



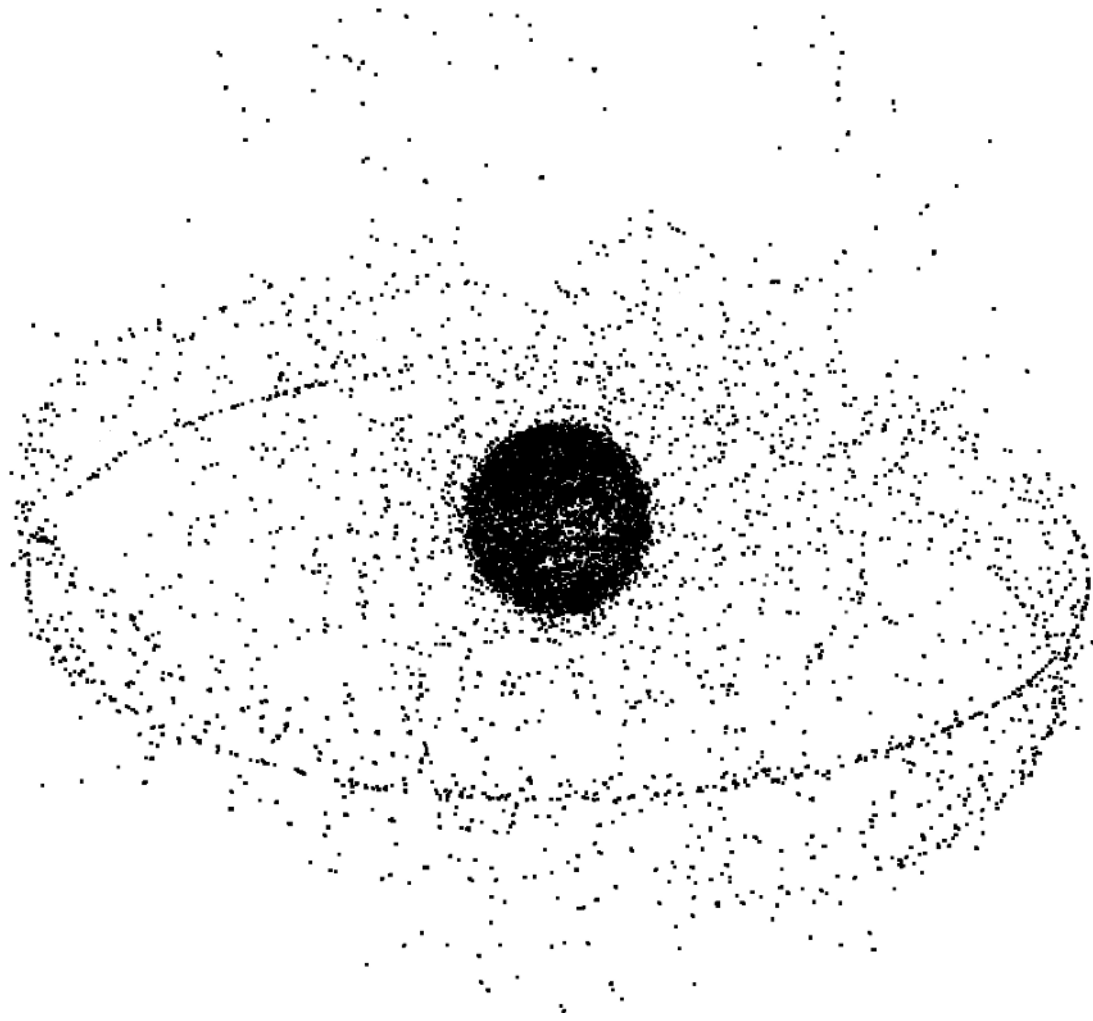
Enhancing spaceflight safety with UoS³ cubesat

