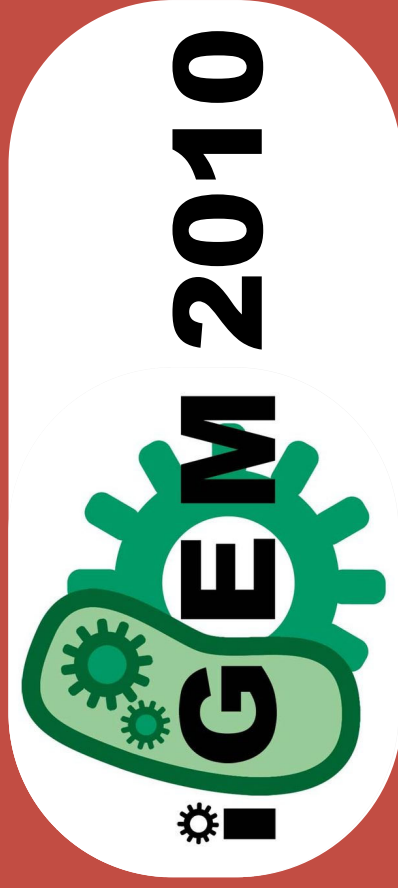
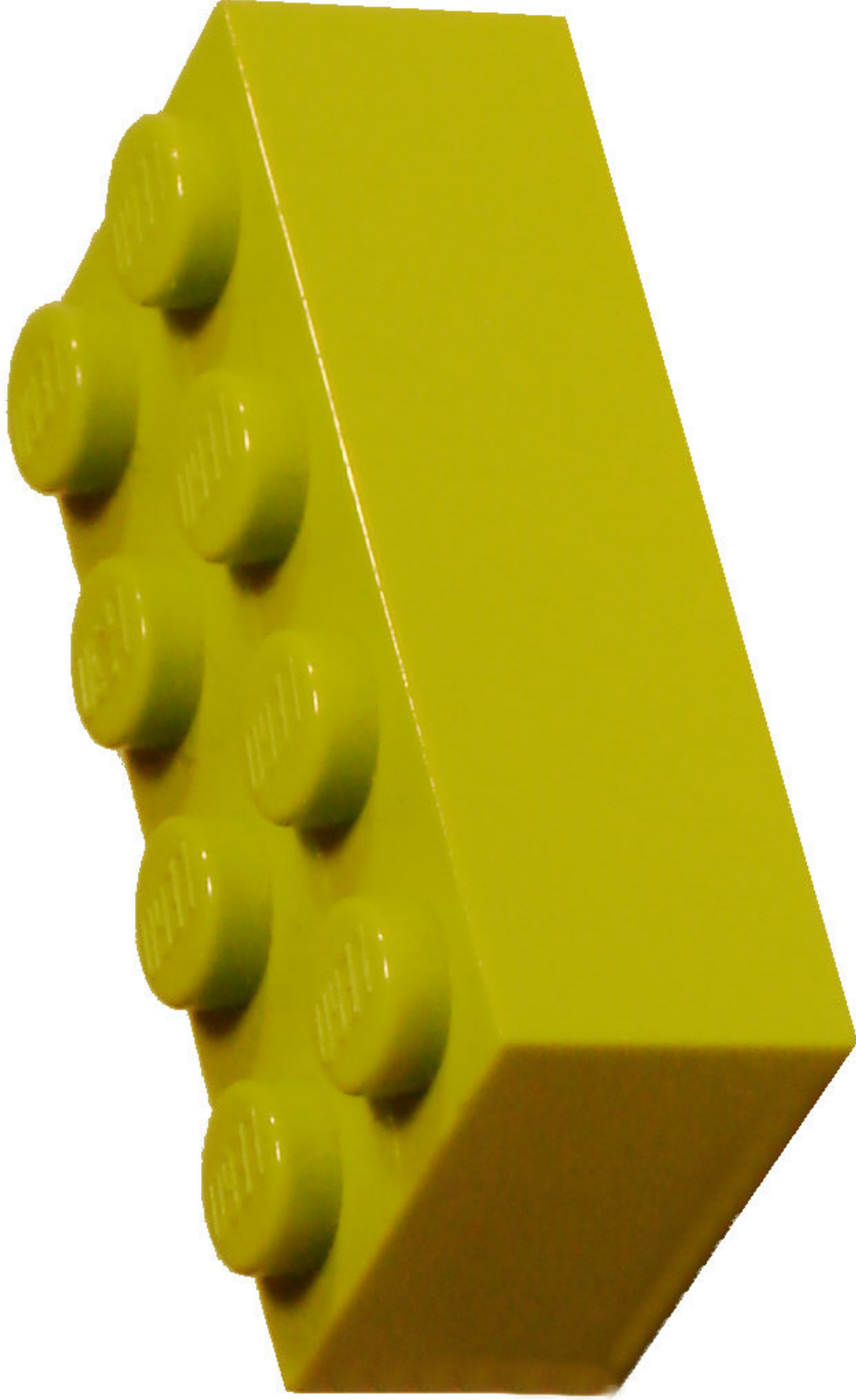


