

# Land Subsidence in Hampton Roads

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# Why should we measure land subsidence?

- To develop better predictions of future rates of land subsidence.
- To understand where land subsidence is likely to occur.

## Summary of Measured sea-level rise and subsidence from USGS report

[IPCC, Intergovernmental Panel on Climate Change; mm/yr , millimeters per year; NA, not available; NGS, National Geodetic Survey; NOAA, National Oceanic and Atmospheric Administration; SD, standard deviation; USCG, U.S. Coast Guard; USGS, U.S. Geological Survey]

What was measured	Monitoring technique	Agency	Number of stations	Period	Rate, <sup>1</sup> in mm/yr			
					Average	Low	High	SD
Global data								
Estimated average global sea-level rise	Various	IPCC <sup>2</sup>	NA	1961–2003	1.8	NA	NA	NA
Southern Chesapeake Bay region data								
Aquifer compaction	Extensometer	USGS <sup>3</sup>	2	1979–1995	–2.6	–1.5	–3.7	NA
Land subsidence	Geodetic survey	NGS <sup>4</sup>	17	1940–1971	–2.8	–1.1	–4.8	0.8
Land subsidence	Fixed GPS	NOAA/USCG <sup>5</sup>	3	2006–2011	–3.1	–2.7	–3.4	0.4
Relative sea-level rise	Tidal station	NOAA <sup>6</sup>	4	1927–2006	3.9	3.5	4.4	0.2

<sup>1</sup>Negative values indicate downward motion (land subsidence), positive values upward motion.

<sup>2</sup>Data are from Bindoff and others (2007).

<sup>3</sup>Data are from Pope and Burbey (2004).

<sup>4</sup>Data are from Holdahl and Morrison (1974).

<sup>5</sup>Data are from Snay and Soler (2008) and National Geodetic Survey (2013) from Continuously Operating Reference Station (CORS) network.

<sup>6</sup>Data are from Zervas (2009).

## Options

1. HRPDC could fund USGS to assess the methods of monitoring land subsidence and develop cost estimates. The resulting report could be used to support a state budget request or future grant opportunities. Estimated costs = \$50,000.
2. HRPDC could issue a request for proposals for InSar analysis. The analysis would compare land elevations from the 1990s to 2000s to create a map of historic land subsidence across the region. Estimated costs = \$250,000.

## Advisory Committee Input

*Special Committee on Recurrent Flooding and Sea Level Rise* and *Directors of Utilities Committee* endorsed Option 1 – fund USGS study.

## Recommended Action

Approve Option 1 and use existing HRPDC funding to support the USGS project.

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