



научная школа
ПЛАВУЧИЙ
УНИВЕРСИТЕТ



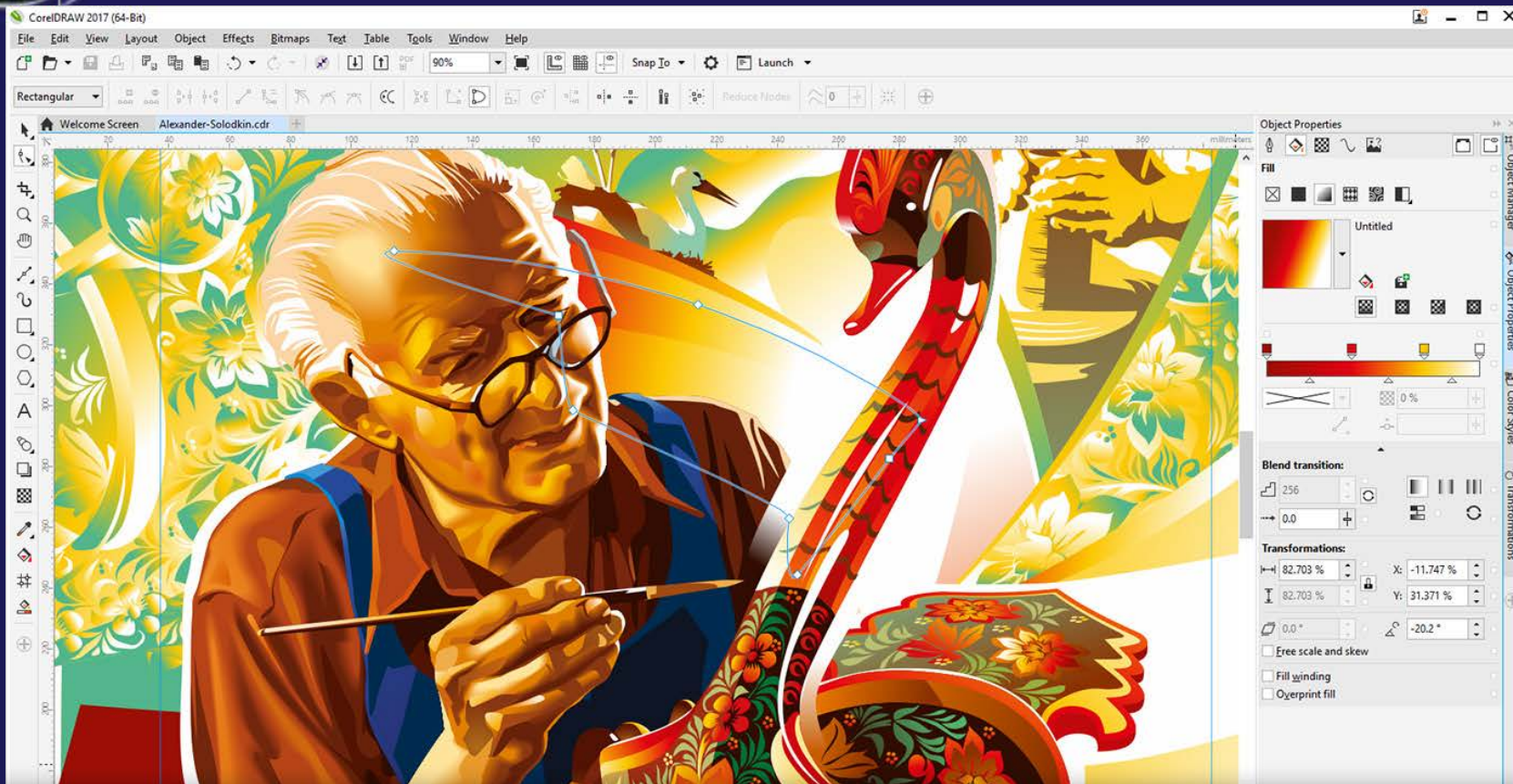
CoreIDRAW в современной океанологии

Игорь Медведев
лаборатория цунами

17.04.2018



CorelDRAW



Программа предназначена для создания и редактирования векторной графики



CorelDRAW

Основной пакет программ CorelDRAW Graphics Suite 2017:

- CorelDRAW 2017;
- Corel® PHOTO-PAINT® 2017;
- Corel Font Manager™ 2017;
- Corel® PowerTRACE™ 2017 (входит в состав CorelDRAW 2017);
- Corel® CAPTURE™ 2017;
- Corel® CONNECT™ 2017;
- Corel® Website Creator™



CorelDRAW

Вспомогательные приложения, входящие в состав CorelDRAW Graphics Suite 2017:

- Microsoft Visual Basic for Applications 7.1 — автоматизация задач;
- Microsoft Visual Studio Tools for Applications 2015 — автоматизация задач и использование прогрессивных макросов;
- BenVISTA PhotoZoom Pro 4 — плагин для увеличения цифровых изображений;
- Barcode Wizard — генератор штриховых кодов в стандартных форматах;
- Duplexing Wizard — мастер двусторонней печати;
- WhatTheFont — онлайн-сервис опознавания шрифтов;
- GPL Ghostscript — улучшенный импорт файлов EPS и PS.



