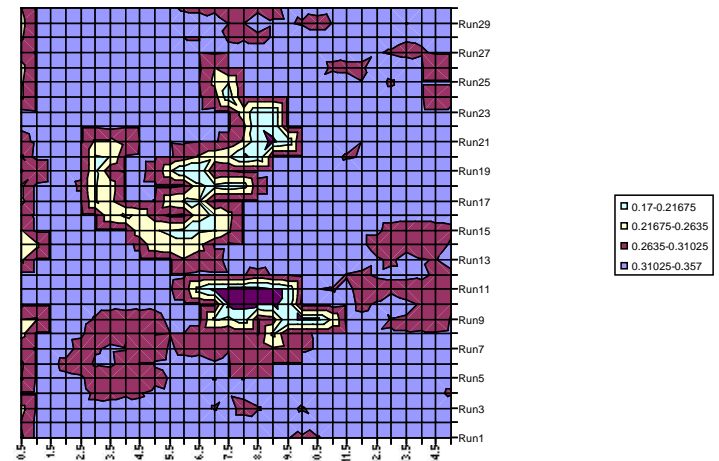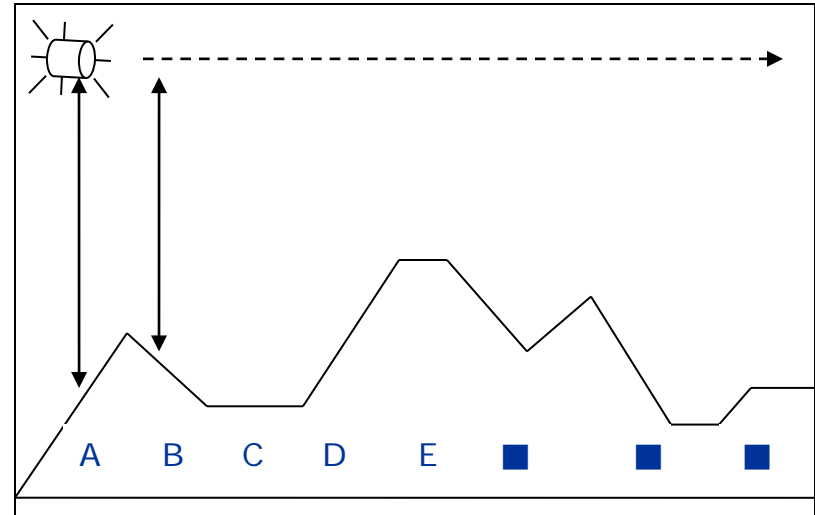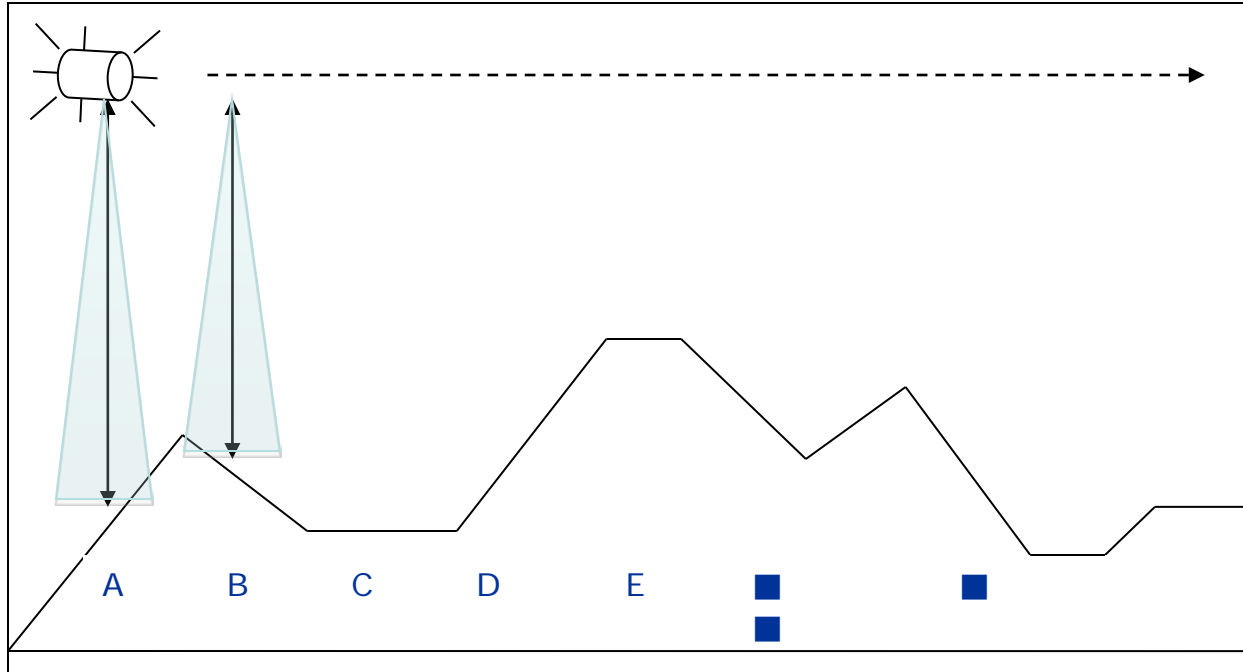# Constructing the maps