University of Southampton Small Satellite

Aleksander Lidtke

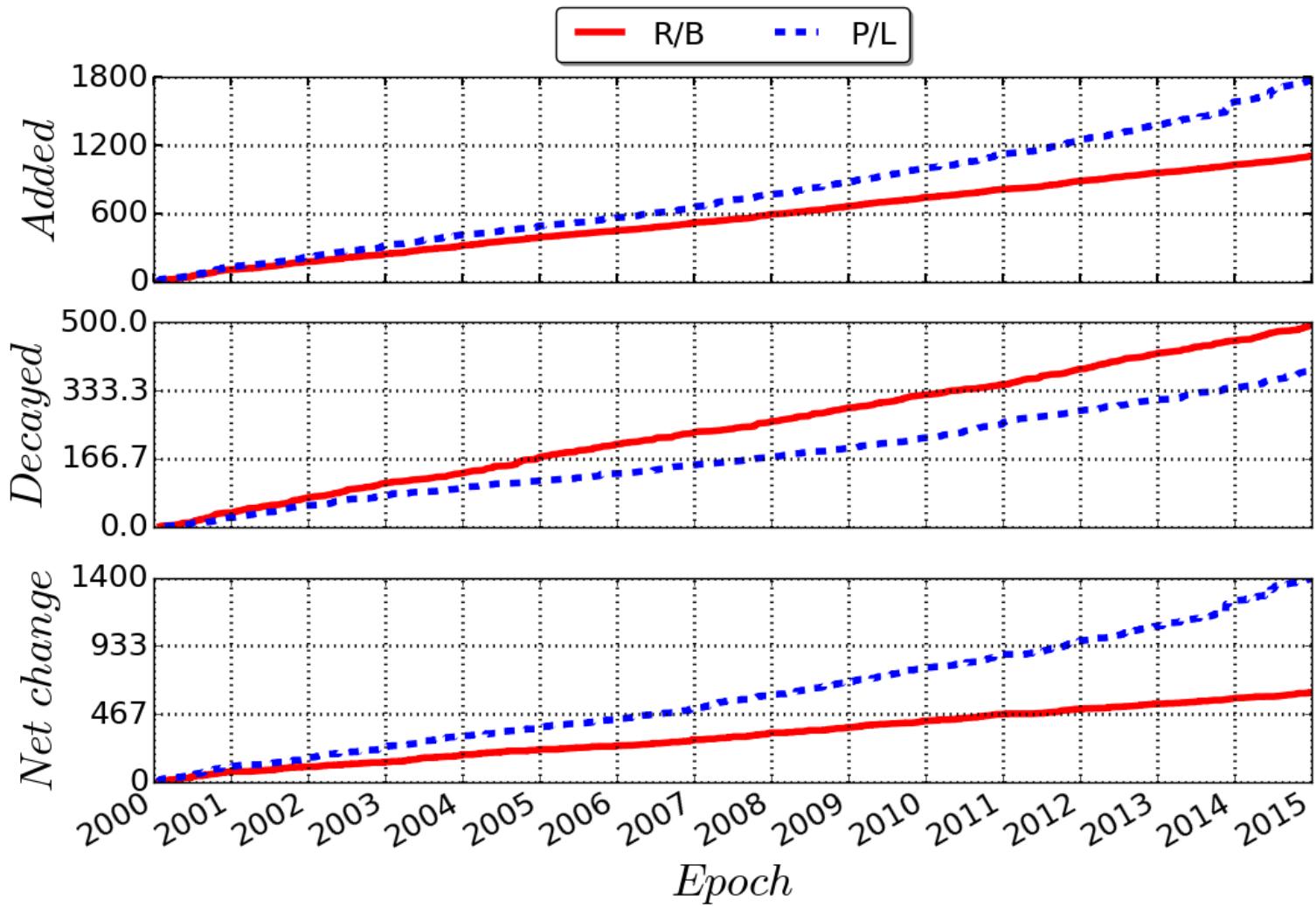
Clemens Rumpf, Adrian Tatnall, Hugh G. Lewis, Scott J. Walker, Mia Taylor,
Robert C. Fear, Alex S. Weddell, Robert G. Maunder, James R.B. Bantock

Space debris

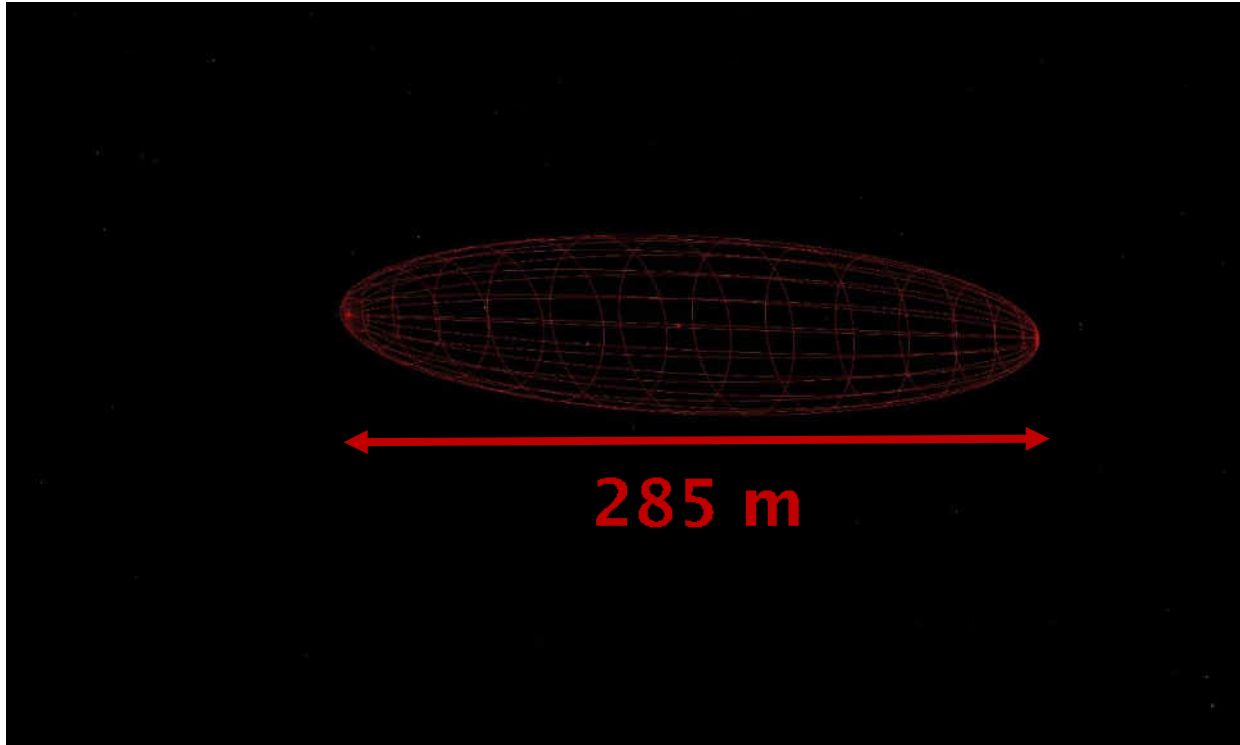


Size of objects NOT to scale.

