Ocean Engineering 78 (2014) 124–130

Contents lists available at ScienceDirect

Ocean Engineering

journal homepage: www.elsevier.com/locate/oceaneng

Short Communication

Impacts of sea level rise on coastal planning in Norway

Albert Parker *

RMIT University, PO Box 71, 3083 Bundoora, Australia

ARTICLE INFO

Article history:
Received 29 August 2012
Accepted 1 December 2013
Available online 27 December 2013

Keywords:
Sea level rises
Post-glacial rebound
Coastal management
Norway

ABSTRACT

This paper shows that despite today's most popular climate models indicating that sea levels are generally rising and accelerating and that the coastal management in Norway may face sea level rises from 16 to 116 cm by the year 2100, all the local and global tide gauges and the satellite radar altimeter reconstruction of global mean sea level consistently show that there is no accelerating behaviour, with negative sea level rises for the specific of Norway because of the post-glacial rebound. This suggests the sea level rise of this century will very likely be the one from the past century.

1. Introduction

A recent paper (Almås and Hygen, 2012) has claimed that coastal planning for Norway should consider today's most popular climate models' predictions indicating that the sea level could rise from 16 to 116 cm by the year 2100, relative to the year 2000, depending on location and a variety of uncertainties. This sea level rise it is said may cause major damage to existing buildings along the Norwegian coastline, and the authors provide an assessment of this sea level rise for Norway's building stock leading up to 2100. A risk map is created at the country level to assess high, moderate or low consequences for the building stock, and the authors estimate the total costs for Norway on constructional measures for buildings alone (excluding coastal defences and infrastructure) to be as much as €725 million.

This work, as unfortunately many others, misses the point that the most popular models used to estimate the impacts of climate-change, as Rahmstorf (2007), are based on the very simplistic assumptions that the anthropogenic carbon dioxide emissions are the only force for the climate-change parameters in general, and the sea levels in particular, but this assumption, especially for what concerns sea levels, still lacks any proper validation. As recently discussed by Boretti (2012a, 2012b, 2012c, in press a, in press b, in press c, in press d), Boretti and Watson (2012) and Parker (in press a, in press b, in press c), individual, locally and globally averaged tide gauges of enough quality and length as well as the satellite radar altimeter reconstruction of the global mean sea level, all show that there is no positive accelerating pattern.

The problem of sea levels is that while a significant number of tide gauges are recording the sea level oscillation, over the last few decades, the number of tide gauges operational with continuity across the world since more than a century, is not very large. Four-fifths of the southern hemisphere and more than three-fifths of the northern hemisphere that are covered by water are very poorly described by the available data. Furthermore, sea levels are very well known to oscillate with important inter-annual and multi-decadal periodicities, and without proper time coverage, the analysis of a tide gauge record may be particularly misleading.

The lack of significant global coverage until the very recent past and the need to consider records long enough to cover at least the most important multi-decadal oscillations are the major factor producing uncertainties in the assessment of sea level rises and accelerations at the present time.

2. The long term tide gauge records show that locally there are no accelerating sea levels across the world

While almost everybody understands the relevance of the multidecadal oscillations, some people often forget and compute the latest sea level rises over small time windows of 20 or 30 years in selected locations that are then compared with the values of the past for different time windows and locations. Being the 60–70 years multi-decadal oscillations quite relevant, when not having data covering of at least, 120–140 years, may be very misleading to computing the sea level rise, as it is shown in this section.

Fig. 1 presents for Bergen, Norway and The Battery, NY, the measured monthly sea levels (data from PSMSL, 2012) showing the linear trend at the present time and the departures vs. the linear trend. The sea level rises (SLR) are computed at any time by considering 20, 30 and 60 years of data as well as all the data

* Tel.: +61 3 99256122; fax: +61 399256108.
E-mail address: albertparker@y7mail.com

0029-8018/$ - see front matter © 2013 Elsevier Ltd. All rights reserved.
http://dx.doi.org/10.1016/j.oceaneng.2013.12.002

