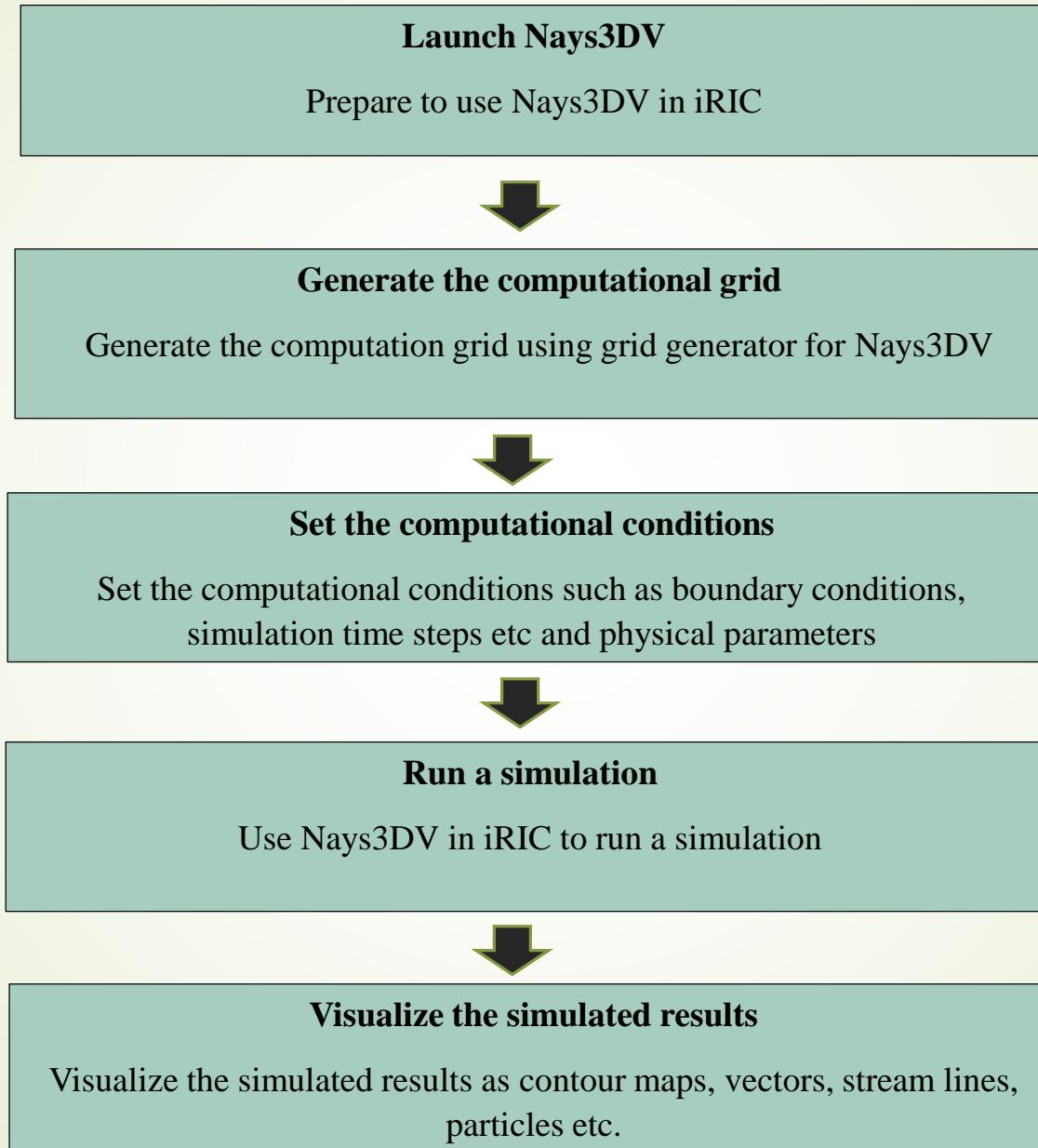


# 第4回iRICオンラインワークショップ

**Nays3DV** 概要および事例集のデモンストレーション

株式会社エコー チヤミラ ニロシニ

# Basic steps to run Nays3DV



# Nays3DVの基本的な作業手順

## Nays3DV の 起動

iRIC 上で、Nays3V を使うための準備をします。



## 計算格子の作成

DEMデータなどを利用して計算格子を作成します。



## 計算条件の設定

計算流量や境界条件、粗度などを設定します。



## 計算実行

Nays3DV による計算を実行します。



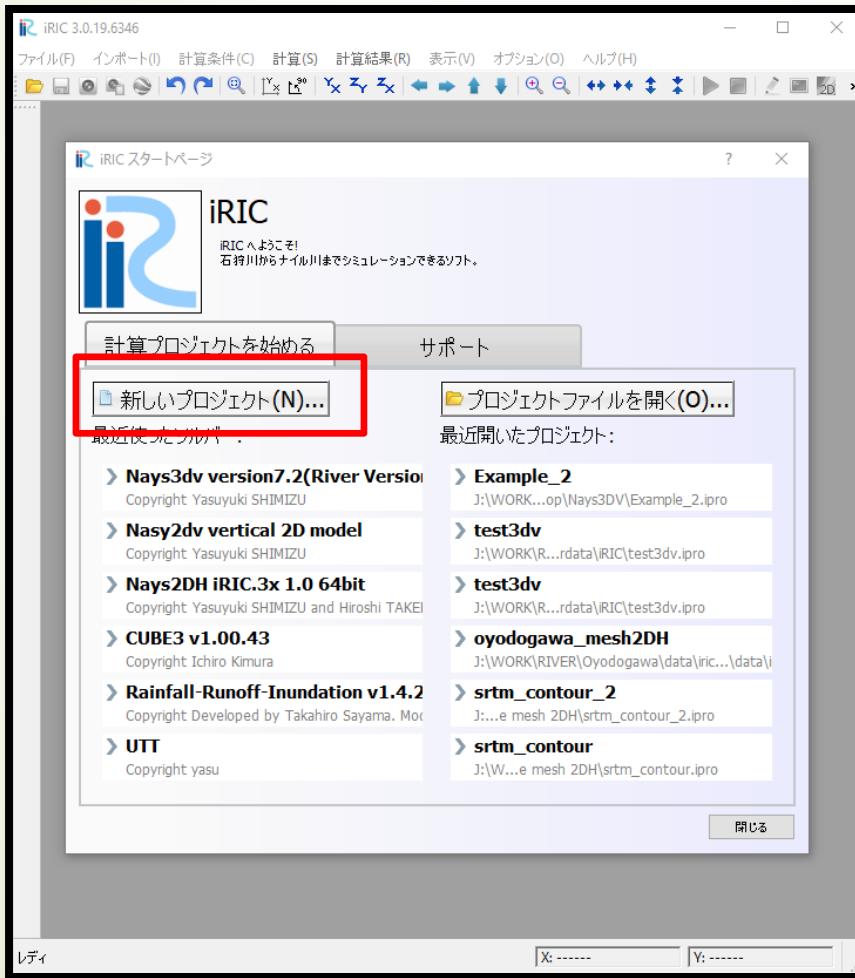
## 計算結果の可視化

計算結果の流速や水深、河床高などをコンター図やベクトル図などで 可視化し確認します。

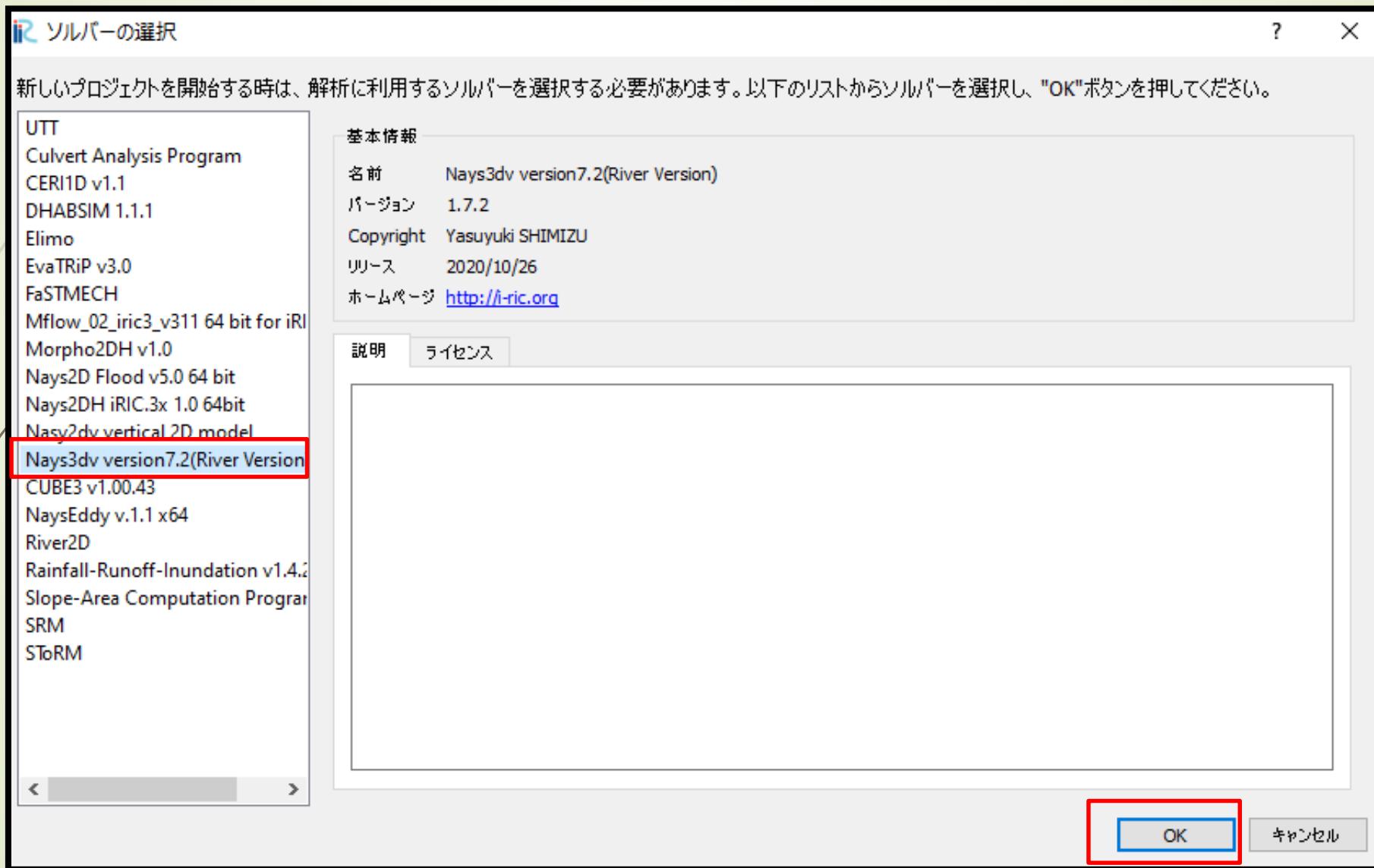
# Nays3DV の起動

iRIC 上で、Nays3DV を起動するための作業手順は、以下のとおりです。

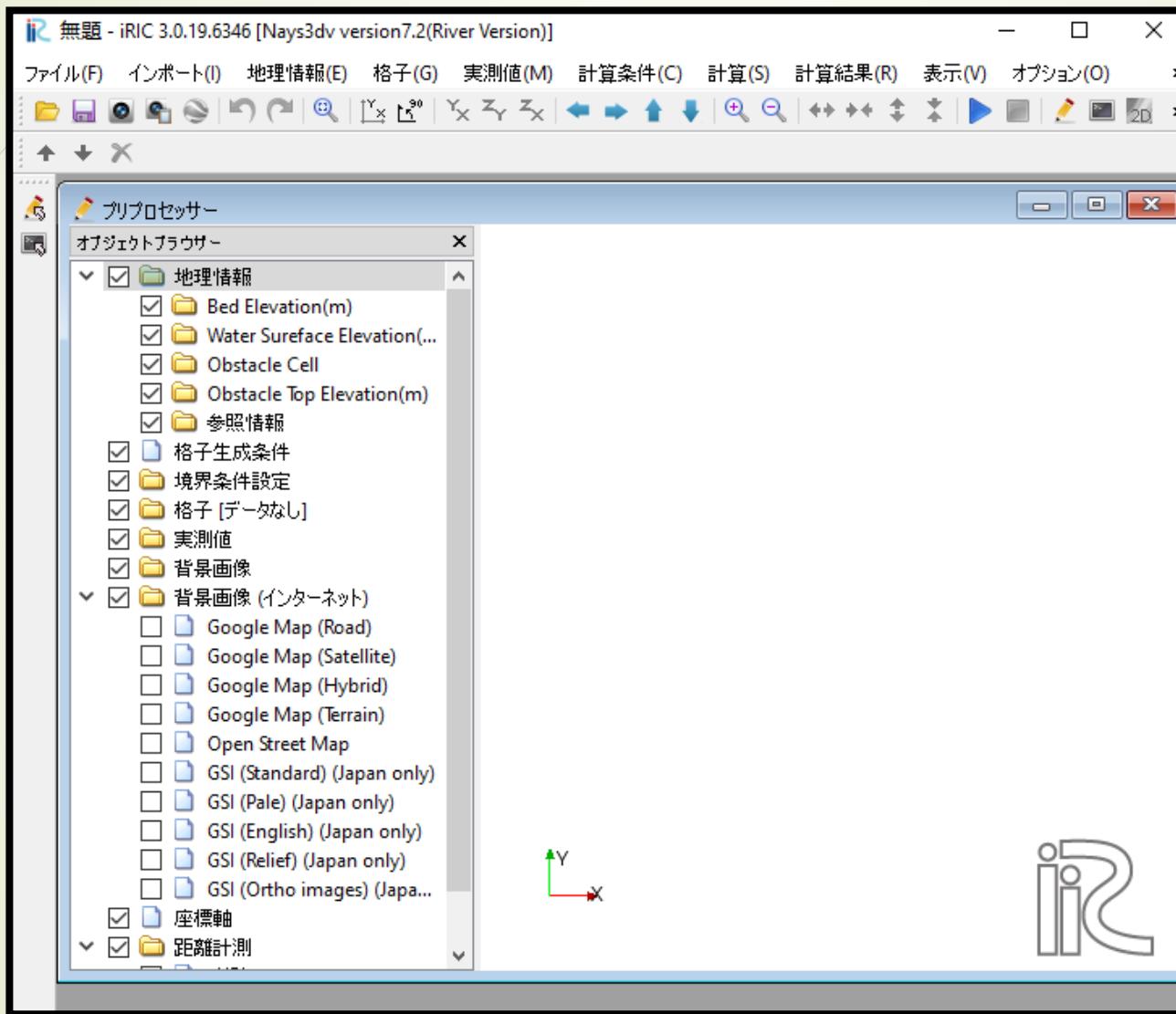
- iRIC を起動すると、[iRIC スタートページ] 画面が開きます。
- [iRIC スタートページ] 画面で、[新しいプロジェクト] ボタンをクリックします。



- ▶ [ソルバー選択]画面が開きます
- ▶ [ソルバー選択] 画面で、[Nays3DV version 7.2] を選択し、[OK] ボタンをクリックします。

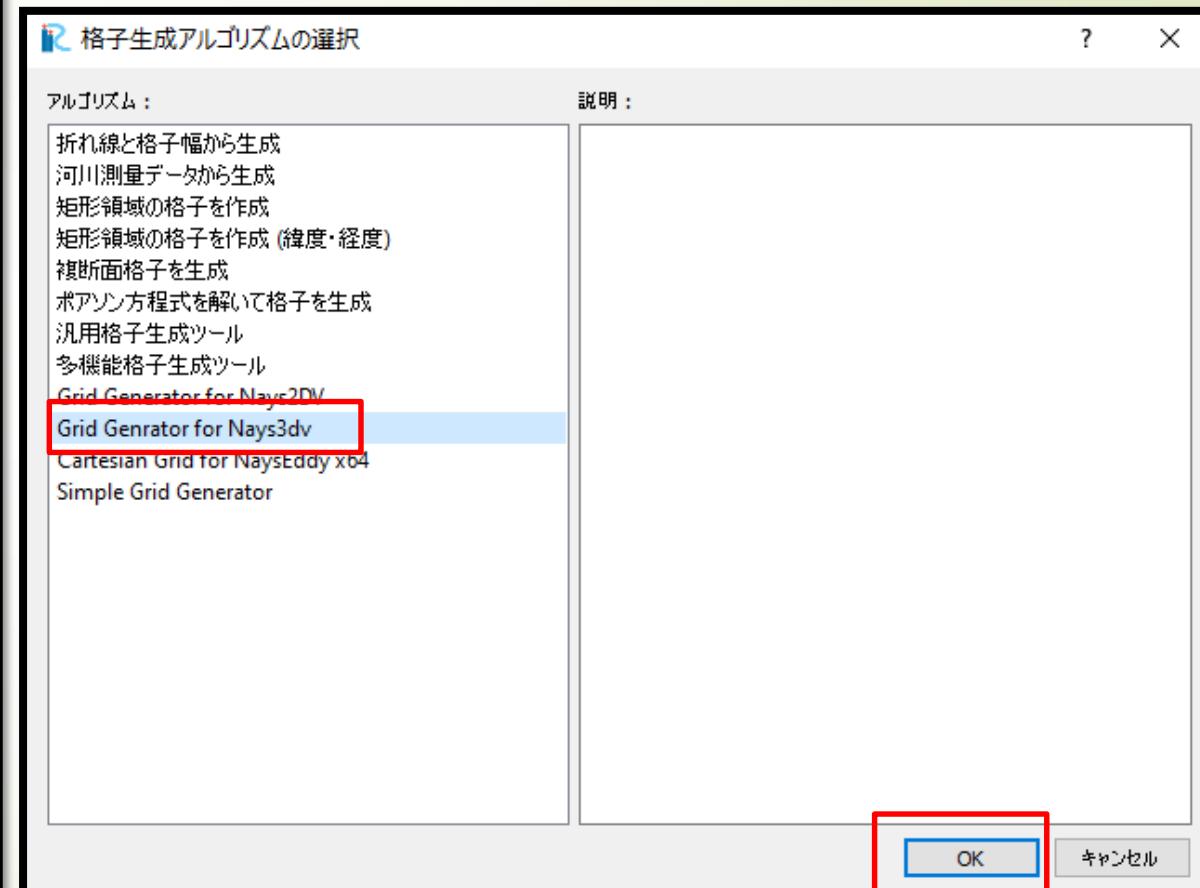
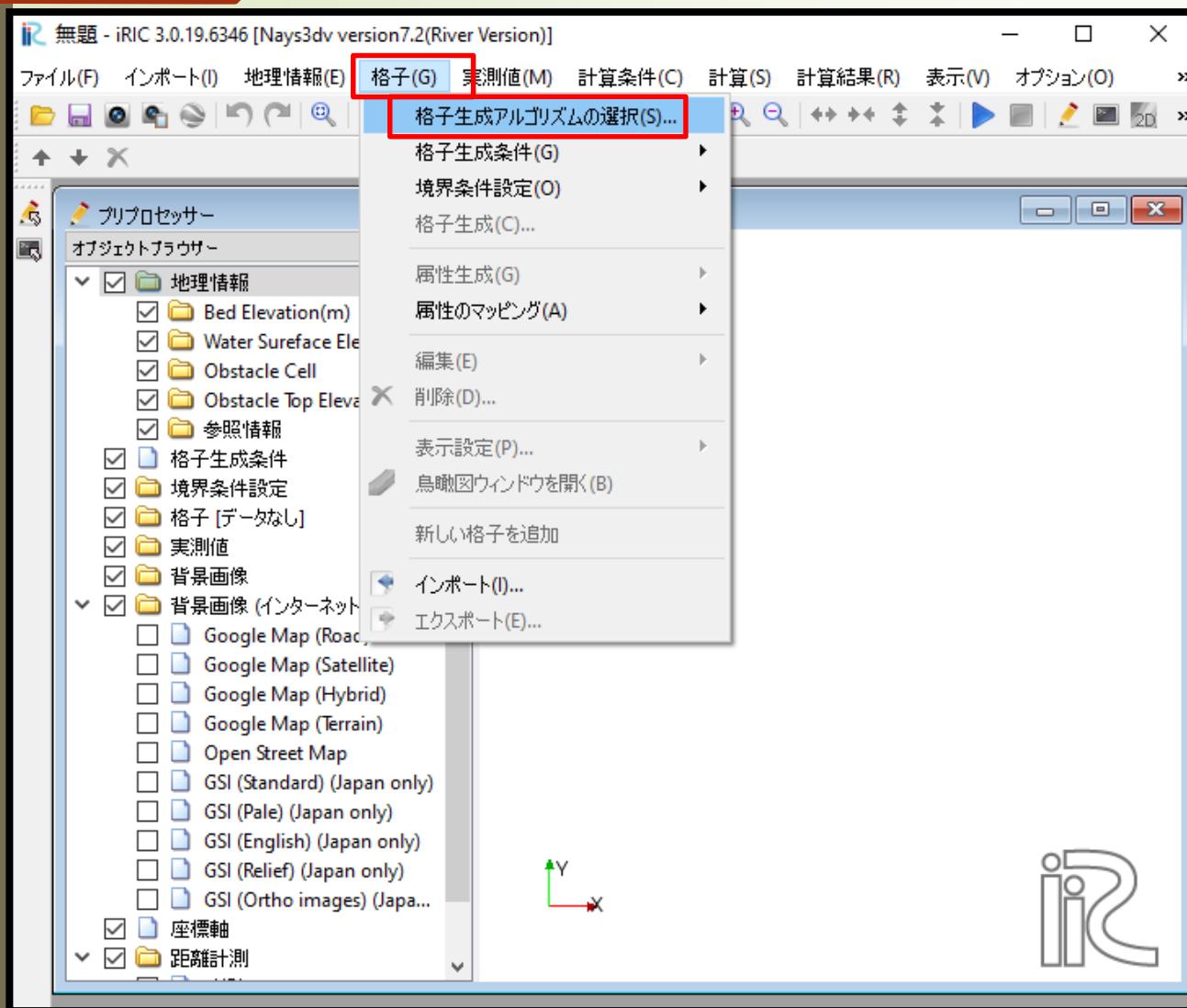


▶ タイトルバーに「untitled-iRIC 3.0 [Nays3DV version 7.2]」と表示された画面が起動します。

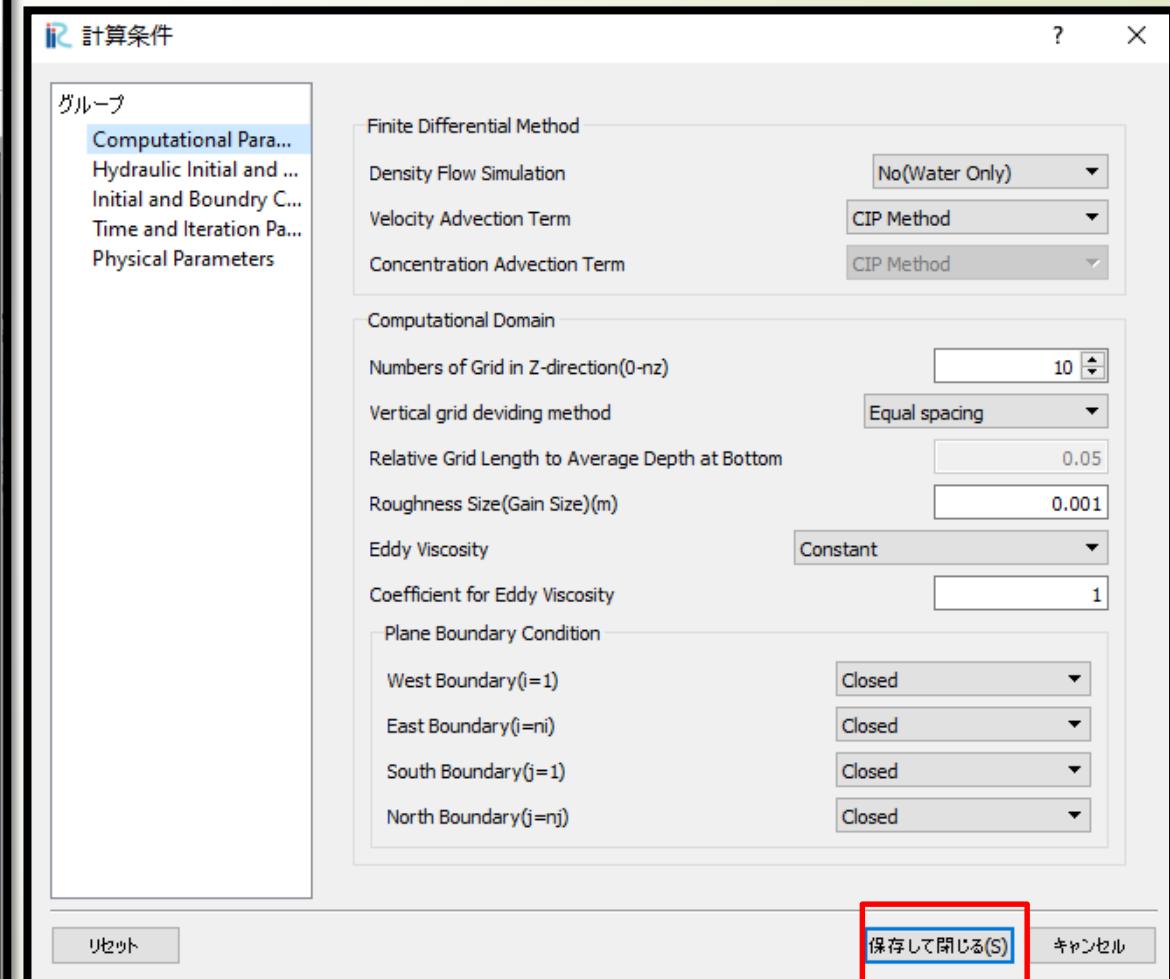
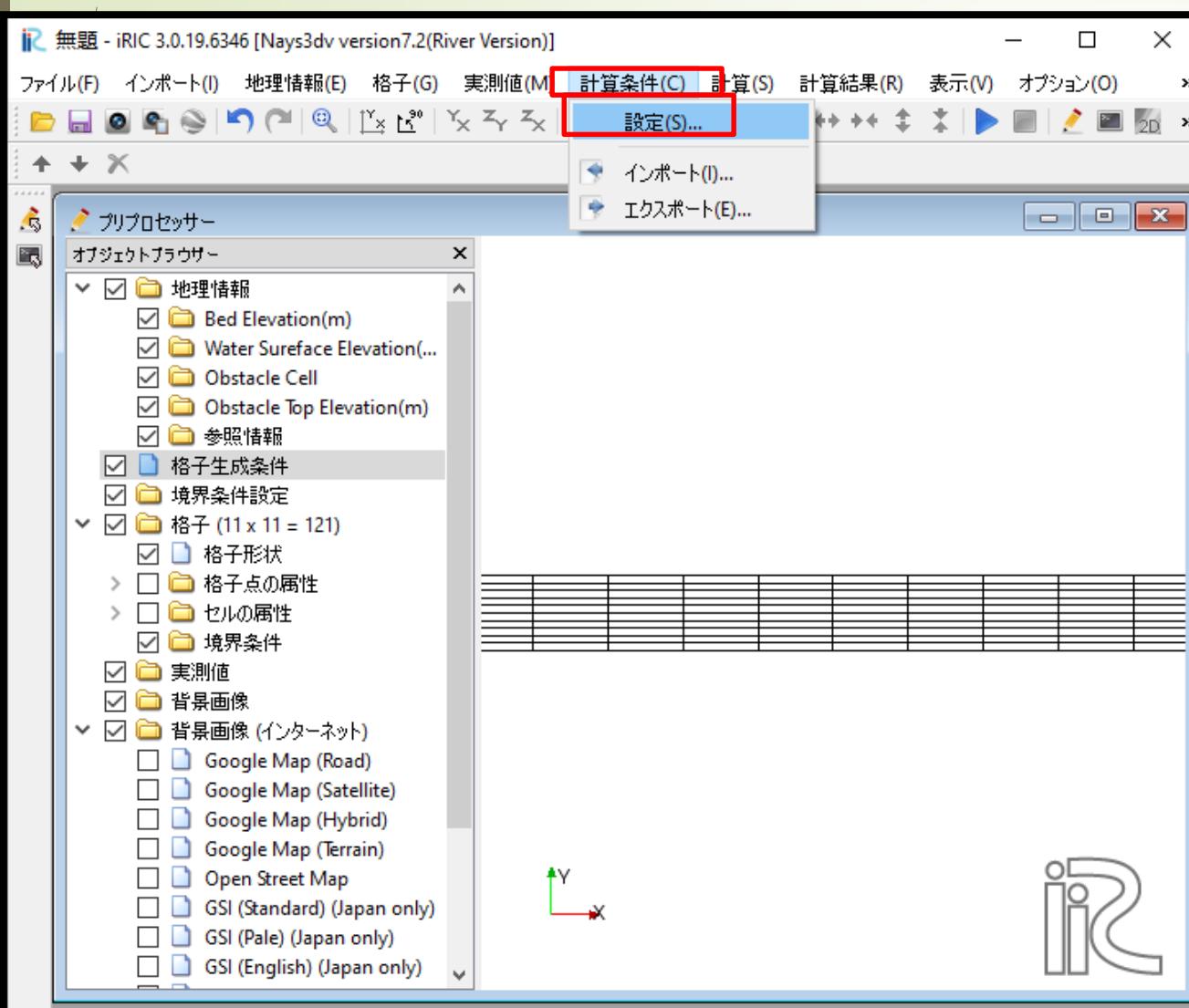


