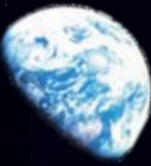


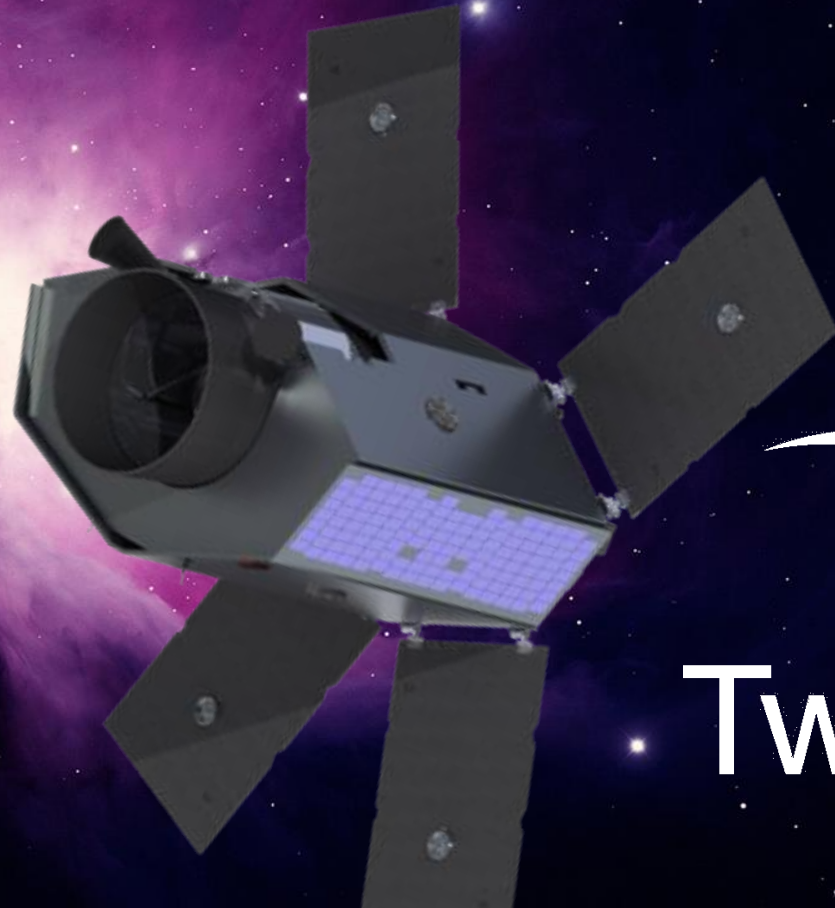


Changing the economics of space



World Class Science as a Business Proposition – Twinkle Case Study

*Doug Liddle
and the
Twinkle Team*

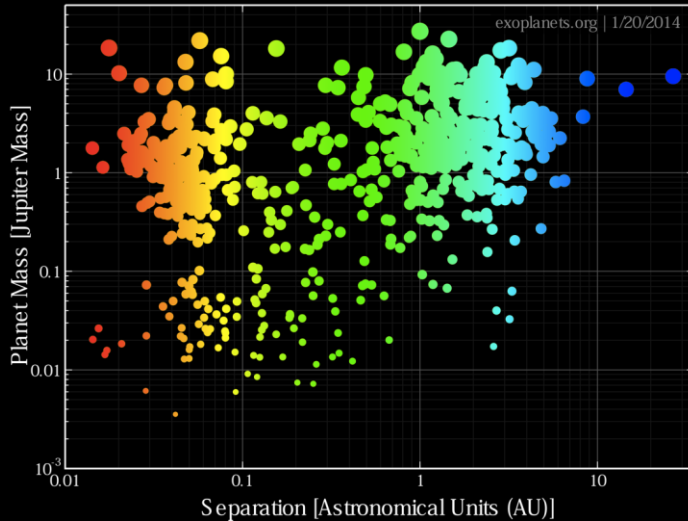


Why would SSTL bother getting involved in a European science mission?

