

Are Sea Levels Rising And What Does This Have To Do With Arithmetic

This report is based on a letter I sent to EA in June 2011 where I looked at sea level rise for 7 locations around UK. At JeremyShiers.com there are graphs and tables of sea level rise at all UK locations for which www.psmsl.org hold data.

It is common knowledge that sea levels are rising due to global warming melting the Arctic and Antarctic

In addition some locations, such as the south east of England, are slowly sinking.

There's just one question, Is it true?

My interest in sea levels was raised due to a plan by the Environment Agency, which has the duty of protecting coast lines in UK, to knock a hole in the sea wall about 1/2 mile from where I live at Kirby le Soken in Essex UK.

The logic seemed to go, sea levels are rising, in fact they are predicted to rise over a meter in the next 100 years therefore the sea might come over the sea wall. Higher sea levels are killing salt marsh. So let's make a hole in the wall and flood some of the land at Devereux Farm to make new salt marsh.

Curiously this plan was met by very strong local opposition.

The plan to flood Devereux farm is just one part of the "Shoreline Management Plan" or SMP. The SMP details how the EA propose to defend the coastline of UK for next 100 years.

The starting point of this plan is the projection of sea level DEFRA 2006. These projections are in turn based on projections of rising temperature from UN IPCC.

Sea level is 'predicted' to rise at 4mm/year from 1990 to 2025 rising to 15mm/year from 2025 to 2115, resulting in a total rise of 1.205 meters by 2115.

Time period	Net Rate of Sea Level Rise mm/year	Total Sea Level Rise for period in mm
1990-2025	4.0	140
2025-2055	8.5	255
2055-2085	12.0	360
2085-2115	15.0	450
Total Sealevel Rise 1990 to 2115		1205

Table 1: DEFRA 2006 predictions of sea level rise

The Permanent Service for Mean Sea Level holds records of observations of sea levels at various sites around the world and this data may be downloaded from www.psmsl.org. The data for the UK is supplied by Proudman Oceanographic Laboratory.

Felixstowe is about 5 miles from Kirby, the other side of a large bay and PSMSL holds observations of sea levels from here.

The green dots on the plot are monthly observations of sea levels at Felixstowe.

The upward curving line shows the sea level rise predicted by DEFRA in 2006.

The downward pointing straight line is the trend line of the observations. I found it using the free stats package R, but I could have used Excel or any of the many other spreadsheets or maths tools. The trend line shows that the sea level at Felixstowe has actually fallen by around 0.2mm/year from 1980 to 2009. Admittedly 0.2mm/year is not very much but if sea level is falling by 0.2mm/year then it is not rising by 4mm/year or even 15mm/year.

