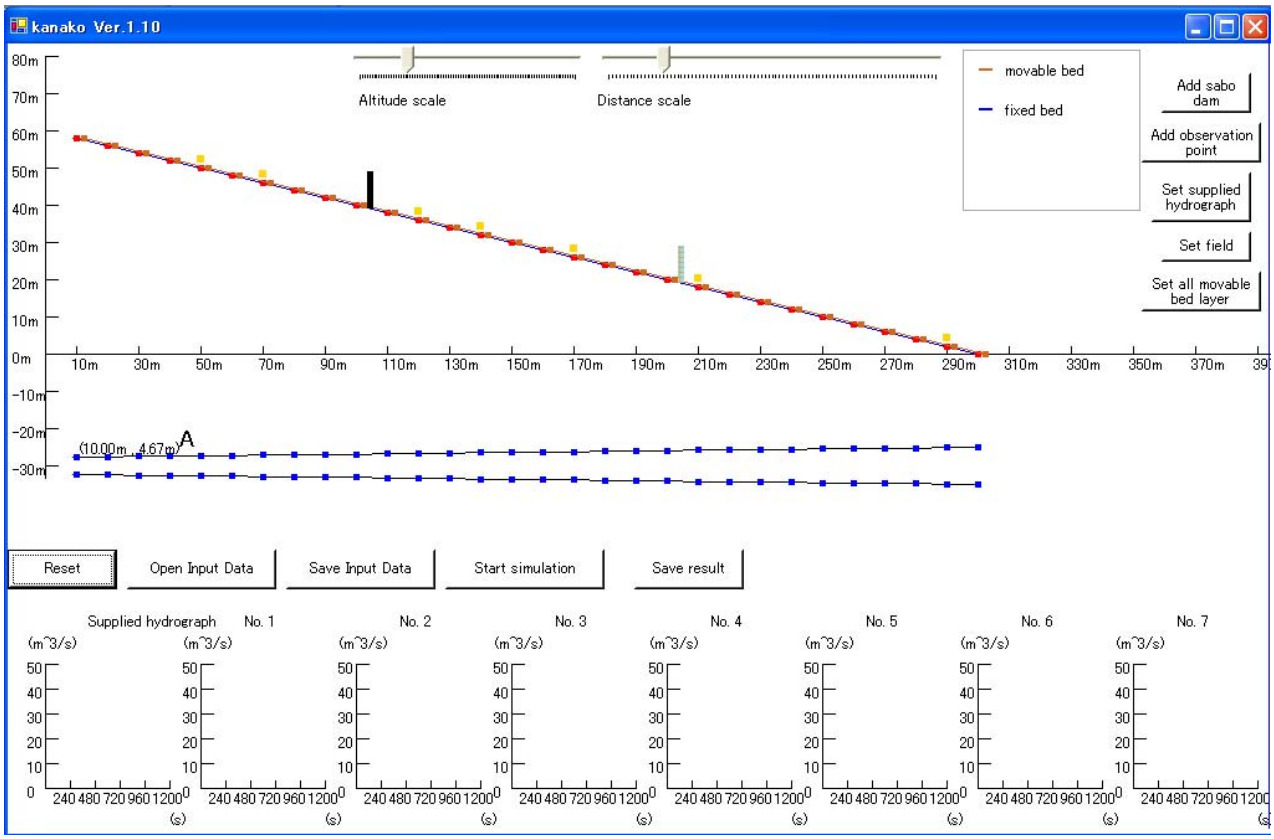


Fig-4: Input Screen (Dragging the upper blue point on the left end)

The riverbed profile and width of a river are set through these works (see Fig-5).

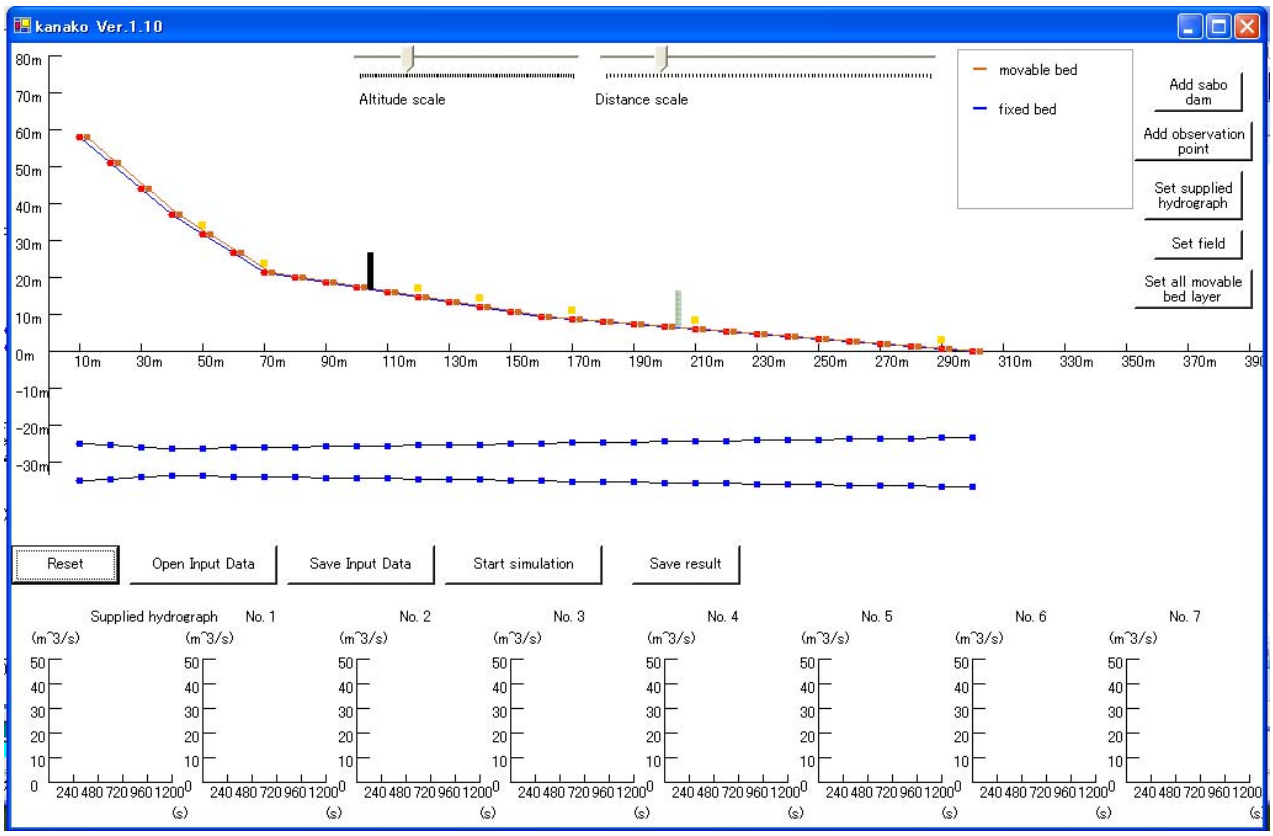


Fig-5: Input Screen

To change the scale of graphic screen, just drag the track bars on the upper screen to left or right direction. The scale of the altitude set by left track bar (A, see Fig-6) and the right track bar is for the distance (B, see Fig-6).

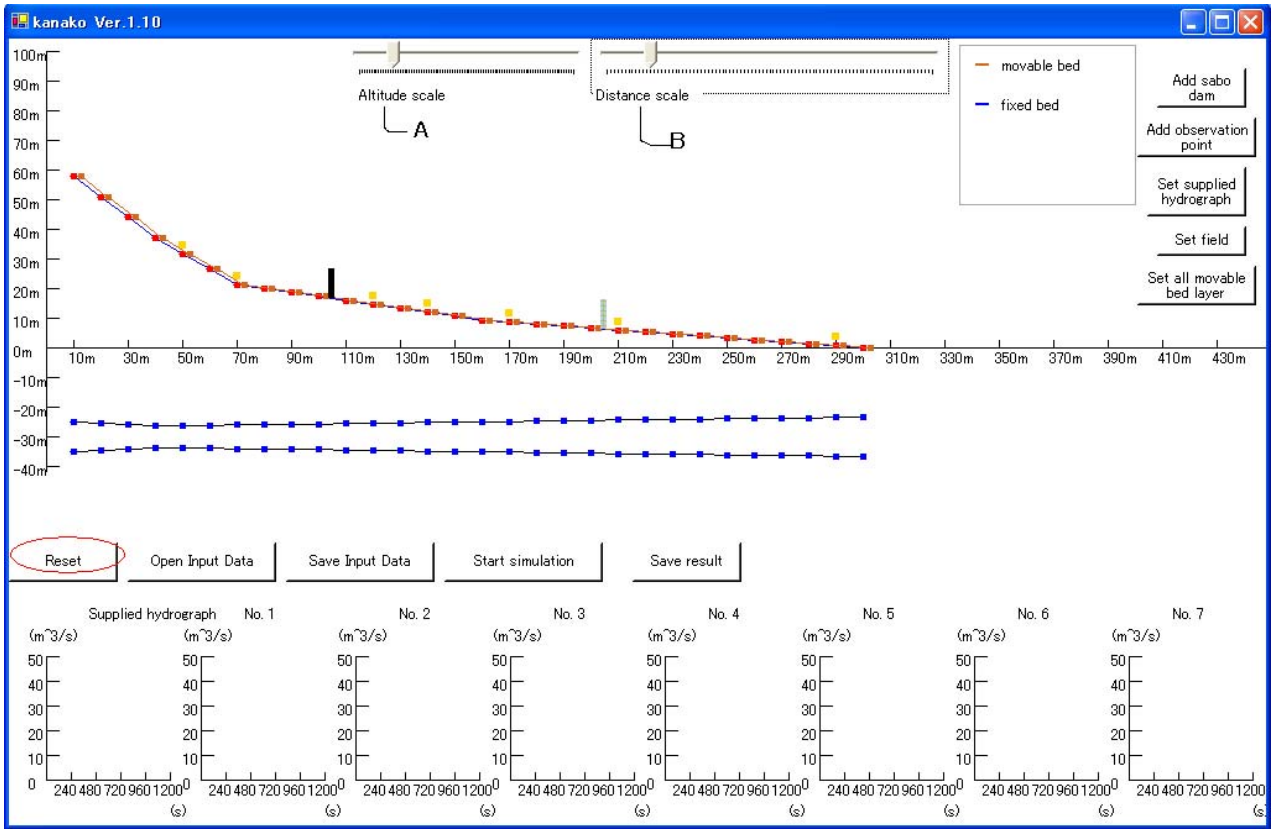


Fig-6: Input Screen
(Both reduced scales of the altitude and distance from the upstream end are changed from Fig-5)

When it doesn't go well …..

Just push 'Reset' button (red circle, see Fig-6) then the screen setting will return to initial/default condition (Fig-1).

4.2 Set Sabo dam (closed type and slit type)

In this program, four parameters of each Sabo dam can be set, its position, height, type (closed type, slit type and grid type Sabo dam), and slit width (only for slit type Sabo dam). Two Sabo dams are already set when the program start. One is closed type Sabo dam, and the other is the grid type Sabo dam.

As information, the black rectangle is closed type Sabo dam and blue checked rectangle is grid type Sabo dam, and here it is not showed, the gray rectangle is slit type Sabo dam. About the grid type Sabo dam, we will make detail explanation in next section. The position can be adjusted by dragging rectangle (Sabo dam symbol) right and left along the river profile. While the rectangle is dragged, the guide is displayed on the upper right side of the rectangle (see Fig-7). It shows the current position of the Sabo dam (distance from the most upstream point, altitude of the bottom of Sabo dam) and automatically will disappear when dragging is stopped.

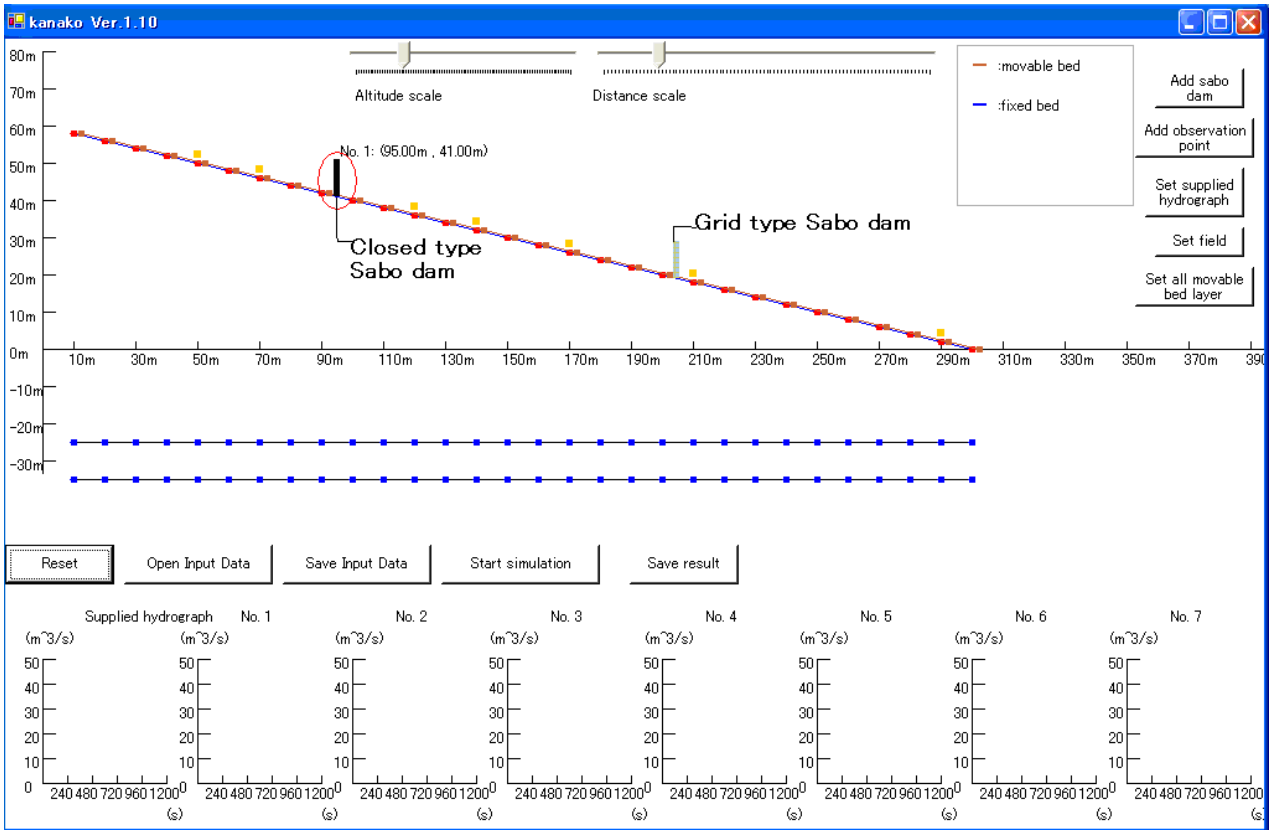


Fig-7: Input Screen (Dragging the Sabo dam, black rectangle surrounded red)

Double-clicks is used to modified Sabo dam setting after each Sabo dam has been set. See Fig-8 for example, if the settings of closed type Sabo dam (black rectangle) need changing follow the procedure below:

1. Double-clicks closed type Sabo dam, then a pop-up window of dam detail setting will appear (see Fig-9). The menu setting consists of type, height and slit width (only for the slit type Sabo dam).
2. The type of Sabo dam is decided by selecting either radio button of closed type or slit type Sabo dam. The closed type Sabo dam is selected in this case, see green circle in Fig-10.
3. Next the height of Sabo dam, input the numerical value to the text box, see blue circle in Fig-10, for an instance the height is changed to 15 m (compare Fig-9 and Fig-10).
4. After all Sabo dam parameters have been set, click the 'OK' button (see red circle in Fig-10), then screen in Fig-11 will appear.

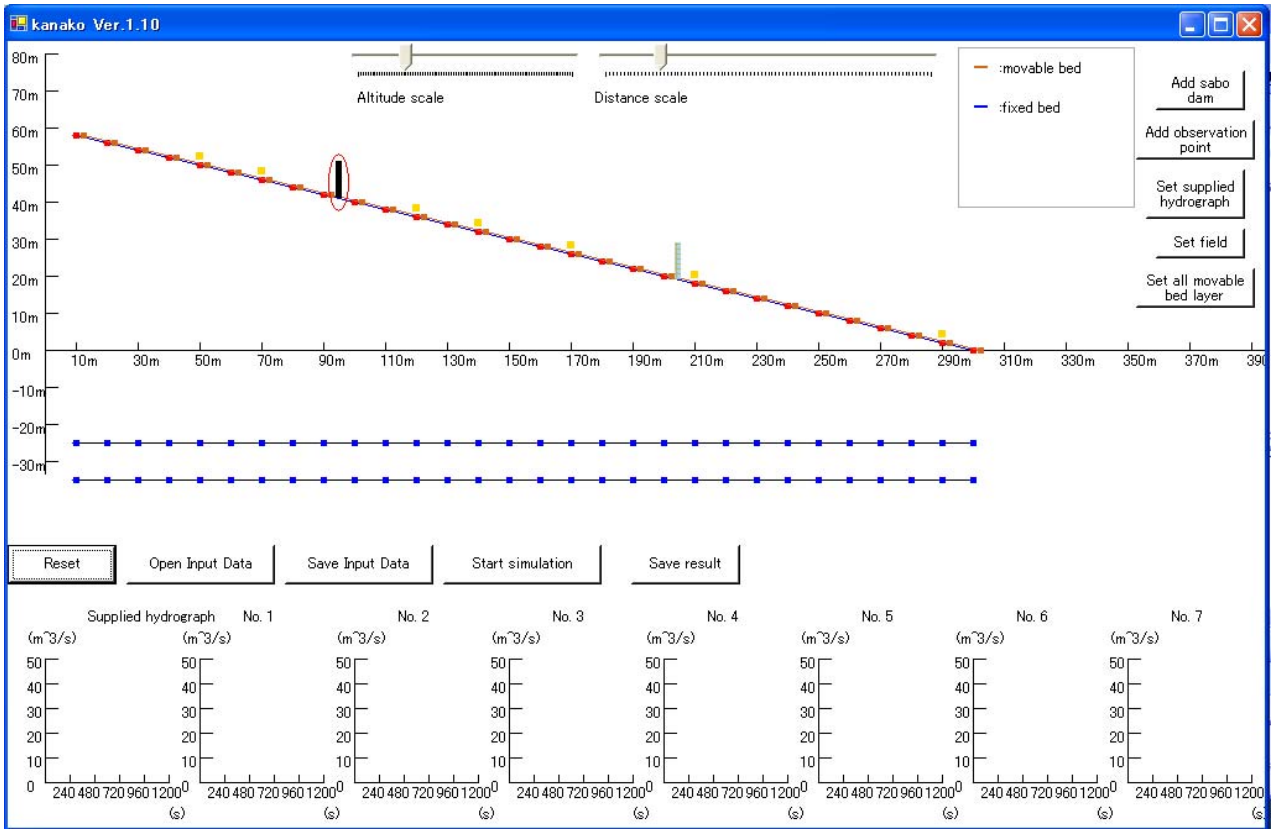


Fig-8: Input Screen (Select the Sabo dam to set parameters)

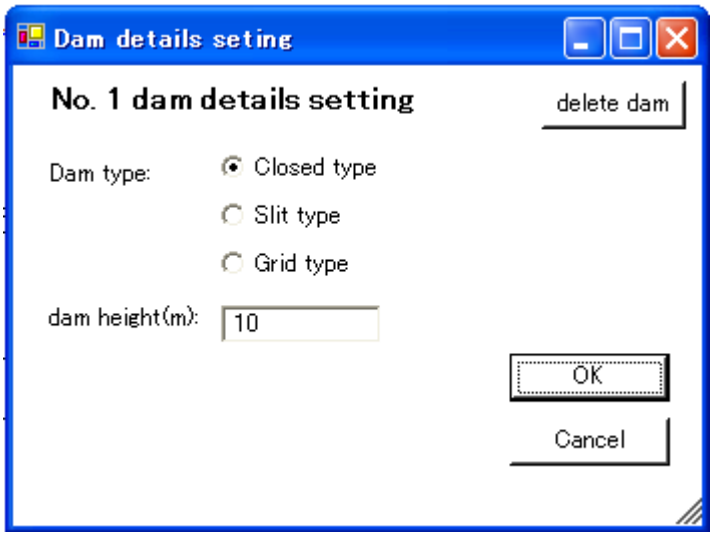


Fig-9: Dam details setting Screen

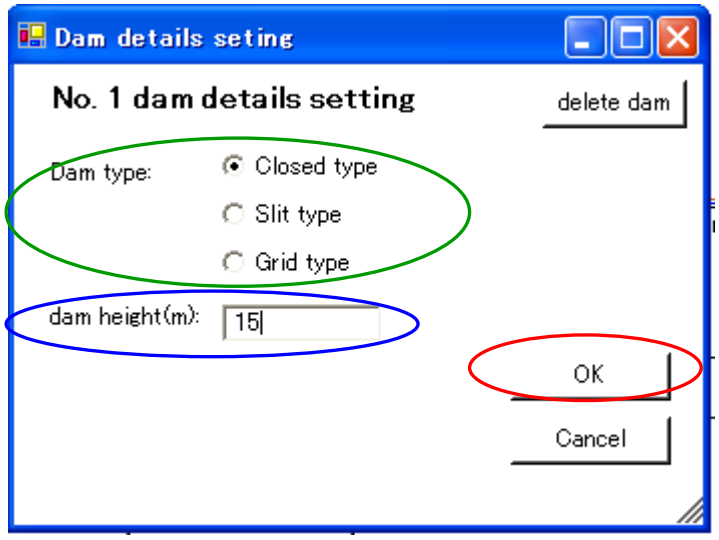


Fig-10: Dam details and setting Screen
(Dam type : closed, height of Sabo dam : 15m)

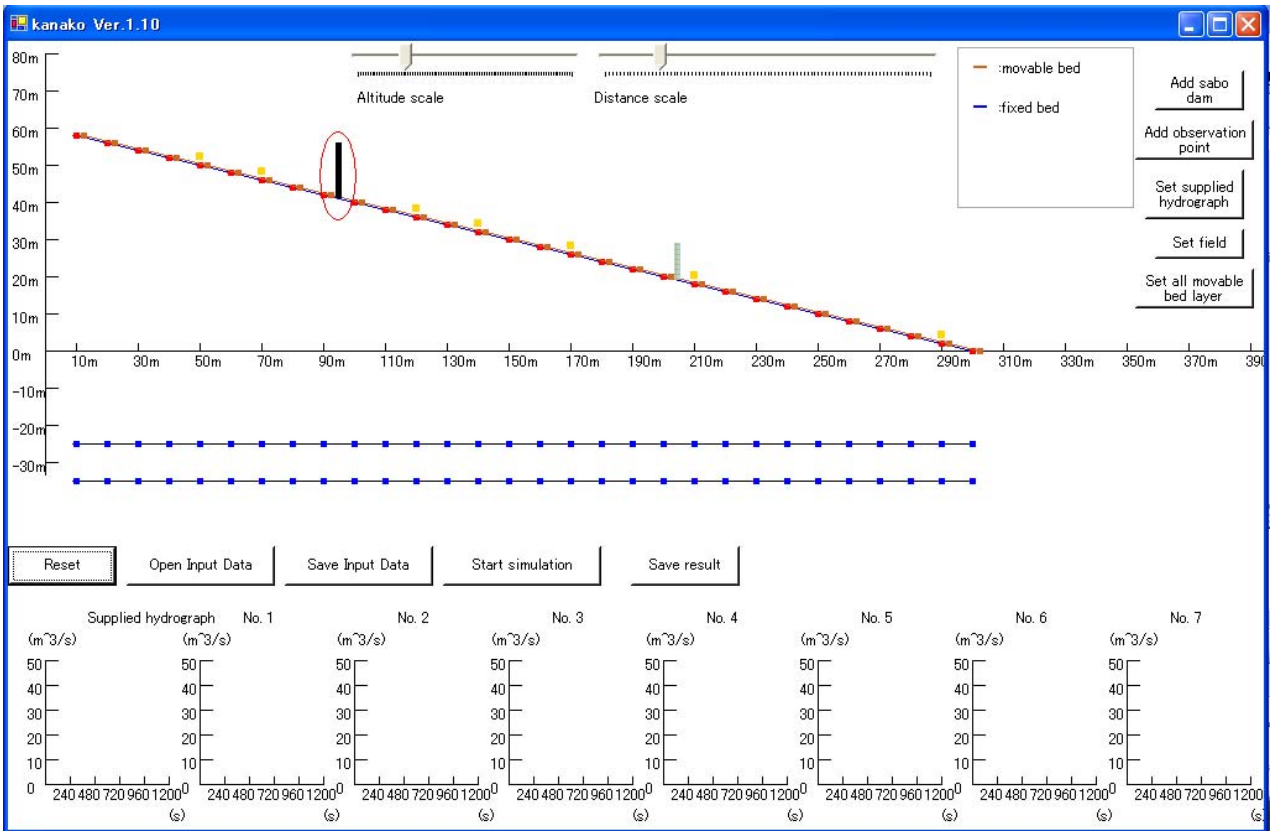


Fig-11: Input Screen (Red surrounded sabo dam is changed from Fig-8)

The same dam can be changed to the slit type Sabo dam. In this case, follow the procedure before. In the second step select the slit type Sabo dam radio button. After that the pop-up window will change form (see Fig-12), additional parameter of slit width will appear. Put the desire height and slit width, then click the 'OK' button. Moreover, the display screen will returns to Fig-11 if the 'Cancel' button (yellow circle in Fig-12) is clicked and the changing will be cancel.

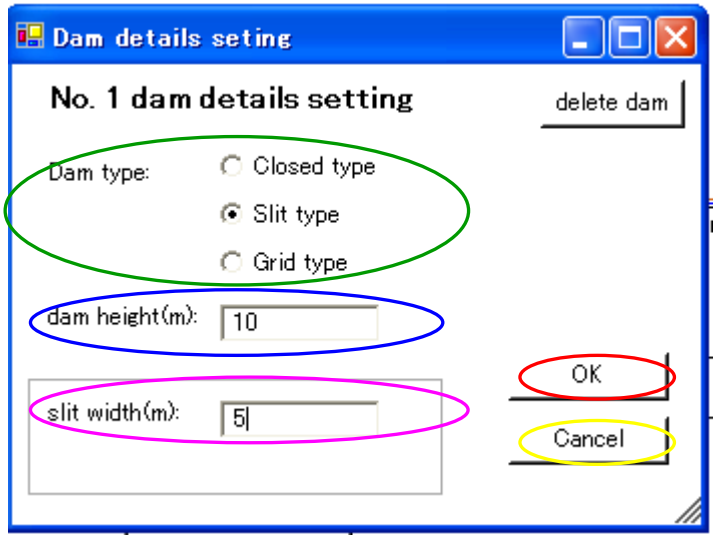


Fig-12 : Dam details and setting Screen
(Dam type: slit, height of Sabo dam : 10m, slit width : 5m)

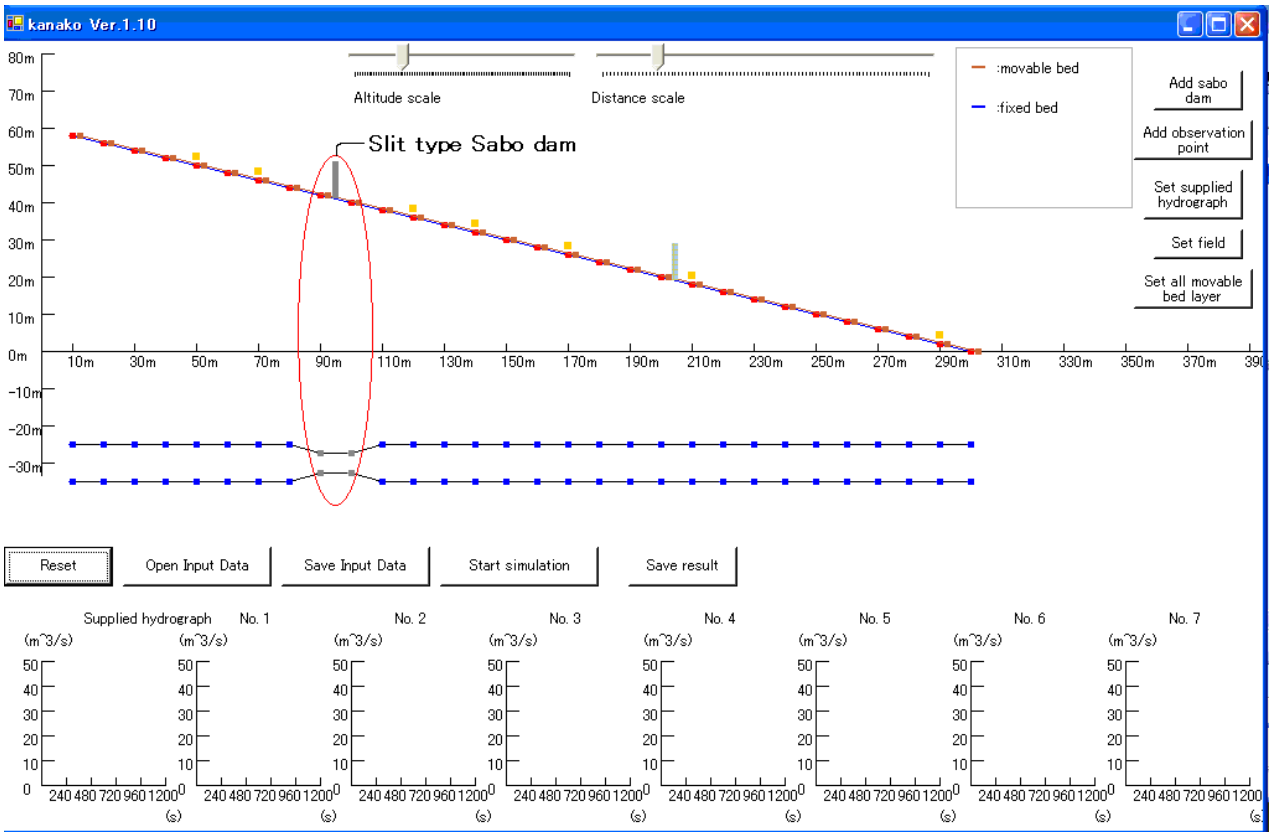


Fig-13: Input Screen (Red surrounded Sabo dam is changed from Fig-11)

When you want to delete one of Sabo dam, there is 'Delete dam' button facility in pop-up window Sabo dam detail setting (see red circle in Fig-14). After click the button, a pop-up window to confirm the action will appear (see Fig-15). If you click the 'OK' button, the dam will be deleted and the display screen will show as Fig-16. But if you do not want to execute the action, click the 'Cancel' button on the right side.

