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Data versus Hype: How Ten Cities Show Sea-level Rise Is a False Crisis

By Dennis Hedke*

Introduction

Are the world's coastal cities destined to be inundated as ice melts at the top and bottom of the planet, causing the oceans to rise? Climate alarmists argue this will be the case if policymakers do not adopt draconian measures to eliminate fossil fuels, especially coal, which produce carbon dioxide (CO₂) emissions that, they allege, cause harmful global warming.

We can test the rising-seas hypothesis with real data collected from ten coastal cities with long and reliable records of sea level.

Alarmists have difficulty making this argument because, despite increasing concentrations of CO₂ in the atmosphere, global temperatures have risen very little during the past two decades, and sea-level trends are not significantly different from what they were seven to nine decades ago, when CO₂ levels were 310 parts per million by volume (ppmv) or less.¹ Dire predictions made decades ago of dramatically accelerating polar ice loss, and an ice-free Arctic Ocean have not come to pass.² As Dr. Steven E. Koonin, former Undersecretary for Science for the Obama administration, noted in 2014, “Even though the human influence on climate was much smaller in the past, the models do not account for the fact that the rate of global sea-level rise 70 years ago was as large as what we observe today.”³

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¹ Patrick J. Michaels, “[2016 Record Warm Surface Temperatures: The Party’s Over!](#)” *Cato at Liberty*, August 10, 2017.

² Douglas Stanglin, “[Gore: Polar Ice Cap May Disappear By Summer 2014](#),” *USA Today*, December 14, 2009.

³ Steven E. Koonin, “[Climate Science Is Not Settled](#),” *The Wall Street Journal*, September 19, 2014.

Despite that, alarmists still push fear of inundations, most recently in the wake of hurricane-driven floods and President Donald Trump’s rescission of the Obama-era requirement that government agencies take account of projected hypothetical global warming-induced sea-level rise for federally funded projects.⁴

We can test the rising-seas hypothesis with real data collected from ten coastal cities with long and reliable sea-level records.

We don’t need to wonder who is right and who is wrong in the debate over future sea-level rise. We can test the rising-seas hypothesis with real data collected from ten coastal cities with long and reliable sea-level records. Those cities are Ceuta, Spain; Honolulu, Hawaii; Atlantic City, New Jersey; Sitka, Alaska; Port Isabel, Texas; St. Petersburg, Florida; Fernandina Beach, Florida; Mumbai/Bombay, India; Sydney, Australia; and Slipshavn, Denmark.

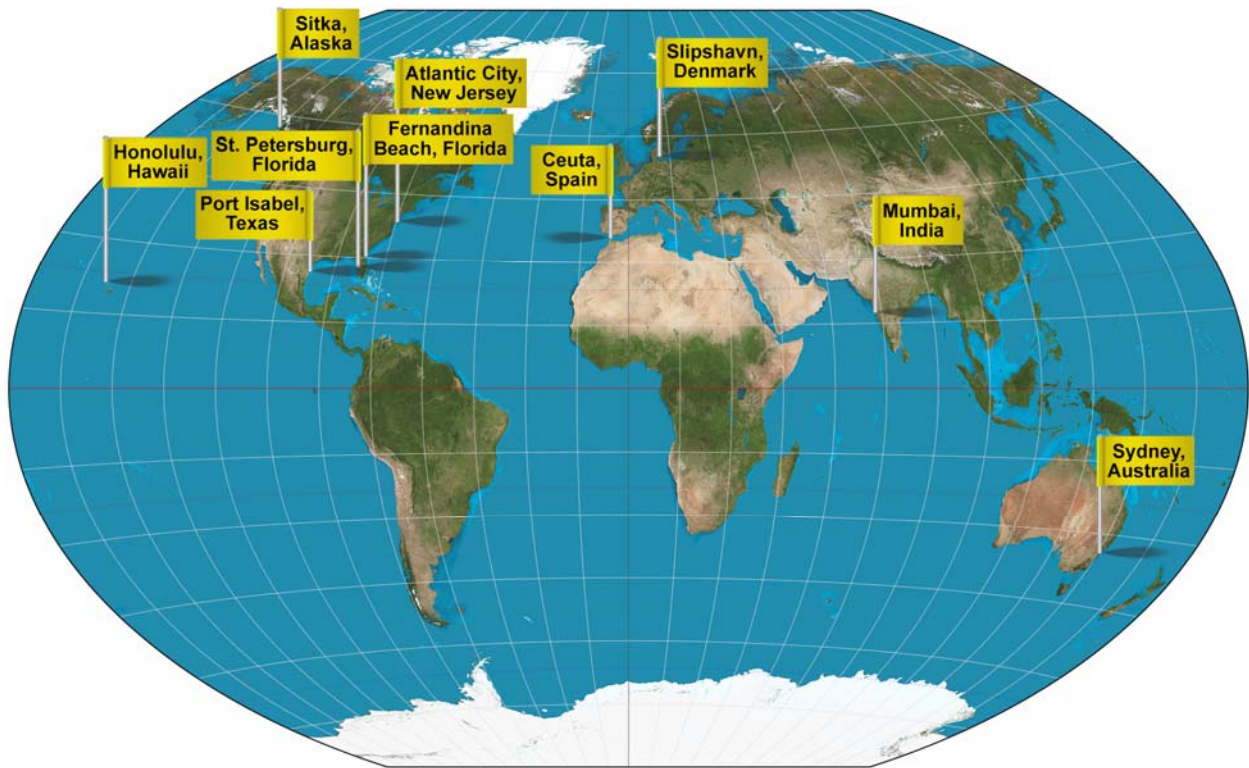
New Jersey; Sitka, Alaska; Port Isabel, Texas; St. Petersburg, Florida; Fernandina Beach, Florida; Mumbai/Bombay, India; Sydney, Australia; and Slipshavn, Denmark.

