CAST - A site assessment tool

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QUICK ONLINE USAGE AND OFFLINE INSTALLATION

Contamination Assessment and Site-management Tool (CAST) - A browser based tool for site assessment ##

Prabhas will do this - actually it is the readme file in the website currently.

CHAPTER

ONE

USING CAST ONLINE (STILL IN DEVELOPMENT)

This is introduction to CAST online interface.

Anton and **Vedanti** can do this.

1.1 User Login and Access

Vedanti will do this.

1. Why Login is required
2. What are accessible without login
3. What user info are stored and if they are cross-verified.
4. Anything more

1.2 A quick usage example of CAST

Sandhya and **Iram** to do this.

This is one very simple example and linking to the model page for more detailed example.

CHAPTER

TWO

INSTALLATION OF BROWSER-BASED CAST

Kanishk will do this with help from **Vedanti** and **Prabhas**

This is mostly already done. We need to reformat and that's all.

2.1 Quick example of offline CAST

Sandhya and **Iram** to do this.

This is one very simple example and linking to the model page for more detailed example.

2.2 Updating CAST

The following steps must be taken.

Kanishk Aryal with help from **Vedanti** to do this

This means how to update the CAST when the software updates. Nothing much here. E.g., update database etc.

CHAPTER

THREE

CAST TOOLBOX - DATABASE MODELS

The following steps must be taken.

Kanishk, **Iram** with help from **Prabhas** to do this.

OK, this is how we do:

1. Describe data a bit
2. Provide how to use the code with screenshots
3. All functions should be explained

We do this for all models.

CHAPTER

FOUR

CAST TOOLBOX - ANALYTICAL MODELS

The analytical model toolbox within the CAST provides the solution for L_{max}. The toolbox currently include **6** different models; each of them varying with the other with respect to model conditions, dimensionality, input quantities, and also orientation. Analytical model toolbox is the recommended step after the use of *Data Toolbox* in the CAST work flow.

4.1 Analytical models in CAST

Included models are (*see individual model page for details*): (~we will hyperlink the models later~)

1. Ham et al. (2004)

$$L_{max} = \frac{W_r^2}{4\pi\alpha_{Th}}\left(\frac{\gamma C_D^\circ}{C_A^\circ}\right)^2$$

2. Liedl et al. (2005)

$$L_{max}\frac{4M^2}{\pi^2\alpha_{Tv}}\ln\left(\frac{4}{\pi}\frac{\gamma C_{ED}+C_{EA}}{C_{EA}}\right)$$

3. Chu et al. (2005)

$$L_{max} = \frac{\pi}{16}\frac{W^2}{\alpha_{Th}}\left(\frac{\gamma C_D^\circ}{C_A^\circ-\epsilon}\right)^2$$

4. Liedl et al. (2011)

$$\mathrm{erf}\left(\frac{W}{\sqrt{4\alpha_{Th}L_{max}}}\right)\mathrm{e}^{-\alpha_{Tv}L_{max}\left(\frac{\pi}{2M}\right)^2} = \frac{\pi}{4}\frac{\gamma C_{Thres}+C_A^\circ}{\gamma C_D^\circ + C_A^\circ}$$

5. Karanovic et al. (2007) - **BIOSCREEN-AT**

$$c(x,y,z,t) = C_0\frac{x}{8\sqrt{\pi D_x'}}\exp(-\gamma t)\times\int_0^t\frac{1}{\xi^{3/2}}\exp\left\{(\gamma-\lambda_{EFF})-\xi\frac{(x-v'\xi)^2}{4D_x'\xi}\right\}\times$$

$$\times\left[\mathrm{erfc}\left\{\frac{y-\frac{w}{2}}{2\sqrt{D_y'\xi}}\right\}-\mathrm{erfc}\left\{\frac{y+\frac{w}{2}}{2\sqrt{D_y'\xi}}\right\}\right]\times$$

$$\times\left[\mathrm{erfc}\left\{\frac{z-H}{2\sqrt{D_z'\xi}}\right\}\mathrm{erfc}\left\{\frac{z+H}{2\sqrt{D_z'\xi}}\right\}\right]\mathrm{d}\xi$$

4.2 Computing interfaces in CAST

CAST provide the following two computing interfaces for each analytical and empirical models:

1. Single computing interface
2. Multiple computing interface

4.2.1 Single computing interface

The **single computing interface** is a quick computing mode in which a set of model data can be inserted in data input box to obtain L_{max}. The interface output (see screenshot Fig. 4.1 below) is actual L_{max} and the plot in which the user input result is compared against the field plume length. The output graph has limited interactive options- such as zooming, panning, and obtaining figure as a *png* graphics.