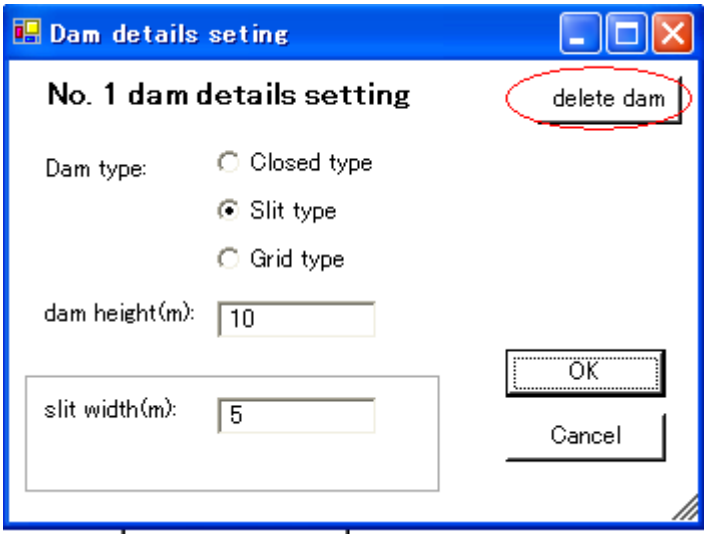


Fig-14: Dam details and setting Screen (Delete Sabo dam)

Fig-15 : Dam Deletion confirmation Screen

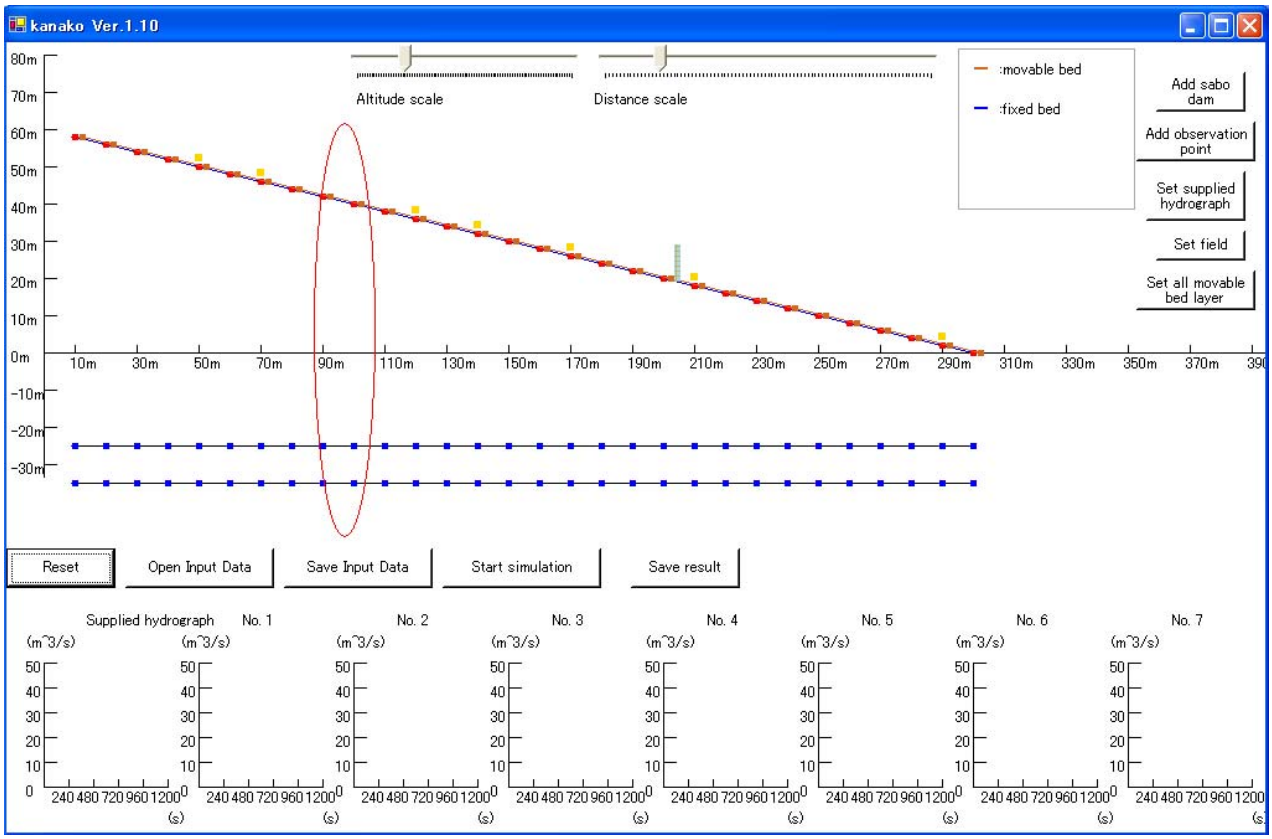


Fig-16: Input Screen (Red surrounded Sabo dam is deleted)

To increase the number of dams, you can use the ‘Add Sabo dam’ button in the upper right of the input screen (see red circle in Fig-17).

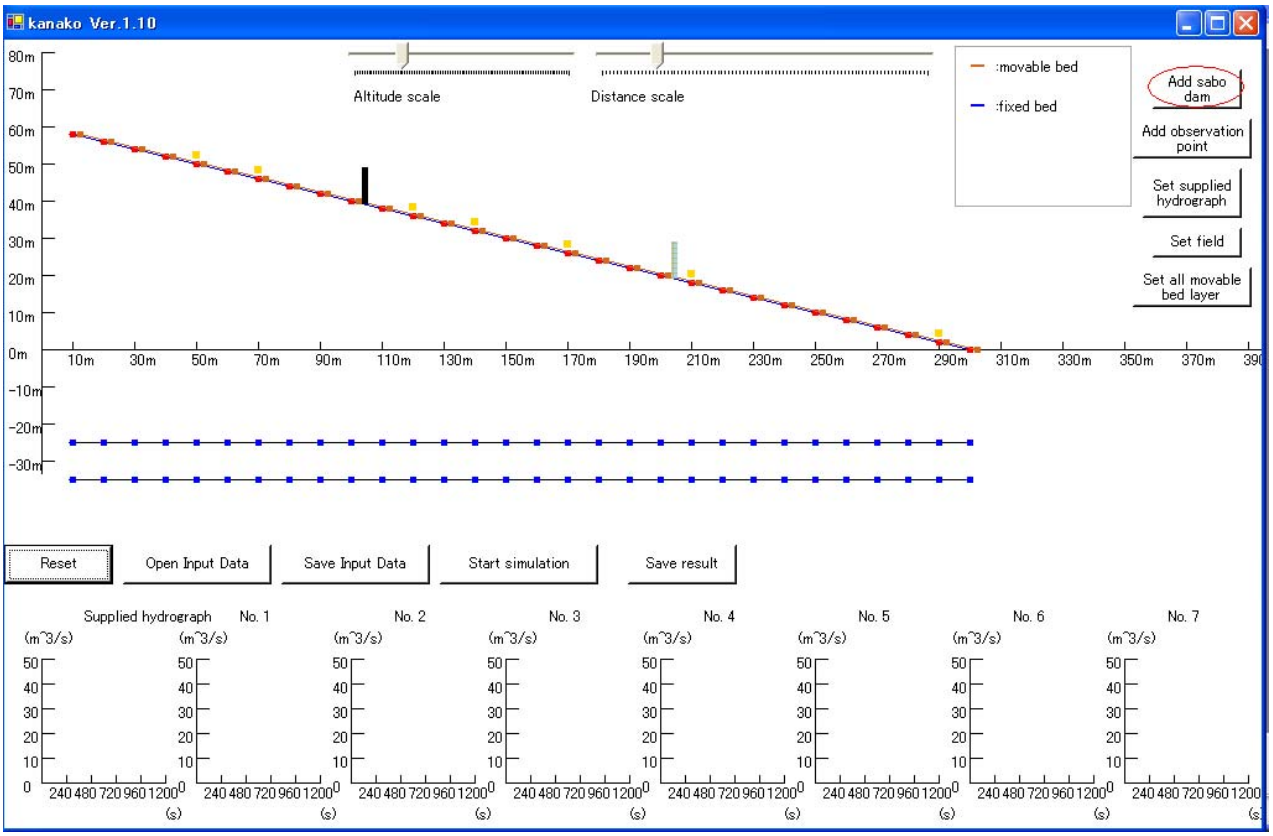


Fig-17: Input Screen (Add Sabo dam)

Then closed type of Sabo dam will be added in random position, so you have to set or modify the parameters of Sabo dam by using procedure that has been mentioned before and move it to the design position as also mentioned before.

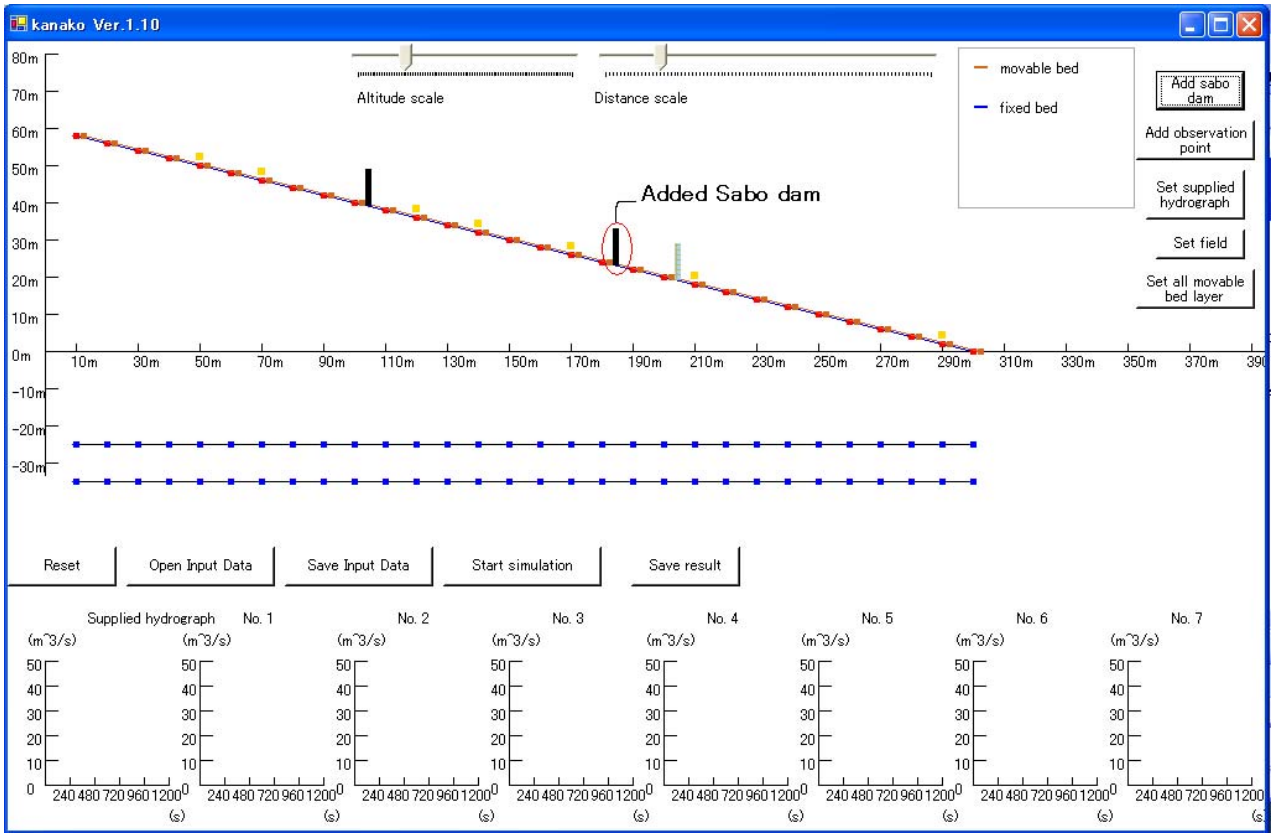


Fig-18: Input Screen (One Sabo dam is added to Fig-17)

Please note, that in the start screen numbers of dams are arranged sequences in numerical order from the upstream, but by adding the Sabo dam with 'Add Sabo dam' button, the dams may not be arranged as it is supposed to be because it added randomly (see Fig-18). As a result, probably the 3rd dam might be put left from the 2nd dam on the upstream part as shown in Fig-19.

When this condition is happened, if the 'Start simulation' button is clicked the project will not be executed directly and a warning pop-up window will appear as shown in Fig-20. For this case, click the 'OK' button to return the screen as seen in Fig-19, then set the order of the dam position again and after all those finish, try to begin the simulation again.

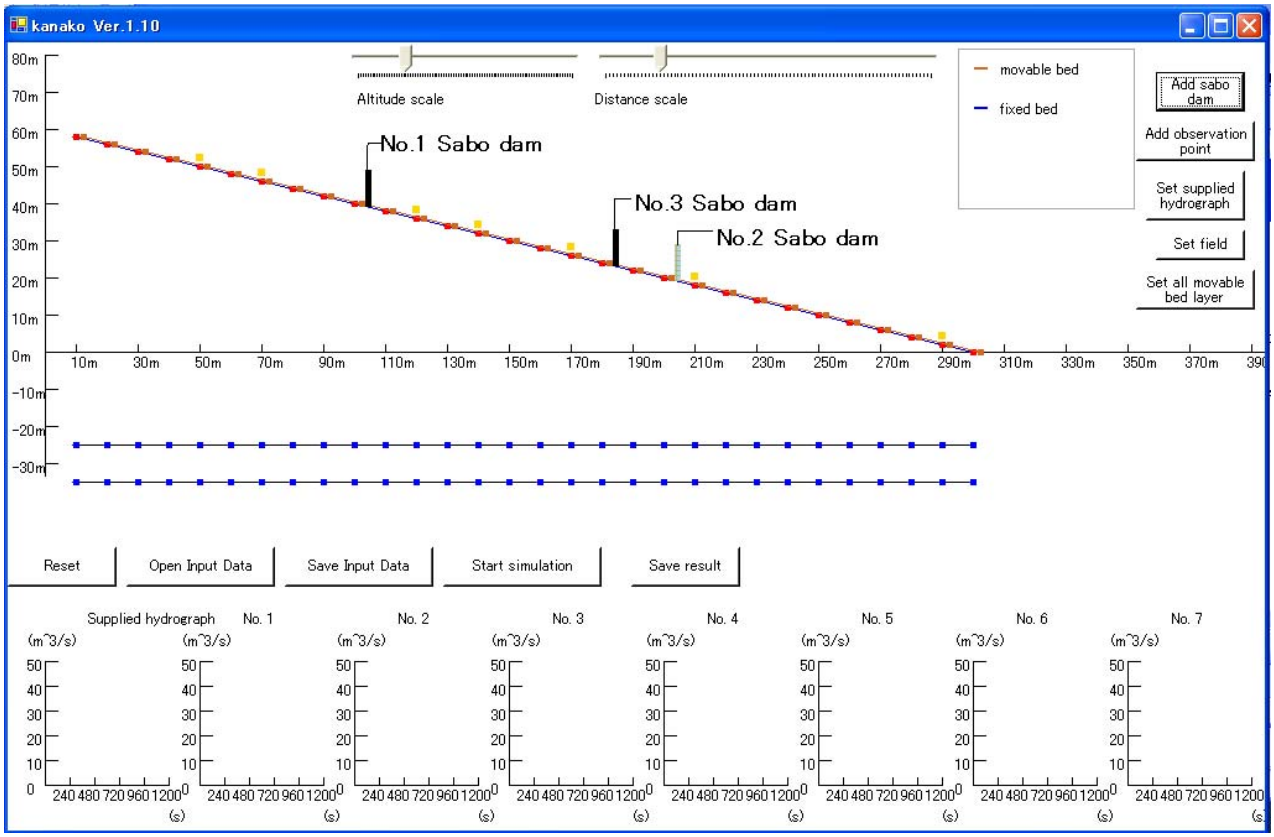


Fig-19: Input Screen (Sabo dam is not set in numerical order from the upstream end)

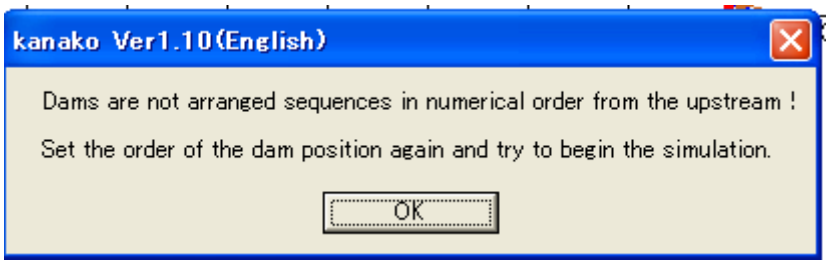


Fig-20: Warning Screen
(In case Sabo dam is not set in numerical order from the upstream end)

4.3 Set grid type Sabo dam

Grid type sabo dam can be set in Kanako 1.10. It is displayed as a blue checked rectangle on the screen. When you double click it (see Fig-21), or when you select 'grid type radio button' in 'dam details setting screen (see Fig-22), then a pop-up window of 'set grid dam' screen will appear (see Fig-23).

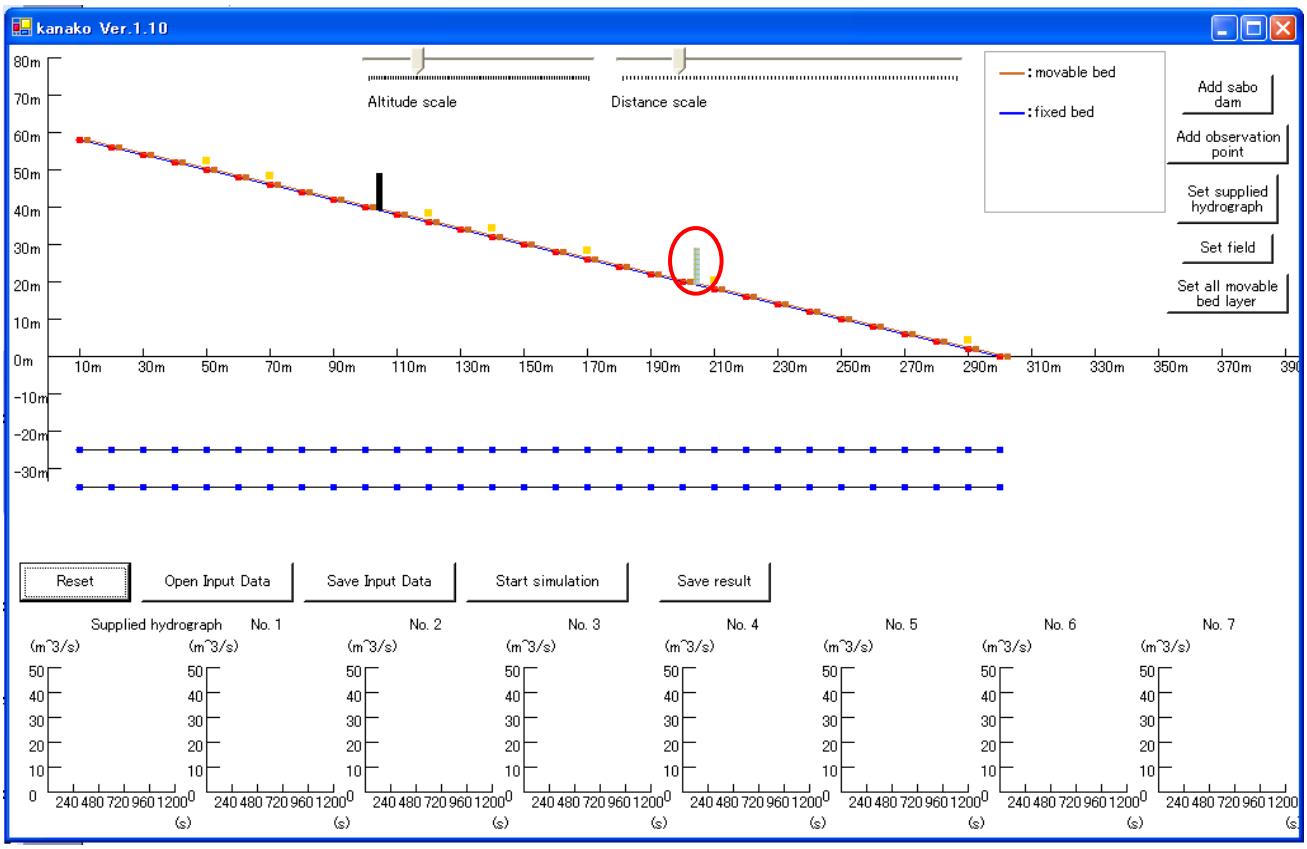


Fig-21: Input Screen (Select the grid type Sabo dam to set parameters)

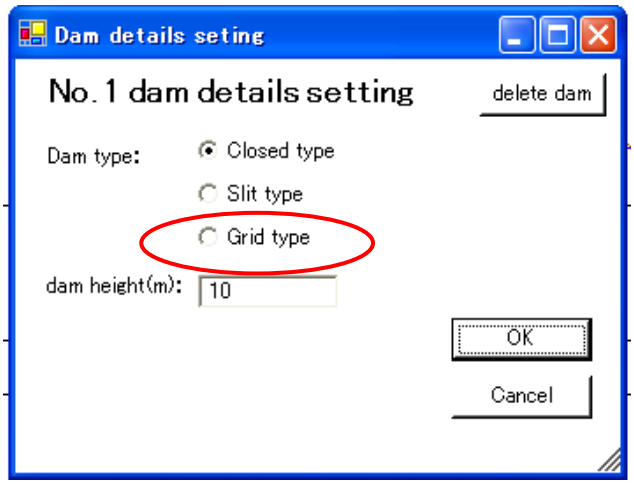


Fig-22: Dam details setting Screen

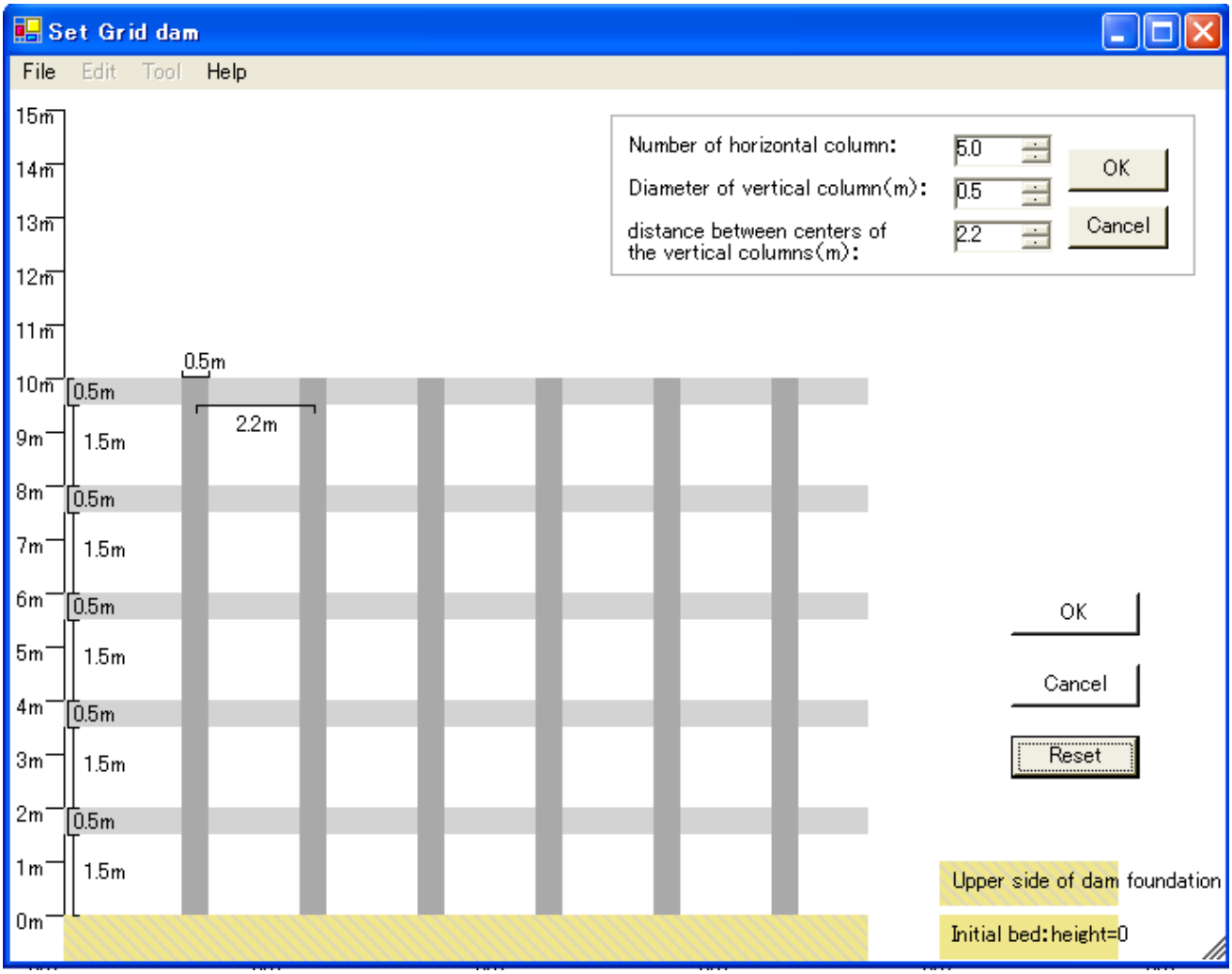
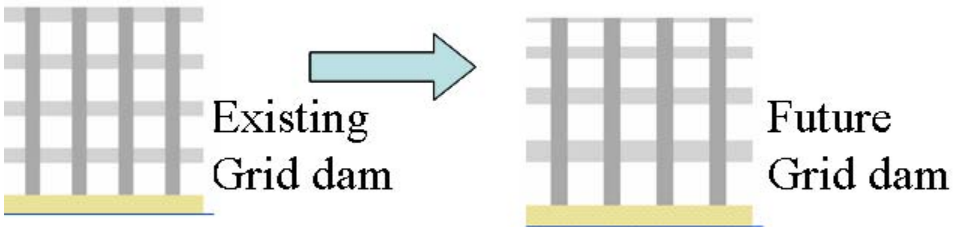


Fig-23: Set Grid dam Screen (Initial condition)

Here, you can set the details for a grid type of sabo dam, such as column diameter and distance between columns.

Cf. In existing grid type sabo dams, grid diameter and distance between each grid are fixed. But in the future, the diameter of and the distance between horizontal beams on the upper part are thinner, will be the main type.



Therefore in kanako 1.10, we can set horizontal beam diameter and distance individually.

The number of horizontal column, each diameter of vertical column, and distance between centers of the vertical columns is input with the spin control, in the group box set on upper right side (see red circle in Fig.-24).

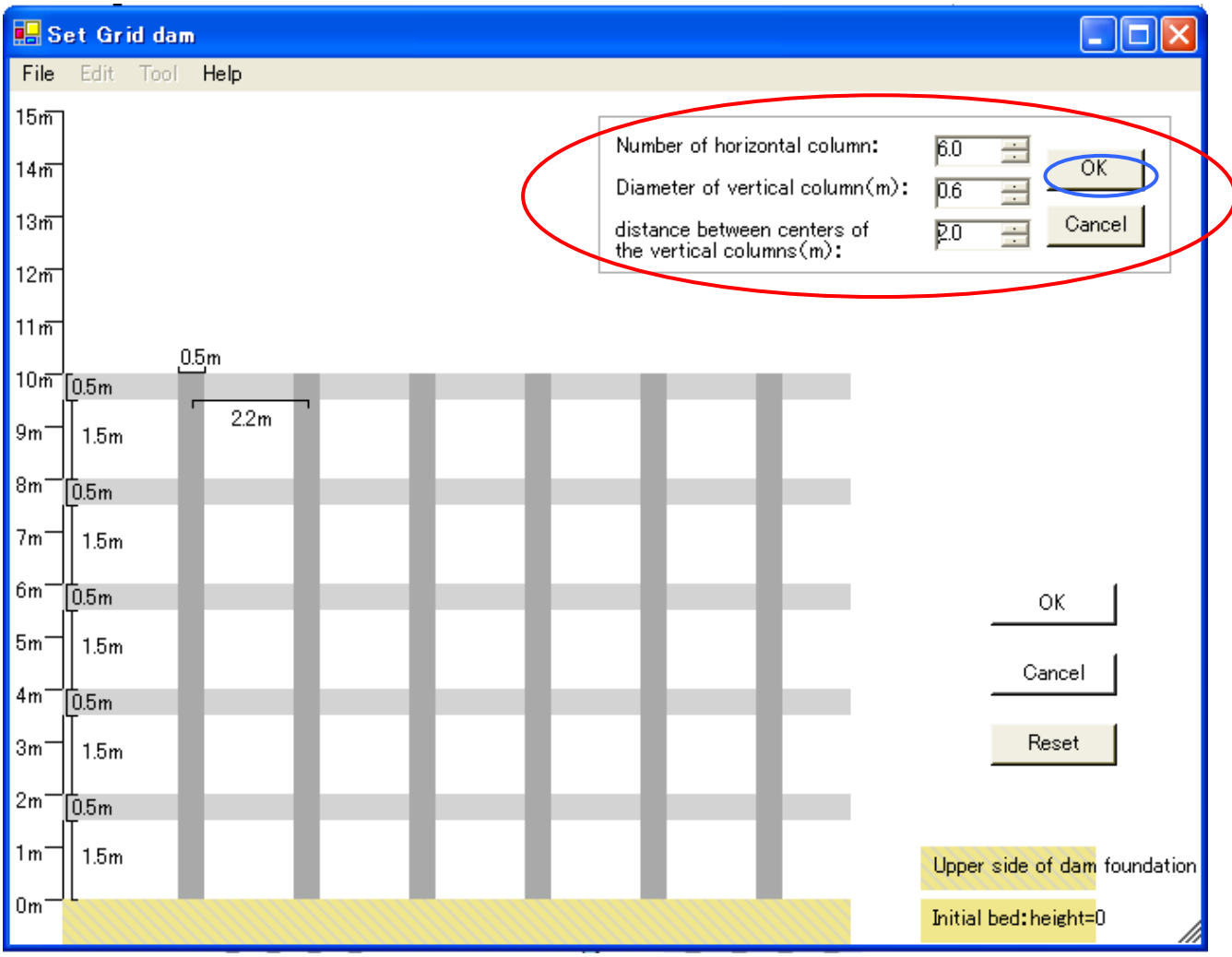


Fig-24: Set Grid dam Screen (Under editing)

Set the number, using the spin controls or by keyboard, click the 'OK' button in the group box (see blue circle in Fig-24), then screen will change as Fig-25. If you do not want to execute the action, click the 'Cancel' button under the OK button.