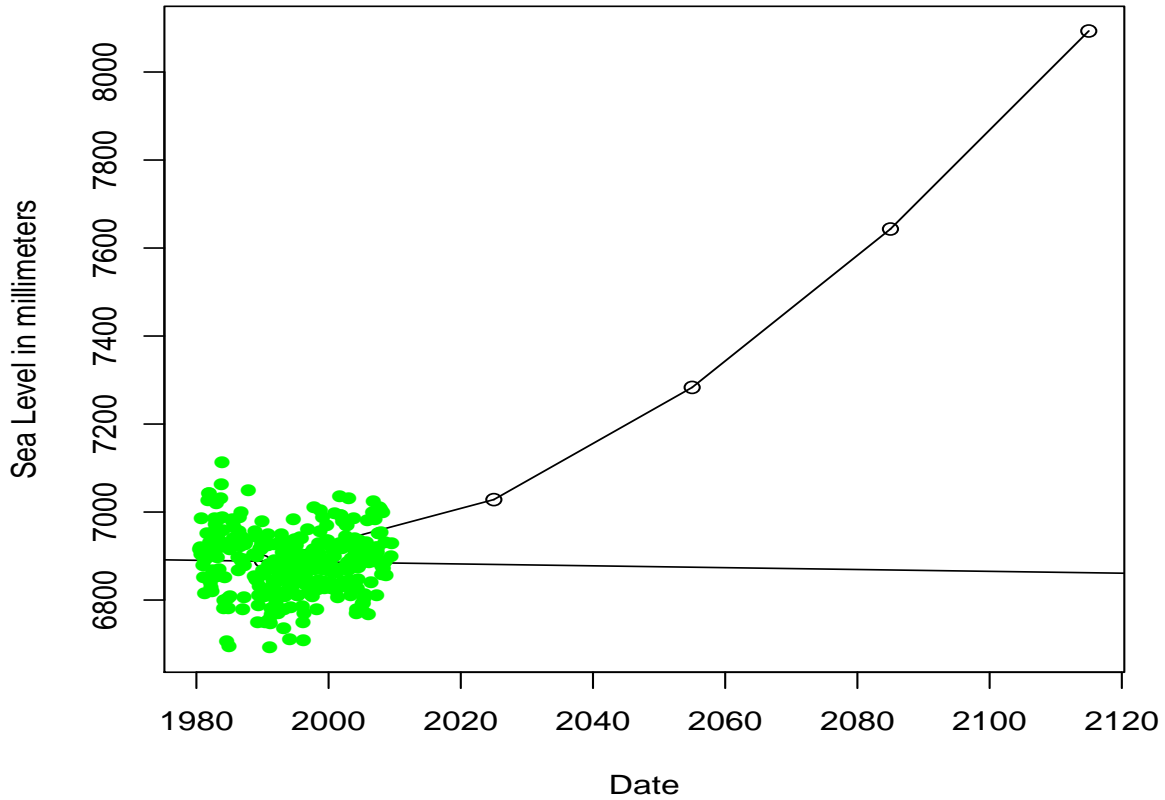


Figure 1: Fexlistowe

On this web page <http://www.environment-agency.gov.uk/cy/ymchwil/llyfrgell/data/34449.aspx> EA shows charts of rise in sea levels at 4 locations in the UK. and claims that they show 2.3 to 4.6mm/year.

The scale is so small that the graphs are almost unreadable and they appear to only use annual observations. But we shall see that the rises these charts show are 1.25 to 2mm/year around 1/2 that claimed by EA.

EA also states that UK sea levels are now about 10cm higher than in 1900. Scientists predict that sea levels will rise by between 2 and 9mm per year as a result of climate change.

In other words the prediction is that sea levels will rise in this century between 2 and 9 times as fast as they did in the last century.

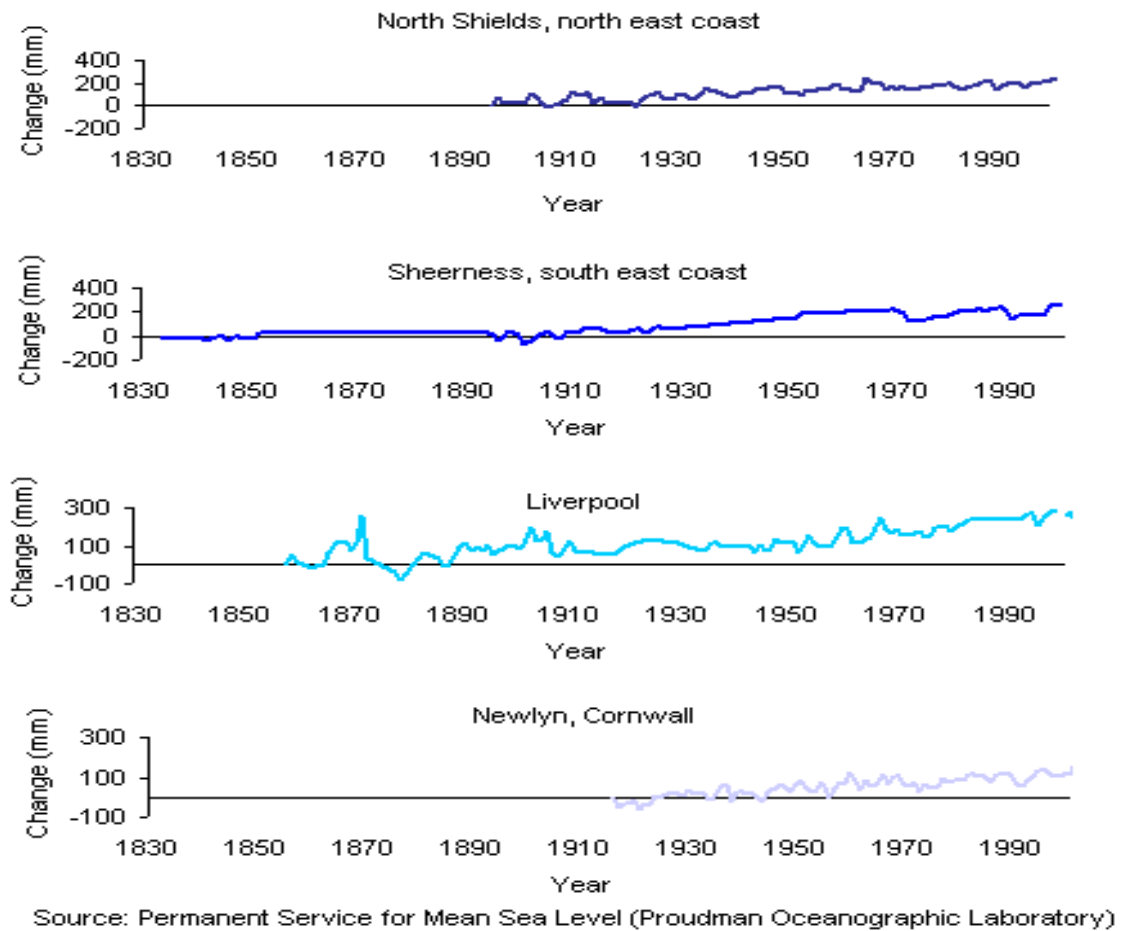


Figure 2: North Shields, Sheerness, Liverpool, Newlyn

Here are two more charts of sea level rise. These are on a larger scale and there is a line drawn on each of them, which may be a trend line, but there is nothing to say what it is. These also use annual observations.