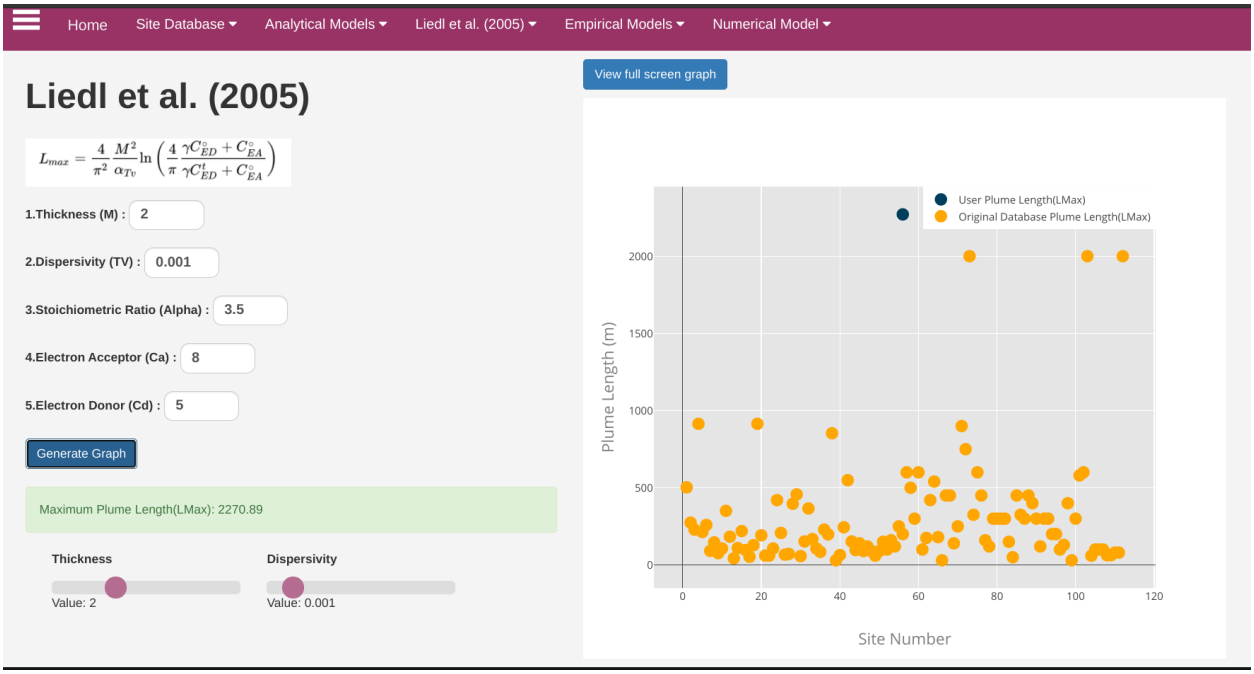

Fig. 4.1: Single computing interface

The single computing interface also provide user interactivity with computation. Interface provide *sliders* for changing parameter values, which leads to computation and visualization of L_{max}.

4.2.2 Multiple computing interface

The **Multiple computing interface** provides a possibility to create simulation scenarios and compute L_{max} for all scenarios at once (see screenshot Fig. 4.2 below) . Scenarios can be directly put input in the table or can be uploaded to the interface. For uploading the sample input template (a *.csv*) file has to be downloaded. After creating data in the *.csv* file, it can be uploaded to the interface for the L_{max} computation.

The computed L_{max} is graphically displayed in the interactive figure. The obtained results can then be compared with the user selected data from the database.

The workflow with the computing interfaces can be to begin with either single or multiple interface based on the user requirements.