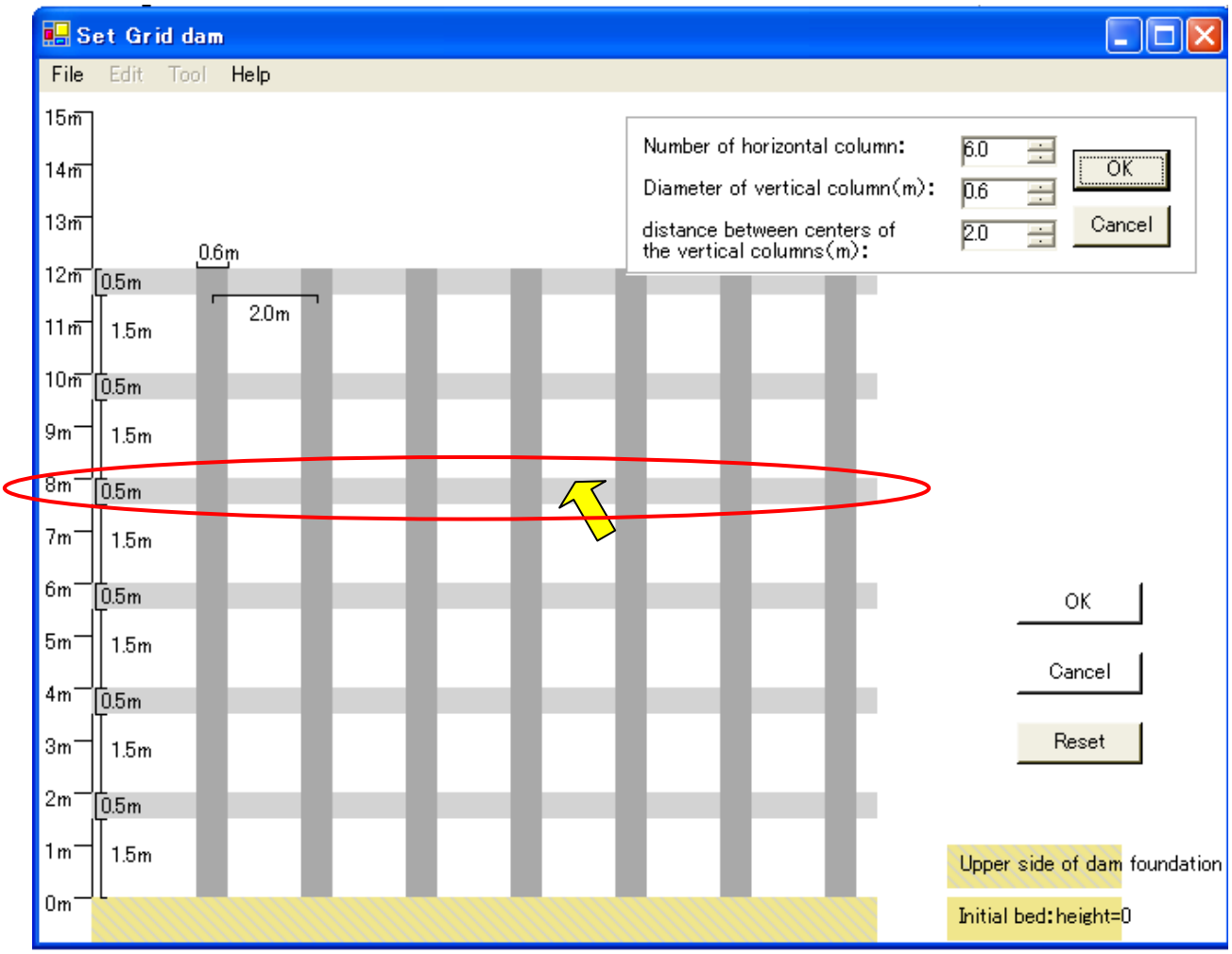


Fig-25: Set Grid dam Screen (Number: 6.0, Diameter: 0.6 distance: 2.0)
[Double click 4th horizontal column diameter from the bottom]

To change the diameter of a horizontal column, put the pointer (see yellow pointer in Fig-25) on the horizontal column, 4th column from the bottom in this case (see red circle in Fig-25) and double-click it.

Then, the color of column changes to pink (see Fig-26) and a group box appears (see red circle in Fig-26). Set the number using the spin control or by keyboard, click the 'OK' button in the group box (see blue circle in Fig-26), then screen will change as Fig-27. If you do not want to execute the action, click the 'Cancel' button under the OK button.

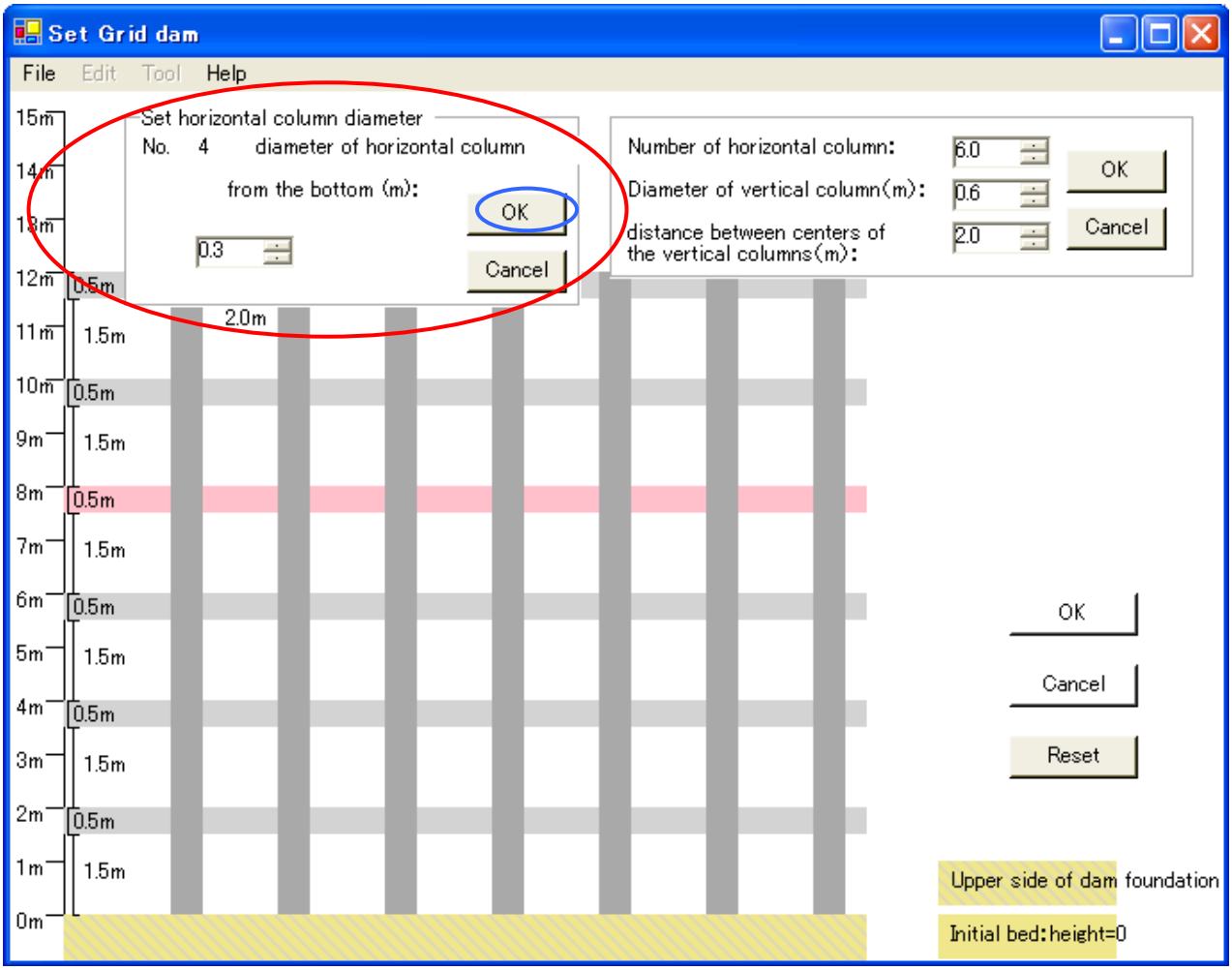


Fig-26: Set Grid dam Screen (Editing 4th horizontal column diameter from the bottom)

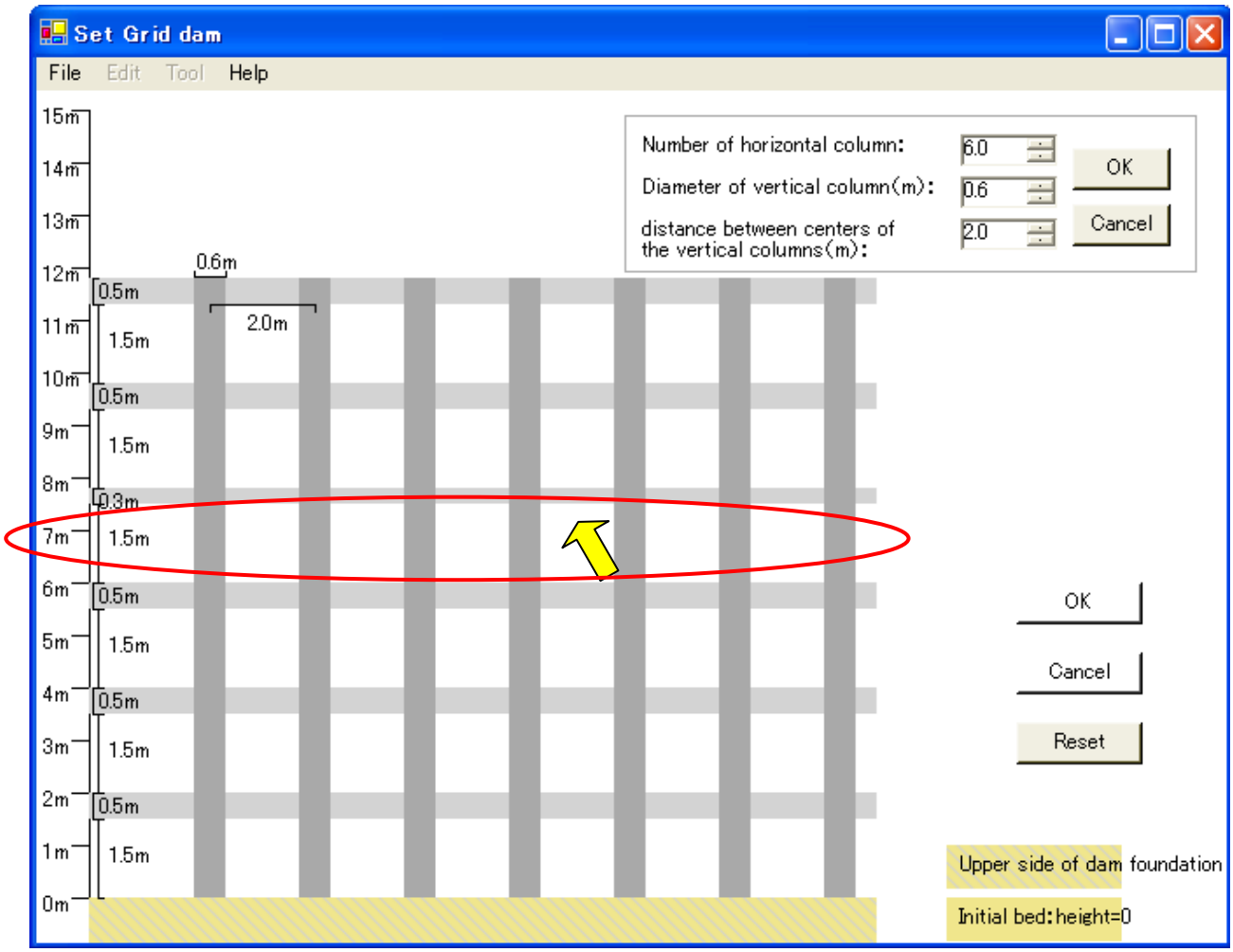


Fig-27: Set Grid dam Screen (4th horizontal column diameter from the bottom changed to 0.3m) [Double click 4th space between horizontal columns from the bottom]

To change the distance between the vertical columns, put the pointer on the place you want to change (see yellow pointer in Fig-27), 4th space between the vertical columns from the bottom in this case (see red circle in Fig-27) and double-click it. Then the color changes and a group box appear. Set the number using the control.

Then, the color of space between the vertical columns changes to pink (see Fig-26), and a group box appears (see red circle in Fig-26). Set the number using the spin control or by keyboard, click the 'OK' button in the group box (see blue circle in Fig-28), then screen will change as Fig-29. If you do not want to execute the action, click the 'Cancel' button under the OK button.

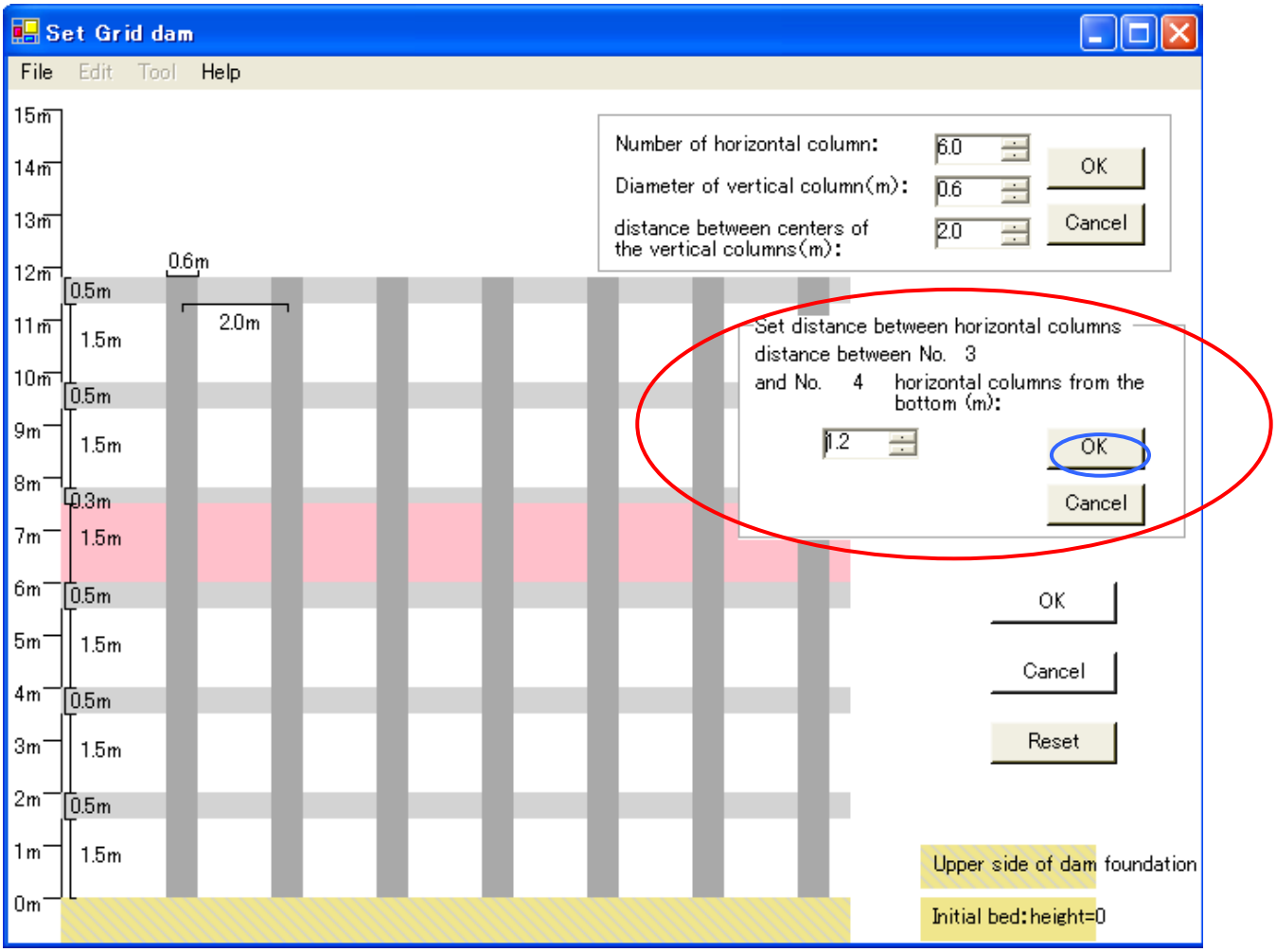


Fig-28: Set Grid dam Screen (Editing 4th space between horizontal columns from the bottom)

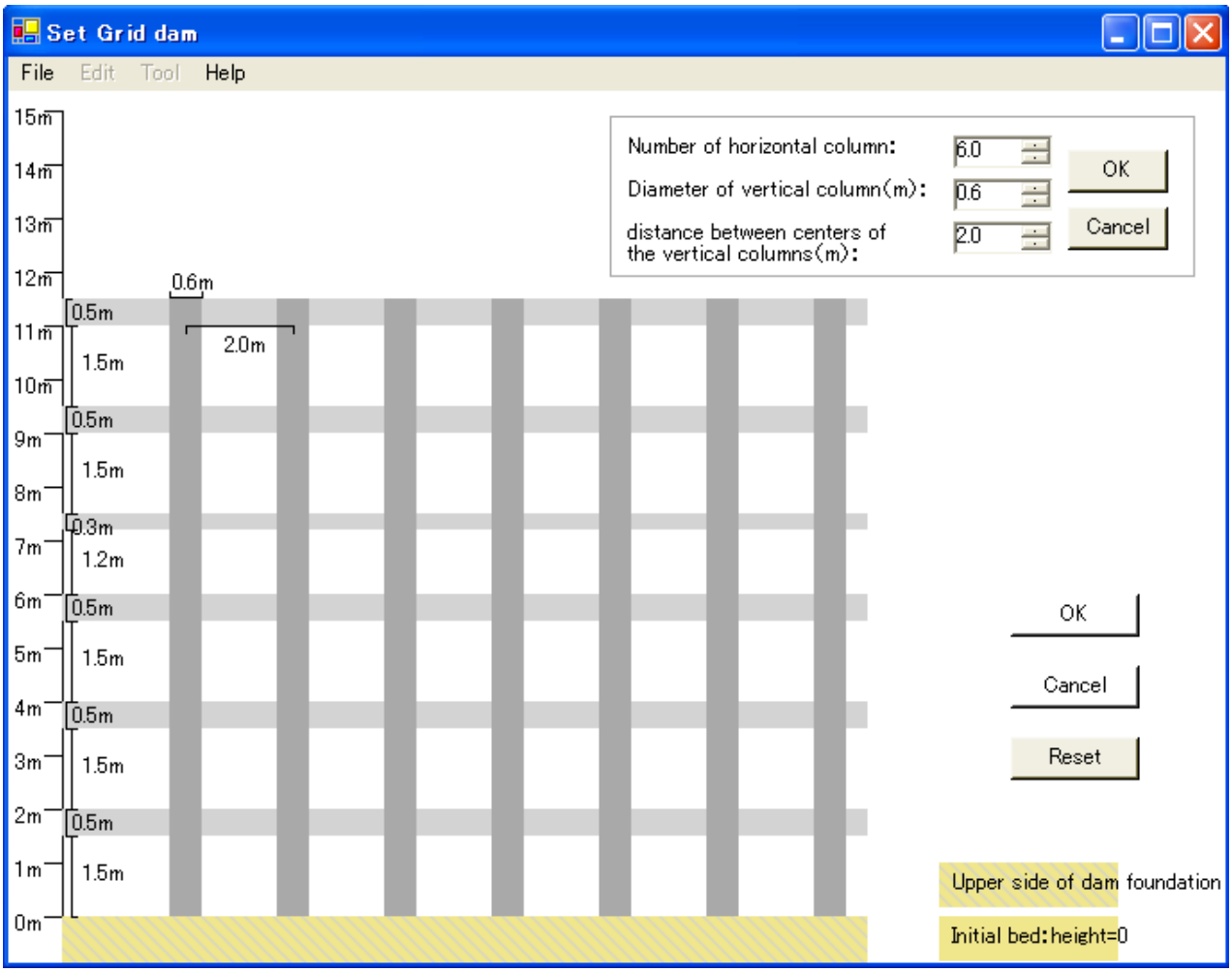


Fig-29: Set Grid dam Screen
(4th space between horizontal columns from the bottom changed to 1.2m)

Following the procedure before, you can set the grid dam details.

Here, we set as Fig-30, which the diameter of and the distance between horizontal beams on the upper part are thinner.

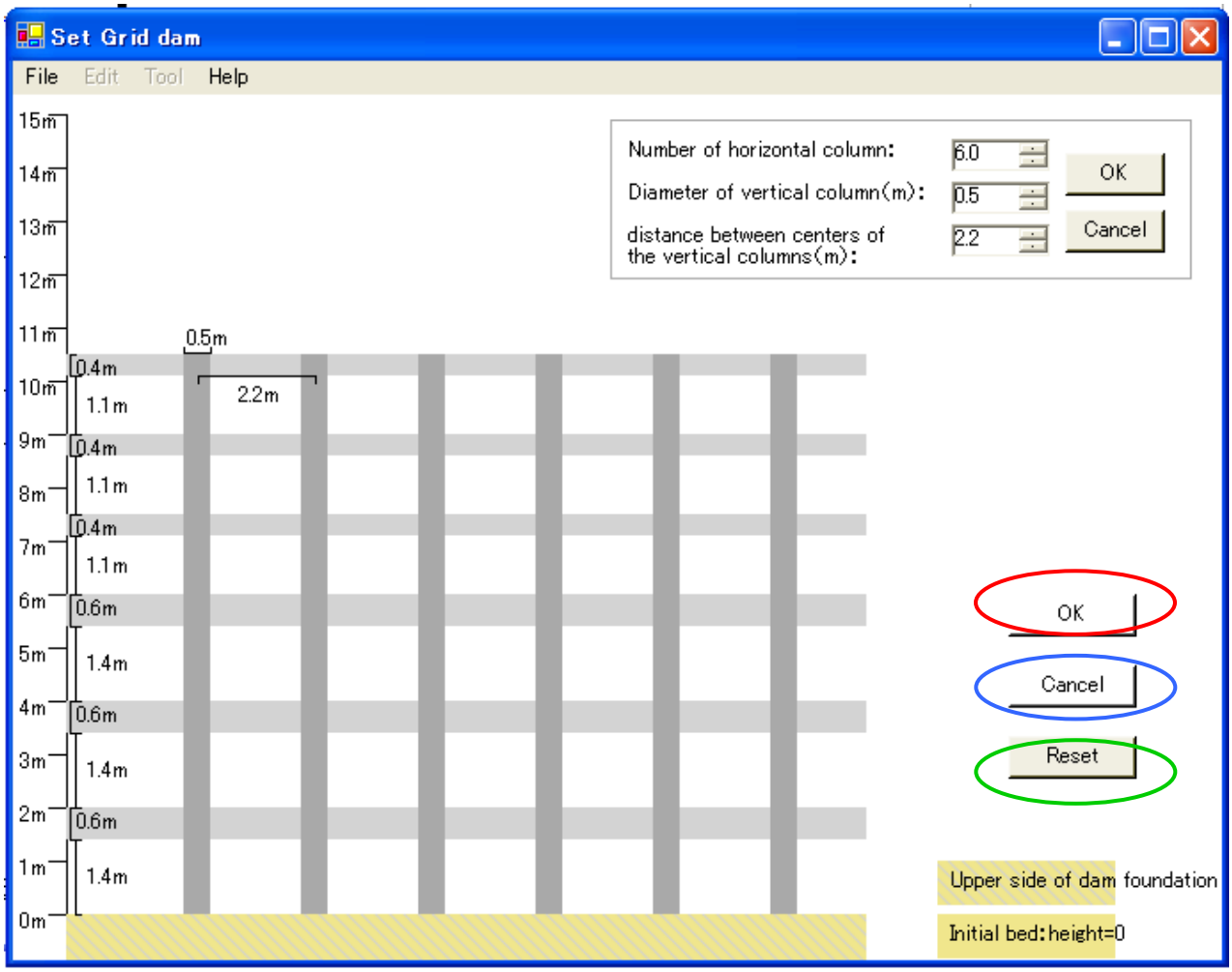


Fig-30: Set Grid dam Screen

To resolve these grid dam conditions, click 'OK' button (see red circle in Fig-30) and 'Set grid dam' screen will close and 'dam detail setting' screen appears. To resolve, click 'OK' button (see red circle in Fig-31) on this screen, too. Then Fig-32 screen will appears.

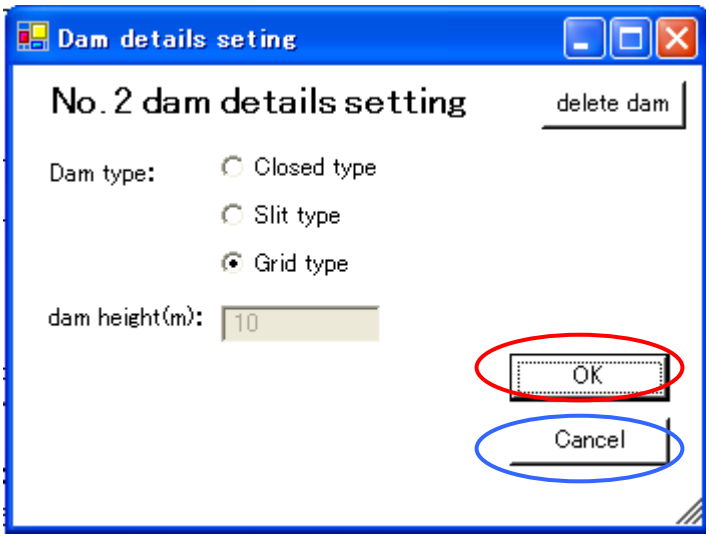


Fig-31: Dam details setting Screen

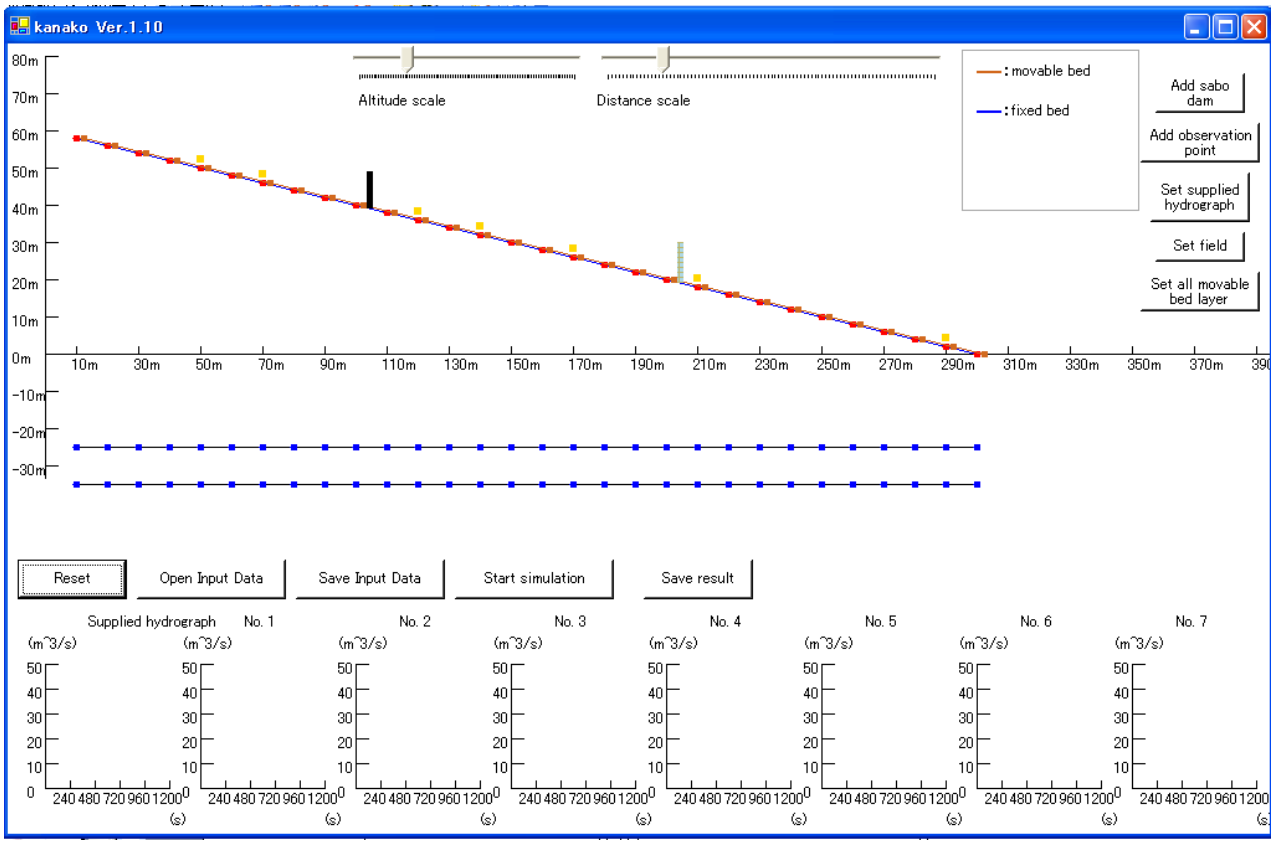


Fig-32: Input Screen (Grid dam details is changed)

If you want to cancel these changing, click ‘Cancel’ button in both ‘Set grid dam’ screen (see blue circle in Fig-30) and in ‘Dam detail setting’ screen (see blue circle in Fig-31), then it will go backs to the Fig-21 condition.

