

Report at the Museum of the Aral Sea in Muynak, Uzbekistan,
February 18, 2023

About the history of the Aral Sea

Aladin N., Gontar V., Jakova L.,

Plotnikov I., Smurov A.

Laboratory of Brackish Water Research,
Zoological Institute of the Russian Academy of Sciences

- The first significant research on the Aral Sea was carried out in 1848-1849. expedition led by Lieutenant Alexei Ivanovich Butakov.
- A general reconnaissance of the Aral Sea was carried out, a depth measurement was made, a complete survey of Barsa-Kelmes Island was made, a group of Renaissance islands was discovered and studied, astronomical determinations were made with the organization of a network of astronomical points, meteorological observations, an inventory of the ice situation in winter, a collection of samples of minerals transferred then to the Petersburg Mining Institute, and flora.
- January 27, 1849 Butakov was accepted as a full member of the Russian Geographical Society.

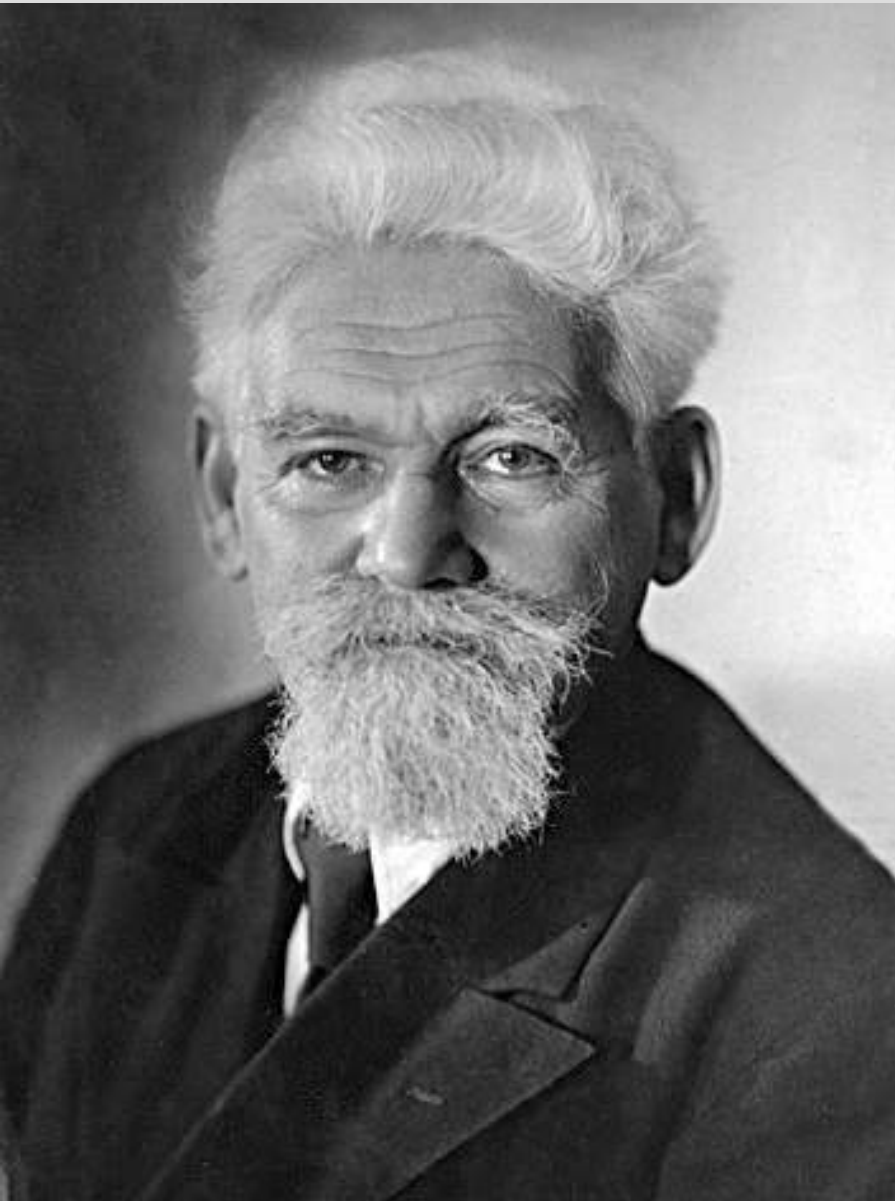


- Taras Grigoryevich Shevchenko, who was in exile in Orenburg, was accepted into the expedition as an artist.
- In addition to drawings, Shevchenko wrote more than 70 poems in Raim and Kosaral, some of which were born of Aral motifs.





