Themes emerging through the collaboration included human and technological 'perception'; synchronicity, frequencies, time-scales and intervals; and the whole problem of 'sampling'. In what sense is digital audio 'continuous', and what are films and videos if not 'real-time time-lapses'?

Patrick introduced the Heisenberg-Gabor uncertainty principle: the more exact you want to be about frequencies in a signal, the longer time-window is needed for observation. And Sofia explained that our notion of a signal depends on how quickly we see it; the notion of 'scale' is important in the context of time, audio wavelengths (eg.a boat engine or train rumble), frequency of complex events (eg.waves hitting a wall or beach) and frequency of sampling.

How we experience the world in space and time could be the widest theme of all. But the tidal Thames offers endless foreground subject matter for the artists; for example, 'tidal excursions'. What happens to the estuarine water itself (and to its biota, microscopic as well as visible), as the level rises and falls?
The work is out there; further collaboration is invited.

The Science Library,
University College London
DMS Watson Building
Malet Place
London WC1E 6BT
020 7679 7795

July 27th-Sept.22nd.2017
Mon-Fri.09:30-20:30
Saturdays 11:00-17:45
admission free

https://events.ucl.ac.uk

Bobby&Stillman blog, plus more on Thames Tides work
by Crispin and Susi, here: http://thamestides.wordpress.com

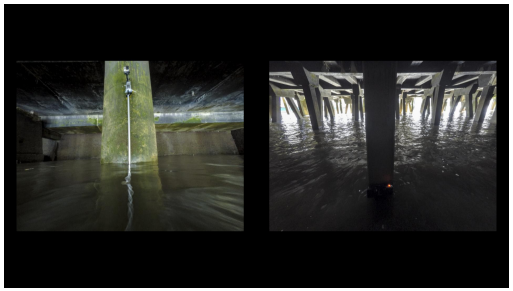
UCL's Big Data Institute, here: https://www.ucl.ac.uk/big-data/bdi

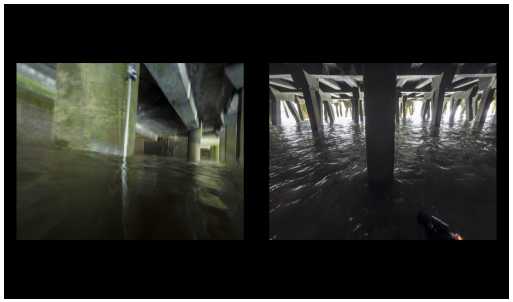
An initiative of *Creative Reactions* (*Pint of Science*), facilitated by Eleanor Armstrong, Aaron Jones + Sam Wigfield, here: https://pintofscience.co.uk/creativereactions/

Bobby&Stillman in the Science Library:
art, maths, movies and point-of-view

The Thames estuary is a piece of coastline reaching up into the middle of London: twice a day the water rises and falls up to seven metres. Tidal rhythms, once a metronome of the city's commerce, often go un-noticed today.
A film-maker and a photographer, working with tides, join scientists from UCL's Big Data Institute to understand their observations in new ways.

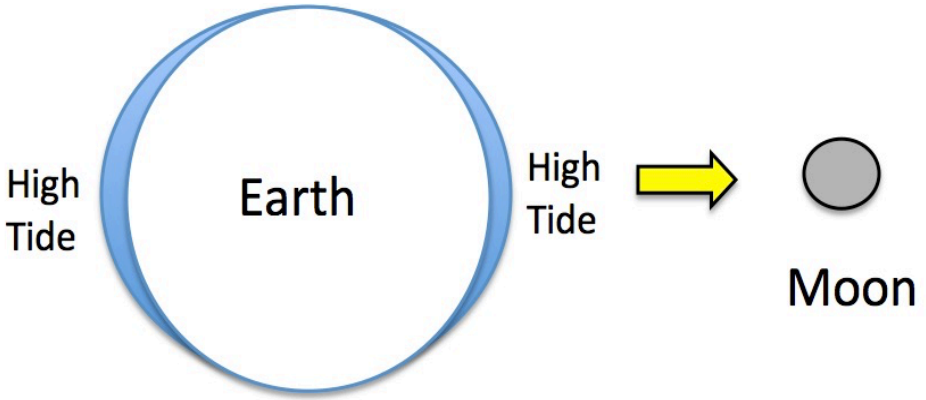
***The Moon and the City**:*
16'46" (silent), Susi Arnott, 2016.
Two tides, four locations, looking around the clock and compass for 24 hrs.
A full moon rises in the East to cross the Southern night sky; it sets in the West as morning develops. Looking North, the moon slips round behind our planet to rise again that night.