- One scan yields one cross sectional slice of surface

- Multiple parallel scans can yield a contour representation

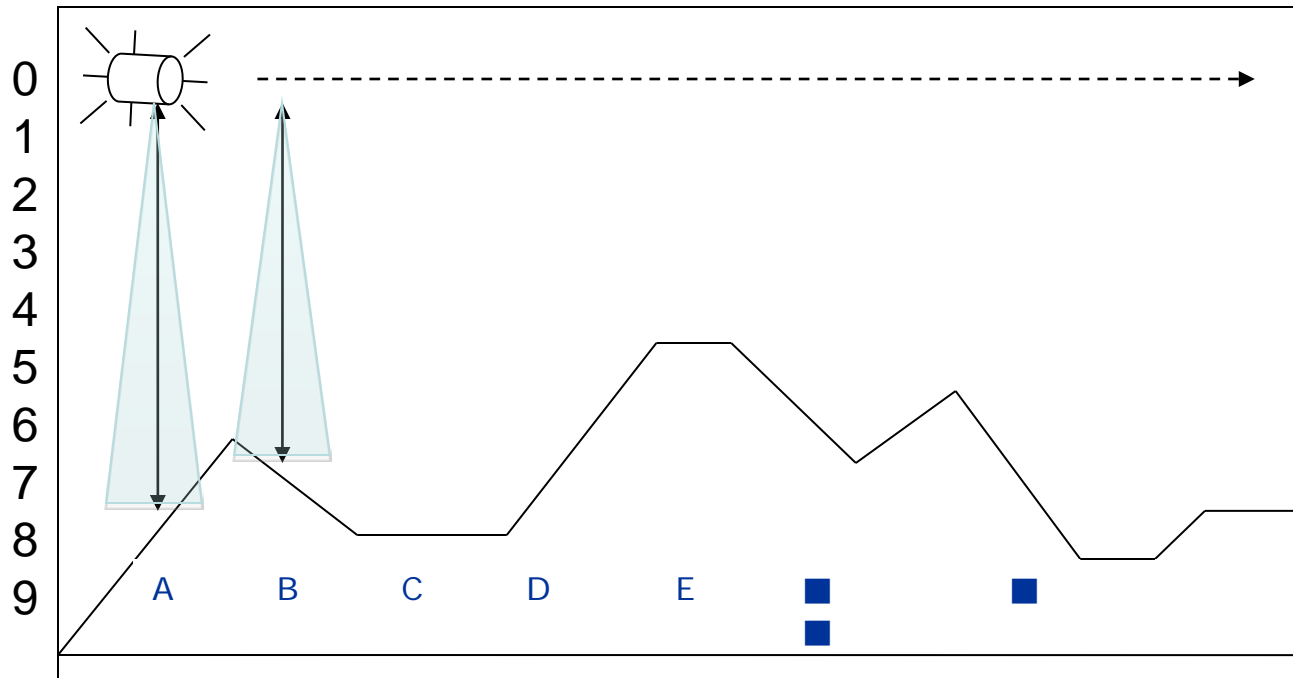# Satellite Mapping
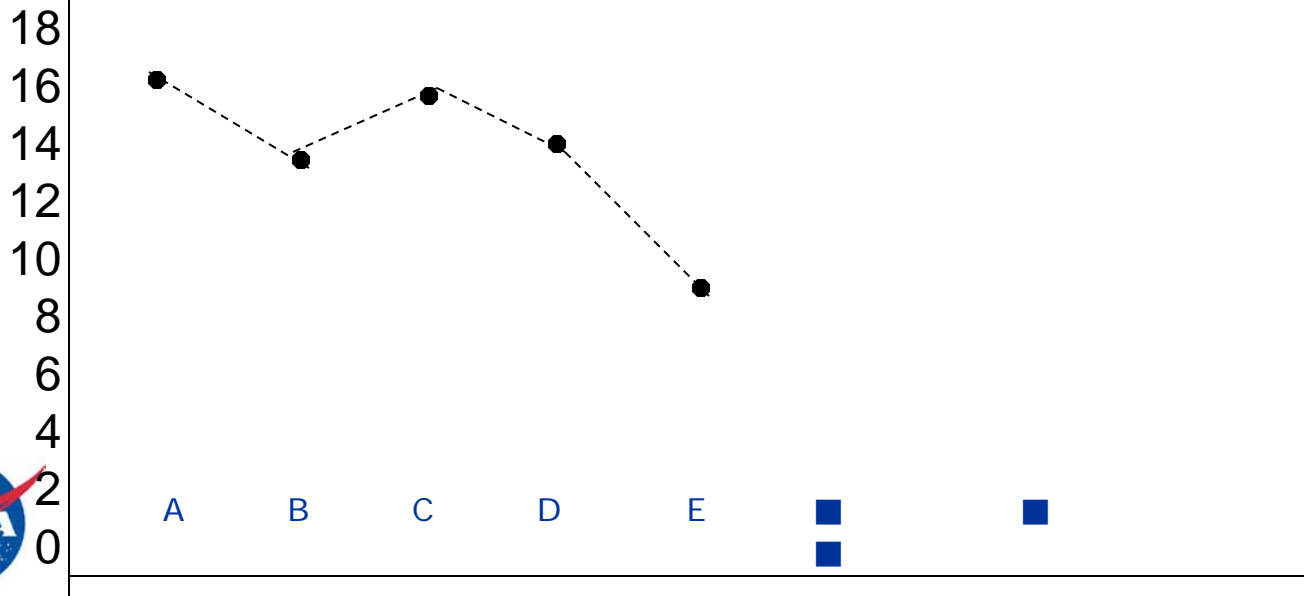