Leo Berg(1876–1950)



- Geographer and ichthyologist, corresponding member (1928) and full member (1946) of the USSR Academy of Sciences, president of the Geographical Society of the USSR (1940–1950), laureate of the Stalin Prize (1951, posthumously).
- L.S. Berg was the first member of the staff of the Zoological Museum/Zoological Institute to study the Aral Sea.
- In 1900, the Turkestan Department of the Imperial Russian Geographical Society instructed him to complete in 1900-1902. a comprehensive study of the extremely poorly studied Aral Sea. For three seasons, Berg walked around the entire Aral Sea.
- He carried out the first comprehensive study of the Aral Sea, and he made the greatest personal contribution to the study of this reservoir.
- L.S. Berg conducted physical and geographical research, collected geological, paleontological, zoological, and botanical collections.
- He wrote a monograph dedicated to the fish of the Aral Sea.
- In 1906, Berg again visited the north of the Aral Sea and supplemented the previously collected materials

В. И. Шотт
Петербург 1912 г.

Извѣстія Турк. Отд. Имп. Русск. Географич. Общ., т. V.
Научные Результаты Аральской Экспедиціи, вып. 9.

Л. Бергъ.

АРАЛЬСКОЕ МОРЕ.

ОПЫТЪ

ФИЗИКО-ГЕОГРАФИЧЕСКОЙ МОНОГРАФІИ.

Съ 2 картами, 6 таблицами и 78 рисунками.

L. Berg. Der Aral-See. Versuch einer physisch-geographischen
Monographie.

С.-ПЕТЕРБУРГЪ.

Типографія М. М. Стасюлевича, Вас. остр., 5 лн., 28.