When you want to reset and go back to the initial condition grid dam….

Just push ‘Reset’ button (green circle, see Fig-30) then the screen setting will return to initial grid dam condition (Fig-23).

To set the installation of grid dam, and other conditions(to delete or add dam, the number of the dam should be in numerical order from upstream, etc) is quite same as closed type and slit type sabo dam. Therefore, please read ‘4.2 Set Sabo dam (closed type and slit type)’ if you want to know these information.

4.4 Set the hydrograph observation point

Seven hydrograph observation points are already set when the program start. They can be seen as yellow points along the riverbed profile and are placed in numerical order from the upstream through the downstream, begin with No. 1 observation point, No. 2 observation point, … and the last No. 7 observation point. This position can be moved by dragging these yellow points. Similar with others the position guide will appear while it is dragged to show the current position of it (A, see Fig-33) and disappear when the dragging is stopped. During the simulation, hydrograph will be displayed by 8 graphs in the bottom of screen. The first graph on the most left is the data of supplied hydrograph at the most upstream, 7 others are hydrograph in each observation points.

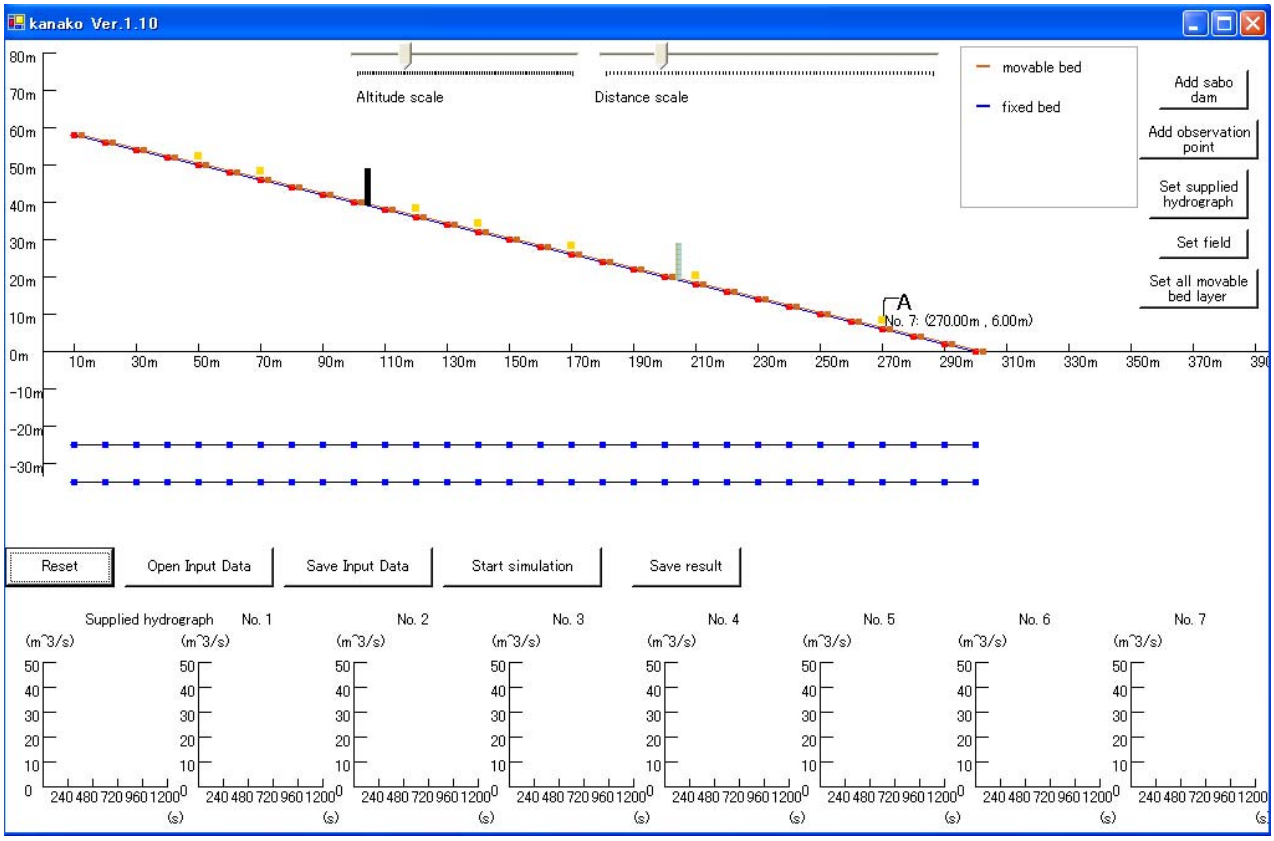


Fig-33: Input Screen (Dragging the right end hydrograph observation point)

If you want to delete some of the hydrograph observation point, double-click the point you want to delete (A, see Fig-34), so the pop-up delete hydrograph observation point window will appear (see Fig-35), click the button and again the pop-up confirmation window will come out (see Fig-36), if you are sure about the action click the 'OK' button and this observation point will be deleted as shown Fig-37. But if you are not sure click the 'Cancel' button. When the numbers of observation points decrease, the graphs in the bottom screen will also decrease related to the number of observation points.

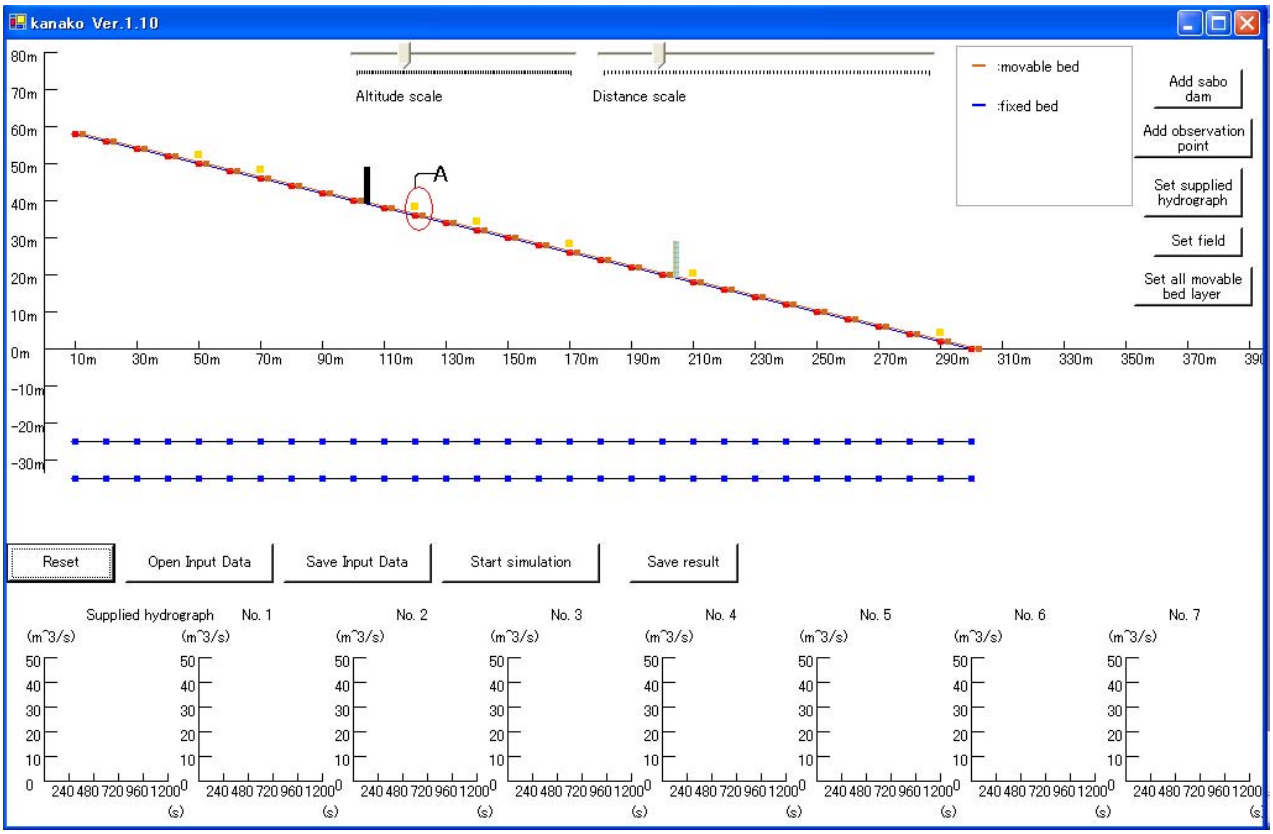


Fig-34: Input screen (Delete observation point screen)

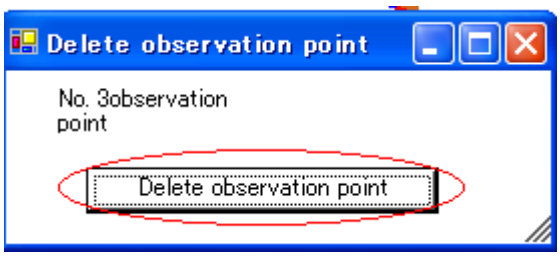


Fig-35: Delete observation point screen

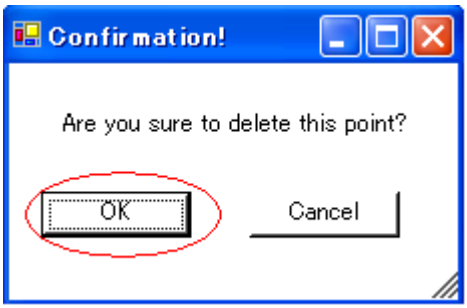


Fig-36: Oobservation point deletion confirmation Screen

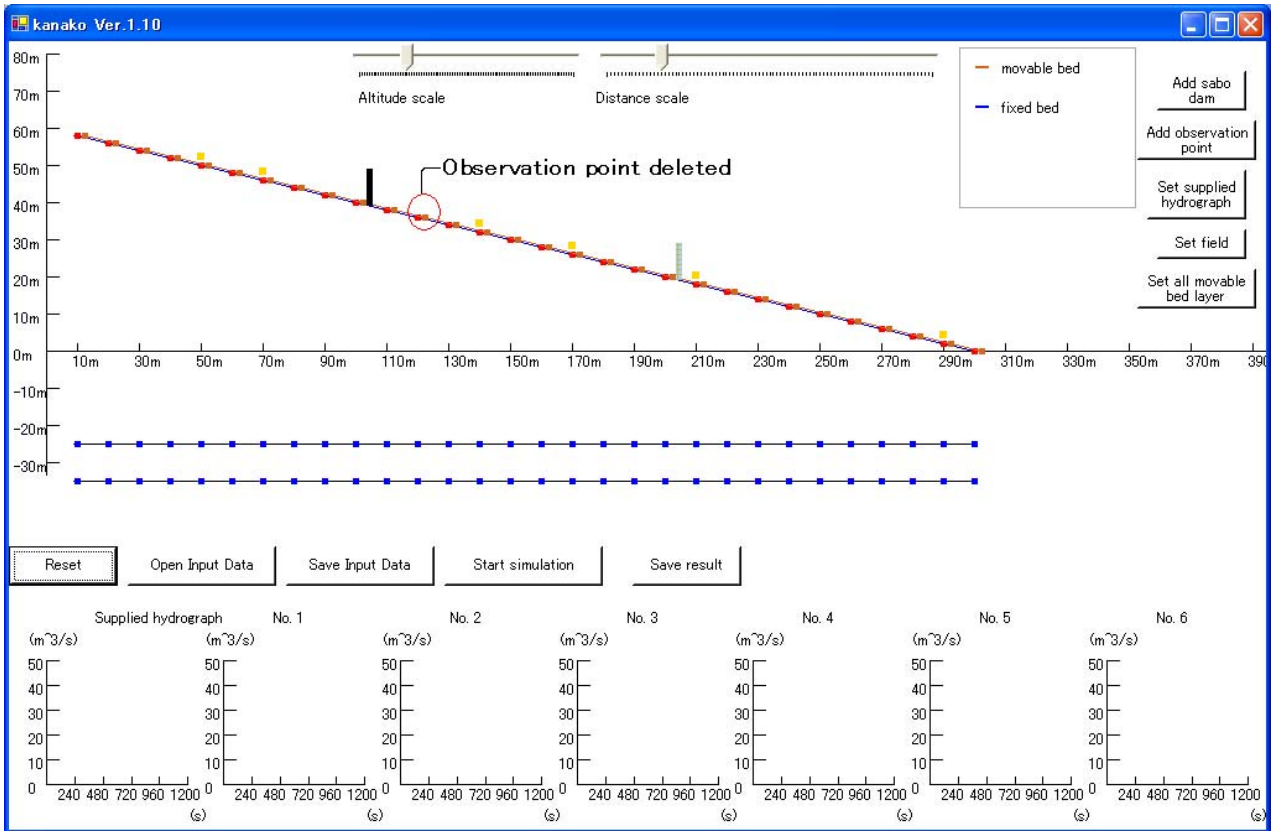


Fig-37: Input Screen (Red surrounded observation point is deleted)

You can also increase the numbers of hydrograph observation points by clicking ‘Add observation point’ button in the upper right of input screen (see red circle in Fig-38).

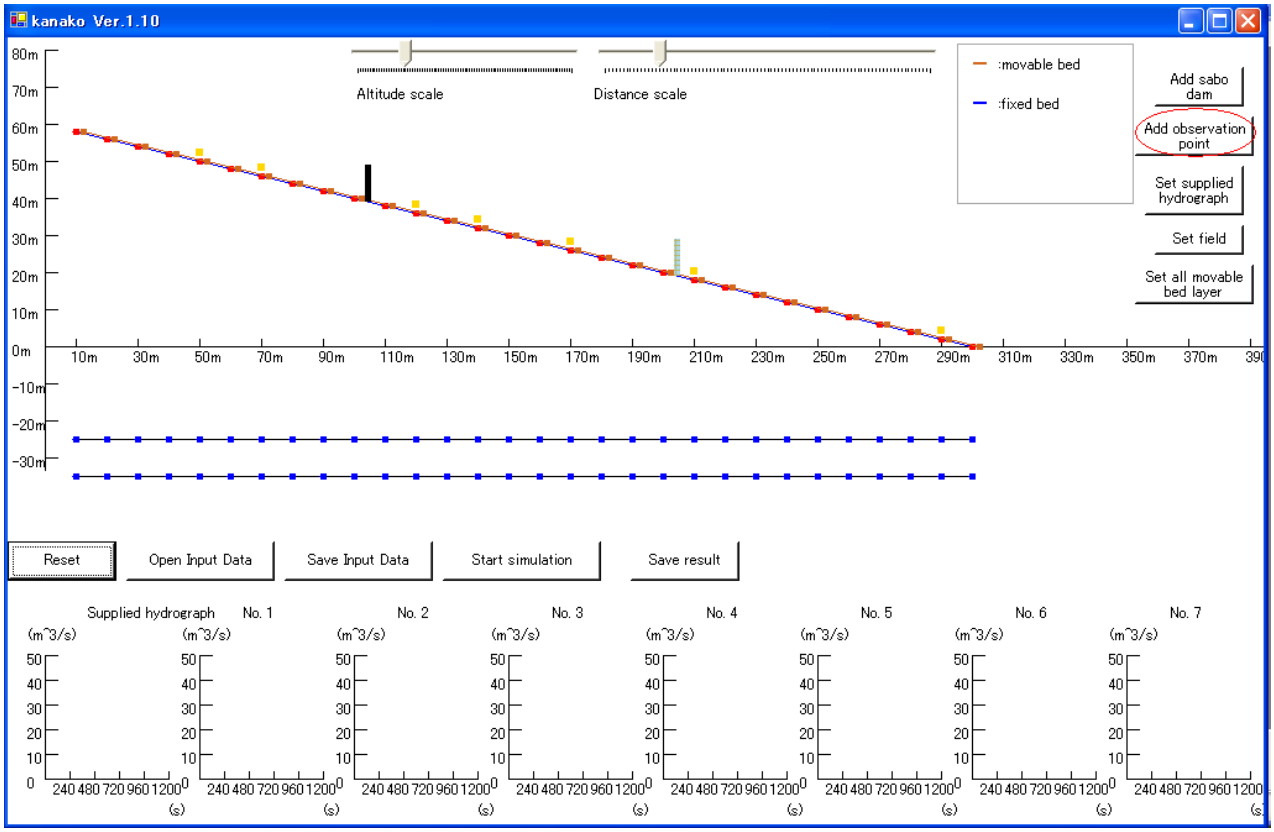


Fig-38: Input Screen (Add observation point)

Then observation point will be added in random position, you can change its positions also by dragging the points along the riverbed.

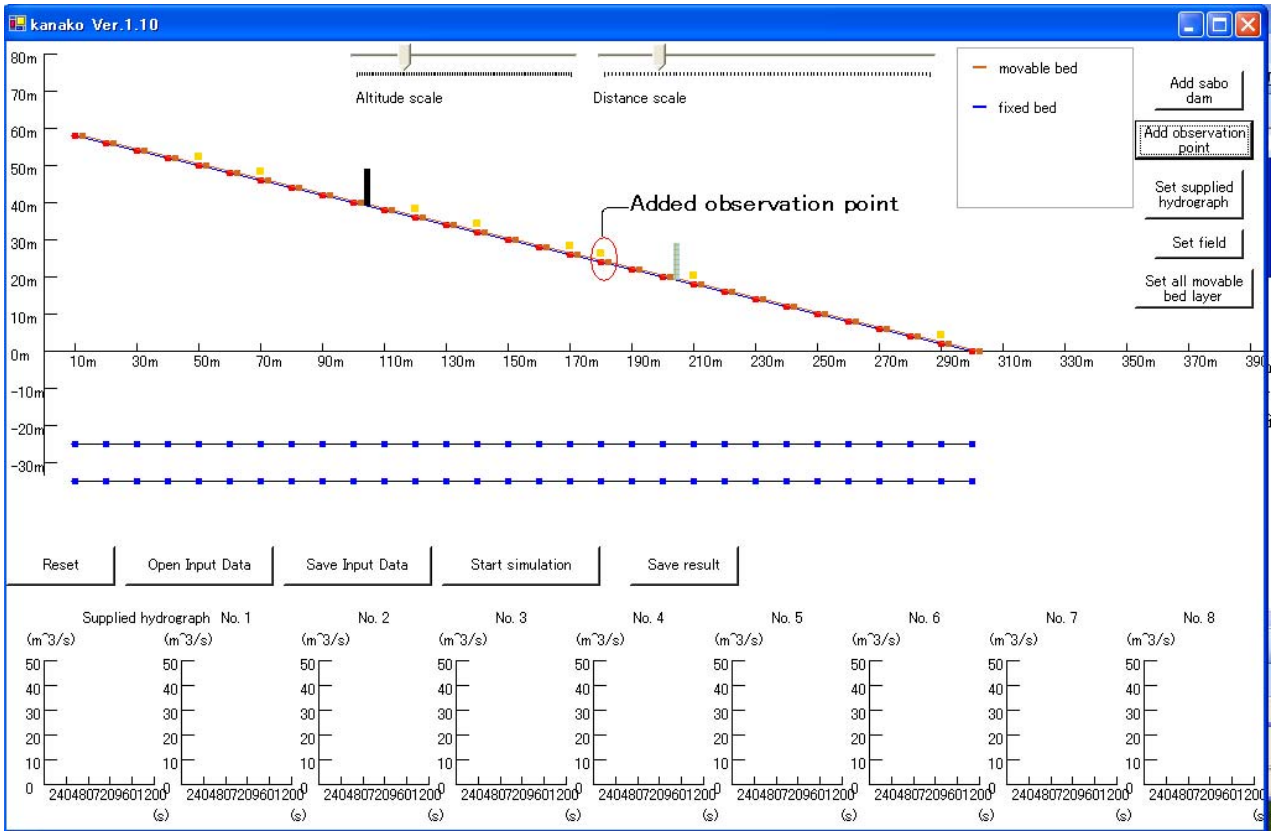


Fig-39: Input Screen (One observation point is added to Fig-38)

Note that in the start screen, the numbers of observation points are already arranged sequences from the upstream. By adding the observation point with this button they might not be arranged as they are supposed to be because it is added randomly. As a result the No. 8 observation point might be put left from the No. 7 point as shown in Fig-39.

To meet the requirement for the simulation, you can not place the observation point just before the Sabo dam (see Fig-40). If you click 'Start simulation' button anyway, the warning pop-up window will appear as shown in Fig-41. In this case, you can close the warning pop-up window by clicking the 'OK' button so it returns to screen in Fig-40. Please set the position of the observation points again and after that, start the simulation again.

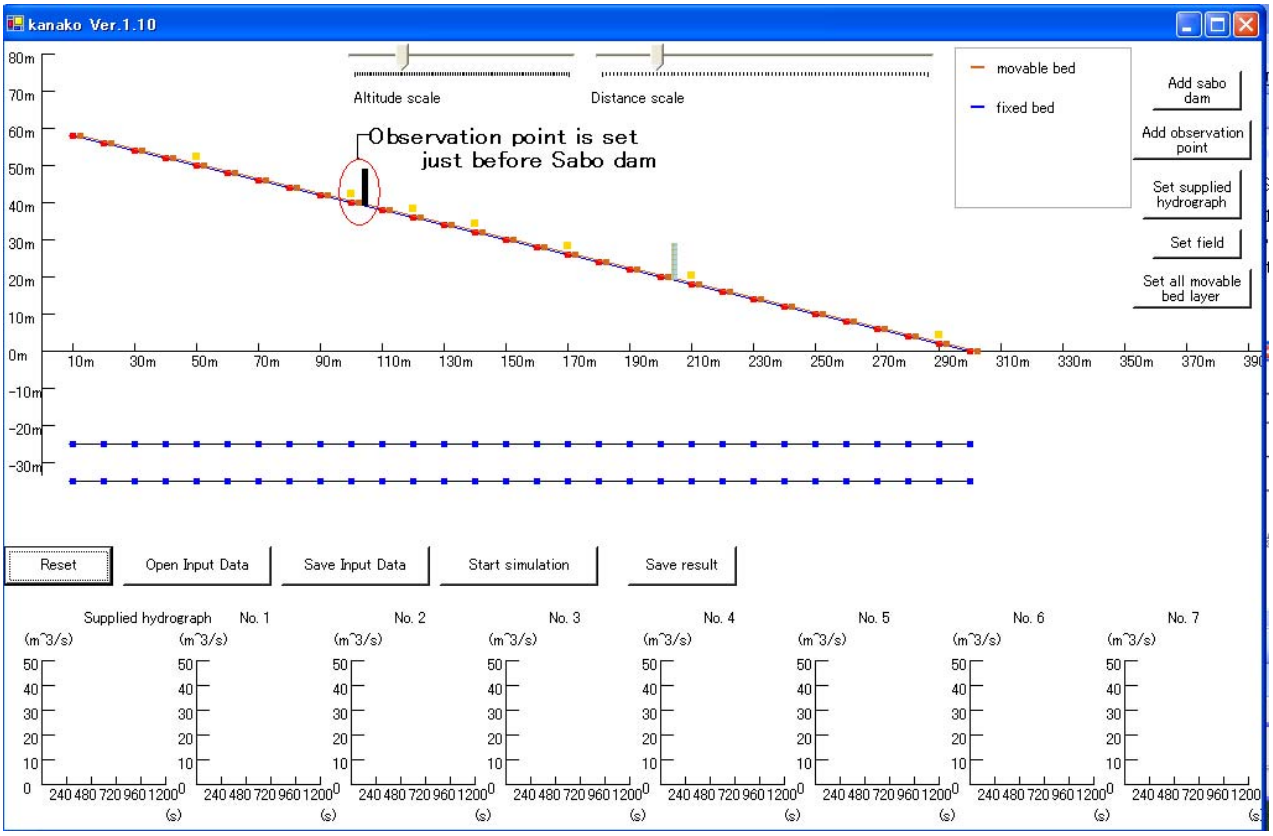


Fig-40: Input Screen (One observation point is set just before Sabo dam)

Fig-41: Warning Screen (In case one observation point is set just before Sabo dam)

4.5 Set the calculation points

When the program start, 30 calculation points are set. You can change the numbers of the calculation points from 30 to 50. If you want to modify the numbers, click 'Set field' button in the upper right of the input screen (red circle, see Fig-42), then 'Set field' pop-up window will appear (see Fig-43). There will be textbox options offered to change, numbers of the calculation points (red circle, see Fig-43).

If you want to change the numbers, input the numerical value to the text box (green circle, see Fig-44) and then click 'OK' button (red circle, see Fig-44). And the pop-up window will close and Fig-45 will appear. If you are not sure to change it, click 'Cancel' button (yellow circle, see Fig-44).

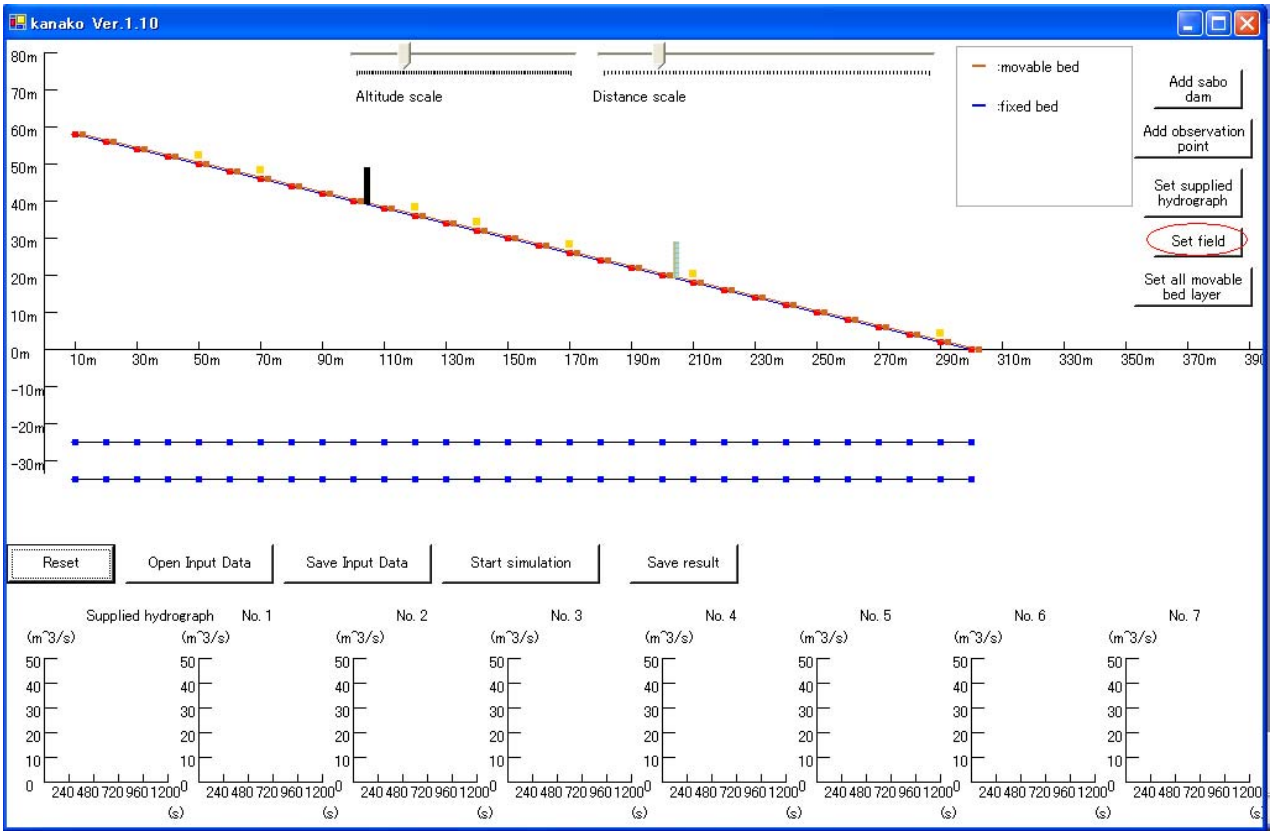


Fig-42: Input Screen (set the calculation points)

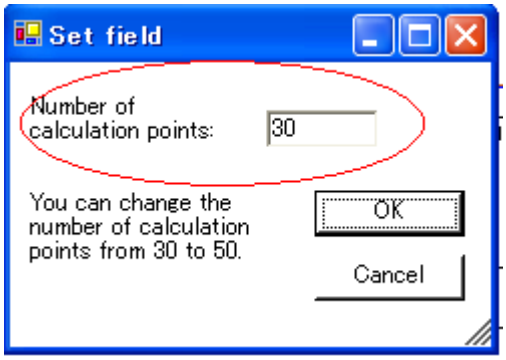


Fig-43: Set field screen

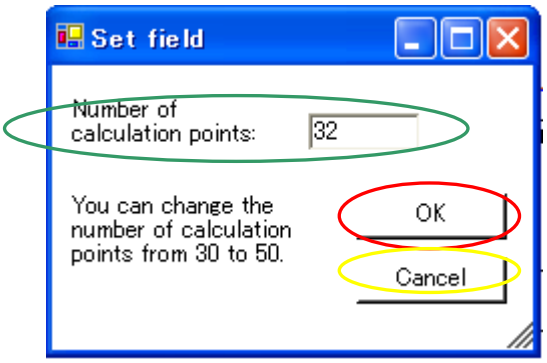


Fig-44: Set field screen

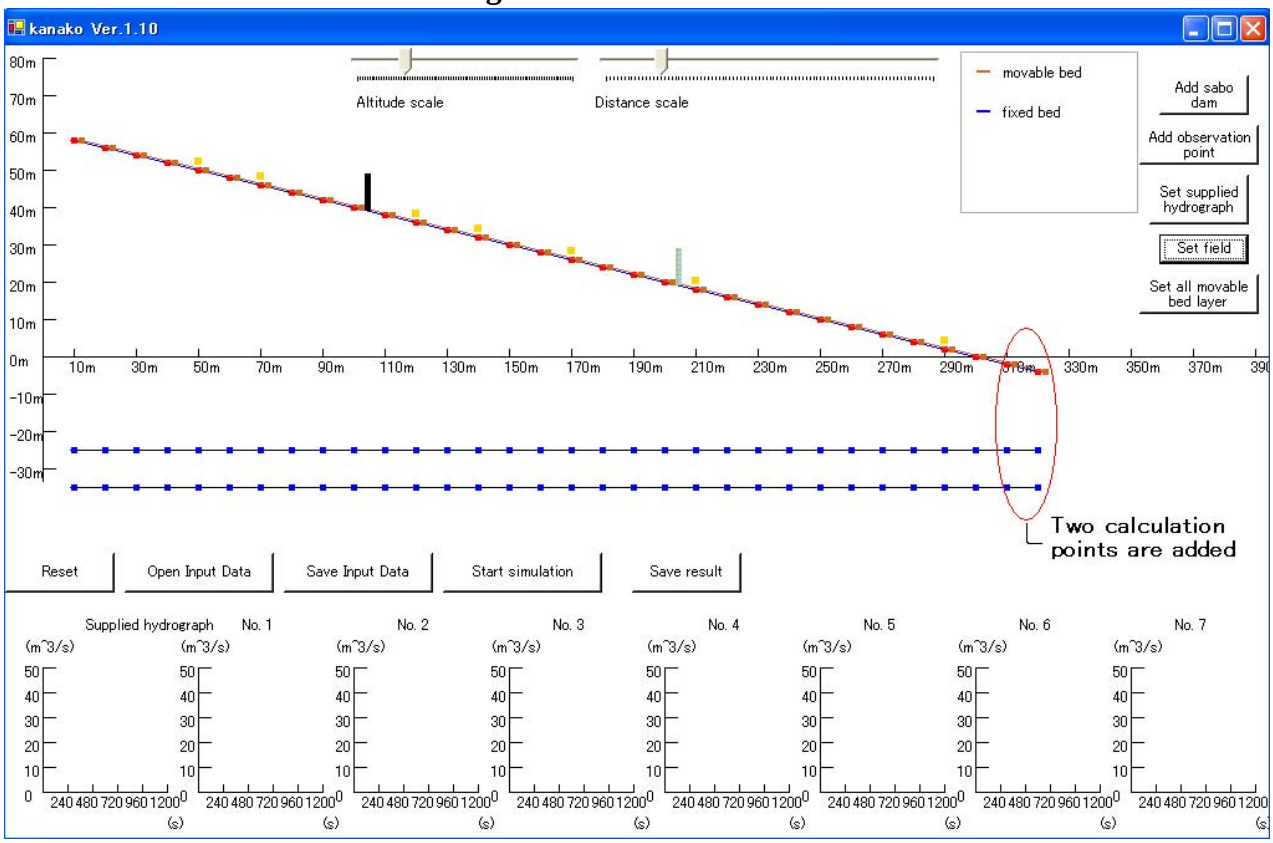


Fig-45: Input Screen (two calculation points added)

If the numbers of calculation points is out of 30-50, range, the warning pop-up window will appear as the 'OK' button is clicked. In this case, close the warning pop-up window and return to the 'Set field' pop-up window and set it again.