**BRISTOL** *centre for*  
COMPLEXITY  
SCIENCES

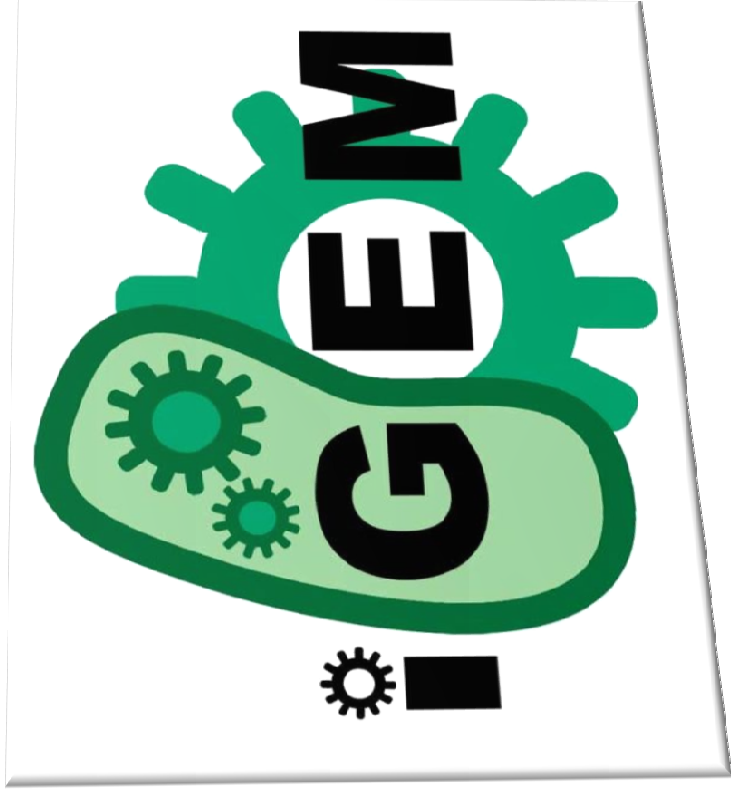


# Synthetic Biology

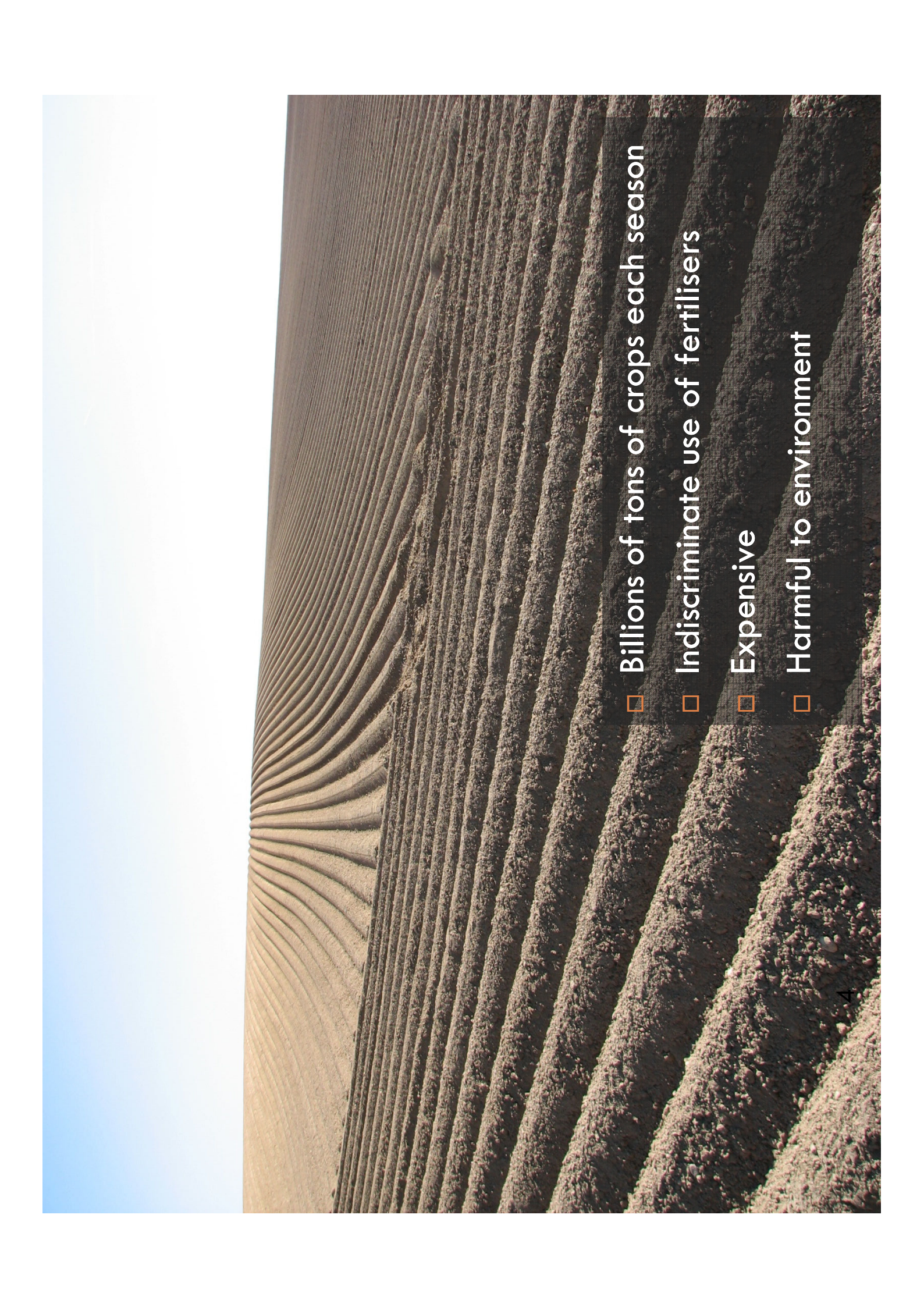




# iGEM



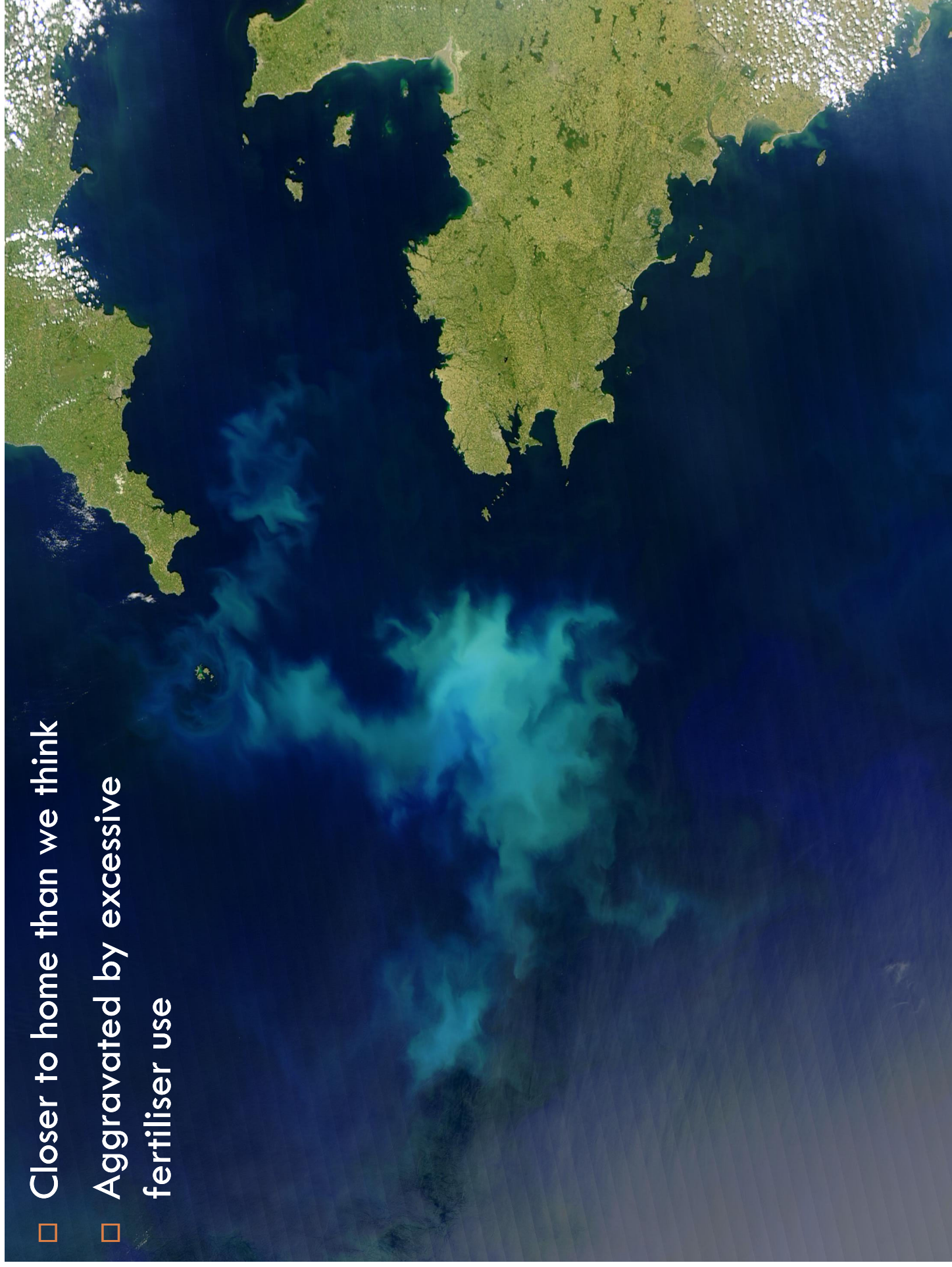
- 128 Teams
- Worldwide
- Student-Run
- Open Source
- Quick and dirty science

- 
- ❑ Billions of tons of crops each season
  - ❑ Indiscriminate use of fertilisers
  - ❑ Expensive
  - ❑ Harmful to environment

- ❑ Eutrophication
- ❑ Can be toxic
- ❑ Drains oxygen from water
- ❑ Blocks out sunlight
- ❑ Ugly!