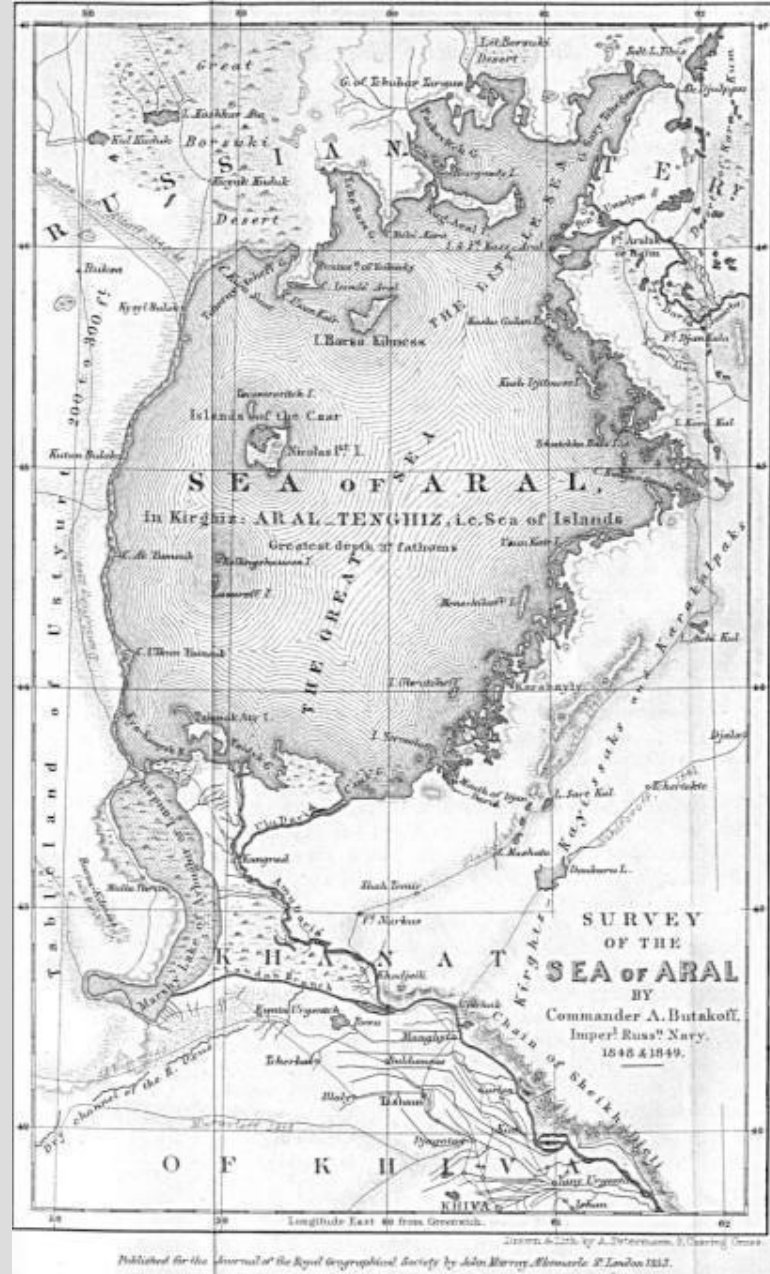
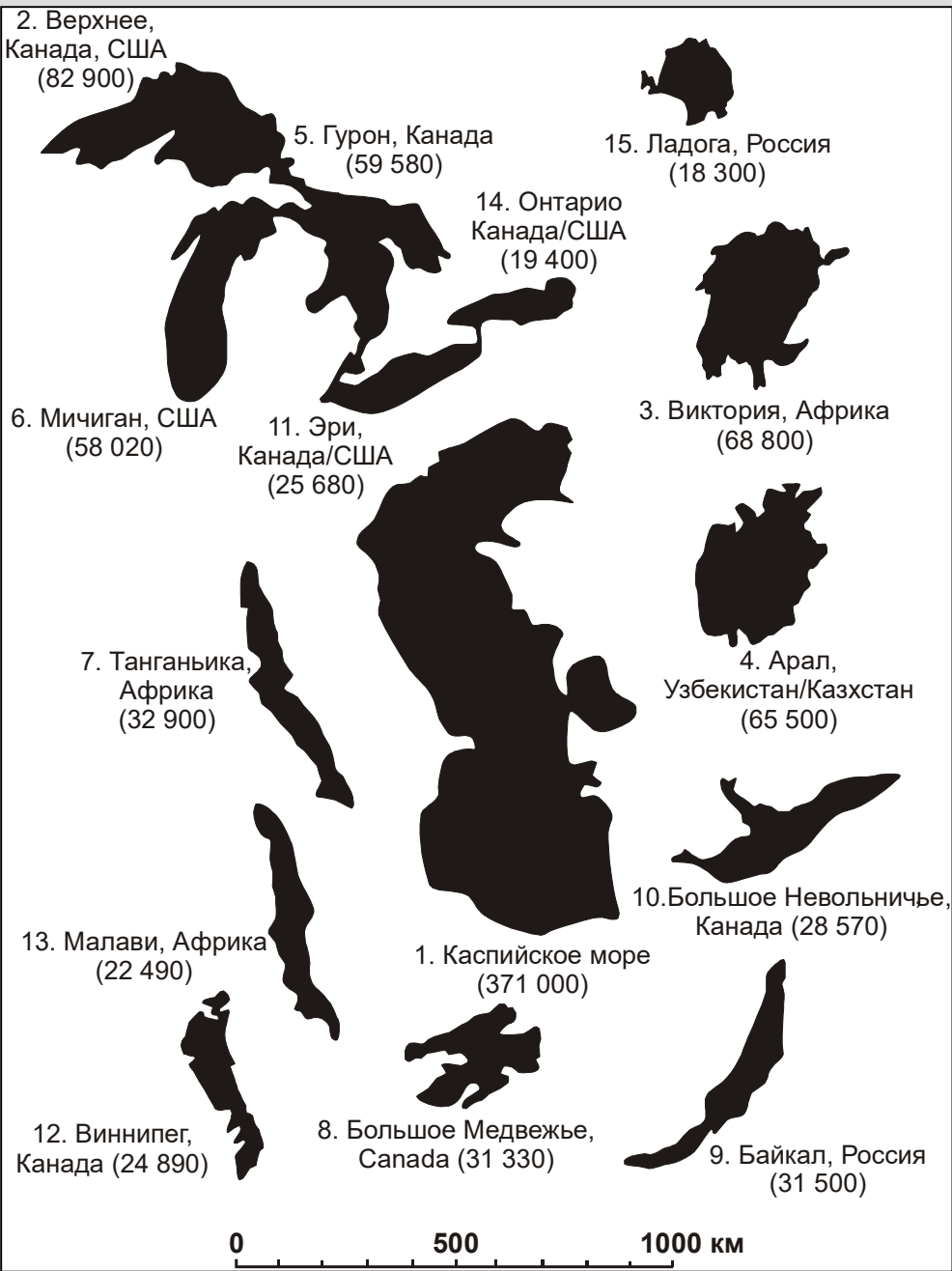
1908.

- The knowledge about the Aral Sea available by the beginning of the 20th century and the whole huge amount of new data acquired thanks to the expedition, L.S. Berg summarized in his fundamental work "The Aral Sea. The experience of a physical-geographical monograph", published in 1908.
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- As a result, the first list of representatives of the flora and fauna of the Aral Sea appeared, which included: 110 species of unicellular and multicellular algae; 6 species of higher plants; 28 types of protozoa; 55 species of multicellular invertebrates and 18 species of fish.
- This book still retains its enduring value for all researchers of the Aral Sea.