これで、Nays3DV の起動（使う準備）は完了です。

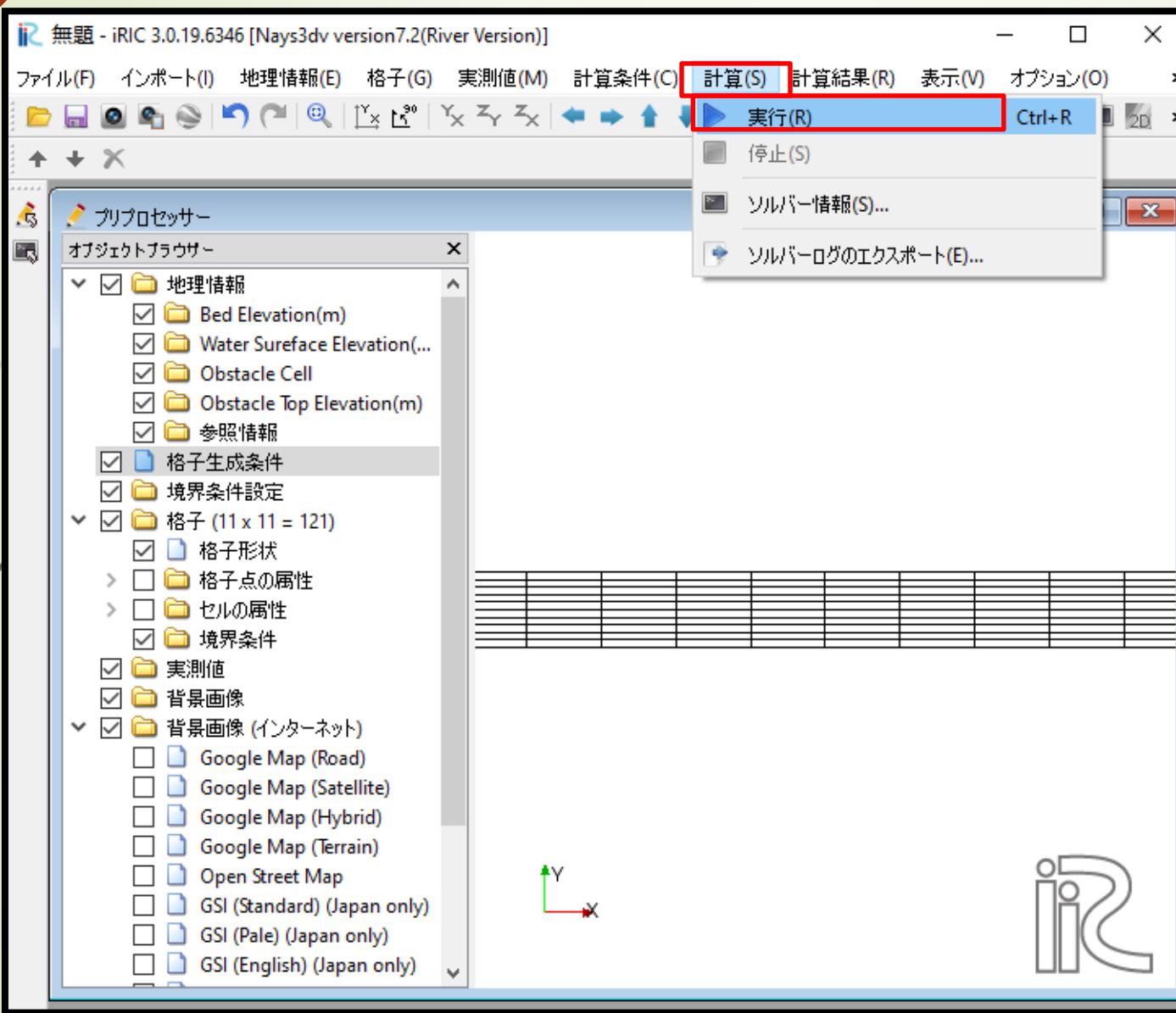
# 計算格子の作成



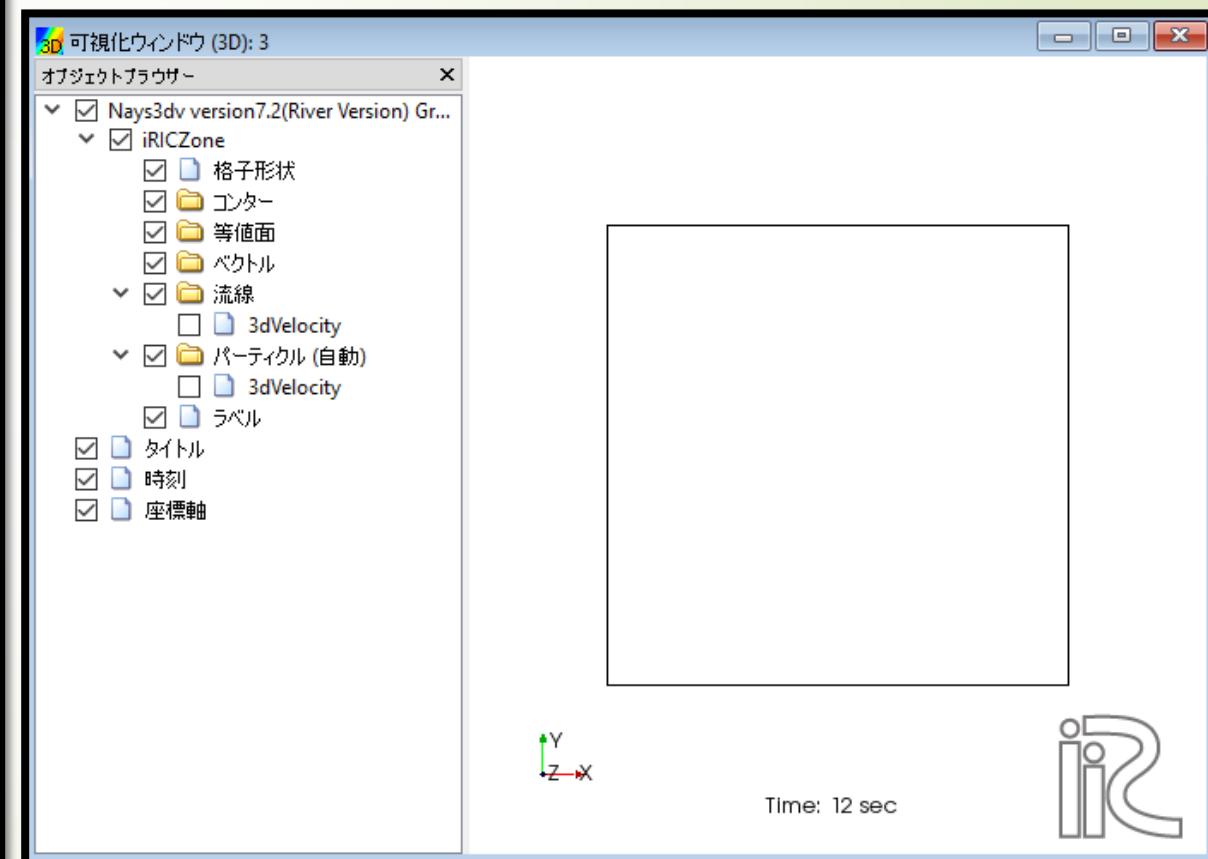
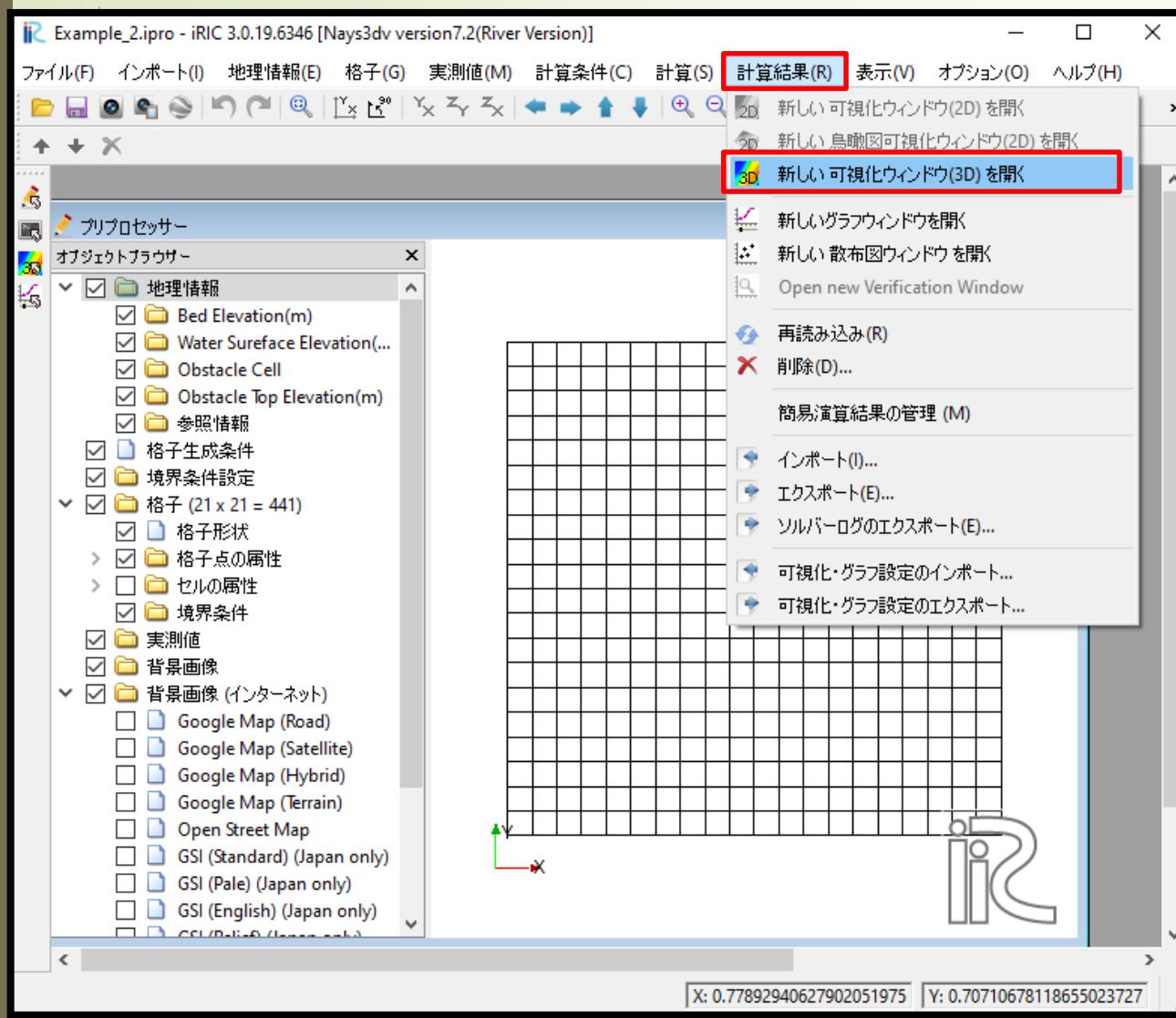
# 計算条件の設定



# 計算実行



# 計算結果の可視化



# Nays3DV examples

- Upward flow in a tank (タンク内の上向きの流れ)
- Dropping a dense liquid inside a tank (濃い液体をタンク内に落とす)
- Rectangular channel with an obstacle (障害物のあるチャネル)

These examples and several other examples will be available at iRIC website online example manual.  
[https://uc.i-ric.org/uc\\_products/nays3dv\\_tutorial/index.html](https://uc.i-ric.org/uc_products/nays3dv_tutorial/index.html)

If any problem occurred during the simulations, please write in the forum.

<https://i-ric.org/en/forum/>

<https://i-ric.org/forum/>

We will reply.

# Upward flow in a tank (タンク内の上向きの流れ)

## ▶ 目的

To check the flow when a low dense liquid is inserted in to a tank

## ▶ 概要

Grid creation, initial and boundary concentration setting, other calculation parameters setting, simulation, viewing results (iso surface of concentration, contours of concentration, velocity vectors )



Hiroshima atomic bomb blast



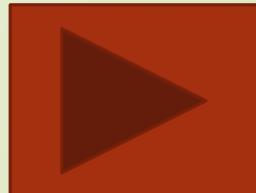
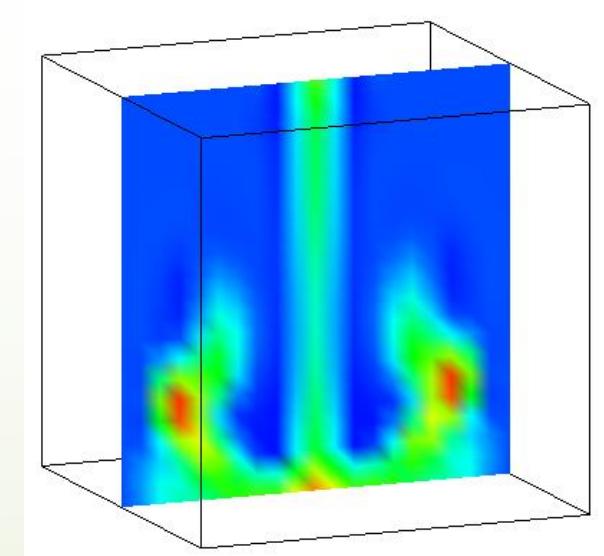
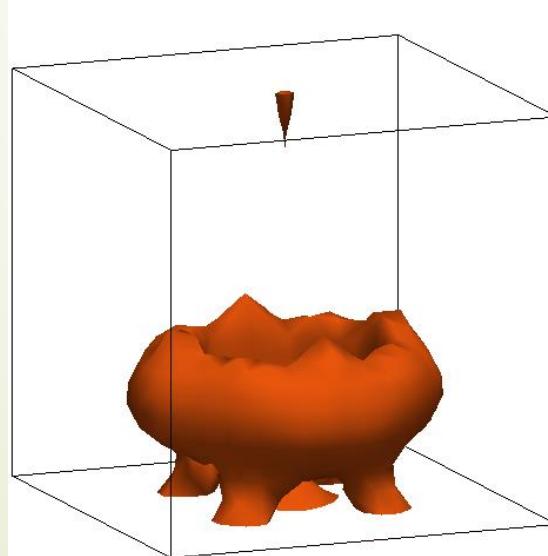
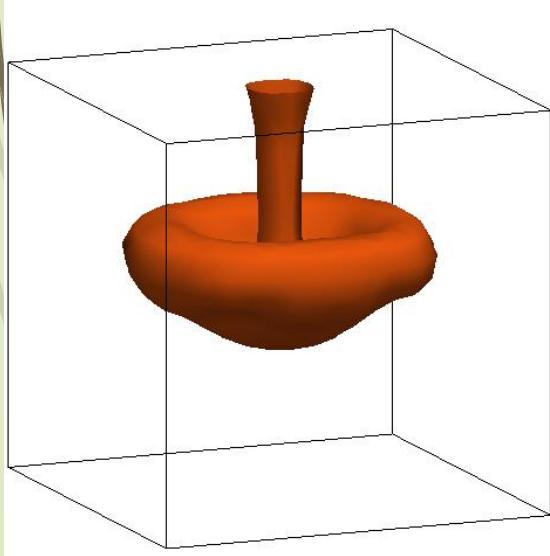
# Dropping a dense liquid inside a tank (濃い液体をタンク内に落とす)

## ▶ 目的

To check the flow patterns when a dense liquid dropped into a tank

## ▶ 概要

Grid creation, initial and boundary concentration setting, other calculation parameters setting, simulation, viewing results (iso surface of concentration, contours of concentration, velocity vectors )



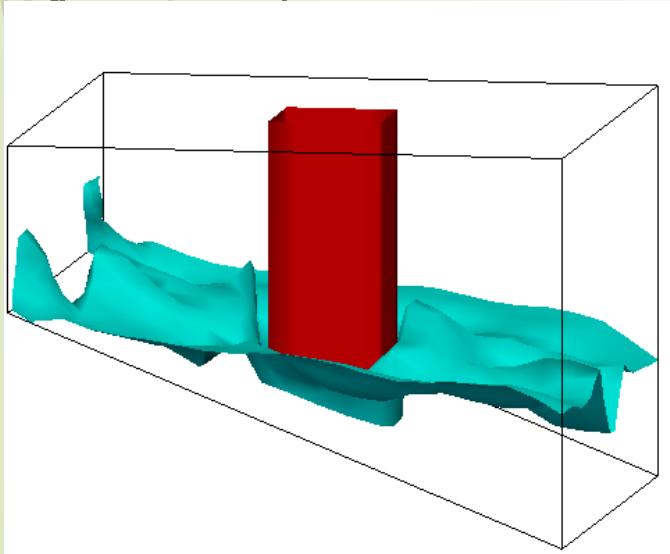
# Rectangular channel with an obstacle (障害物のあるチャネル)

## ▶ 目的

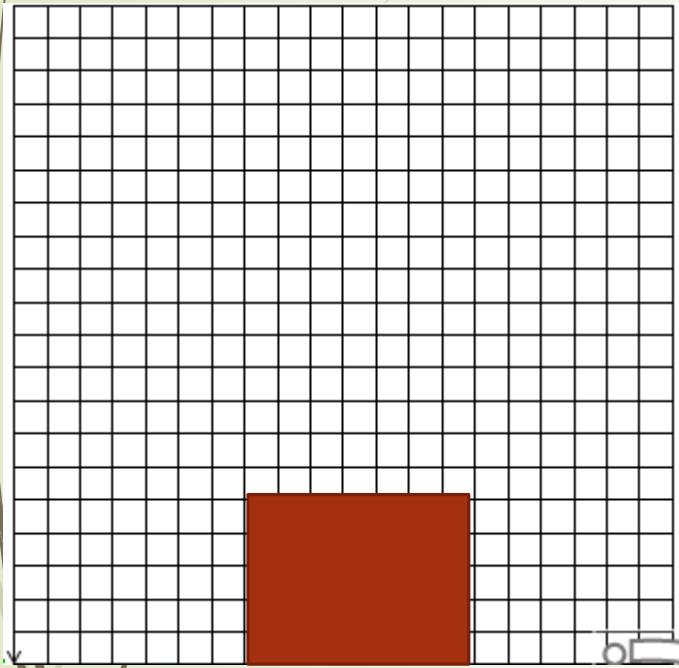
To calculate the density currents in a rectangular channel with an obstacle.

## ▶ 概要

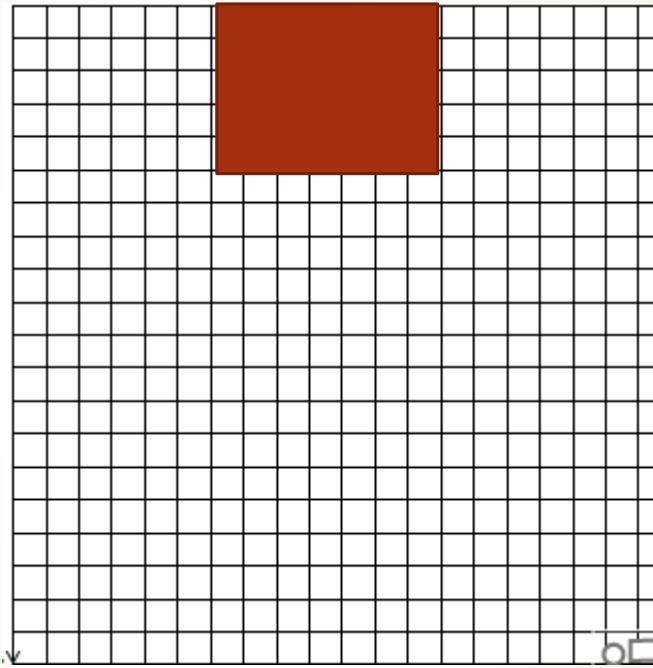
Grid creation, obstacle setting, Obstacle top elevation setting, obstacle and obstacle top elevation mapping, concentration boundary setting and mapping, initial and boundary concentration setting, other calculation parameters setting, simulation, viewing results (iso surface of concentration and obstacle, contours of concentration, velocity vectors)



# Initial concentration boundary



Upward flow  
initial concentration



Downward flow  
initial concentration

# Upward flow in a tank (タンク内の上向きの流れ)

## ▶ 目的

To check the flow when a low dense liquid is inserted in to a tank

## ▶ 概要

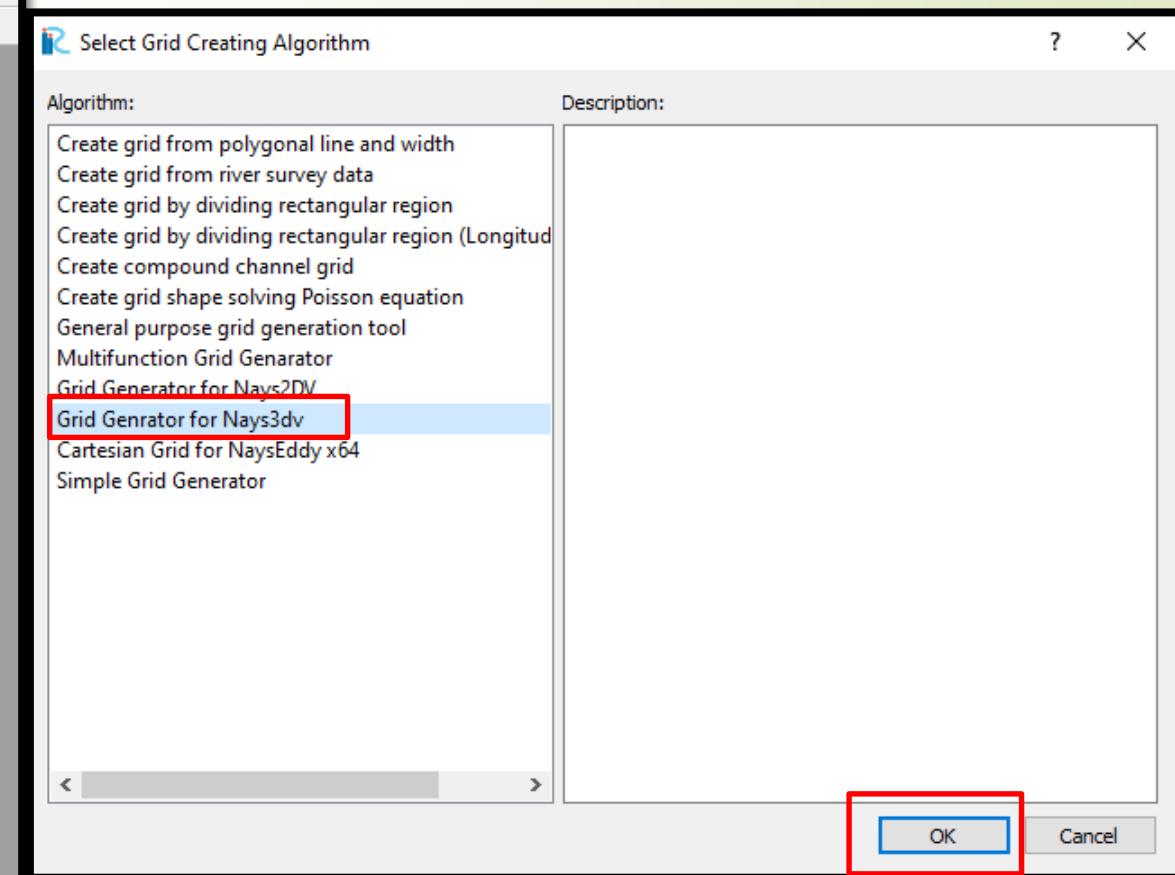
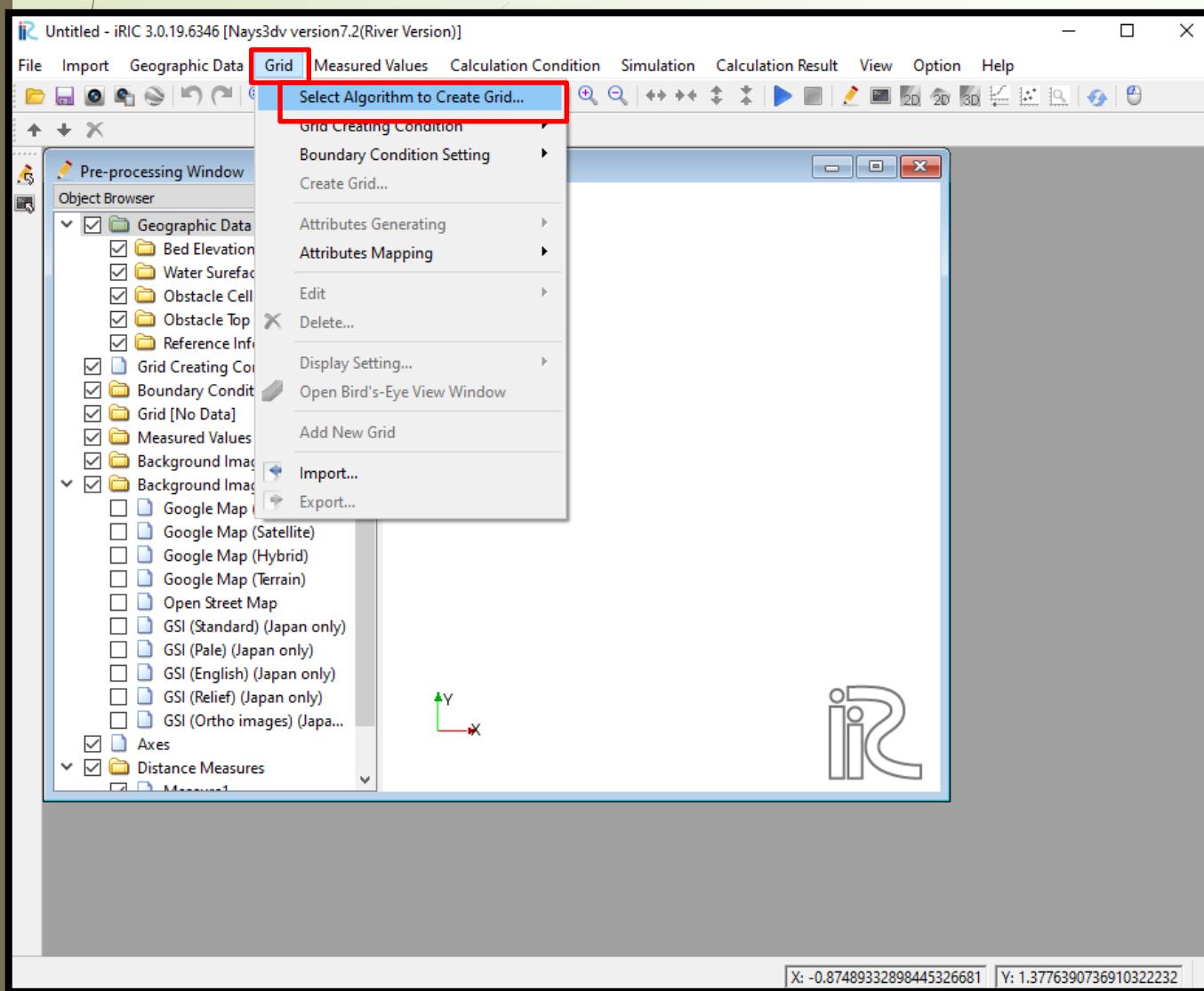
Grid creation, initial and boundary concentration setting, other calculation parameters setting, simulation, viewing results (iso surface of concentration, contours of concentration, velocity vectors )



Hiroshima atomic bomb blast



# 計算格子の作成



# 計算格子の作成

Grid Creation

Groups

- Channel Shape
- Channel Bed Condition
- Grids Adding
- Width Variation
- Initial Water Surface ...

