

# MITK Anisotropic ICP Utility: Getting Started

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Alfred. M. Franz and Lena Maier-Hein, August 2012

The Anisotropic ICP Utility implements the Anisotropic Iterative Closest Point (A-ICP) algorithm presented in

*L. Maier-Hein, A. M. Franz, T. dos Santos, M. Schmidt, H.-P. Meinzer, and J. M. Fitzpatrick. Convergent Iterative Closest-Point Algorithm to Accomodate Anisotropic and Inhomogenous Localization Error. IEEE T Pattern Anal, 34(8): 1520–1532, 2012.*

This guide will show you step by step how to install and start the software and then perform a registration using the A-ICP algorithm.

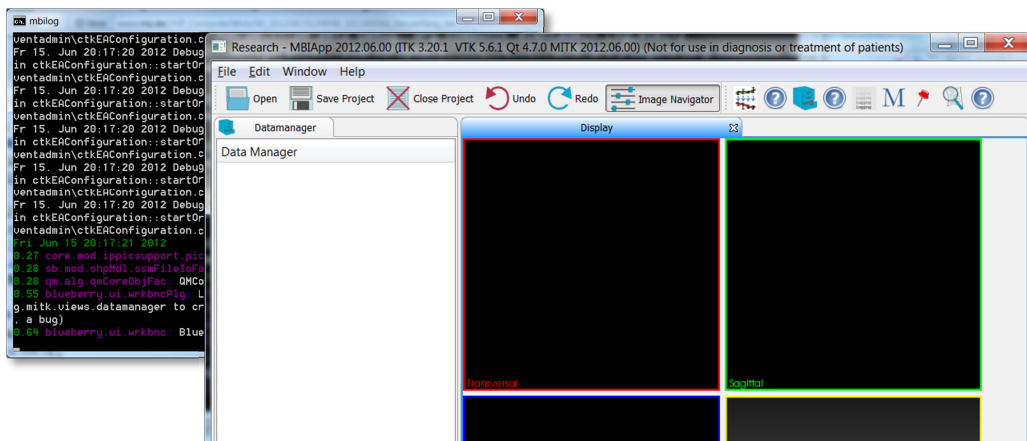
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## Downloading and Starting the Software

The first step is to download the MITK-Anisotropic-ICP software package (Windows: MITK-AnisotropicICP-win64.zip / Linux: MITK-AnisotropicICP-linux.tar.gz) and the test data package (TestdataAICP.zip). Extract the software package and the test data to separate folders. You can then start the MITK Anisotropic ICP software by running/double-clicking the executable file „MITK-AnisotropicICP“ (Windows: MITK-AnisotropicICP.bat / Linux: MITK-AnisotropicICP.sh) in the main directory of the software package.

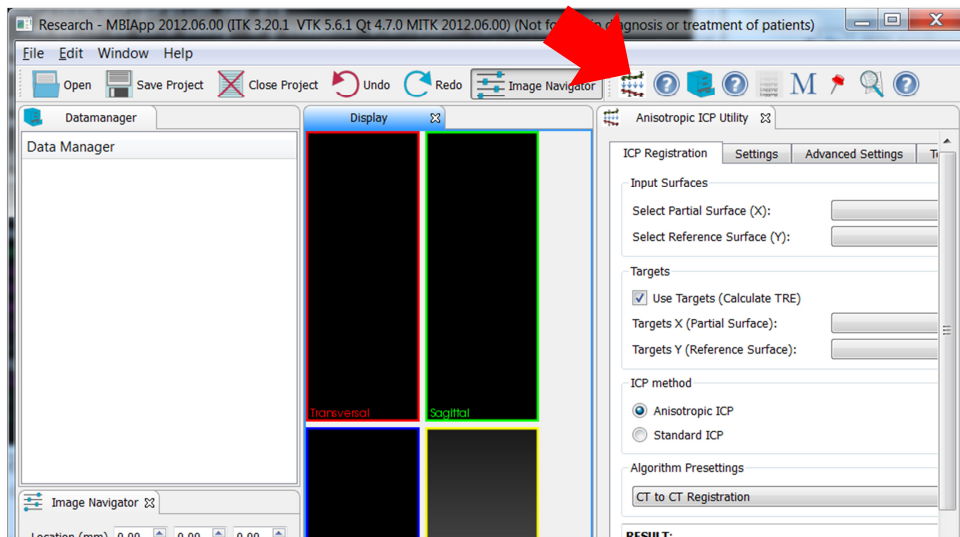
When running the software, two screens will appear, as shown in the screenshot below:



The first one is the MITK console „mbilog“, which will give you some logging information. The second one is the MITK main window, the central user interface which you will use most of the time. For more information on MITK on general, please refer to [www.mitk.org](http://www.mitk.org).