Commonwealth of Independent States - Central Asian States

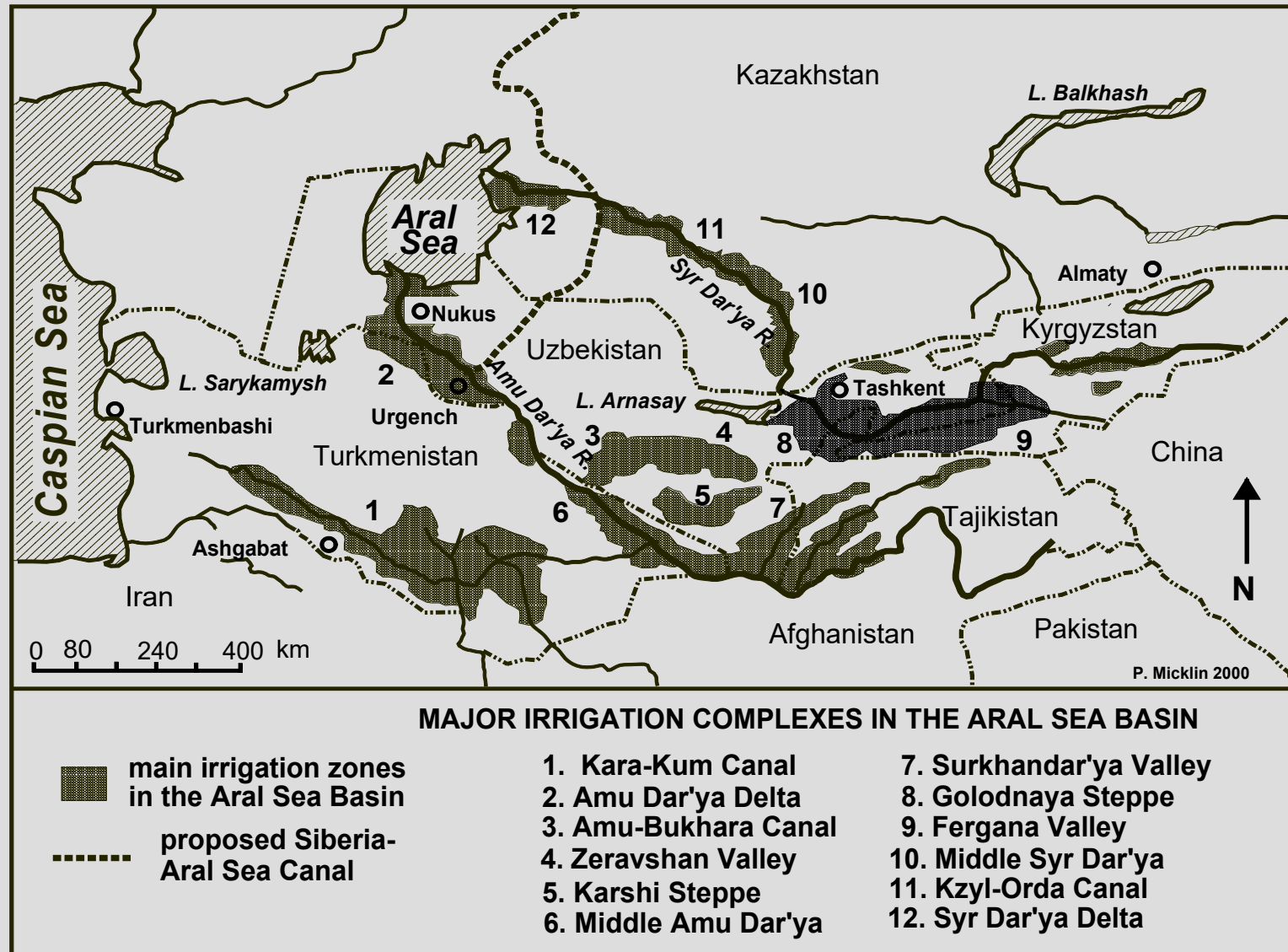


The Aral was the fourth lake in the world in terms of water area



Map of the Aral Sea, compiled based on the materials of the expedition of A. I. Butakov in 1848-1849

IRRIGATION DEVELOPMENT IN THE ARAL SEA BASIN



In the late 1980s, when the level dropped by 13 m and reached +40 m, the Aral Sea ceased to be a single body of water and was divided into the Small and Large Aral.