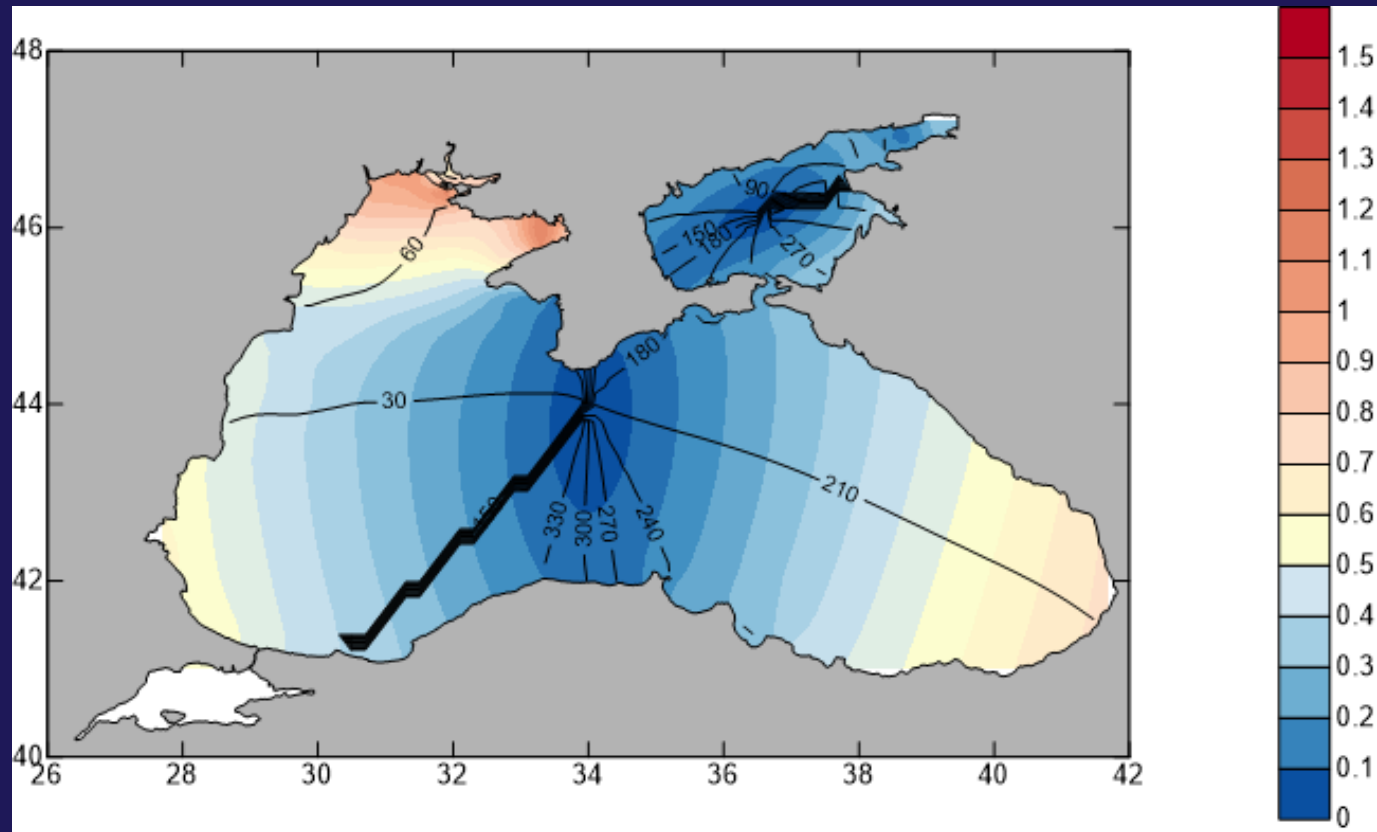
План доклада

- Правка рисунков (карт, графиков)
- Создание сложных рисунков
- Создание новых рисунков, схем и т.п.
- Трассировка и оцифровка изображений
- Импорт и экспорт изображений
- Создание постеров