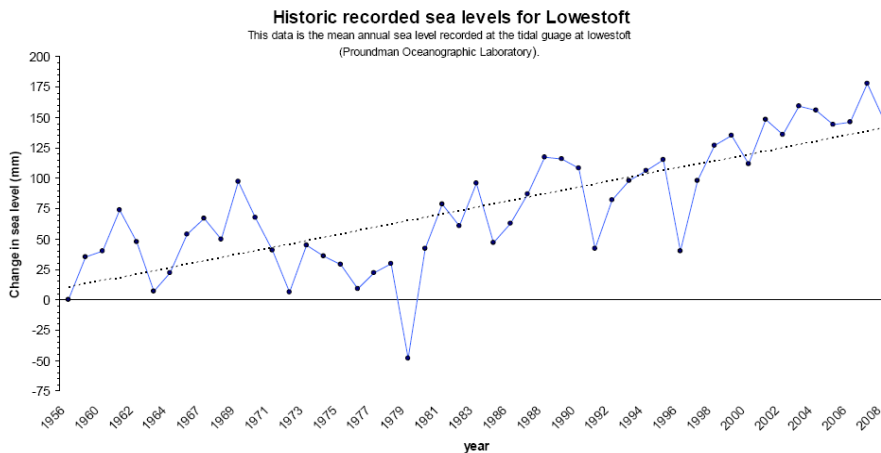


Figure 3: Lowestoft

We can estimate the rise shown by each chart

1. Do an eye ball fit, use a ruler to decide the line that best represents the trend of the data.
2. Choose start and end points on the line.
3. Estimate the rate of sea level rise just by dividing

$$\frac{\text{Change in sea level between points}}{\text{Number of years between points}}$$

So by reading four numbers of the each graph

$$\frac{\text{ending sea level} - \text{starting sea level}}{\text{ending year} - \text{starting year}}$$

	end level	star level	end year	start year
North Shields	200	0	2000	1900
Sheerness	280	0	2000	1835
Liverpool	250	0	2000	1860
Newlynn	100	0	2000	1920
Lowestoft	140	10	2008	1958
Southend	85	25	1983	1933

Table 2: Start and End Values from graphs in Figure 2 to 4

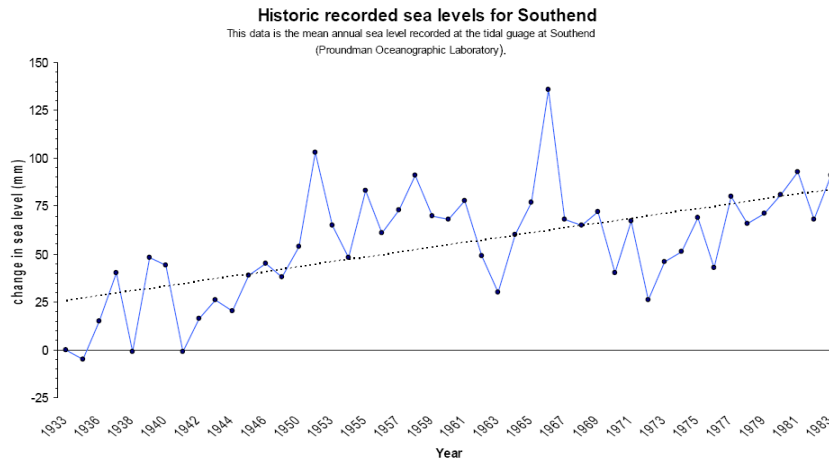


Figure 4: Southend

North Shields	$(200-0)/(2000-1900)$	200/100	2.0 mm/year
Sheerness	$(280-0)/(2000-1835)$	280/165	1.7 mm/year
Liverpool	$(250-0)/(2000-1860)$	250/140	1.8 mm/year
Newlynn	$(100-0)/(2000-1920)$	100/80	1.25 mm/year
Lowestoft	$(140 - 10)/(2008 - 1958)$	130/50	2.6 mm/year
Southend	$(85 - 25)/(1983 - 1933)$	60/50	1.2 mm/year

Table 3: Calculated Sea Level Rise from graphs in Figure 2 to 4

Figures 5 to 10 show graphs for the six locations that we have seen graphs from the EA, that have been drawn in a similar way to that of Felixstowe in Figure 1.

Table 3 shows the value of the rise in sea levels (the trend lines) and the rise in sea level this would imply from 1990 to 2115.

Apart from Liverpool there is quite good agreement between values estimated by reading start and end values of the graphs by eye and the values estimated by calculating the trend lines.