- Timing is everything!
- Time -> Distance (d = vt)
- Note width of signal cone (blurs features)
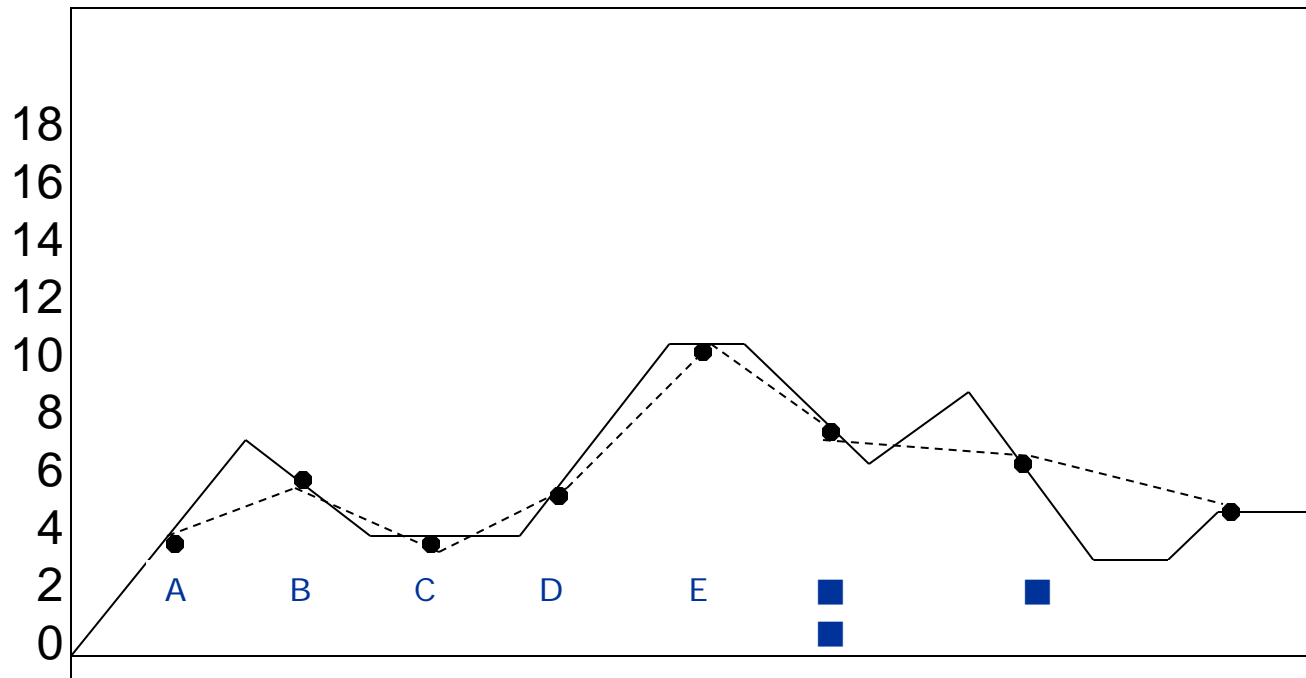- Each pass represents one cross section
- Landscape appears upside down

Why do the mountains look upside down?

Measurement vs. Reality

Spatial Resolution

Why does the dashed line not look exactly like the solid line?
What could you do to improve the accuracy of the measurement?

Needle in the Haystack

12				4	4	2	2
				4			
		16	3	4			
			1	4	4	2	2
					8		
		32			8		
						8	

- If the numbers represent the height of features on the surface (blank = 0 represents "sea level"), where is the tallest feature?
- What does the landscape look like in the upper right corner?
- Would you feel safe trying to land in the lower left quadrant?

Let's say your LIDAR detector has a spatial resolution of 4 x 4 in this field of view instead of 8 x 8:
Average the values in each 4 x 4 square

8 x 8

4 x 4

Your Turn…

12				4	4	2	2
				4			
		16	3	4			
			1	4	4	2	2
					8		
		32			8		
						8	
							8

8 x 8

3			

4 x 4

Voila! New view of landscape!