Select Channel Shape: Straight Channel or Cubic Box

Length in X or streamwise direction(m): 1

Number of Nodes in X Direction: 20

Meandering Channel

Wavelength of Meander(m): 3

Number of Nodes in One Wavelength: 24

Wave Number: 1

Meander Angle(degree): 40

Length in Y Direction or Width(m): 1

Number of Nodes in Y or Transvers Direction: 20

Channel Bed Slope: 0

Bed Elevation of Downstream End(m): -1

Parameters for Kinoshita Meander

Skewness of Kinoshita Meander: 0.03125

Flatness of Kinoshita Meander: 0.00521

Reset Create Grid Cancel

Grid Creation

Groups

- Channel Shape
- Channel Bed Condition
- Grids Adding
- Width Variation
- Initial Water Surface Profile

Downstream Depth(m): 1

Water Surface Slope: 0

Initial Water Surface Perturbation: None

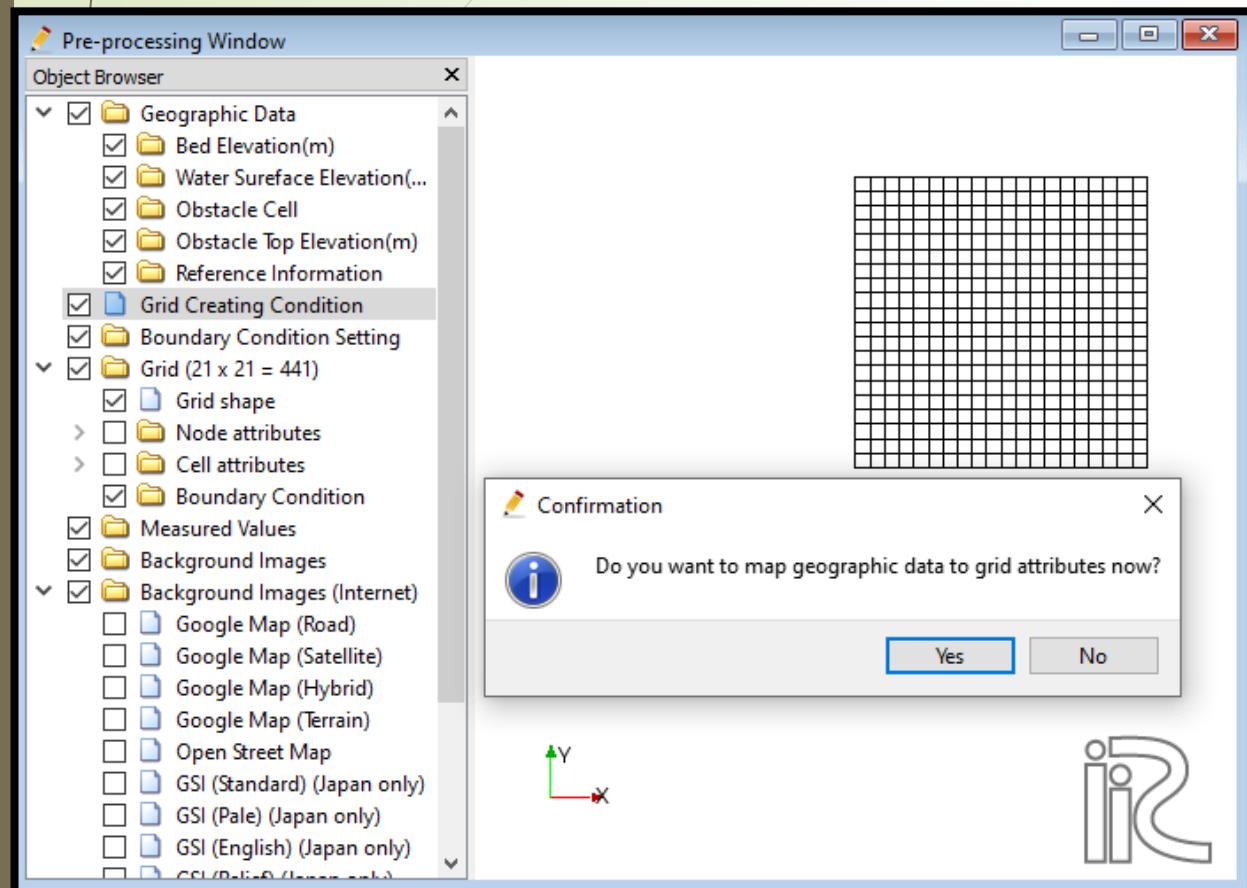
Water Surface Perturbation Direction: x-direction

Amplitude of the perturbation(m): 0.1

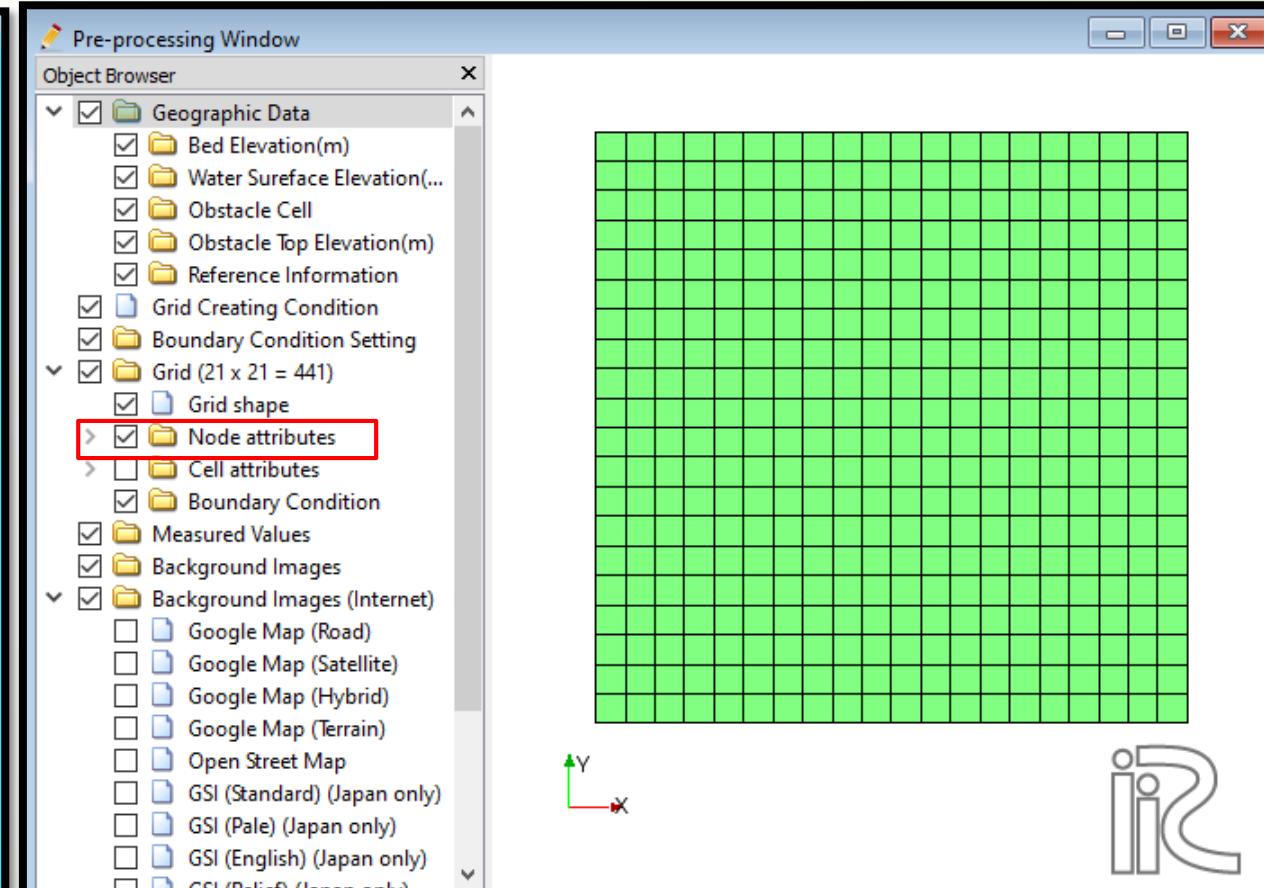
Wavenumber of the perturbation(m): 1

Reset Create Grid Cancel

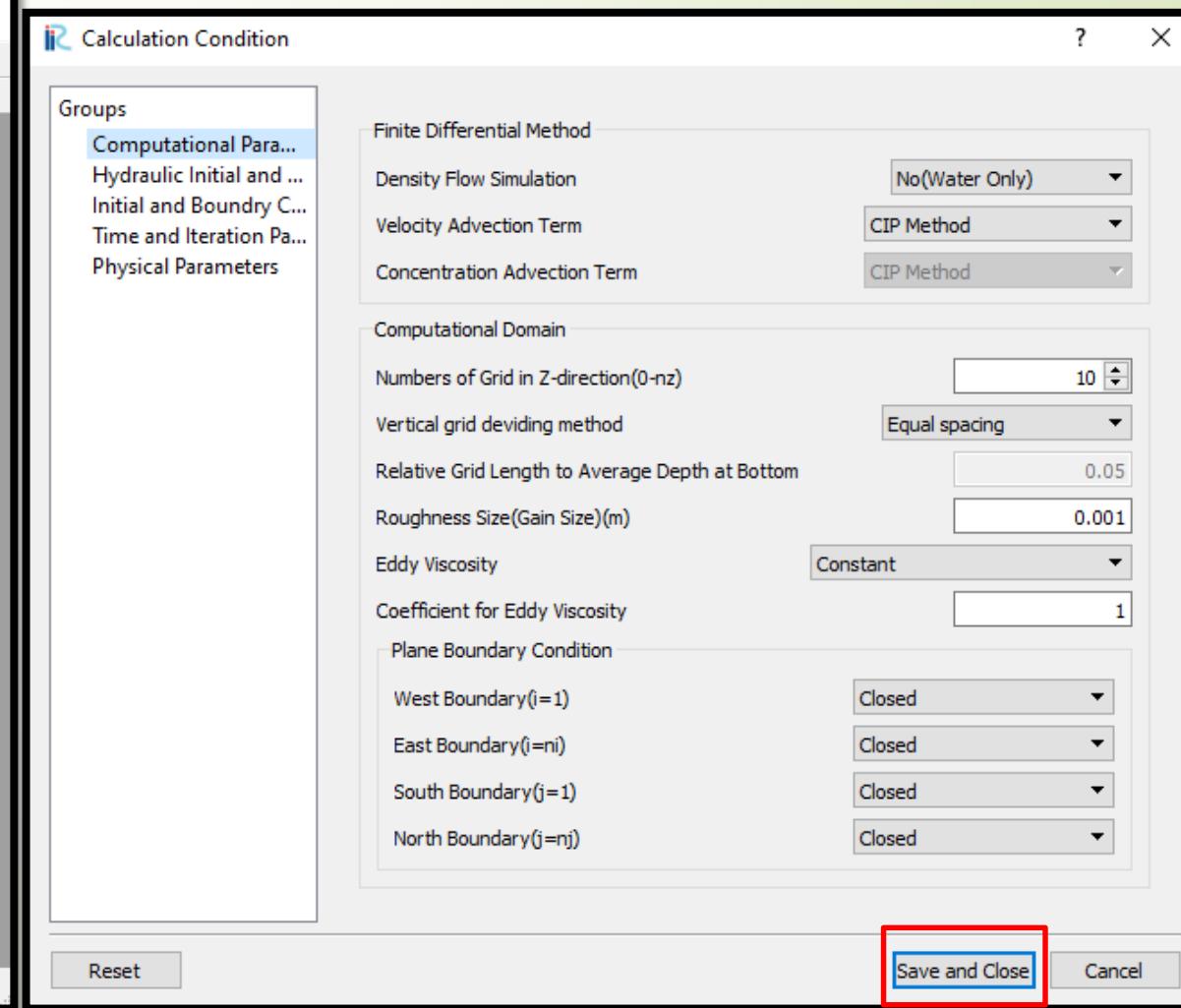
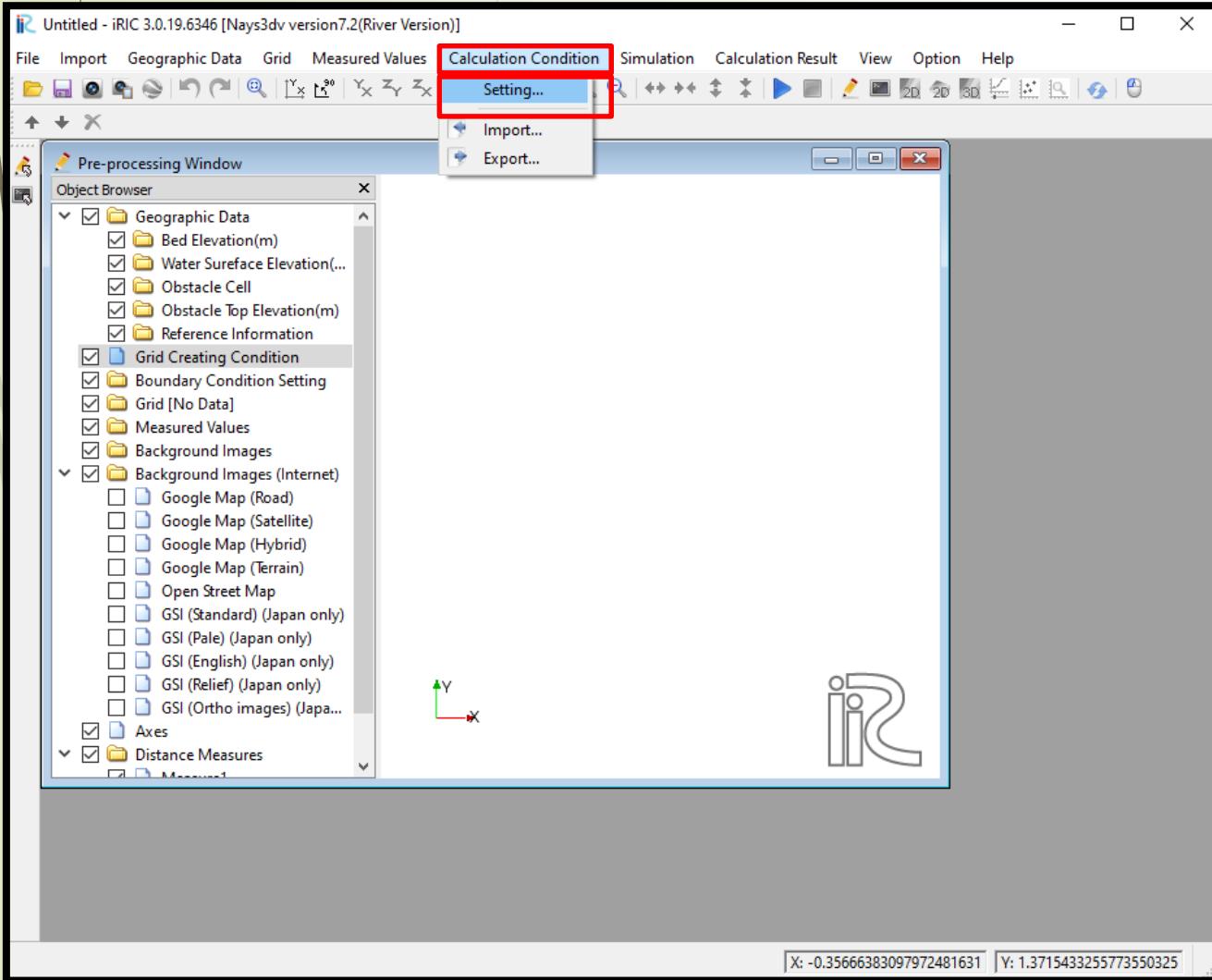
## 属性のマッピング



## 属性のマッピング チェック



# 計算条件の設定



# 計算条件の設定

Calculation Condition

Groups

- Computational Para...
- Hydraulic Boundary ...
- Initial and Boundry C...
- Time and Iteration Pa...
- Physical Parameters

Finite Differential Method

Density Flow Simulation: Yes(Density Flow)

Velocity Advection Term: CIP Method

Concentration Advection Term: CIP Method

Computational Domain

Numbers of Grid in Z-direction(0-nz): 20

vertical grid deviding method: Equal spacing

Relative Grid Length to Average Depth at Bottom: 0.05

Roughness Size(Gain Size)(m): 0.001

Eddy Viscosity: Constant

Coefficient for Eddy Viscosity: 1

Plane Boundary Condition

West Boundary(i=1): Closed

East Boundary(i=ni): Closed

South Boundary(j=1): Closed

North Boundary(j=nj): Closed

Save and Close Cancel

Reset

Calculation Condition

Groups

- Computational Parameters
- Hydraulic Initial and Boundary ...
- Initial and Boundry Concentrat...
- Time and Iteration Parameters
- Physical Parameters

Upstream Discharge Cndition

Discharge: Constant 0

Contant Discharge Value(m\*\*3/s): Edit

Discharge Hydrograph

Start time of discharge adjustment(sec): 100

Time to reach full discharge(sec): 500

Upstream Water Surface

Watersurface Condition: Constant 0

Watersurface Elevation Value(m): 0

Slope for upstream uniform flow computation: 0.005

Downstream(Eastern Boudary)

Water Surface Condition: Constant 0

Downstream(East) Watersurface Elevation(m): 0

Downstream Stage Oscillation Values

Amplitude(m): 0

Cycle Time(sec): 0

Start Time of Oscillation(sec): 0

Time to reach full oscillation(sec): 0

Time series of downstream water surface elevation: Edit

Initial Watersurface Condition

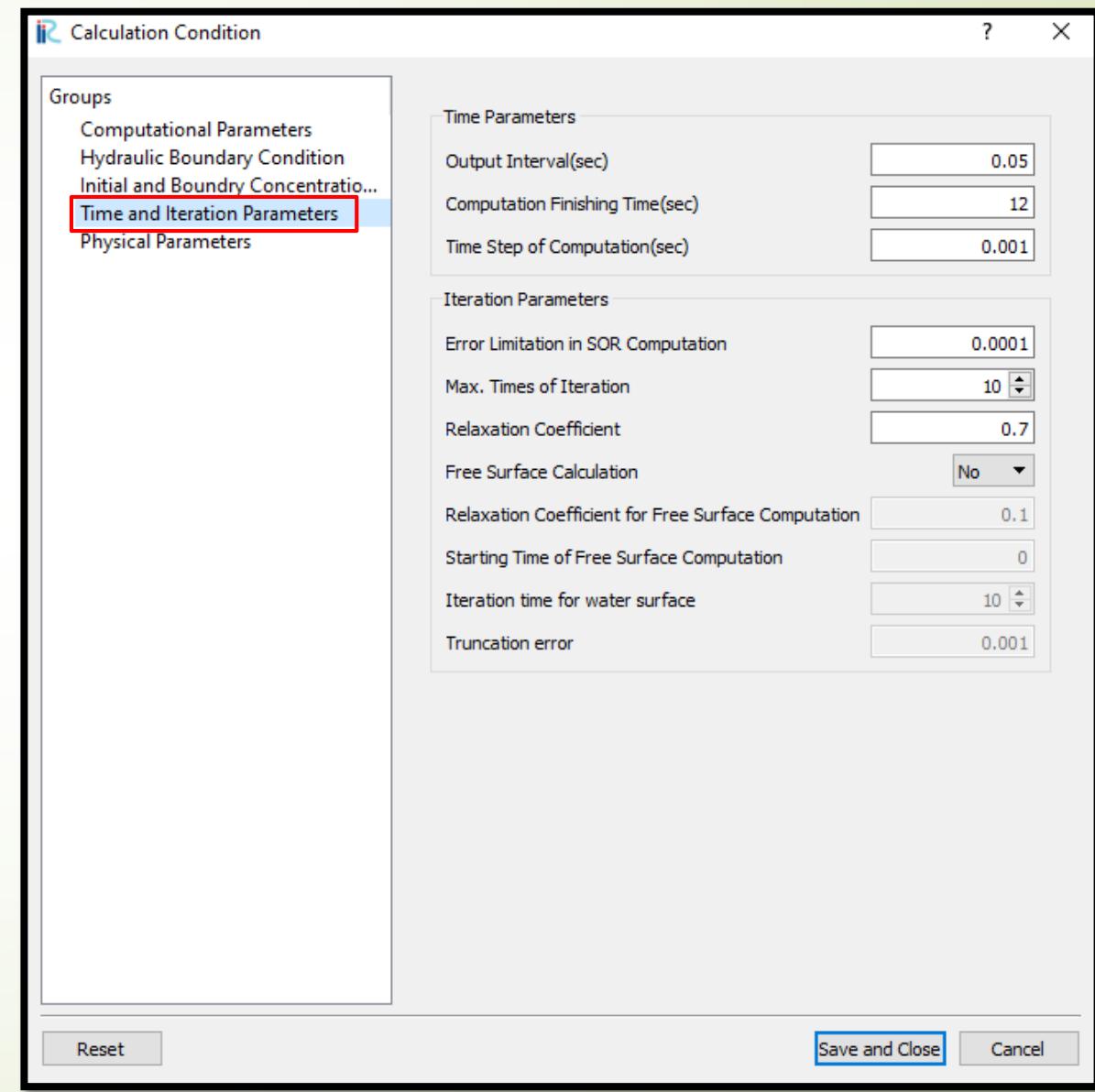
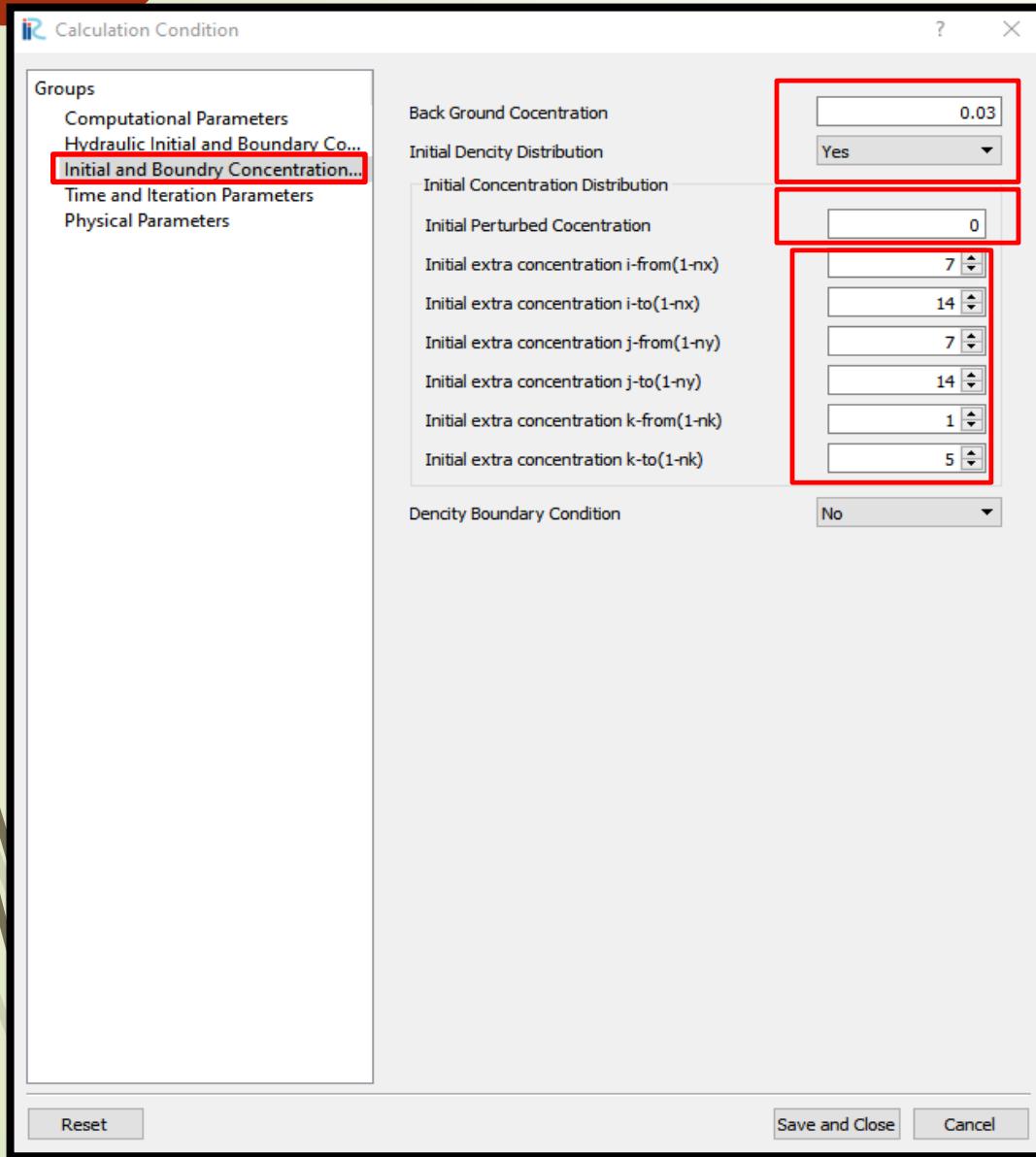
Initial Water Surface Profile: Horizontally Constant