The only location that shows a rise of more than 2mm/year is Lowestoft. It would be interesting to learn more, especially as Lowestoft is only about 40 miles from Felixstowe were the sea levels appear to be falling.

There is clearly a problem with the DEFRA predictions as they state that sea levels will rise at 4mm/year between 1990 and 2015.

But they are not in 7 locations looked at here.

Looking at Figures 1 and 5 to 10 it can be seen that sea levels fluctuate by as much as 4

Location	Net Rate of Sea Level Rise mm/year	Total Sea Level Rise for 1990 to 2115 mm
Felixstowe	-0.2097	-26.22
North Shields	1.946	243.2
Sheerness	1.669	208.6
Liverpool	1.079	134.9
Newlyn	1.775	221.8
Lowestoft	2.434	304.2
Southend	1.25	156.2

Table 4: Predicted Sea Level Rise From PSMSL Observations

metres and we are trying to track a change which is only 1 or 2 mm/year.

In addition, PSMSL, documents that tide gauges are sometimes moved to a different location which may be at a different height. So the sea level records which appear to be continuous are in fact set of different observations which have been spliced together and adjusted to a common height.

Any mistake in adjusting for the change in height when a tide gauge is relocated would influence the reported sea level rise.

Finally there is no indication whatsoever of any acceleration in the rate of sea level rise.

I have been surprised how ready people are to accept official figures on trust. Some seem to question their ability or even their right to decide for themselves, which is a shame as all that is needed is some simple arithmetic.

What can you do?

1. Look at the charts of monthly sea levels at psmsl.org
2. Click on the link to the right of graph to see larger view.
3. Print some out (tip use landscape to get a bigger picture), then estimate the rate of sea level rise yourself.
4. Download the monthly data and using Excel R or whatever calculate the trend.
5. If you feel that the DEFRA predictions are wrong lobby your MP, council, Environment Agency. Oh and DEFRA too.