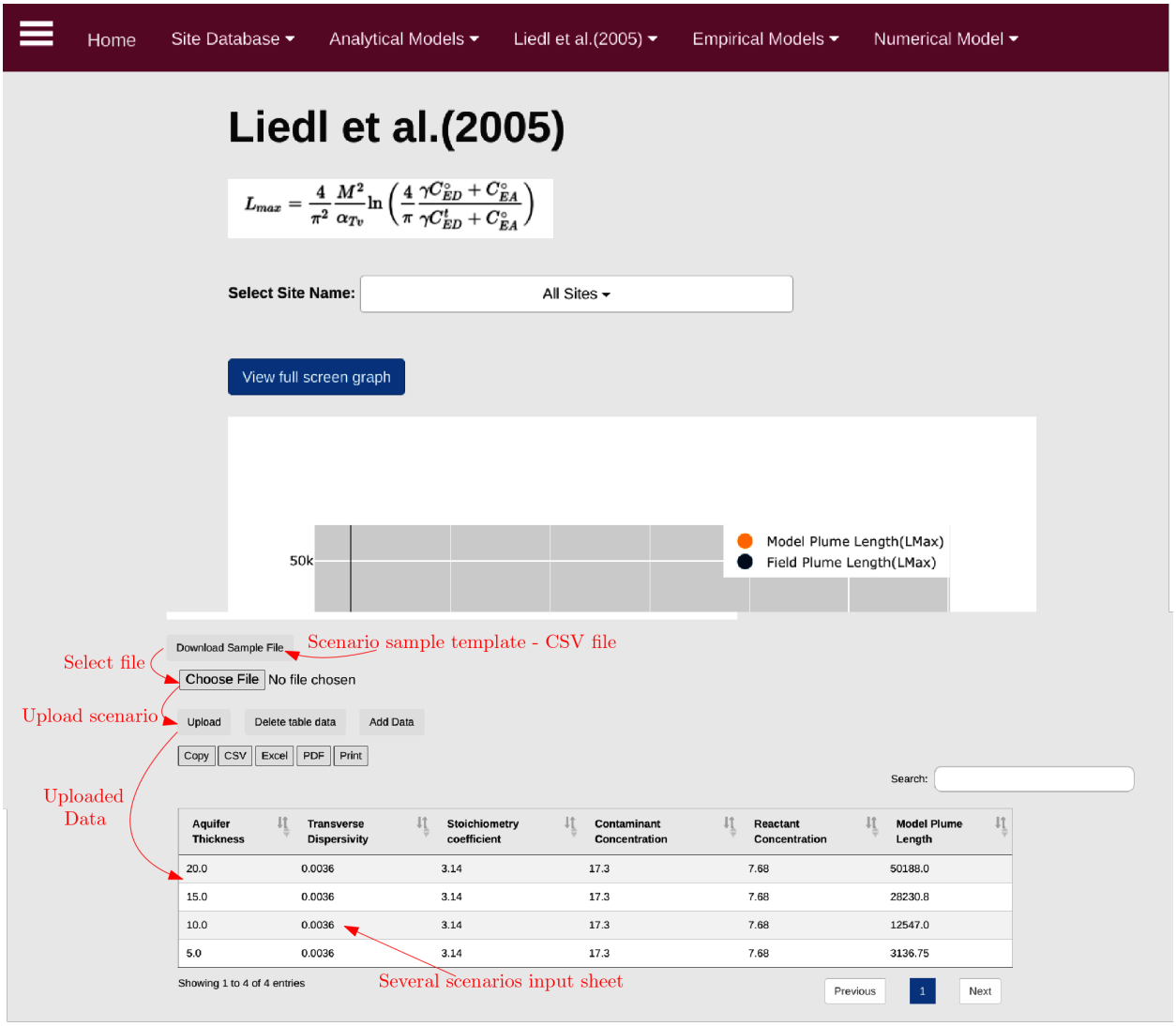

Fig. 4.2: Multiple computing interface

CAST Toolbox - Analytical Models - Liedl et al. (2005)

Sandhya and **Iram** - 2D models

OK, this is how we do:

1. Describe each model - this we already have
2. Provide how to use the code with screenshots
3. Step 2 should talk a bit about input value and about functionalities - e.g., slider and how to interpret results
4. We have to do this for both single and multiple scenario mode.

We do this for all models.

CAST Toolbox - Analytical Models - Chu et al. (2005)

Sandhya, **Iram**, **Prabhas** and **Anton** to do this.