12				4	4	2	2
				4			
		16	3	4			
			1	4	4	2	2
					8		
		32			8		
						8	
							8

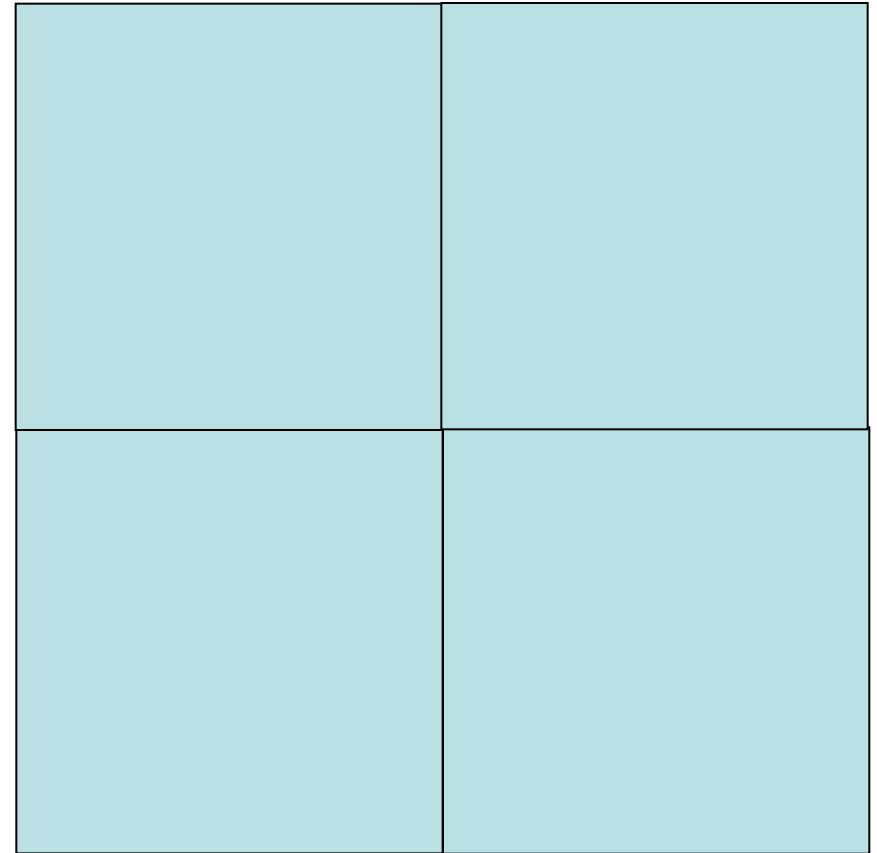| 3		3	1
	5	3	1
	8	4	
			4

8 x 8

4 x 4

Now let's say it is even worse: your LIDAR detector has a
spatial resolution of 2 x 2 in this field of view:
Decrease resolution by a factor of 2…AGAIN

3		3	1
	5	3	1
	8	4	
			4

4 x 4

2 x 2

How does this compare to the original landscape?