Horizontally Constatnt Value(m): 0

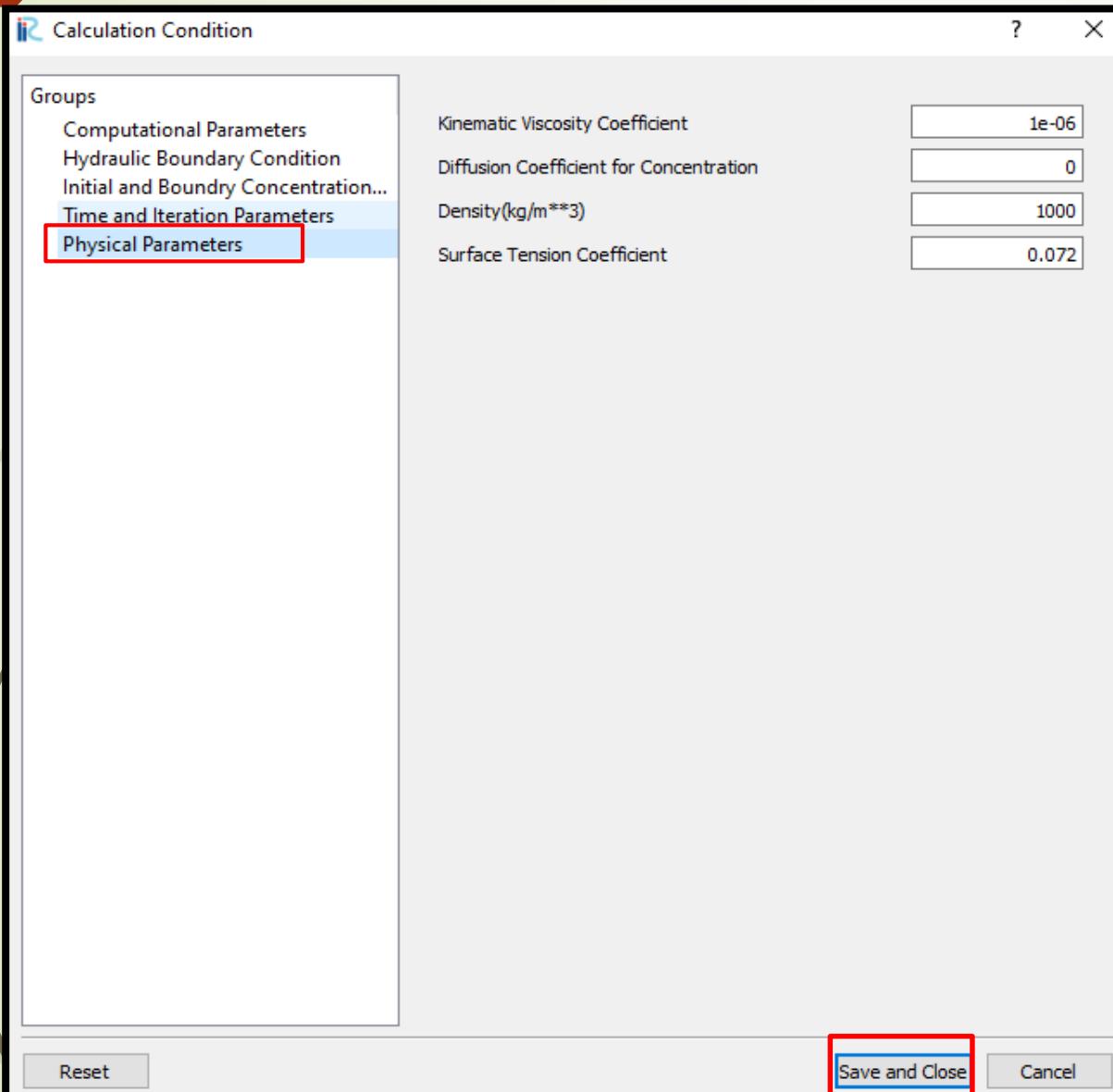
Save and Close Cancel

Reset

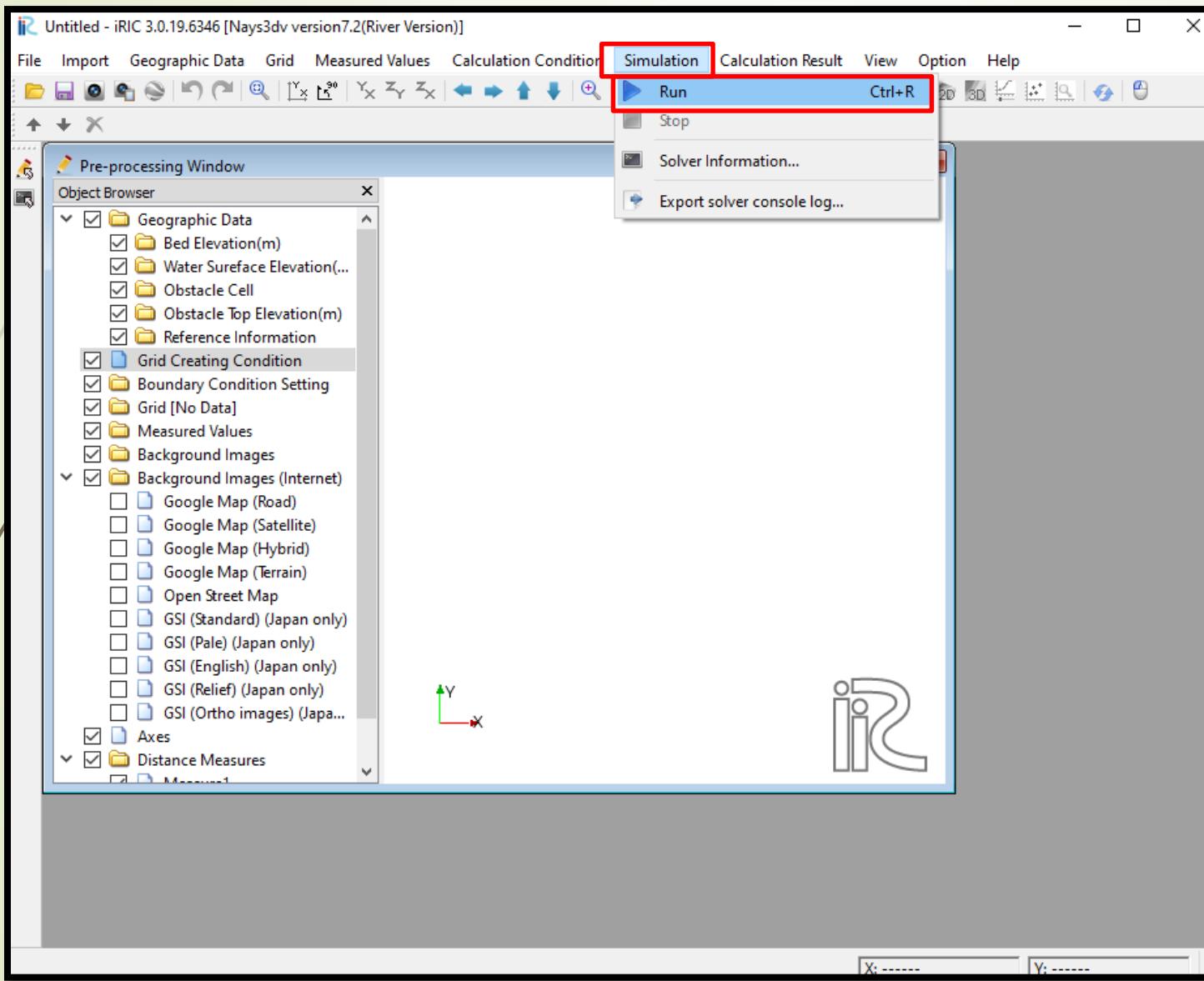
# 計算条件の設定



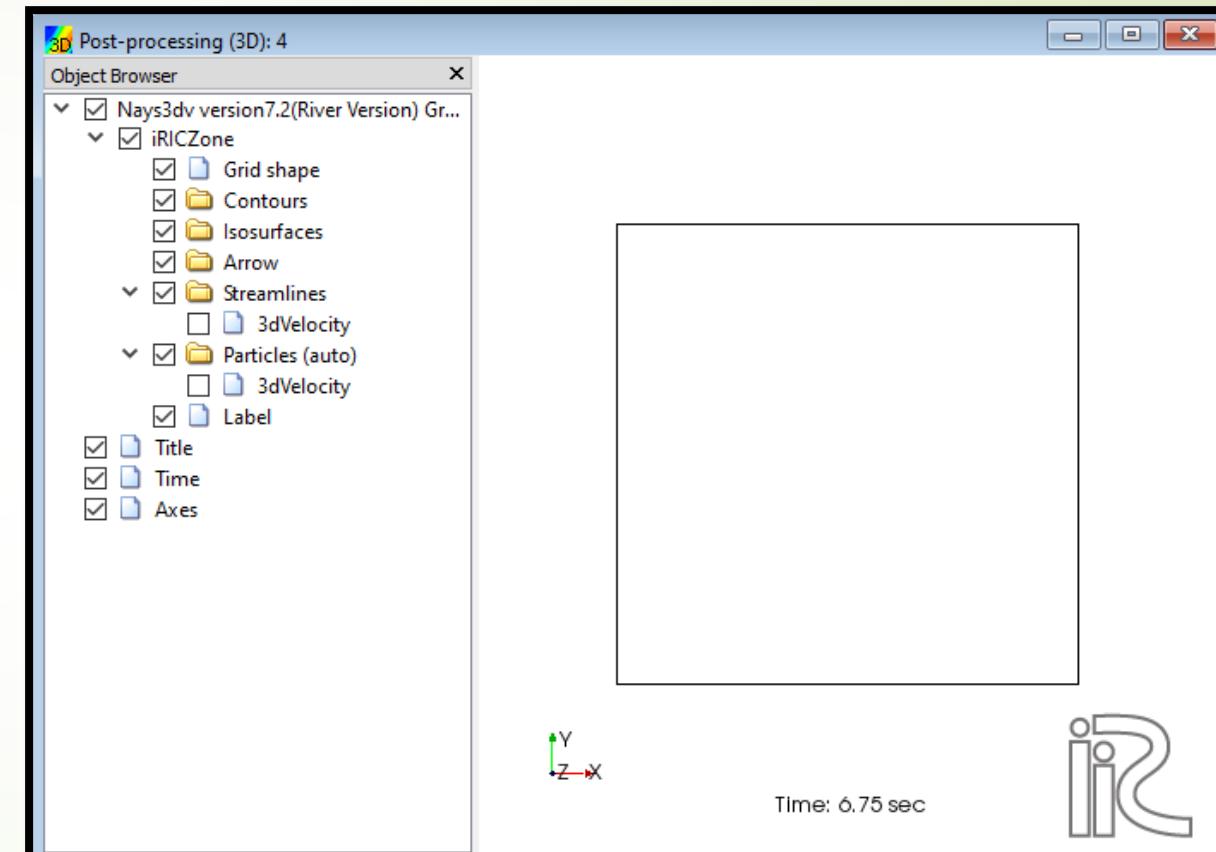
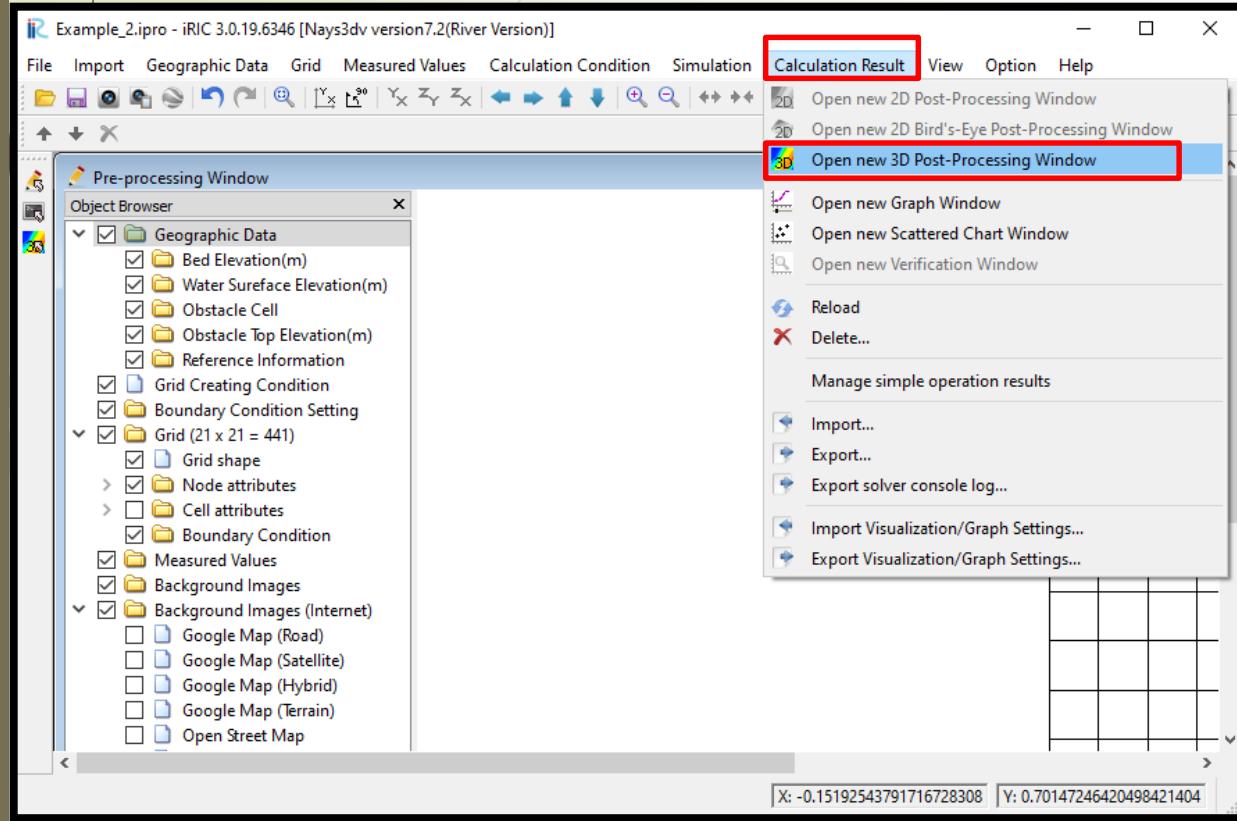
# 計算条件の設定



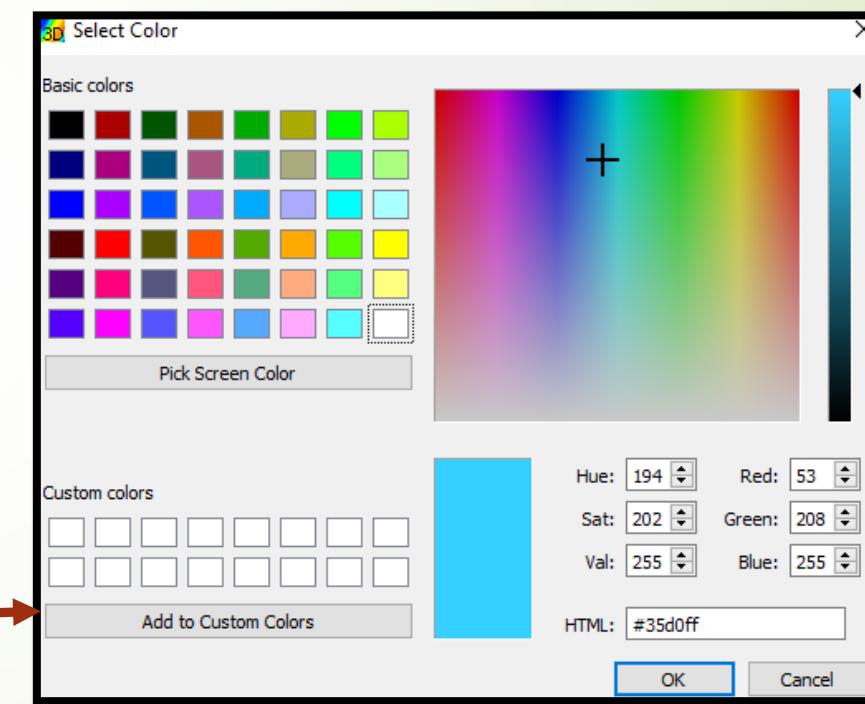
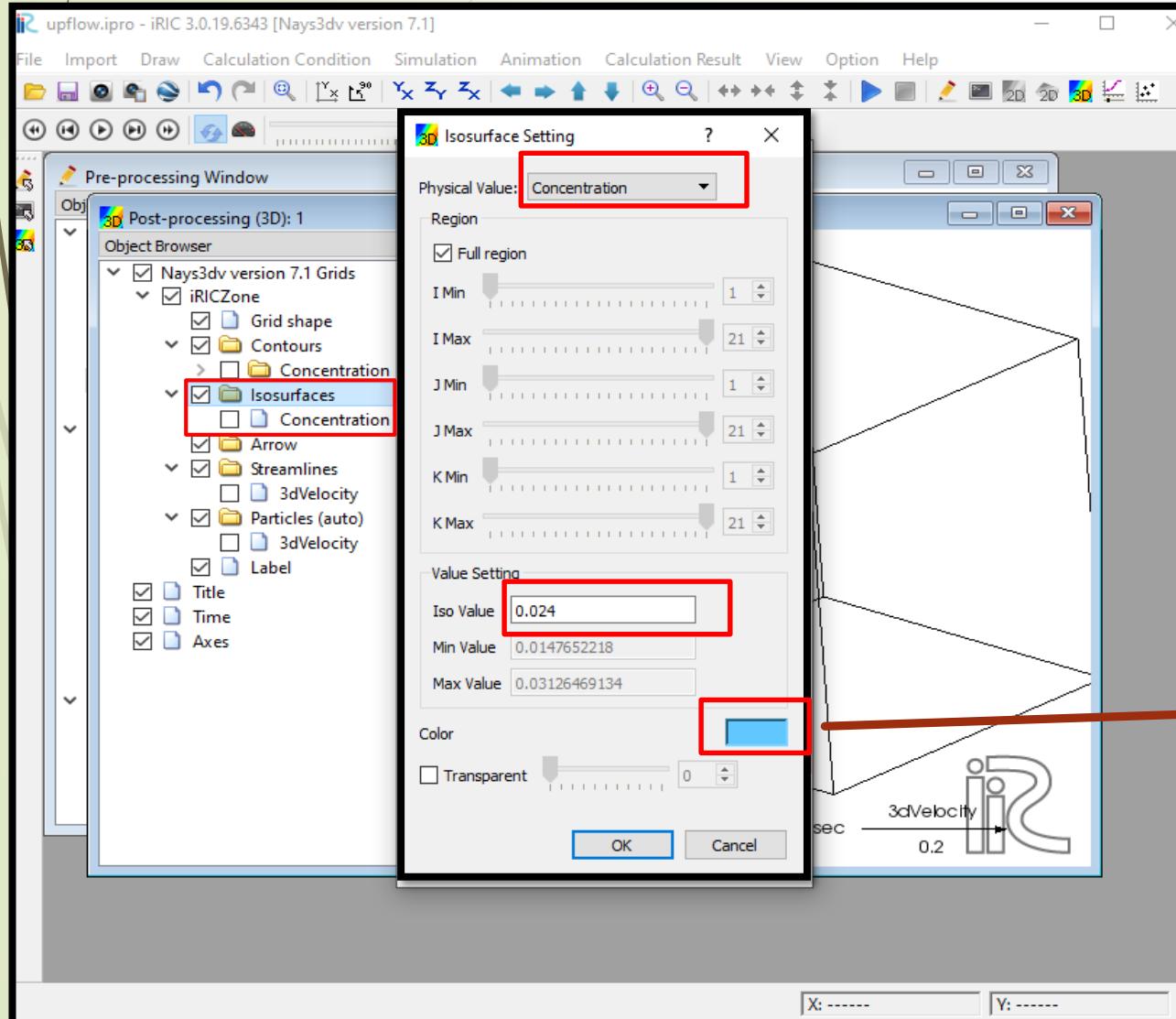
# 計算実行



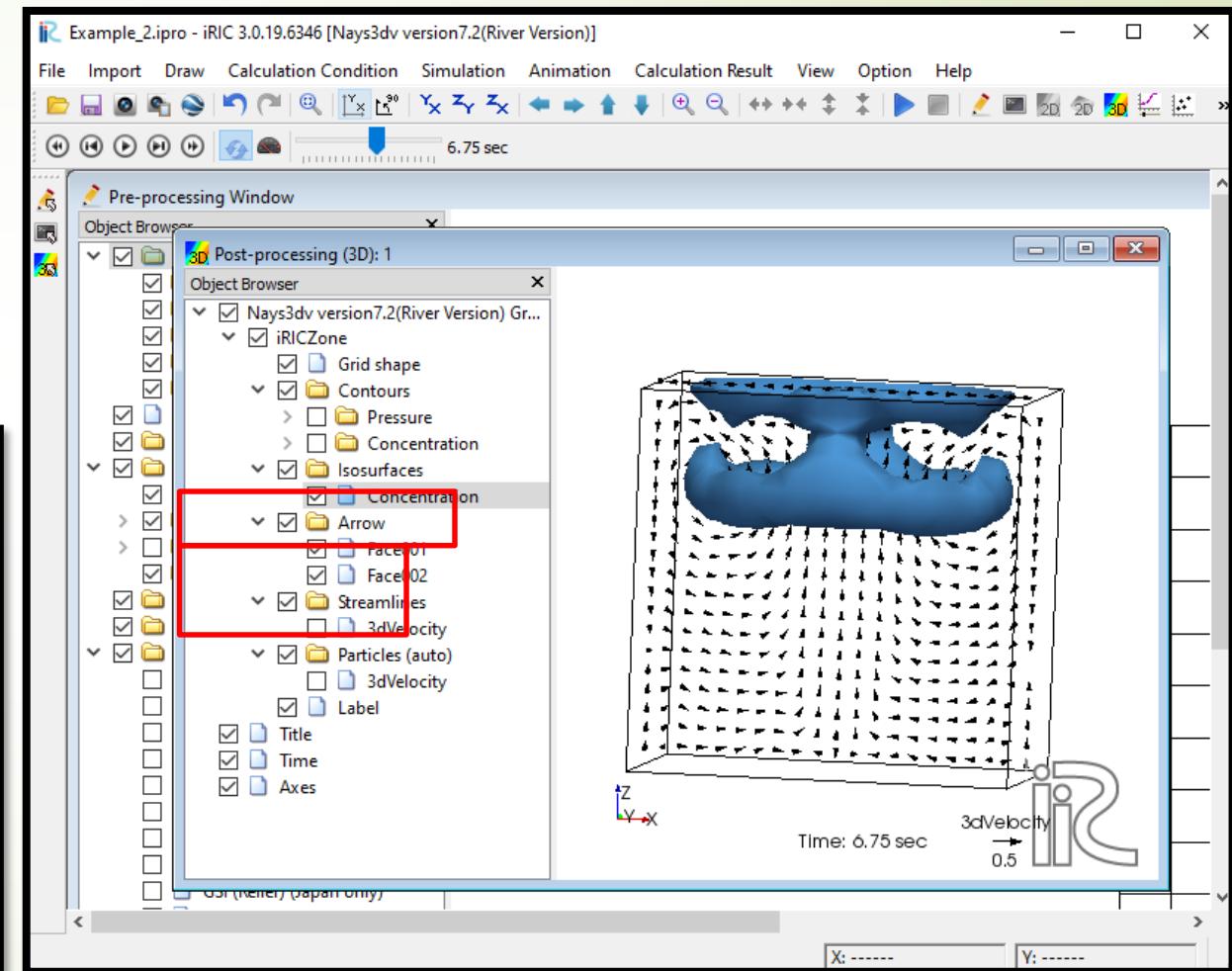
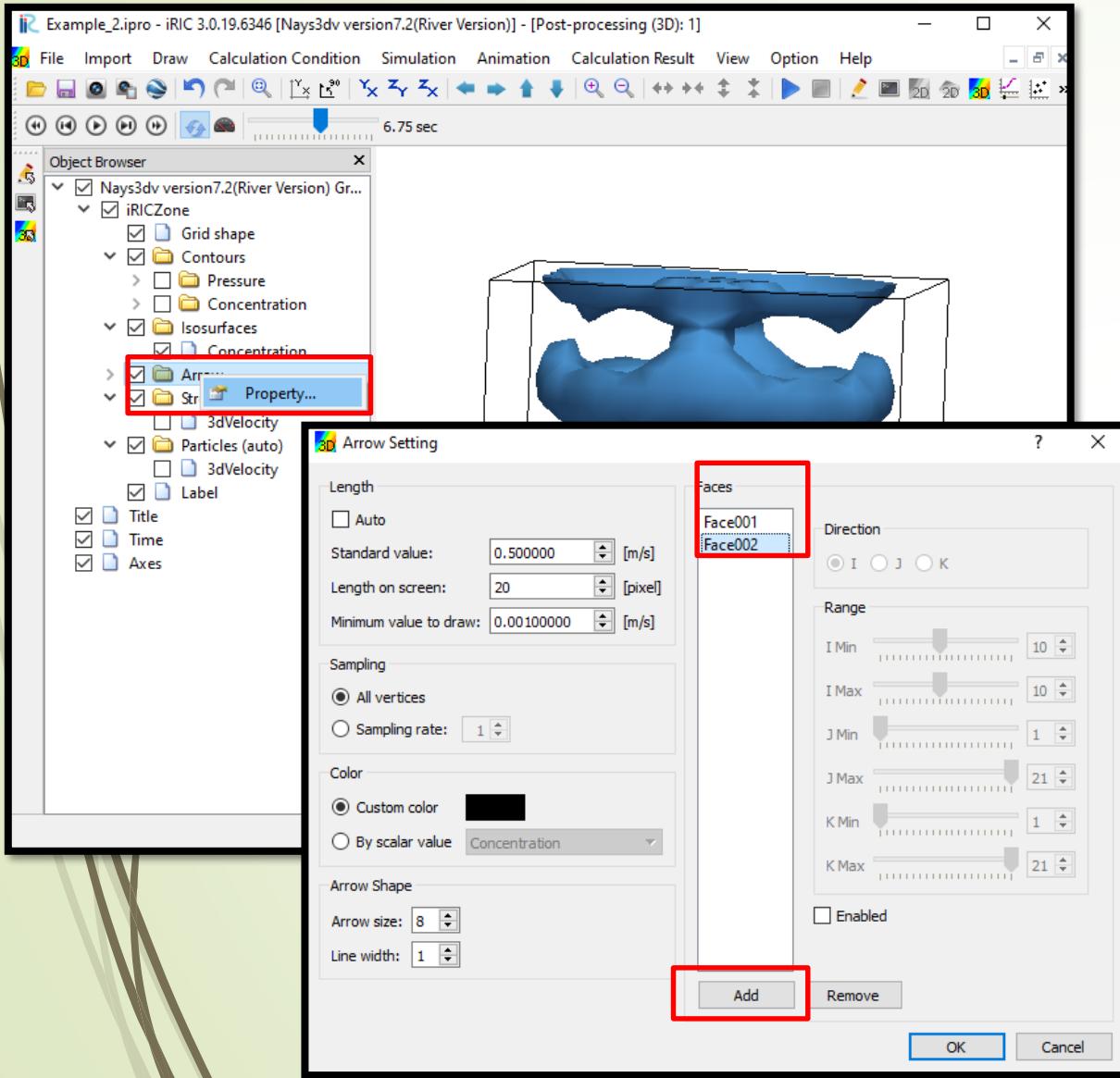
# 計算結果の可視化



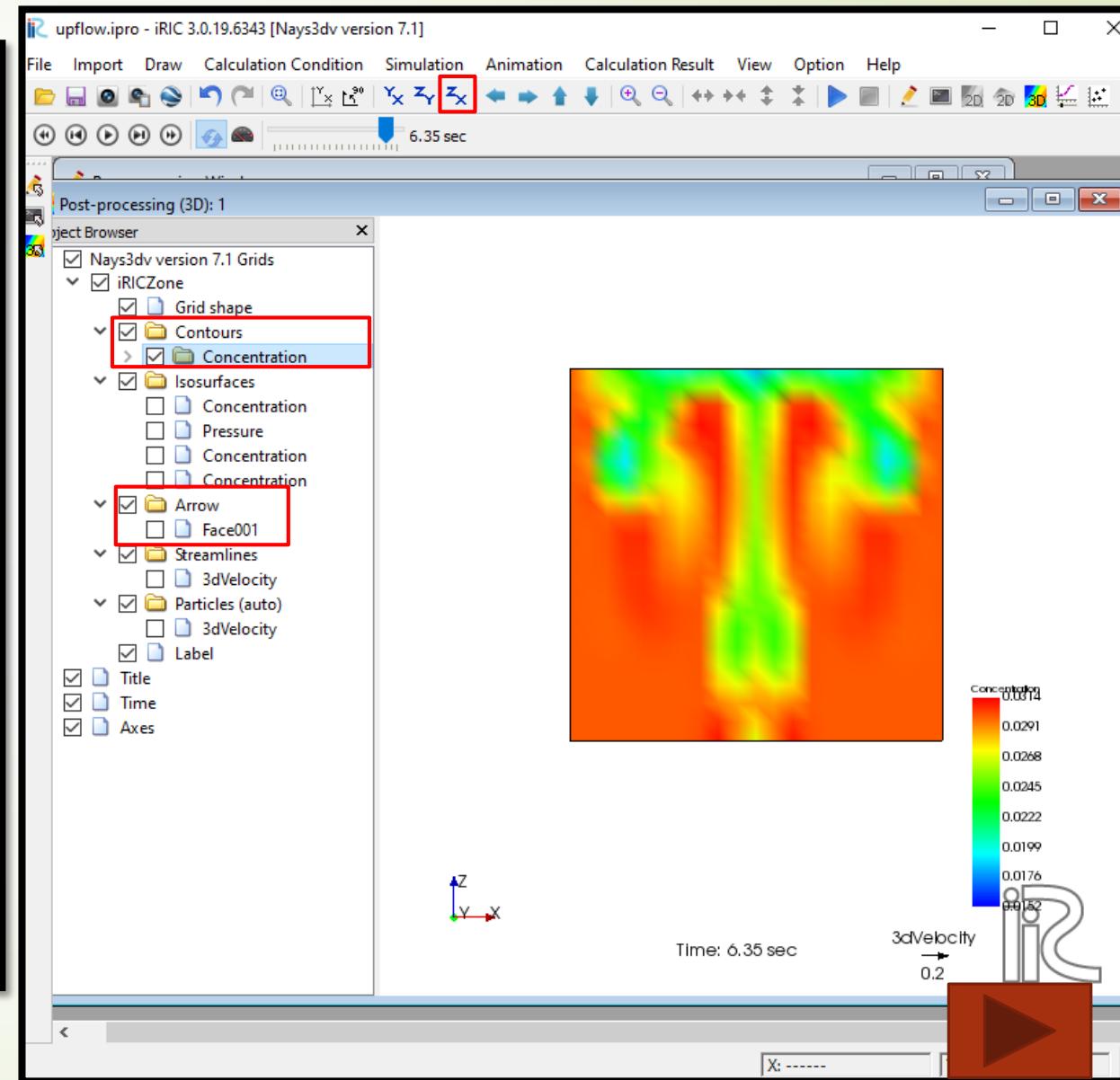
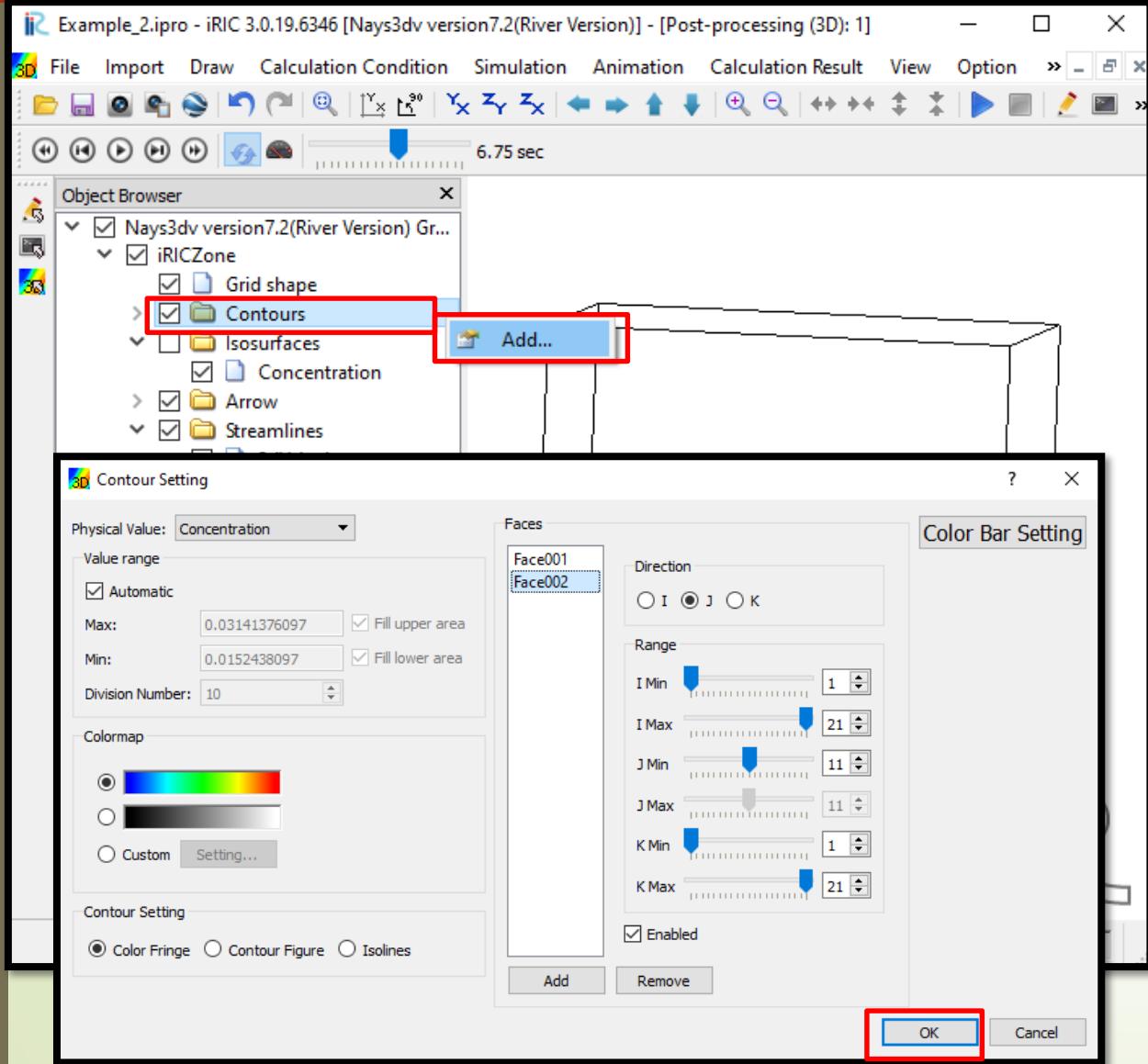
# 計算結果の可視化



# 計算結果の可視化



# 計算結果の可視化



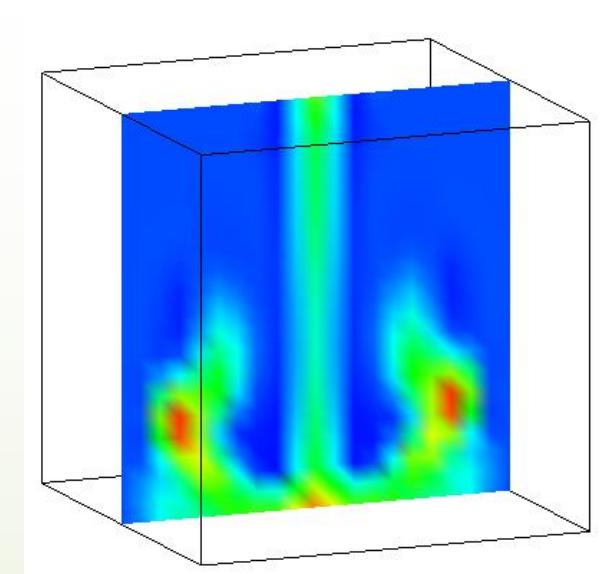
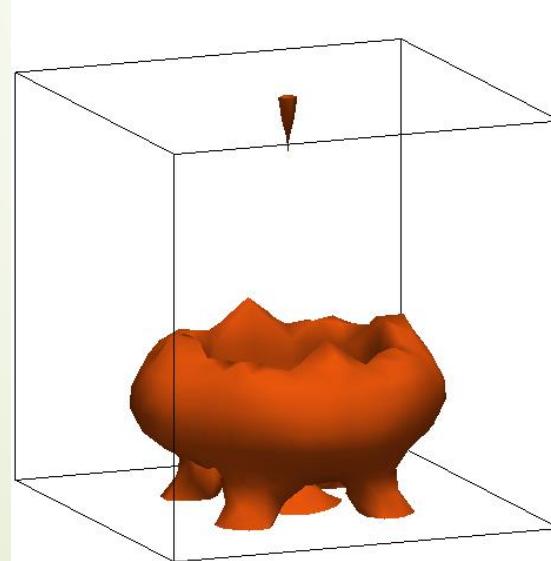
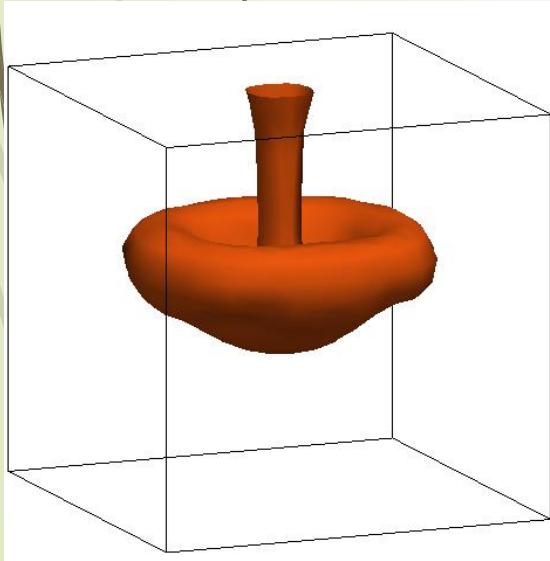
# Dropping a dense liquid inside a tank (濃い液体をタンク内に落とす)