Launches continue

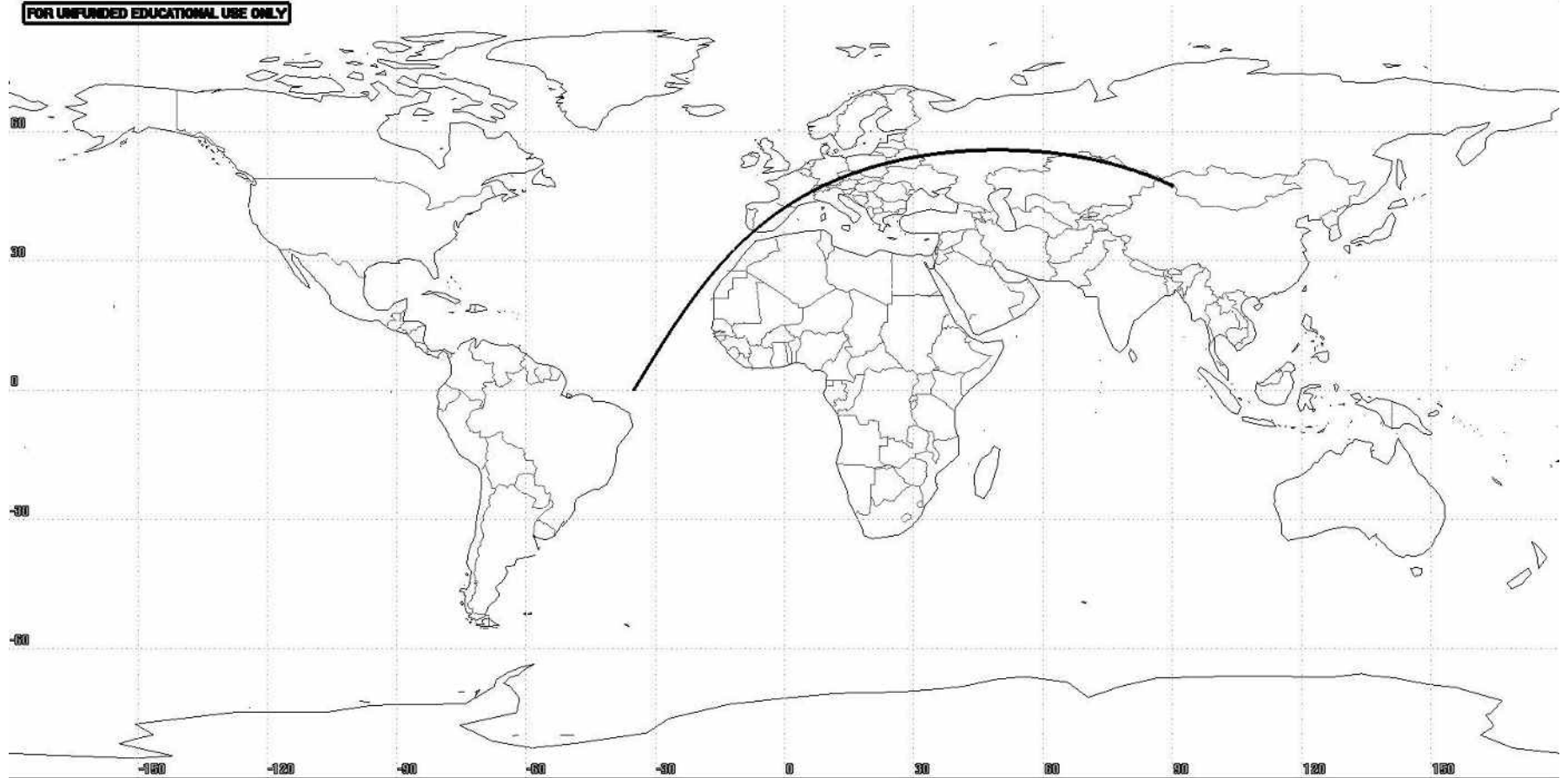


We don't know where they are



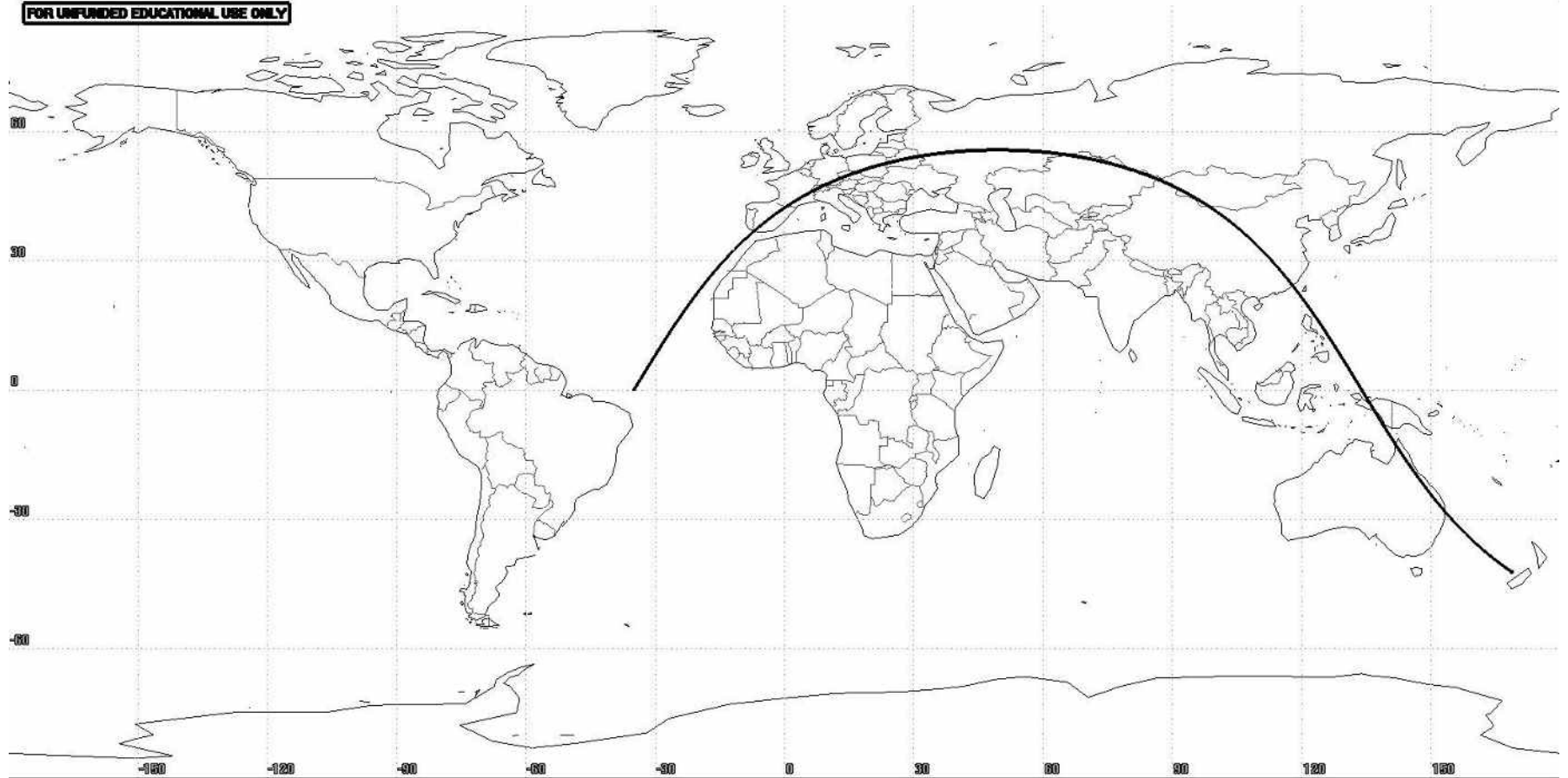