Правка рисунков

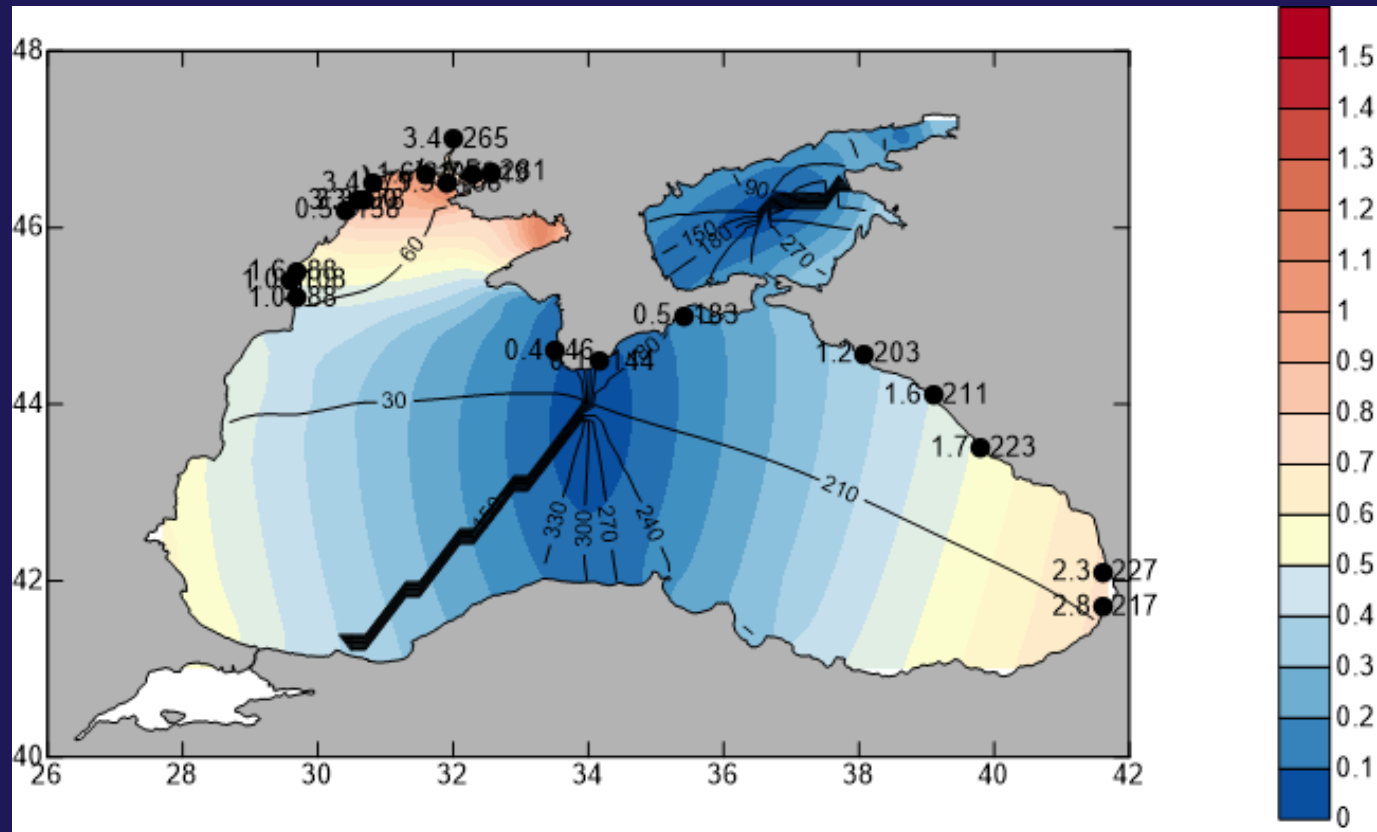
Сделали в Surfer





Правка рисунков

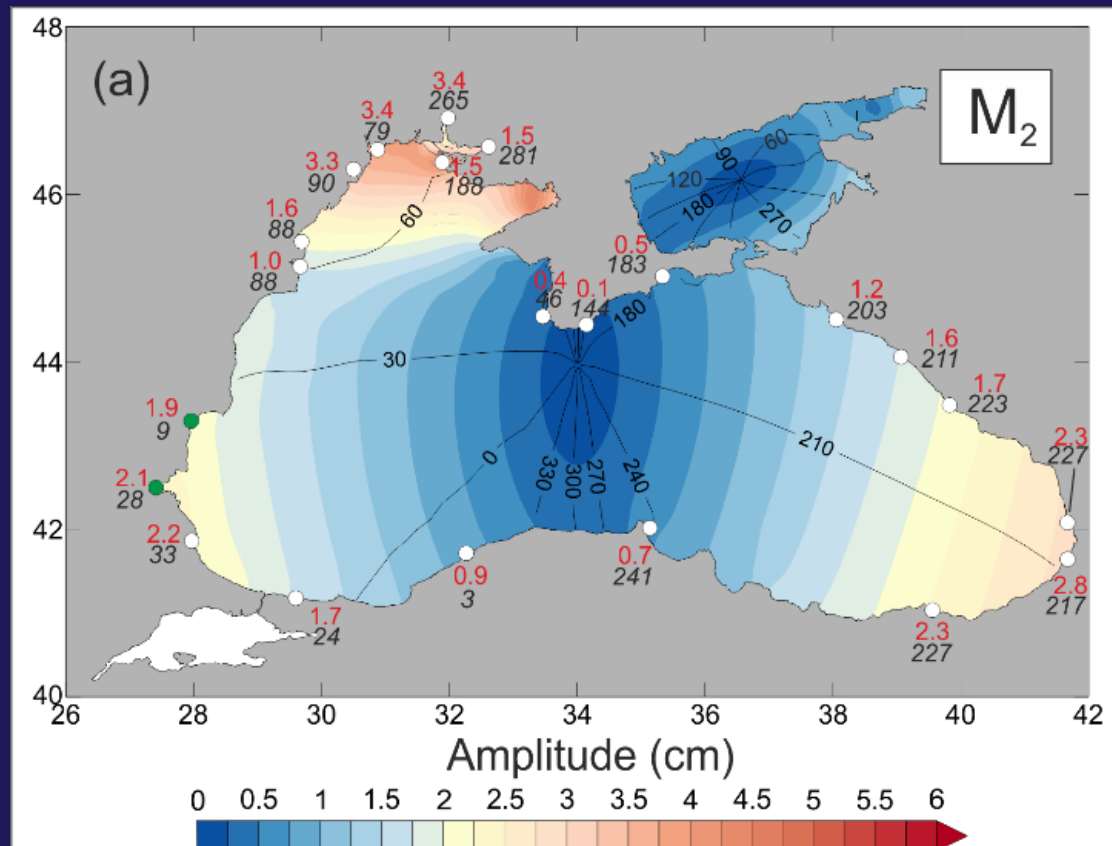
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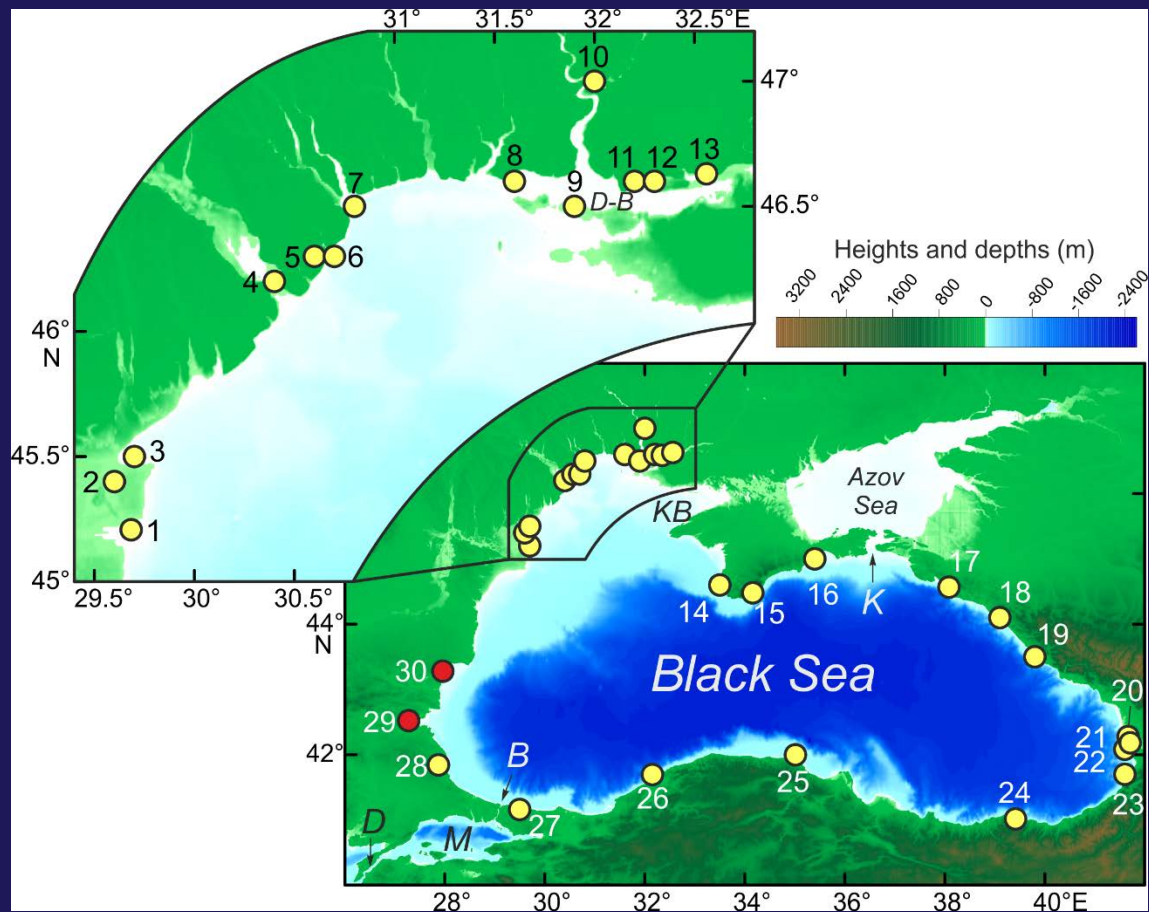
Правка рисунков

