

Hands-on ICP with CloudCompare

Introduction

Two surveys of the Hope fault have been realized. One before and one after a forest fire. The goal is to register both surveys and to locate and study the burned region.

Get the data and open it

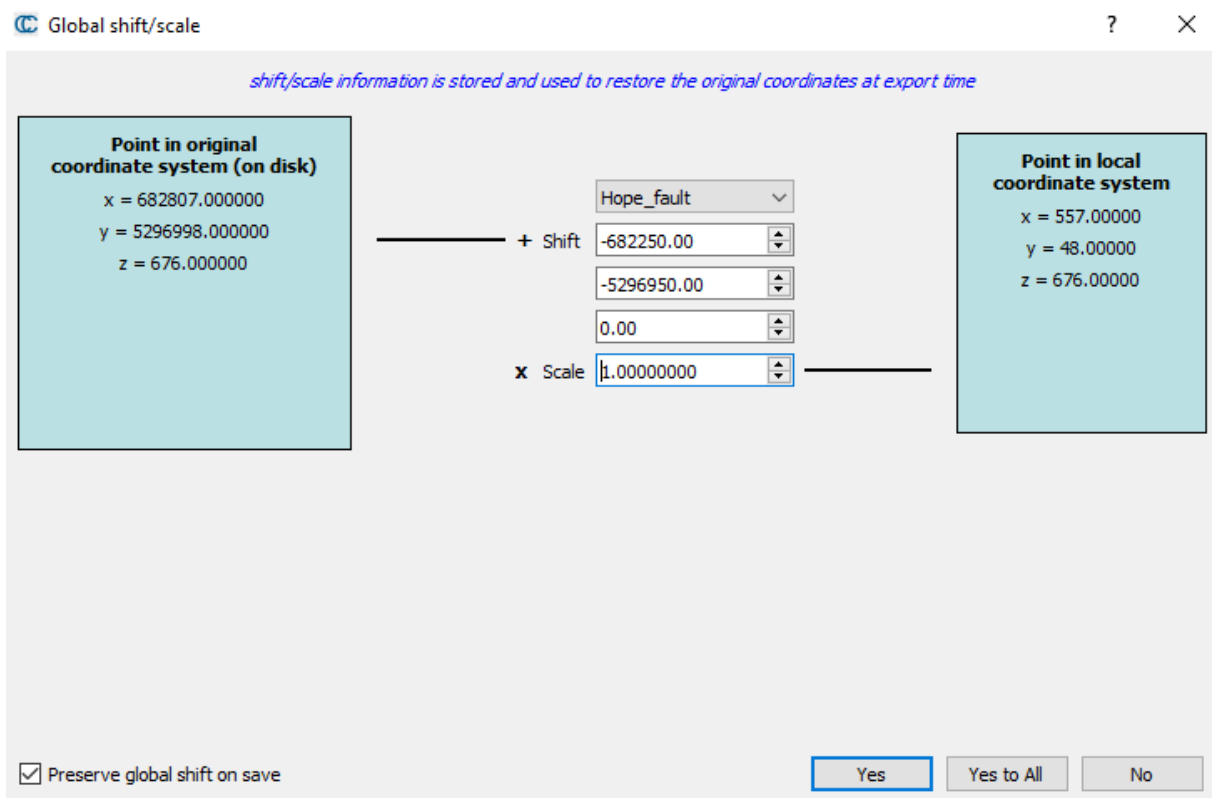
Download the data in the resources section of the website.

We will open both clouds in CloudCompare using the following global shift (-682250.00, -5296950.00, 0). To do that, we will store this custom value in a specific file read at start-up by CloudCompare.

Edit the file *global_shift_list_template.txt* located in the same directory as your CloudCompare executable, rename it *global_shift_list.txt* after having added the following entry:

```
Hope_fault ; -682250.00 ; -5296950.00 ; 0.0 ; 1.0 ;
```

Open both clouds using the configured global shift. Our custom value should appear in the menu:

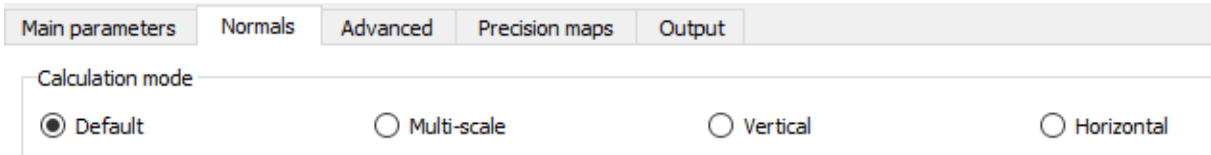


M3C2 initial diagnostic

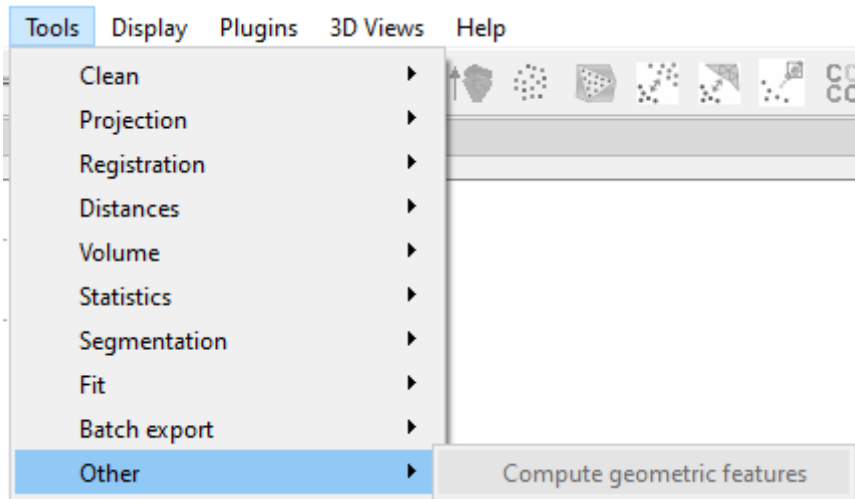
Perform a first overview of the difference between both clouds using M3C2.

Question: Which parameters can we choose? Normal scale, search scale?

Set the normal mode to the *Default*.




Use the tool located in *Tools/Other/Compute geometric features* to compute the number of neighbours with different scales.



Sub-clouds extraction

As we are looking for a change in vegetation, what is the first step to do before trying to register?

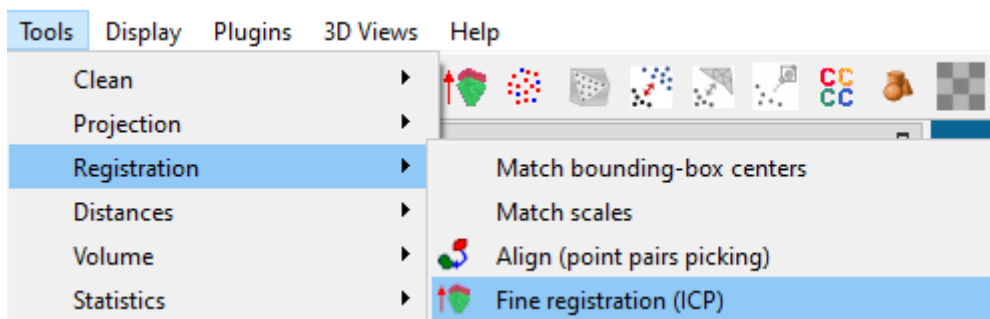
Build two clouds extracted from survey 1 and 2 on which to perform the registration with *Filter*

points by value 

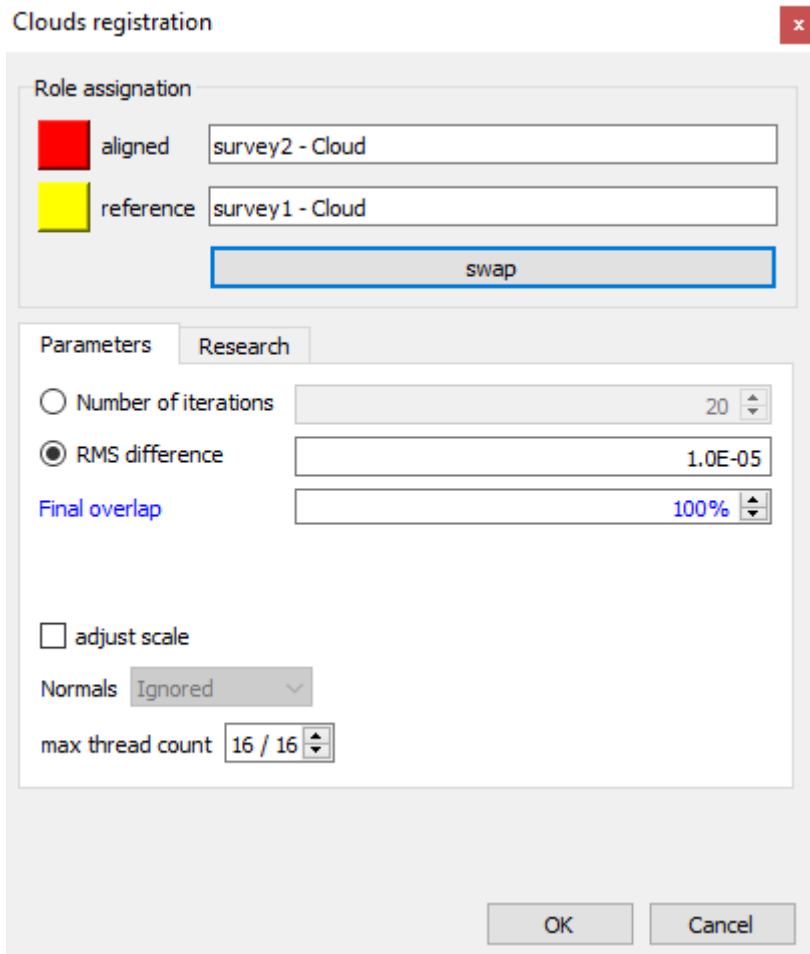
Do not remember what classes class 1 and 2 are? 2 is the ground, try to isolate it by hiding the points of class 1 for instance. What is 1?