The cities appear on the map on the following page, and data for each city are presented in ten graphs below. The graphs include the following elements:

- CO₂ concentrations measured in the atmosphere over the past century, signified by the green lines in the graphs. (This line is the same in all the graphs.)
- Monthly mean sea-level data for each city, signified by the blue lines, and
- The “linear fit,” signified by the red line, representing the best estimate of past and projection of future average sea levels. We also include the 95% Prediction Intervals.

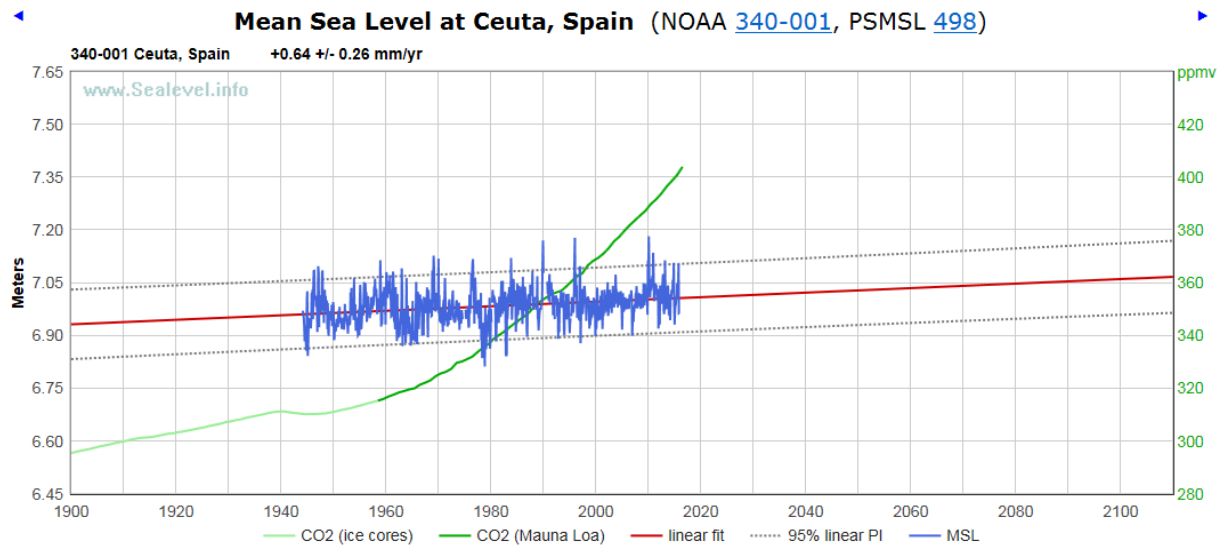
Sources for these data are reported in Appendix 1, along with the formulas for calculating the linear fit. Based on these data and formulas, we have records of sea-level dating back more than a century for some cities, and we can project the sea-level rise over the next century for these locations.

⁴ Michael Bastasch, “[Trump to Repeal Obama Executive Order on Sea Level Rise](#),” *The Daily Caller*, August 15, 2017.



Source: https://en.wikipedia.org/wiki/World_map, modified.

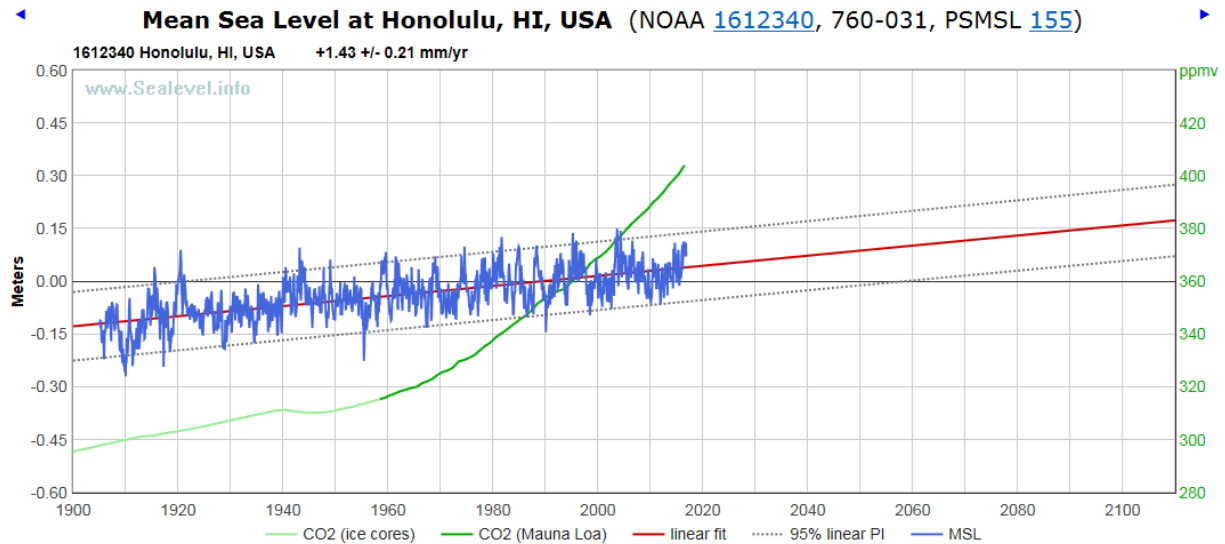
Example 1: Ceuta, Spain on the Mediterranean Sea



The Ceuta, Spain data show about as flat a trend as we will observe globally. Most notably, the data show no correlation between CO₂ concentration and sea-level rise. If the current trend continues for the next century, sea level in Ceuta will rise only three inches. This is in sharp

contrast to the ten-foot global rise in sea levels recently projected by former NASA scientist James Hansen.⁵