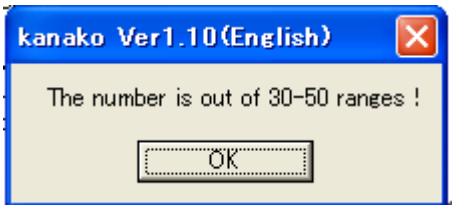


Fig-46: Warning Screen
(In case calculation point number is out of 30-50 range)

In other cases, when you try to change the number of the calculation points, after click the 'OK' button, if the warning pop-up windows shown in Fig-47 to 48 appear, there are 2 possibility conditions; first, Sabo dam is set on the downstream where you are trying to change, second, hydrograph observation point is set on the downstream where you are trying to change. For those cases, you can close the warning pop-up window by clicking 'OK' button, and it returns to the 'Set field' pop-up window and set it again.

Fig-47: Warning Screen (In case Sabo dam is set on downstream)

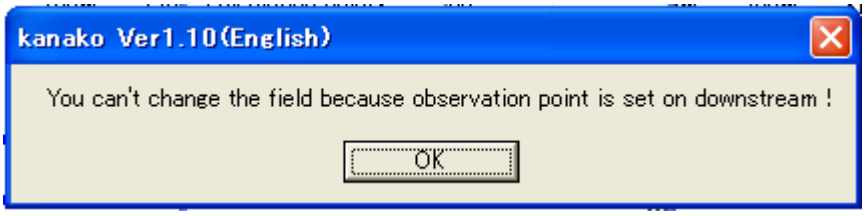


Fig-48: Warning Screen (In case observation point is set on downstream)

4.6 Set supplied hydrograph at the upstream

If you want to change the supplied hydrograph at the upstream, you click the 'Set supplied hydrograph' button (red circle, see Fig-49) and call 'Set supplied hydrograph' screen as Fig-50. When the program starts, the supplied hydrograph at the upstream is set as the graph shown in Fig-50, and density of the coarser material is set as 0.3, density of the finer material is set as 0.2.

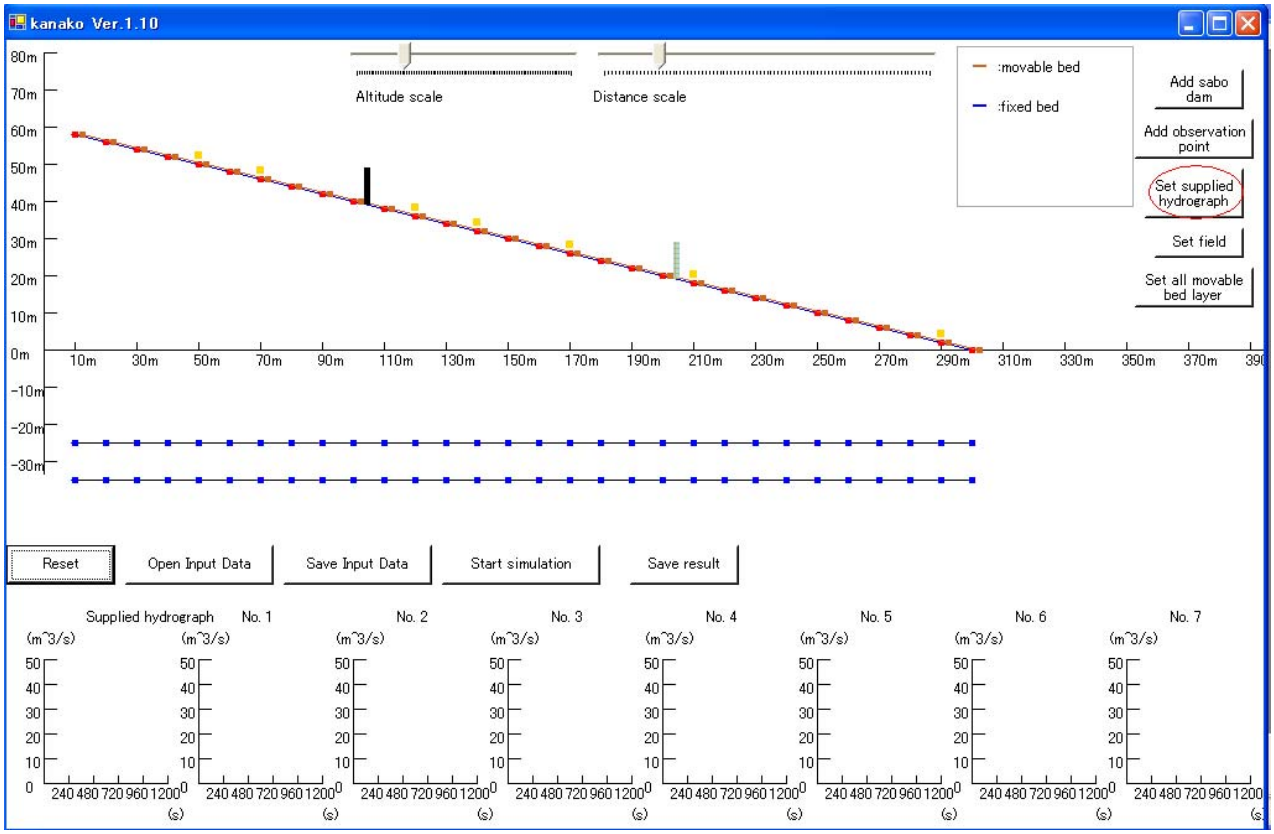


Fig-49: Input Screen (Set supplied hydrograph at the upstream)

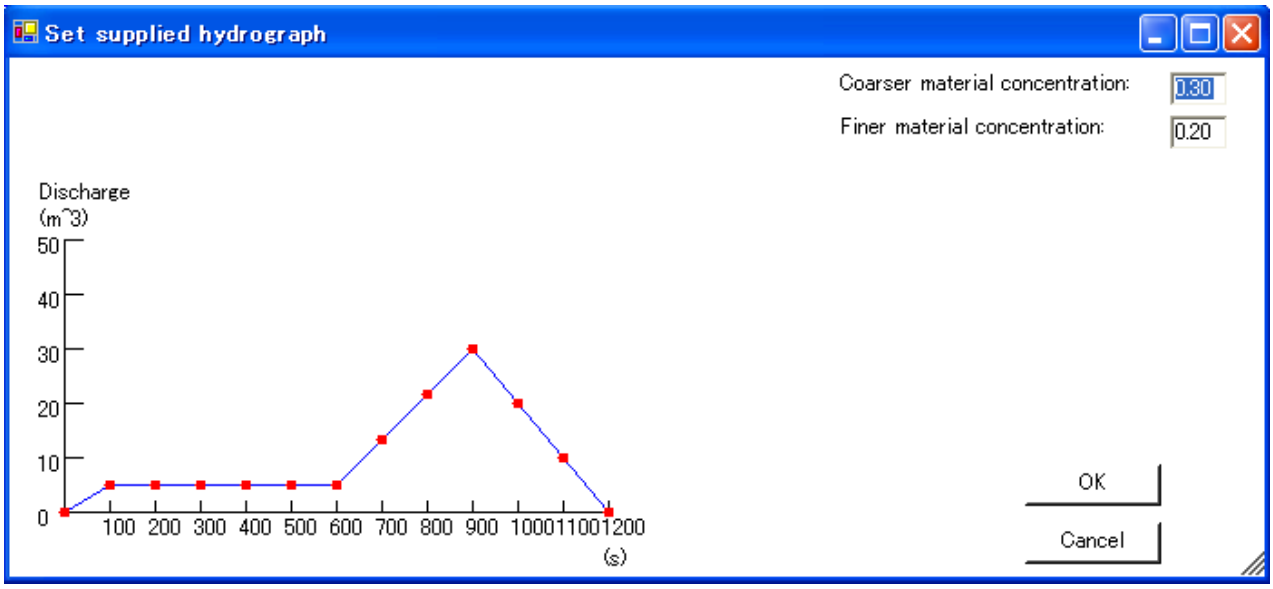


Fig-50: Set supplied hydrograph Screen

You can change the discharge of debris flow by dragging up and down red points. While you drag the point, two numbers appear here (A, see Fig-51). From the left, these show the time, and discharge of debris flow. If you stop dragging, the guide will disappear.

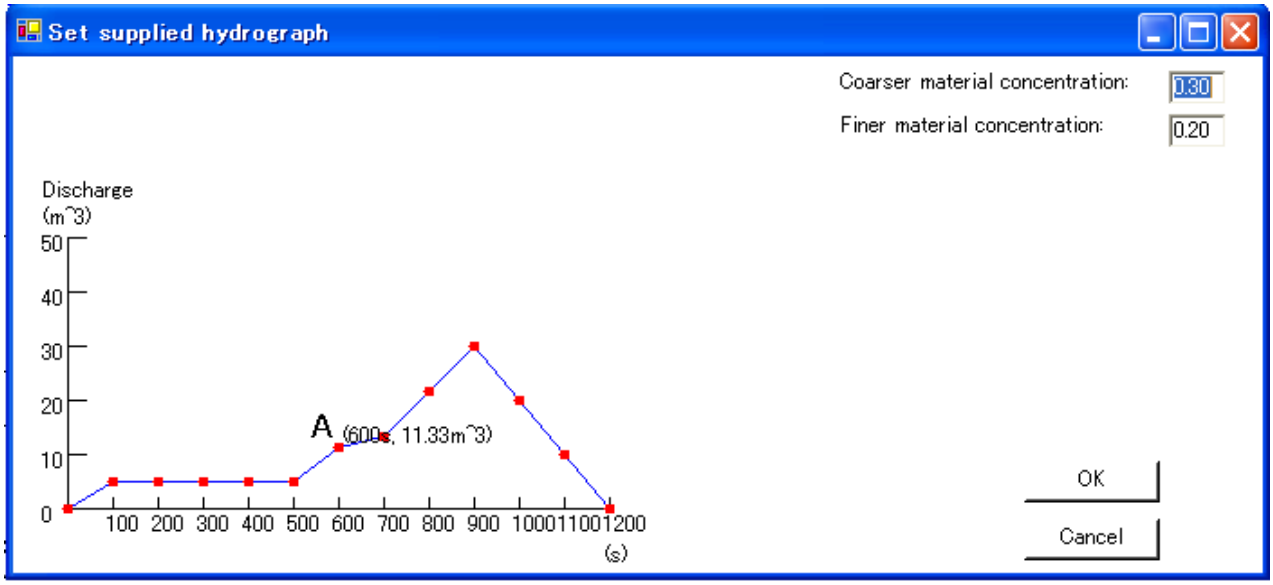


Fig-51: Set supplied hydrograph Screen (Dragging the 600 second's point)

You can change the density of the bed material by changing the number in these textboxes.
Upper textbox shows the coarser material, lower textbox shows the finer material. Here, we set density of the coarser material is as 0.2(blue circle, see Fig-52), density of the finer material as 0.1(green circle, see Fig-52).

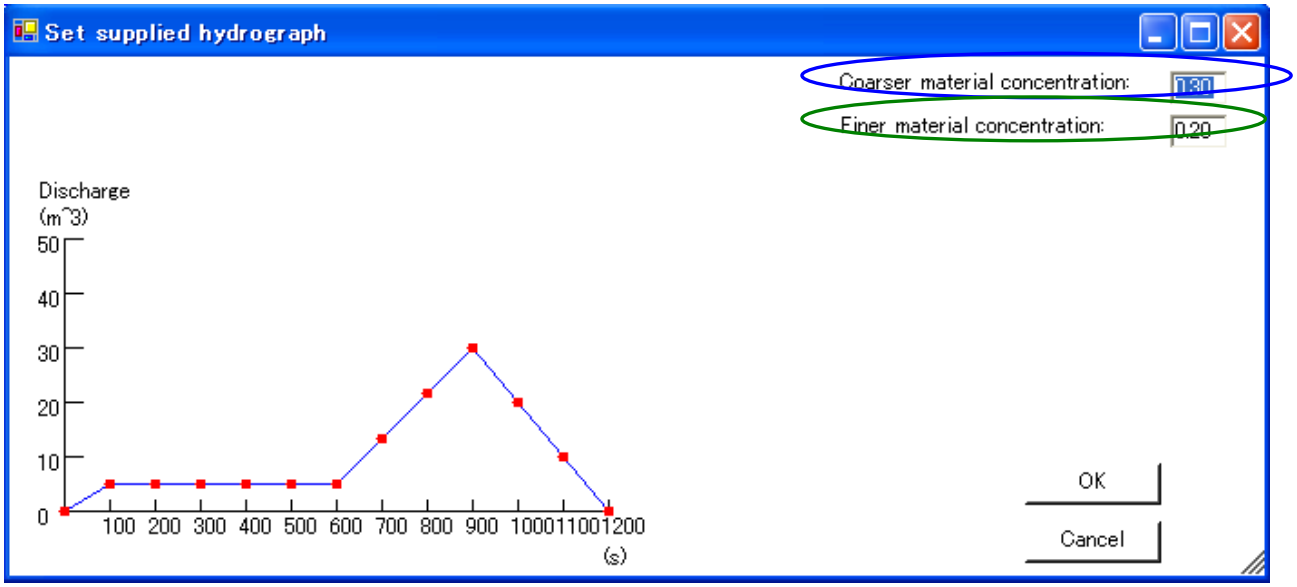


Fig-52: Set supplied hydrograph Screen

When deciding it by this, click 'OK' button (red circle, see Fig-53). When not changing, click 'Cancel' button (yellow circle, see Fig-53).

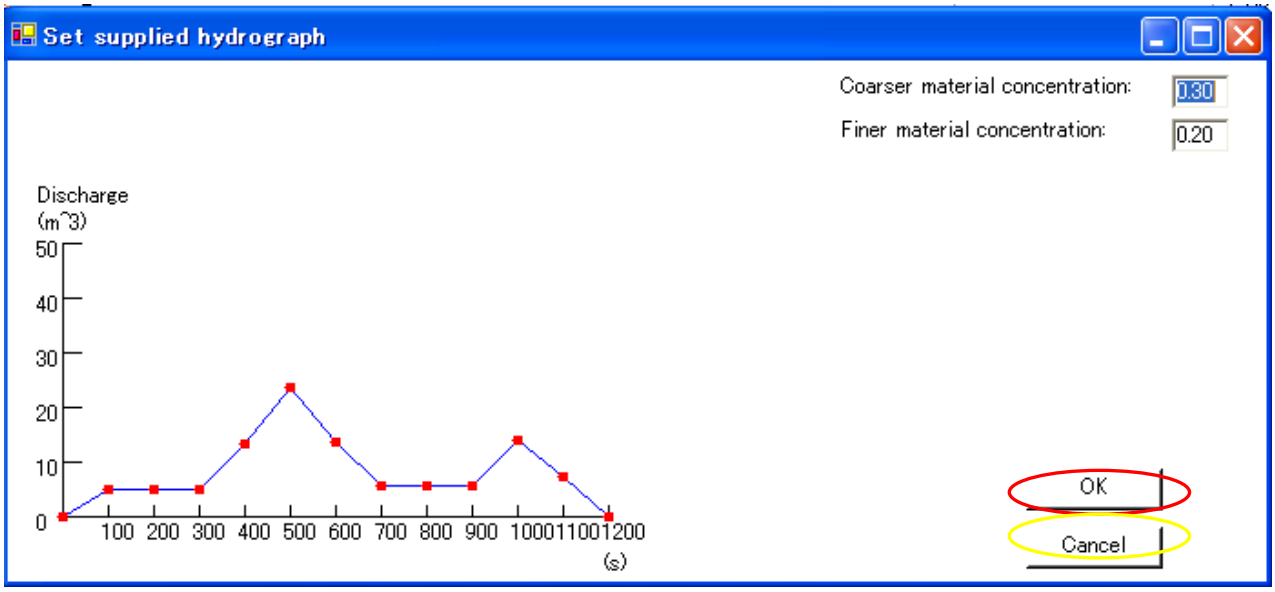


Fig-53: Set supplied hydrograph Screen

The supplied hydrograph set here is displayed in the graph in the left end under the screen as 'supplied hydrograph at the upstream' during the simulation.

Moreover, please set the end of the input hydrograph to $0 m^3/s$ as shown in Fig-54 below, when continuance time of the input hydrograph is shorter than 1200 .

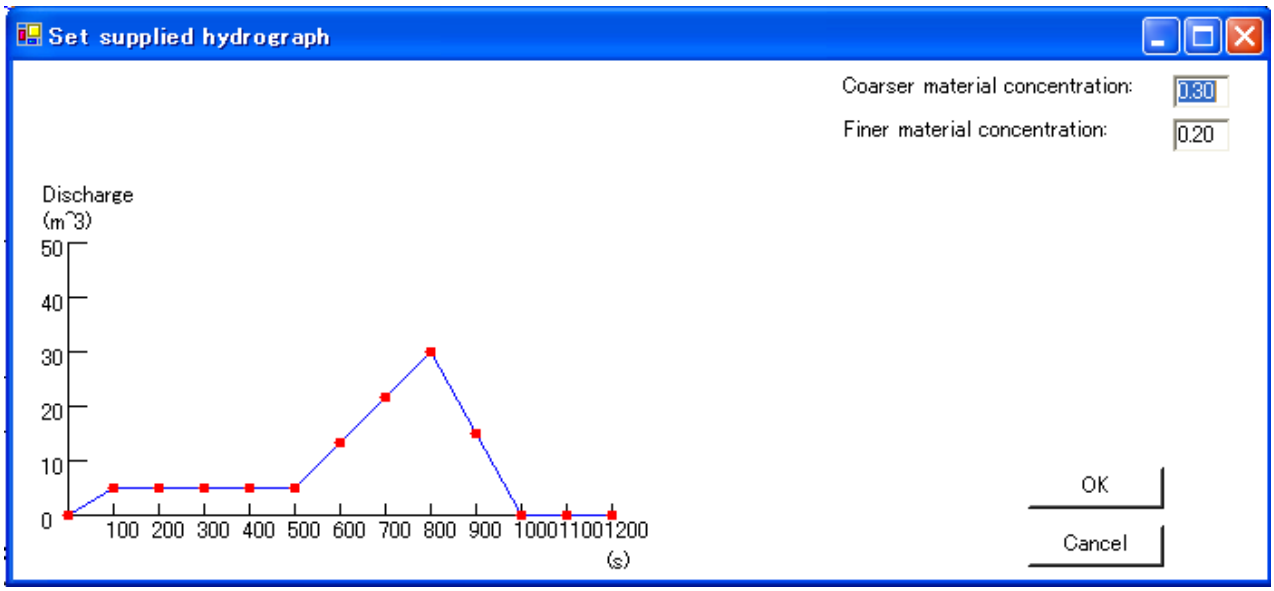


Fig-54: Set supplied hydrograph Screen
(When hydrograph continuance time is 1000 second)

4.7 Set all movable layer

When the program starts, thickness of movable layer (thickness between fixed bed and movable layer) is set as 0 m. You can change the numbers of the movable layer by changing each point one by one, but to set all from the upstream end to downstream end at once, click 'Set all movable layer' button in the right of the input screen (red circle, see Fig-55), then 'Set all movable layer' pop-up window will appear (see Fig-56). There will be spin control; options offered to change (red circle, see Fig-57) in range of 0-3 m range.

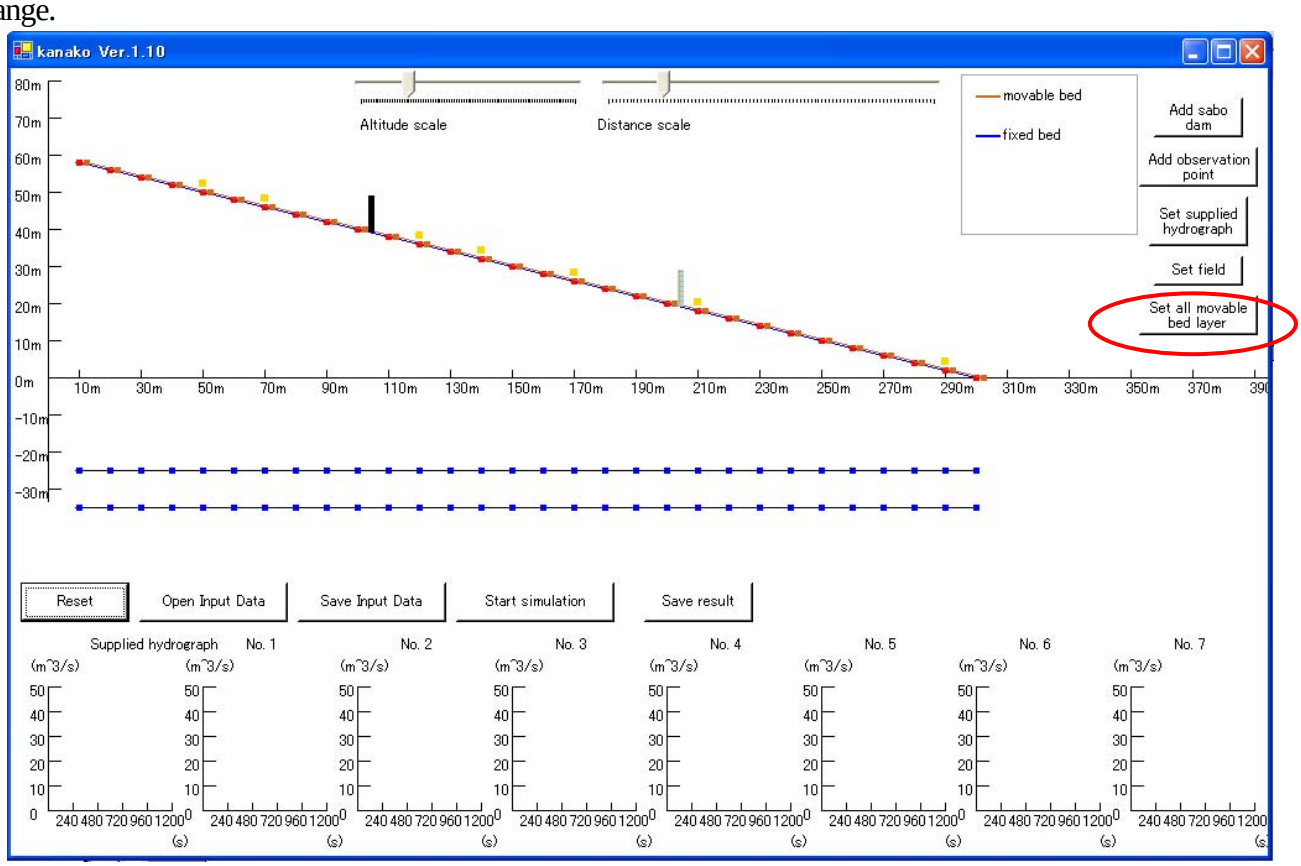


Fig-55: Input Screen (set all movable layer)

Change the numbers using the spin control or input the numerical value by keyboard (green circle, see Fig-56) and then click 'OK' button (red circle, see Fig-56). And the pop-up window will close and Fig-57 will appear. If you are not sure to change it, click 'Cancel' button (blue circle, see Fig-56).

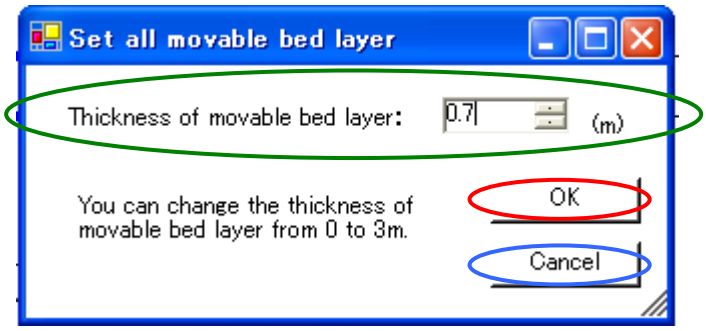


Fig-56: Set all movable layer Screen

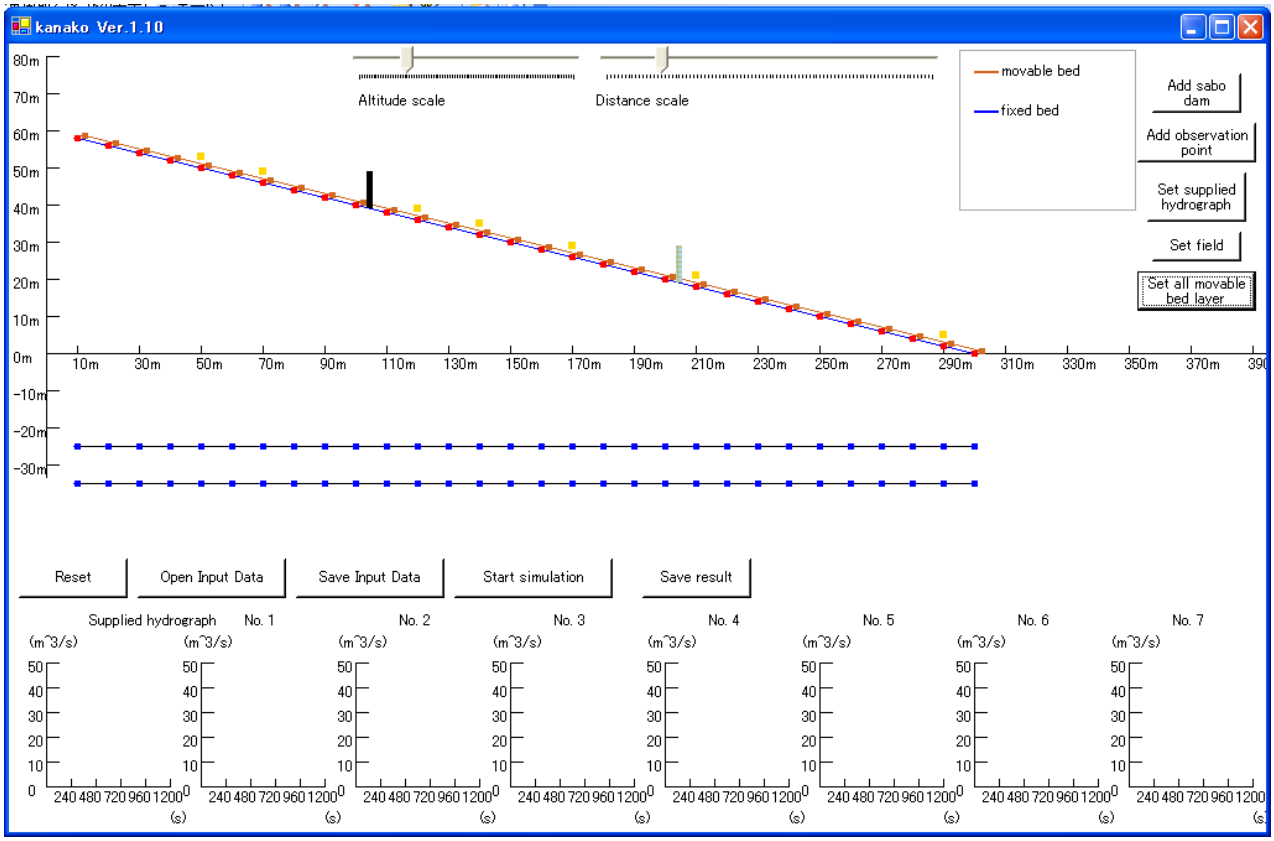


Fig-57: Input Screen (all movable layer is set as 0.7m)

From this kind of condition that movable layer is set in a lump, you can change each point's movable layer by mouse dragging as in procedure 4.1 'Setting of riverbed profile and width of river'

If the numbers of layer is out of 0-3 range, the warning pop-up window will appear as the 'OK' button is clicked. In this case, close the warning pop-up window and return to the 'Set all movable layer' pop-up window and set it again.