Questions or comments email me at jeremy@jeremyshiers.com

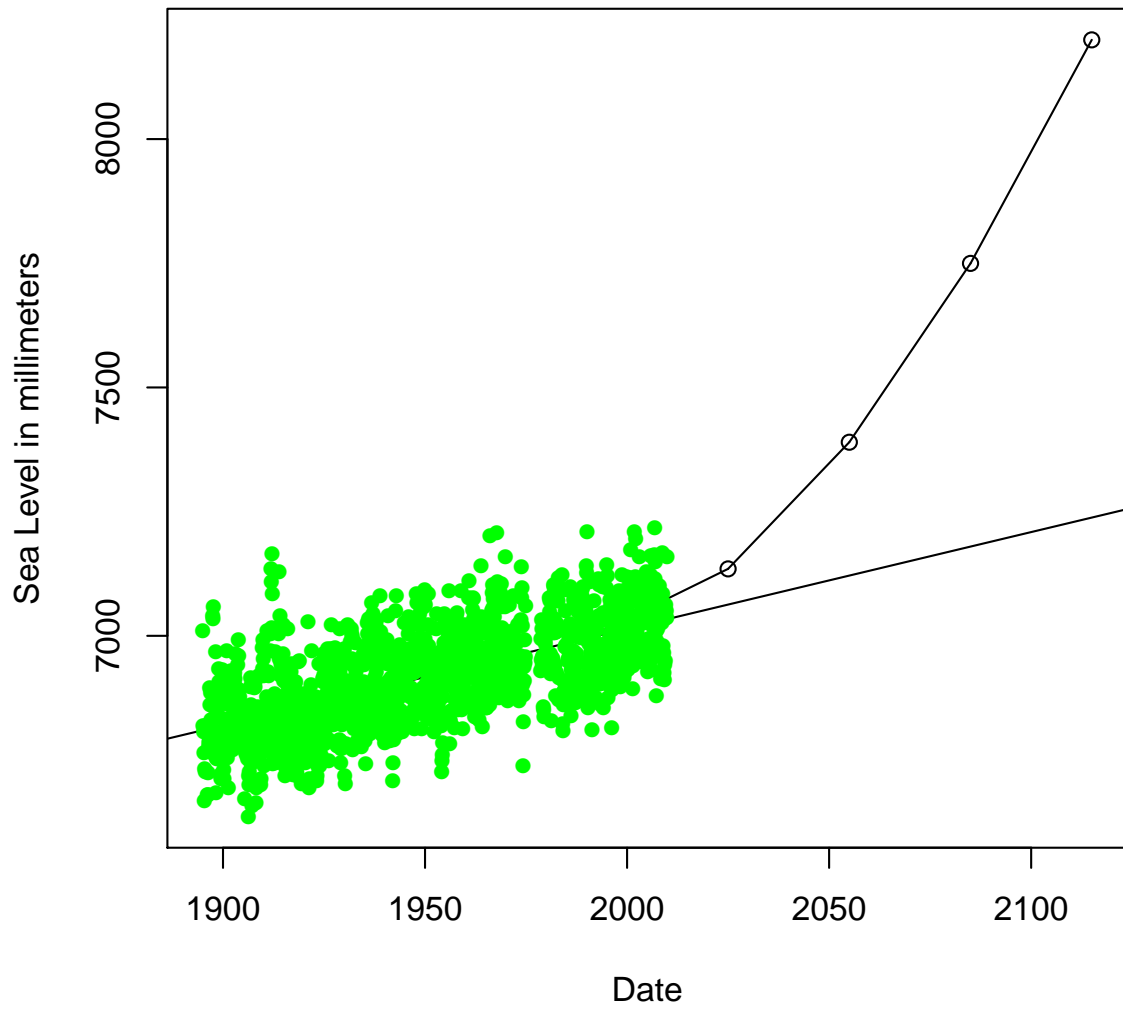


Figure 5: North Shields

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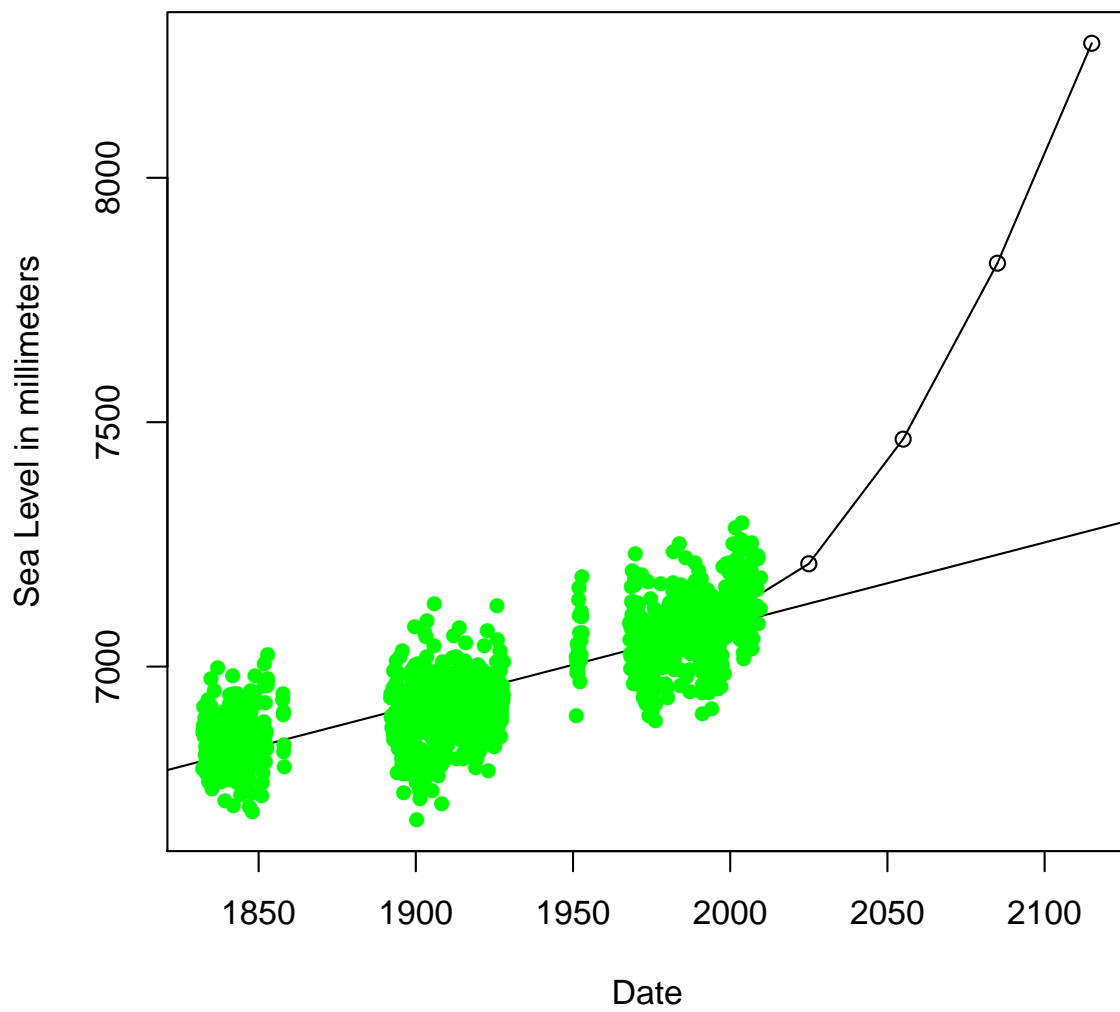


