Low-lying coastal communities face increasing challenges from rise in sea level, more extreme storm surge levels and floods. In addition, changing groundwater levels and precipitation patterns may further exacerbate the water-related impacts of climate change on society. Approximately 40,000 km2 of Europe’s North Sea region is already flood prone. Storm surges pose a real and substantial risk to this area, especially the densely populated areas. Climate and sea level research seek to provide robust regional projections of change and to address uncertainties and errors inherent in climate models. It is a challenge for coastal communities to transform this information in order to provide for local impact assessments and to implement adaptive measures. To this end, information about potential subsidence, its magnitudes and causes is important: subsidence may adversely affect the probability, extent and depths of future floods, and knowledge about subsidence will serve to reduce the total uncertainty about the anticipated climate impacts. If included in an 'impact integration system', reliable subsidence mapping may serve to deal with possible future outcomes in local management and planning.

The paper presents subsidence mapping using Sentinel-1 (S-1) data over a case study area on the Danish North Sea coast, and it addresses challenges to validate and reference results to the national datum levelling network. For this, repeated precision levelling (2006-2015) and ERS2 (1995-2001) data are used. In addition, the Sentinel-1 time series for selected scatter points are compared to groundwater level data from 10 wells and sea level data from two tide gauges to analyse their effect in the S-1 data. Likewise, the variations in the ocean water level (from tidal excursion and positive/negative surges etc.) and in the groundwater table (from ocean level and gradient, wave run-up, precipitation etc.) may in an initial evaluation suggest time-dependent and water-related mechanisms for the inferred subsidence encountered. These variations may thus serve to detail our understanding of S-1 results, and they may be indicative of system responses to subsidence under climate change scenarios. Results are put into perspective in relation to additional S-1 studies carried out by the authors as well as to literature to outline perspectives of further work to relate and apply S-1 data to improve local coastal climate impact assessments and adaptation.