Example satellite state vector at epoch.

We don't know where they will be



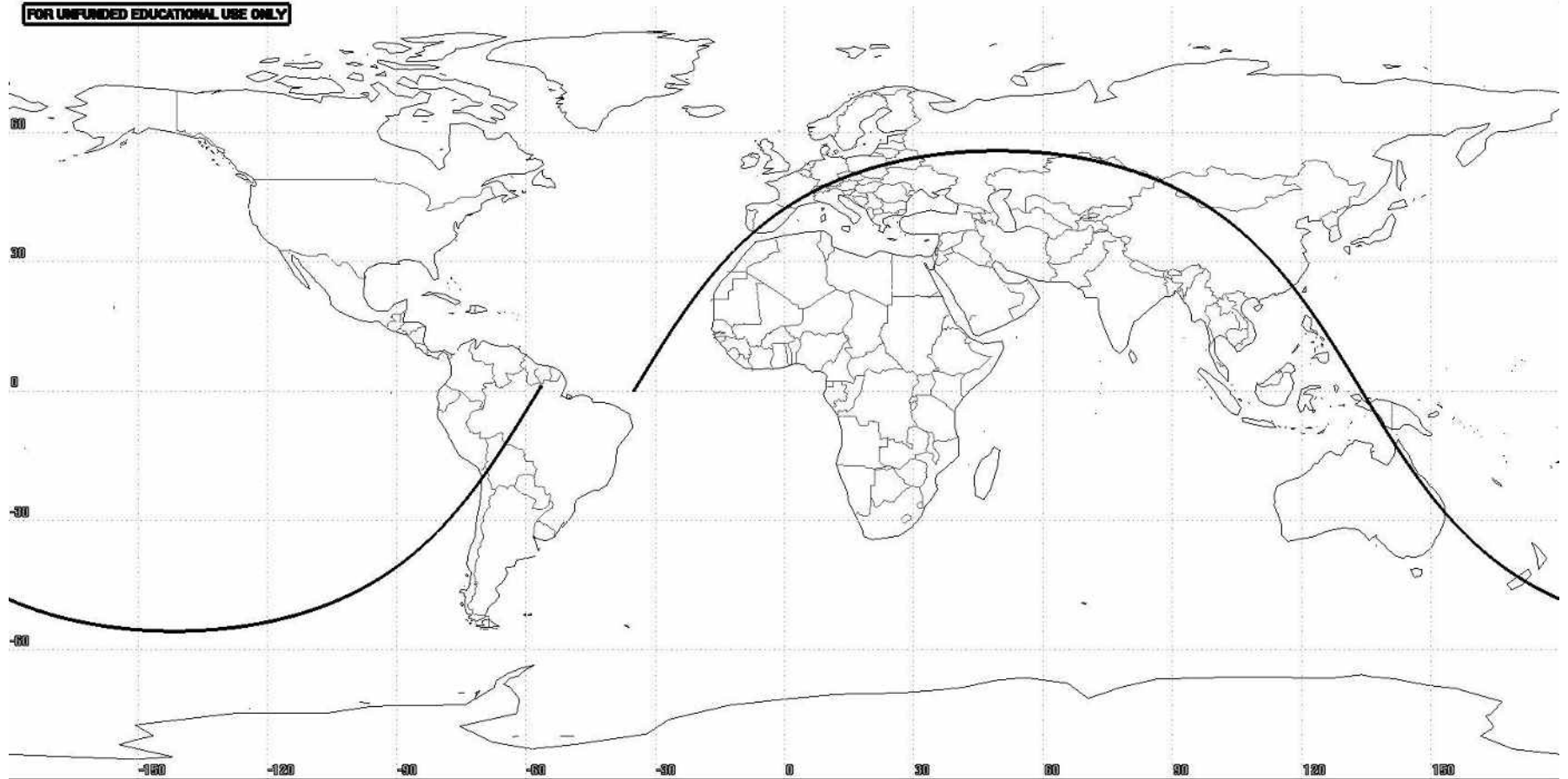
24 hours lead time.