Подправили в Corel



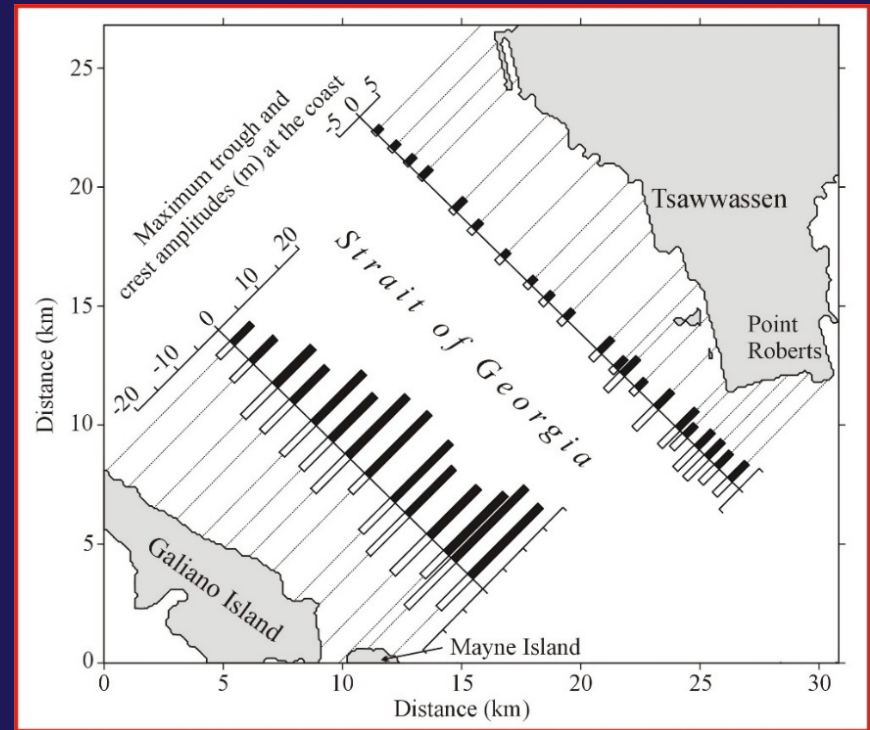
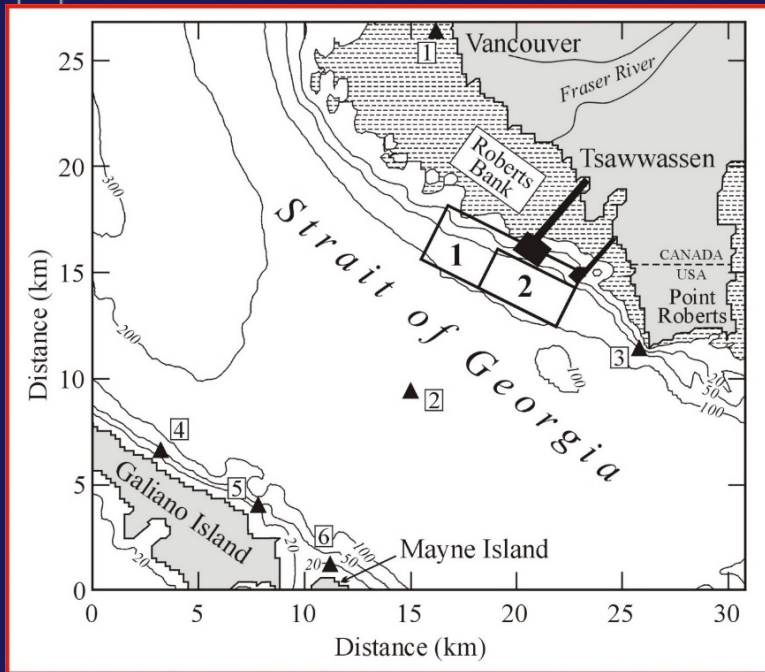