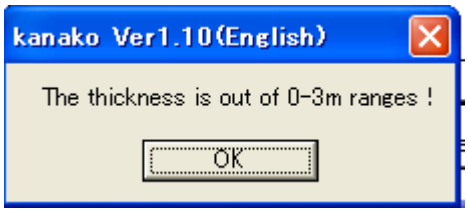


Fig-58: Warning Screen

4.8 Save river data

You can save all data of the initial bed, including the shape of initial bed surface, river width, dam installation position, height of the dam, opening of the dam slit, hydrograph observation point, grain size or density of the bed material and supplied hydrograph at the upstream end, and the number of bed data. When you want to save these data, click 'Save river data' button (red circle, see Fig-59) at the center of the screen of Fig-59.

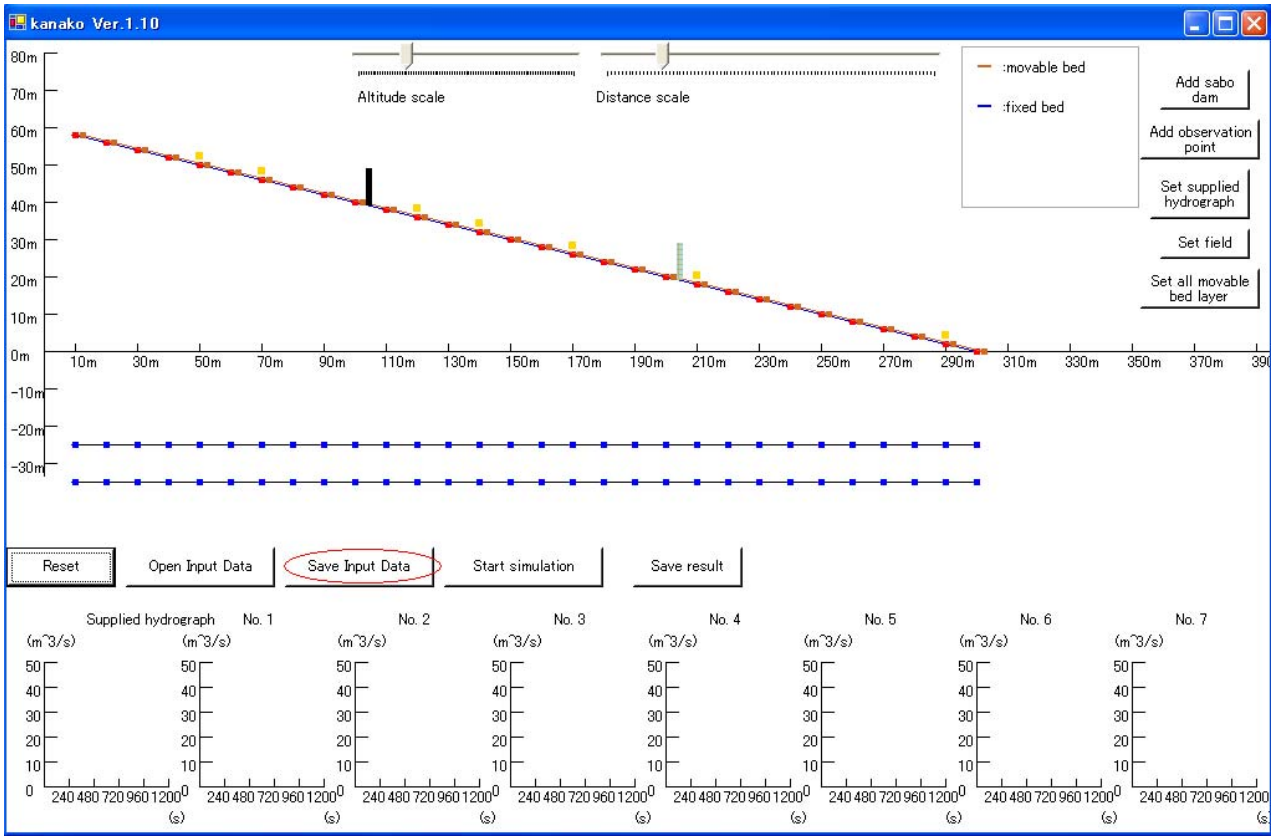


Fig-59: Input Screen (Save river data)

When clicking, ‘Save it giving a name’ screen in Fig-60 appears. Then, you give it a name to the made river data (example: bed1), click ‘Save’ button, and the river data will be saved. When you save the river data, all data including the initial bed, including the shape of initial bed surface, river width, dam installation position, height of the dam, opening of the dam slit, hydrograph observation point, grain size or density of the bed material and supplied hydrograph at the upstream end, and the number of bed data, will be saved.

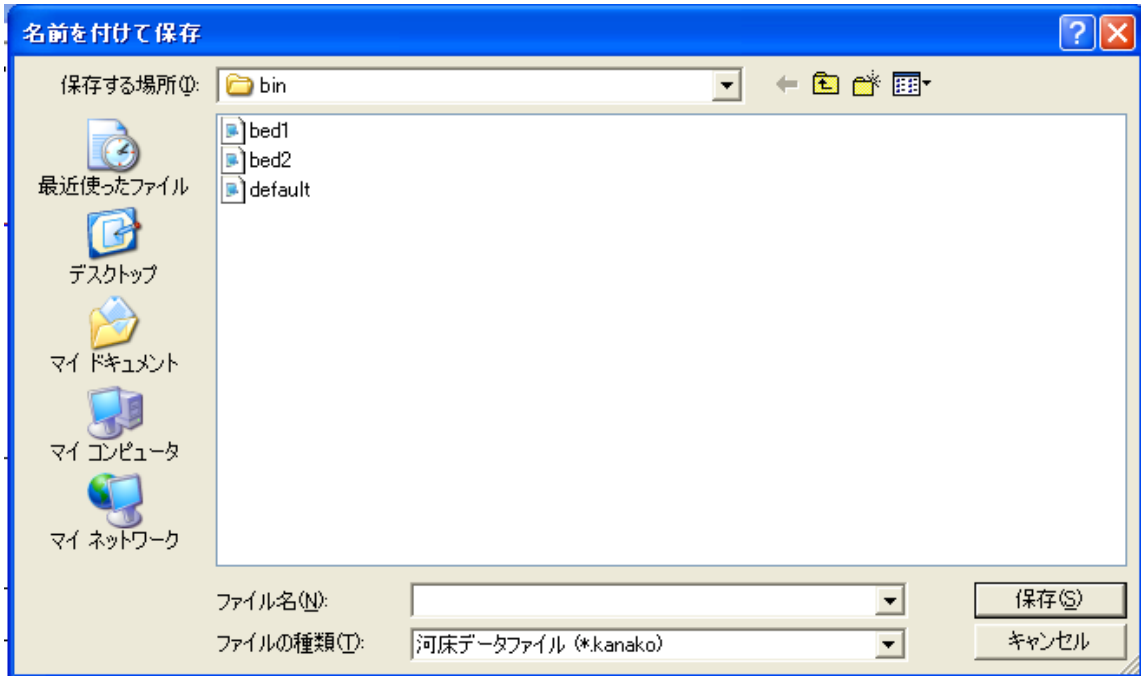


Fig-60: Save river data

Here we are saving river data as a text type file, but you can also save it as CSV file, too. Considering modify some parameters from the initial condition from the file, it is better to use the text file format.

4.9 Open saved river data

You can open the saved river data. When you want to call it, click 'Open river data' button (red circle, see Fig-61) at the center of the screen of Fig-61.

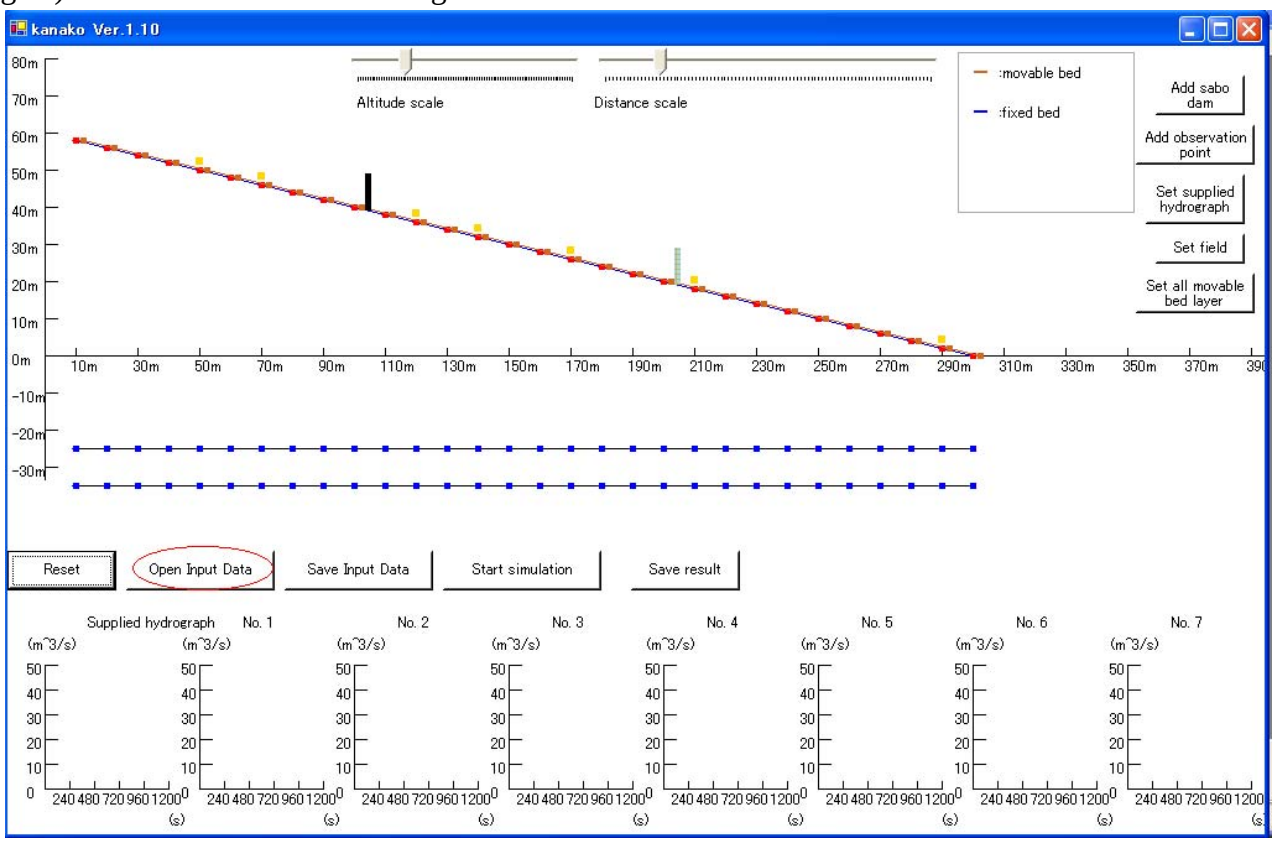


Fig-61: Input Screen (Open river data)

When clicking, ‘Open file’ screen in Fig-62 appears. Then, you give choose the river data you want to call, click ‘Open’. And the river data will be called up on ‘kanako Ver.1.10’ screen.

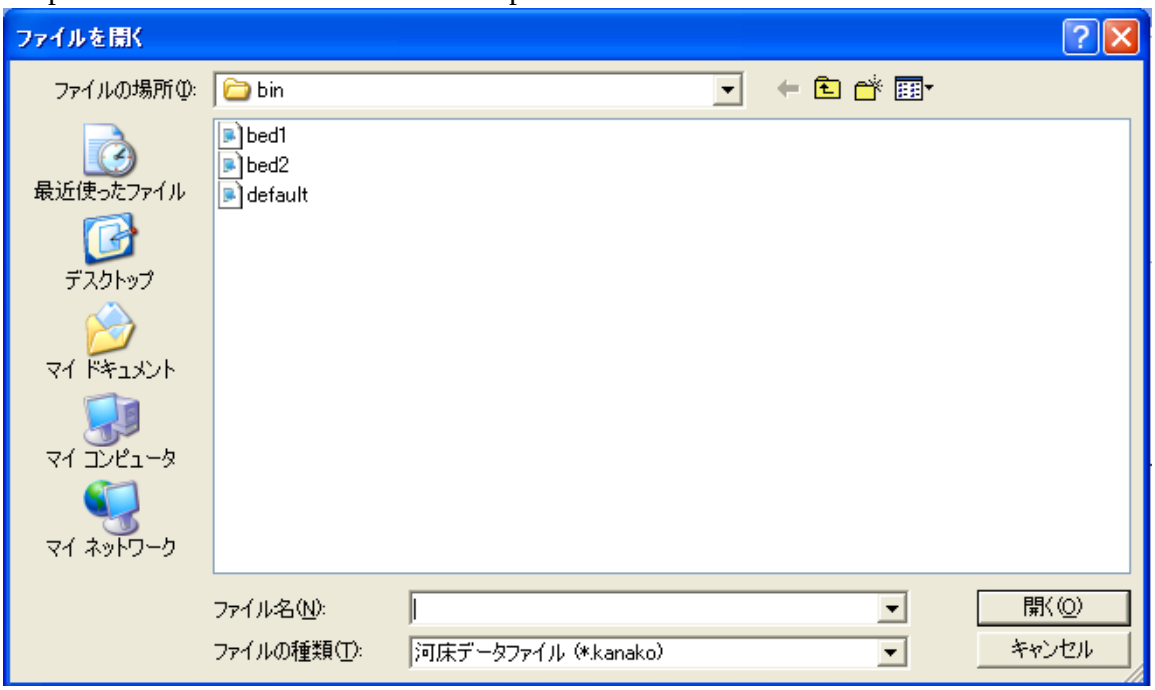


Fig-62: Open river data

5. Start simulation.

Now, here, we will start the simulation, using the river data set up on Fig-63 and grid dam condition is set as Fig-65. The debris flow hydrograph supplied from the upstream end is assumed to be the one set as shown in Fig-64. The calculation starts when you click the 'Start simulation' button (red circle, see Fig-63).

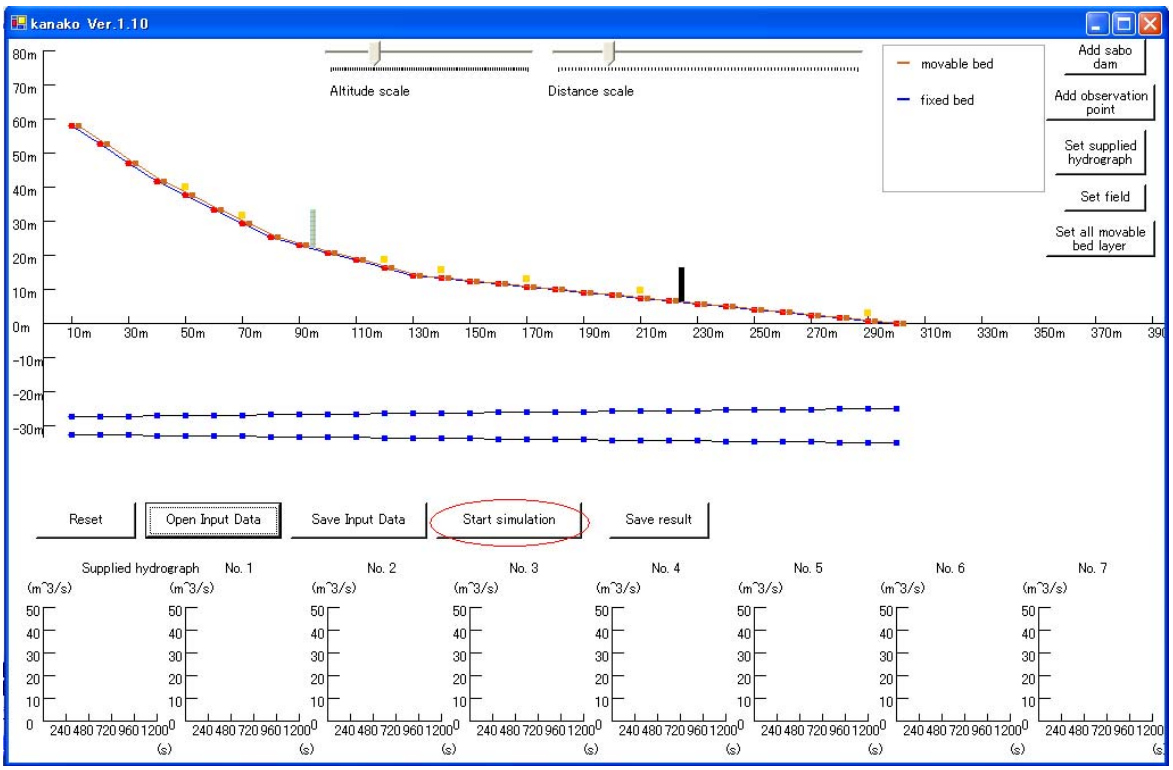


Fig-63: Input Screen (Start simulation)

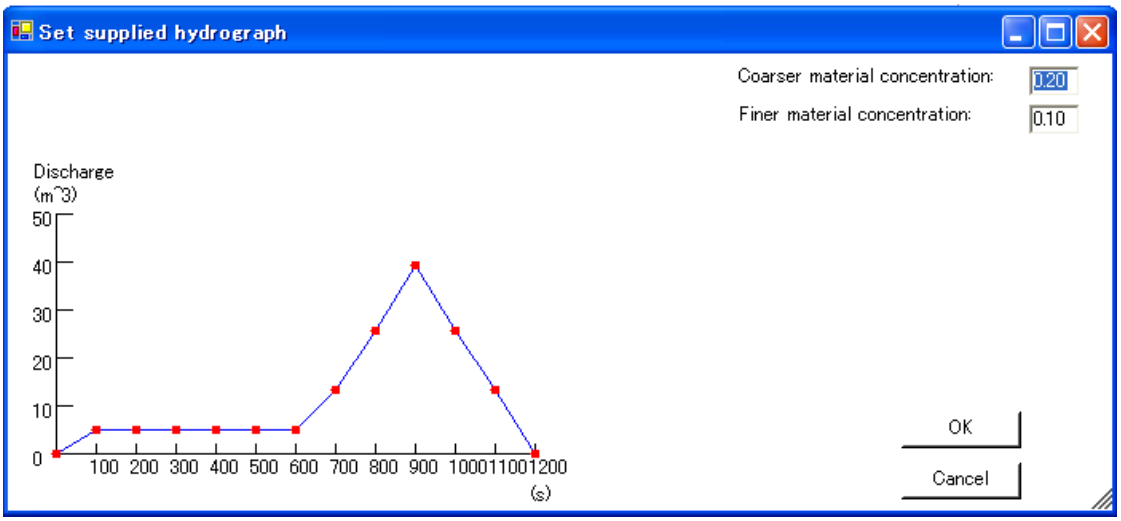


Fig-64: Set hydrograph Screen

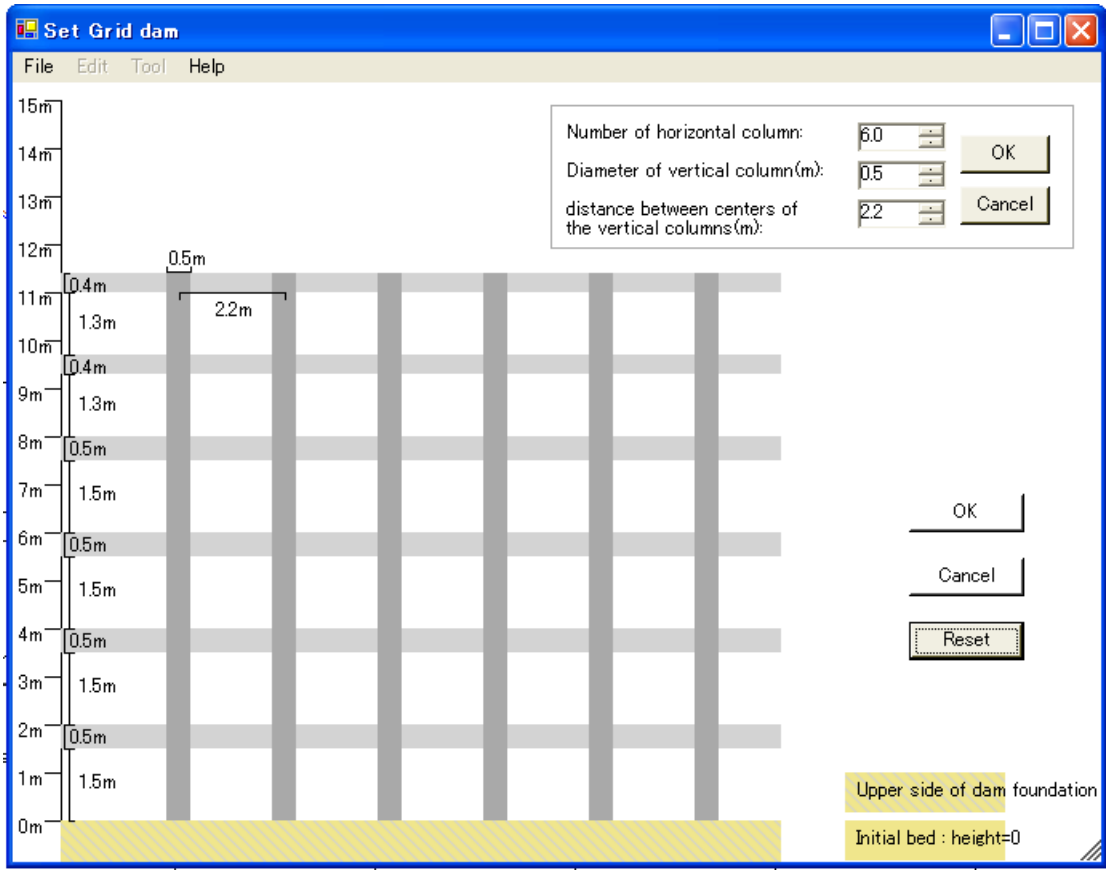


Fig-65: Set Grid dam Screen

When the simulation starts, debris flow occurs and sediments are carried down from the upper stream. Blue line shows the flow depth, black line shows the moving bed surface, green line shows the initial bed surface, and brown line shows the fixed bed. （What brown line shows changed when the simulation started. When setting up the river bed data and so on introduced in 2.1 section, it showed the movable river bed.）

And the eight graphs you see in the bottom shows the data of supplied hydrograph at the upstream end, and at the each hydrograph observation point. The vertical axis shows the discharge of the debris flow (m3/second) and the horizontal axis shows time (second). Blue line shows the discharge of debris flow, red line shows the discharge of coarse sediment material, and yellow line shows the discharge of fine sediment material.

This simulator calculates the change of flow depth and bed height from the debris flow occurrence to the passage of 1200 seconds (for 20 minutes), and stops（Fig-66 to 69）. If you want to stop the simulation while it is running, you click the 'Stop simulation' button (red circle, see Fig-66) and the simulation will stop.

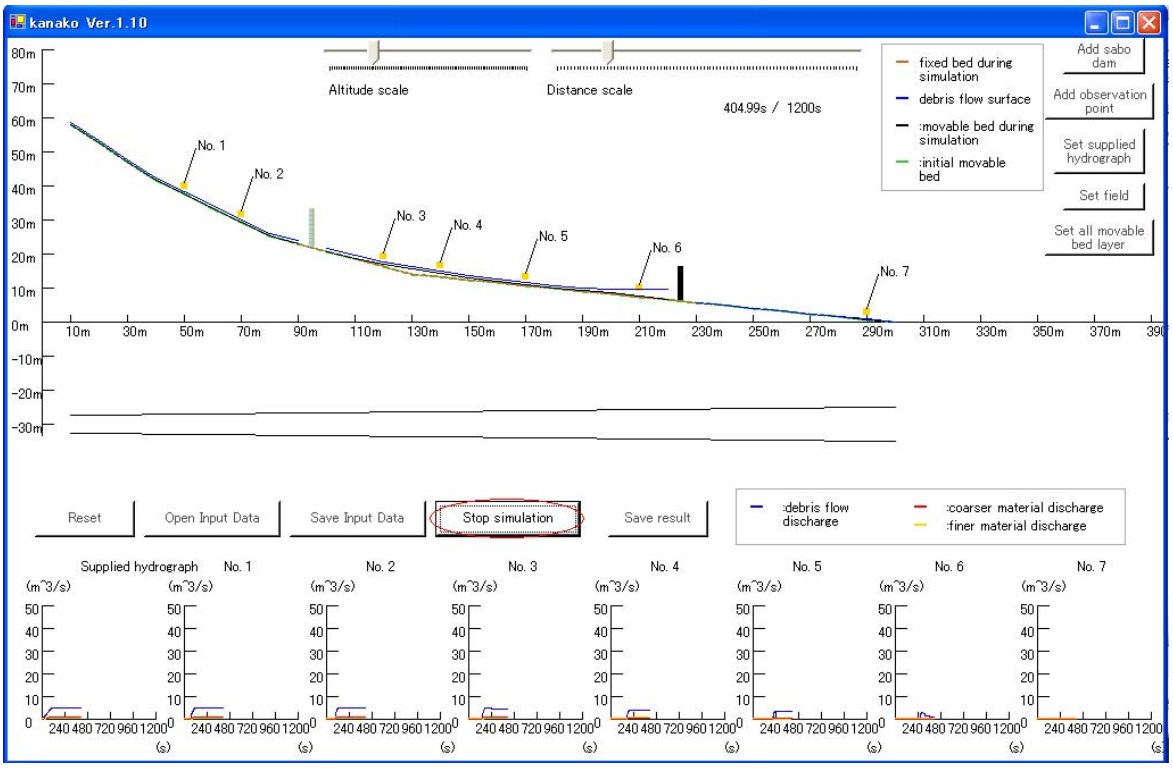


Fig-66: Simulation screen (404.99 second passed)

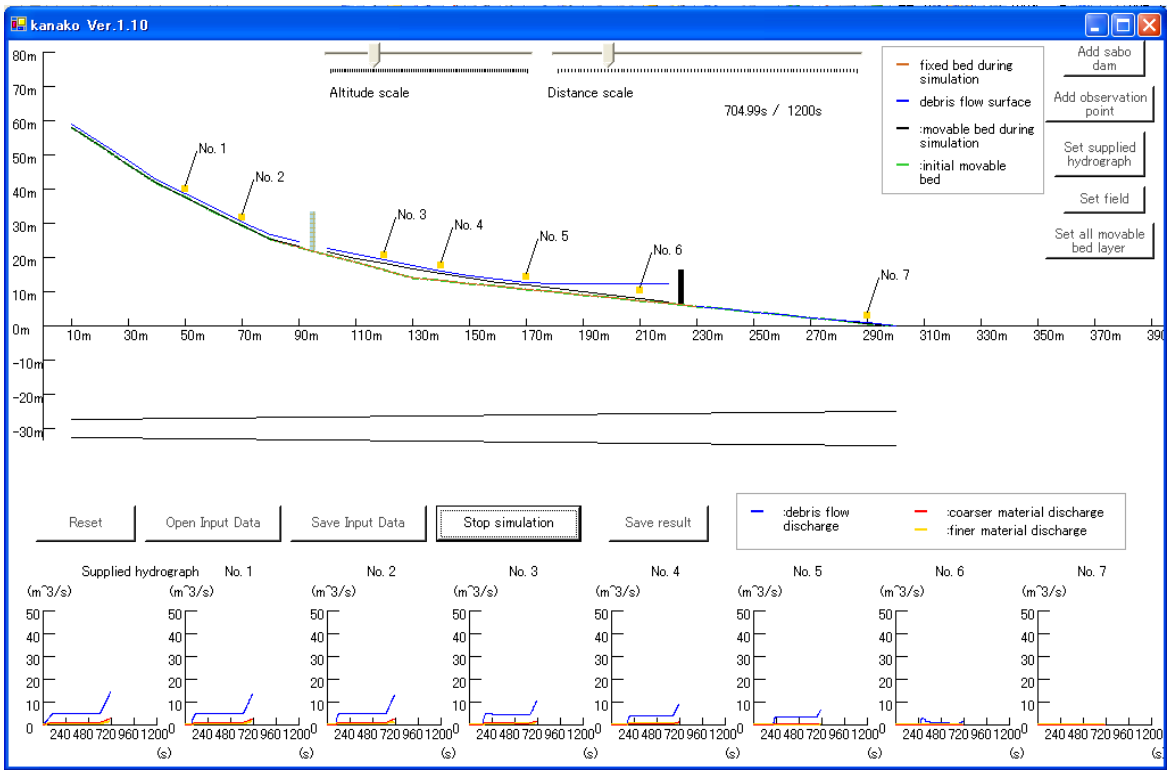


Fig-67: Simulation screen (704.99 second passed)

