

# 1<sup>st</sup> Tidal and Water Level Working Group Meeting

DHN, Niteroi, Brazil 31/03/09 – 02/04/09

Tidal Range Study

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## Background

- Possibility that Atlantic tidal resonance is becoming less vigorous due to:-
  - i) The warming of the ocean leading to an increase in its volume
  - ii) The widening of the ocean resulting from changes due to tectonic plate movement – circa 3cm per year.
- Other possible factors
  - iii) Moon distance to Earth – circa 2.5cm per year
  - iv) Salinity / Water Density parameters
- Has potential to affect all oceans, not just the Atlantic
- Timescales?



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## The Study

- Primary focus of the study is the predicted HAT – LAT range at UK ports over a long period
- Data currently analysed covers the period 1998 - 2010 (originally only 2 isolated years considered)
- 15 UK locations – primarily south coast locations
- All have recording tide gauges routinely monitored
- 11 locations show a general decrease in the HAT – LAT range
- 4 locations show a general increase
- Some trends are more definite than others
- Two major locations show a definite decrease, namely London Bridge and Avonmouth



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# UK Locations



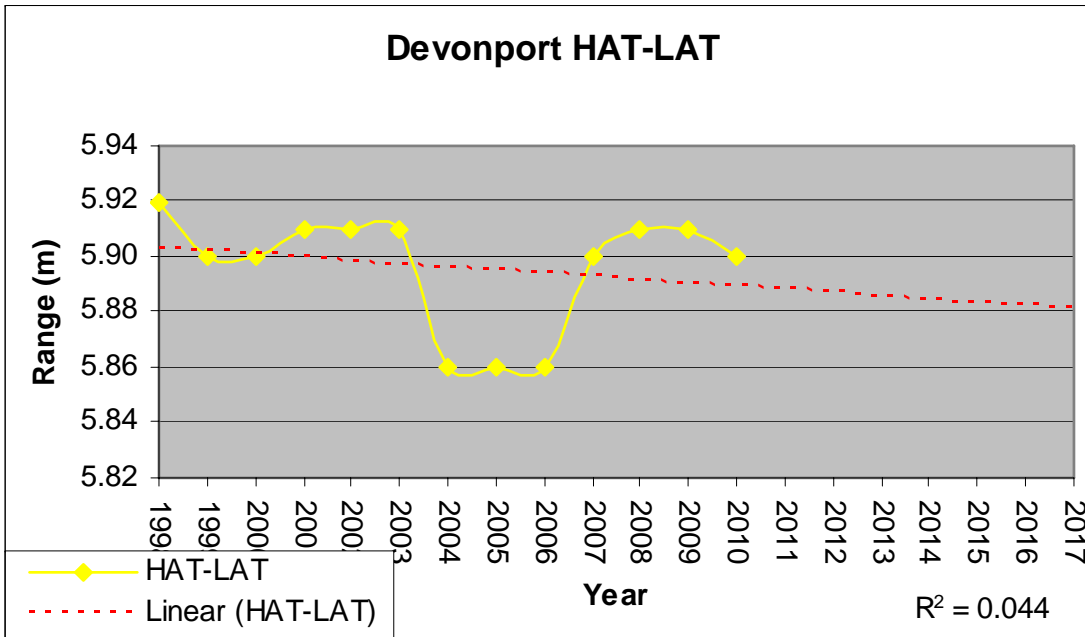
- Also considered the trends in MSL and Amplitude of the  $M_2$  tide at each location