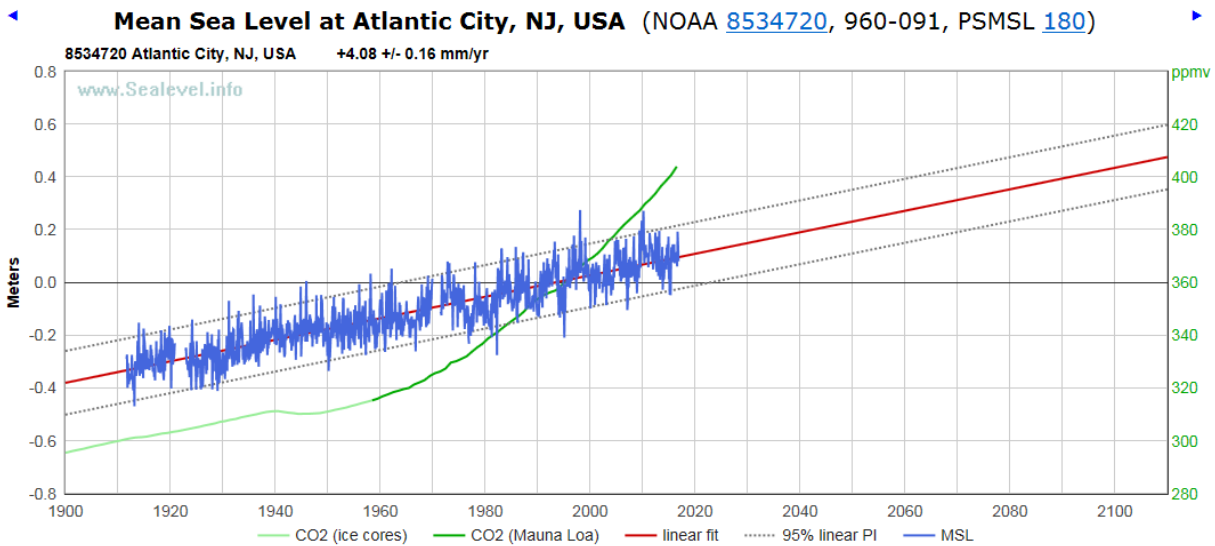
Example 2: Honolulu, Hawaii on the Pacific Ocean



Hawaii, like some other regions, can see significant fluctuations in sea level because of global oceanic currents or local plate tectonic movements. The latter, on a global scale, have been responsible for the breaking up of continents, reshaping of oceans, and rises and falls of sea levels over geologic time. However, Honolulu has seen an average sea-level rise of only 5.6 inches since 1900. The sea level around Honolulu is projected to rise a mere 5.6 inches in the next 100 years, once again with no correlation to CO₂ levels.

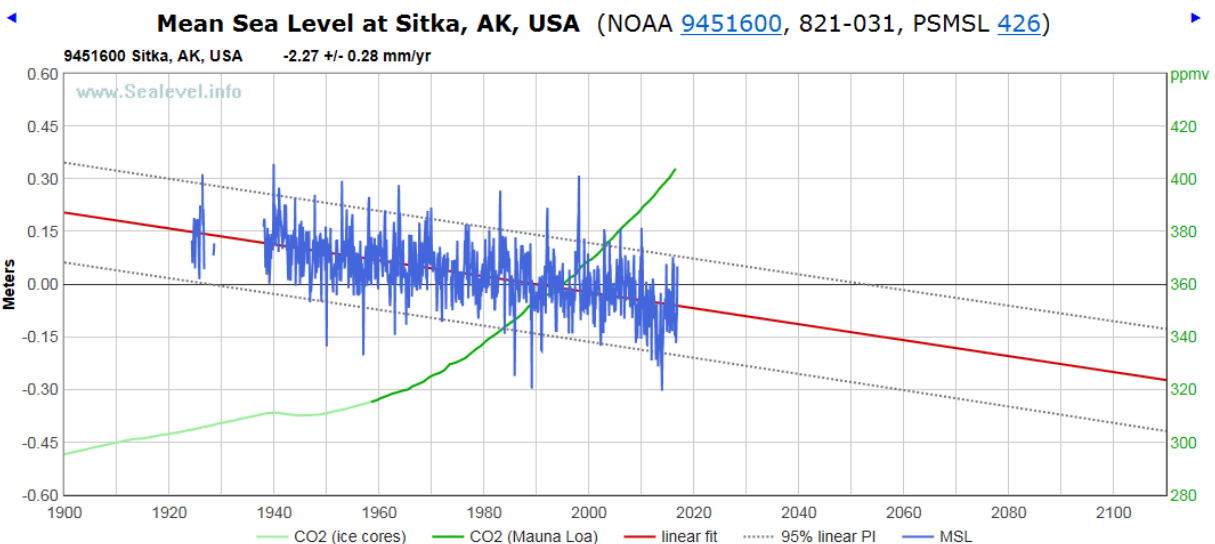
⁵ Brian Clark Howard, "[Prediction of Rapid Sea Level Rise Won't Change Global Climate Talks](#)," *National Geographic*, July 21, 2015.

Example 3: Atlantic City on the Atlantic Ocean



Atlantic City represents one of the more significant upward trends. The average sea level there has risen about 16 inches in the past 100 years. Notice, however, the spike at 1998, when the El Niño event took place in the Pacific Ocean, and then the subsequent drop in sea level that persisted for the next five years. Obviously, factors other than CO₂ levels were responsible for both the spike and the drop.