Figure 6: Sheerness

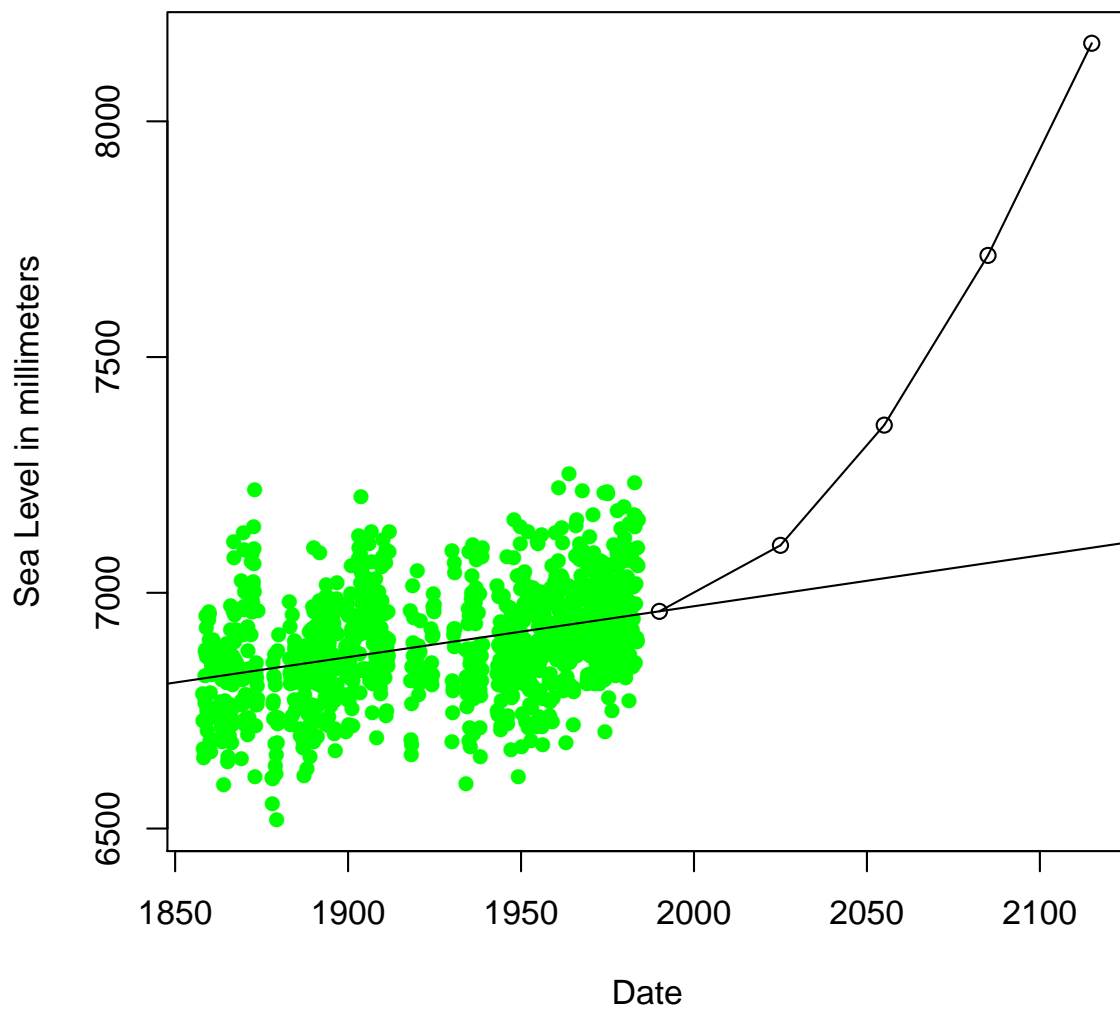


Figure 7: Liverpool