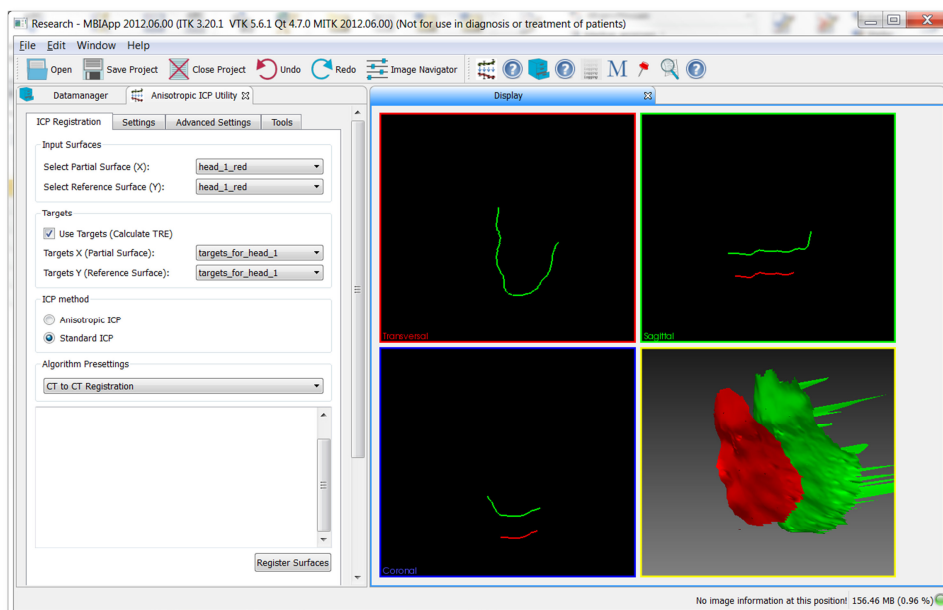
## Activating the MITK Anisotropic ICP Utility

To activate the Anisotropic ICP Utility, simply click the corresponding button in the top part of the window, as shown in the following screenshot, or use the file menu (Window -> show view -> Anisotropic ICP Utility).