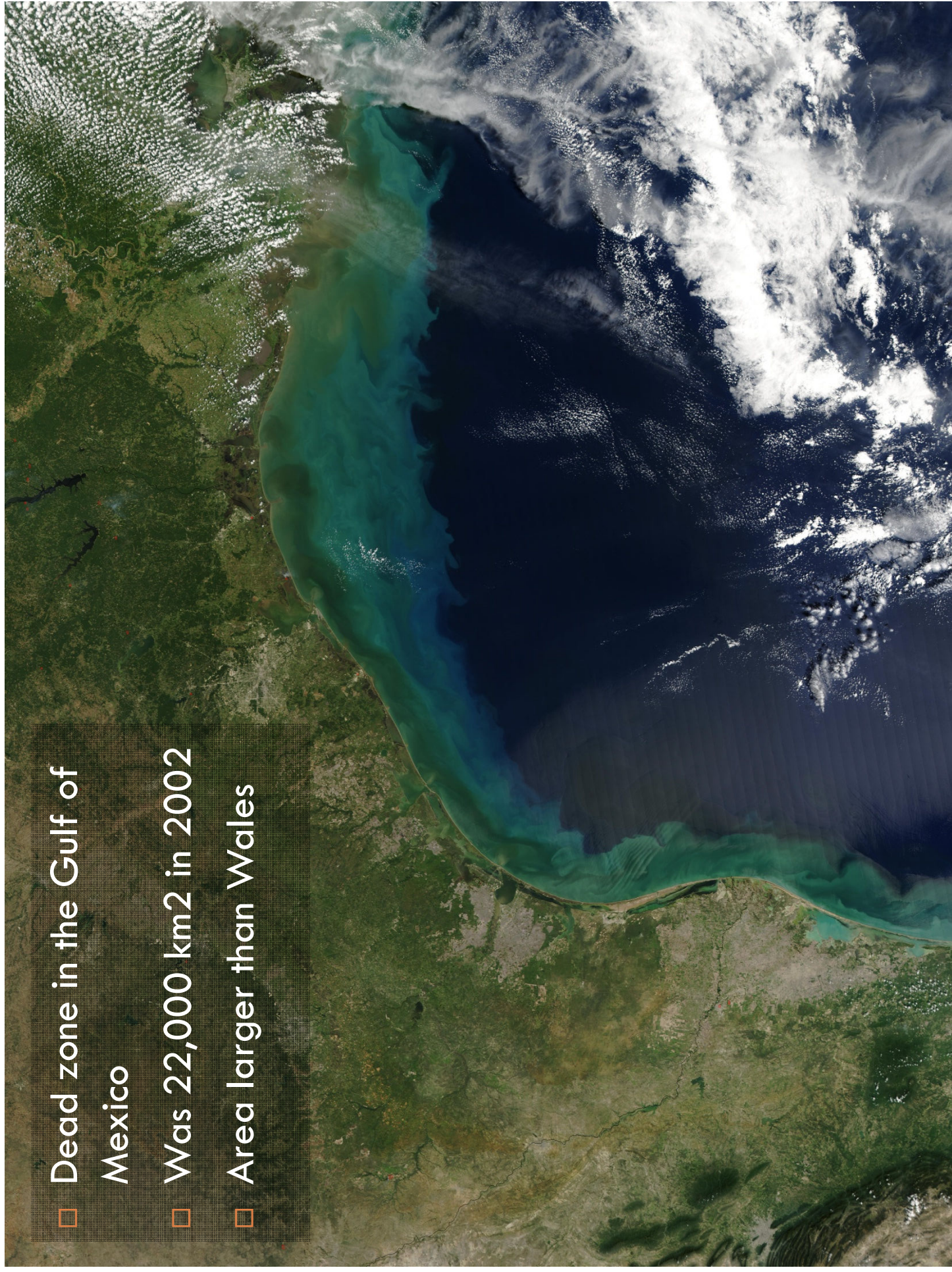
- Closer to home than we think
- Aggravated by excessive  
fertiliser use



- Closer to home than we think
- Aggravated by excessive  
fertiliser use



- ❑ Dead zone in the Gulf of Mexico
- ❑ Was 22,000 km<sup>2</sup> in 2002
- ❑ Area larger than Wales