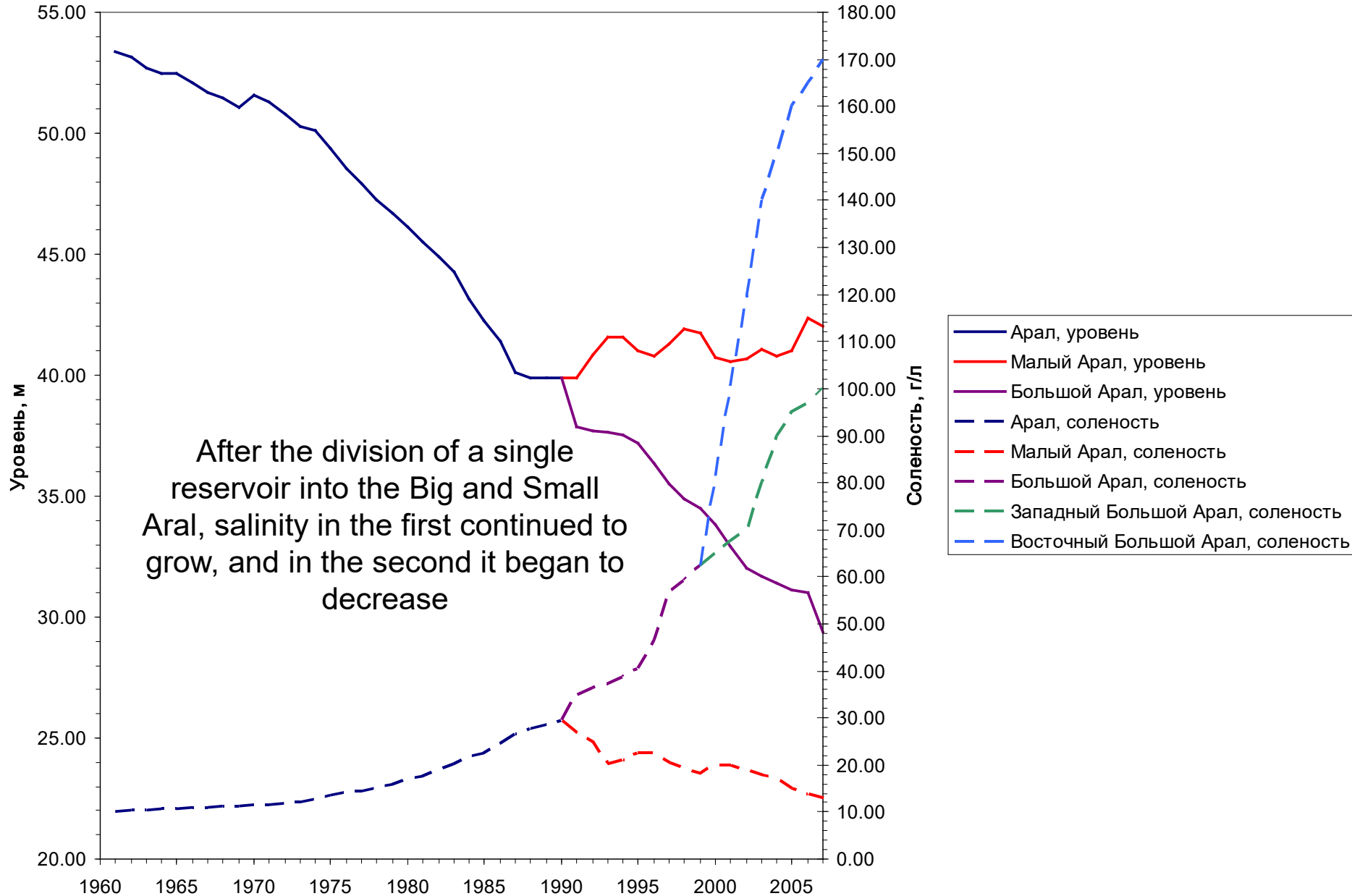


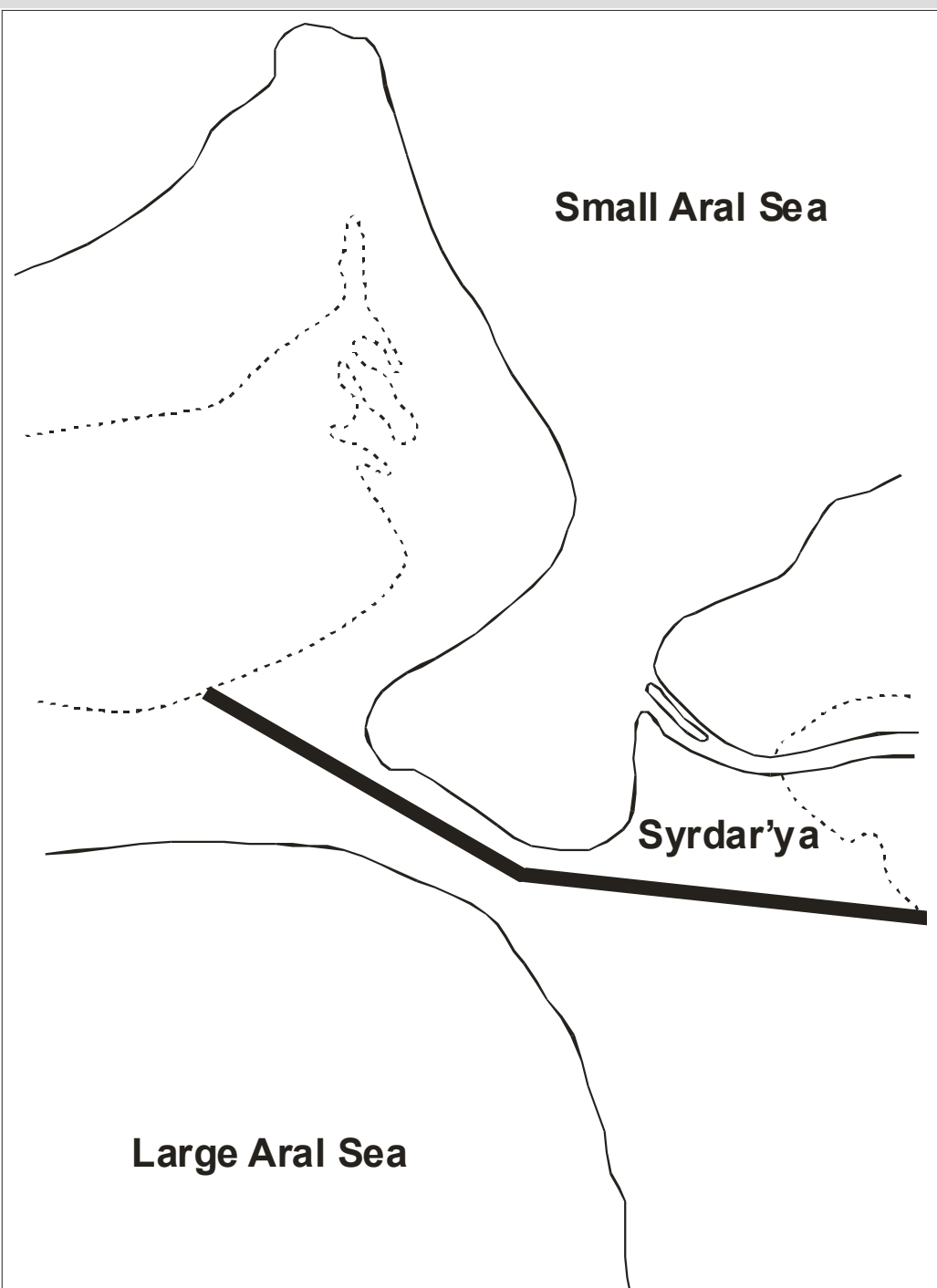
Area 40000 km²
(60% from 1960 г.)

Volume 333 km³
(33% from 1960 г.)

Salinity 30 g/l
(10 г/л in 1960 г.)

Changes in the level and salinity of the Aral Sea

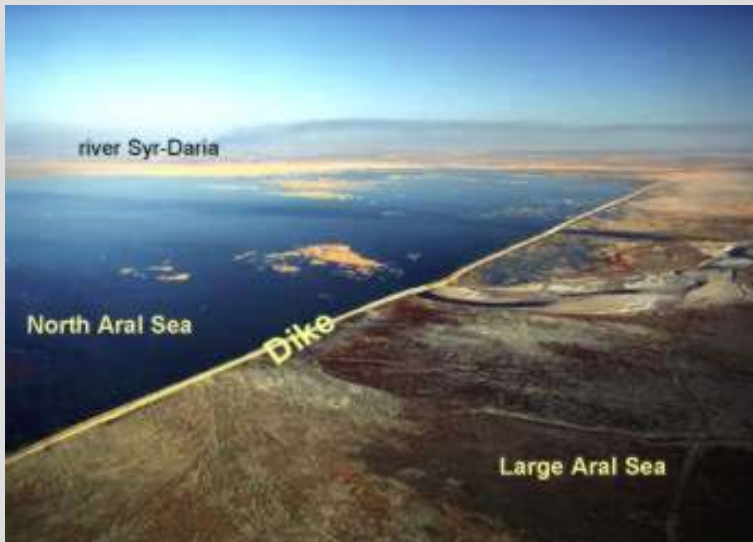




The dam in the Berg Strait helps to preserve the Small (Northern) Aral and contributes to the restoration of its biodiversity

По: Aladin N.V., Plotnikov I.S., Potts W.T.W., 1995. The Aral Sea desiccation and possible ways of rehabilitation and conservation of its North part // Int. J. Environmetrics. Vol. 6: 17-29.

The dam was first built at our suggestion in August 1992.



After the construction of a dam in 1992 in the Berg Strait at the end of the 20th century, the fishery of the flounder universe continued in the Small Aral and native fish began to be caught.