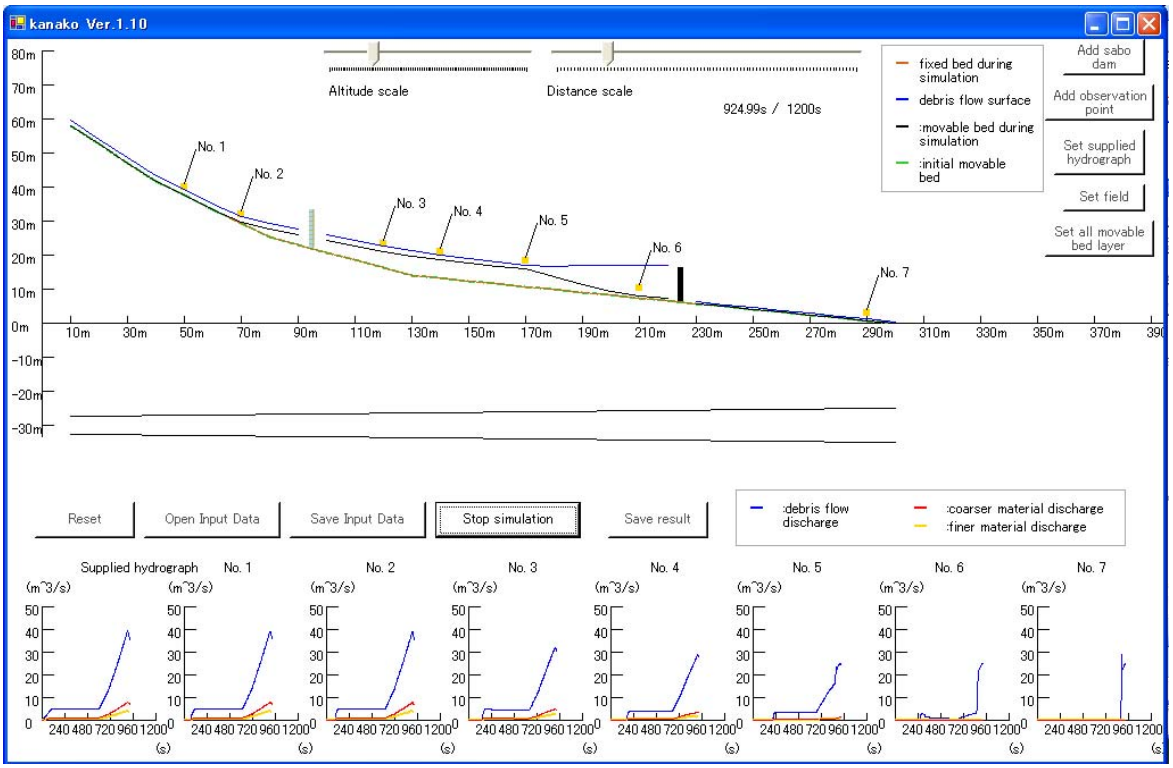


Fig-68: Simulation screen (924.99 second passed)

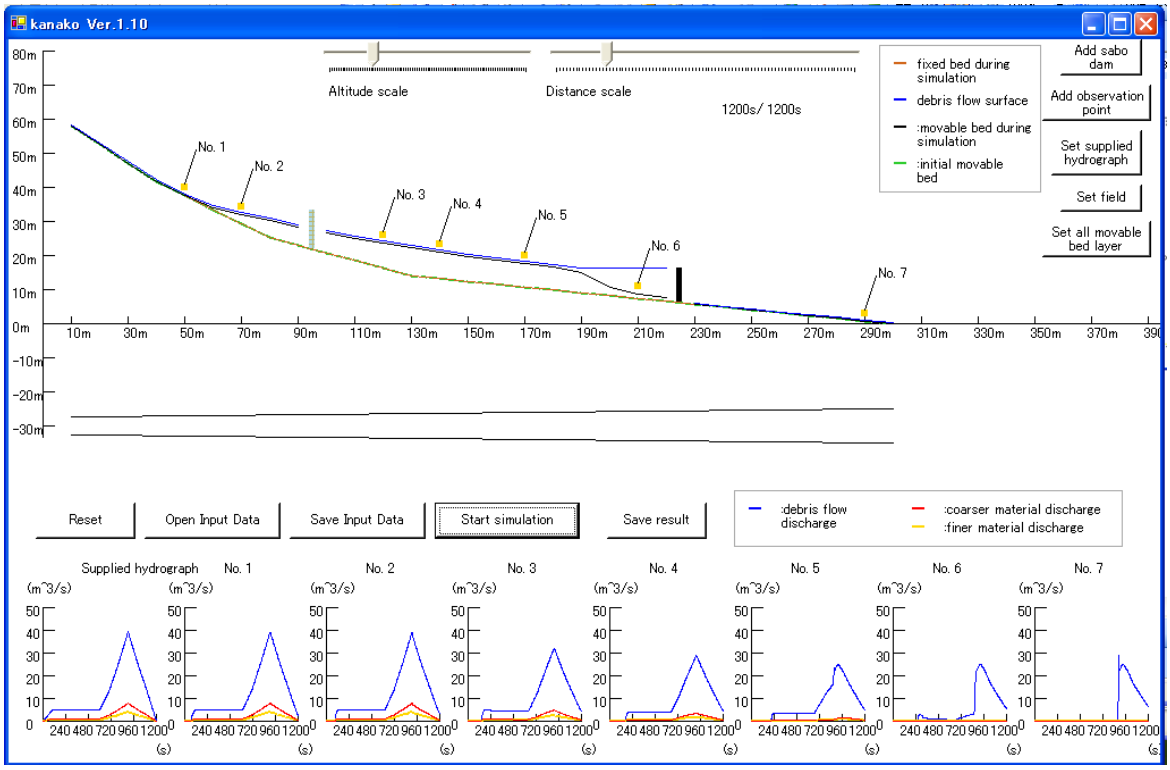


Fig-69: Simulation screen (1200 second passed)

6. Save result of the simulation

To preserve the result of the simulation, you click the 'Save result' button (red circle, see Fig-70).

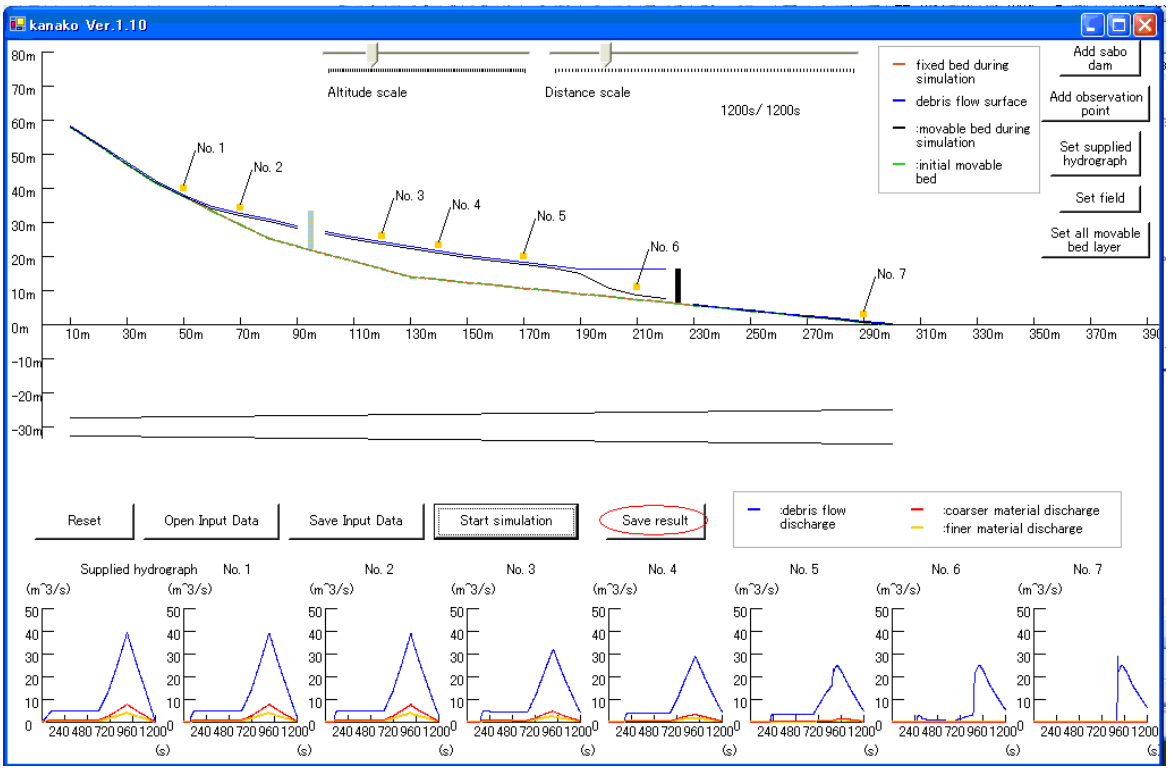


Fig-70: Simulation finished screen

When clicking, ‘Save it giving a name’ screen in Fig-71 appears. Then, you give it a name to the result data (example: result1.csv), click ‘Save’ button, and the result data will be saved. You can choose any folder to save data.

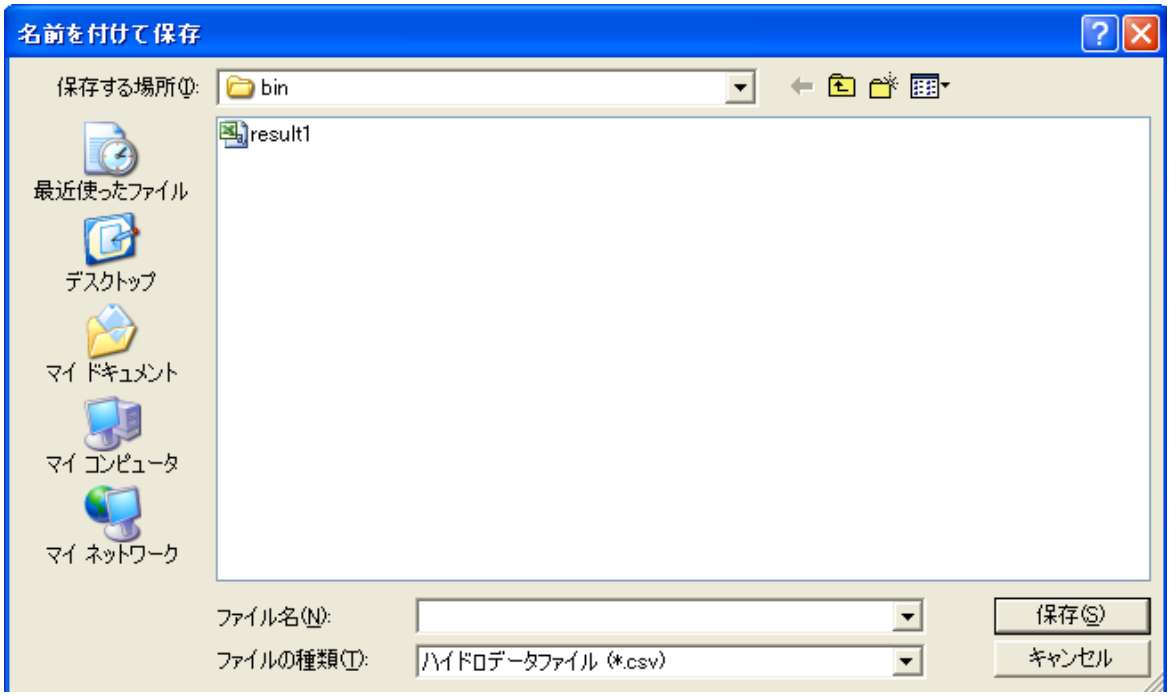
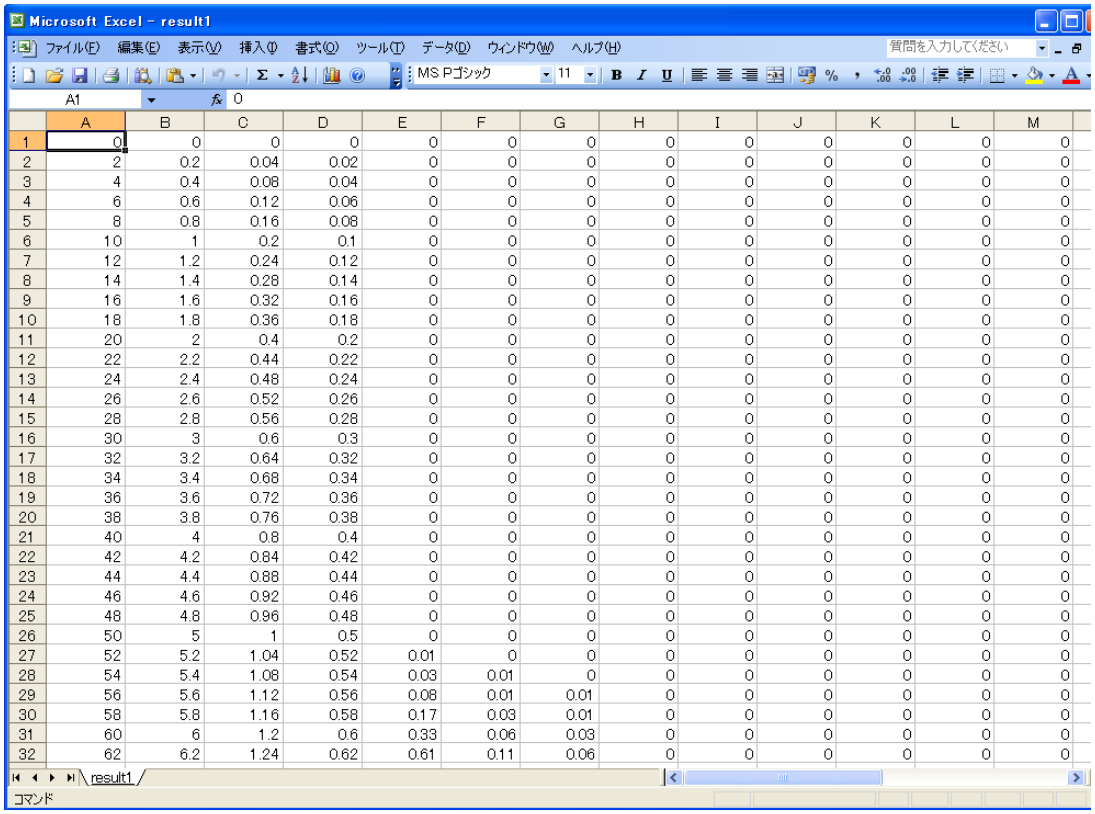


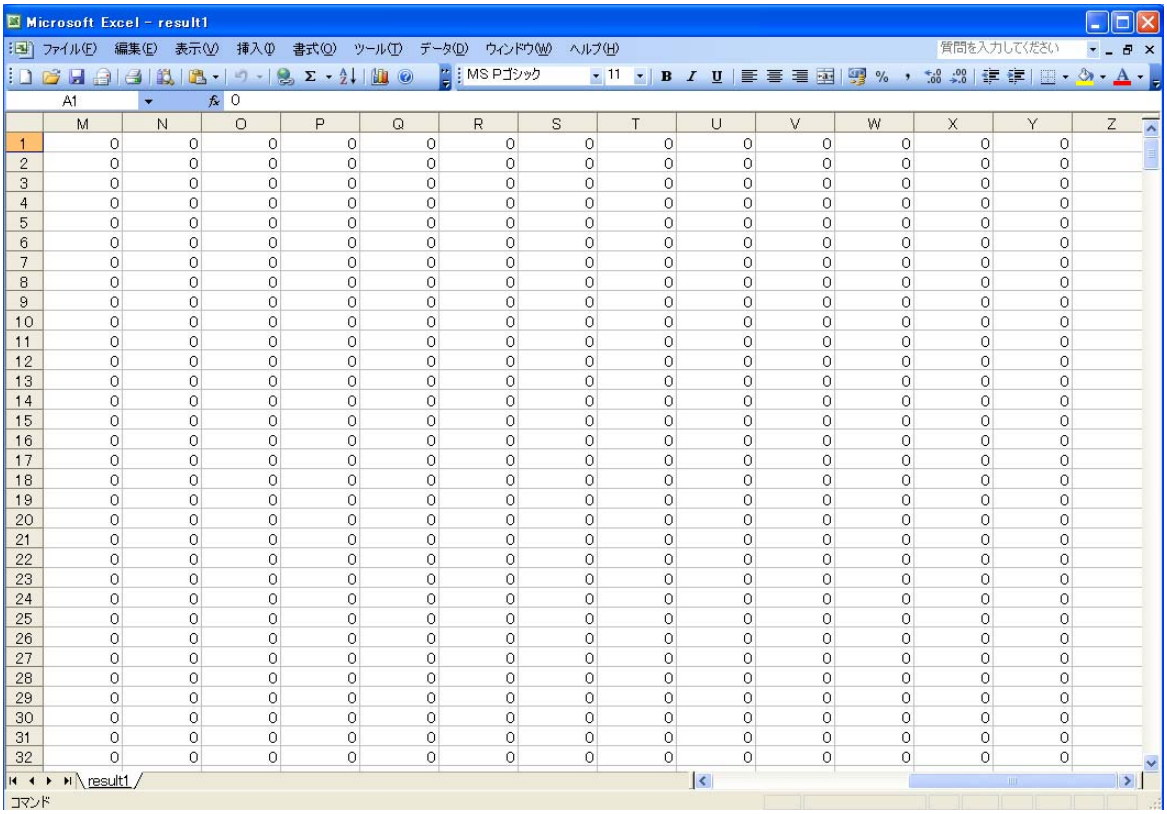
Fig-71: Save result Screen

The result of the simulation is saved as a CSV data file such as shown from Fig-72 to74.



	A	B	C	D	E	F	G	H	I	J	K	L	M
1	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2	0.2	0.04	0.02	0	0	0	0	0	0	0	0	0
3	4	0.4	0.08	0.04	0	0	0	0	0	0	0	0	0
4	6	0.6	0.12	0.06	0	0	0	0	0	0	0	0	0
5	8	0.8	0.16	0.08	0	0	0	0	0	0	0	0	0
6	10	1	0.2	0.1	0	0	0	0	0	0	0	0	0
7	12	1.2	0.24	0.12	0	0	0	0	0	0	0	0	0
8	14	1.4	0.28	0.14	0	0	0	0	0	0	0	0	0
9	16	1.6	0.32	0.16	0	0	0	0	0	0	0	0	0
10	18	1.8	0.36	0.18	0	0	0	0	0	0	0	0	0
11	20	2	0.4	0.2	0	0	0	0	0	0	0	0	0
12	22	2.2	0.44	0.22	0	0	0	0	0	0	0	0	0
13	24	2.4	0.48	0.24	0	0	0	0	0	0	0	0	0
14	26	2.6	0.52	0.26	0	0	0	0	0	0	0	0	0
15	28	2.8	0.56	0.28	0	0	0	0	0	0	0	0	0
16	30	3	0.6	0.3	0	0	0	0	0	0	0	0	0
17	32	3.2	0.64	0.32	0	0	0	0	0	0	0	0	0
18	34	3.4	0.68	0.34	0	0	0	0	0	0	0	0	0
19	36	3.6	0.72	0.36	0	0	0	0	0	0	0	0	0
20	38	3.8	0.76	0.38	0	0	0	0	0	0	0	0	0
21	40	4	0.8	0.4	0	0	0	0	0	0	0	0	0
22	42	4.2	0.84	0.42	0	0	0	0	0	0	0	0	0
23	44	4.4	0.88	0.44	0	0	0	0	0	0	0	0	0
24	46	4.6	0.92	0.46	0	0	0	0	0	0	0	0	0
25	48	4.8	0.96	0.48	0	0	0	0	0	0	0	0	0
26	50	5	1	0.5	0	0	0	0	0	0	0	0	0
27	52	5.2	1.04	0.52	0.01	0	0	0	0	0	0	0	0
28	54	5.4	1.08	0.54	0.03	0.01	0	0	0	0	0	0	0
29	56	5.6	1.12	0.56	0.08	0.01	0.01	0	0	0	0	0	0
30	58	5.8	1.16	0.58	0.17	0.03	0.01	0	0	0	0	0	0
31	60	6	1.2	0.6	0.33	0.06	0.03	0	0	0	0	0	0
32	62	6.2	1.24	0.62	0.61	0.11	0.06	0	0	0	0	0	0

Fig-72: Result data saved as CSV file (1)



	M	N	O	P	Q	R	S	T	U	V	W	X	Y
1	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0

Fig-73: Result data saved as CSV file (2)

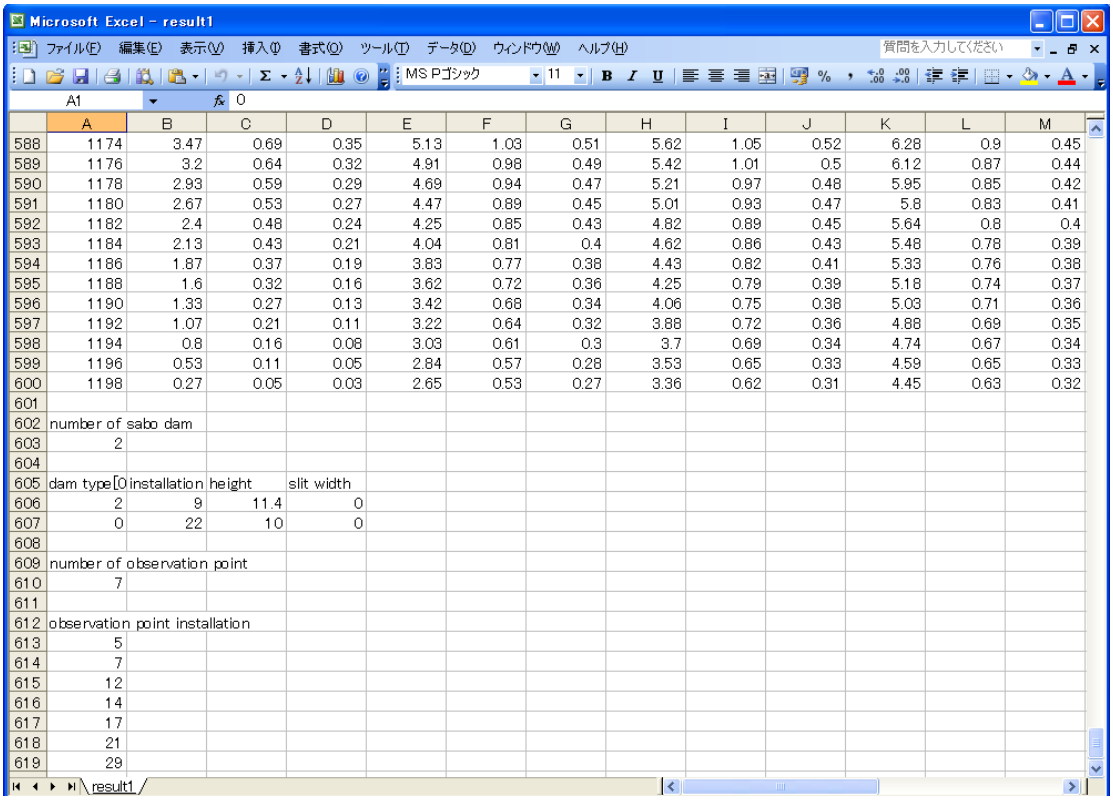
From the left in Fig-72 and 73, it shows

A：time
B：discharge of supplied hydrograph at the upstream end
C：discharge of coarse sediment material at the upstream end
D：discharge of fine sediment material at the upstream end
E：No.1 hydrograph observation point’s discharge
F：No.1 hydrograph observation point’s discharge of coarse sediment material
G：No.1 hydrograph observation point’s discharge of fine sediment material
H：No.2 hydrograph observation point’s discharge
I：No.2 hydrograph observation point’s discharge of coarse sediment material
J：No.2 hydrograph observation point’s discharge of fine sediment material
K：No.3 hydrograph observation point’s discharge
L：No.3 hydrograph observation point’s discharge of coarse sediment material
M：No.3 hydrograph observation point’s discharge of fine sediment material
N：No.4 hydrograph observation point’s discharge
O：No.4 hydrograph observation point’s discharge of coarse sediment material
P：No.4 hydrograph observation point’s discharge of fine sediment material
Q：No.5 hydrograph observation point’s discharge

R：No.5 hydrograph observation point’s discharge of coarse sediment material
S：No.5 hydrograph observation point’s discharge of fine sediment material
T：No.6 hydrograph observation point’s discharge
U：No.6 hydrograph observation point’s discharge of coarse sediment material
V：No.6 hydrograph observation point’s discharge of fine sediment material
W：No.7 hydrograph observation point’s discharge
X：No.7 hydrograph observation point’s discharge of coarse sediment material
Y：No.7 hydrograph observation point’s discharge of fine sediment material

All units of discharge are m^3/s.

Moreover, the parameter of Sabo dam (number, type, position, height, and slit width) and the observation points (number and position) is shown under result data like Fig-74.



	A	B	C	D	E	F	G	H	I	J	K	L	M
588	1174	3.47	0.69	0.35	5.13	1.03	0.51	5.62	1.05	0.52	6.28	0.9	0.45
589	1176	3.2	0.64	0.32	4.91	0.98	0.49	5.42	1.01	0.5	6.12	0.87	0.44
590	1178	2.93	0.59	0.29	4.69	0.94	0.47	5.21	0.97	0.48	5.95	0.85	0.42
591	1180	2.67	0.53	0.27	4.47	0.89	0.45	5.01	0.93	0.47	5.8	0.83	0.41
592	1182	2.4	0.48	0.24	4.25	0.85	0.43	4.82	0.89	0.45	5.64	0.8	0.4
593	1184	2.13	0.43	0.21	4.04	0.81	0.4	4.62	0.86	0.43	5.48	0.78	0.39
594	1186	1.87	0.37	0.19	3.83	0.77	0.38	4.43	0.82	0.41	5.33	0.76	0.38
595	1188	1.6	0.32	0.16	3.62	0.72	0.36	4.25	0.79	0.39	5.18	0.74	0.37
596	1190	1.33	0.27	0.13	3.42	0.68	0.34	4.06	0.75	0.38	5.03	0.71	0.36
597	1192	1.07	0.21	0.11	3.22	0.64	0.32	3.88	0.72	0.36	4.88	0.69	0.35
598	1194	0.8	0.16	0.08	3.03	0.61	0.3	3.7	0.69	0.34	4.74	0.67	0.34
599	1196	0.53	0.11	0.05	2.84	0.57	0.28	3.53	0.65	0.33	4.59	0.65	0.33
600	1198	0.27	0.05	0.03	2.65	0.53	0.27	3.36	0.62	0.31	4.45	0.63	0.32
601													
602	number of sabo dam												
603	2												
604													
605	dam type[0	installation	height	slit width									
606	2	9	11.4	0									
607	0	22	10	0									
608													
609	number of observation point												
610	7												
611													
612	observation point installation												
613	5												
614	7												
615	12												
616	14												
617	17												
618	21												
619	29												

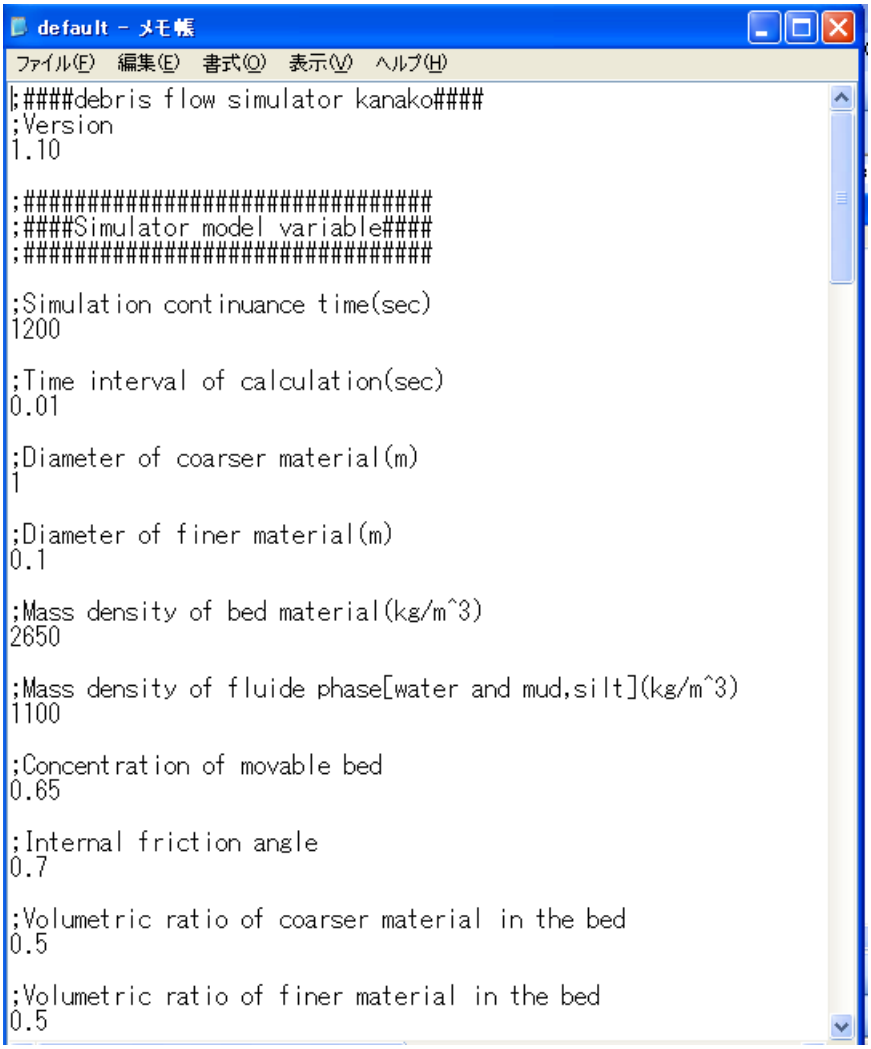
Fig-74: Result data saved as CSV file (3)
（Part of showing parameters of dam and observation point）

Please use Excel etc. based on this CSV filed data, when you want to examine the calculation result more in detail. Because the hydrograph displayed in the graph under the screen while simulating is a simple display.