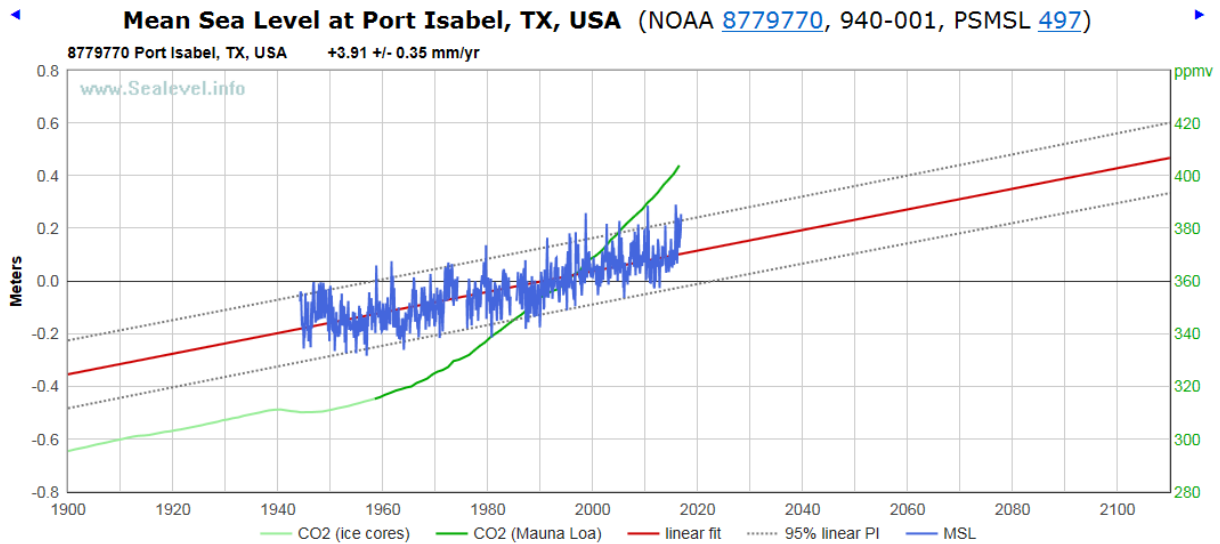
Example 4: Sitka, Alaska in the Northern Pacific



The sea-level trend in Sitka, Alaska has been downward, not upward, as the alarmists' theory would seem to predict. If the rate of change continues, sea level will fall nine inches over the next 100 years. Note Sitka is only about 100 miles from Glacier Bay and 200 miles from the

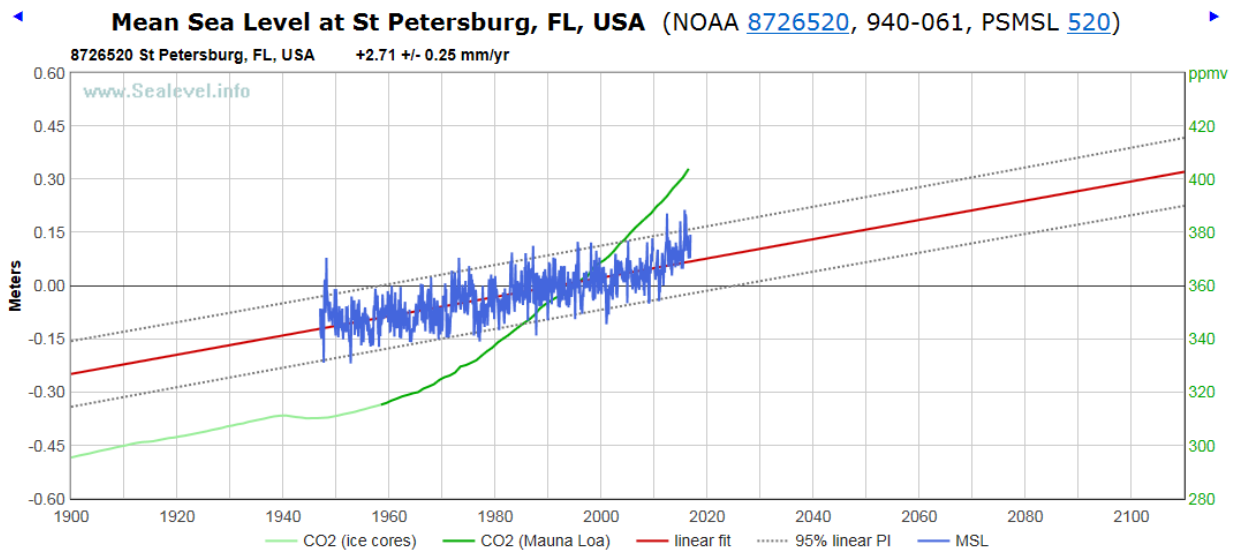
Hubbard Glacier on Disenchantment Bay. If melting glaciers were causing sea levels to rise, one might expect to see it in Alaska.

