AFModulus_Flex

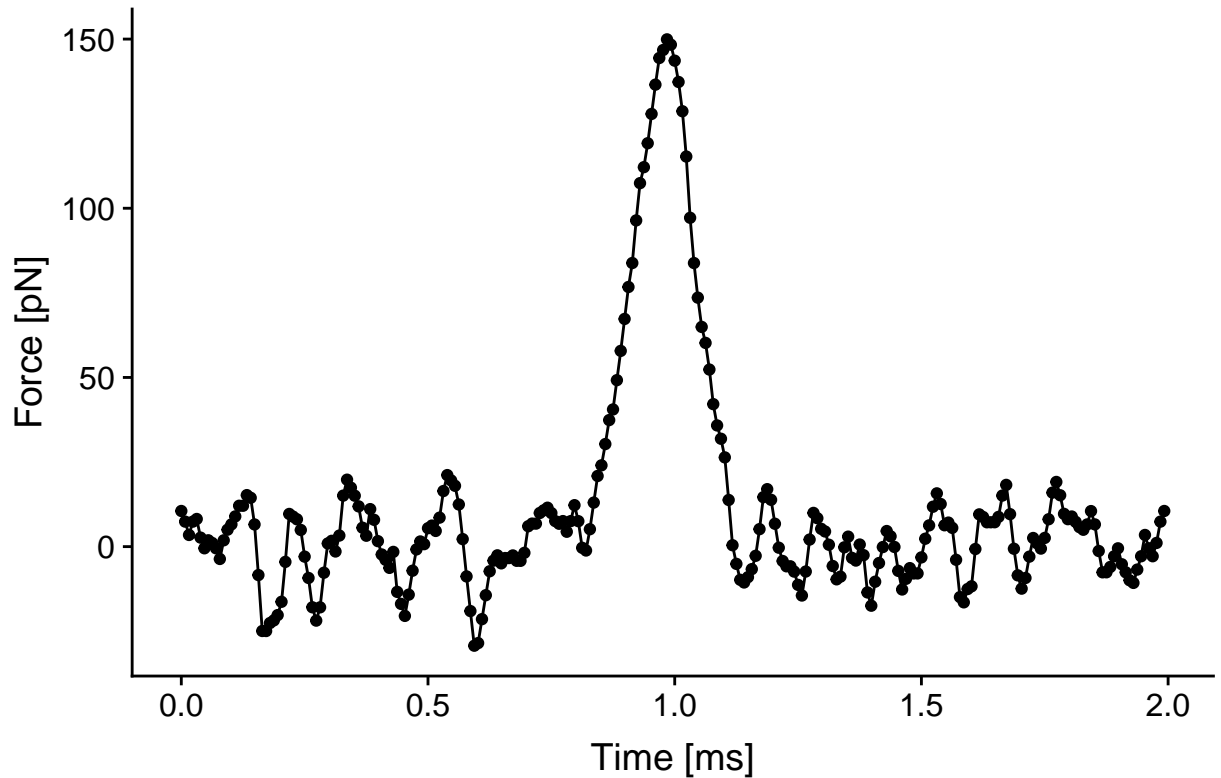Selen Manioglu, Astrid Stubbusch, Audrey Yeo

1/11/2021

Atomic Force Microscopy - From Topology to Stiffness (Modulus)

The git page of this project can be found here https://github.com/audreyyeoCH/AFModulus_Flex.

Import of AFM curves (force vs. separation distance) for each pixel

Plot 1 curve

s/20200619_.005.pfc−4069_ForceCurveIndex_45647.spm − NanoScope

We will use the force signal between time 0.0 - 0.5 ms as well as 1.5 - 2.0 ms as **baseline**.

We will use a sliding window approach to approximate the **gradient** of the linear slope within the time 0.5 - 1.2 ms.

Extract maximal force (F max) from each graph

F max = 149.9152, the time of F max = 1.99219.