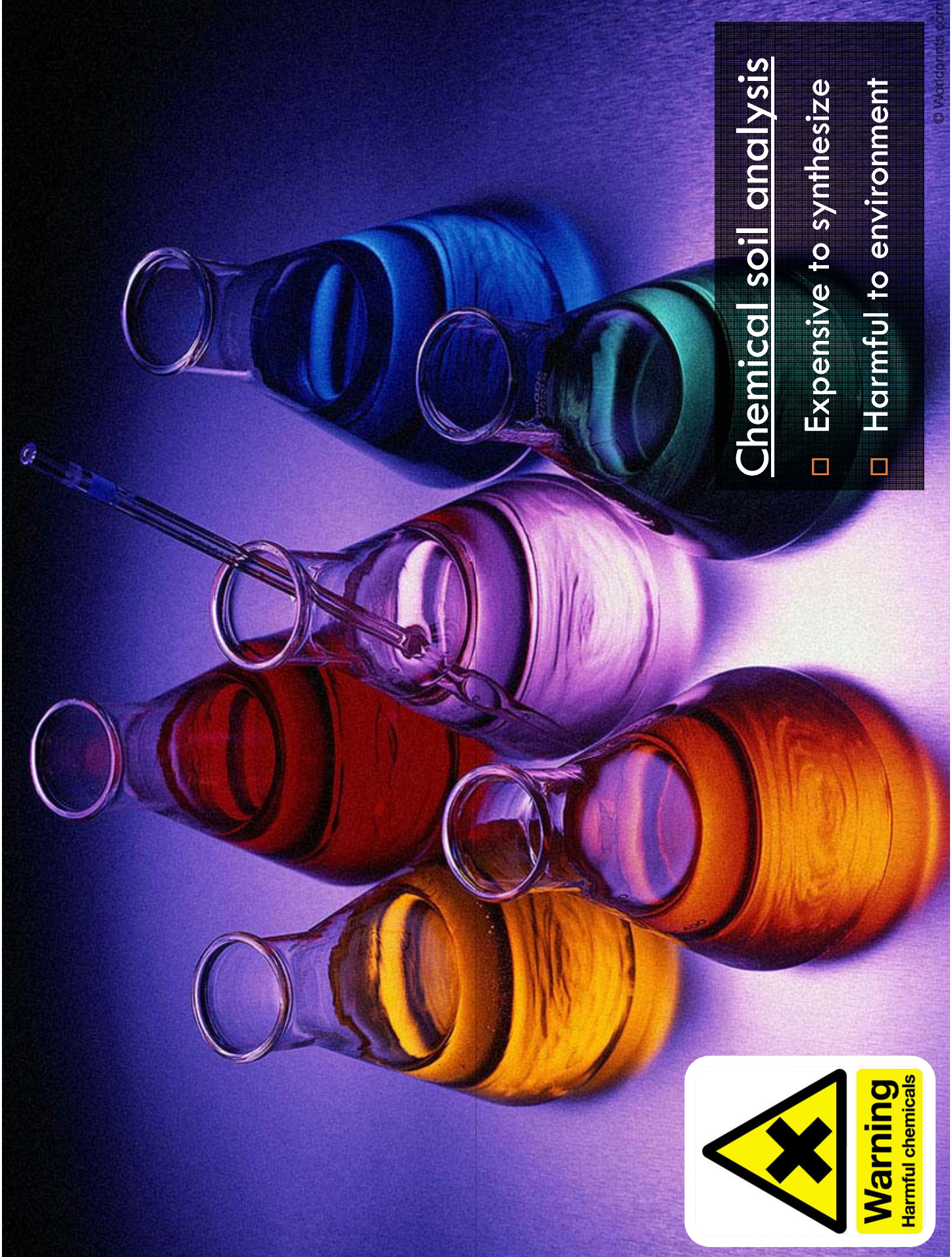


## Soil Analysis

- ❑ Gives only local reading
- ❑ Cheap but complicated
- ❑ Limited effectiveness

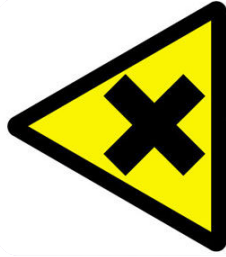


Forestry Commission



## Chemical soil analysis

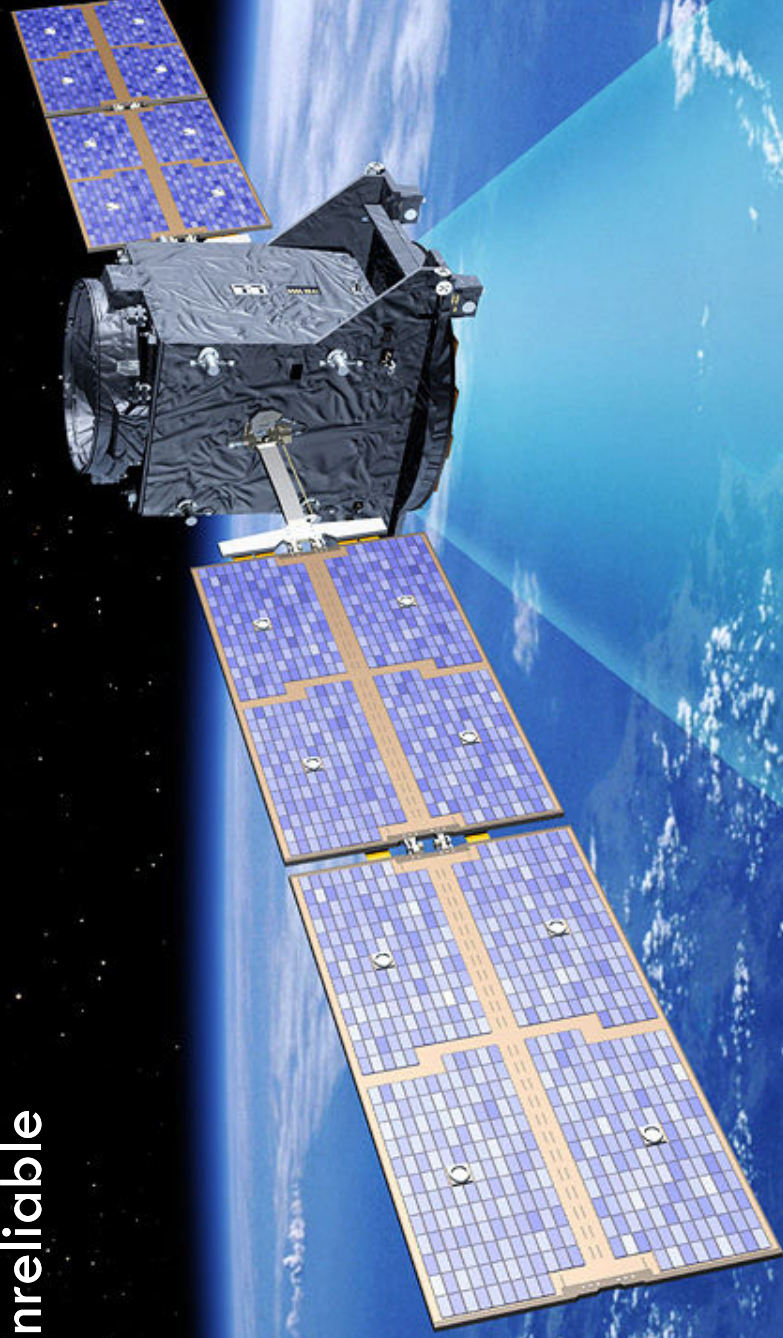
- ❑ Expensive to synthesize
- ❑ Harmful to environment