- ✗ Science missions take 10 – 20 years to build
- ✗ Science missions rely on novel, low TRL technologies and frequently see massive cost and schedule escalation
- ✗ Science missions come with high levels of product and process assurance
- ✗ Science missions cost €0.5Bn+ and are targeted at the ‘big’ LSIs
- ✗ Before mission implementation kicks-off, there is an elaborate knock-out competition between the ideas and then the implementation
 - ✗ small industry has very little influence up to this point and can end up investing significant sums with low probability of returns

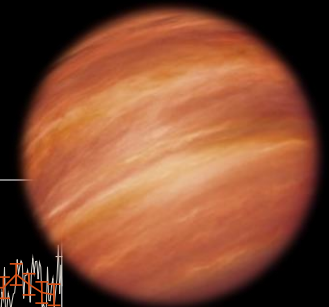
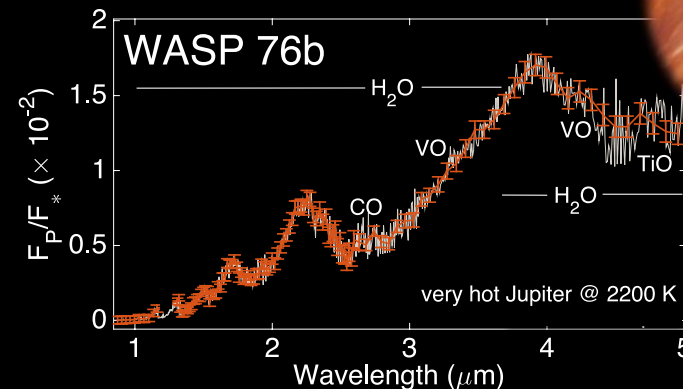
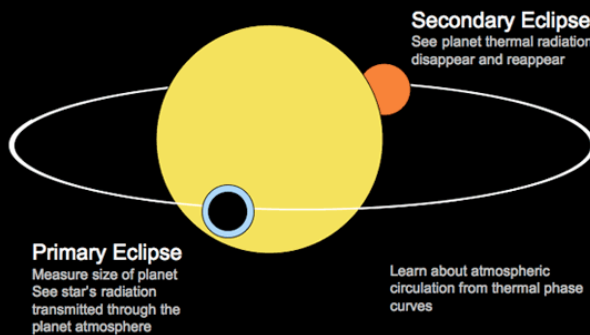
- Low cost British mission to explore far-away worlds
- Makes use of British technologies and scientific excellence
- Service offering based on an identified need
- Sell time on space telescope as per terrestrial observatories
- Anchor customer and/or investor model

Twinkle Science in brief



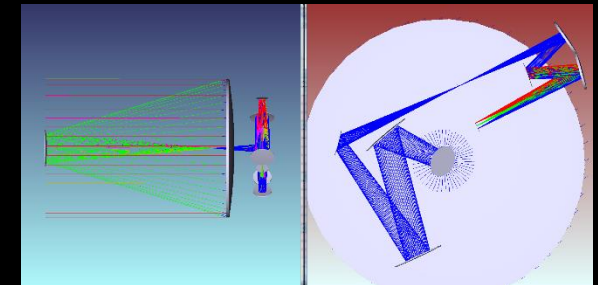
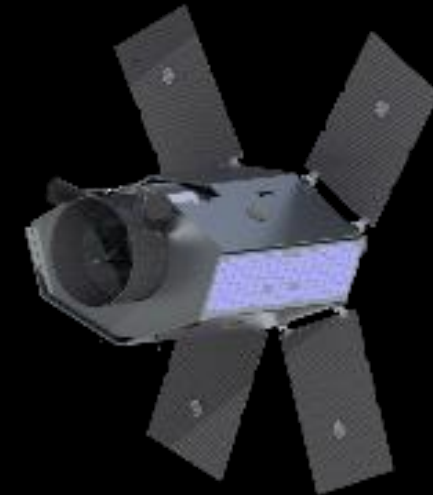
Thousands of planets found – but:

- What are they made of?
- Why are they so exotic?
- How did they form?
- What's the weather like there?
- Are they Habitable?



Twinkle Instrument

- Slit spectrograph
 - no imaging
- Telescope aperture ~48 cm
- V band 0.55 to 1.0 μm
- IR Band1 1.3 to 2.4 μm
- IR Band2 2.4 to 4.5 μm
- R (spectral res.) ~300 in all bands