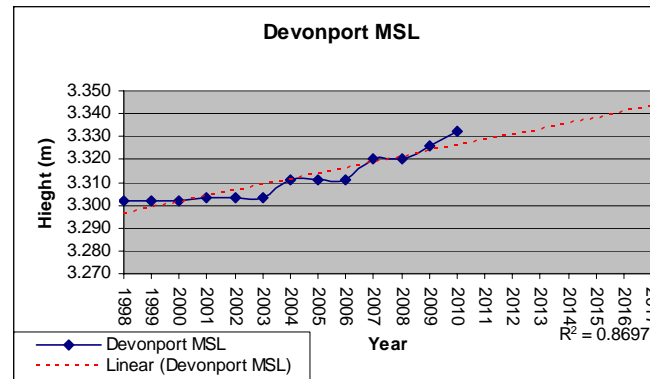
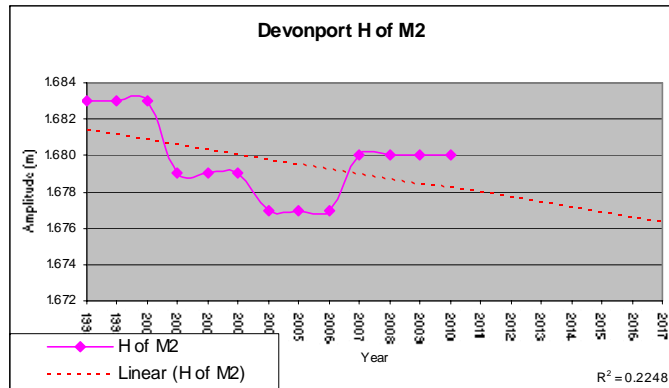
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# Some Results

