Coastal storms are highly unpredictable phenomena, frequently changing their characteristics and directly linked to global climate changes. They result in an intensive erosion processes and, are now a serious concern for the communities inhabiting the littoral zones. However, owing to the technical difficulties in registering morphological changes on cliff coasts, most short-term monitoring systems, analyses, and models have been implemented primarily along the dune coasts. Notwithstanding these difficulties, the changes on cliff coasts have been investigated quantitatively in order to properly identify the mechanisms controlling those phenomena. Here, we report on three soft-cliff systems in the southern Baltic Sea that were monitored with the use of terrestrial laser scanner (TLS) technology. A time series of thirteen topographic surveys were generated over a period of two years (12.2016–04.2018) and presented as coastal profiles with 50 meter spacing.

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Specifications Table

| Subject | Earth-Surface Processes |
|---------|--------------------------|
| Specific subject area | Remote Sensing Applications in Coastal Environment |
| Type of data | Table |
| How data were acquired | Rieg VZ-400 – a 3D Laser Scanning System was used to obtain location and height of each point (x, y, z). |
| Data format | Filtered, Raw |
| Parameters for data collection | Topography profiles of coastal cliffs |
| Description of data collection | Three coastal soft cliff test sites have been measured with a 3D Laser Scanning System from 10 spots, acquiring 90 to 100 points per square meter, with an estimated vertical accuracy of more than 5 mm. |
| Data source location | Institution: Institute of Marine and Environmental Sciences, University of Szczecin |
| City/Region | Szczecin / Zachodniopomorskie |
| Country | Poland |
| Latitude and longitude: | Międzyzdroje: 53.942878, 14.466891; 53.946304, 14.471933 |
| Bansin: 53.984058, 14.129931; 53.987170, 14.124293 |
| Wicie: 54.498868, 16.450979; 54.502293, 16.455900 |
| Data accessibility | Filtered profile data: |
| Repository name | Mendelay Data |
| Data identification number | 10.17632/g448xnxp2j.2 |
| Direct URL to data: | https://data.mendeley.com/datasets/g448xnxp2j/1 |
| Primary data sources (raw data): | Repository name: Institute of Marine and Environmental Sciences FTP repository |
| host | szop.ztikm.szczecin.pl |
| user: | lidarusz |
| password: | juk417y526je |
| ftp://lidarusz.juk417y526je@szop.ztikm.szczecin.pl |
| Related research article | Terefenko, P.; Paprotny, D.; Giza, A.; Morales-Nápoles, O.; Kubicki, A.; Walczakiewicz, S. Monitoring Cliff Erosion with LiDAR Surveys and Bayesian Network-based Data Analysis. Remote Sens. 2019, 11, 843. |
| https://doi.org/10.3390/rs11070843 |

Value of the Data

- Coastal morphology profiles enable to describe erosion processes occurring during storm events.
- This dataset could be used to investigate dynamic nature of coastal cliff systems.
- The dataset represent a starting point for detailed monitoring of morphology changes in Polish cliff systems.
- These data can facilitate long term modelling of coastline changes in Poland.
- The investigation of cliff profiles can help to understand landslide processes.

1. Data Description

Coasts are extremely dynamic environments. To track cliff changes and identify the processes of its modifications, data must be collected frequently over consistent time intervals [1,2]. The data presented here cover a survey timeline from November 2016 to June 2018. Thirty-nine topographic surveys (thirteen for each measured site – namely Międzyzdroje, Bansin and Wicie) were conducted with Terrestrial Laser Scanner (TLS) technology resulting in a point cloud. The results were filtered for beach and cliff areas as a profile lines with 50-m-wide spacing and are presented in a separate Excel sheet for each investigated site. A list of all surveys with dates and individual data files for each field campaign is included in Table 1.
Table 1
Analytical periods used according to dates of surveys by test site.

| Campaign no. | Międzyzdroje | Bansin | Wicie | Profile file name | Point cloud catalogue |
|--------------|--------------|--------|-------|-------------------|----------------------|
| 1            | 03.11.2016   | 09.11.2016 | 14.11.2016 | Camp1.xlsx | C1 |
| 2            | 14.12.2016   | 19.12.2016 | 12.12.2016 | Camp2.xlsx | C2 |
| 3            | 30.12.2016   | 29.12.2016 |      | Camp3.xlsx | C3 |
| 4            | 14.02.2017   | 16.02.2017 | 15.02.2017 | Camp4.xlsx | C4 |
| 5            | 03.04.2017   | 06.04.2017 | 10.04.2017 | Camp5.xlsx | C5 |
| 6            | 06.06.2017   | 07.06.2017 | 09.06.2017 | Camp6.xlsx | C6 |
| 7            | 11.09.2017   | 04.09.2017 | 01.09.2017 | Camp7.xlsx | C7 |
| 8            | 16.10.2017   | 17.10.2017 | 18.10.2017 | Camp8.xlsx | C8 |
| 9            | 07.11.2017   | 06.11.2017 | 29.11.2017 | Camp9.xlsx | C9 |
| 10           | 09.01.2018   | 12.01.2018 | 15.01.2018 | Camp10.xlsx | C10 |
| 11           | 19.02.2018   | 01.02.2018 | 02.02.2018 | Camp11.xlsx | C11 |
| 12           | 04.04.2018   | 21.03.2018 | 23.03.2018 | Camp12.xlsx | C12 |
| 13           | 14.06.2018   | 26.06.2018 | 20.06.2018 | Camp13.xlsx | C13 |

* survey on 28.12.2016 was unsuccessful due to high water levels;.
** survey was unsuccessful at two profiles.

2. Experimental Design, Materials and Methods

The implemented laser-based survey technique allowed for rapid and accurate collection of large amounts of topographic data. During the last decade, TLS has been successfully applied to topographic surveys and to the monitoring of coastal processes [3–5]. Highly accurate measurements of coastal changes were performed on three sections of south Baltic coast, each 500 m long. With the use of RiegVZ-400 scanner measurements campaigns have been performed as a post-storm surveys. Scans have been carried out at each survey from eight stations located about 50 m from the coastline acquiring 90 to 100 points per square meter of measured surface. Additional two scanning stations have been located at the lower part of the slope. This enabled to partially resolve the occlusion problem generated generally by existing vegetation. The estimated vertical accuracy of all measurements was not higher than 5 mm.

Acquired set of data consist of millions of points, i.e. the locations/positions measured both on the cliff. Every single point carries information about its geographic location (discrete x,y,z values), which is obtained by calculating the distance and angle from the scanner’s location [6,7].

With the use of the „point cloud” data, not only a full spatial surface model of the cliff face was generated, but also information about the whole beach up to the line of water had been registered. Obtained data required multi-scan adjustment and georeferencing. It was realized by using the georeferencing targets distributed evenly over the investigated area used to fit each scan in the same spatial reference. Based on precisely measured GCPs (Ground Control Points) different scans have been integrated into a common reference system. For further analysis data has been transformed into a Polish national coordinate system (PL-2000). The scanning procedure included also the process of authorized classification which enabled to identify the vegetation in the cloud of scanned points. Furthermore with the process of the 3D point cleaning procedure the reflections, rest of the vegetation and false measurements has been removed manually.

For further processing the point cloud representing coastal surface have been filtered and presented as profile lines with 50-m-wide spacing. First the profile lines has been generated automatically with a 1 meter node spacing. Finally each node has been assigned the value of the closest point form the point cloud.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships which have, or could be perceived to have, influenced the work reported in this article.
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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.dib.2020.106291.

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