Правка рисунков Подправили в Corel





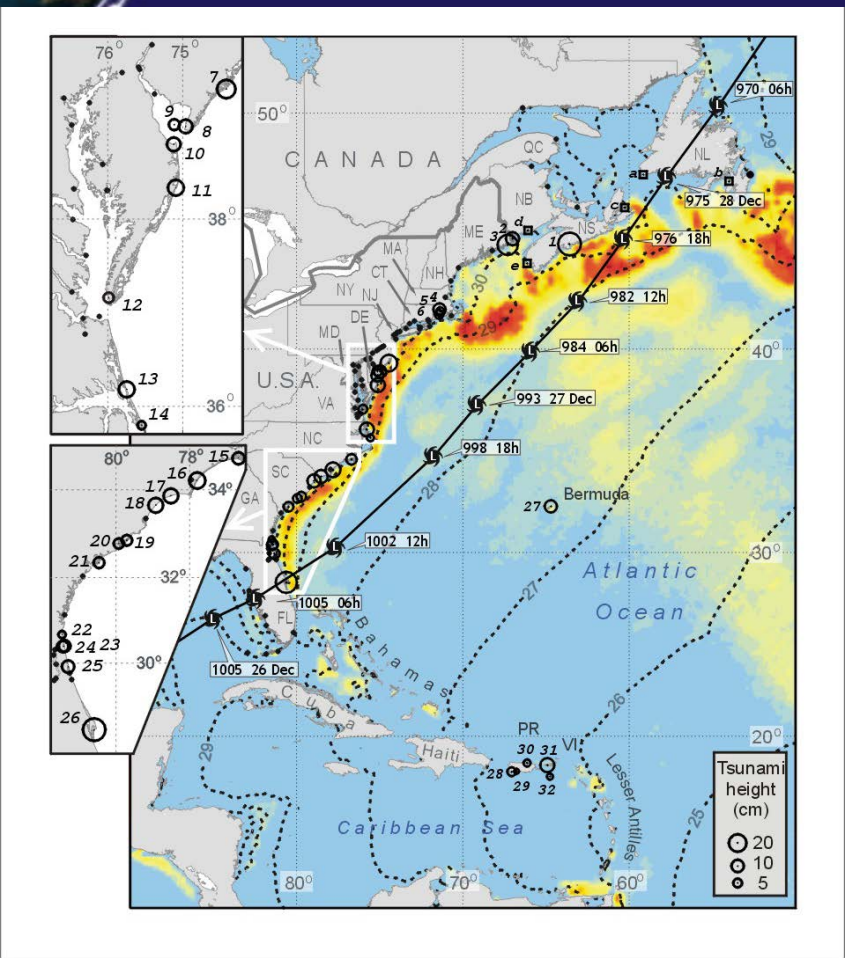
Создание сложных рисунков



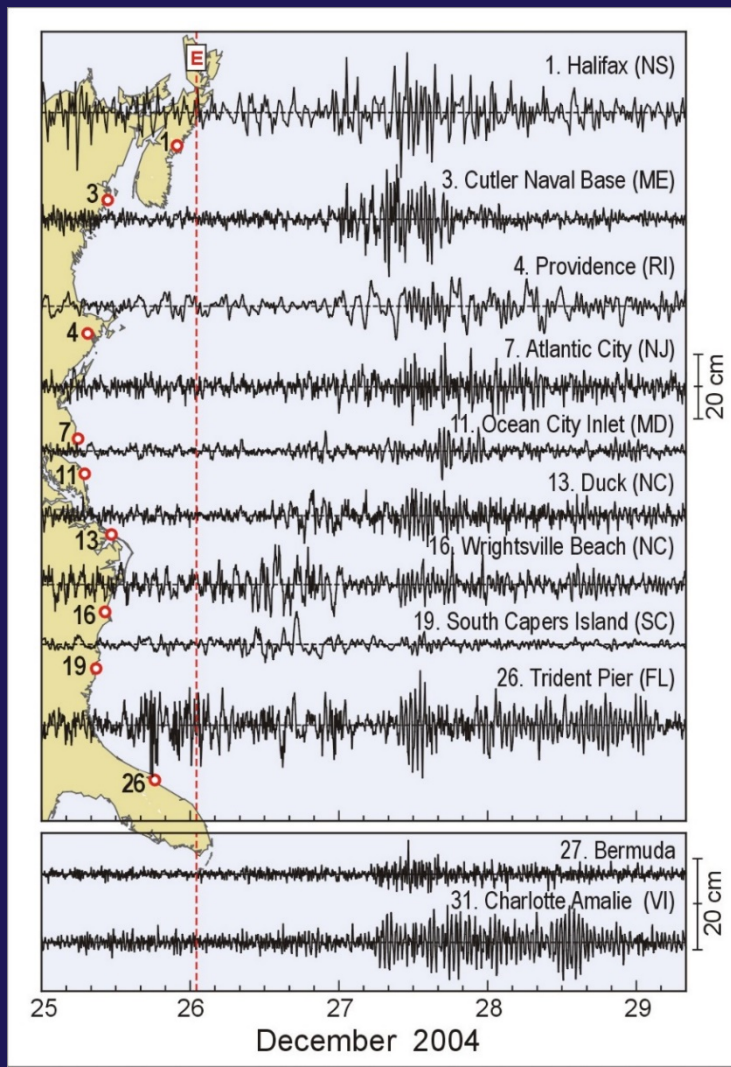
Rabinovich et al., 2004



Создание сложных рисунков

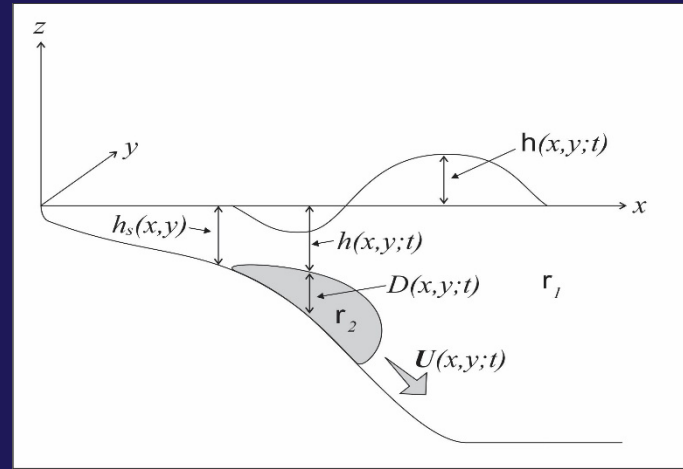
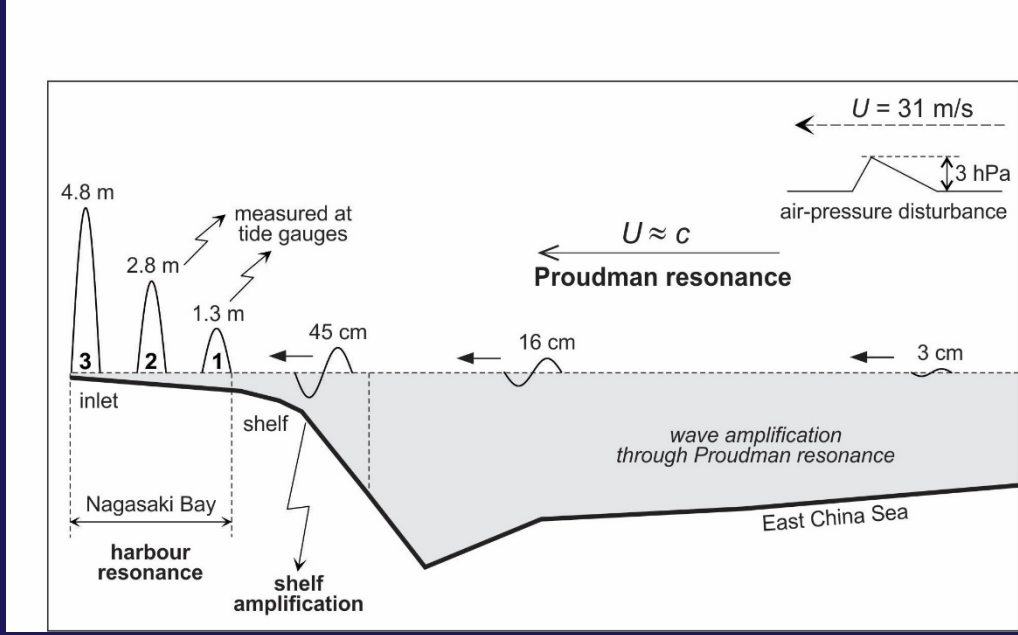


Thomson et al., 2007





Создание рисунков и схем

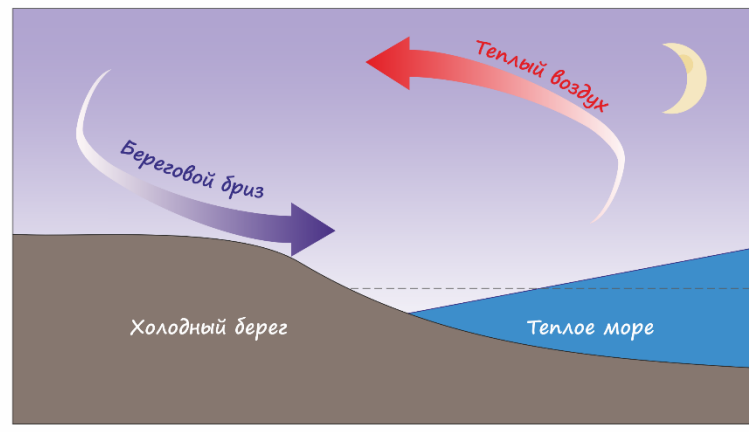
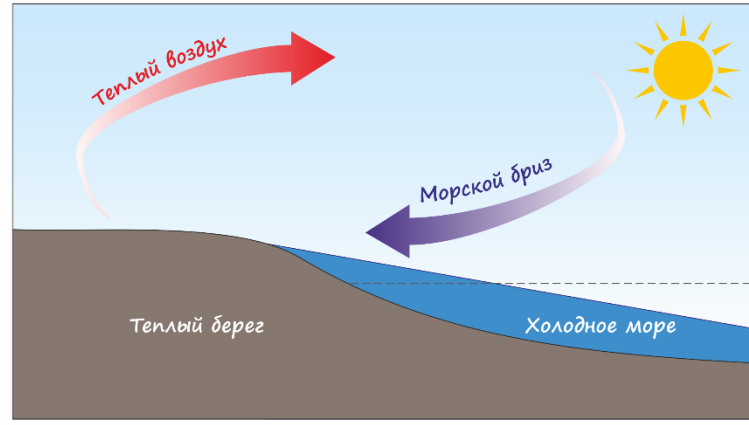