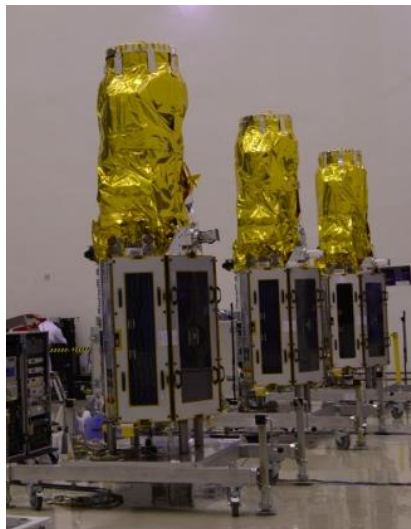
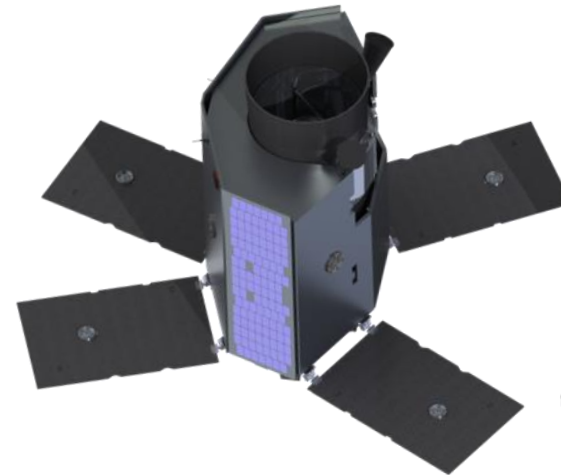


What's special about Twinkle?

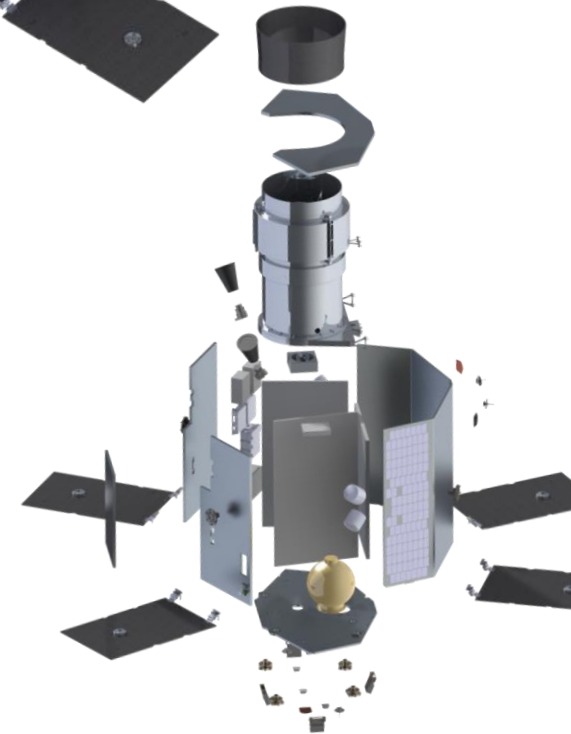


Mission Readiness

- Spacecraft based on DMC-3
 - Addition of deployed panels
 - Slit Spectrograph payload draws on UK heritage with some small developments being performed in 2015
- Mission business case also shares elements of DMC-3 mission
 - Service provision with anchor customer



Twinkle
Precursor



- World class science team
 - World leading exoplanet scientists
 - Finalist in the ESA M3 call
- Business focussed
 - Have prioritised on-time delivery and mission cost as key requirements to be traded against technical performance
 - Have identified Twinkle as the solution to a service provision problem
 - Engaged UCL MBA students and Innovate UK to run market survey to validate business plan
 - Not just looking for the same pot of money as everyone else!
 - Could require an anchor customer or could even be a business investment
 - Projected revenues > capital investment and running costs
 - Created mission delivery vehicle → Blue Skies Space
 - University investment → triggers industry investment



- Commercial assurance approach
 - Managed via Incentives and Penalties not via retro-active ECSS on an existing product
- Rapid schedule
 - KO → Launch inside 36 months
- Low cost
 - Total mission cost including platform, payload, launch and operations for <£50m

This is an SSTL niche and enables application of heritage and well demonstrated technical, management and commercial approaches

- Twinkle team have already identified a number of exploitation opportunities
 - Scientific
 - Some key targets pre-identified and potential users already engaged
 - Outreach
 - Educational already started (EduTwinkle), public engagement to follow
 - Commercial
 - Pre and post launch sales of time on telescope
 - Blue Skies Space
 - Potential for space science missions *beyond* Twinkle!

- World class science meets low cost access to space
- Both a science mission and a business investment
- Well developed exploitation plan which opens the door for future missions
 - not just exoplanet observatories
- *For more details, please see Dr Marcell Tessenyi presenting tomorrow in the Space Science, Research and Technology Session at 1pm*

Thank you

15/07/2015

Twinkle