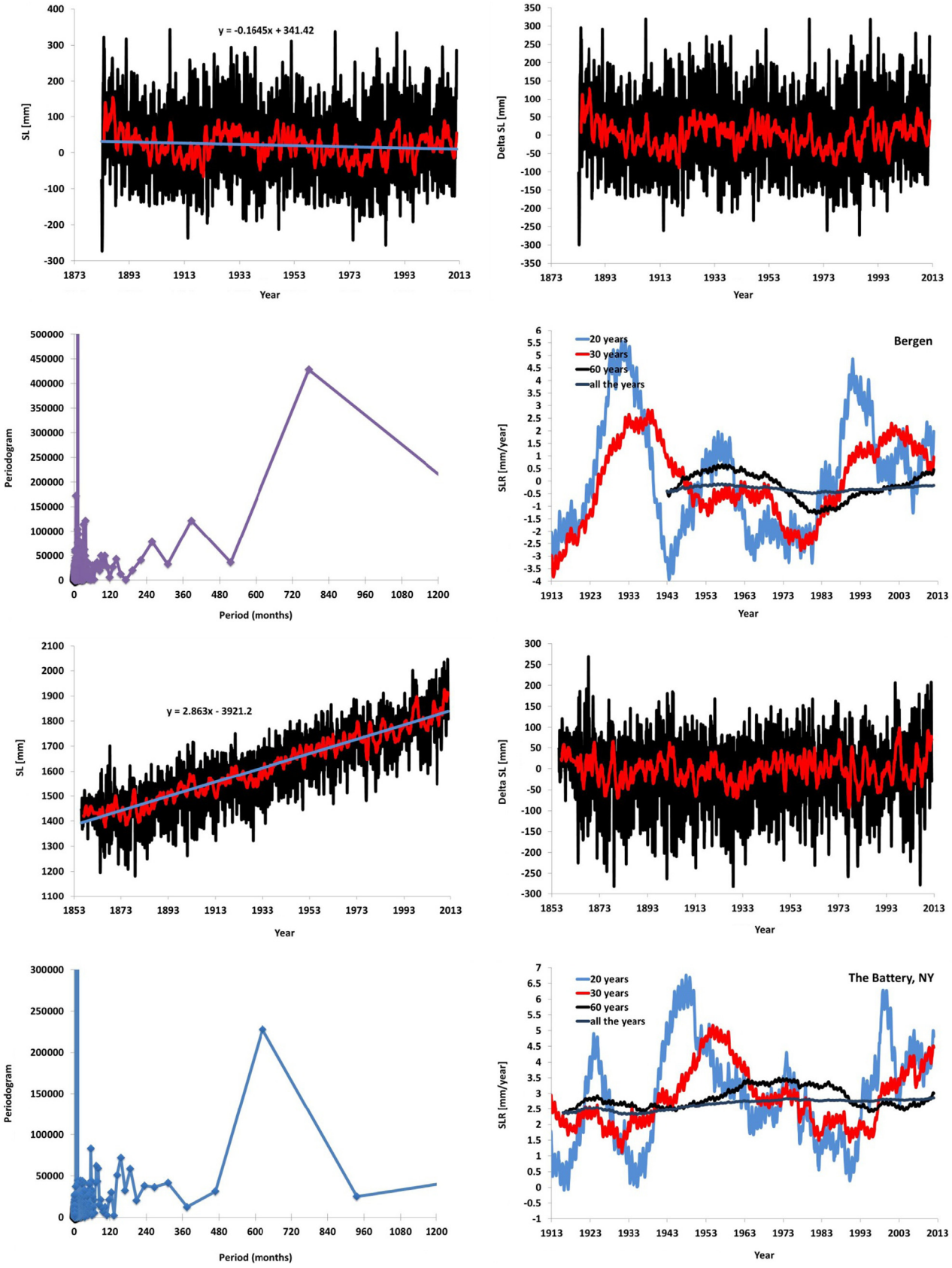

Fig. 1. Measured monthly sea levels (data from PSMSL, 2012) with linear trend at the present time, oscillations about the linear trend, periodogram of the oscillations and sea level rises (SLR) computed at any time by considering 20, 30 and 60 years of data as well as all the data if more than 60 years in Bergen, Norway (top) and The Battery, NY (bottom).