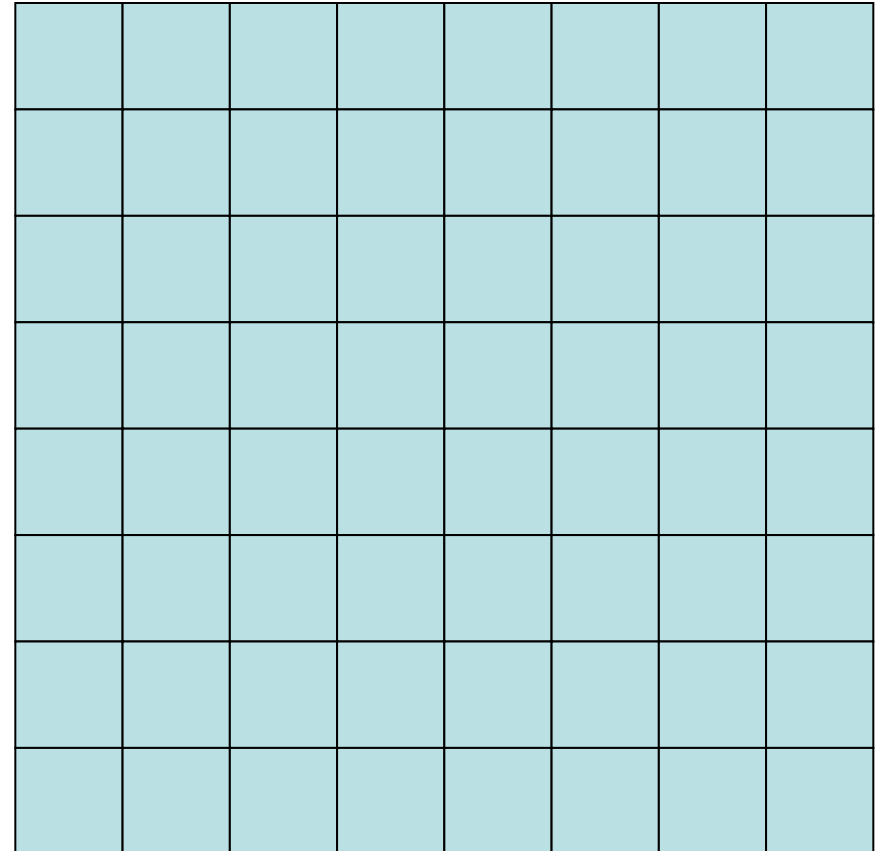|			
3		3	1
	5	3	1
	8	4	
			4

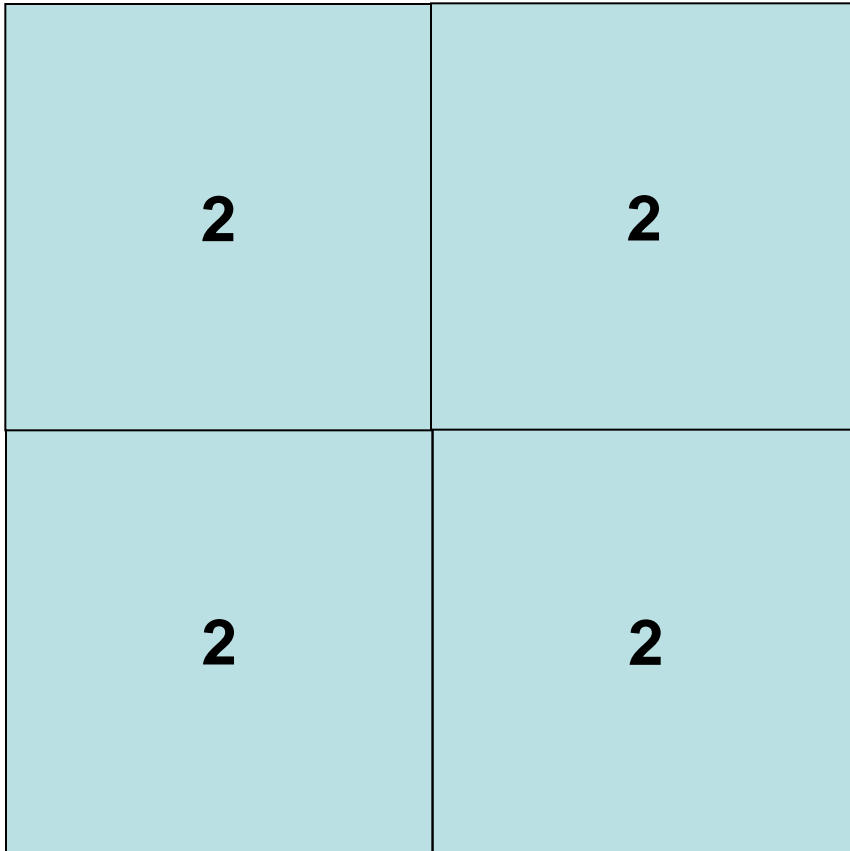|	
2	2
2	2

4 x 4

2 x 2

Can you go the other way??

If your detector produces the data with 2 x 2 resolution, can you recover the "reality" at 8 x 8 resolution?

Can you go the other way??

12				4	4	2	2
				4			
		16	3	4			
			1	4	4	2	2
					8		
		32			8		
						8	

NO!