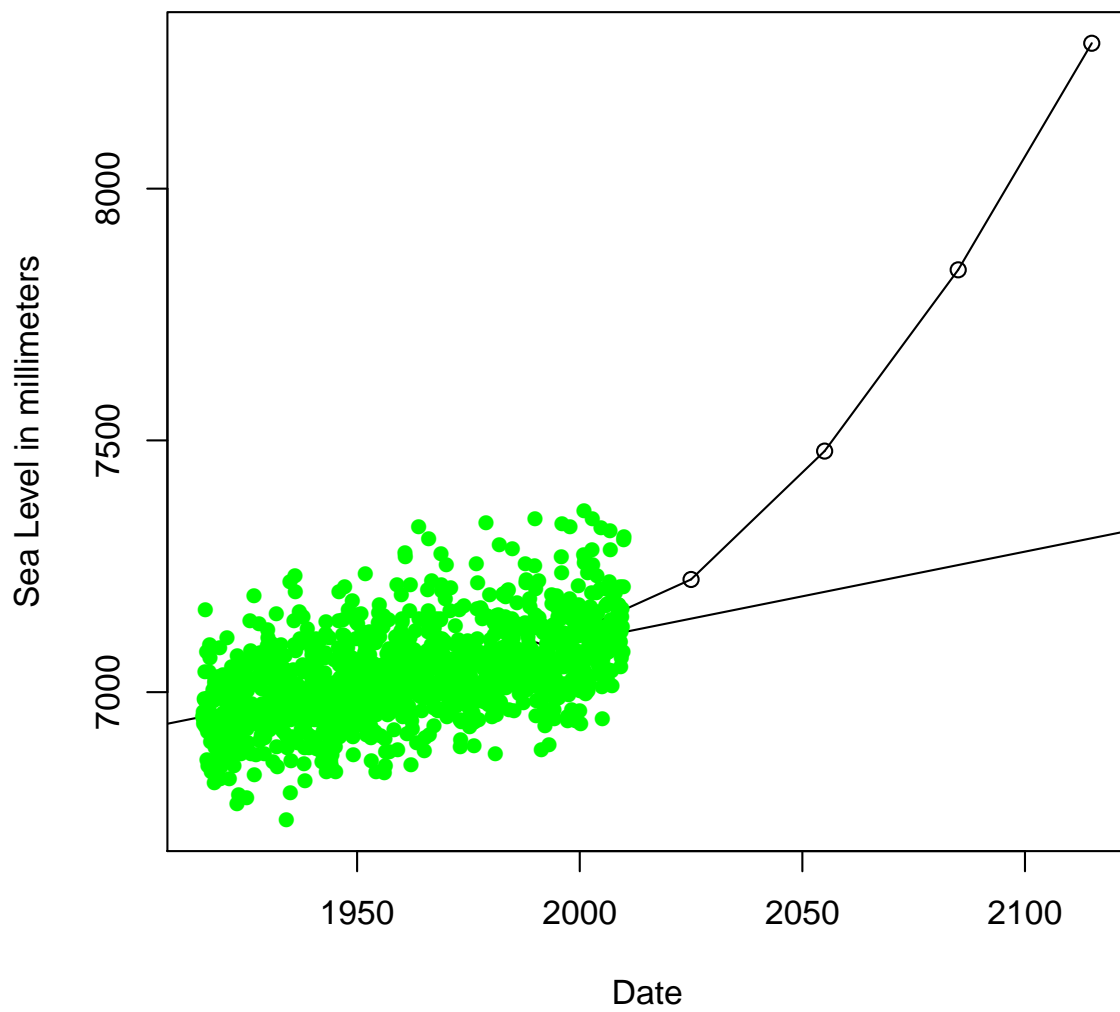


Figure 8: Newlyn, Cornwall

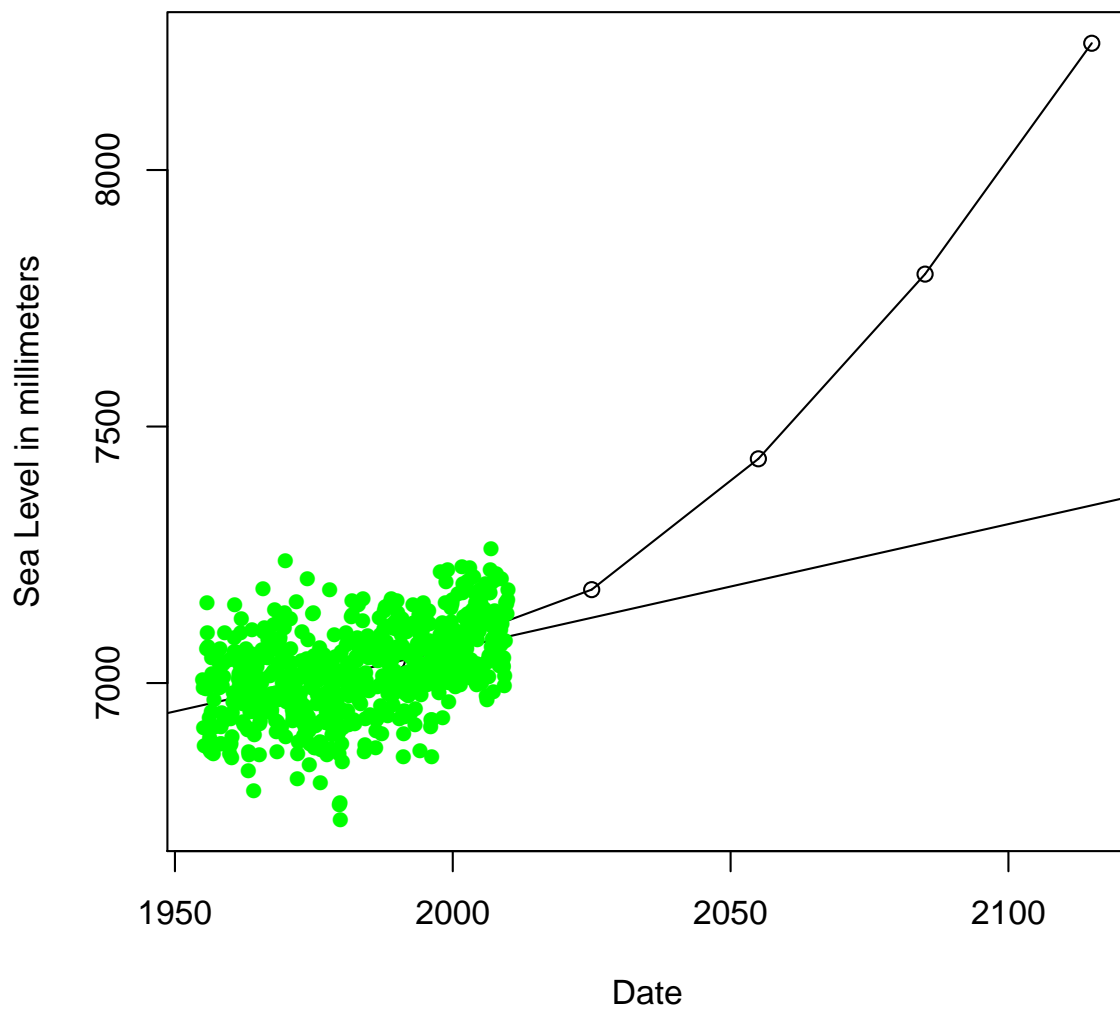