We don't know where they will be



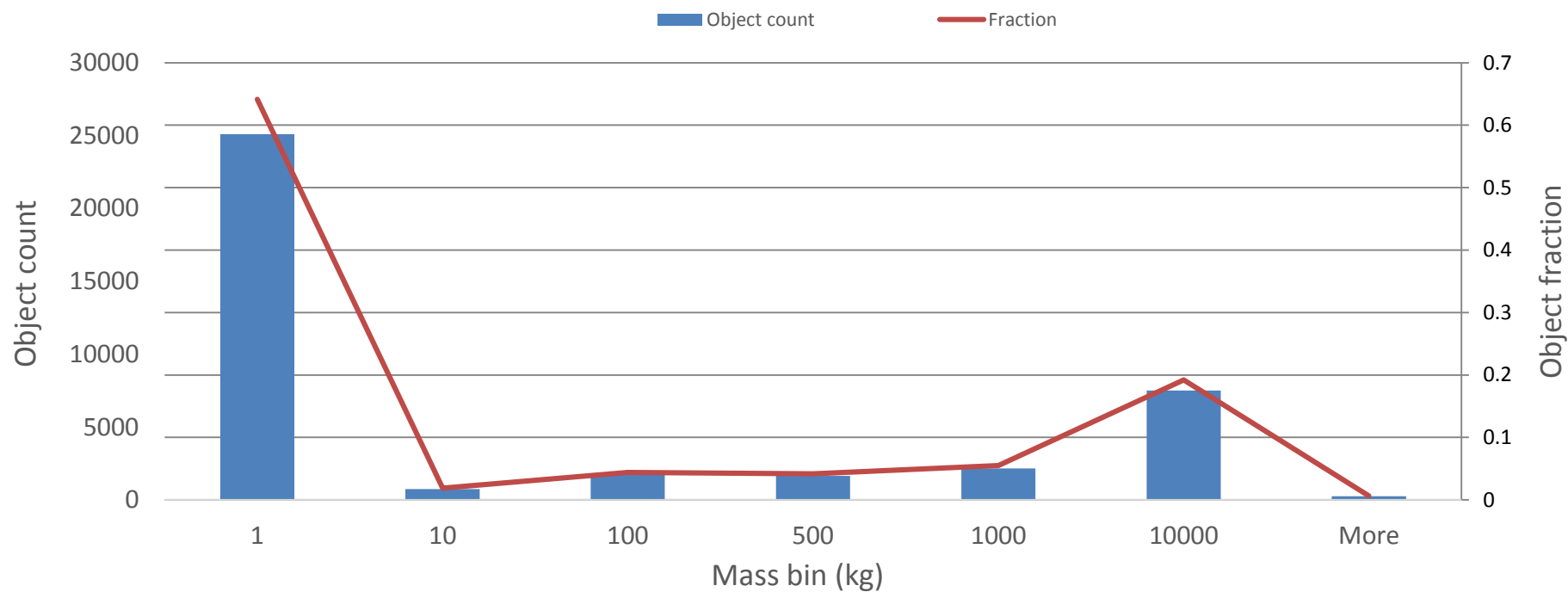
48 hours lead time.

We don't know where they will be



74 hours lead time.

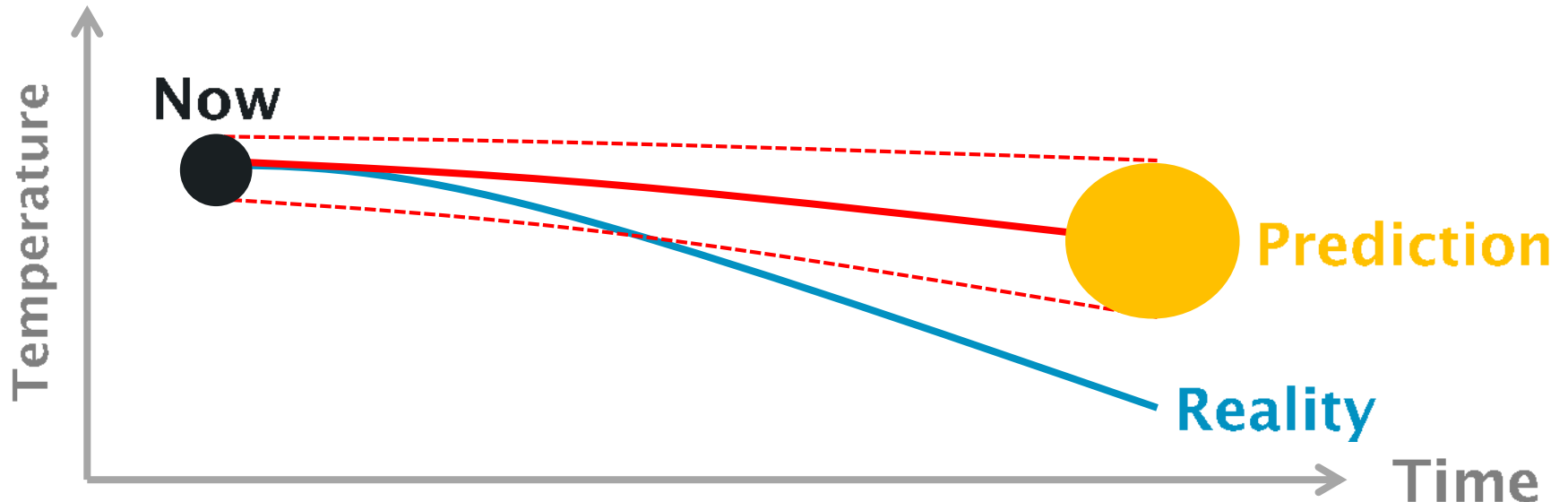
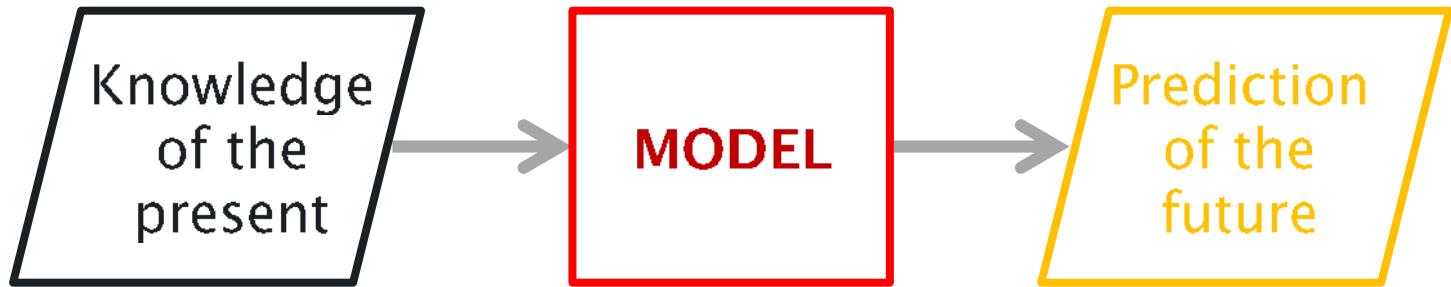
Why do we care