Apply ICP

Select your two extracts and apply the ICP on them (**clone the second one before registering!**). You can use the menu *Tools/Registration/Fine registration (ICP)* or directly click on the icon in the toolbar





The reference cloud is the survey 1.



Control with M3C2

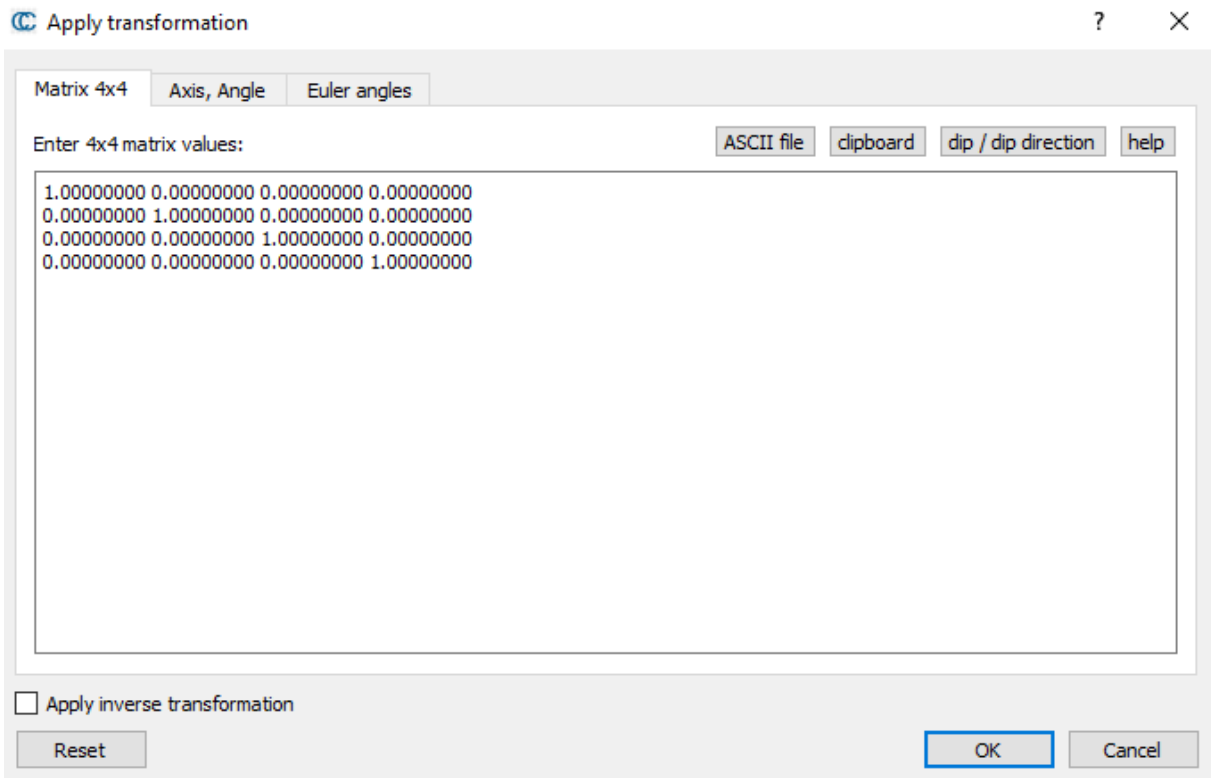
Once the ICP is performed, control the quality using M3C2, compare with the first M3C2 run. Use the

tools *Show histogram*  and *Fits a statistical model on the active scalar field* .

Do we have to run again the ICP?


Register survey 2

Apply the transformation on the full survey 2 cloud (do not forget to clone your cloud before applying the transformation).



Now you are ready to perform M3C2 again, and look for changes.

Look for changes with M3C2

Isolate the area where changes have occurred with the *Segment* tool  or with *Filter points by value*



. Compute statistics on it.

Use M3C2 Vertical mode and / or C2C distances to estimate the height of the highest tree which disappeared

Change the normal calculation mode to Vertical and relaunch the computation.