Monserrat et al., 2006



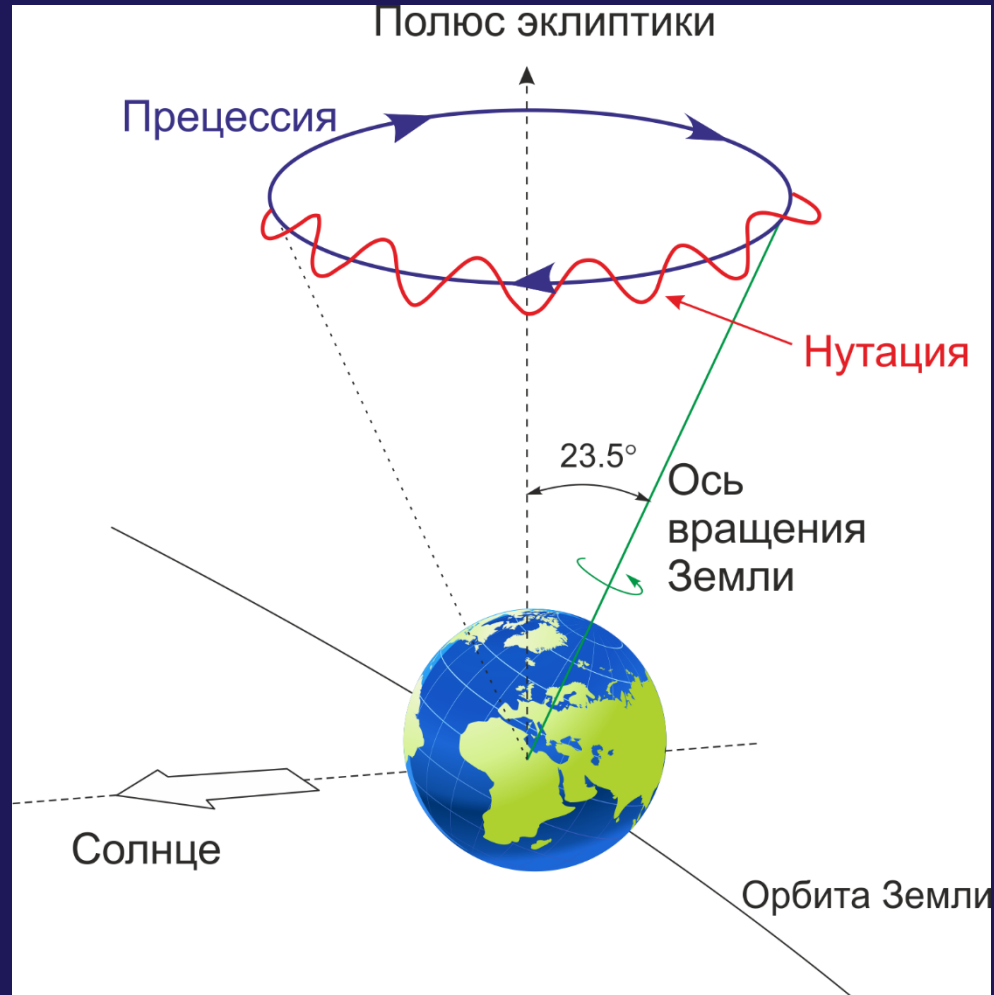
Создание рисунков и схем

Формирование бризовых колебаний уровня моря



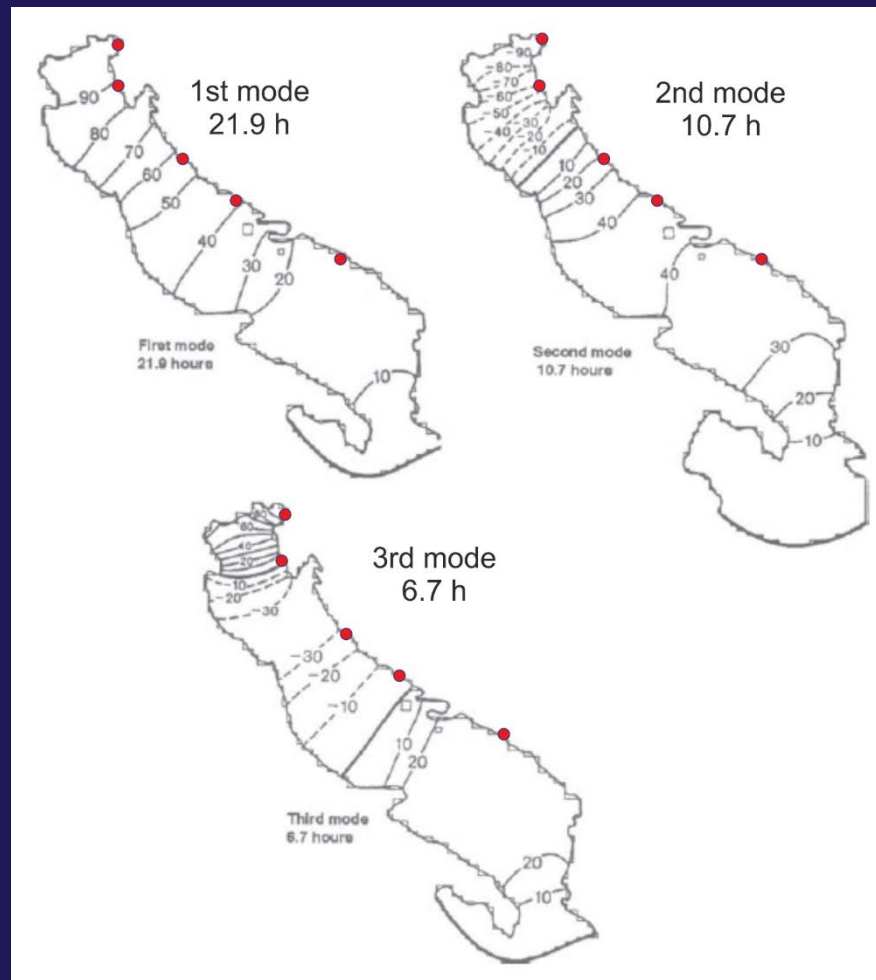


Создание рисунков и схем





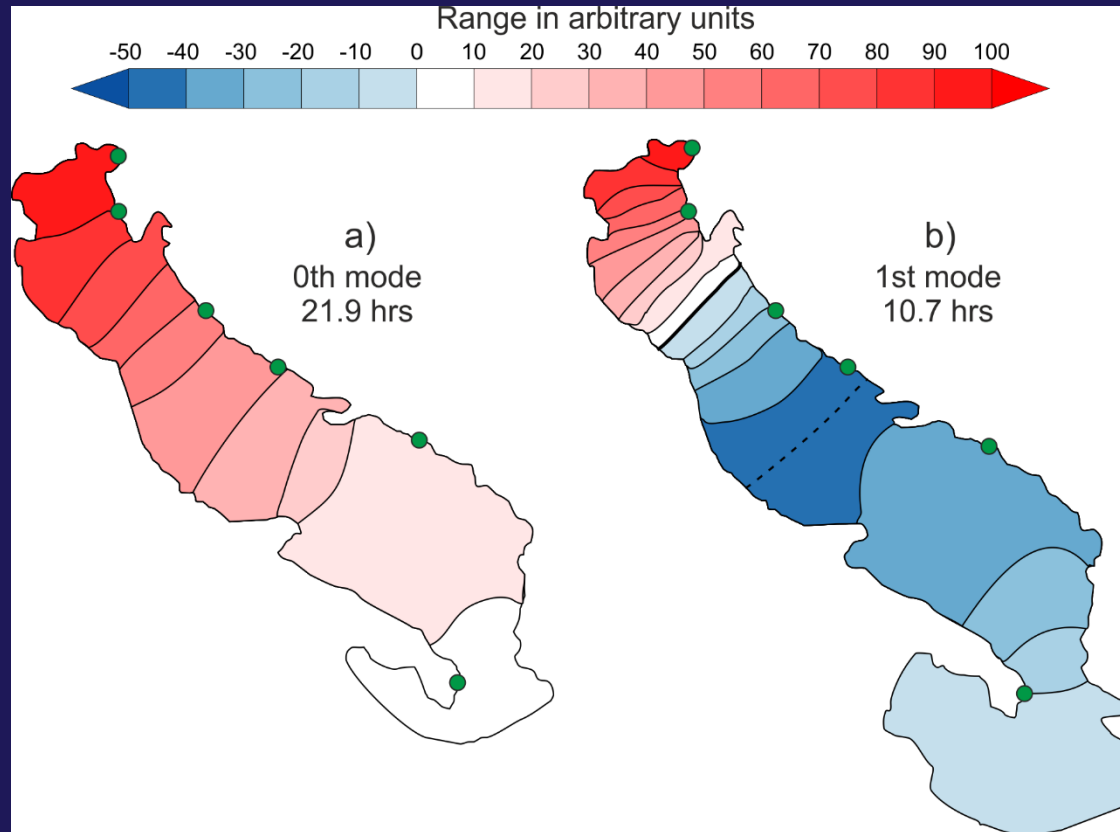
Трассировка изображений



Cushman-Roisin et al., 2001



Трассировка изображений

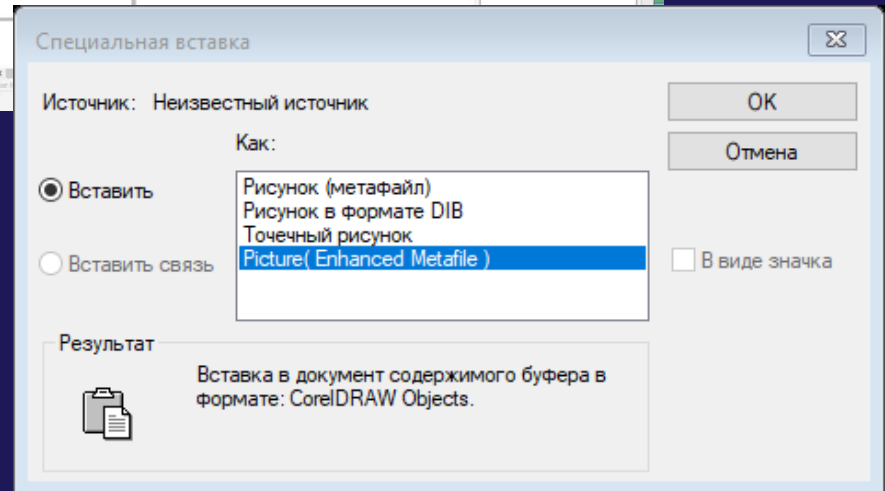
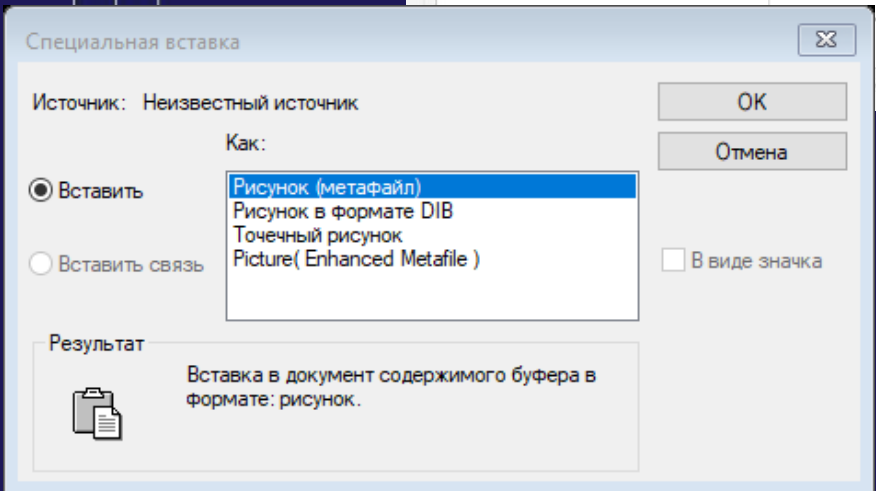
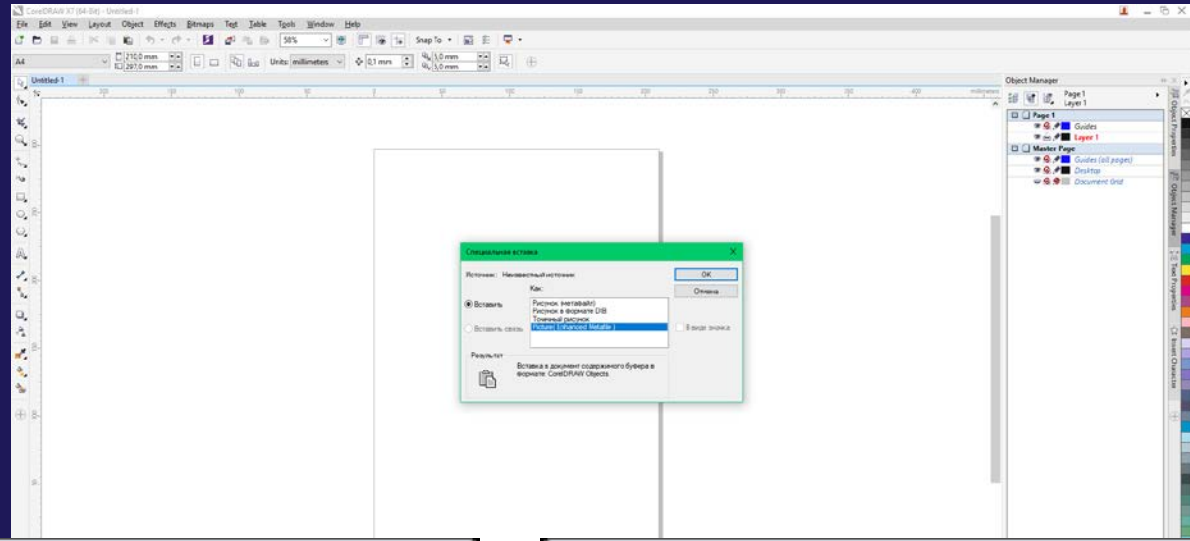


Medvedev et al., 2018



Импорт и экспорт

Импорт через Paste Special





Импорт и экспорт

Экспорт:

Растровые изображения:

- jpg, png, tiff

Векторные изображения

- pdf
- eps (Encapsulated PostScript)



Создание постеров

Extreme statistics of the sea level oscillations on the Russian coast of the Baltic Sea

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 Fedorov Institute of Applied Geophysics Moscow, Russia
 patamates@gmail.com

Introduction

The longest monthly maximal and minimal sea level data from 20 tide gauges on the Russian coast of the Baltic Sea were used to examine the statistical properties of extreme sea levels. The duration of observations varied from 9 to 192 years. It is shown that the extreme sea level value distributions of return period for short tide gauge records are well approximated by the Gumbel distribution.