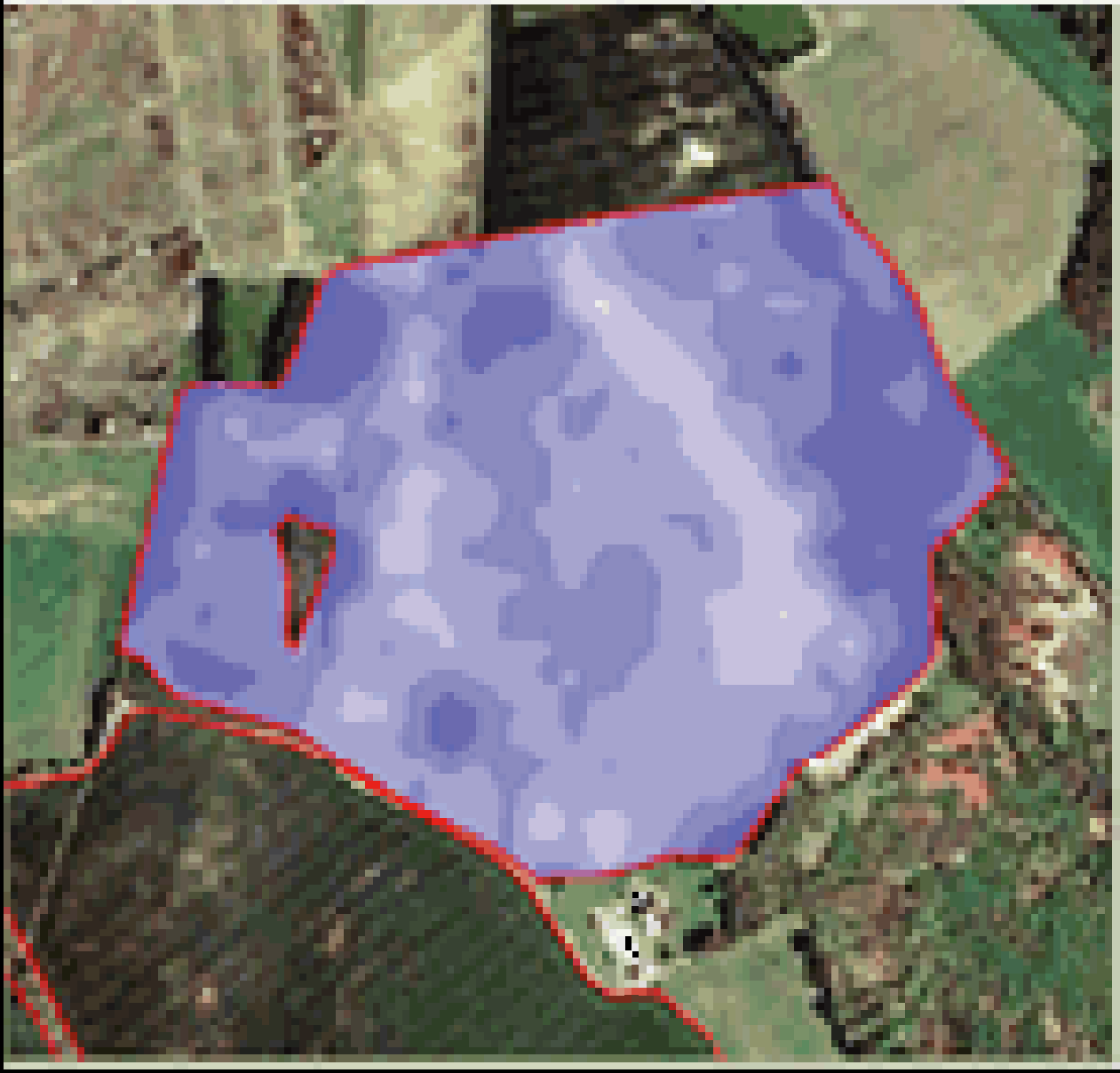


**Warning**  
Harmful chemicals

## Satellite analysis

- ❑ Expensive
- ❑ Unreliable





Low



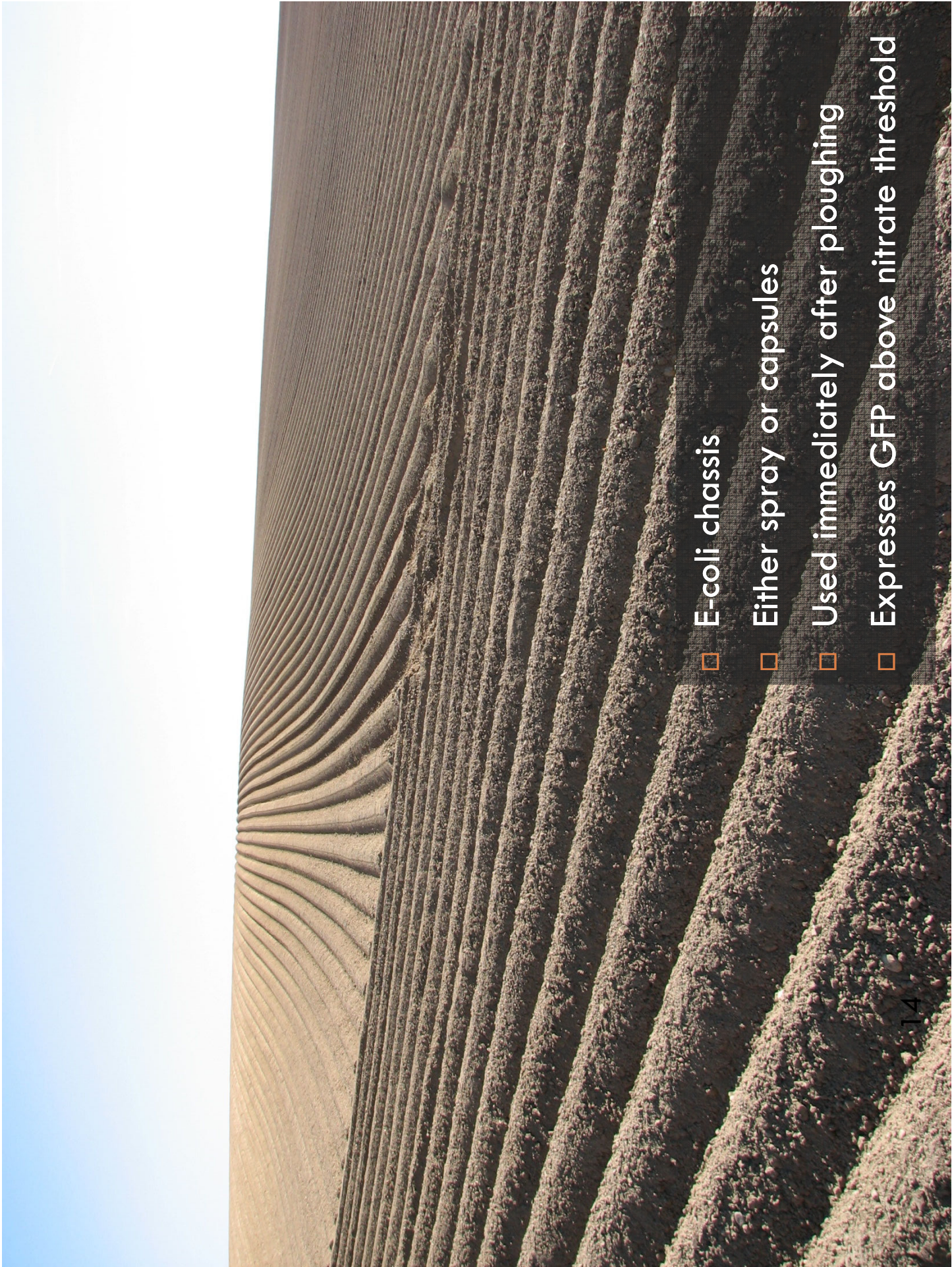
High

**Nitrogen Application Map**

## Better than satellite maps

- We can produce similar map, but:
  - Cheaper
  - More reliable
  - Pre-facto



- 
- E-coli chassis
  - Either spray or capsules
  - Used immediately after ploughing
  - Expresses GFP above nitrate threshold

