

# Import Data

## 1. Marker data

In the tutorial we will use data from the “Fifth Grand Challenge Competition to Predict In Vivo Knee Loads”. The full data package is available here: [https://simtk.org/frs/?group\\_id=413](https://simtk.org/frs/?group_id=413)

For example, during the workshop we will work with a static and a gait trial. Go to the “1\_Import\_data\c3d\_files” folder to locate the .c3d files:

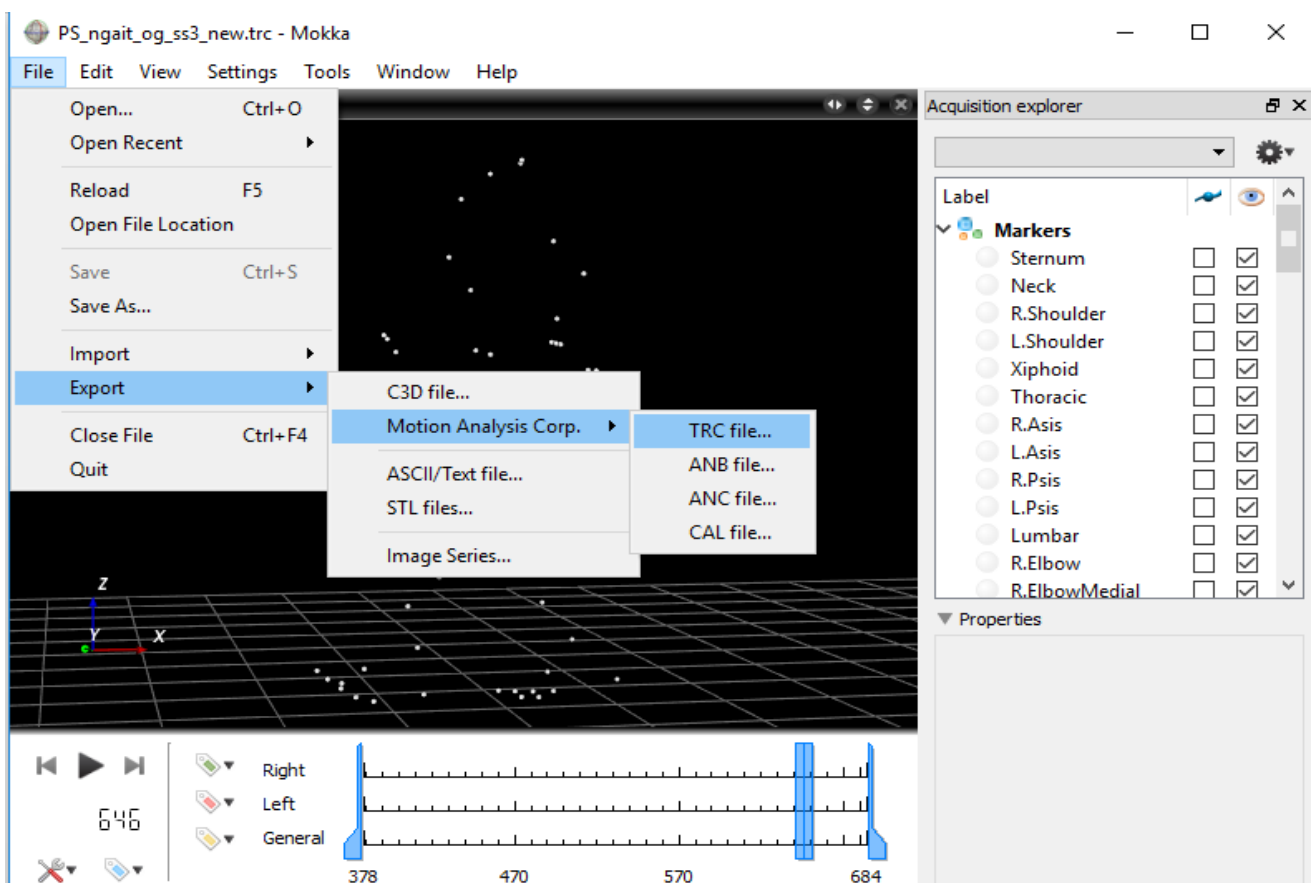
- Static position: **PS\_staticfor2.c3d**
- Gait cycle: **PS\_ngait\_og\_ss8.c3d**
- Gait cycle (cropped to a single stride): **PS\_ngait\_og\_ss8\_CROPPED.c3d**

This data must be pre-processed before being used in OpenSim simulations.

## 2. Visualisation in Mokka

Load the movement data (.c3d files) in Mokka to visualise the markers. You can load the configuration file “Mokka\_GC\_config\_file.mvc” to better visualize body segments.

You can export the marker data as .trc files.



