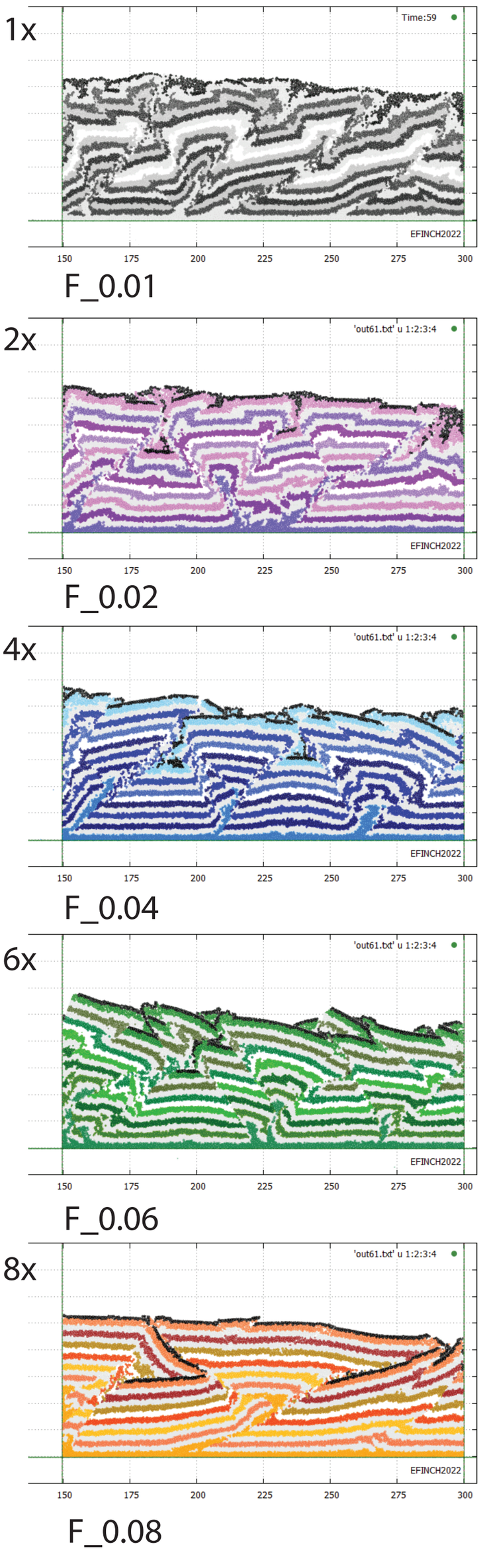
DEM: Thrusts 1. The effect of pre-kinematic strength on faulting