9 Dec 2015

Image credit: NASA

How can we improve our predictions?



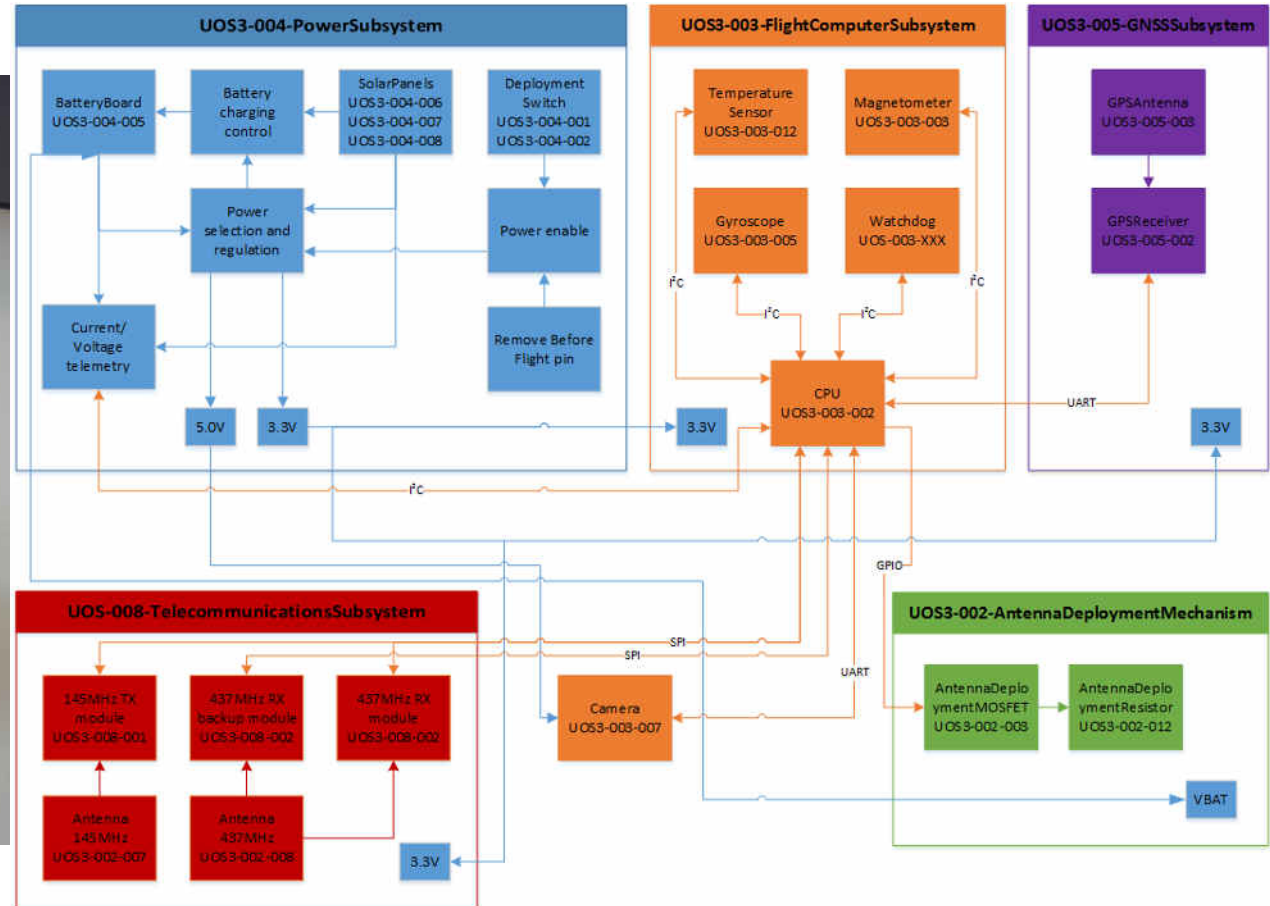
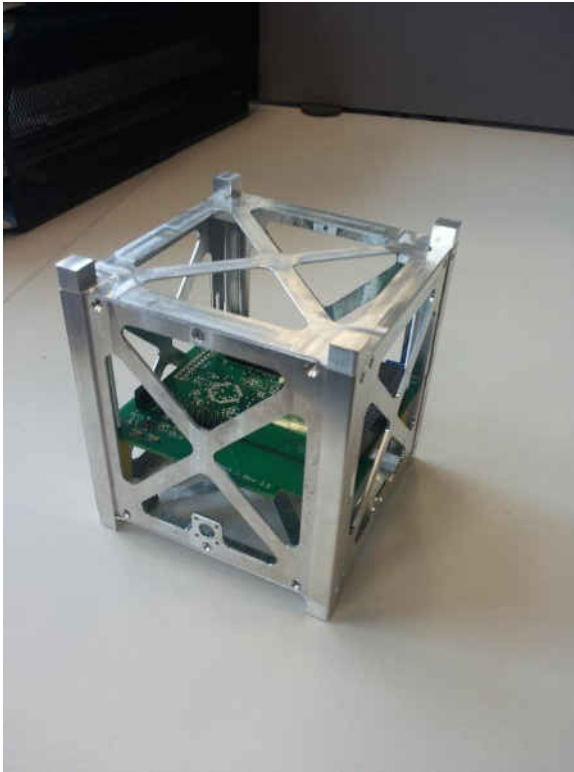
The model we're trying to improve