7. About the configuration file

7.1Details of configuration file

In kanako Ver.1.10, parameters necessary for the calculation, such as interval of the time of calculation and the particle size etc. is set by the file format. The file name is default (Fig-75 to 79).
Here we are using text type default file, but you can also use CSV file, too. To modify some parameters from the initial condition, it is better to use the text file format.



```
;####debris flow simulator kanako####
;Version
1.10

;##################################
;####Simulator model variable####
;##################################

;Simulation continuance time(sec)
1200

;Time interval of calculation(sec)
0.01

;Diameter of coarser material(m)
1

;Diameter of finer material(m)
0.1

;Mass density of bed material(kg/m^3)
2650

;Mass density of fluide phase[water and mud,silt](kg/m^3)
1100

;Concentration of movable bed
0.65

;Internal friction angle
0.7

;Volumetric ratio of coarser material in the bed
0.5

;Volumetric ratio of finer material in the bed
0.5
```

Fig-75: default file (Simulator model variable–1)

default - メモ帳

ファイル(F) 編集(E) 書式(O) 表示(V) ヘルプ(H)

```
;Gravity acceleration(m/s^2)
9.8

;Coefficient of erosion rate
0.0007

;Coefficient of accummulation rate
0.05

;Minimum depth at the front of debris flow(m)
0.05

;Minimum flow depth(m)
0.01

;Minimum concentration of material in the bed
0

;Manning's roughness coefficient
0.03

;Time interval of output hydrograph data(sec)
2

;Interval step of displaying simulation
1
```

Fig-76: default file (Simulator model variable–2)

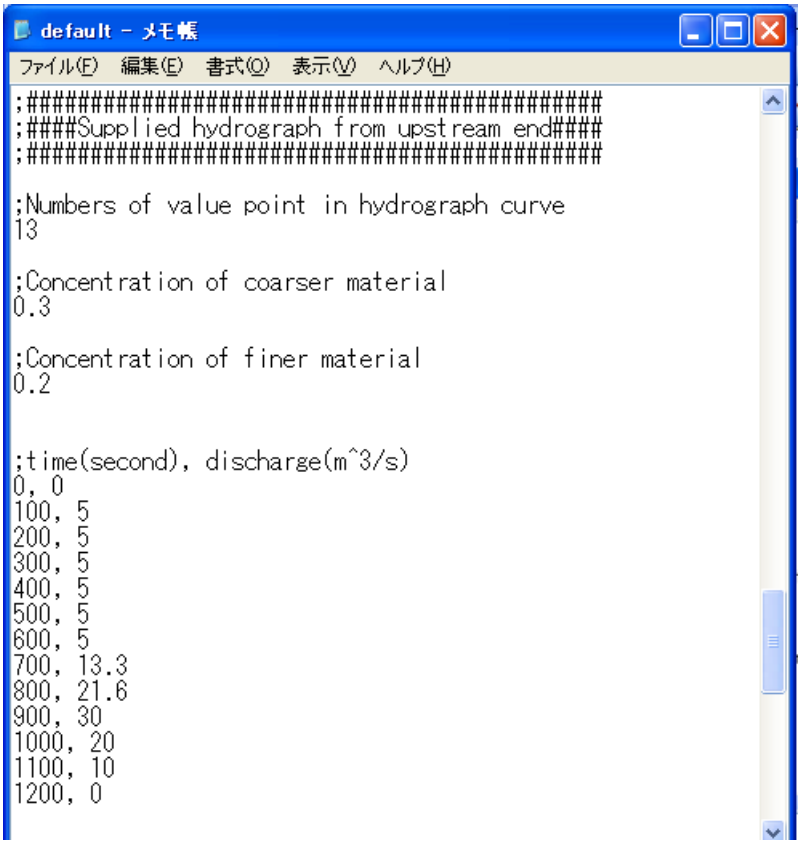
default - メモ帳

ファイル(F) 編集(E) 書式(O) 表示(V) ヘルプ(H)

```
;##########################
;####River channel data####
;##########################

;Number of calculation points
30

;Interval of calculation points(m)
10

;River shape(fixed bed,movable bed,river width,fixed bed input flag,movable bed input flag,river width input flag)
58, 58, 10, 0, 0, 0
56, 56, 10, 0, 0, 0
54, 54, 10, 0, 0, 0
52, 52, 10, 0, 0, 0
50, 50, 10, 0, 0, 0
48, 48, 10, 0, 0, 0
46, 46, 10, 0, 0, 0
44, 44, 10, 0, 0, 0
42, 42, 10, 0, 0, 0
40, 40, 10, 0, 0, 0
38, 38, 10, 0, 0, 0
36, 36, 10, 0, 0, 0
34, 34, 10, 0, 0, 0
32, 32, 10, 0, 0, 0
30, 30, 10, 0, 0, 0
28, 28, 10, 0, 0, 0
26, 26, 10, 0, 0, 0
24, 24, 10, 0, 0, 0
22, 22, 10, 0, 0, 0
20, 20, 10, 0, 0, 0
18, 18, 10, 0, 0, 0
16, 16, 10, 0, 0, 0
14, 14, 10, 0, 0, 0
12, 12, 10, 0, 0, 0
10, 10, 10, 0, 0, 0
8, 8, 10, 0, 0, 0
```

```
6, 6, 10, 0, 0, 0
4, 4, 10, 0, 0, 0
2, 2, 10, 0, 0, 0
0, 0, 10, 0, 0, 0

;Existance of dam[0:No、1:Yes]
1


;Numbers of  sabo dam
2

;Dam parameters(type[0:closed type,1:slit type,2:grid type],installation,height,slit width,griddam input flag[0;de
0, 10, 10, 0, 0
2, 20, 10, 0, 0

;Numbers of observation point
7

;Position of observation point
5
7
12
14
```

Fig-77: default file (River shape data)

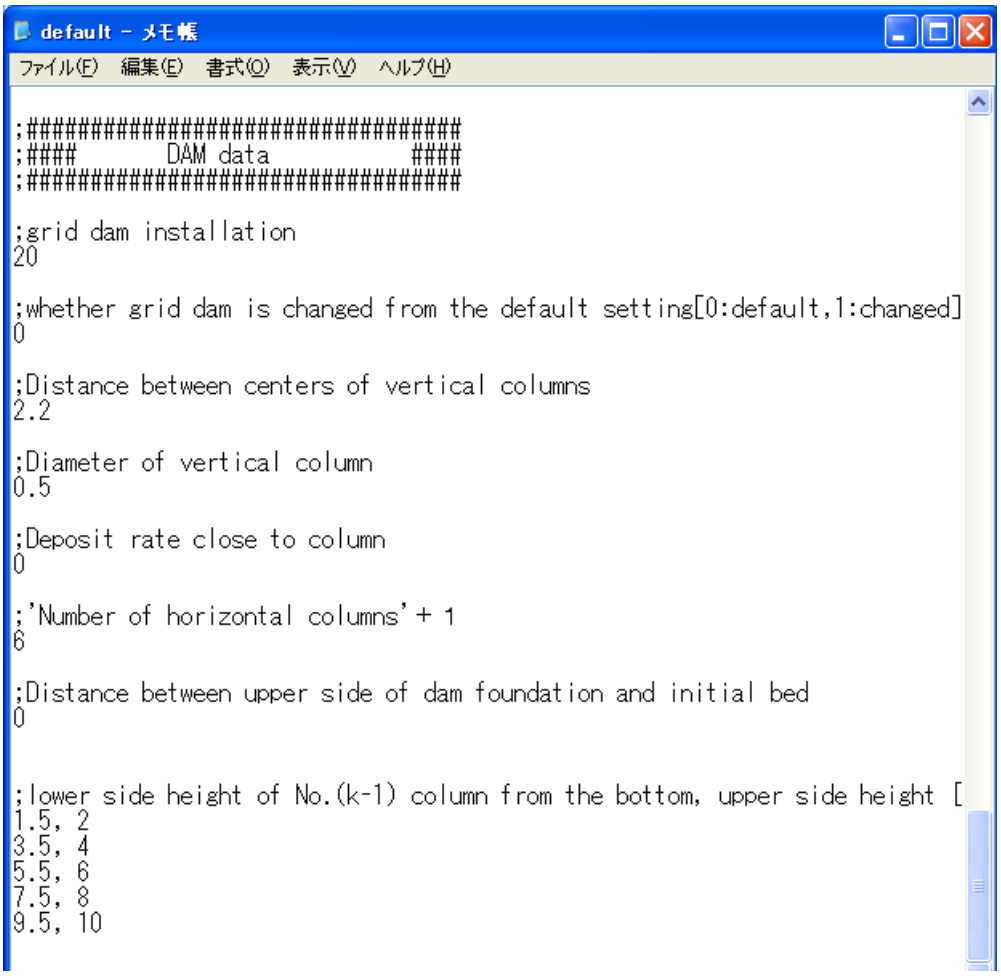


default - メモ帳

ファイル(F) 編集(E) 書式(O) 表示(V) ヘルプ(H)

```
;##############################################
;####Supplied hydrograph from upstream end####
;##############################################

;Numbers of value point in hydrograph curve
13

;Concentration of coarser material
0.3

;Concentration of finer material
0.2


;time(second), discharge(m^3/s)
0, 0
100, 5
200, 5
300, 5
400, 5
500, 5
600, 5
700, 13.3
800, 21.6
900, 30
1000, 20
1100, 10
1200, 0
```

Fig-78: default file (Supplied hydrograph from upstream end)



default - メモ帳

ファイル(F) 編集(E) 書式(O) 表示(V) ヘルプ(H)

```
;##################################
;####        DAM data          ####
;##################################

;grid dam installation
20

;whether grid dam is changed from the default setting[0:default,1:changed]
0

;Distance between centers of vertical columns
2.2

;Diameter of vertical column
0.5

;Deposit rate close to column
0

;'Number of horizontal columns' + 1
6

;Distance between upper side of dam foundation and initial bed
0


;lower side height of No.(k-1) column from the bottom, upper side height [
1.5, 2
3.5, 4
5.5, 6
7.5, 8
9.5, 10
```

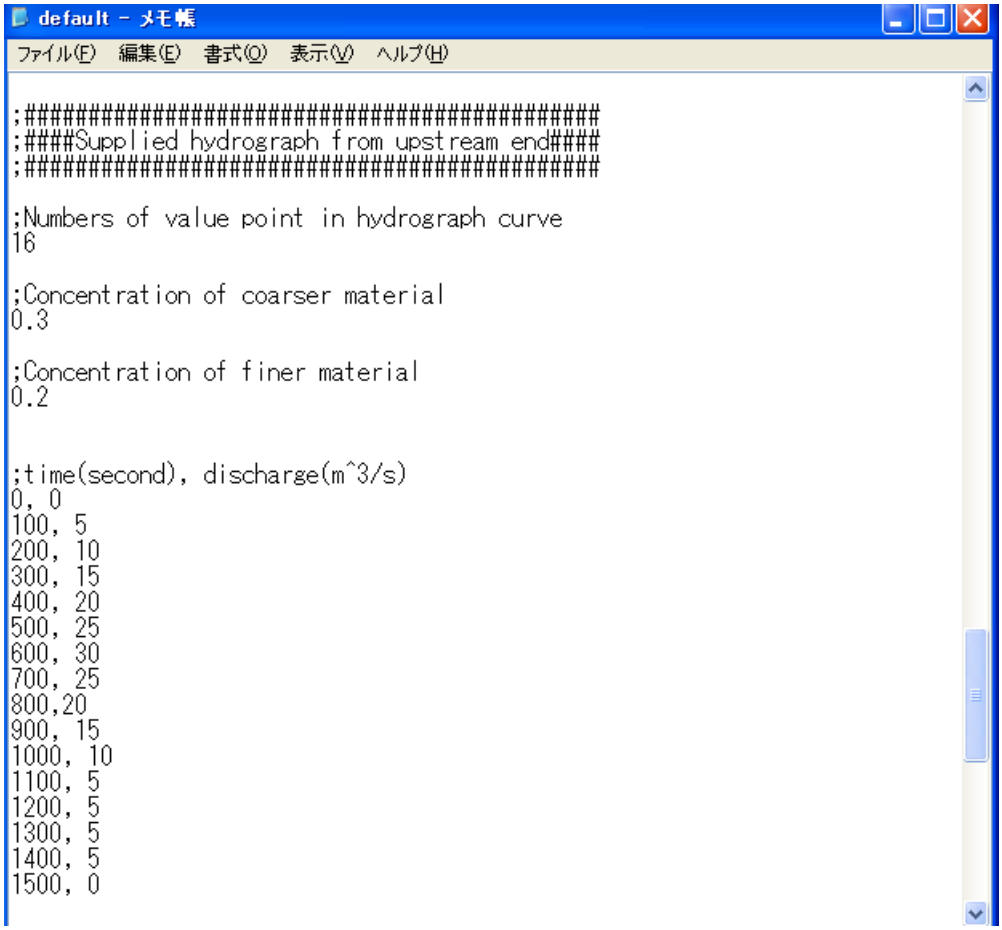
Fig-79: default file (Grid dam data)

Please refer to the default file when you examine the initialization of the parameter. These parameters can be changed, and by overwriting and saving from the default to a new value, you can run a simulation based on new value.

Next, we sill show how to change the hydrograph continuance time and the simulation continuance time.

7.2 Set the hydrograph continuance time

When you want to change the hydrograph continuance time, you overwrite and save 'Numbers of value point in hydrograph curve' and 'time (second), discharge (m^3/s)' in the 'supplied hydrograph from upstream end' data, part of the default file in Fig-78.
When you change the hydrograph continuance time to 1500 second, you overwrite 'Numbers of value point in hydrograph curve' and 'time (second), discharge (m^3/s)' in the 'supplied hydrograph from upstream end' data, part of the default file as showed in Fig-80, and save the file.


default - メモ帳

ファイル(F) 編集(E) 書式(O) 表示(V) ヘルプ(H)

```
;##############################################
;####Supplied hydrograph from upstream end####
;##############################################

;Numbers of value point in hydrograph curve
16

;Concentration of coarser material
0.3

;Concentration of finer material
0.2


;time(second), discharge(m^3/s)
0, 0
100, 5
200, 10
300, 15
400, 20
500, 25
600, 30
700, 25
800,20
900, 15
1000, 10
1100, 5
1200, 5
1300, 5
1400, 5
1500, 0
```

Fig-80: Change data of default file (time [second], discharge [m^3/s])

When you start 'kanako Ver.1.10' after overwriting and saving the file, screen such as Fig-81 appears. You click 'Set supplied hydrograph' button (red circle, see Fig-81), and 'Set supplied hydrograph' screen where the continuance time is set as 1500 seconds appears shown in Fig-82. Please go according to the procedure introducing by 4.6 section when you change the discharge and so on of supplied hydrograph from the upstream end.

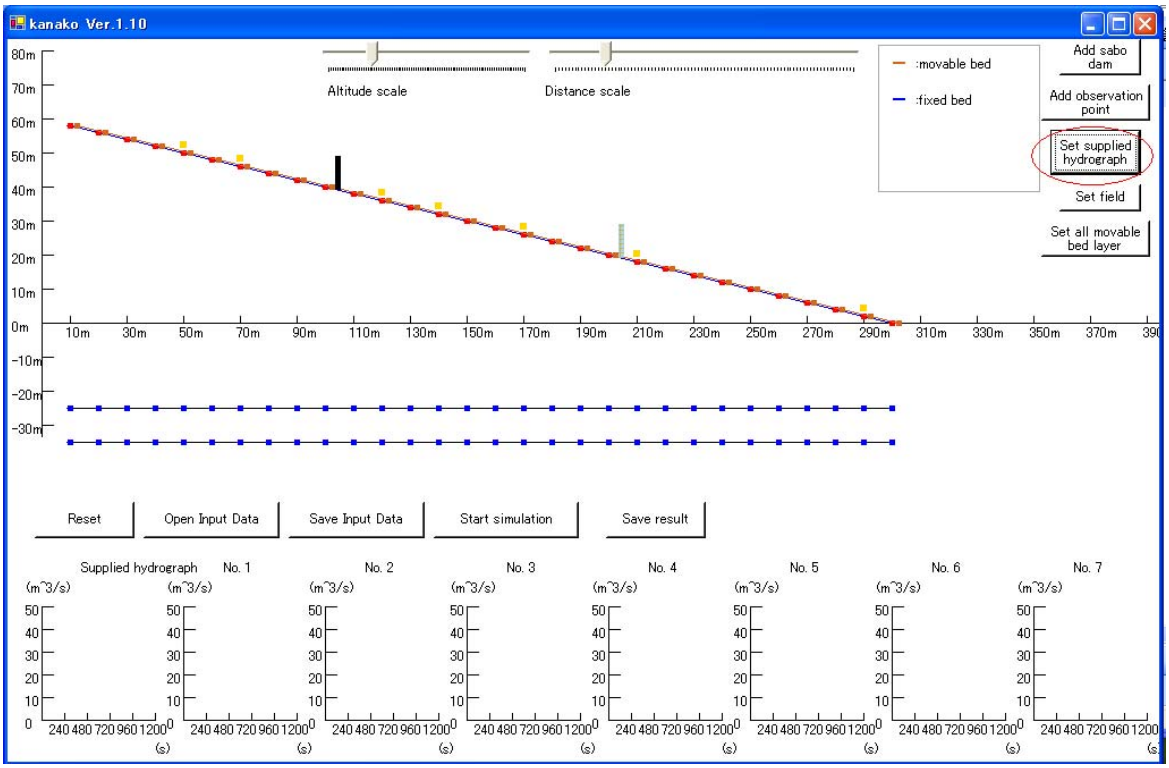


Fig-81: Start Screen

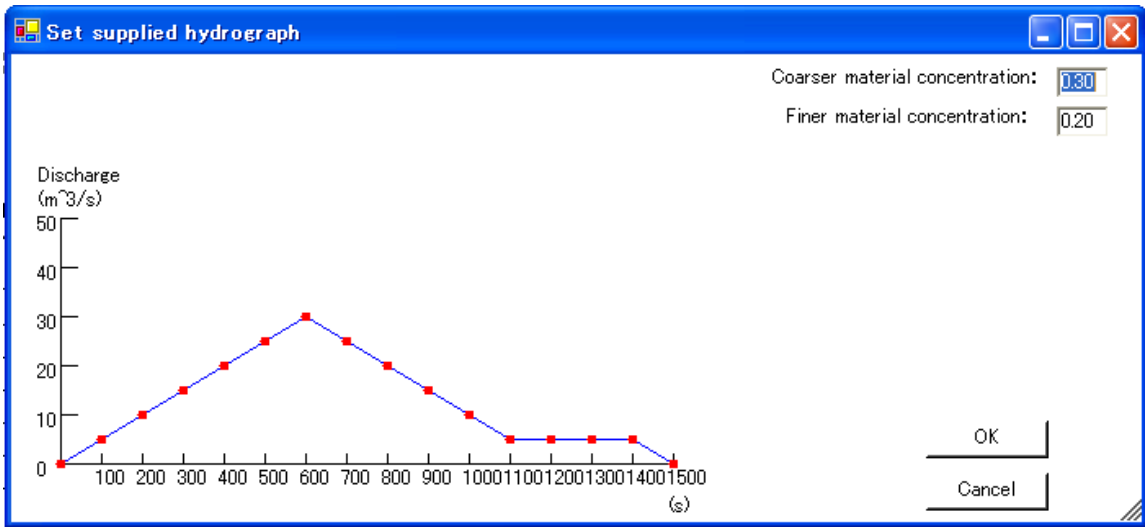


Fig-82: Set supplied hydrograph screen
（When hydrograph continuance time is 1500 second）

(Attention！)

Even if the hydrograph continuance time is changed at 1500 seconds, the calculation is executed only until 1200 seconds without changing the simulation time. Please change the simulation time by the method that shows as follows for this case.

7.3 Set the simulation continuance time

When you want to change the simulation continuance time, you overwrite and save ‘simulation continuance time (sec)’ in the simulation model parameter variable data, part of the default file in Fig-75. When you change the simulation continuance time to 1500 second, you overwrite ‘simulation continuance time (sec)’as showed in Fig-83, and save the file.

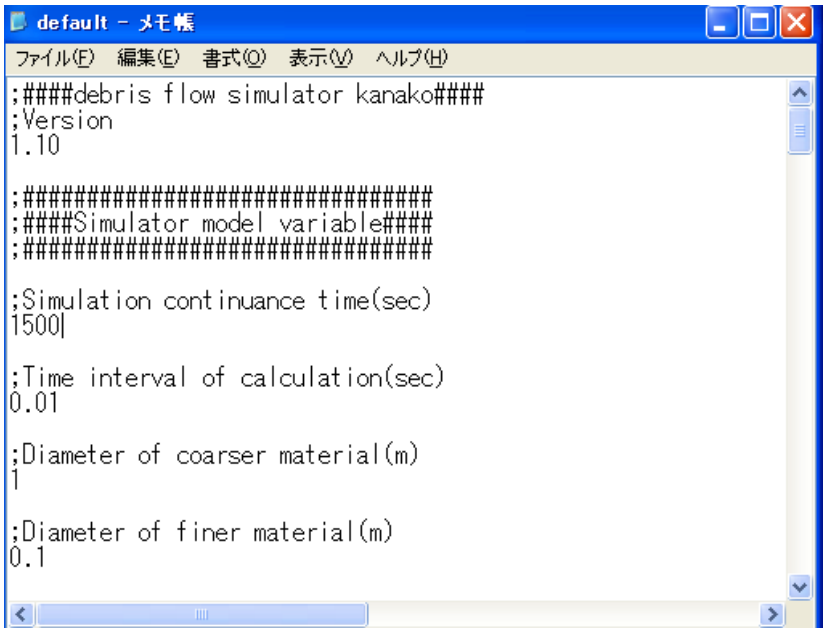


Fig-83: Change data of default file (simulation continuance time [sec])

When you start ‘kanako Ver.1.10’ after overwriting and saving the file, screen such as Fig-83shows. At the bottom of the screen, each horizontal axis of eight graphs which display the hydrographs will be displayed to 1500 second (pink circle, see Fig-84).

You click ‘Start simulation’ button (red circle, see Fig-84), and simulation will begin. In this case, supplied hydrograph from the upstream end is one set on Fig-82 in 5.2 section. This time, simulator calculates the change of flow depth and bed height from the debris flow occurrence to the passage of 1500 seconds (for 25 minutes), and stops（showed on Fig-85 to 86）.

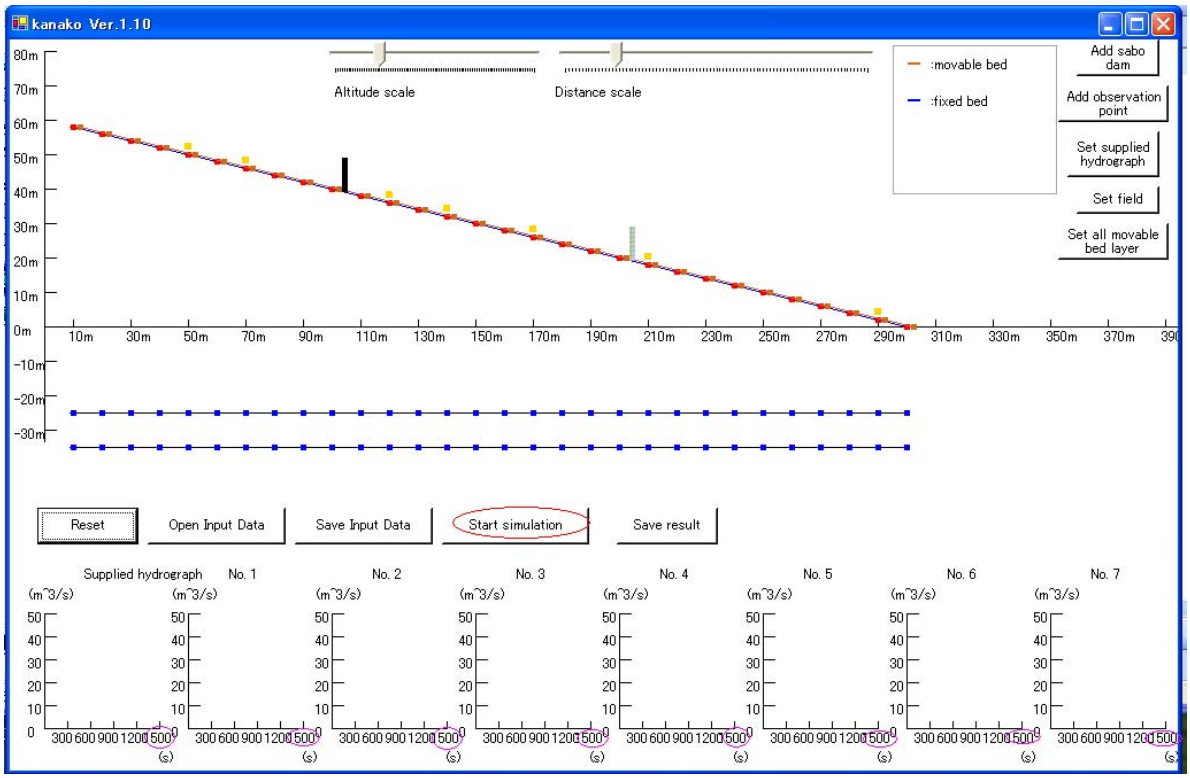


Fig-84: Input Screen (simulation continuance time is changed to 1500 second)

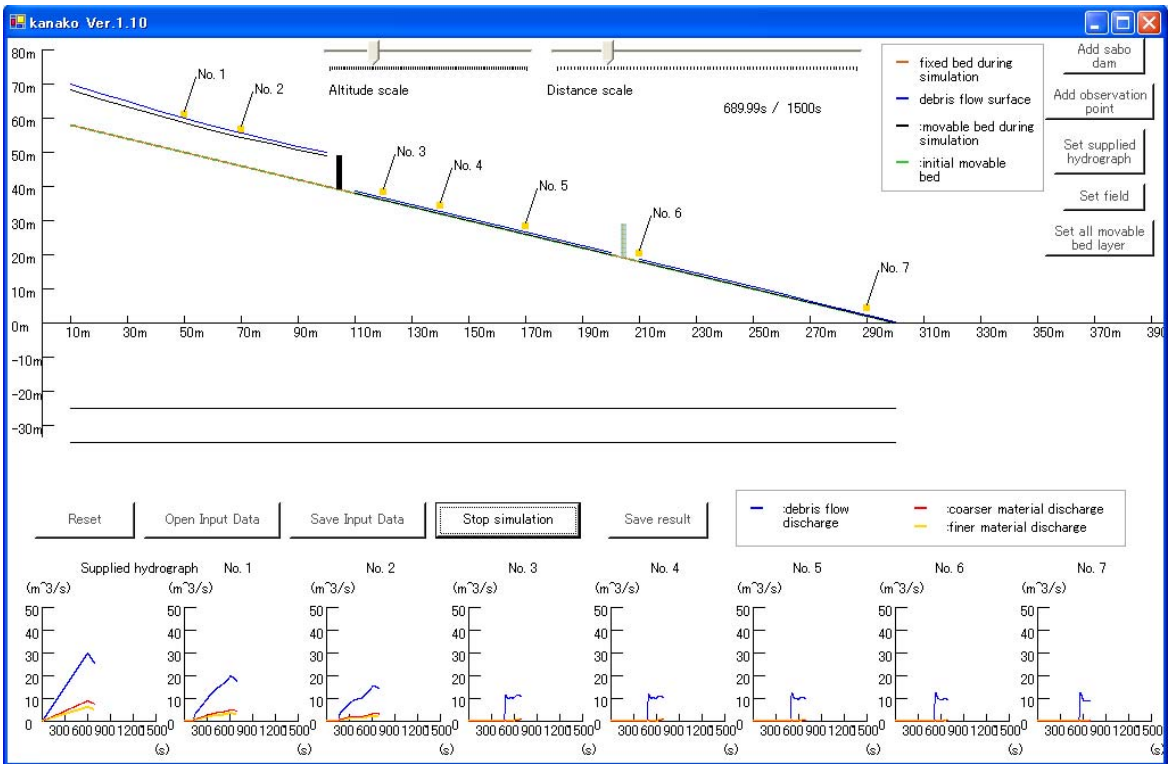


Fig-85: Simulation Screen (614.99 second passed)

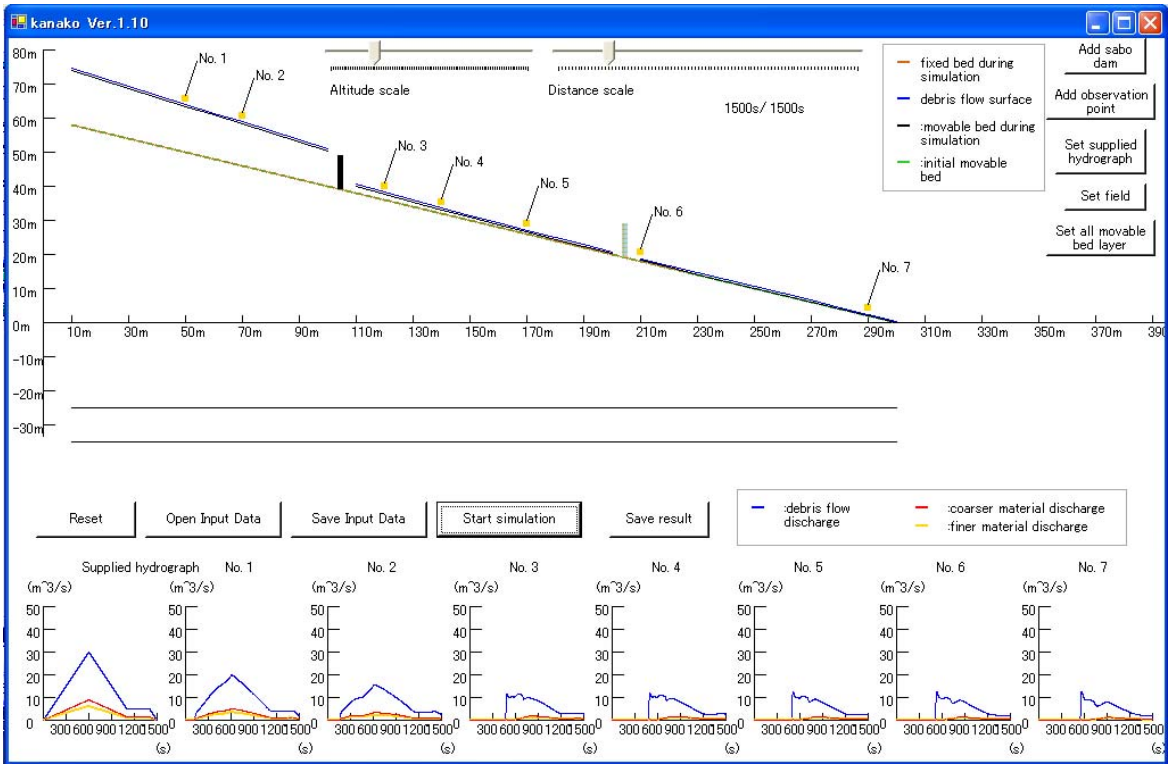


Fig-86: Simulation Screen (1500 second passed)

It is also possible to change other parameters from the default to a new value by overwriting and saving the rewriting superscription, according to the procedure similar to 7.2 and 7.3.