Compute touching point

Intersect between baseline and linear gradient

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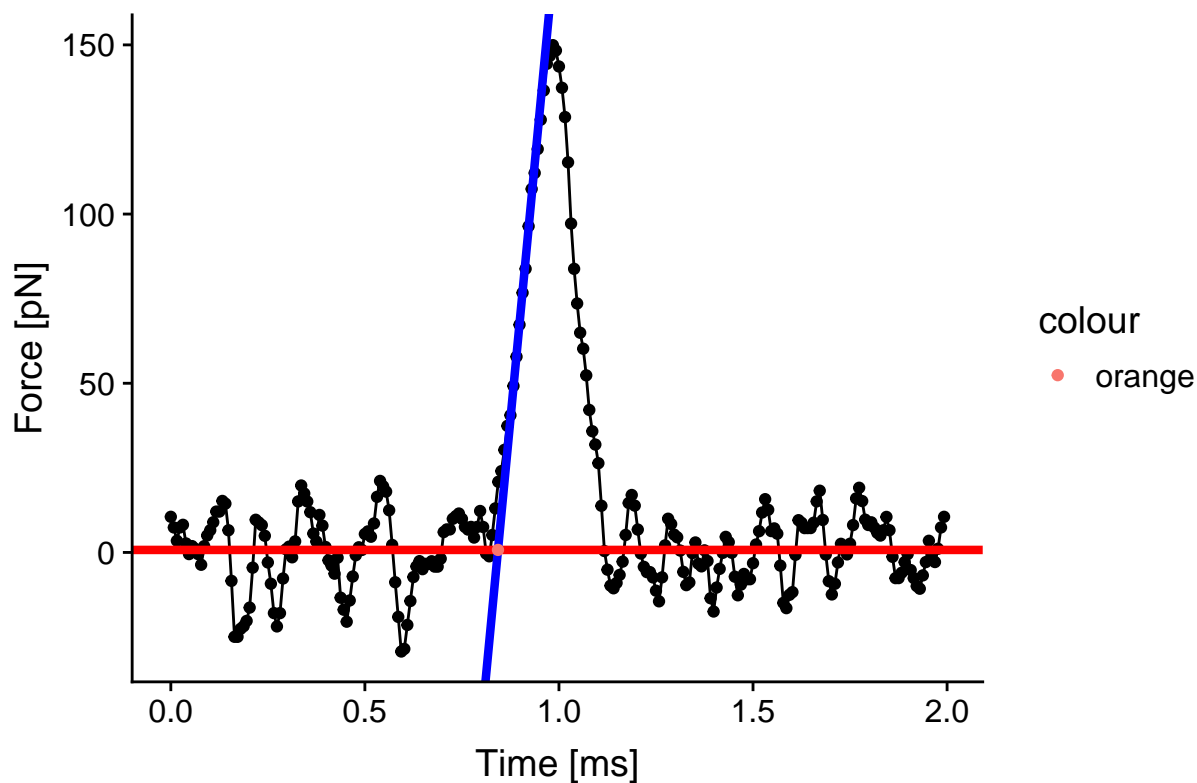
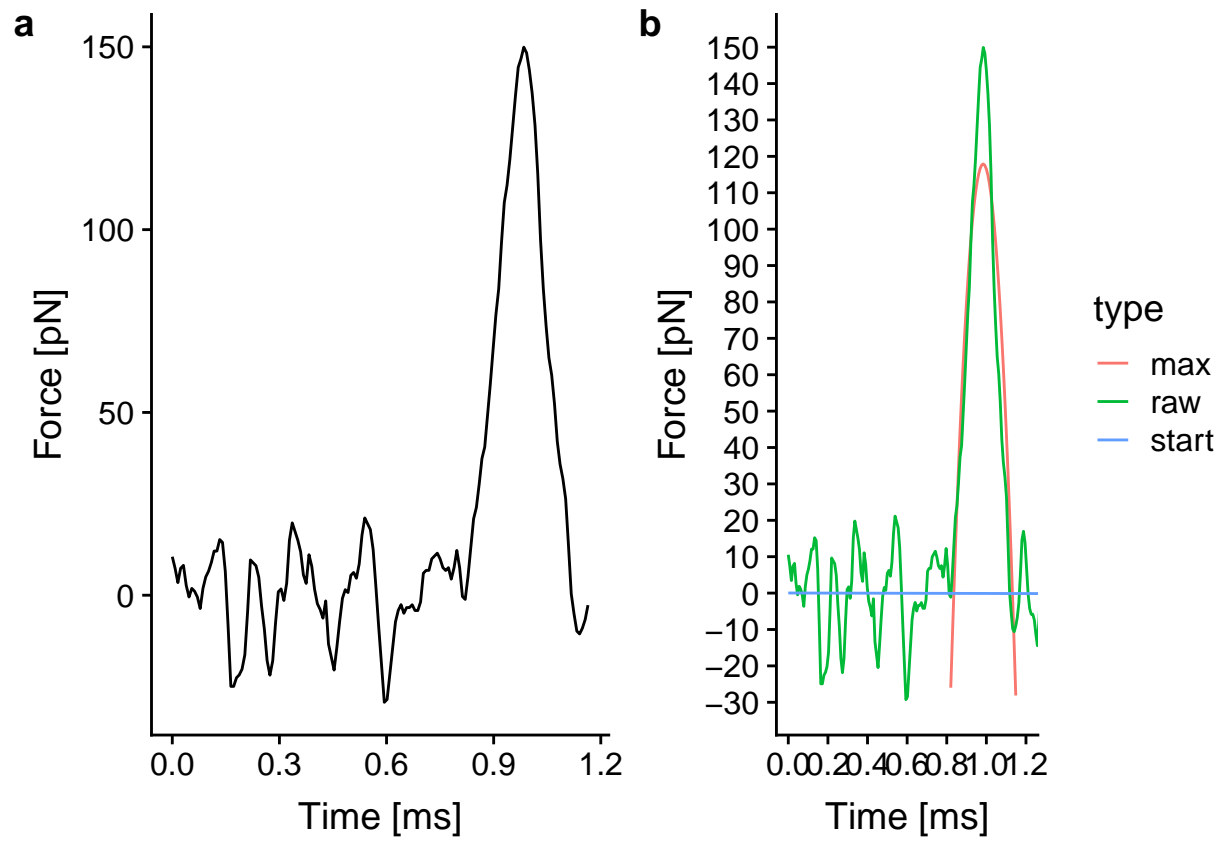**s/20200619_.005.pfc−4069_ForceCurveIndex_45647.spm − NanoScope**