Force equals mass times acceleration, or

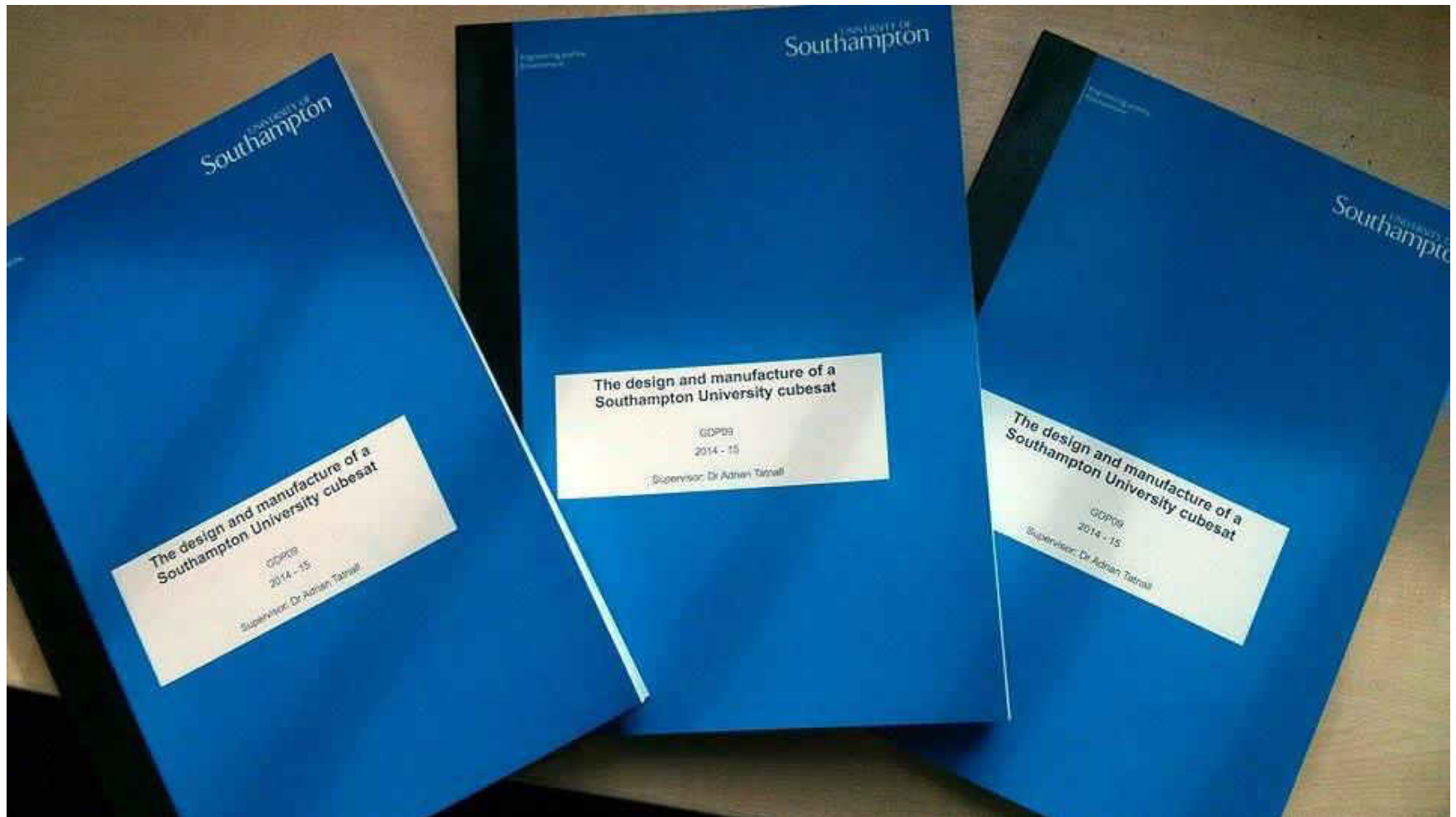
$$a = \frac{F}{m} = \frac{1}{2} \rho v^2 A C_D \times \frac{1}{m}.$$