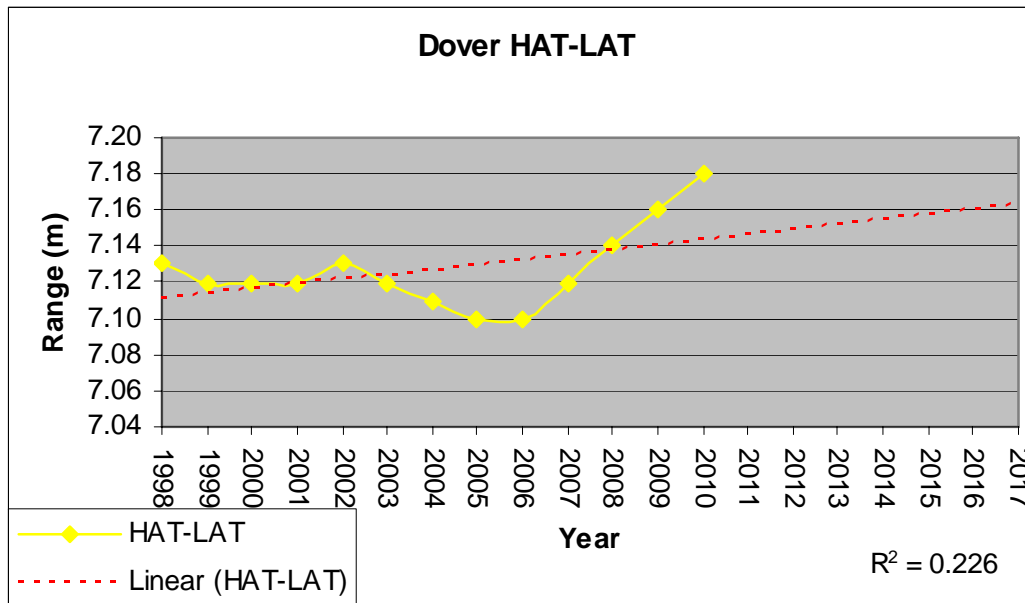


- Linear trend is poor
- Inconclusive result
- General decrease in HAT - LAT

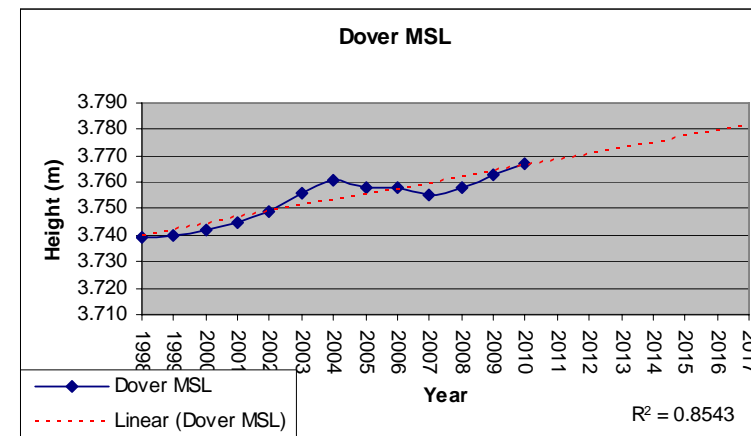
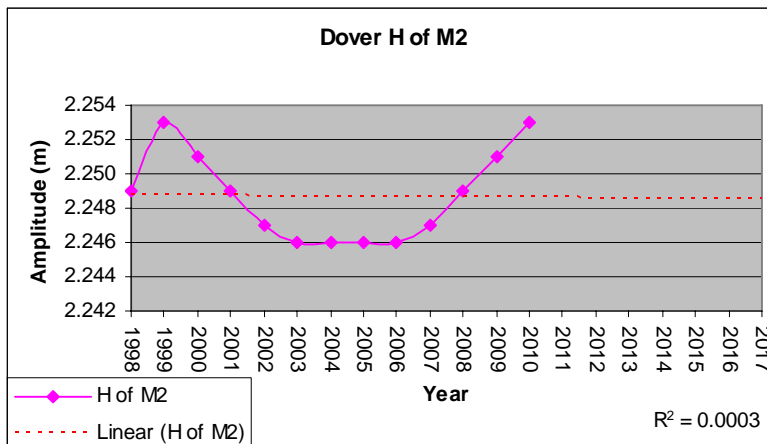


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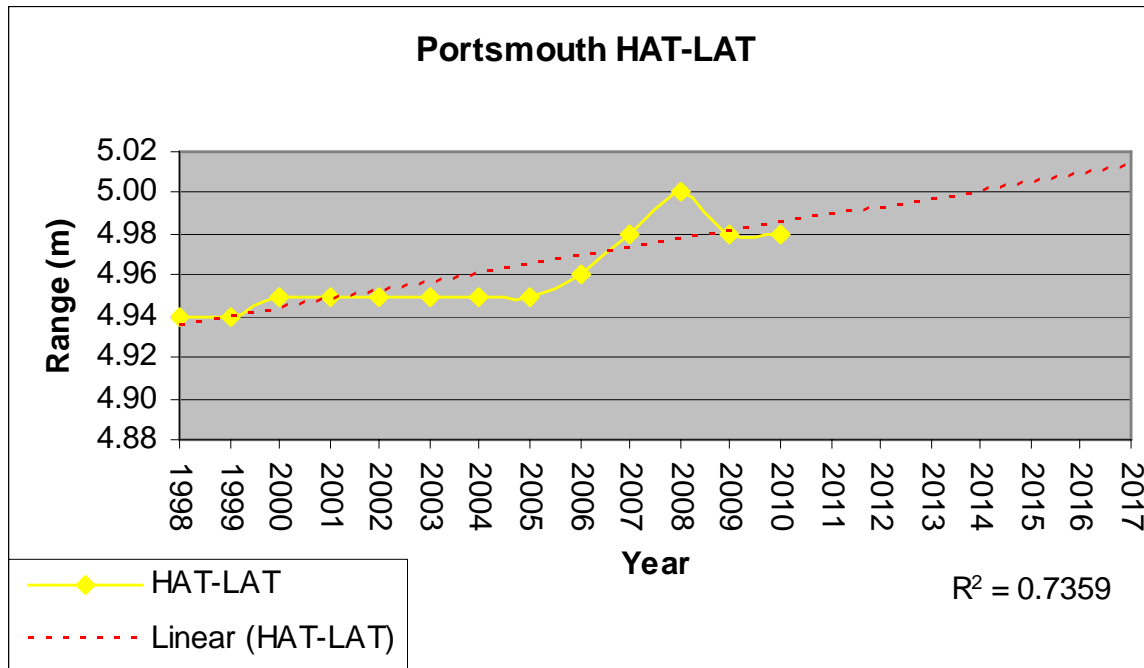