## ▶ 目的

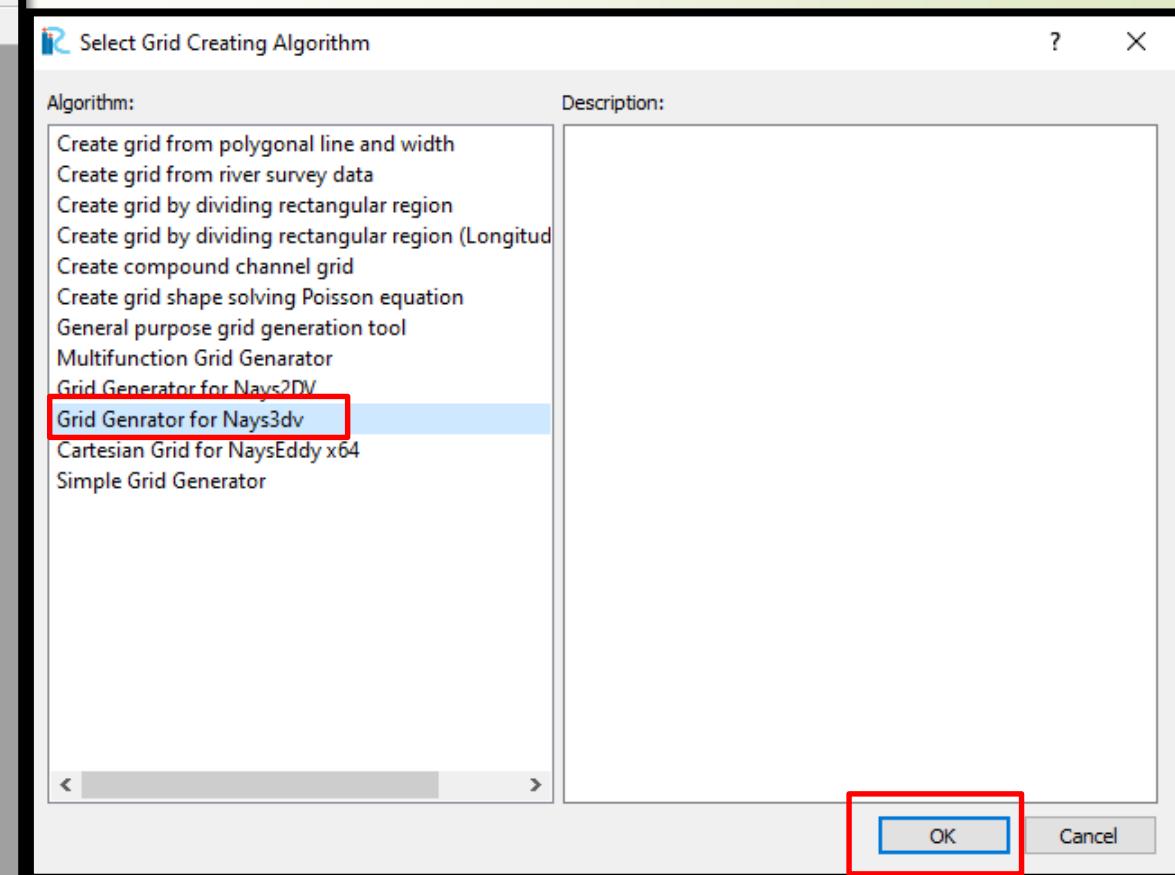
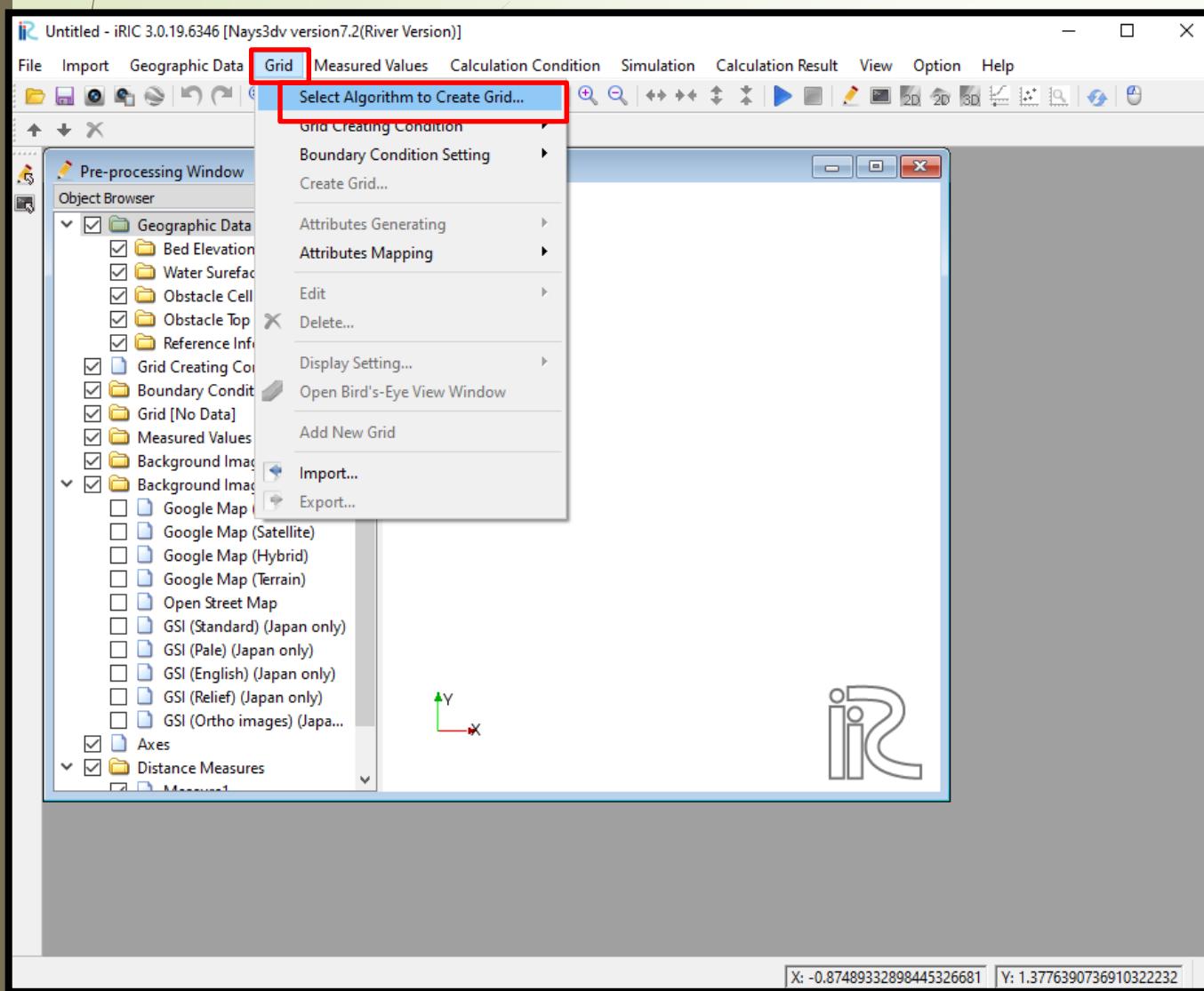
To check the flow patterns when a dense liquid dropped into a tank

## ▶ 概要

Grid creation, initial and boundary concentration setting, other calculation parameters setting, simulation, viewing results (iso surface of concentration, contours of concentration, velocity vectors )



# 計算格子の作成



# 計算格子の作成

Grid Creation

Groups

- Channel Shape
- Channel Bed Condition
- Grids Adding
- Width Variation
- Initial Water Surface ...

Select Channel Shape: Straight Channel or Cubic Box

Length in X or streamwise direction(m): 1

Number of Nodes in X Direction: 10

Meandering Channel

Wavelength of Meander(m): 3

Number of Nodes in One Wavelength: 20

Wave Number: 1

Meander Angle(degree): 40

Length in Y Direction or Width(m): 1

Number of Nodes in Y or Transvers Direction: 20

Channel Bed Slope: 0

Bed Elevation of Downstream End(m): -1

Parameters for Kinoshita Meander

Skewness of Kinoshita Meander: 0.03125

Flatness of Kinoshita Meander: 0.00521

Reset Create Grid Cancel

Grid Creation

Groups

- Channel Shape
- Channel Bed Condition
- Grids Adding
- Width Variation
- Initial Water Surface Profile

Downstream Depth(m): 1

Water Surface Slope: 0

Initial Water Surface Perturbation: None

Water Surface Perturbation Direction: x-direction

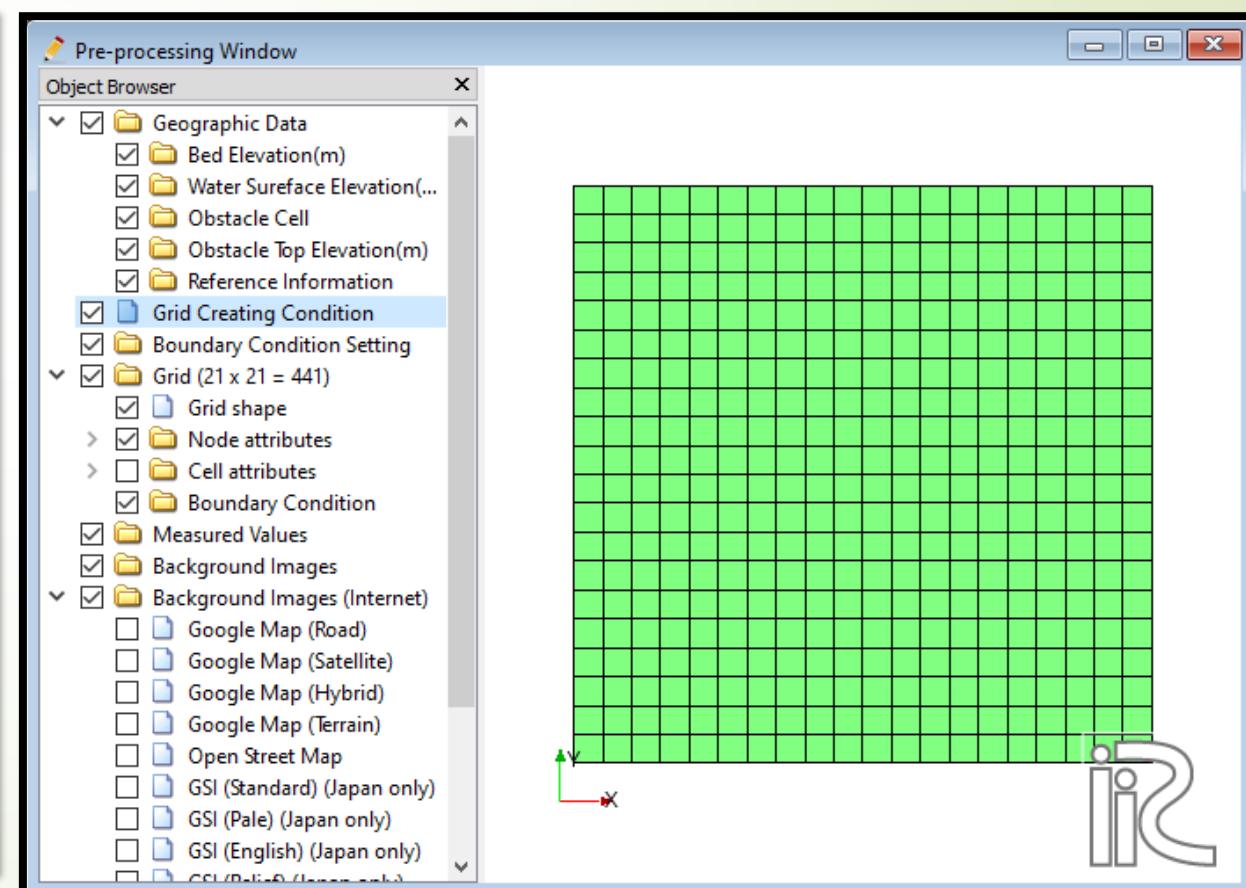
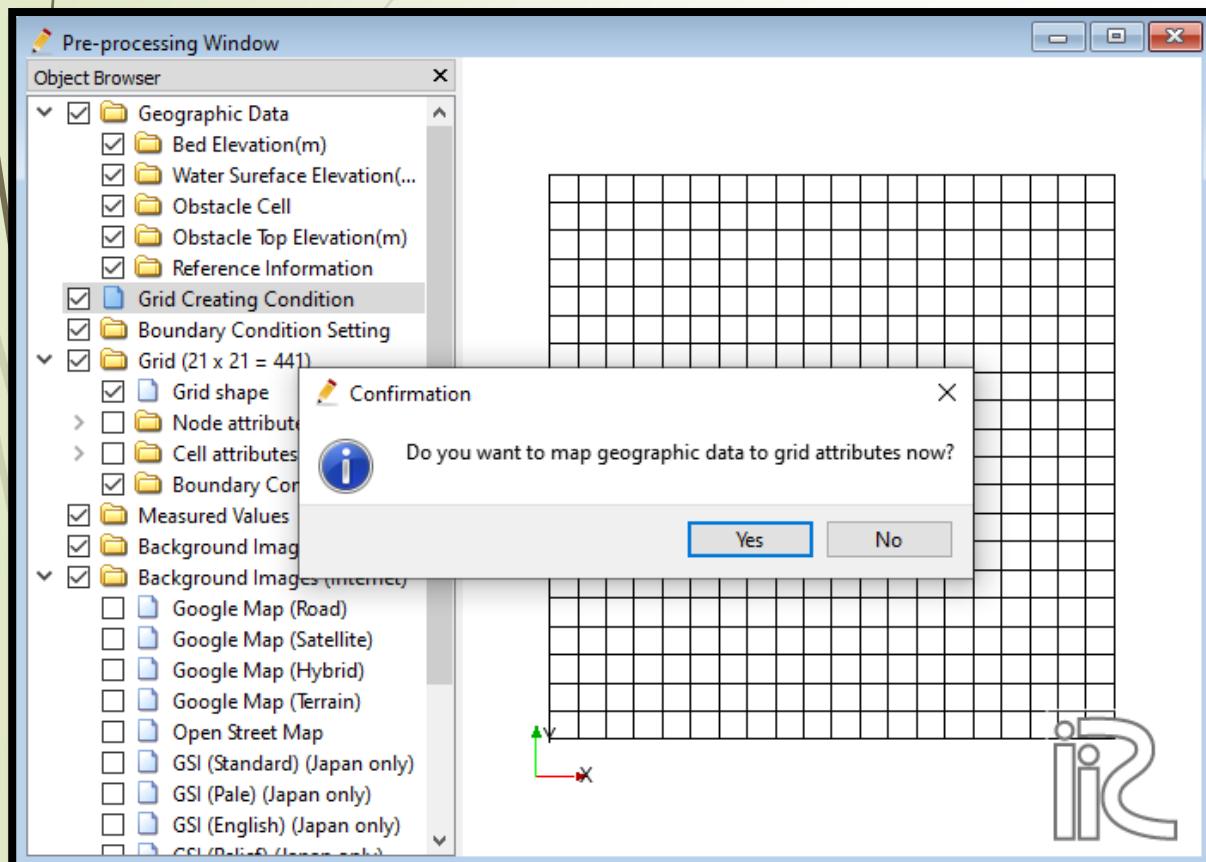
Amplitude of the perturbation(m): 0.01

Wavenumber of the perturbation(m): 1

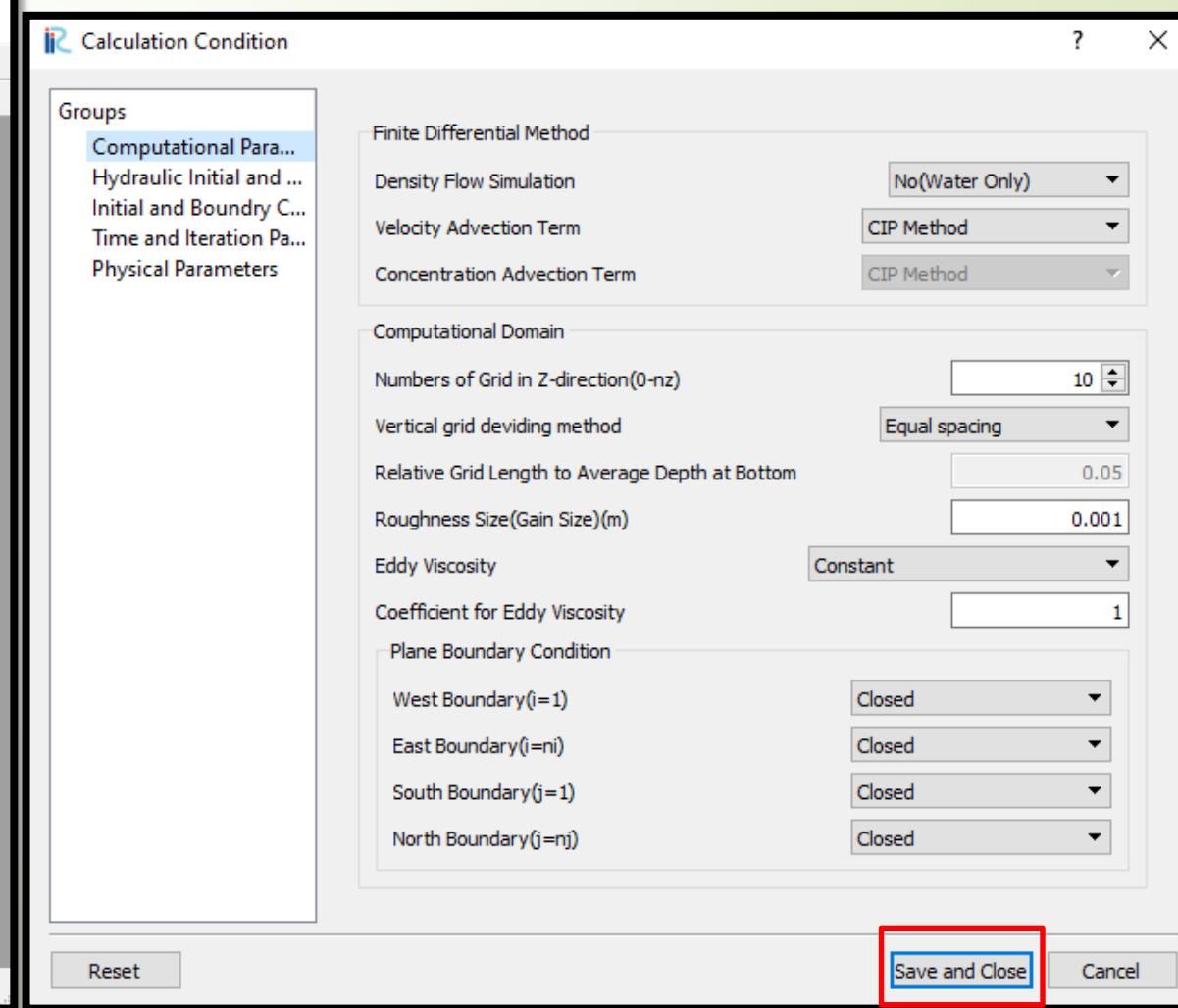
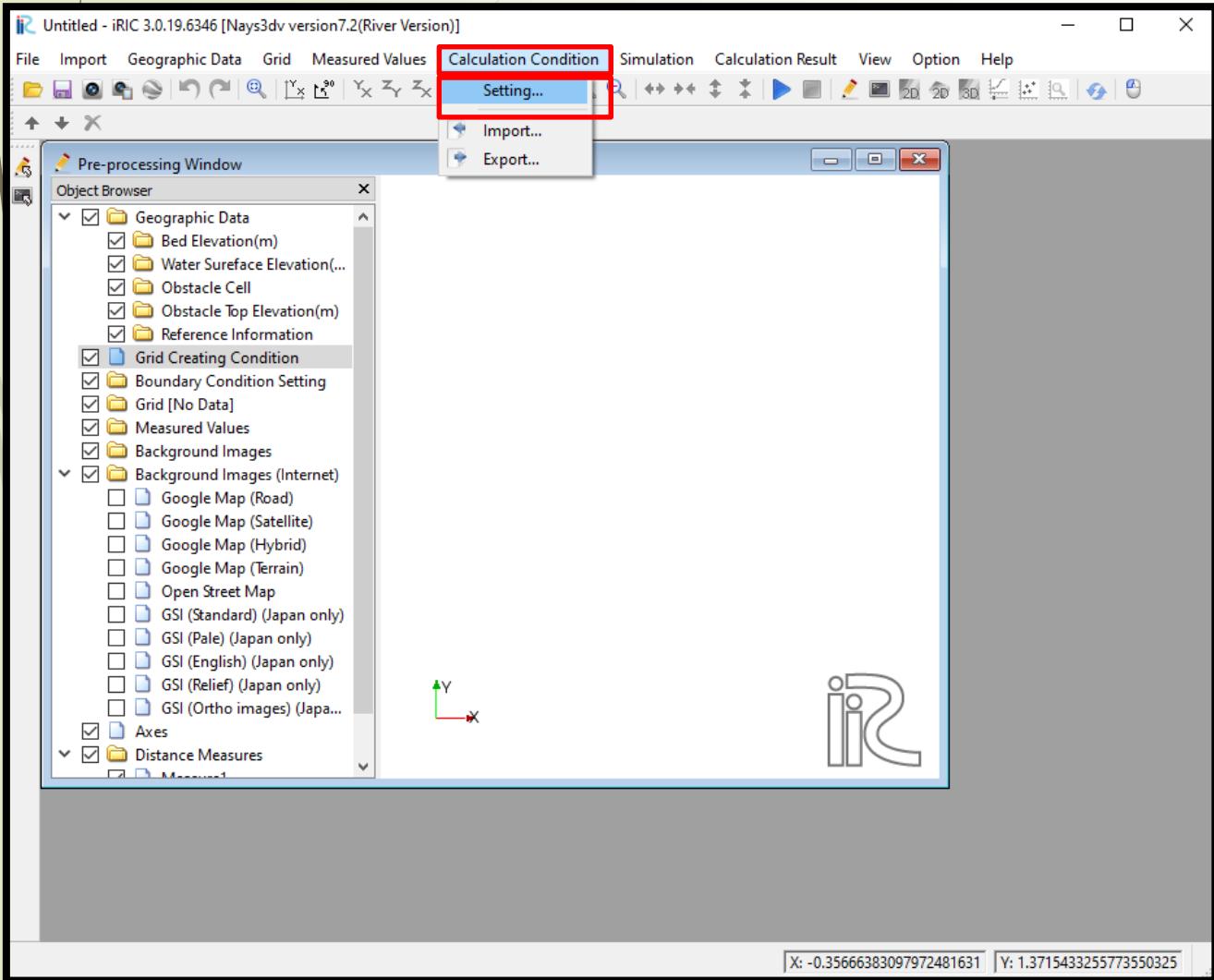
Reset Create Grid Cancel

# 計算格子の作成

## 属性のマッピング



# 計算条件の設定



# 計算条件の設定

Calculation Condition

Groups

- Computational Para...
- Hydraulic Boundary ...
- Initial and Boundary C...
- Time and Iteration Pa...
- Physical Parameters

Finite Differential Method

- Density Flow Simulation: Yes(Density Flow)
- Velocity Advection Term: CIP Method
- Concentration Advection Term: CIP Method

Computational Domain

- Numbers of Grid in Z-direction(0-nz): 20
- vertical grid deviding method: Equal spacing
- Relative Grid Length to Average Depth at Bottom: 0.05
- Roughness Size(Gain Size)(m): 0.001
- Eddy Viscosity: Constant (Value: 1)
- Coefficient for Eddy Viscosity: 1

Plane Boundary Condition

- West Boundary(i=1): Closed
- East Boundary(i=n): Closed
- South Boundary(j=1): Closed
- North Boundary(j=n): Closed

Reset Save and Close Cancel

Calculation Condition

Groups

- Computational Parameters
- Hydraulic Initial and Boundary ...
- Initial and Boundary Concentrat...
- Time and Iteration Parameters
- Physical Parameters

Upstream Discharge Cndition

- Discharge: Constant (Value: 0)
- Contant Discharge Value( $m^{**3}/s$ ): 0
- Discharge Hydrograph: Edit
- Start time of discharge adjustment(sec): 100
- Time to reach full discharge(sec): 500

Upstream Water Surface

- Watersurface Condition: Constant (Value: 0)
- Watersurface Elevation Value(m): 0
- Slope for upstream uniform flow computation: 0.005

Downstream(Eastern Boudary)

- Water Surface Condition: Constant (Value: 0)
- Downstream(East) Watersurface Elevation(m): 0
- Downstream Stage Oscillation Values

  - Amplitude(m): 0
  - Cycle Time(sec): 0
  - Start Time of Oscillation(sec): 0
  - Time to reach full oscillation(sec): 0
  - Time series of downstream water surface elevation: Edit

Initial Watersurface Condition

- Initial Water Surface Profile: Horizontally Constant
- Horizontally Constant Value(m): 0

Reset Save and Close Cancel

# 計算条件の設定

Calculation Condition

Groups

- Computational Parameters
- Hydraulic Boundary Condition
- Initial and Boundary Concentration...**
- Time and Iteration Parameters
- Physical Parameters

Back Ground Concentration: 0.03

Initial Density Distribution: Yes

Initial Concentration Distribution:

- Initial Perturbed Concentration: 0.05
- Initial extra concentration i-from(1-nx): 7
- Initial extra concentration i-to(1-nx): 14
- Initial extra concentration j-from(1-ny): 7
- Initial extra concentration j-to(1-ny): 14
- Initial extra concentration k-from(1-nk): 15
- Initial extra concentration k-to(1-nk): 20

Density Boundary Condition: Yes

Save and Close Cancel

Calculation Condition

Groups

- Computational Parameters
- Hydraulic Boundary Condition
- Initial and Boundary Concentration...
- Time and Iteration Parameters**
- Physical Parameters

Time Parameters

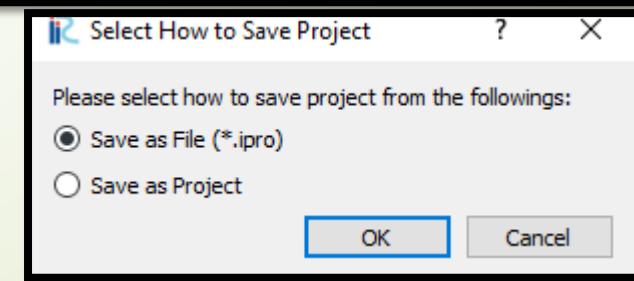
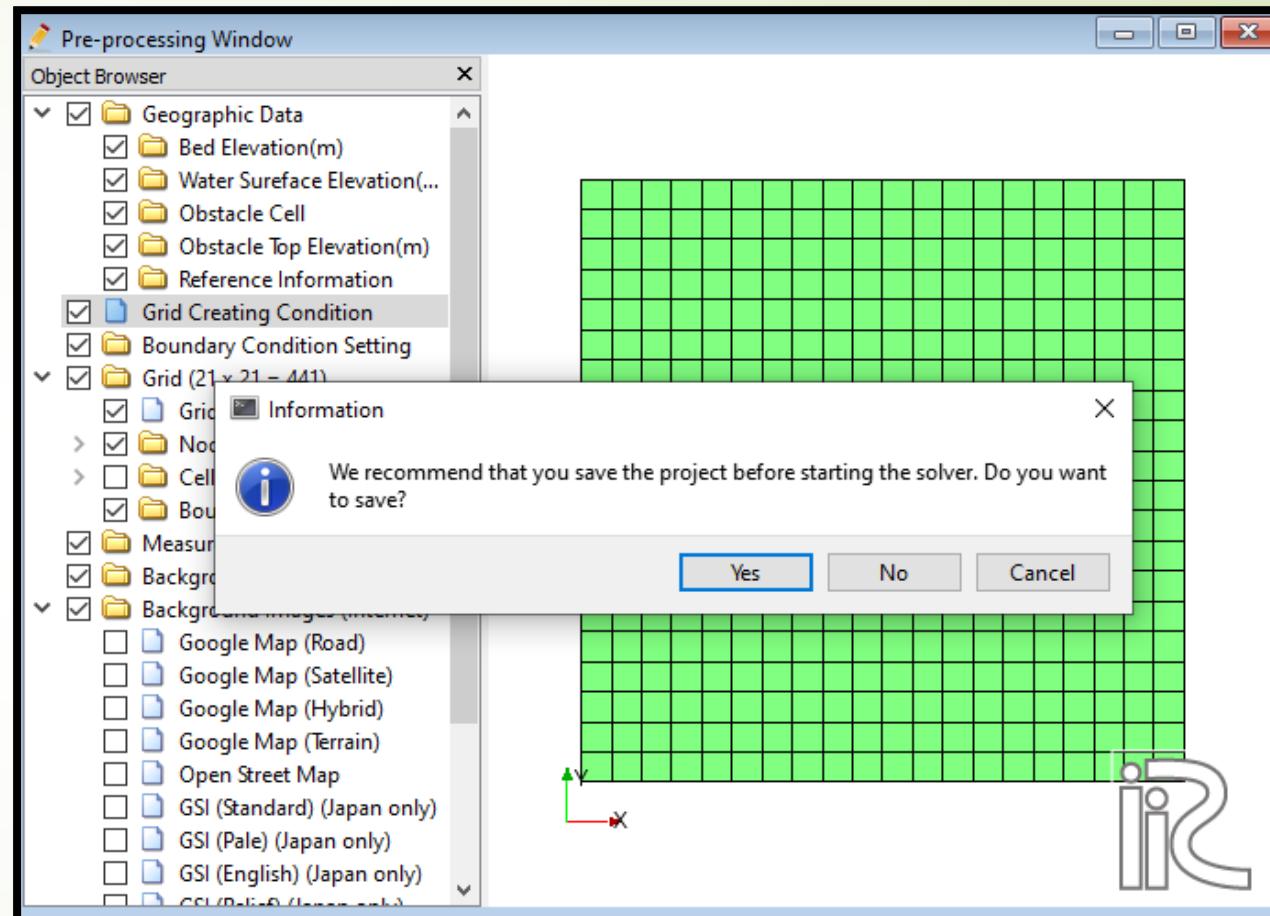
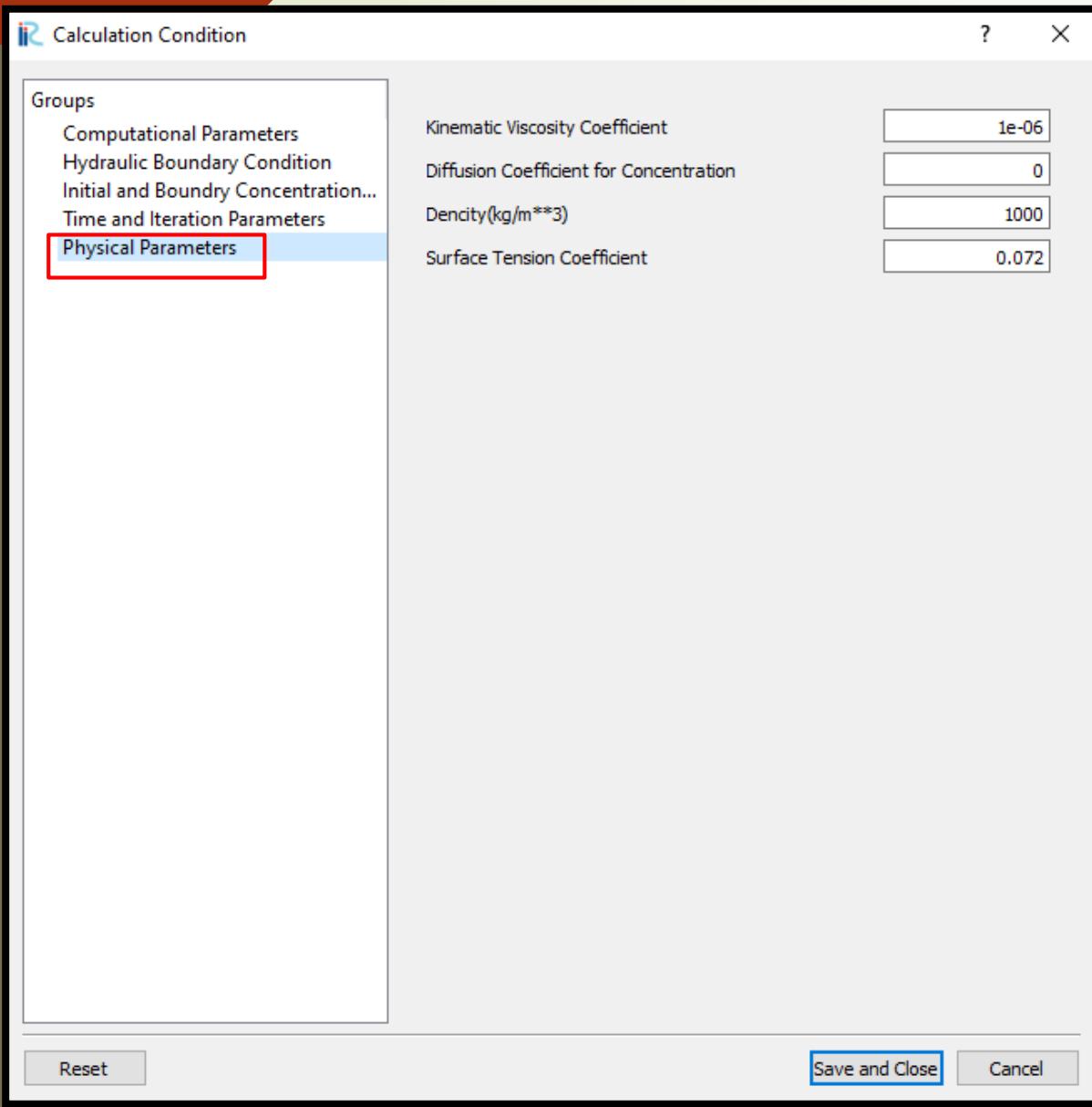
- Output Interval(sec): 0.05
- Computation Finishing Time(sec): 12
- Time Step of Computation(sec): 0.001