***Twinset timelapse*:**
7'50" (stereo), Crispin Hughes/Susi Arnott with Sofia Olhede, 2017

A single tide in a single location, from two paired camera/sound devices: *Bobby* and *Stillman*. They record the tide, and each other, from moving and fixed perspectives.
Bobby's moving frame of reference is shown to the left-hand half of the frame, and heard in the left earpiece. Stillman has a fixed point of view, seen and heard to the right.



The Moon's gravity makes our oceans bulge at both near and far sides –
so there are two tides, as the Earth rotates. *Dr.Kenny Scott*

Film-maker Susi Arnott and photographer Crispin Hughes have worked with tides on the North Cornish coast and in Central London. Previous work includes composite stills photography from fixed points, time-lapse films from fixed, hand-held & free-floating devices, and audio from fixed or moving perspectives.

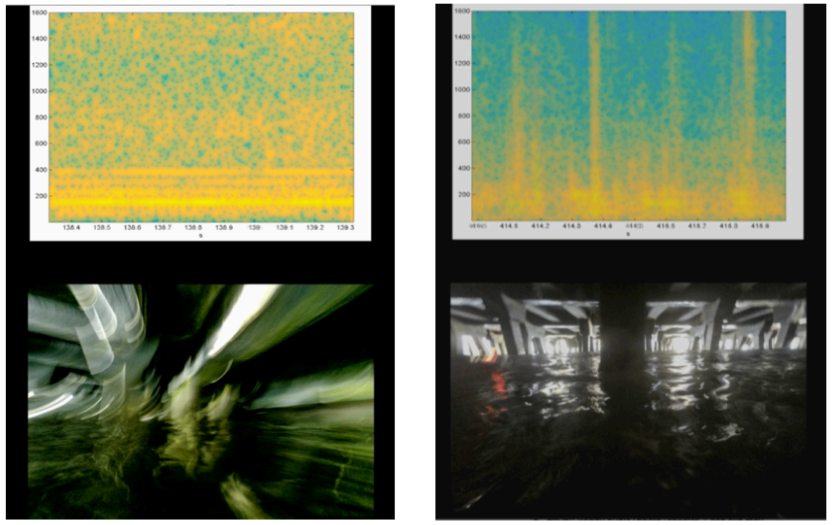
Professor Sofia Olhede is Scientific Director of the UCL Big Data Institute. Amongst many other projects, she handles data on physical oceanography in order to characterise global circulation patterns, important for quantifying climate change. Fixed and moving observation platforms are standard practice, to observe from within a current, or as it passes a fixed point. And in the applied maths, data from fixed and moving points are referred to as 'Eulerian' or 'Lagrangian' respectively.

Sofia introduced Susi and Crispin to these scientific terms, helping them explore tensions in their art work between active immersion and impassive 'observation'. Crispin came up with a new project in which the same tide, in the same space, is recorded by camera/recorder arrays with Eulerian and Lagrangian frames of reference. They also observe each other observing.
Their new recordings were at the same time a collection of photographic images & sound recordings for artists, and a 'data set' for mathematicians.

Initially, Sofia wanted to analyse photographic pixels over time, following Bobby's spatial movements and tracking colour/intensity changes in recorded light. On learning how much the cameras pre-processed their visual data, she turned her attention to the audio and another colleague joined the collaboration; Professor Patrick Wolfe, Executive Director of UCL Big Data Institute and musician.

The first output was a conventional 'time-lapse' of animated photographs from both cameras, ***Twinset Timelapse.*** But human ears wouldn't hear the sound at x80 speed, and the soundtrack is heavily edited 'real-time' audio.
Using this as an 'overview' the artists then made much smaller image+sound data sub-sets from both points of view, to include passages of tiderise-immersion-emergence (three discontinuities, or 'cuts'). Bobby and Stillman's stereo audio tracks were mixed down to one channel each; left, and right.

The BDI team produced a time-series of spectrograms from the audio tracks, showing volume (colour) and audio frequency (y axis), against time (x axis).
The artists animated these, and the corresponding photographs, to play against the two simultaneous soundtracks, in 'real time'. So photographs taken 2 secs. apart, show for two seconds each. (The long exposure times often produced strong motion blur. Interestingly, Sofia is currently developing mathematical techniques to unpick distorting effects of motion on oceanographic data.)
The four resulting movies share the same stereo soundtrack, and are projected as near to simultaneously as standard technology allows.



Sub-Set Samples*: 17'33", stereo;*
Susi Arnott/Crispin Hughes, Sofia Olhede/Patrick Wolfe, 2017.
Left screen, Bobby's animated spectrograms and photographic data;
right screen, Stillman's perspective. Stereo headphones give Bobby's audio in the left channel, Stillman's in the right.