University of Southampton Small Satellite

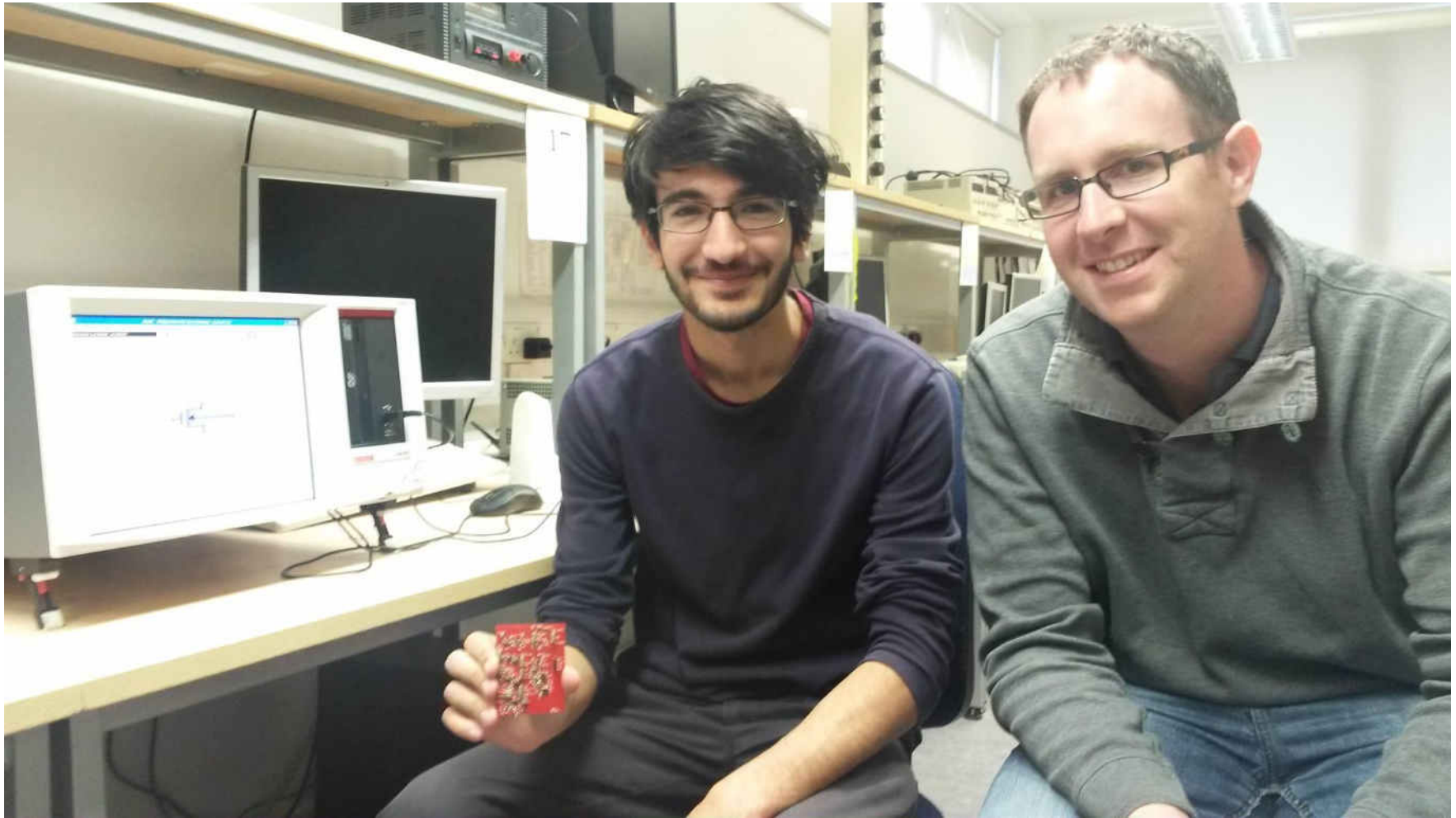
– UoS³



UoS³ – a very student cubesat



UoS³ – a very student cubesat



UoS³ – a very student cubesat



Cross-University collaboration

Aleksander Lidtke⁽¹⁾, Clemens Rumpf⁽¹⁾, Adrian Tatnall⁽¹⁾, Hugh G. Lewis⁽¹⁾, Scott J. Walker⁽¹⁾
Mia Taylor⁽²⁾
Robert C. Fear⁽³⁾
Alex S. Weddell⁽⁴⁾, Robert G. Maunder⁽⁵⁾, James R.B. Bantock⁽⁶⁾

1. Aeronautics and Astronautics
2. Winchester School of Art
3. School of Physics and Astronomy
4. Electronics and Electrical Engineering
5. Southampton Wireless Group
6. Electronics and Software Systems

Winchester School of Art



Exhibition still from *Deep Highly Eccentric* at The Winchester Gallery, curated by Mia Taylor, image: Dave Clark



Sculpture by Systems House: '*New Reflector Tower*', 2013, Stainless steel, aluminum, concrete, reflective tape & industrial paint

Exhibition still from *Deep Highly Eccentric* at The Winchester Gallery, curated by Mia Taylor, image: Dave Clark

Winchester School of Art



Conclusion

- Possibly 2nd University cubesat in the UK
- Invented, designed and built by students
- Much-needed science that interests:
 1. European Space Agency – Space Debris Office
 2. TU Braunschweig – Institute of Aerospace Systems
 3. University College London – Space Geodesy and Navigation Laboratory
 4. Centre National d'Etudes Spatiales
 5. Hyperschall Technologie Göttingen

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