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Tide Gauge Location and the Measurement of Global Sea Level Rise

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We study individual PSMSL tide gauge data on sea levels during the 20th century. We find that according to 61% of tide gauges sea levels neither rose nor fell, in 33% sea levels rose and in 4% sea levels fell. Although sea levels rose in the Baltic, the US Atlantic and the Ring of Fire, there is no evidence of global sea level rise. Studies which report evidence of global sea level rise during the 20th century use the same data supplemented by reconstructed data. We suggest that this result is coming from the reconstructed data rather than from the actual data in PSMSL. We show that the location of tide gauges is independent of SLR as measured by satellite altimetry. Therefore PSMSL tide gauges constitute a quasi-random sample and global inferences based on them are unbiased. We also show that tide gauges with longer histories happened to be located where sea levels were rising. This partially explains why data reconstructions over-estimate sea level rise.