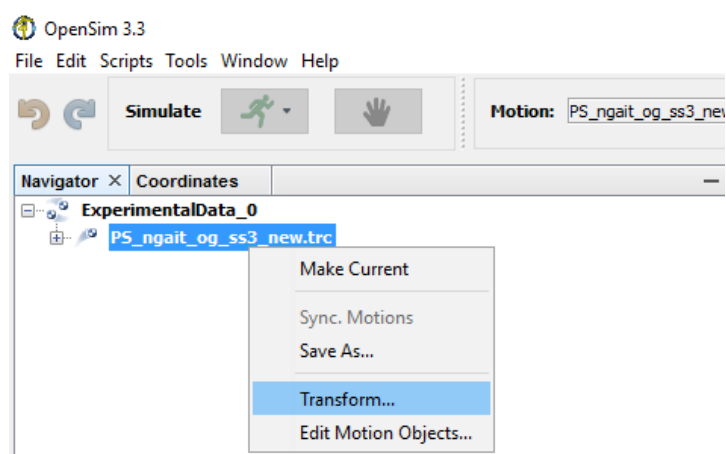
The .trc files used in the workshop are located in the “1\_Import\_data\workshop\_trc\_files” folder:

- Static position: **Static.trc**
- Gait cycle: **Gait.trc**

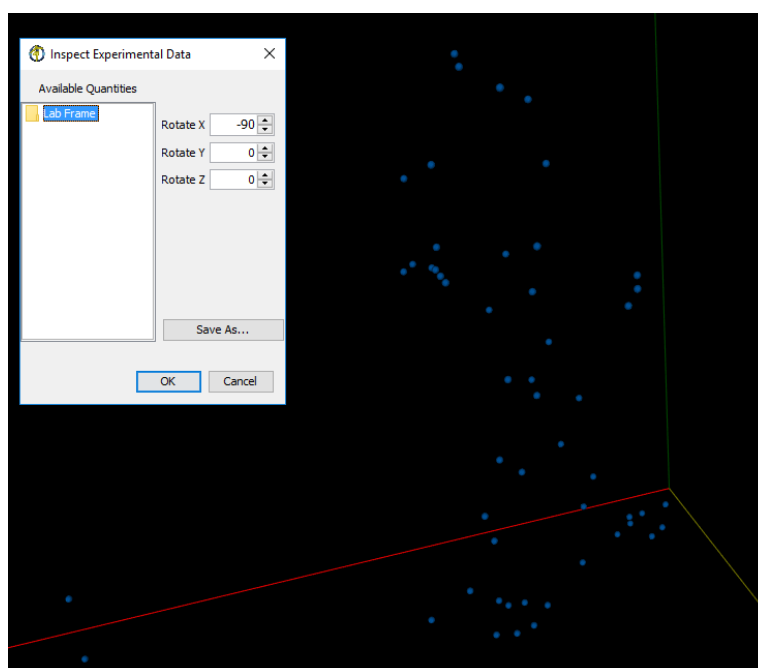
### 3. Coordinate system (rotation matrix)

The gait lab coordinate system does not necessarily match the OpenSim coordinate system, which is consistent with the recommendation of the International Society of Biomechanics. Data should then be rotated to match the OpenSim model orientation.

In OpenSim, go to File\Preview Experimental Data and open the .trc files you just created. In the Navigator tab, right click on the data and select Transform.



Rotate the lab coordinate system to match the OpenSim coordinate system (in this case  $-90^\circ$  around the X axis for the static trail;  $180^\circ$  around the Y axis and  $90^\circ$  around the X axis for the gait trial).



Save as a new .trc file.

The rotated .trc files used in the workshop are located in the “1\_Import\_data\workshop\_trc\_files” folder:

- Static position: **transformed\_Static.trc**
- Gait cycle: **transformed\_Gait.trc**
- Gait cycle (cropped to a single stride of right leg): **transformed\_Gait\_cropped.trc**.
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**NB:** The last file was produced using the BTK script in the folder “1\_Import\_data\example\_BTK\_Matlab\_script”.

## 4. Marker files (.trc)

1	PathFileType	4	(X/Y/Z)	E:\_Clement\	PARISWORKSHOP\Opensim_material\1_IMPORTDATA\Gait_transformed.trc									
2	DataRate	CameraRate	NumFrames	NumMarkers	Units	OrigDataR	OrigDataS	OrigNumFrames						
3	120	120	307	68	mm	120	1	307						
4	Frame#	Time	Sternum		Neck			R.Shoulder			L.Shoulder			
5			X1	Y1	Z1	X2	Y2	Z2	X3	Y3	Z3	X4	Y4	Z4
6	1	3.15	978.778	1403.8	-215.545	1136.9	1514.41	-218.823	1085.88	1505.15	-377.527	1106.93	1495.85	-75.9539
7	2	3.158333	968.752	1402.67	-213.231	1127.08	1513.06	-216.597	1075.98	1503.91	-375.429	1097.24	1494.33	-73.5428
8	3	3.166667	958.619	1401.79	-210.994	1117.44	1512.3	-214.22	1066.12	1502.93	-373.308	1087.58	1493	-71.2165
9	4	3.175	948.612	1401.34	-208.72	1107.7	1511.53	-212	1056.6	1502.35	-371.083	1077.94	1492.06	-68.85
10	5	3.183333	938.7	1401.39	-206.644	1098	1511.03	-209.794	1047.23	1502.04	-368.949	1068.32	1491.41	-66.5124
11	6	3.191667	928.803	1401.8	-204.667	1088.53	1510.92	-207.521	1038.17	1502.16	-366.605	1058.64	1491.11	-64.2694
12	7	3.2	918.853	1402.57	-202.715	1079.13	1511.1	-205.231	1029.21	1502.57	-364.312	1048.95	1491.25	-61.8428
13	8	3.208333	908.808	1403.78	-200.568	1069.87	1511.77	-203.638	1020.17	1503.47	-363.044	1039.17	1491.78	-59.4763

- Header with trial info

- Marker names

- Coordinate component and Marker number

## 5. Useful links

More details about data format and links to tools for pre-processing experimental data are available at:

<https://simtk-confluence.stanford.edu/display/OpenSim/Preparing+Your+Data>