Example 5: Port Isabel, Texas in the Western Gulf of Mexico



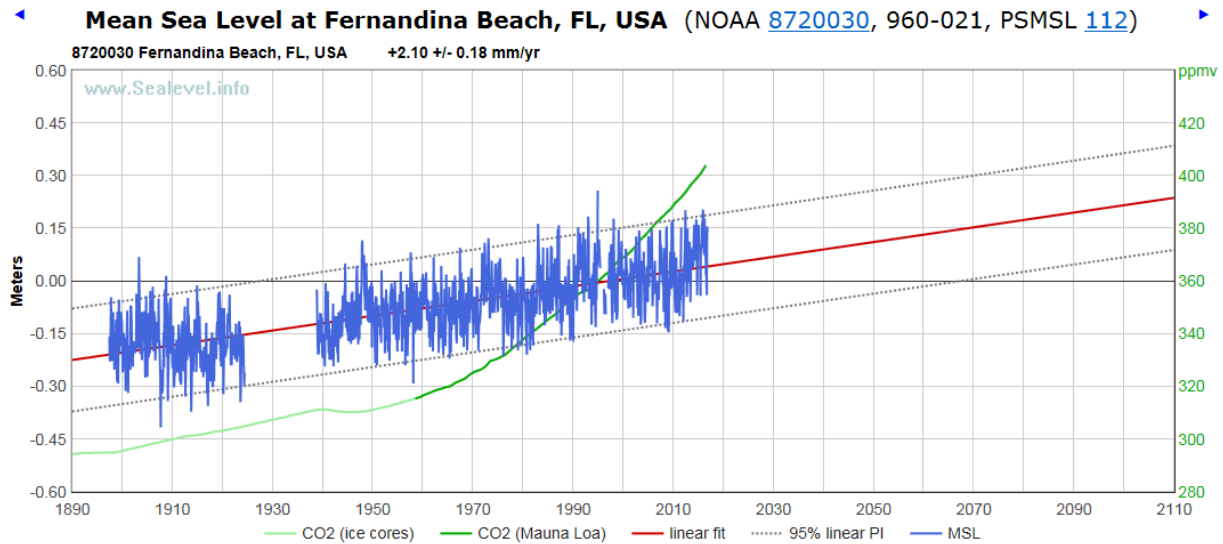
Port Isabel, Texas shows an upwardly inclined sea-level trend, although the record reaches only as far back as 1944. If the current trend continues, sea level will rise 15.4 inches over the next 100 years.

Example 6: St. Petersburg, Florida, Eastern Gulf of Mexico



At St. Petersburg, on the other side of the Gulf of Mexico from Port Isabel, Texas, sea level is also rising but more slowly. Once again, the record is shorter than other sites, dating back only to 1947. Here, the projected sea-level rise is only 10.7 inches over the next 100 years.

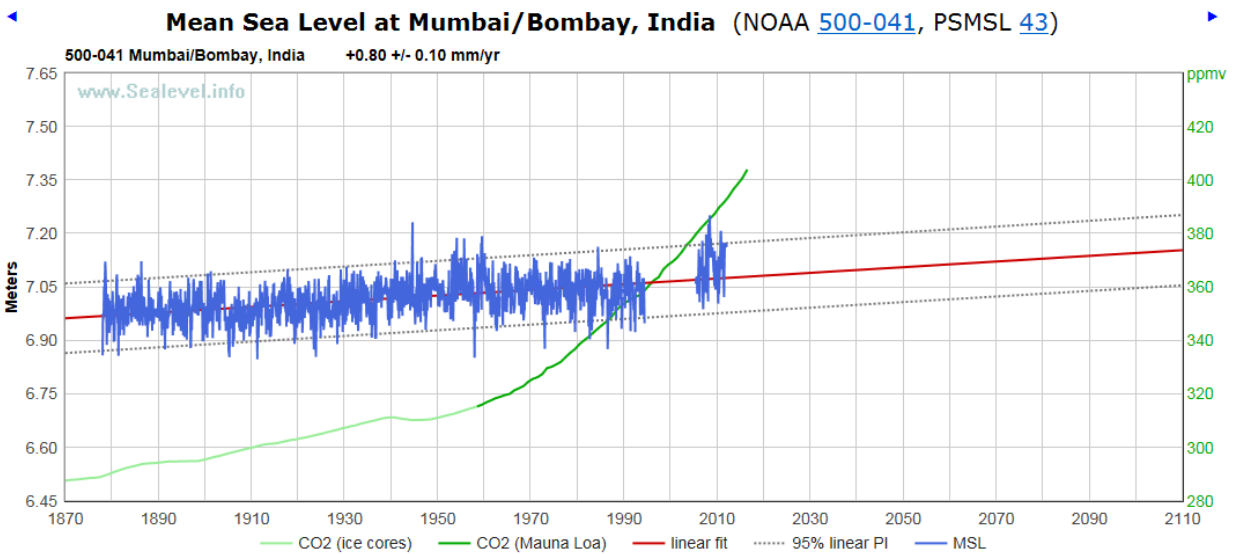
Example 7: Fernandina Beach, Florida on the Atlantic Coast



On the opposite side of Florida from St. Petersburg, the Fernandina Beach sea-level rise is projected at only 8.3 inches over the next 100 years. Miami Beach officials have been formulating policies to combat a rising ocean, even though the data for that area are spotty and incomplete. The real problem might well be land subsidence, which is unrelated to CO₂ concentrations. Miami officials would do better to consider the possible impact of incredibly heavy infrastructure concentrated along the coastline, built upon former swampland.⁶