- Linear trend is poor
- Inconclusive result
- General ***increase*** in HAT - LAT

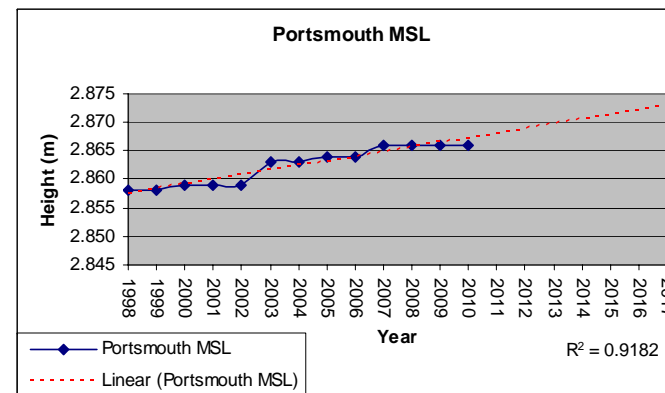
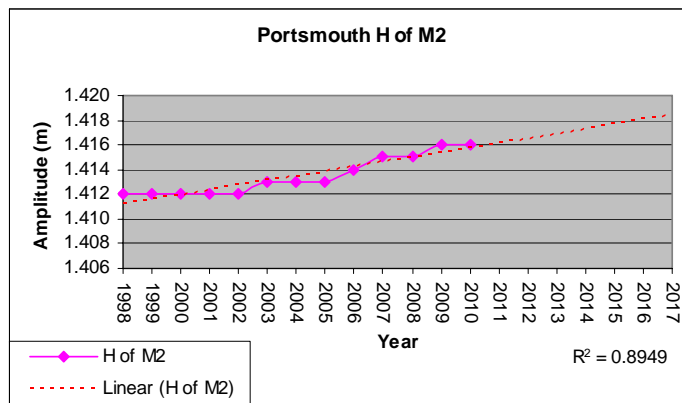


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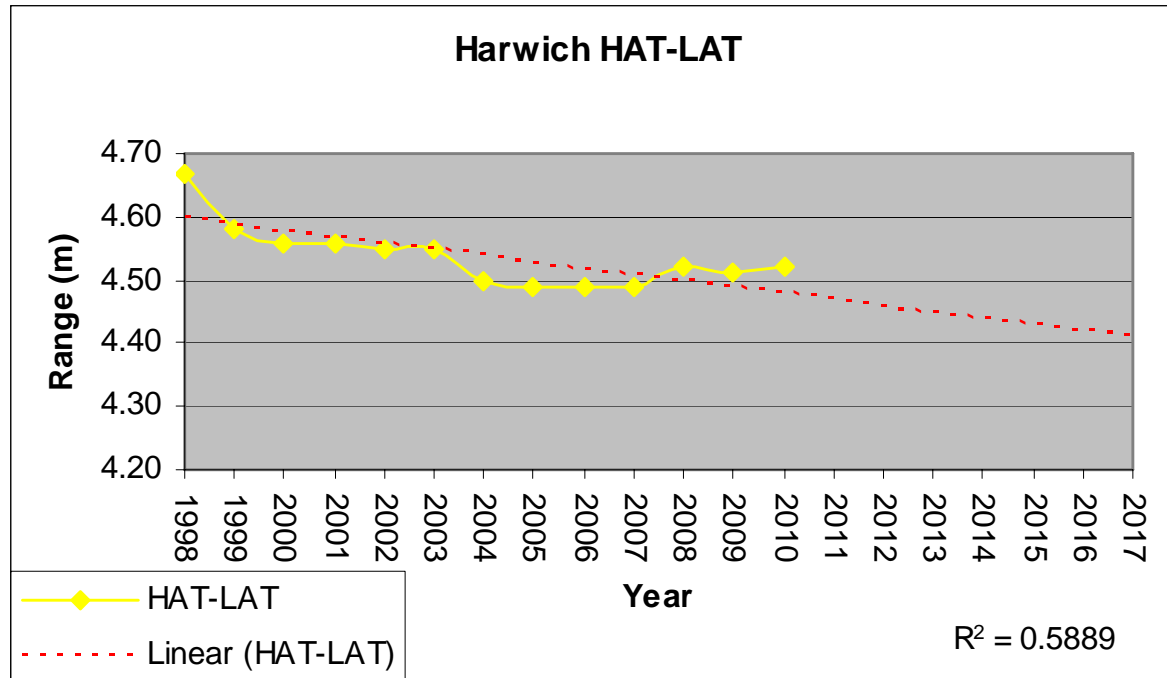