Iteration Parameters

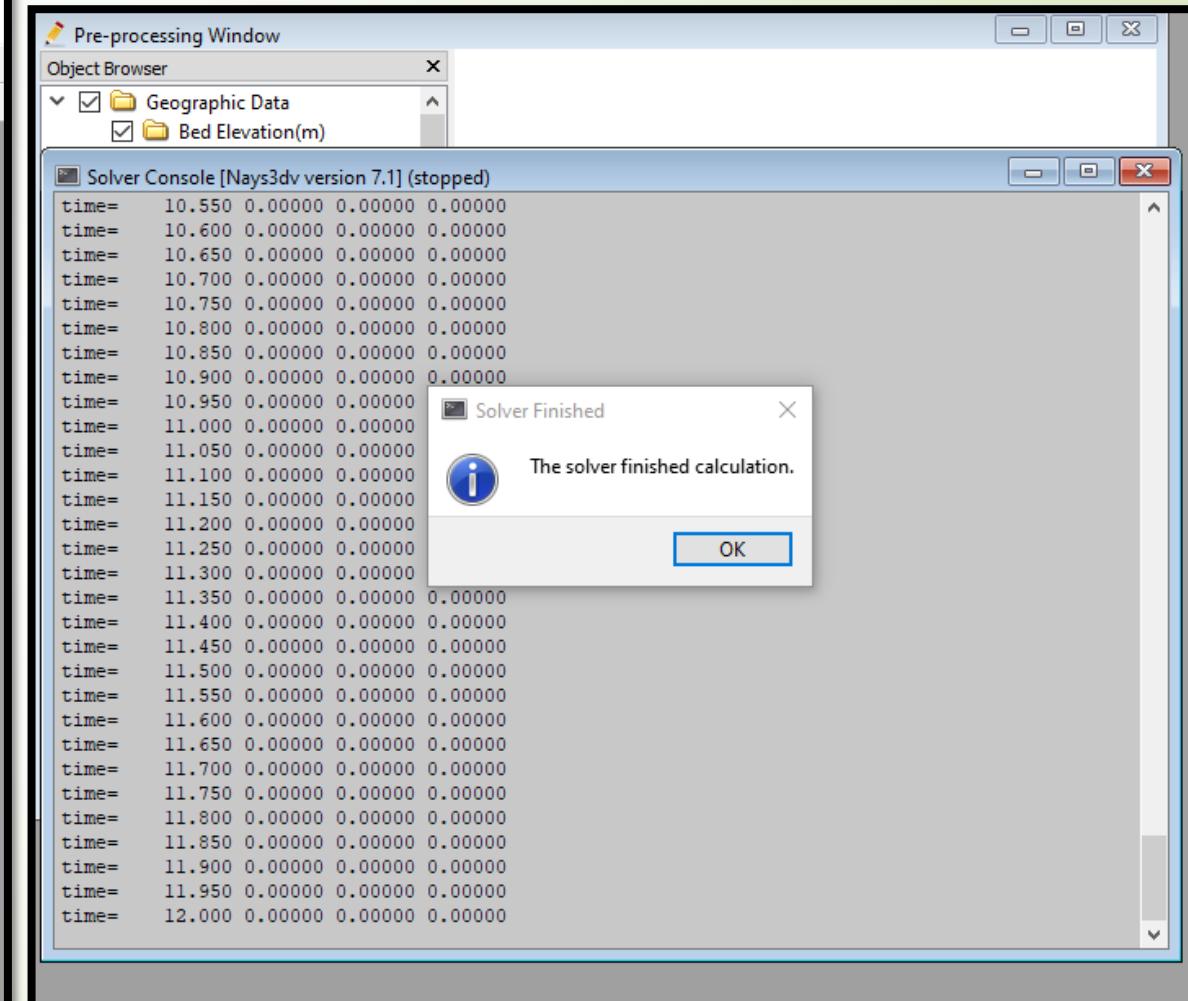
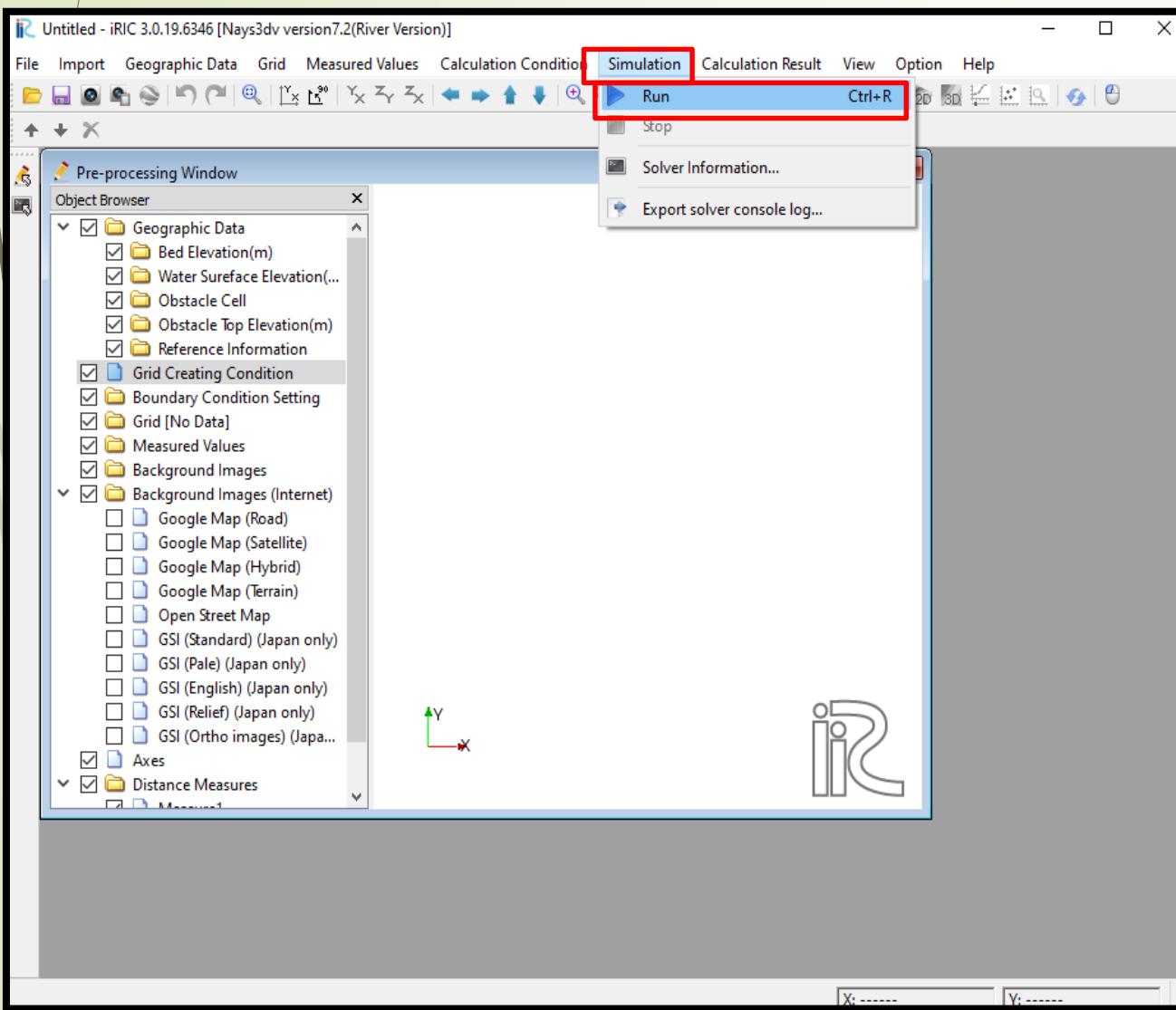
- Error Limitation in SOR Computation: 0.0001
- Max. Times of Iteration: 10
- Relaxation Coefficient: 0.7
- Free Surface Calculation: No
- Relaxation Coefficient for Free Surface Computation: 0.1
- Starting Time of Free Surface Computation: 0
- Iteration time for water surface: 10
- Truncation error: 0.001

Reset Save and Close Cancel

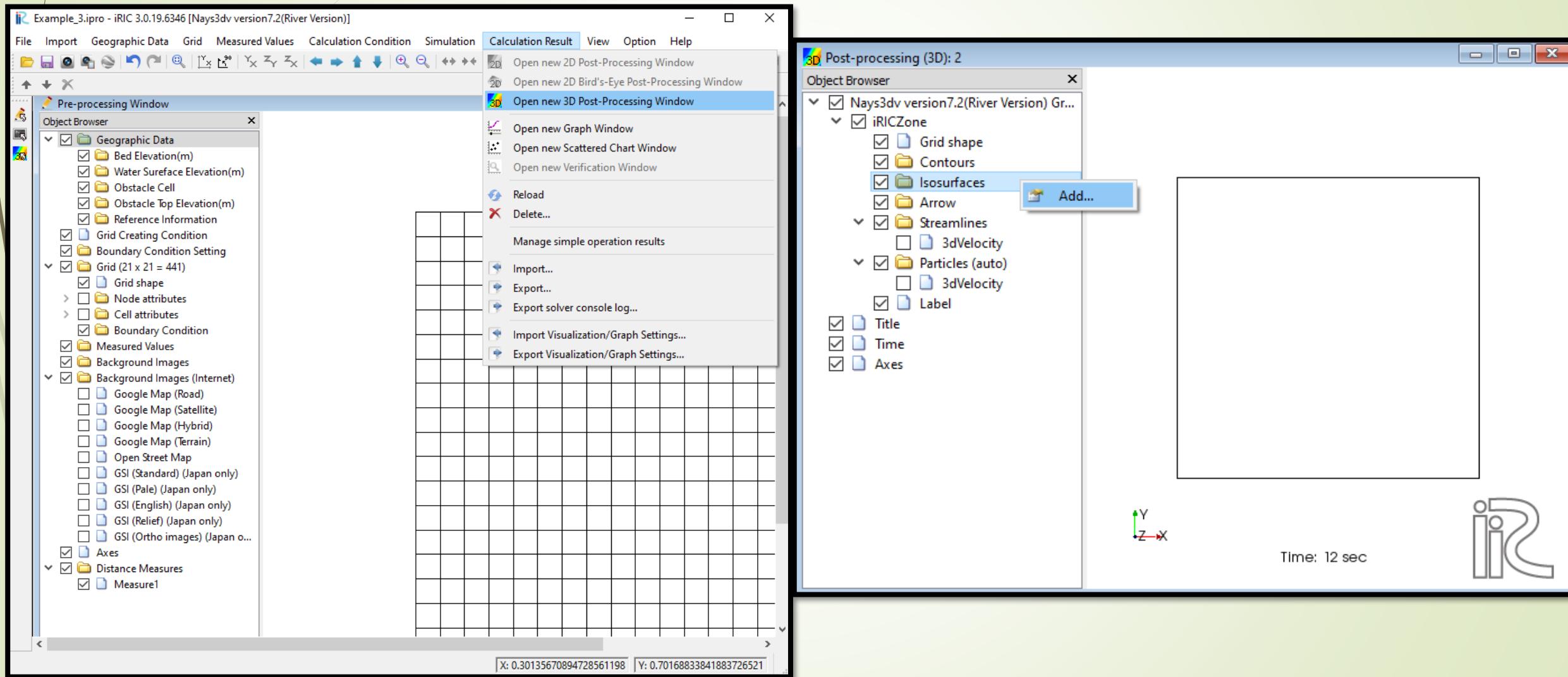
# 計算条件の設定



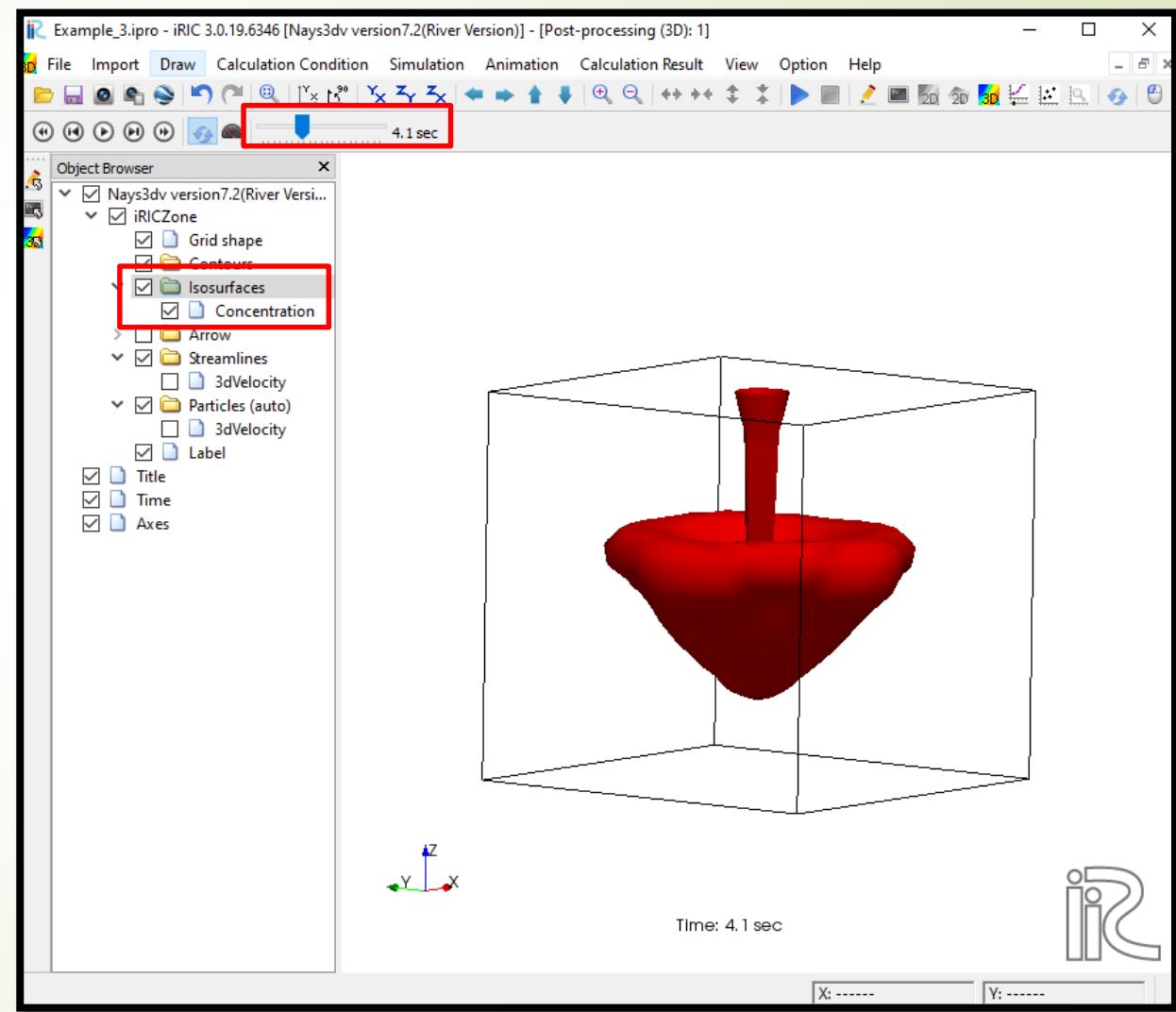
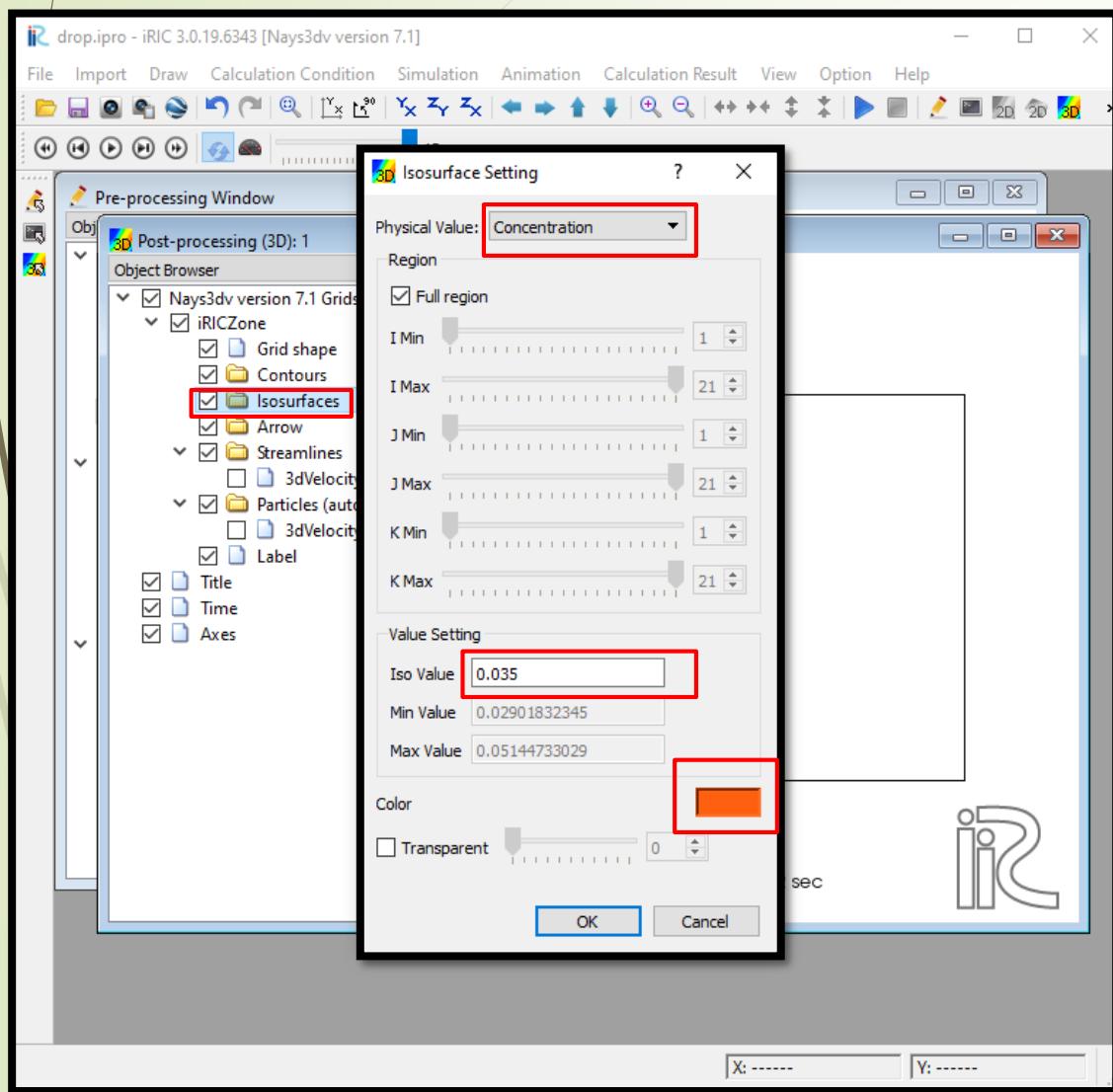
# 計算実行



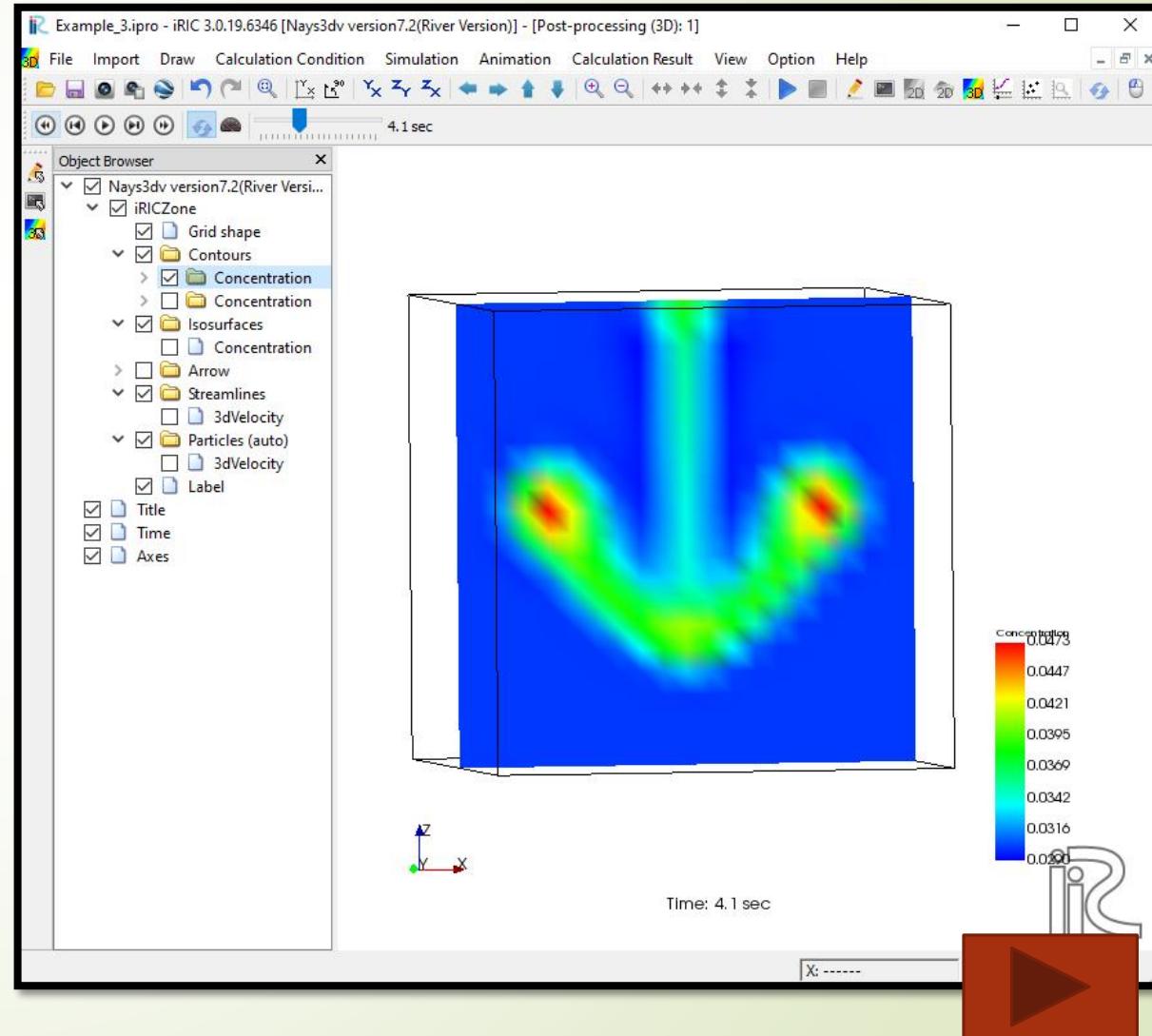
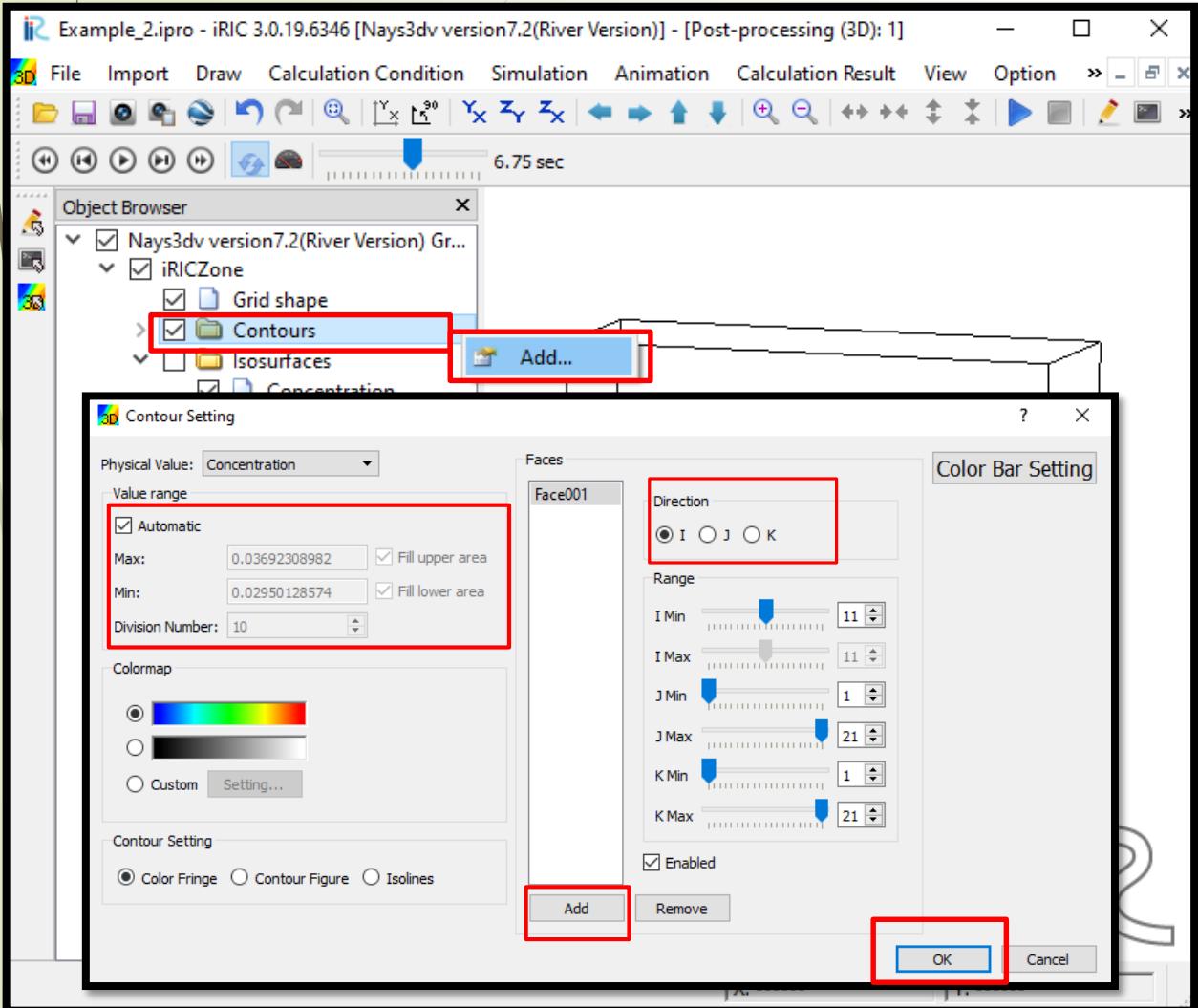
# 計算結果の可視化



# 計算結果の可視化



# 計算結果の可視化



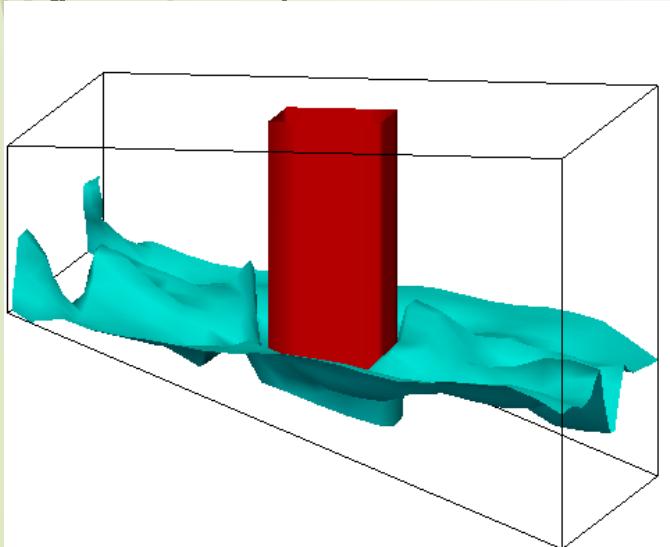
# Rectangular channel with an obstacle (障害物のあるチャネル)