# Outline Summary

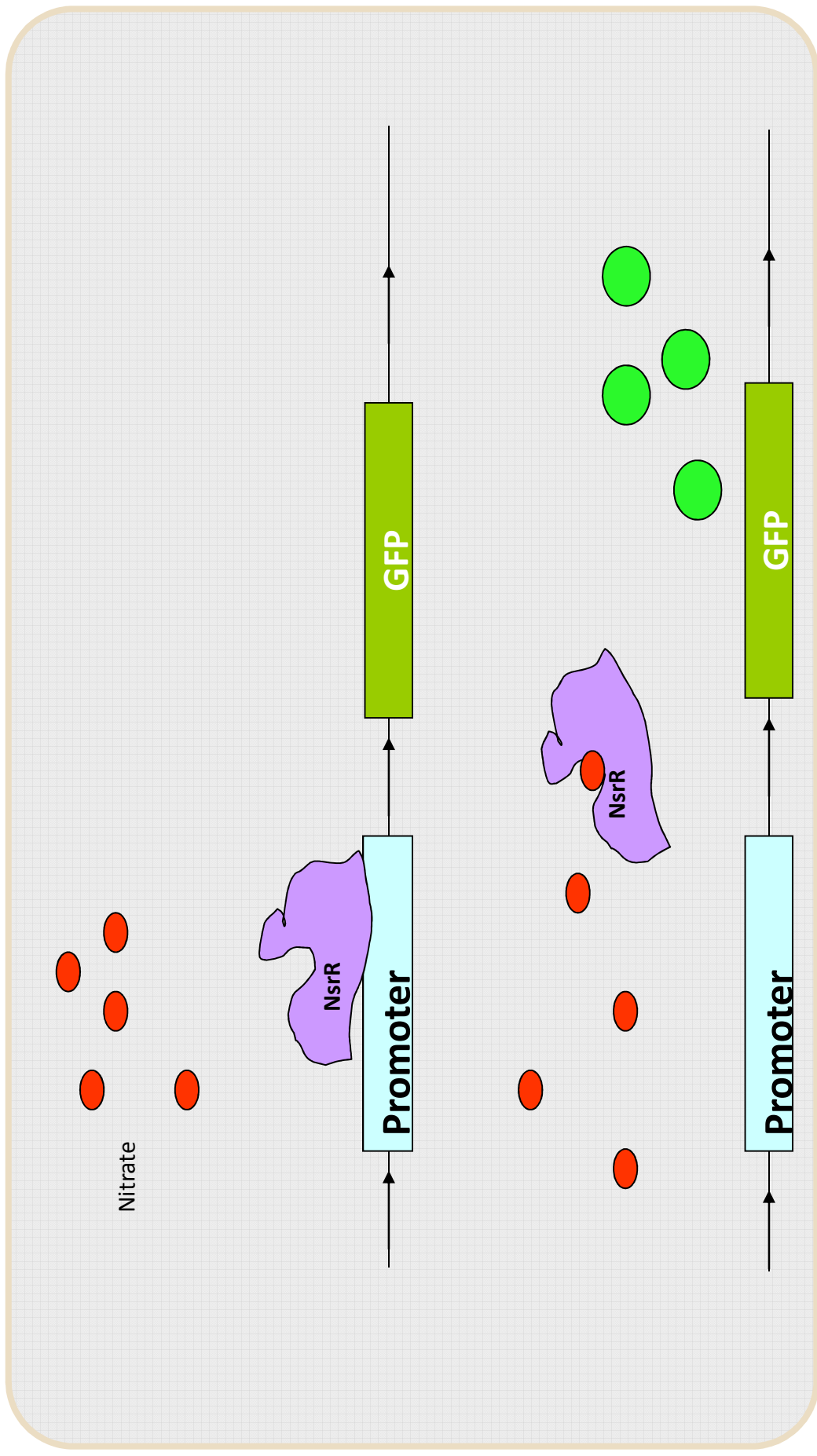
- Detects and signals abundance of nutrients
- Saves Fertiliser
- Prevents Eutrophication

# Our Lab



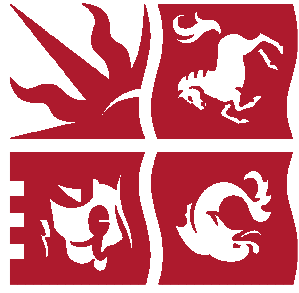


# GRN Models





# Sponsors and Thanks



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