- Linear trend is good
- Steady *increase* in HAT – LAT

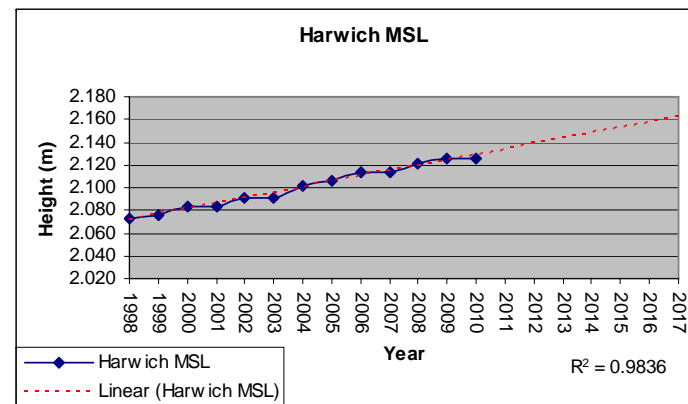
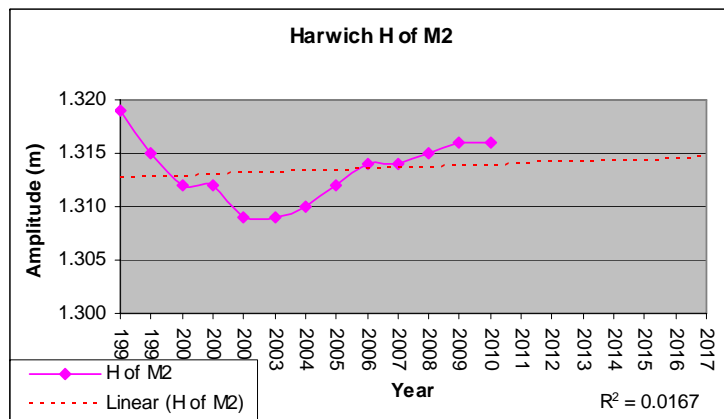


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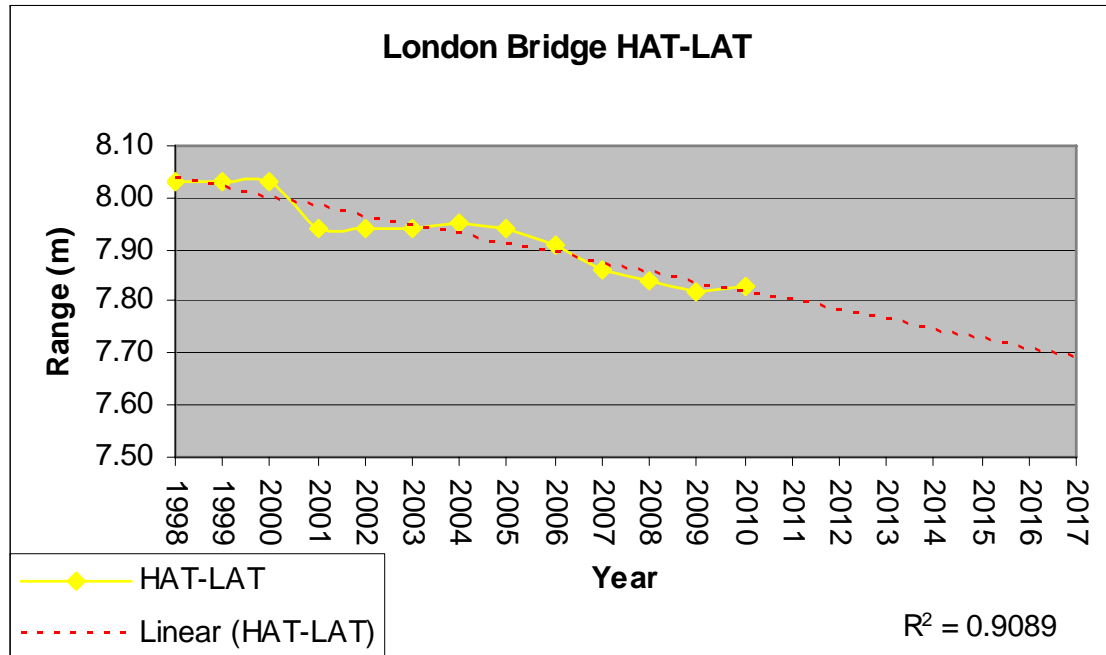
- Linear trend is relatively good
- Steady decrease in HAT – LAT