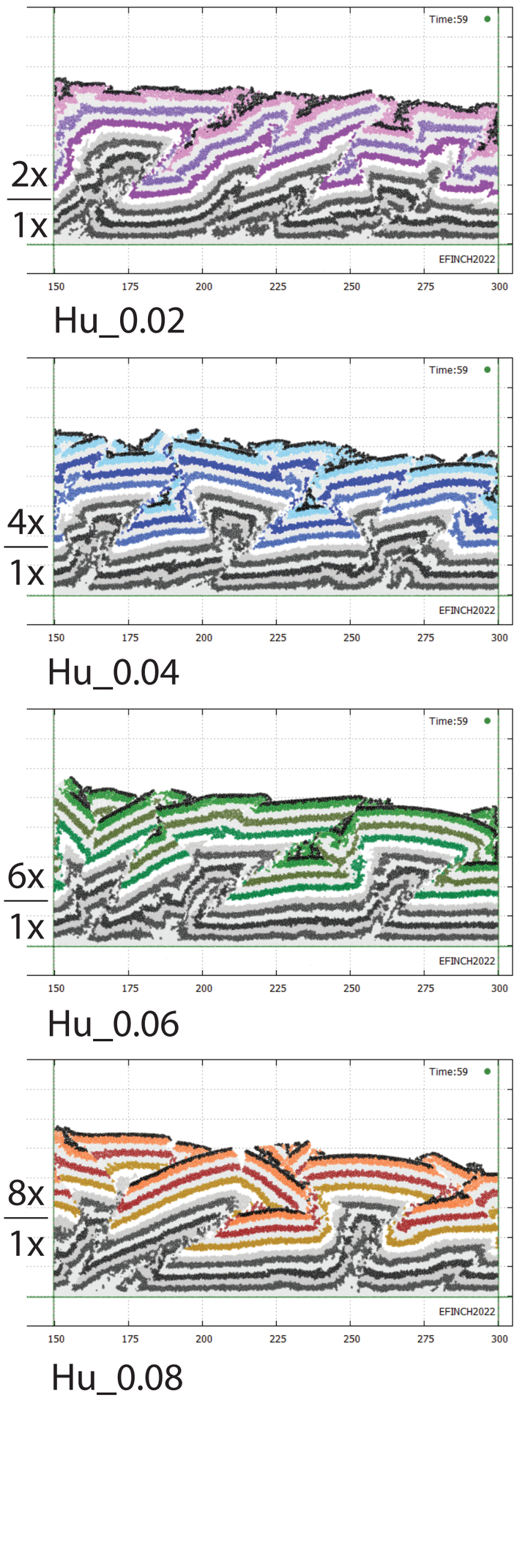
The media in these experiments contain 20664 elements in a box that is 300 x 30 units. Elements are distributed randomly with radii of 0.5, 0.4. 0.3 and 0.2 units. The left-hand boundary is incremented to the right at 0.00005 unit/timestep to a total compression of 150 units (50%). The experiments run for 3 million timesteps with outputs every 50,000 which are presented in the movies. The media is divided into 14 layers. Colours indicate the 'strength' of the media where numbers in the file name represent the separation between elements as a function of their initial separation that is required for bonds to break. This is distinct for each bond pair where each element is assigned a breaking separation determined from the average of the strength assigned to each element.

1. Single strength experiments

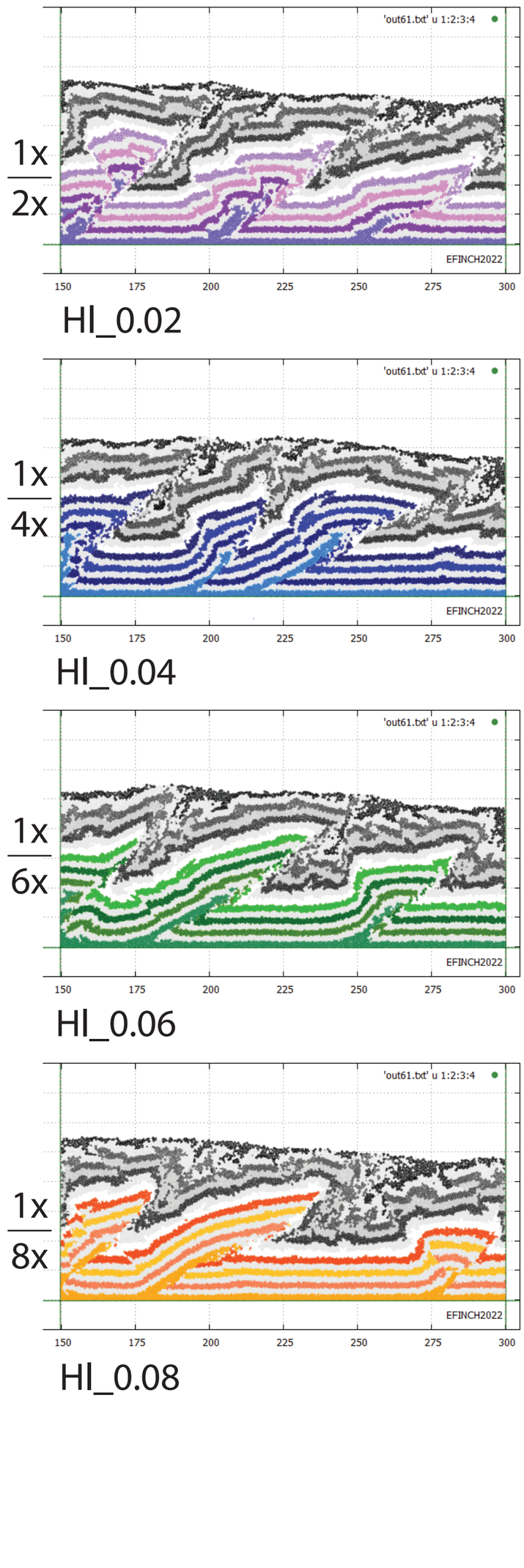
Experiments are shown where (1) the elements have the same breaking strength, the 7 upper (2) or lower (3) layers are relatively weaker or stronger.