The longest data series (Kronstadt, St. Petersburg and Vyborg) have shown a significant deviation from the Gumbel distribution for the short events. The maximum values of extreme rises/ebbs of 100-year recurrence were observed in the Gulf of Finland.

Statistical analysis of the sea level data series reveals that positive surges (floods) occurred more probable than negative surges (ebb). The maps of distribution of the extreme sea level values for Russian coast of the Baltic Sea with different returned period (10, 20, 50, 100 year) were created, they based on the results of this statistical analysis.

Data

Tide gauge	Start	End
Kronstadt	1806	2016
Vyborg	1869	2016
Gdansk	1819	1995
Danzig	1869	2016
Zelenogradsk	1957	1993
Lina Nea	1819	1993
Lomonosov	1920	2016
Mosbju	1947	1993
Wladimir	1926	2016
Orskii	1954	2016
Promslav	1921	1987
Starost	1924	1988
Ust-Luga	1925	1985
Orskirsk	1977	2016
Belobuzh	1977	2016
Krasnoyarsk	1977	2016
Subbotinsk	1977	2016
Primorsk	1977	2016
Komarovsk	1977	1988
Golubk	1977	1988

Sea level trends

Extreme statistic

A positive asymmetry coefficient is observed at most stations on the Russian coast of the Baltic Sea: sea level rises are more likely than decreases at the head of the Gulf of Finland. The maximum positive asymmetry coefficient is observed at the head of the Gulf of Finland. This asymmetry of the positive and negative storm surges can be explained by the asymmetry of the wind over the Baltic Sea. Western winds dominate considerably, and they cause the most powerful storm surges in the west part of the Baltic Sea.

The extreme sea level value distributions of return period for short tide gauge records are well approximated by the Gumbel distribution. For the longest data series the extreme values of sea level for return periods > 20 years fit well on the straight line of the approximation of the Gumbel distribution. However, events with return period < 20 decades from the Gumbel distribution depart. The residual distribution is the more suitable asymptotic for the events with rare return period.

Single extreme events sometimes do not completely correspond to the distribution. On January 9, 2005, a storm surge took place in the Gulf of Finland, observed in Primorsk (the Gulf of Riga). The return period of this storm surge, which is estimated by the extrapolating the empirical Gumbel distribution function is 500 year.

In the range of return periods from 1 to 80 years, extreme values of the sea level are well approximated by the distribution of Gumbel, however, for > 100 years this approximation "breaks". These catastrophic floods with sea level rise of 300 cm have different mechanism of formation.

10-year return period **50-year return period** **Data sea level extremes**

20-year return period **100-year return period** **Historical sea level extremes**

Maximum range of the seasonal sea level oscillations (cm) **Maximum range of tides (cm)**

CONCLUSIONS

- Sea level records with a period less than 30-40 years do not allow to calculate extreme values of sea level with a period of recurrence of 100 years.
- The positive surges essentially prevail over the negative surges in the Gulf of Finland.
- Regular periodic sea level oscillations reach significant amplitudes in the Gulf of Finland.

SEA LEVEL OSCILLATIONS IN THE BALTIC SEA: FROM MINUTES TO CENTURIES

Igor P. Medvedev, Alexander B. Rabinovich and Evgueni A. Kulikov
 P.P. Shirshov Institute of Oceanology RAS
 medvedev@ocean.ru

INTRODUCTION

Various types of storm processes determine the sea level change in the Baltic Sea: meteorological, hydrological, glacial, volcanic, sea level, seasonal, multi-decadal, long-term surge and others that cover a wide range of periods. From minutes to centuries, the extreme sea level records and properties of sea level oscillations, the Baltic Sea, considered in the form of a dynamic system, change over time. The storm surges, which act as a 4- to 6-year cycle, strongly affecting the high-mountain provinces but showing the frequency properties to periods from 100 to 1000 years, probably exist in the form of a 100-year cycle. The storm surges are characterized by a 100-year return period. The storm surges are characterized by a 100-year return period. The storm surges are characterized by a 100-year return period.

EXTERNAL OSCILLATIONS

are generated by the sea level variability beyond the Baltic Sea (in Kattegat and the North Sea) and by fresh water surplus.

GENERAL SPECTRUM

INTERNAL OSCILLATIONS

are caused by atmospheric processes (air pressure and winds), water density changes in the Baltic Sea and astronomical factors.

DATA

LOW-FREQUENCY SPECTRUM

SYNOPTIC AND MESOSCALE SEA LEVEL: EIGEN MODES, STORM SURGES, AND SEICHES

Gulf of Bothnia **Gulf of Finland** **Gulf of Riga**

SEASONAL SEA LEVEL OSCILLATIONS AND POLE TIDE

The annual (1st) and semiannual (2nd) oscillations are prominent in the Baltic Sea. The annual oscillations are associated with the annual variation of the sea level. The semiannual oscillations are associated with the semiannual variation of the sea level.

The pole tide

The pole tide is a global phenomenon that is caused by the Earth's rotation. It is characterized by a 12-hour period and a 12-month period.

Influence of the zonal wind on Baltic sea-level

The zonal wind has a significant influence on the sea level in the Baltic Sea. It is characterized by a 10-day period and a 1000 km/h wind speed.

TIDES AND KINDRED PHENOMENA

Astronomical tides **Relational tides**

The Curonian Lagoon: absence of classical tides

The Curonian Lagoon is a unique body of water that is characterized by the absence of classical tides. It is characterized by a 10-day period and a 1000 km/h wind speed.

The spatial distribution of the amplitudes

This study is based on the following publications:

Medvedev I.P. and Rabinovich A.B. (2015) Oscillations of the Baltic Sea Level and Flood in the Gulf of Finland. *Oceanology*, 55(1), 1-10.
 Medvedev I.P. and Rabinovich A.B. (2016) Sea Level Oscillations in the Baltic Sea. *Oceanology*, 56(1), 1-10.
 Medvedev I.P. and Rabinovich A.B. (2017) Sea Level Oscillations in the Baltic Sea. *Oceanology*, 57(1), 1-10.
 Medvedev I.P. and Rabinovich A.B. (2018) Sea Level Oscillations in the Baltic Sea. *Oceanology*, 58(1), 1-10.
 Medvedev I.P. and Rabinovich A.B. (2019) Sea Level Oscillations in the Baltic Sea. *Oceanology*, 59(1), 1-10.



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medvedev@ocean.ru*