## ▶ 目的

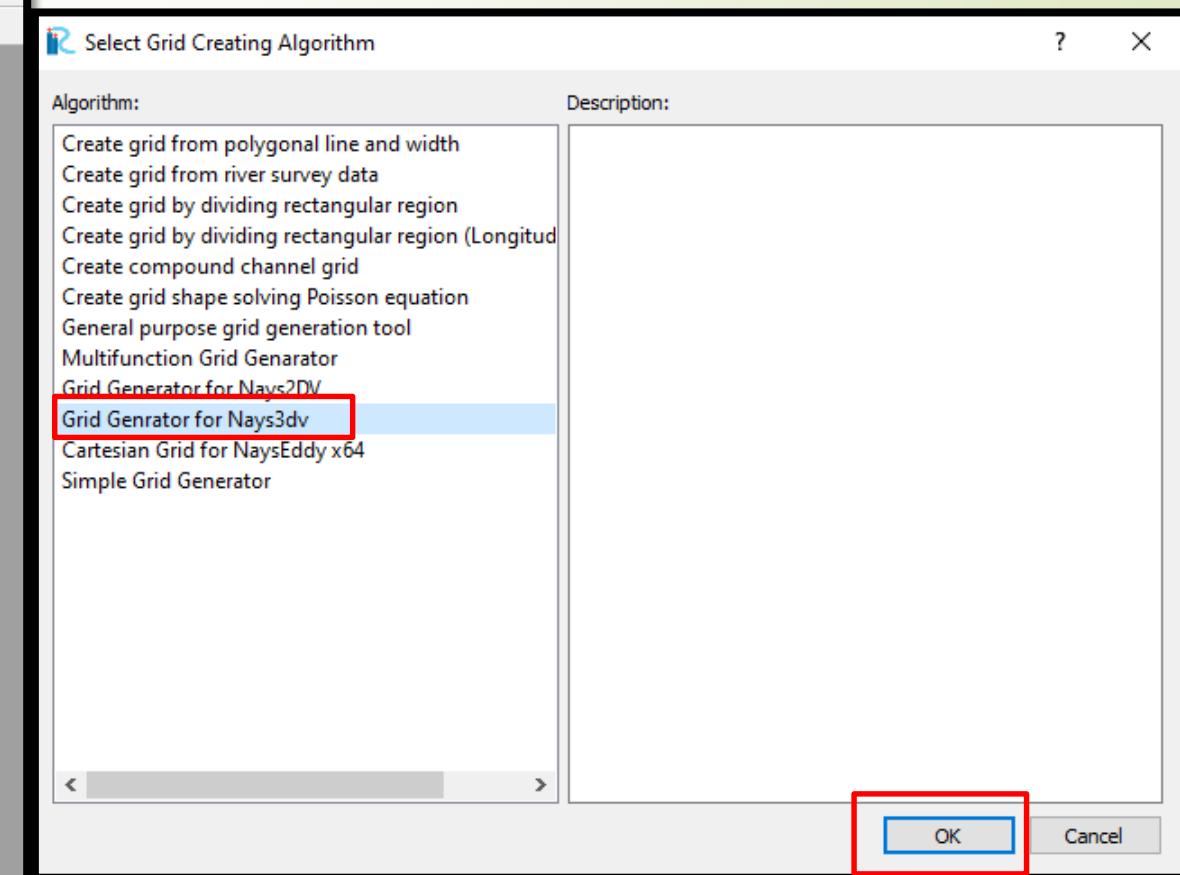
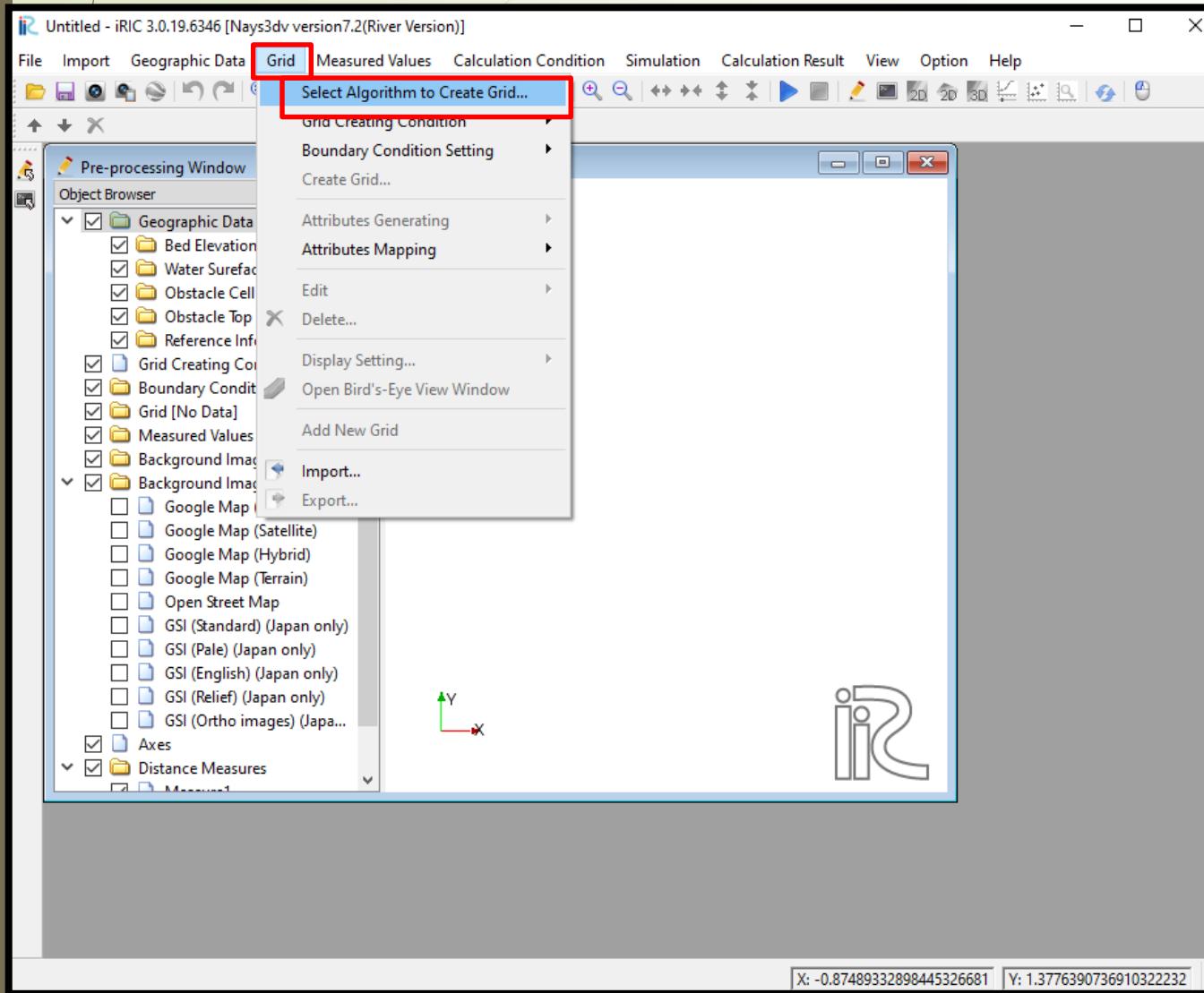
To calculate the density currents in a rectangular channel with an obstacle.

## ▶ 概要

Grid creation, obstacle setting, Obstacle top elevation setting, obstacle and obstacle top elevation mapping, concentration boundary setting and mapping, initial and boundary concentration setting, other calculation parameters setting, simulation, viewing results (iso surface of concentration and obstacle, contours of concentration, velocity vectors)



# 計算格子の作成



# 計算格子の作成

Grid Creation

Groups

Channel Shape

Select Channel Shape Straight Channel or Cubic box

Straight Channel or Cubic Box

Length in X or streamwise direction(m) 10

Number of Nodes in X Direction 20

Meandering Channel

Wavelength of Meander(m) 3

Number of Nodes in One Wavelength 24

Wave Number 1

Meander Angle(degree) 40

Length in Y Direction or Width(m) 10

Number of Nodes in Y or Transvers Direction 20

Channel Bed Slope 0.4

Bed Elevation of Downstream End(m) -7

Parameters for Kinoshita Meander

Skewness of Kinoshita Meander 0.03125

Flatness of Kinoshita Meander 0.00521

Reset Create Grid Cancel

Grid Creation

Groups

Channel Shape

Channel Bed Condition

Grids Adding

Width Variation

Initial Water Surface Profile

Downstream Depth(m) 7

Water Surface Slope 0

Initial Water Surface Perturbation None

Water Surface Perturbation Direction x-direction

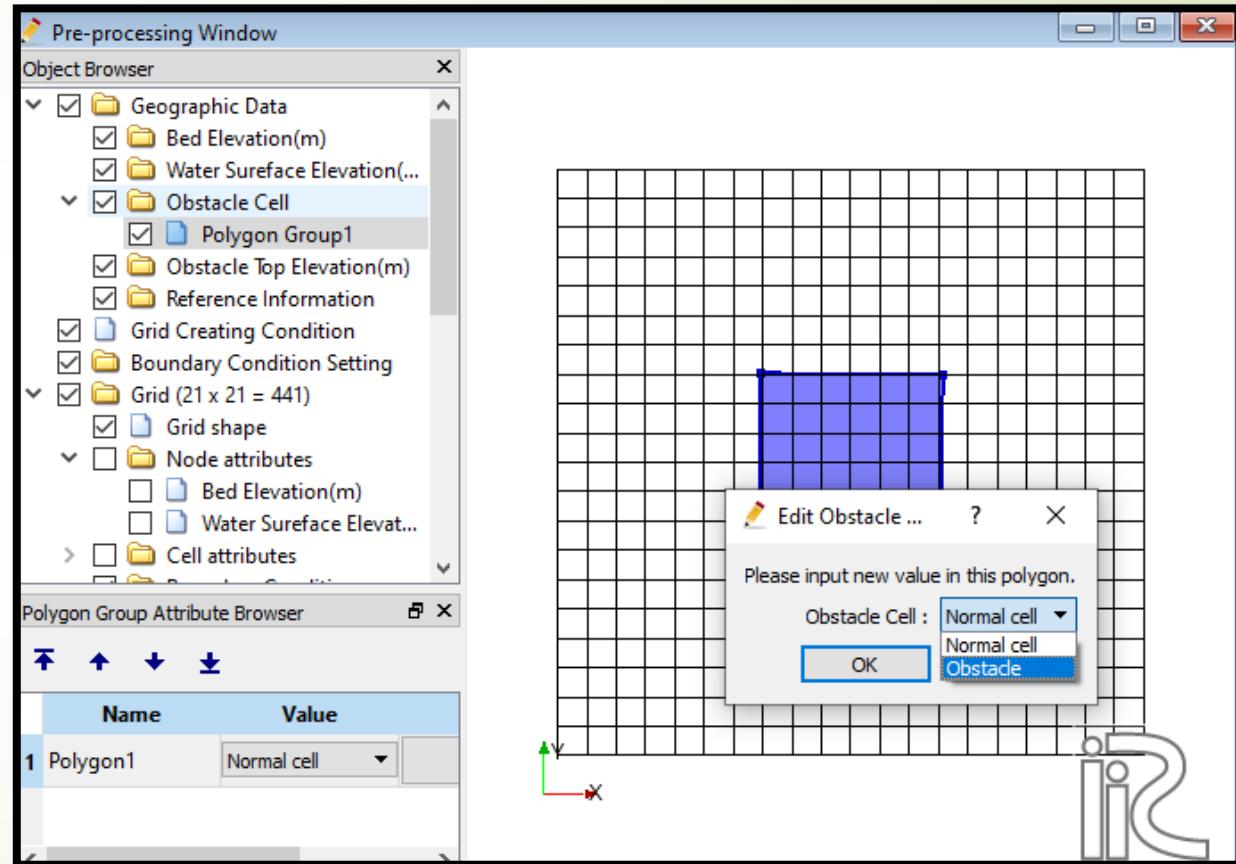
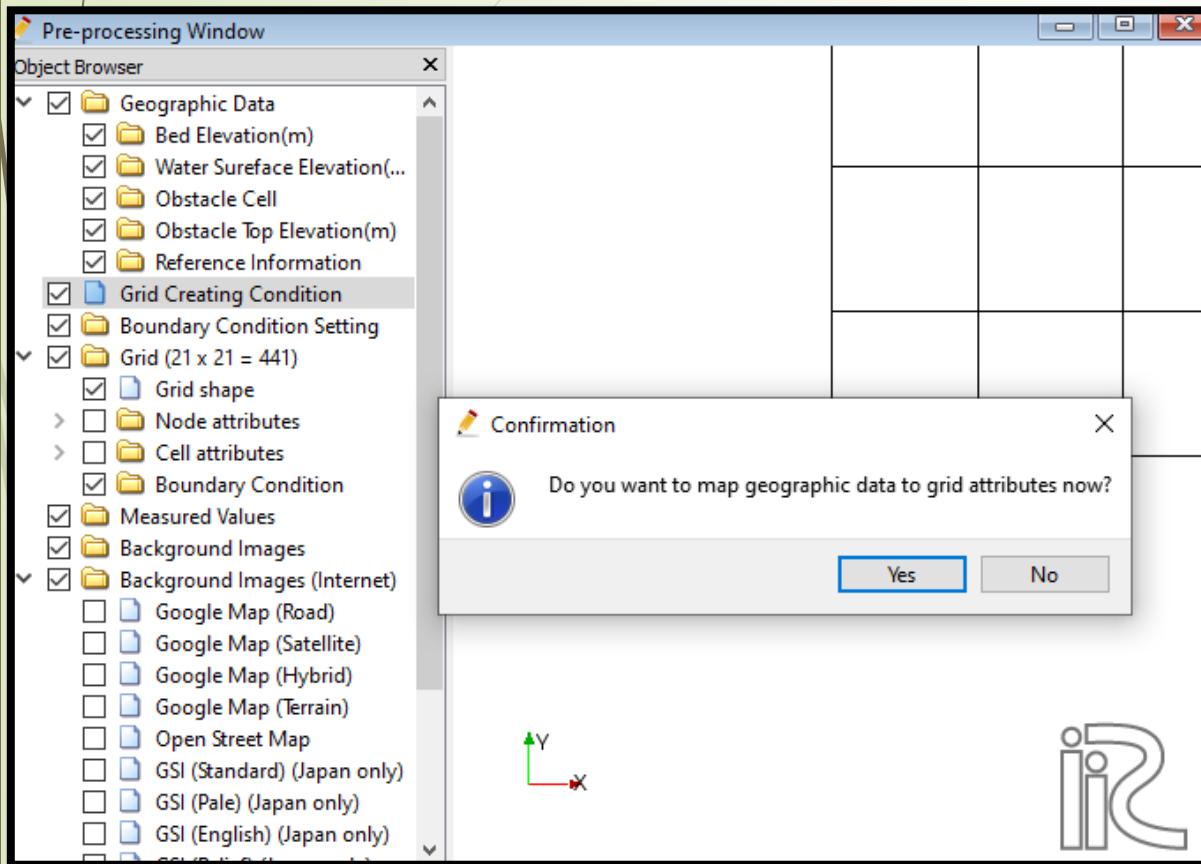
Amplitude of the perturbation(m) 0.01

Wavenumber of the perturbation(m) 1

Reset Create Grid Cancel

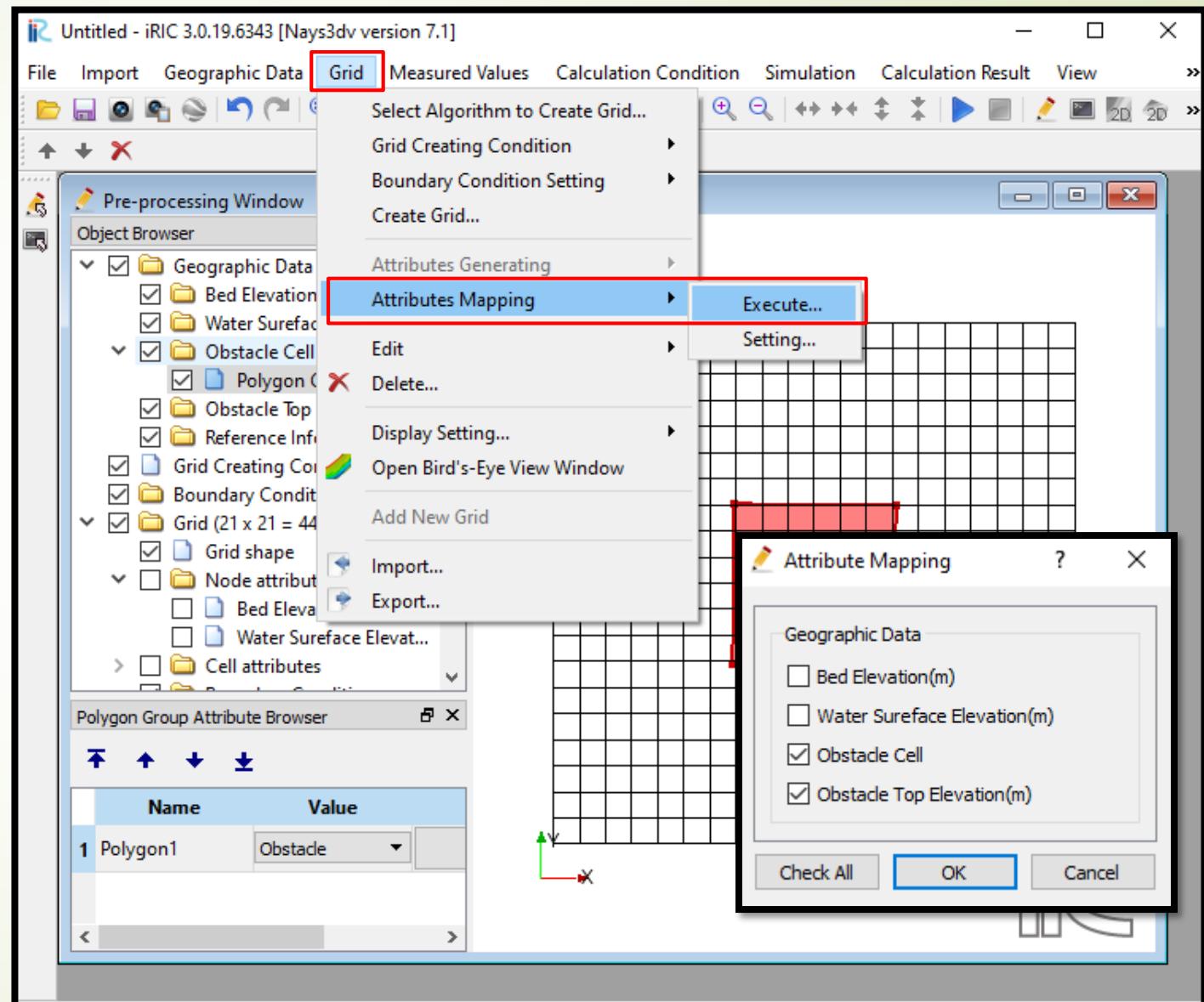
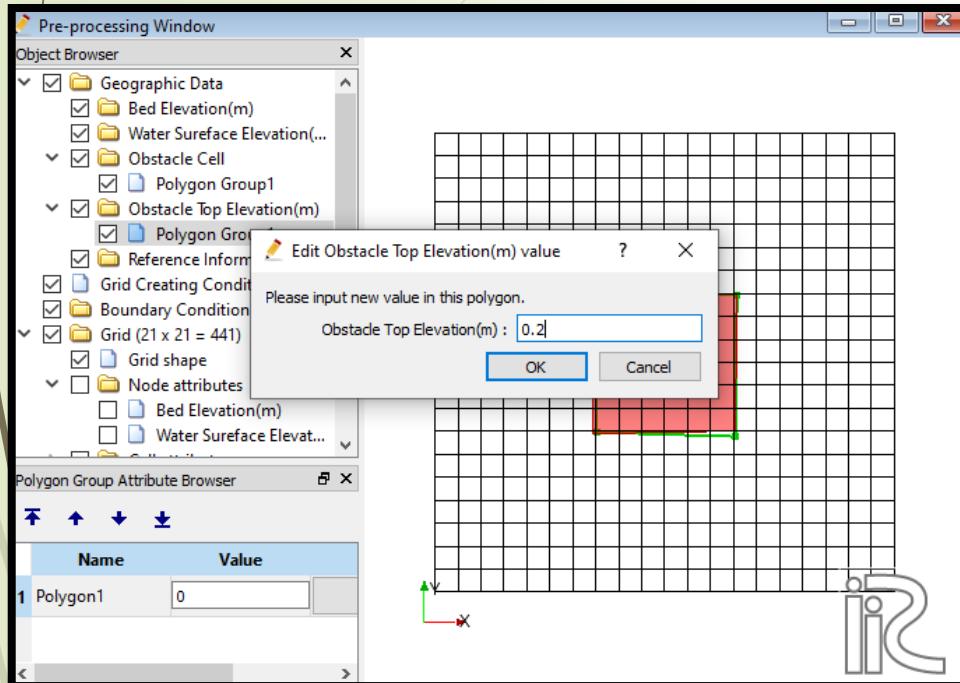
# 計算格子の作成

## 障害物の設定



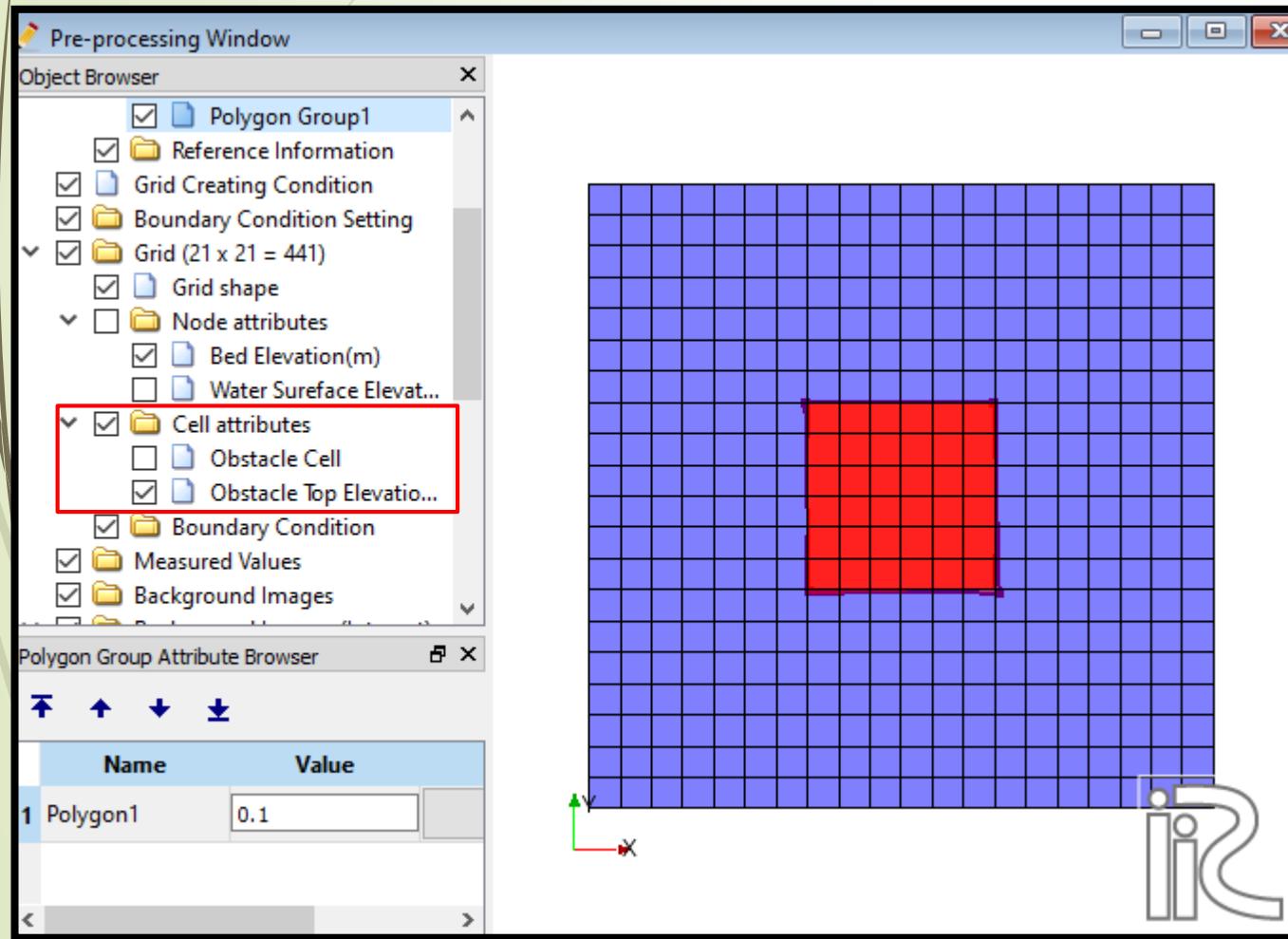
## 障害物のマッピング

# 計算格子の作成

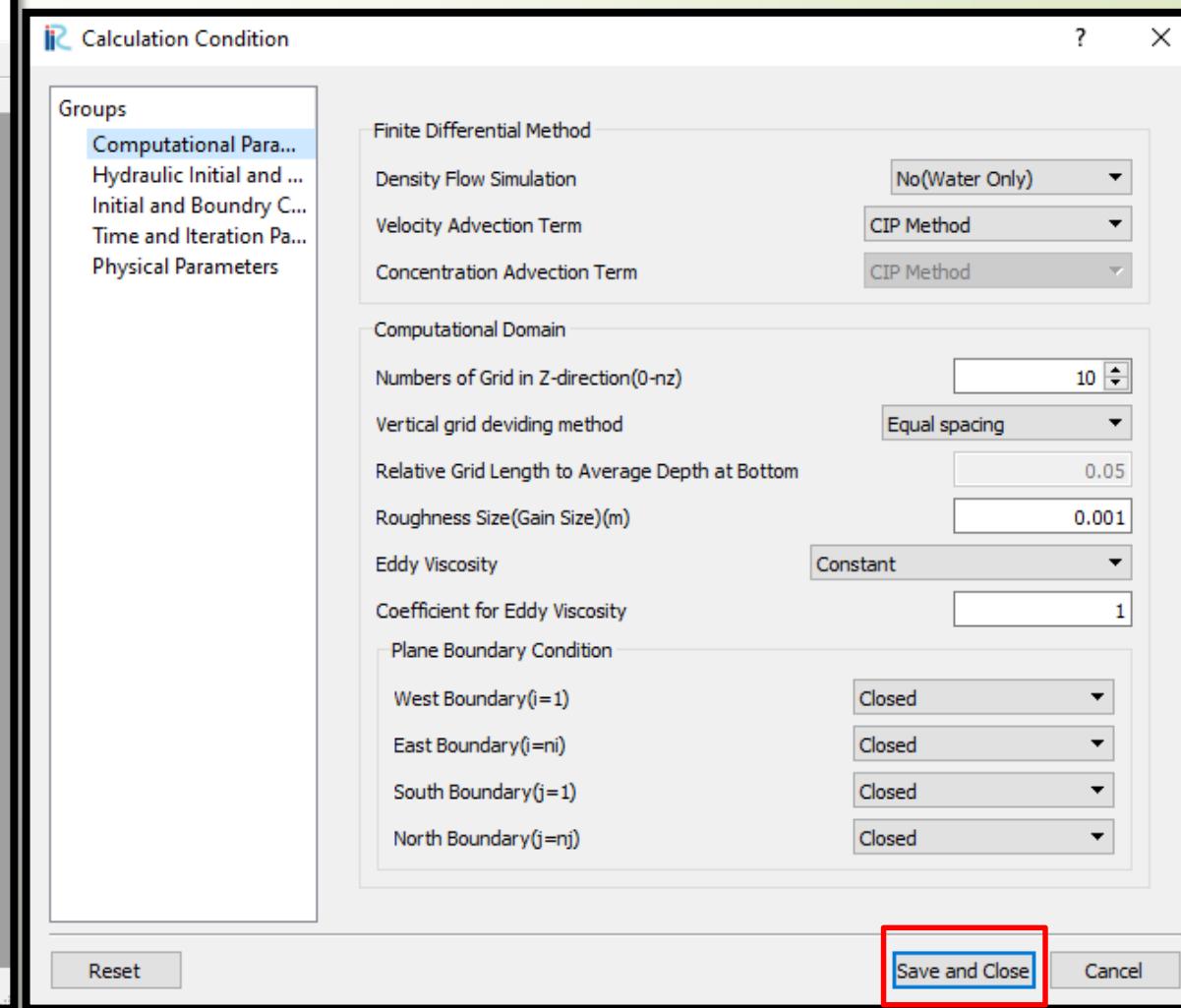
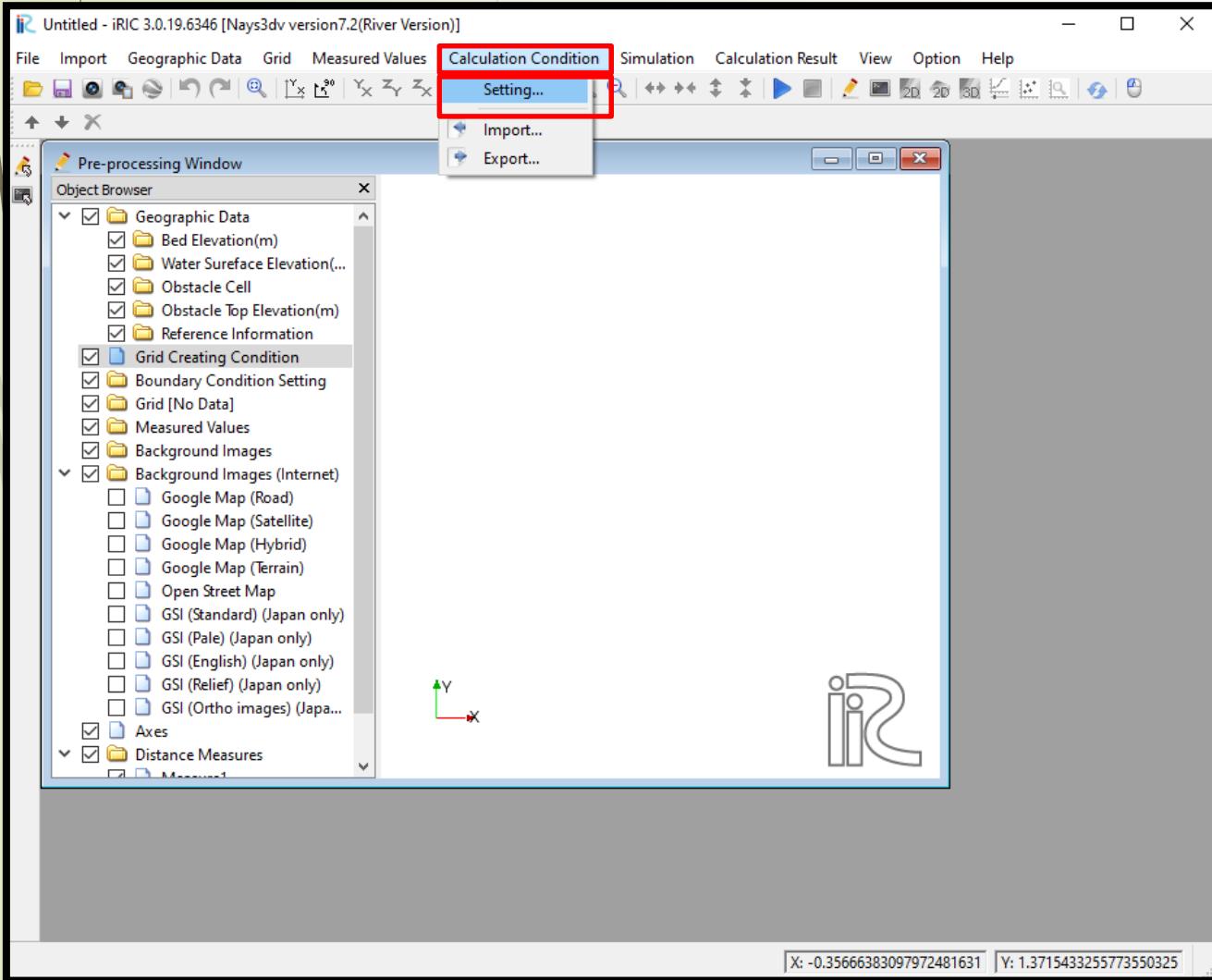