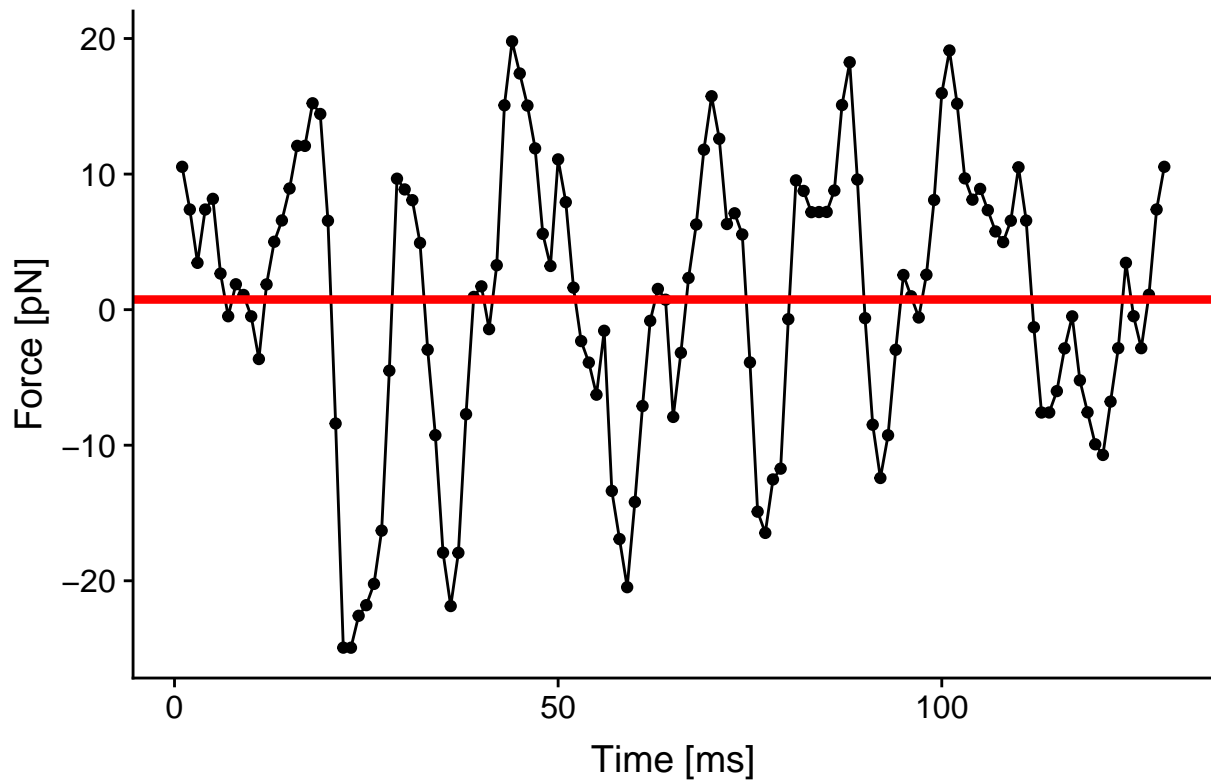
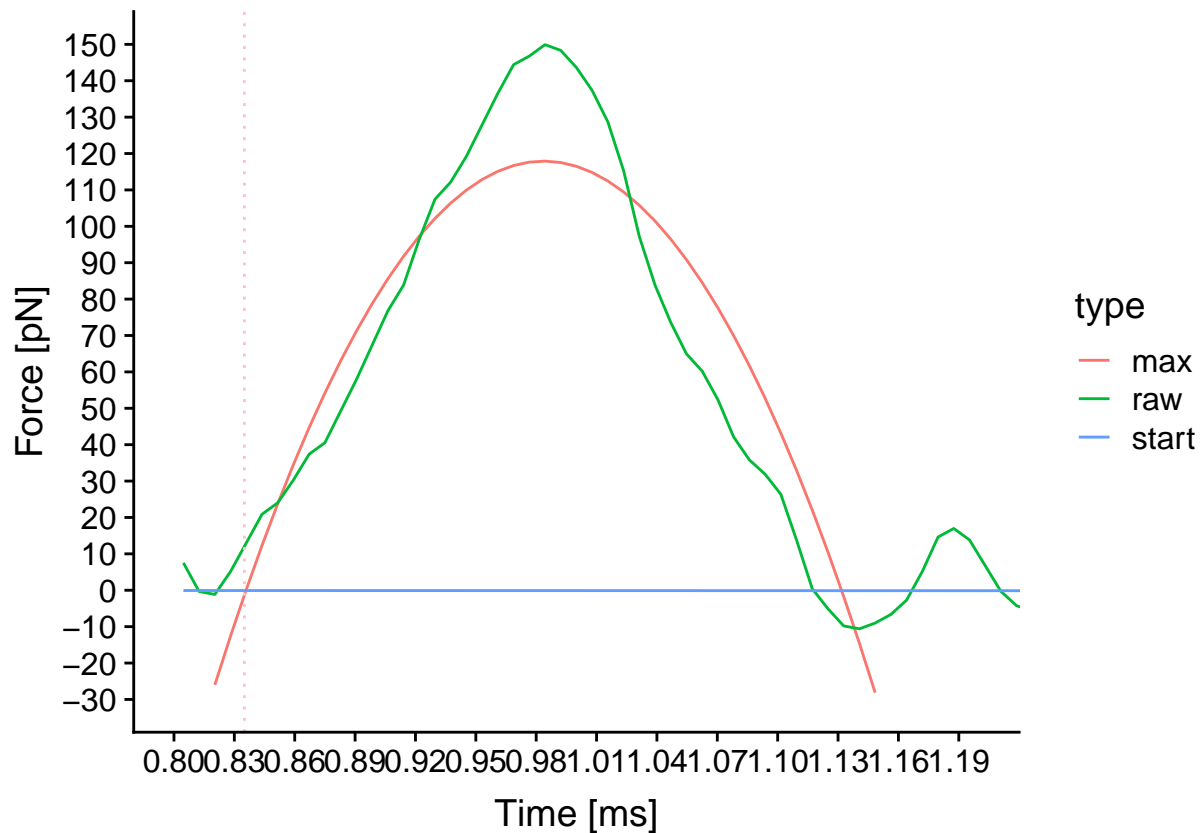**s/20200619_.005.pfc−4069_ForceCurveIndex_45647.spm − NanoScope**
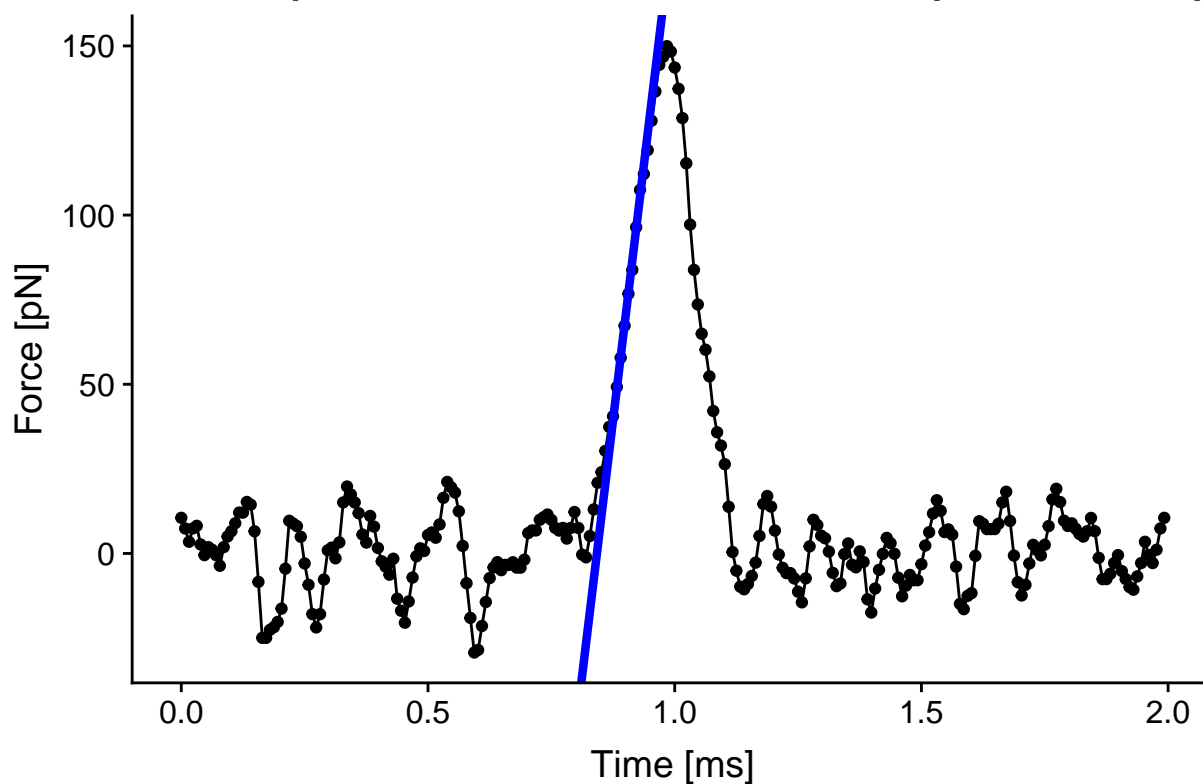
00619_.005.pfc−4069_ForceCurveIndex_45647.spm − NanoScope Analy

Intersect between baseline and parabular fit

a

b

Mean of error increase from baseline (= start of adhesion dent) and error from linear gradient (= end of adhesion dent)

Compute indentation depth (d) from touching point for each pixel

The indentation depth d = 1.1492608

Compute modulus (= stiffness, E) for each pixel from F-max and d

Print picture of stiffness (next to topology picture)

{python pic, echo=FALSE} #B = r.A + 1 # #

Error propagation/ sensitivity analysis of the modulus

{r error, echo=FALSE} #C <- py$B + 1 # #

Plot topology against modulus? Can this detect 'antibiotics affected areas'?