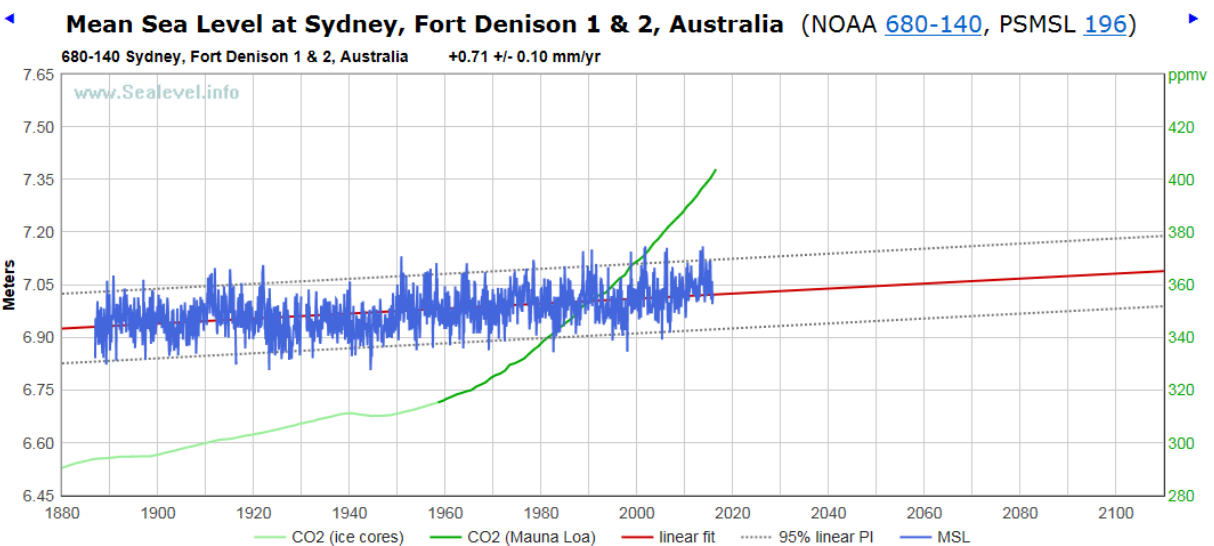
⁶ Simone Fiaschi and Shimon Wdowinski, "[The Contribution of Land Subsidence to the Increasing Coastal Flooding Hazard in Miami Beach](#)," Miami, FL: Rosenstiel School of Marine and Atmospheric Science, no date.

Example 8: Mumbai/Bombay, India, on the Indian Ocean



Reliable sea-level records at Mumbai/Bombay, India, stretch back to the 1870s. The slight upward trend in Mumbai/Bombay means if current trends continue, sea level there will rise a mere 3.12 inches in the next 100 years. If glaciers in the Himalayas are melting, as was reported in 2009, why did average sea level in Mumbai *drop* from 2006 to 2009, as indicated in the figure above? Despite the absence of a threat from sea-level rise, the people of India are paying millions and even billions of dollars to increase reliance on alternative energy sources to reduce CO₂ emissions.⁷

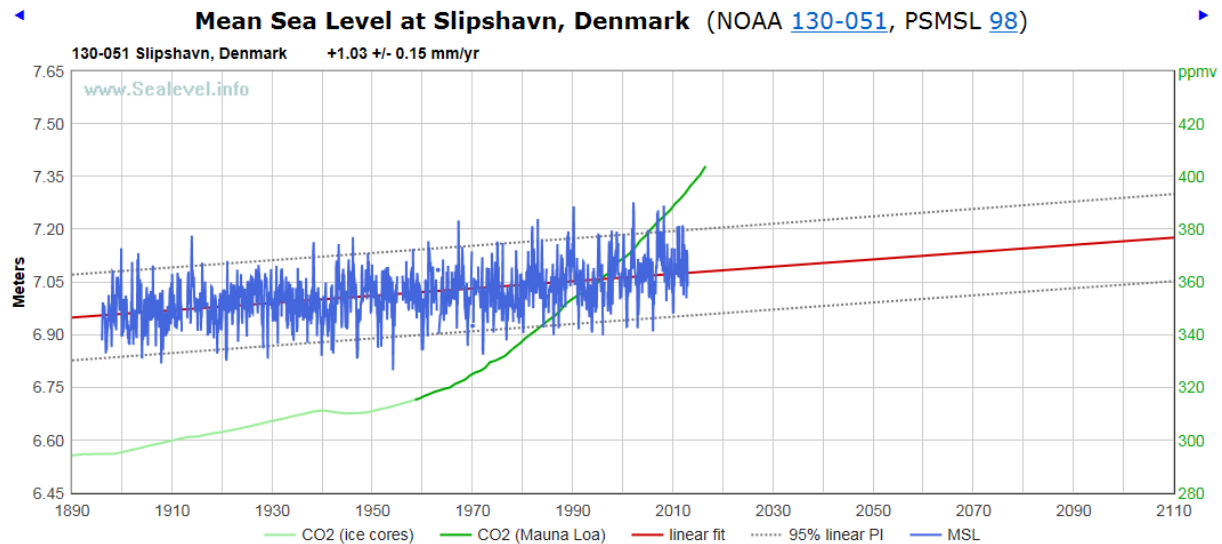
Example 9: Sydney, Australia on the Pacific Ocean



⁷ James Lamont, "[Himalayan Glaciers Melting Fast, Says Nepal](#)," *Financial Times*, September 1, 2009.

Australia has taken drastic measures to mitigate perceived CO₂ issues, and the people of that country have suffered significant electricity blackouts in the past year. The shift from reliable coal-fired power plants to unreliable renewable energy has raised electricity rates in Australia to be among the highest in the world.⁸ Estimated sea-level rise over the next 100 years: 2.76 inches.

Example 10: Slipshavn, Denmark on the Kattegut, near North Sea



Slipshavn is unique in that it is situated in what is believed to be one of the most geologically/tectonically inert regions on Earth. Unlike regions such as Alaska, where many land areas are rising, or the Gulf of Mexico, where some areas are subsiding, Slipshavn is tectonically very stable. If sea-level trends over the past 100 years remain constant, and on the basis of the data above, there is no reason to expect anything different in the near future. Sea level at Slipshavn should rise by a mere 3.6 inches over the next 100 years.