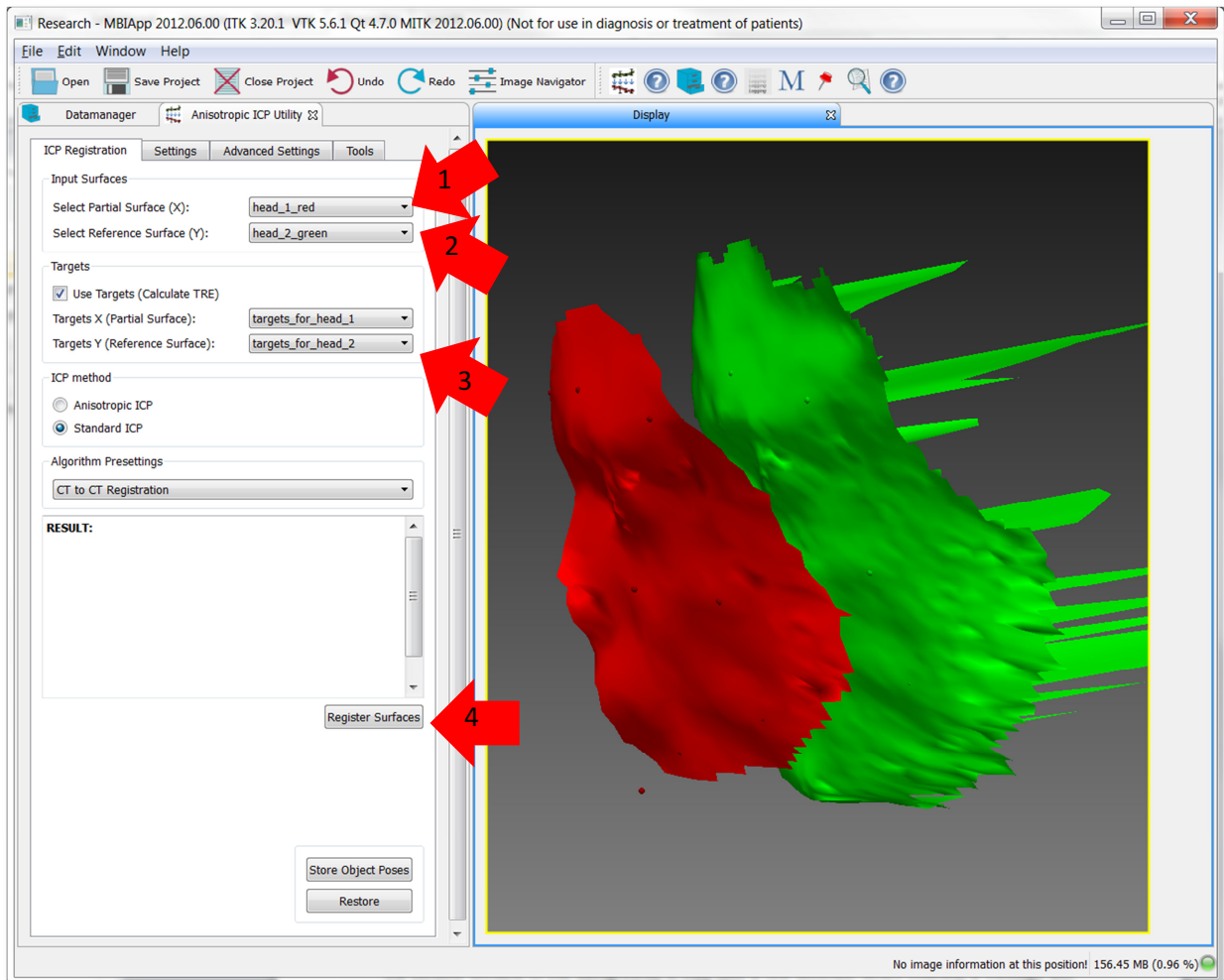


## Loading and Registering Data

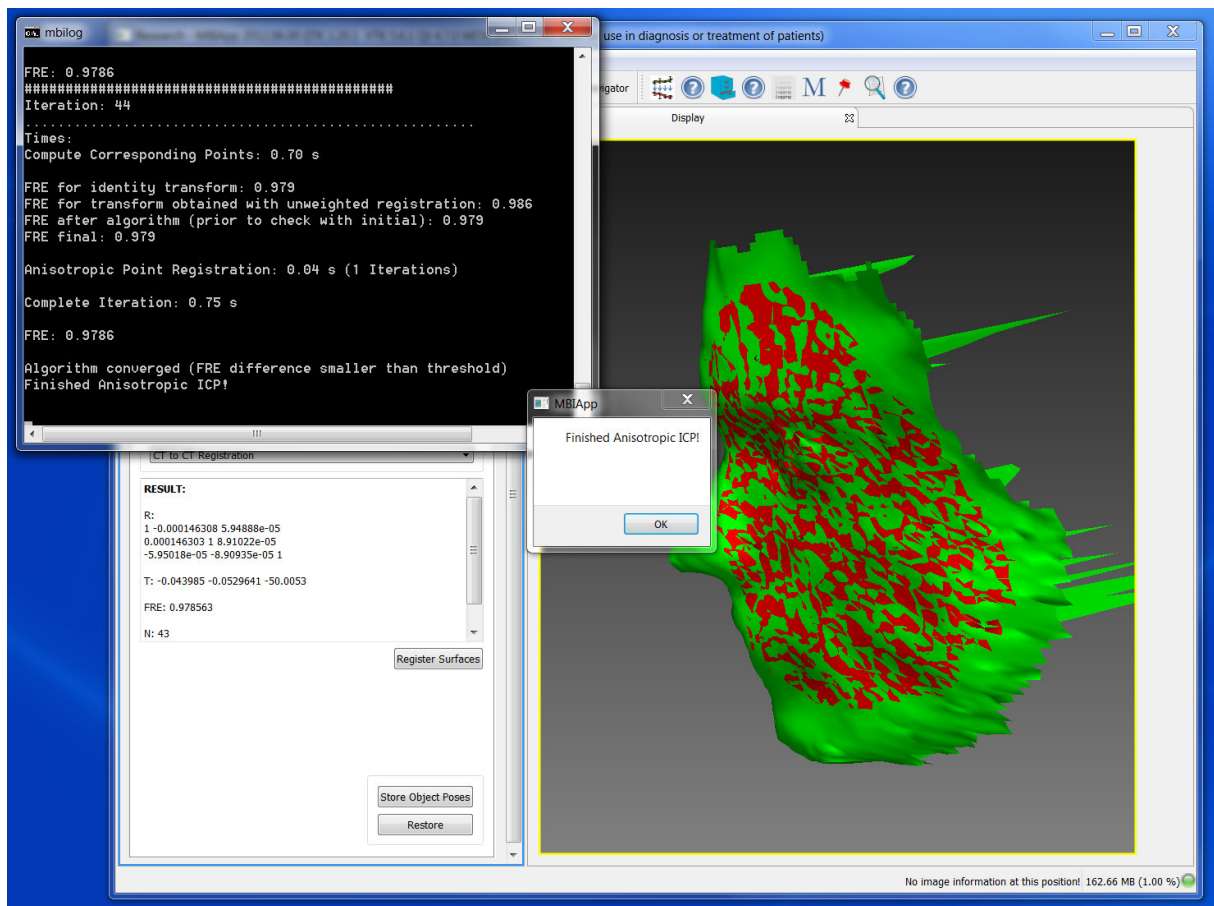
You can now load the file headScene.mitk from the test data file. This can be done by drag and drop of the file to the application or by using the "open" button. You can move the windows inside the main window to adjust the view to your needs. You will now see two surfaces, a red one and a green one in the display window. Please note that you can also load your own surface files (e.g. \*.stl) to the MITK application.