Dynamics of catches in the northern and southern Aral



Green – southern Aral / Blue – northern Aral



dangerous areas 135 m

Опасные участки
(135 м)

Водосбросное сооружение

Кокаральская
плотина 13 км

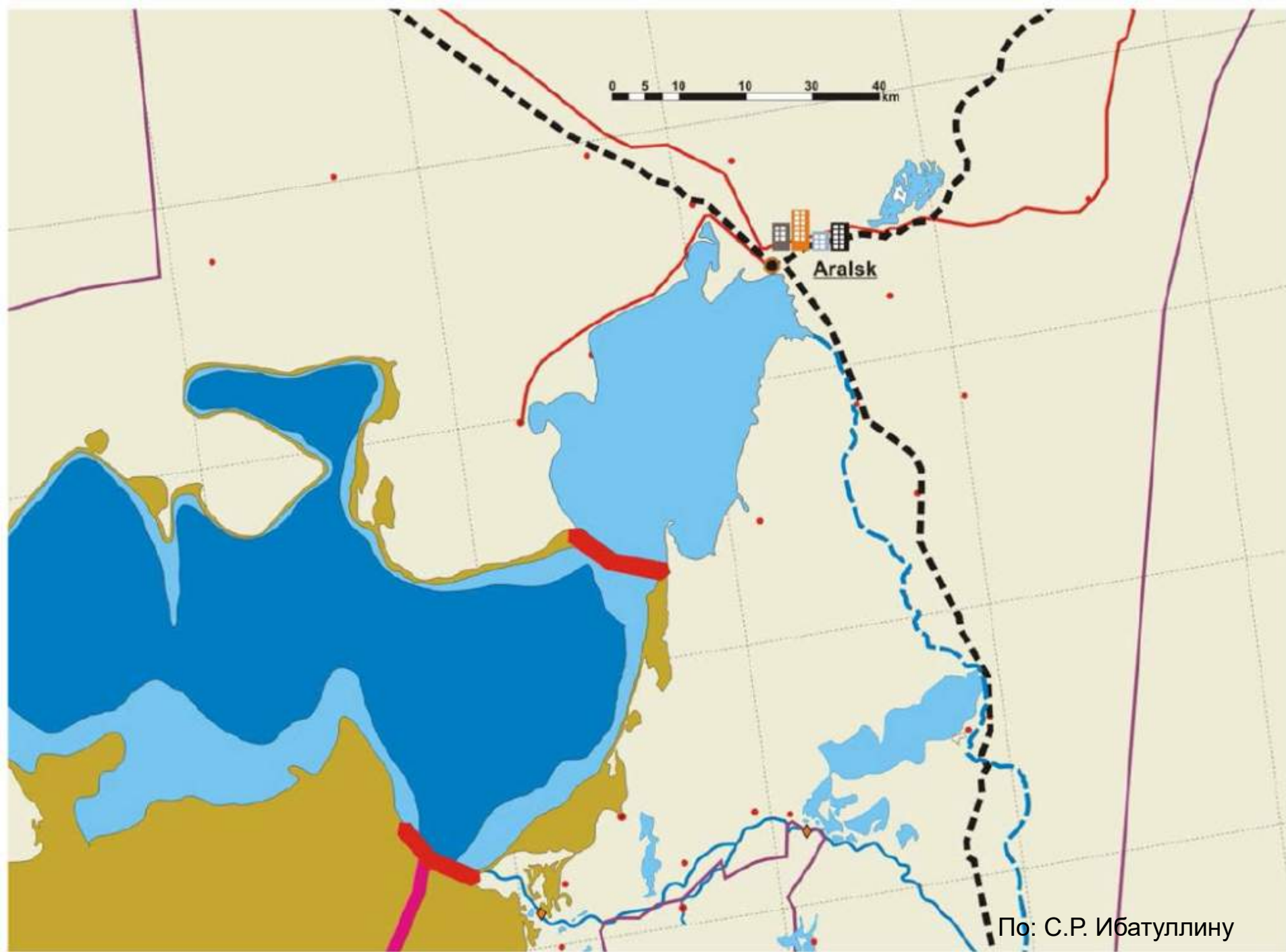
kokaral dam 13 km

река. Сырдарья

Новое русло

New channel





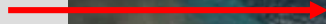
Artemia parthenogenetica appeared in the Great Aral at the end of the 20th century



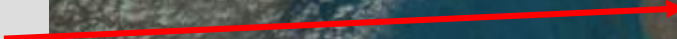


Central Aral, 3.10.2015. Light green color - moist soil, shallow water and hydrophytic vegetation. This is the Central Aral at the end of the dry period (July-November), when little water is discharged into it from the Small Aral. The salinity of West Lake towards the end of this period is probably quite high (probably too high for any fish to survive).