Analysis

The data and projected trends for these ten well-documented and widely distributed coastal cities point to three conclusions:

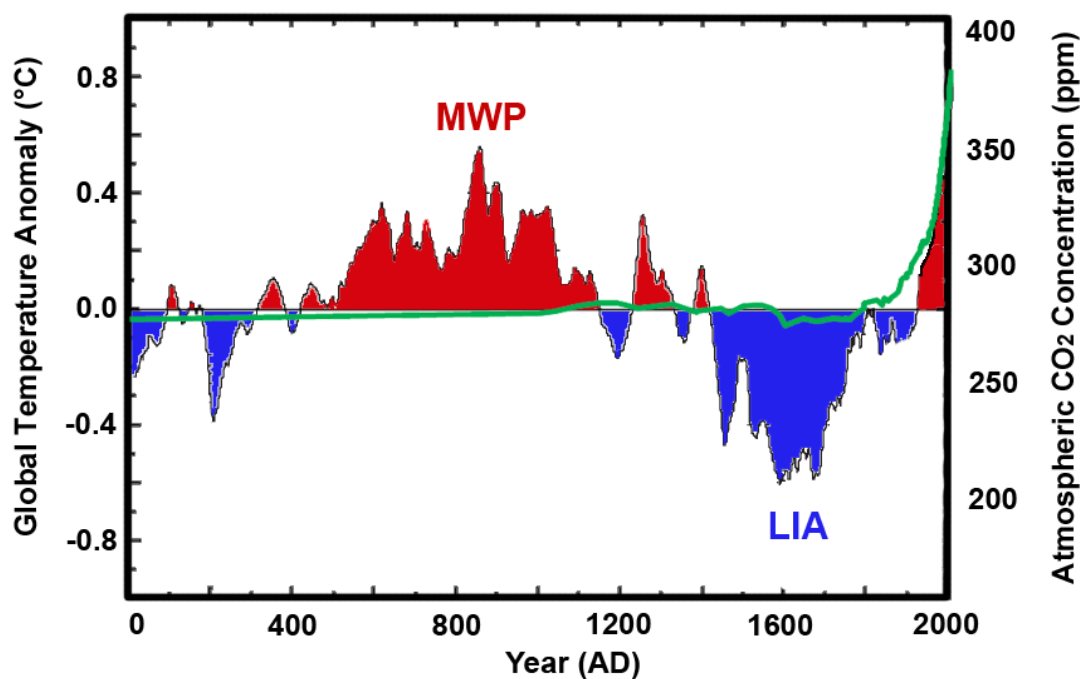
- There has been no dramatic sea-level rise in the past century, and projections show no dramatic rise is likely to occur in the coming century.
- There is no evidence to indicate that the rate of sea-level rise or fall in any of the areas of this study is anything but virtually flat.
- There is no correlation between CO₂ concentrations in the atmosphere and sea-level rise.

⁸ Ian Plimer, *The Climate Change Delusion and the Great Electricity Ripoff* (Redland Bay, Queensland: Connor Court Publishing, 2017).

These locations demonstrate sea-level rise is a local or localized phenomenon affected mainly by sea currents, plate tectonics, and land subsidence. Estimates of average global sea-level rise are controversial and subject to manipulation, but they also show only a low rate of rise and a trend that preceded significant human CO₂ emissions.⁹

Sea-level rise is alleged to be caused by global warming due to higher levels of greenhouse gases (primarily CO₂) in the atmosphere. All measures show Earth has warmed since about 1800, beginning well before atmospheric CO₂ levels rose due to human activities. The data going back a millennium show a Medieval Warm Period, with very warm temperatures, followed by a Little Ice Age starting around the fourteenth century. The world has been coming out of that cool period for the past 200 years.¹⁰ (See Figure 1.)

Figure 1
Mean Relative Temperature History of the Earth



Mean relative temperature history of the Earth (blue, cool; red, warm) over the past two millennia highlighting the Medieval Warm Period (MWP) and Little Ice Age (LIA), together with a concomitant history of the atmosphere's CO₂ concentration (green).¹¹

Global average sea level rose dramatically, not recently, but as the great ice sheets retreated during the last deglaciation, about 20,000 years ago. As the ice sheets retreated, sea levels rose

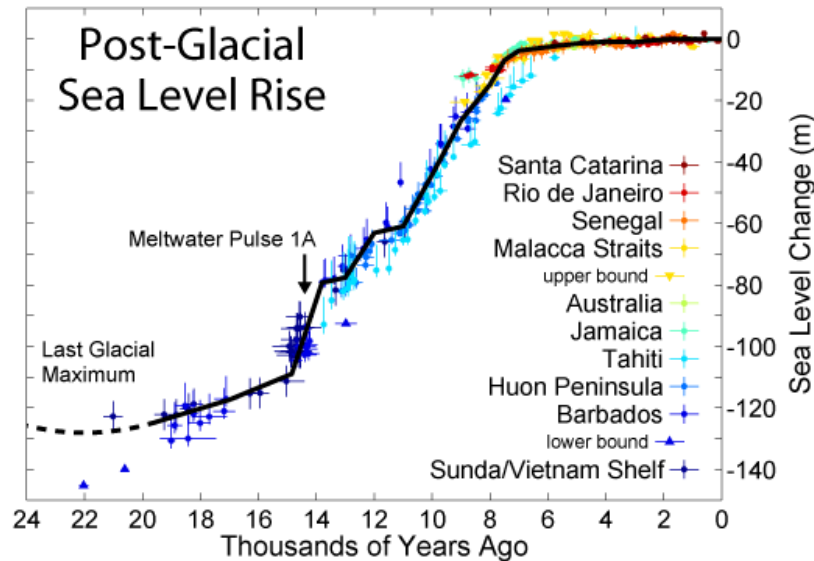
⁹ Nils-Axel Mörner, "Sea Level Manipulation," *International Journal of Engineering Science Invention* 6 (August 2017): 48–51. ISSN (Online): 2319 – 6734, ISSN (Print): 2319 – 6726; Albert Parker and Clifford D. Ollier, "[California Sea Level Rise: Evidence Based Forecasts vs. Model Predictions](#)," *Ocean & Coastal Management*, July 2017.