2. Stronger upper layers

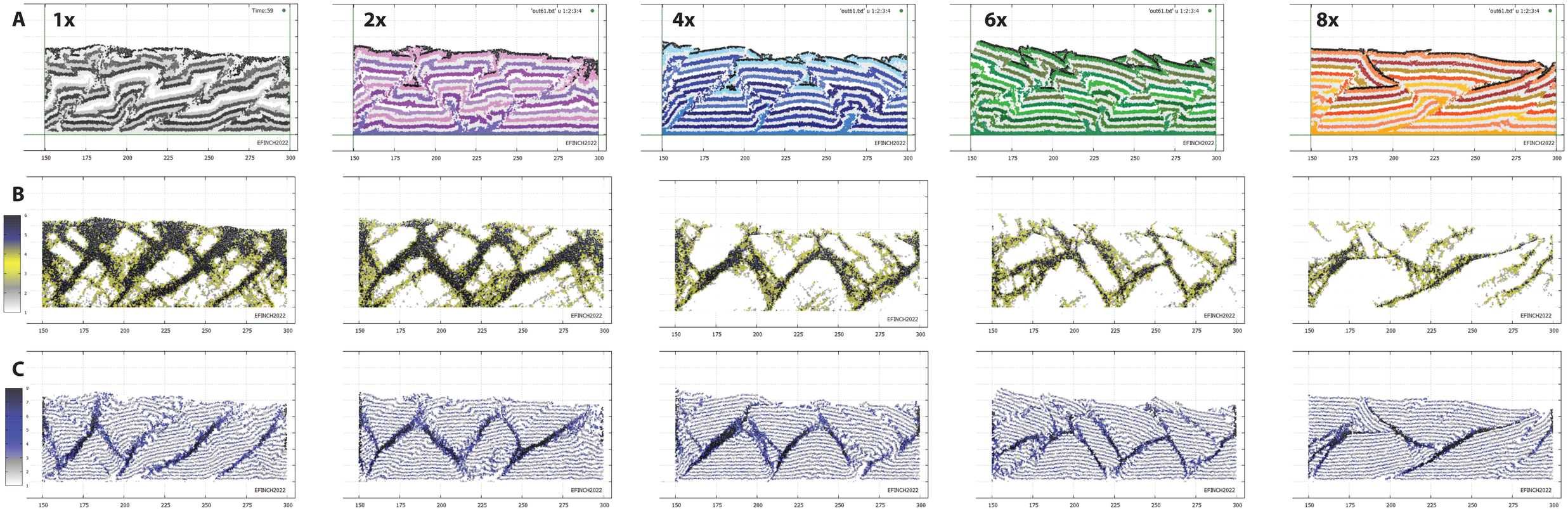


3. Weaker upper layers



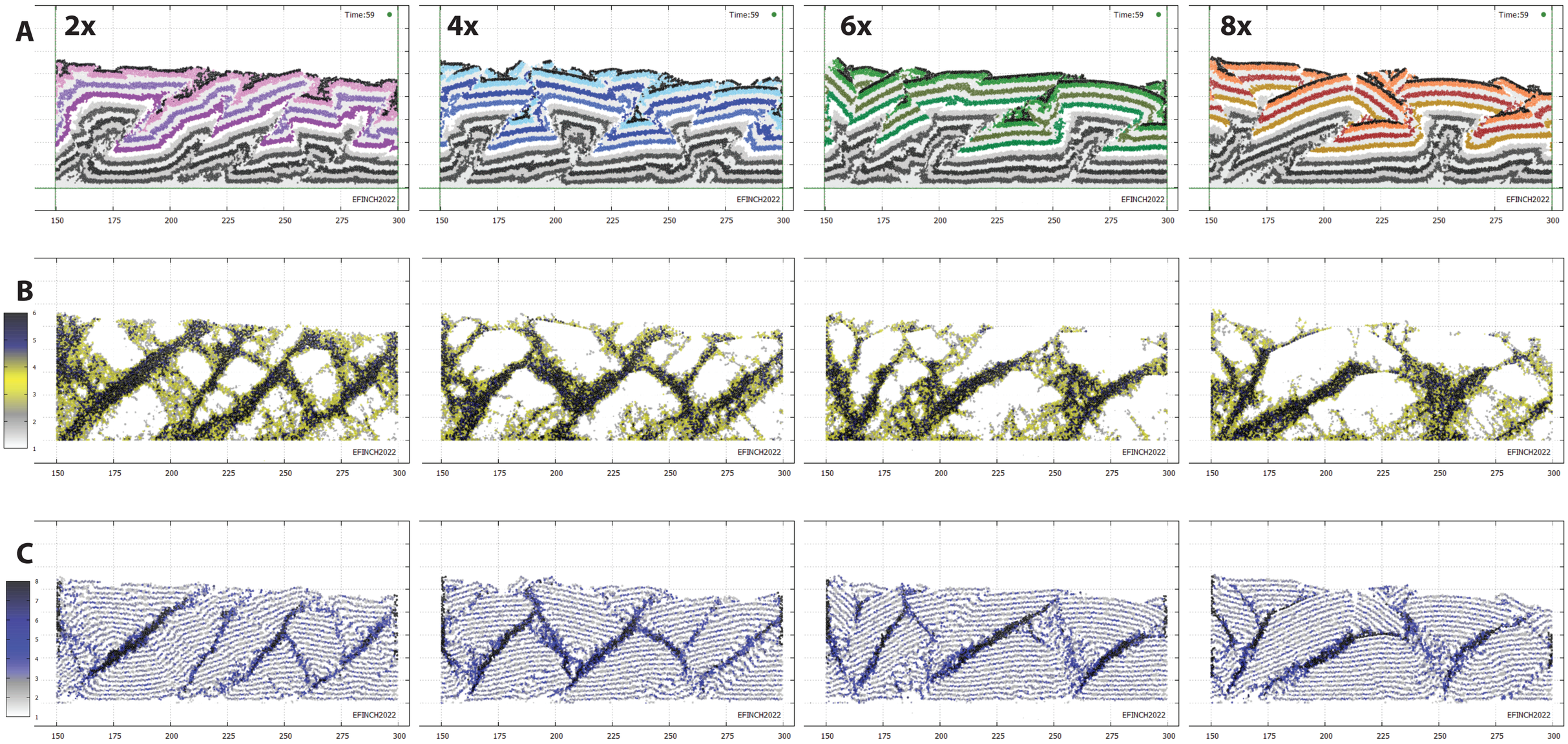
1. Single strength experiments

There are three outputs shown on these pages to demonstrate the failure of the media at the end of the experiment. (A) The layers in the model coloured according to their 'strength', (B) Elements coloured according to the broken bonds between them and their neighbours from white (0) through yellow to black (6+) , and (C) A coherence plot where an element is coloured according to the difference between its layer number and that of the element immediately below it. Elements within layers are white and fault locations are highlighted as the colour darkens.



2. Stronger upper layers

Stronger upper layers control the deformation where the lower layers appear more competent.



3. Stronger lower layers

Stronger lower layers fail in discrete thrusts with major deformation in the upper weaker layers.