Sandhya and **Iram** - 2D models

OK, this is how we do:

1. Describe each model - this we already have
2. Provide how to use the code with screenshots
3. Step 2 should talk a bit about input value and about functionalities - e.g., slider and how to interpret results
4. We have to do this for both single and multiple scenario mode.

We do this for all models.

CAST Toolbox - Analytical Models - Ham et al. 2004

Sandhya, **Iram**, **Prabhas** and **Anton** to do this.

OK, this is how we do:

1. Describe each model - this we already have
2. Provide how to use the code with screenshots
3. Step 2 should talk a bit about input value and about functionalities - e.g., slider and how to interpret results
4. We have to do this for both single and multiple scenario mode.

We do this for all models.

CAST Toolbox - Analytical Models - Liedl et al. 2011

Prabhas to do this.

OK, this is how we do:

1. Describe each model - this we already have
2. Provide how to use the code with screenshots
3. Step 2 should talk a bit about input value and about functionalities - e.g., slider and how to interpret results
4. We have to do this for both single and multiple scenario mode.

We do this for all models.

CAST Toolbox - Analytical Models - BIOSCREEN-AT

Anton Bioscreen-AT

OK, this is how we do:

1. Describe each model - this we already have
2. Provide how to use the code with screenshots
3. Step 2 should talk a bit about input value and about functionalities - e.g., slider and how to interpret results
4. We have to do this for both single and multiple scenario mode.

We do this for all models.

CHAPTER

FIVE

CAST TOOLBOX - EMPIRICAL MODELS

The following steps must be taken.

Sandhya and **Iram**, to do this.

Sandhya and **Iram** - 2D models

OK, this is how we do:

1. Describe each model - this we already have
2. Provide how to use the code with screenshots
3. Step 2 should talk a bit about input value and about functionalities - e.g., slider and how to interpret results
4. We have to do this for both single and multiple scenario mode.

We do this for all models.

5.1 CAST Toolbox - Empirical Models - Birla et al. (2020)

Sandhya and **Iram** to do this. to do this.

OK, this is how we do:

1. Describe each model - this we already have
2. Provide how to use the code with screenshots
3. Step 2 should talk a bit about input value and about functionalities - e.g., slider and how to interpret results
4. We have to do this for both single and multiple scenario mode.

We do this for all models.

5.2 CAST Toolbox - Emperical Models - Maier and Grathwohl (2005)

The following steps must be taken.

Sandhya and **Iram** to do this.

Sandhya and **Iram** - 2D models **Prabhas** Liedl et al 3D **Anton** Bioscreen-AT

OK, this is how we do:

1. Describe each model - this we already have
2. Provide how to use the code with screenshots

3. Step 2 should talk a bit about input value and about functionalities - e.g., slider and how to interpret results
4. We have to do this for both single and multiple scenario mode.

We do this for all models.

CHAPTER

SIX

CAST TOOLBOX - NUMERICAL MODELS

The following steps must be taken.

Anton and **Prabhas**, to do this.

OK, this is how we do:

1. Describe the model - this we already have
2. Provide how to use the code with screenshots
3. Step 2 should talk a bit about input value and about functionalities - e.g., slider and how to interpret results

CHAPTER

SEVEN

CAST TOOLBOX - MODEL SELECTION METHOD

The following steps must be taken.

Prabhas and **Natalia** , to do this.

Basically we talk about decision model here

CHAPTER

EIGHT

CAST CODE STRUCTURE

Vedanti will to do this

This basically talks about “code Structuring”

No very detailed info to be added. Most of them are already there- or bring from your project report.

CHAPTER

NINE

CAST CODE LIBRARIES

Vedanti will to do this

This basically talks about “Different language and libraries”

No very detailed info to be added. Most of them are already there- or bring from your thesis.

CHAPTER

TEN

CAST CODE DEVELOPMENT

Vedanti will to do this

This basically talks about “code level development”

No very detailed info to be added. Most of them are already there- or bring from your thesis.

CHAPTER

ELEVEN

CITE CAST

The following steps must be taken.

Prabhas will to do this

CHAPTER

TWELVE

CAST VERSIONS

Vedanti with help from **Prabhas** to do this

Very short one. We have the first version - offline/online development a