¹⁰ "[Medieval Period Was Warmer Than Expected](#)," *Antarctica Journal*, July 18, 2017.

¹¹ Adapted from C. Loehle and J.H. McCulloch, "Correction to: A 2000-Year Global Temperature Reconstruction Based on Non-Tree Ring Proxies," *Energy & Environment* 19 (2008).

relatively rapidly, by an estimated total of more than 100 meters. But then, 8,000 years ago, when the last of the great Laurentide Ice Sheet dwindled away, the rate of sea-level rise leveled off, inching up only very slowly since then. (See Figure 2.) There is no evidence in this long-term record of an effect of CO₂ on sea levels.

Figure 2
Reconstructed Global Sea Level



Reconstructed global sea level since the Last Glacial Maximum, 20,000 years ago, based on dated worldwide coral and peat deposits.¹²

Conclusions

- Fear of rising sea levels is not a justification for reducing CO₂ emissions or adopting policies that would have that effect. The ten case studies of sea-level rise at coastal cities, broadly representative of sites around the world, and the brief analysis that followed undercut a widely repeated but scientifically debunked claim in the climate change debate.
- There is no justification for the U.S. Environmental Protection Agency's 2009 Endangerment Finding, adopted upon the U.S. Supreme Court's ruling in 2007 that all greenhouse gases, including CO₂, meet the definition of 'air pollutants.'
- CO₂ is not, and has never been, an air pollutant, and it should have been excluded from the group of compounds that do have potential to pollute Earth's atmosphere.

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¹² Adapted from Fairbanks, R.G. 1989. A 17,000 year glacio-eustatic sealevel record: Influence of glacial melting rates on the Younger Dryas event and deep-ocean circulation. *Nature* **342**: 637–42; Toscano, M.A. and Macintyre, I.G., 2003. Corrected western Atlantic sea-level curve for the last 11,000 years based on calibrated 14C dates from *Acropora* palmate framework and intertidal mangrove peat. *Coral Reefs* **22**: 257–70.

About the Author

Dennis E. Hedke is a partner in the firm Hedke-Saenger Geoscience, Ltd., where he is a consulting geophysicist and conducts research related to Earth's climate, as well as policies that relate to energy and environmental interactions. He also served six years in the Kansas House of Representatives from 2011-16, during the last four of which he was chairman of the House Energy & Environment Committee. That committee initiated legislation that ultimately succeeded in reversing policy that mandated the expansion of renewable energy in Kansas, restoring free-market principles for electrical energy production. He has published multiple scientific articles related to seismic technology applied to oil and gas exploration and development.

Hedke has consulted for numerous companies engaged in hydrocarbon exploration and development in North America, South America, Africa and the Middle East. He has been an invited lecturer and panelist at Kansas State University, the University of Kansas, Wichita State University, community colleges, and high schools. He is past president of the Geophysical Society of Kansas and of the Kansas Geological Society. He has served as a board member of the Kansas Geological Foundation and holds active memberships in the Society of Exploration Geophysicists, American Association of Petroleum Geologists, Denver Geophysical Society, and Geophysical Society of Houston.

Appendix

The CO₂ concentration data in this survey come from three sources:

- 1958–present data are from measurements at the Mauna Loa Observatory in Hawaii, at 3,400 meters altitude in the Northern subtropics.¹³
- 1850–1958 data are from ice core data.¹⁴
- 1800–1850 CO₂ data are from a different ice core data set.¹⁵

Sea-level measurements for the ten coastal city graphs represent monthly data points compiled from the National Oceanic and Atmospheric Administration (NOAA) and the Permanent Service for Mean Sea Level (PSMSL), based in Britain. The database from which the graphs are drawn consists of data from 375 long-record tide-gauges around the globe, selected by NOAA for trend analysis.¹⁶

Sea levels vary widely across the globe. Values for the initial levels in the eight city graphs refer to Mean Sea Level data (MSL), established by the NOAA Center for Operational Oceanographic Products and Services (NOAA-CO-OPS).

As an example, the following equations provide the basis for the linear trends appearing on the Sydney, Australia sea-level graphics:

Linear:

$$y = M \cdot x + B$$
$$y = 0.0711 \cdot x \text{ mm} + 6976.570 \text{ mm}$$

Quadratic:

$$y = A \cdot x^2 + M \cdot x + B$$
$$y = 0.000806 \cdot x^2 \text{ mm} + 0.0711 \cdot x \text{ mm} + 6965.302 \text{ mm}$$

Where:

Date range = 1886/12 to 2015/12

$x = (\text{date} - 1951.37)$ (i.e., 1951/5)

slope = $M = 0.0711 \pm 0.0100 \text{ mm/yr}$

acceleration = $2 \cdot A = 2 \times 0.000806 = 0.001612 \pm 0.000587 \text{ mm/yr}^2$

¹³ National Oceanic and Atmospheric Administration, [Earth System Research Laboratory Global Monitoring Division](#), data set from ftp://aftp.cmdl.noaa.gov/products/trends/co2/co2_anmean_mlo.txt and ftp://aftp.cmdl.noaa.gov/products/trends/co2/co2_mm_mlo.txt.

¹⁴ Data compiled by the [NASA Goddard Institute for Space Studies](#).

¹⁵ [Law Dome Atmospheric CO₂ Data](#), World Data Center for Paleoclimatology, and NOAA Paleoclimatology Program.

¹⁶ Sources: [National Oceanic and Atmospheric Administration](#), and the [Permanent Service for Mean Sea Level](#), compiled at www.Sealevel.info.