To perform a registration of the two surfaces, you have to select them in the Anisotropic ICP Utility as source (X) and target (Y) surface (1 and 2 in the next screenshot). If you do not choose the trimmed variant of the ICP/A-ICP (cf. Advanced Settings), all parts of the source surface must have a corresponding region in the target surface. If you activate “Use Targets”, the software will calculate a target registration error (TRE) with the provided targets (3) corresponding to X and Y. If you don’t have targets, e.g. if you use your own surfaces, you can also disable this feature.



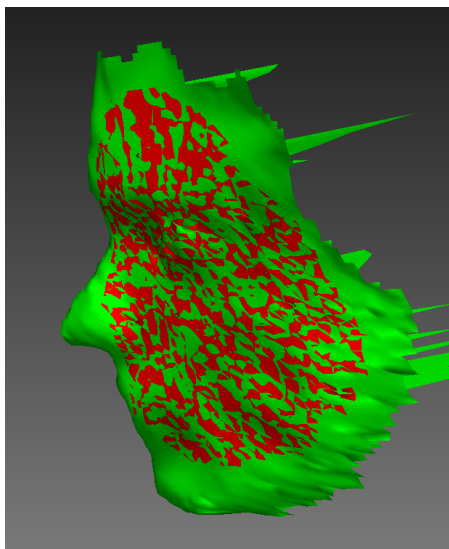
To perform the registration, click “Register Surfaces” (4). You can follow the registration progress in the console window in the background; it may take a few seconds. When finished, a message will appear and, you’ll see the registered surfaces on the screen. Additional information on the registration (e.g. the TRE value) is given in the RESULTS text field of the Anisotropic ICP Utility, as shown in the following screenshot:



If you want to compare the result to the registration of the standard ICP you can choose the radio button "Standard ICP" in the middle of the user interface. For the standard ICP the software uses an implementation of *The Visualization Toolkit* (VTK, [www.vtk.org](http://www.vtk.org)). In case of the test data you'll get the following results:

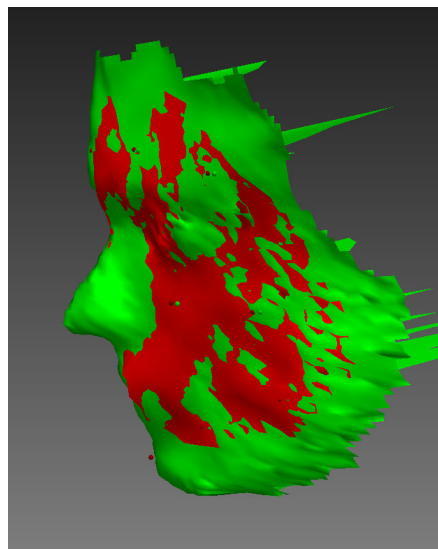
### Anisotropic ICP

TRE: 0.01 mm



### Standard ICP

TRE: 2.92 mm



## Further Information on the Software

This guide is mainly thought to help you getting started with the MITK Anisotropic ICP Utility. However, the software offers much more functionality. In the tab “settings” you can choose different variants for covariance matrix calculation. Details on the corresponding methods can be found in the above-mentioned paper on the A-ICP.. “Advanced settings” holds the trimmed variant of the algorithm. In “Tools” you can find functionality for translating and/or rotating transforming surfaces with a known rigid transform. Most of the functionality has been used for our experiments presented in the A-ICP paper. Reading it may help you to understand all the features. Nevertheless, a more detailed manual will be provided in the future.

We also included more MITK plugins to this application which may help you when working with the algorithm. The “Data Manager” helps you manage all data which you load into MITK. With “Point Set Interaction” you can create your own point sets, which you may need as targets when validating a registration. You can get help on these additional plugins by simply pressing F1 when they are activated in the main application.