# 計算格子の作成

## 障害物のマッピング チェック



# 計算条件の設定



# 計算条件の設定

Calculation Condition

Groups

- Computational Para... (highlighted)
- Hydraulic Boundary ...
- Initial and Boundry C...
- Time and Iteration Pa...
- Physical Parameters

Finite Differential Method

Density Flow Simulation: Yes(Density Flow)

Velocity Advection Term: CIP Method

Concentration Advection Term: CIP Method

Computational Domain

Numbers of Grid in Z-direction(0-nz): 10

vertical grid deviding method: Equal spacing

Relative Grid Length to Average Depth at Bottom: 0.05

Roughness Size(Gain Size)(m): 0.001

Eddy Viscosity: Constant

Coefficient for Eddy Viscosity: 1

Plane Boundary Condition

West Boundary(i=1): Closed

East Boundary(i=n): Closed

South Boundary(j=1): Closed

North Boundary(j=n): Closed

Save and Close

Cancel

Reset

Calculation Condition

Groups

- Computational Parameters
- Hydraulic Initial and Boundary ... (highlighted)
- Initial and Boundry Concentrat...
- Time and Iteration Parameters
- Physical Parameters

Upstream Discharge Condition

Discharge: Constant

Contant Discharge Value(m\*\*\*3/s): 0

Discharge Hydrograph: Edit

Start time of discharge adjustment(sec): 100

Time to reach full discharge(sec): 500

Upstream Water Surface

Watersurface Condition: Constant

Watersurface Elevation Value(m): 0

Slope for Upstream uniform flow computation: 0.005

Downstream(Eastern Boudary)

Water Surface Condition: Constant

Downstream(East) Watersurface Elevation(m): 0

Downstream Stage Oscillation Values

Amplitude(m): 0

Cycle Time(sec): 0

Start Time of Oscillation(sec): 0

Time to reach full oscillation(sec): 0

Time series of downstream water surface elevation: Edit

Initial Watersurface Condition

Initial Water Surface Profile: Horizontally Constant

Horizontally Constatnt Value(m): 0

Save and Close

Cancel

Reset

# 計算条件の設定

Calculation Condition

Groups

- Computational Parameters
- Hydraulic Boundary Condition
- Initial and Boundary Concentration...**
- Time and Iteration Parameters
- Physical Parameters

Back Ground Concentration

Initial Density Distribution

Initial Concentration Distribution

Initial Perturbed Concentration

Initial extra concentration i-from(1-nx)

Initial extra concentration i-to(1-nx)

Initial extra concentration j-from(1-ny)

Initial extra concentration j-to(1-ny)

Initial extra concentration k-from(1-nk)

Initial extra concentration k-to(1-nk)

Density Boundary Condition

Save and Close Cancel

Calculation Condition

Groups

- Computational Parameters
- Hydraulic Boundary Condition
- Initial and Boundary Concentration...**
- Time and Iteration Parameters**
- Physical Parameters

Time Parameters

Output Interval(sec)

Computation Finishing Time(sec)

Time Step of Computation(sec)

Iteration Parameters

Error Limitation in SOR Computation

Max. Times of Iteration

Relaxation Coefficient

Free Surface Calculation

Relaxation Coefficient for Free Surface Computation

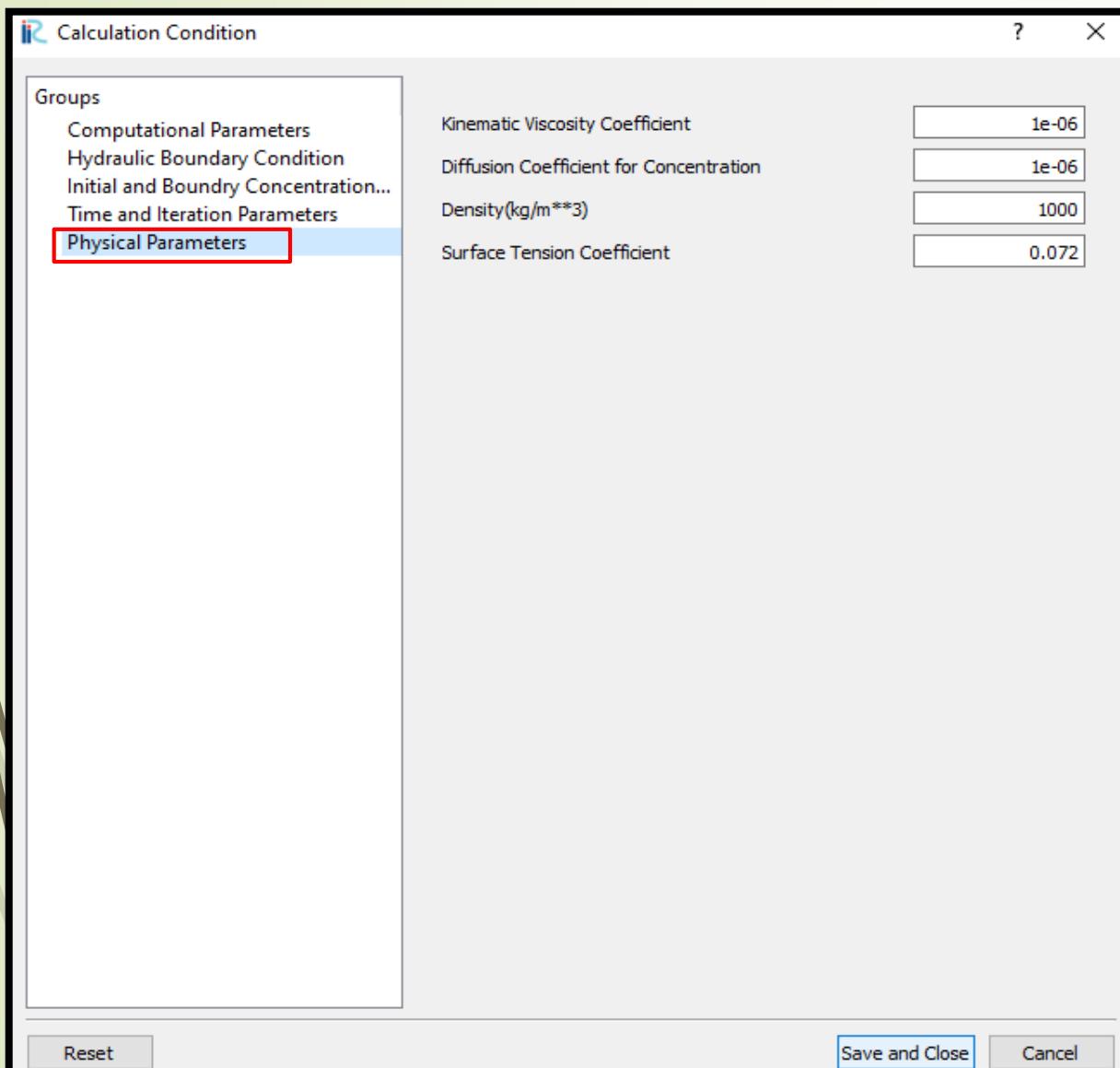
Starting Time of Free Surface Computation

Iteration time for water surface

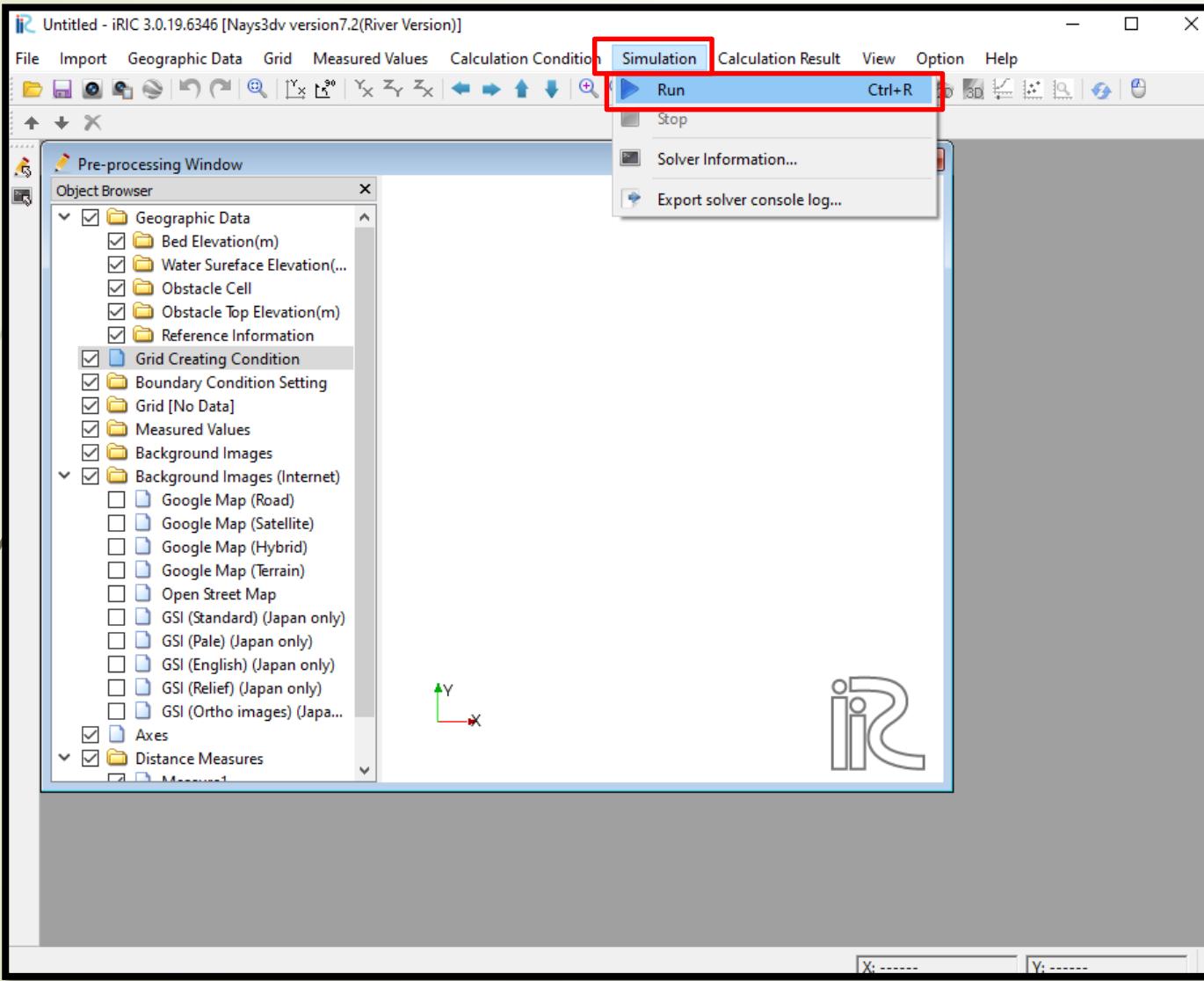
Truncation error

Save and Close Cancel

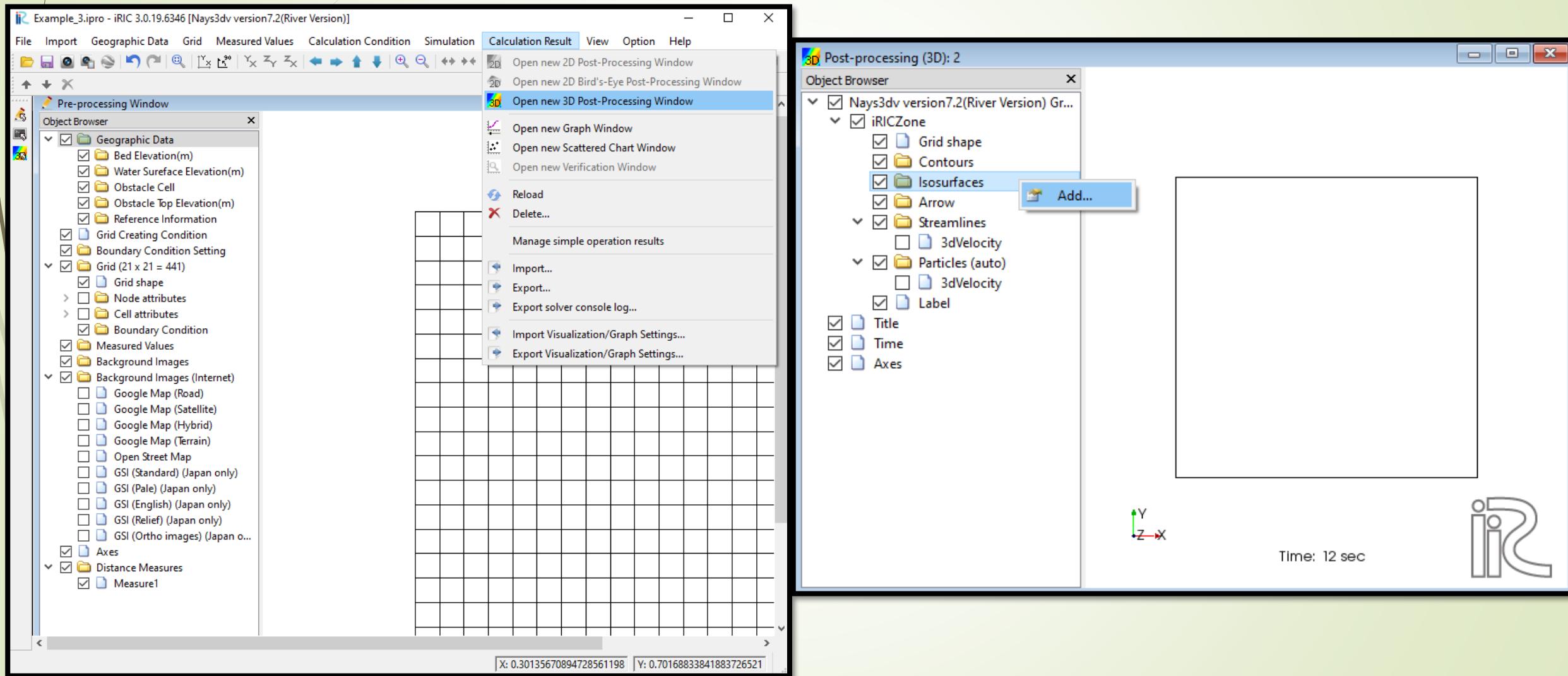
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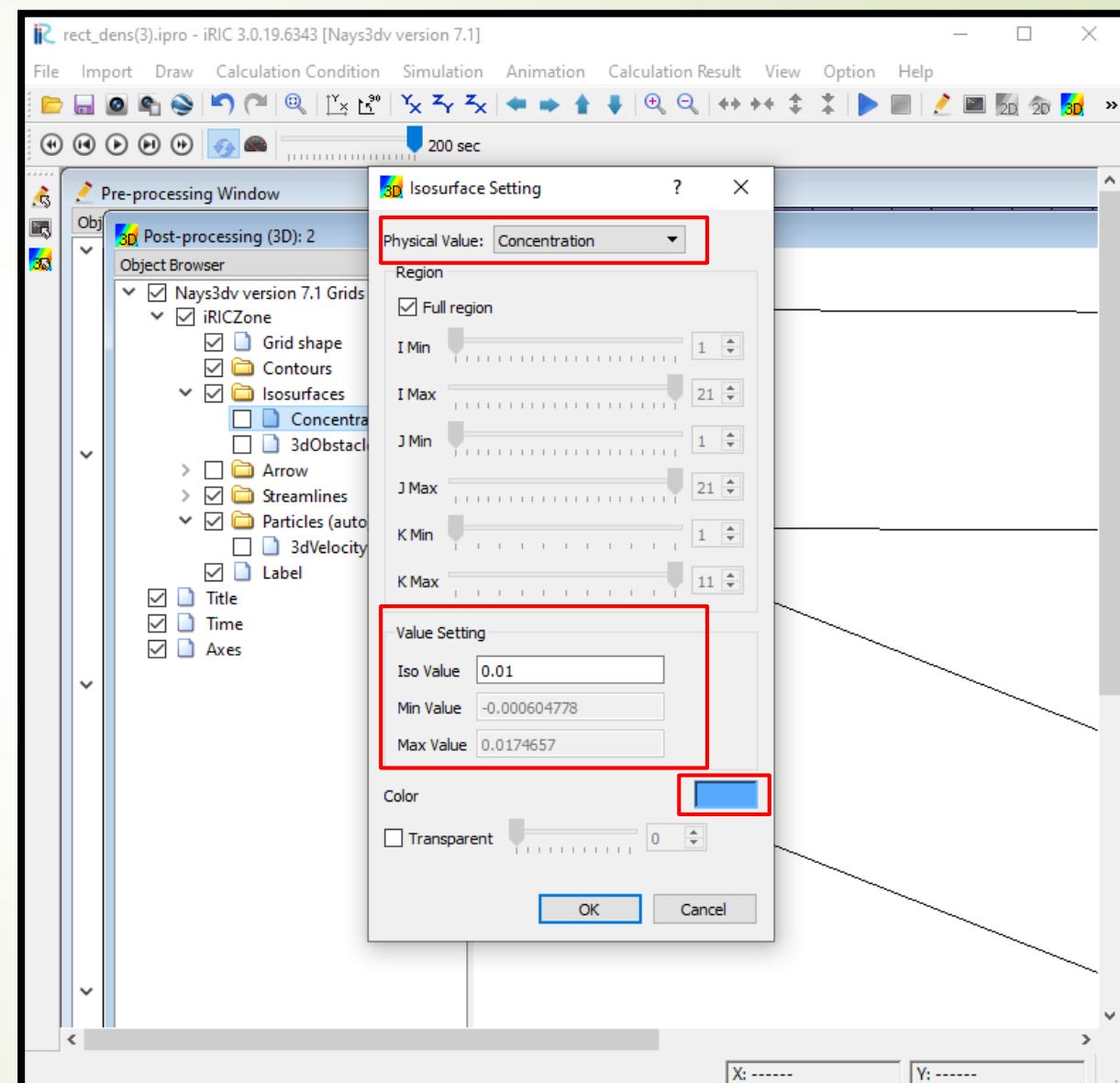
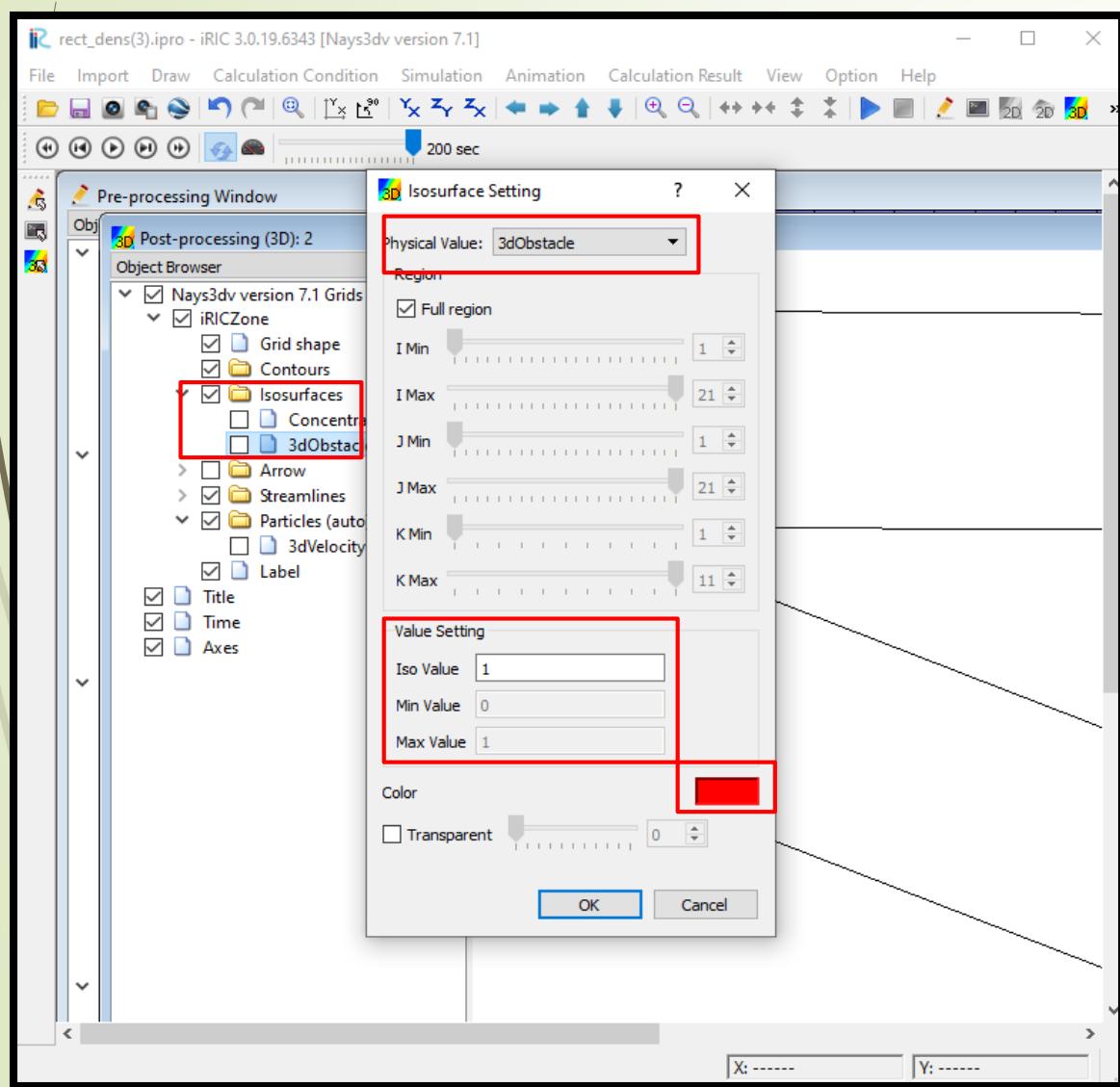
# 計算実行



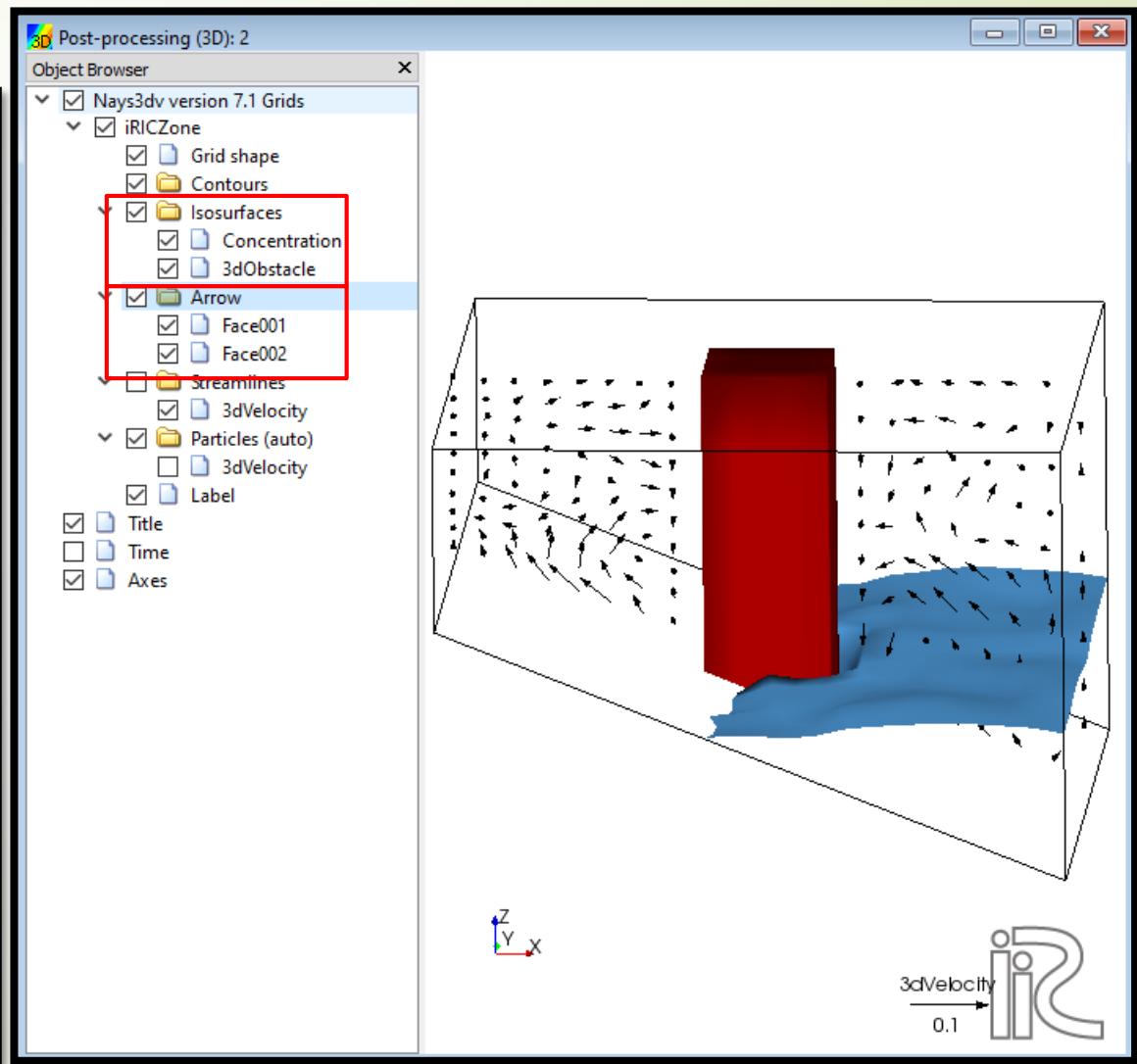
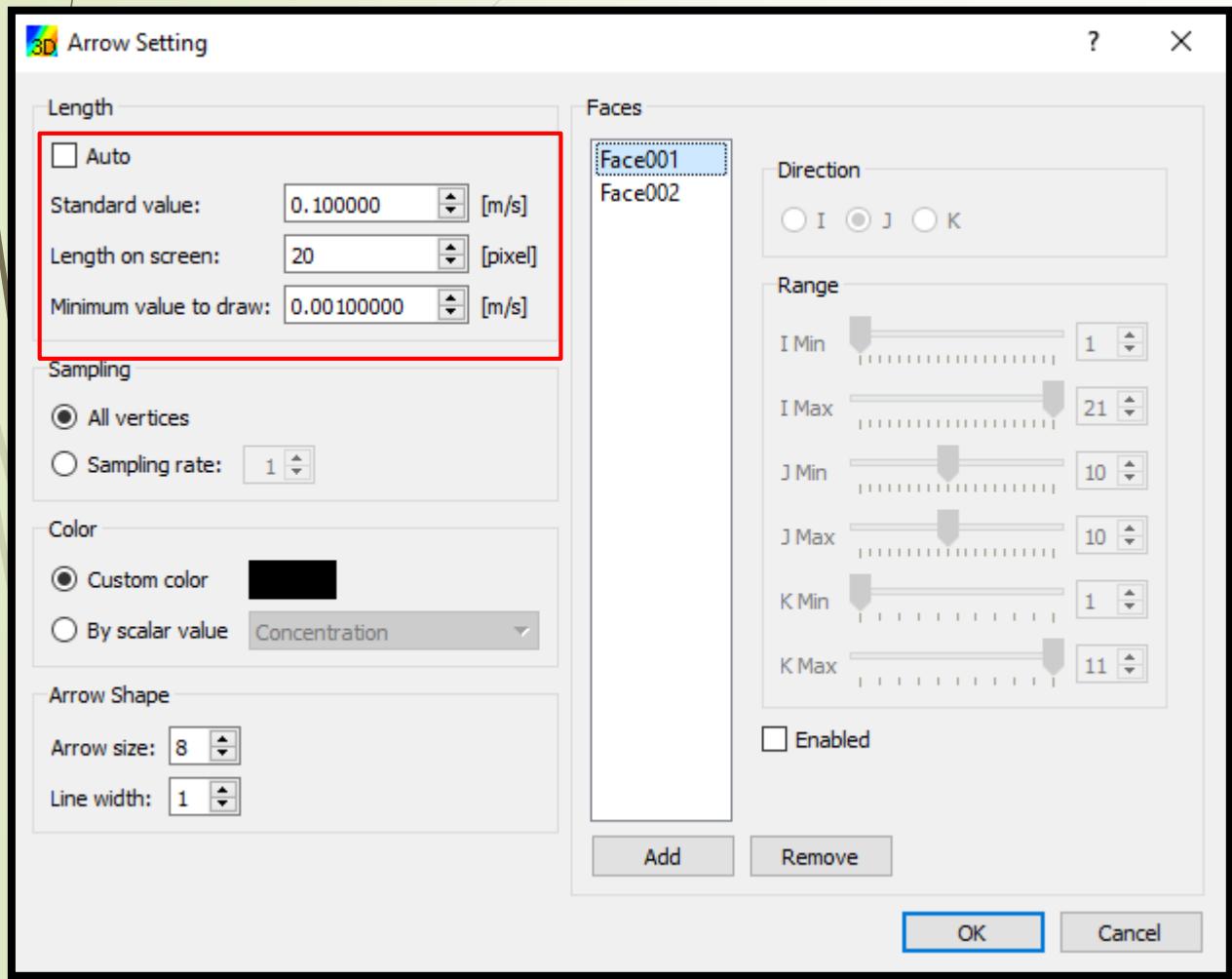
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ご清聴ありがとうございました