**Determining the exact offset of stimulation and the electrodes that show strong artefacts**

***Step 1 - Setup***

* Put all the .eeg and .vhdr files (.vmrk if relevant) in one folder (called ‘Raw files’).
* Create two other folders (‘History files’ and ‘Output’).
* Open BrainVision Analyzer (you need the dongle for it to start – it should be in the hood of the EEG testing box; the software should be in the EEG/TMS lab and the analysis suite; if in doubt, ask David Lloyd)
* Create a new workspace (enter the appropriate paths), save it near the previous folders.
* At this point, all files should have been loaded (left hand-side tree). If some are grey and don’t open when you click on them, this is probably linked to having renamed the .eeg file, but not the corresponding .vhdr. You can either revert to the old name, or change the name to the new version in the .vhdr (open with NotePad ++).
* Open three excel sheets, one for the timing of segments, one for electrodes presenting tCS artefacts and the other for noisy electrodes.

***Step 2 – General quality control***

* Open the first file and quickly scroll through it. You are evaluating the amount of high-frequency noise (muscle clenching), line noise, events that occur similarly over all channels (something affected the reference?), slow large-amplitude oscillations (sweating, movement of the cables), sharp changes in the overall pattern of EEG (mystery event).
* You could create a scale of 1 to 5 for data quality and take a quick note of your overall impression of the recording.
* Take note of the names of any excessively noisy electrodes; you can hover over the trace to read the electrode label (right bottom info bar), then you can click on the electrode label to check you got the right one (it will highlight the corresponding trace). Because some electrodes can become noisy during other times that we aren’t interested in, you could focus your search for these noisy electrodes around the times of interest (see below).

Next, the goal is to determine the times of start and end of ~1 minute-long segments, just before stimulation, and after each block of stimulation (assuming three blocks of tCS). The start and end times (expressed in ms) will be used to cut the segments to be analysed later. We want the segment to be as long as possible, but also as clean as possible, so if it’s possible to avoid a noisy event at the end of segment, do so. Other important point: because we are looking for entrainment of oscillations by the tCS, the segment needs to start as soon as the tCS ends (hence the effort to identify this time-point correctly).

***Step 3 – Start and end of the first segment (baseline, before stimulation)***

* Take note of the time-stamp for the start of the recording (right bottom information bar), by hovering the cursor over the traces. Caution: make sure you are reading the time-stamp in ms for the overall recording, not for the current window. Take note of the second time-stamp, just before the stimulation is turned on (reliable artefact preceding the start of oscillations).

***Step 4 – Finding the offset of stimulation following active tACS***

* Scroll through the recording until you see the oscillations decrease. There is a more or less sharp end to the tCS oscillations, sometimes involving a very small spike. This is particularly seen in the electrodes that display exponential decay of their signal after the end of tCS. These are often electrodes directly over the stimulating pads, that have high tCS signal even towards the end of the stimulation. I suggest taking note of the names of these electrodes, as you will want to exclude them later. It should be roughly the same culprits over all recordings.
* Once you are in the right time-zone, zoom in (reduce time available on the screen), until you display at just a couple of ms on screen. This should allow you to place the cursor very finely over the end of stimulation. If in doubt, choose the following time-point, to avoid including some machine-generated oscillations to the brain-entrained oscillations that we are looking for. Take note of this time-point.
* As previously, the end of this segment will be just before the start of the next stimulation block, as defined by the tCS generated artefact.

***Step 5 – Finding the start and end of segments in the sham condition***

* For the baseline segment, do as for the active tCS.
* For the ‘post-stimulation’ segments, and given there is no stimulation delivered in the sham around that time, first, determine the *end* of the segment (i.e. just before the start of the next sham). From there, you could decide to subtract exactly 60s to the end time-stamp, to obtain the ‘start’ time-stamp, or to match the interval found in the active session (to have more similar lengths). If everything has been timed well, this shouldn’t make a difference.
* For the final segment, there is no ‘start of the next stimulation block’. If timing was respected (recording of ~1 min. after the supposed end of the sham tCS), then you can define the segment as the last 60s of the recording. If you have more recording, you should try to match the time you select to that in the active condition.

***Step 6 – Checking plausibility of information, summarising***

* I recommend checking that the segments you defined are ~60 to 70s in length. If not, check for errors. Possibly exclude participant at this stage if too little data.
* Determine which electrodes are most commonly affected by the tCS artefact (e.g. in 80% of recordings); they will be excluded. You might want to use different % to make sure you don’t exclude too large a number of electrodes altogether.