Figure 9: Lowestoft

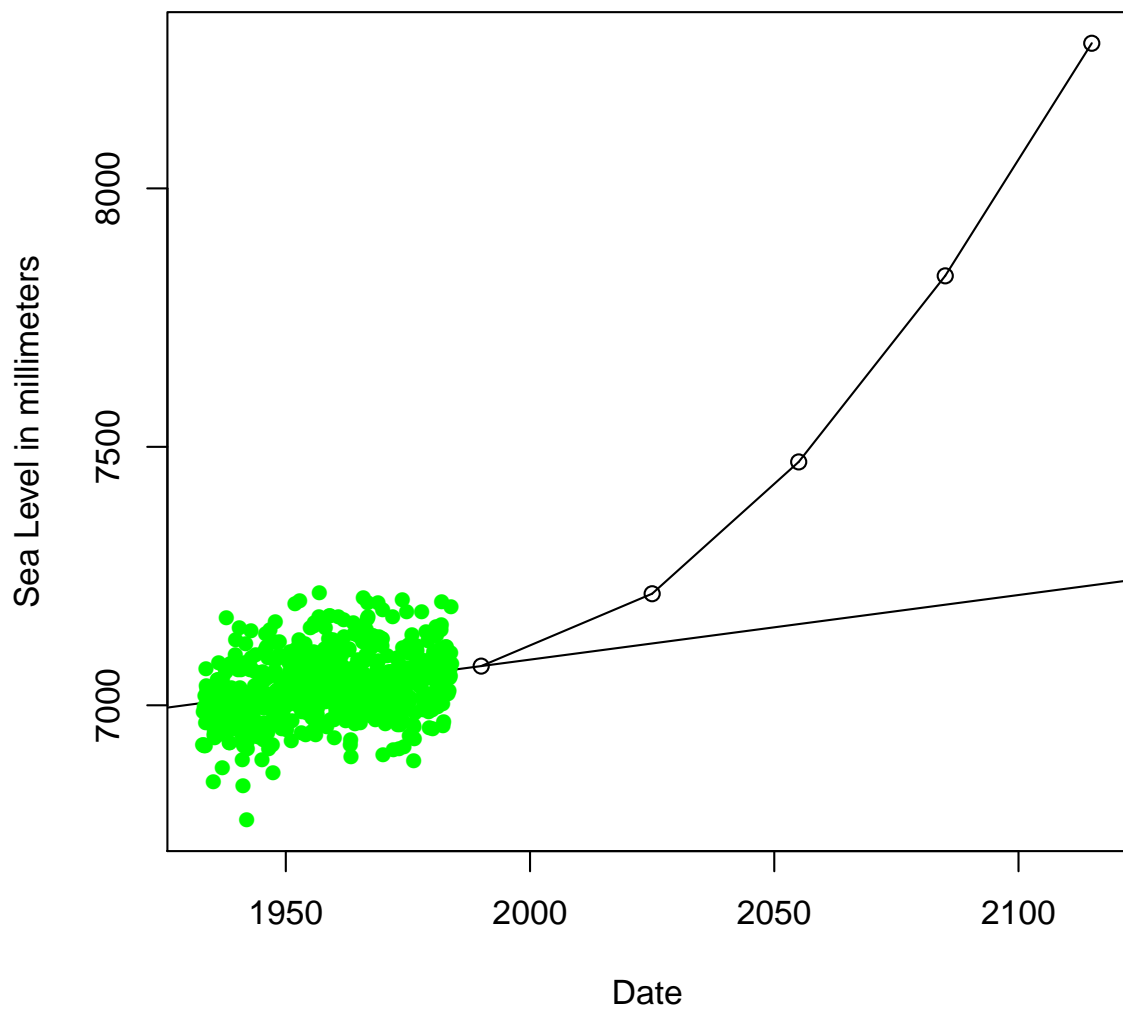


Figure 10: Southend