Number Sleuths up in Space

Continuing the 2013 biodiversity series in Otherways by Jeanie Clark

What is this? Biodiversity continued into space? Sounds a bit contradictory! Well, yes it does, but at the same time, looking to the future, what is done in space will have effects on biodiversity below, so if there can be some biodiversity understanding when looking at a space topic, I want to find them! And this space topic took my interest from the start when I saw it on the MPE Australia website.

The Shape Sleuths series grounded me close to the Earth and nature topics, a long way from space. But niggling at me was a resource on the MPE Australia website that takes us to the opposite scale for maths. Could it be adapted for some biodiversity understanding and therein contribute to the UNDB's first aim of increasing knowledge and understanding of biodiversity?

Do you remember the 'Jumper from Space' late last year? Someone actually worked out how to get up to the top of the atmosphere, get out AND jump right back down to Earth. Now that to me was a crazy idea – but it WORKED. He landed safely. I wondered what he, a living thing, had seen and thought on his way down. Would he have cared about the biodiversity of the Earth below? Would he have been amazed at how this place of life got larger before his eyes? But the resource on the MPE Australia had none of that. It was pure maths, with some basic arithmetic functions, which, with a little more explanation could be used at a wide range of ages once addition, subtraction, multiplication and division are understood.

So here goes … Please jump with me!

How fast did Felix Go?

Let's start with the lesson called *'Descent data'* in the MPE Australian 2013 classroom resources section. Below you will find some modifications to the online instructions, to make it easier to do the maths and to add some biodiversity understanding. Firstly you will need to visit <http://mathsofplanetearth.org.au/mathematics-of-the-mission-to-the-edge-of-space/>.

- Use the numbers in this data. Change distances to km and match a place that distance away from your place using a map. For example, in the Wimmera, the edge of the atmosphere is a little closer than the distance between two main towns. Consider time. How long does it take to travel that distance? What can you do in 10 mins and 5 mins?
- Set the information up as a diagram with columns for features, distances and times so you can see what it looks like. Draw symbols, not a table. Use this diagram to describe what Felix does. One possible diagram is below.
- For the features part, what is the difference between space and atmosphere? How far do living things (the Earth's biodiversity) reach up into the atmosphere? How far do the clouds go? How far up do humans, in a typical passenger plane, go? (You might mark these onto the features part of the diagram at their maximum altitudes.) What is the key reason why living things aren't all the way up to the edge of space? (More complex are the layers of the atmosphere.)
- For the distances and times parts, add the maths data in metres and seconds. Are there some gaps? That shows that some calculations with numbers are needed! Do these subtractions and fill the results into their spaces. You should have freefall distances and time, and the same for controlled fall after the parachute opens.
- Work out the average speeds of Felix as he came back to land (It's question 'a' under the data.) Speed = distance/time (Algebra). Put average speeds on the diagram, in units of metres/second. Think about what the numbers mean. Convert them back to km/hr to see how it compares to car travel. You can now tell how that compares to 100km/hr.
- What happens when you travel in a vehicle - is it a constant (average) speed? Felix took 42 secs to reach his maximum speed in his journey. Work out the distance he travelled in this time - which average speed do you use? If you think about a car accelerating up to its maximum speed, does your answer make sense when compared with the 42 seconds?

How do we communicate this? Does it lead to models, art, words of amazement when distances/speeds are understood relative to our lives? Communicating maths is a challenge, making it come alive! Good luck!