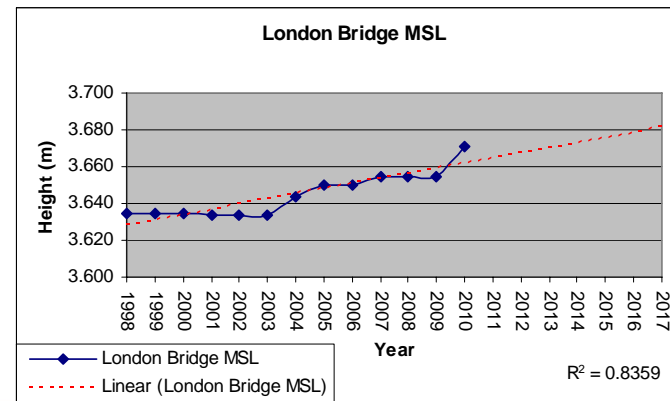
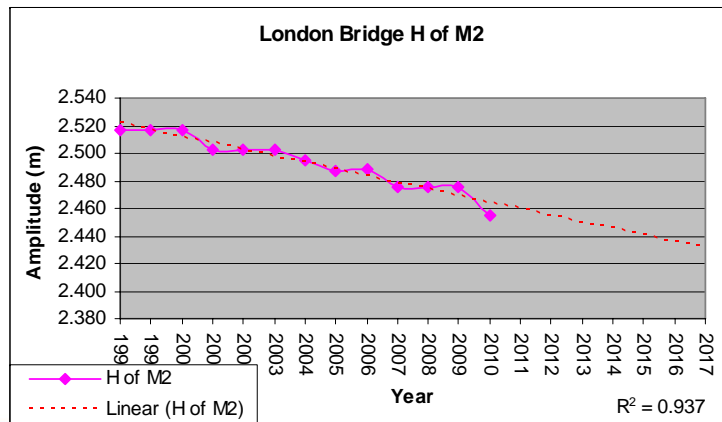
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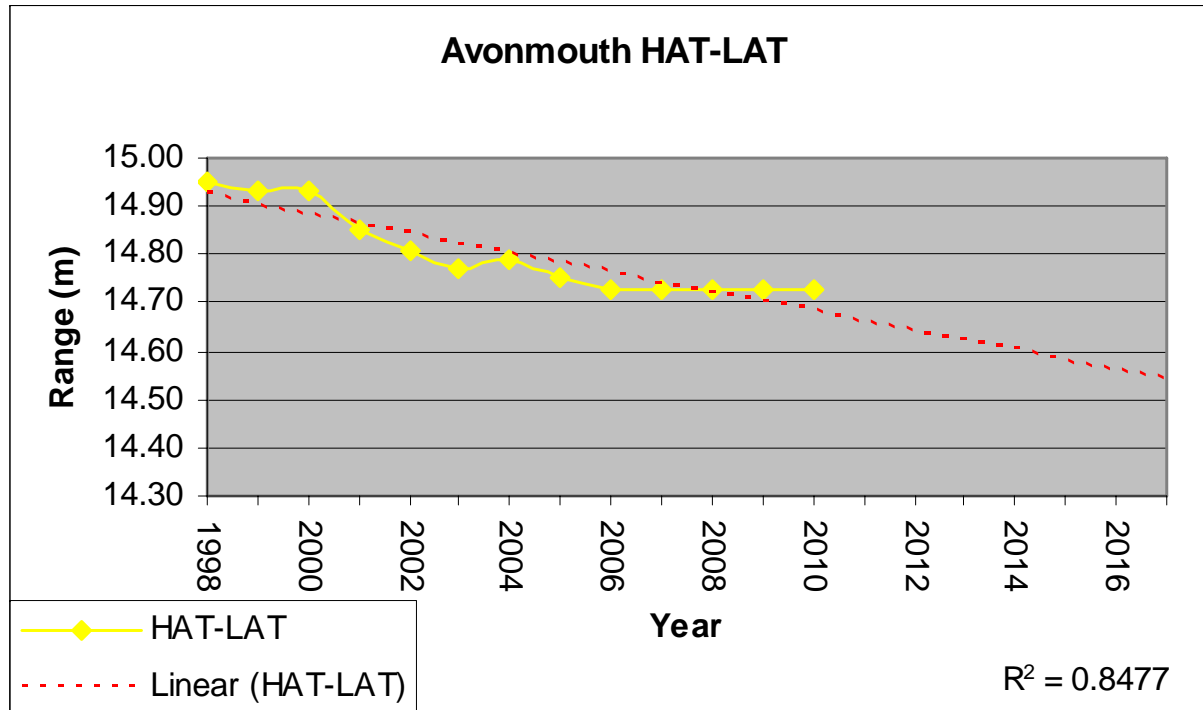


- Linear trend is good
- Steady decrease in HAT – LAT

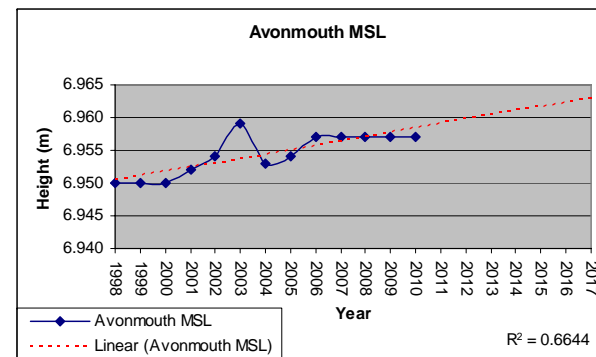
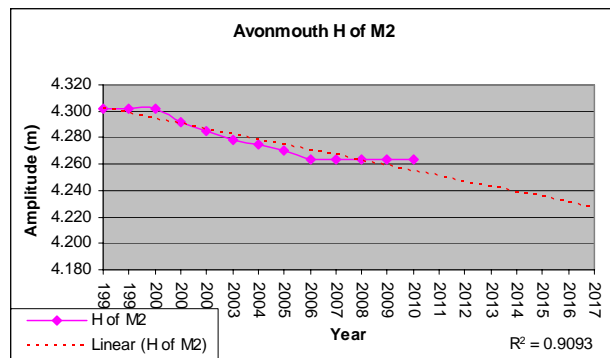


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- Linear trend is good
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# Longer-term issues

- Rising sea levels will increase the potential of flood risk through increased storm-surge activity
- However a reduction in tidal range may counteract some of this affect
- Engineering projects may need to think about this – such as replacement of the Thames Barrage



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# Summary

- Some locations do show more consistency than others (e.g. London Bridge & Avonmouth)
- Largest tidal ranges appear to show the largest reductions
- More work needs to be done - initial results are not convincing
- Involving the Proudman Oceanographic Laboratory – undertaking UK-based investigation, and also global work with the University of Tasmania



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