Tshe-Bas Bay



**Island in the middle of
the Central Aral (area =
276 km²)**



Central Aral, 01/23/2016. The Central Aral during the wet period (December to June) when significant volumes of water are released into it from the Small Aral due to large winter releases through the Toktogul Dam on the Naryn River in Kyrgyzstan for power generation and normal spring flooding. The mineralization of the lake during this period is low (fish can survive). The lake is covered with ice.



Aral Sea 19.08.2014 (MODIS)

**1 - dried up eastern basin of
the Big Aral**

**2 - western basin of the Big
Aral**

3 - new Central Aral

4 - Small Aral

5 - Tshche-Bas Bay

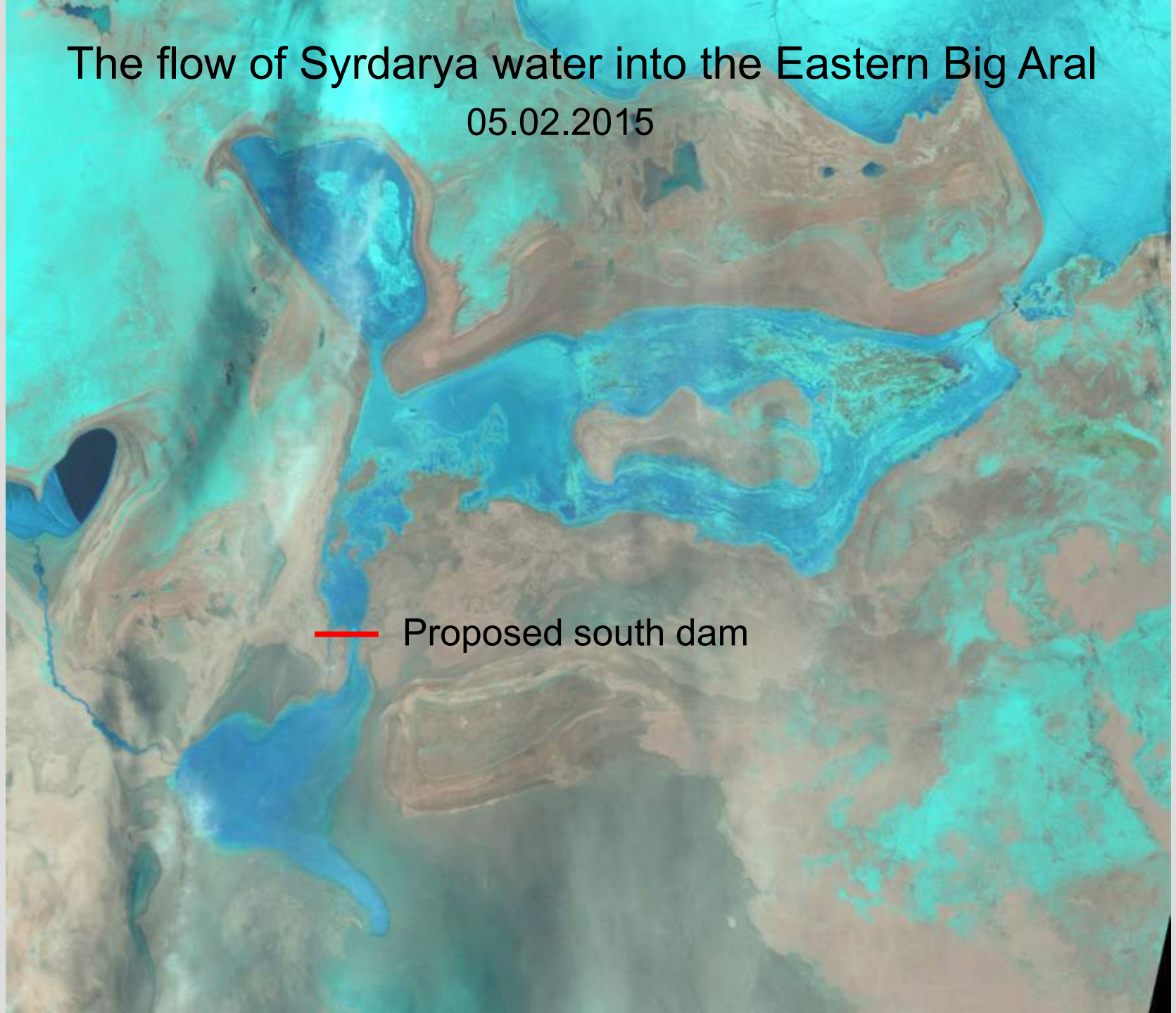
A - Kokaral dam (central dam)

B - proposed northern dam

C - proposed south dam

The flow of Syrdarya water into the Eastern Big Aral

05.02.2015



— Proposed south dam

Water from the Small Aral is discharged along with fish



Fish that passed through the Kokaral dam

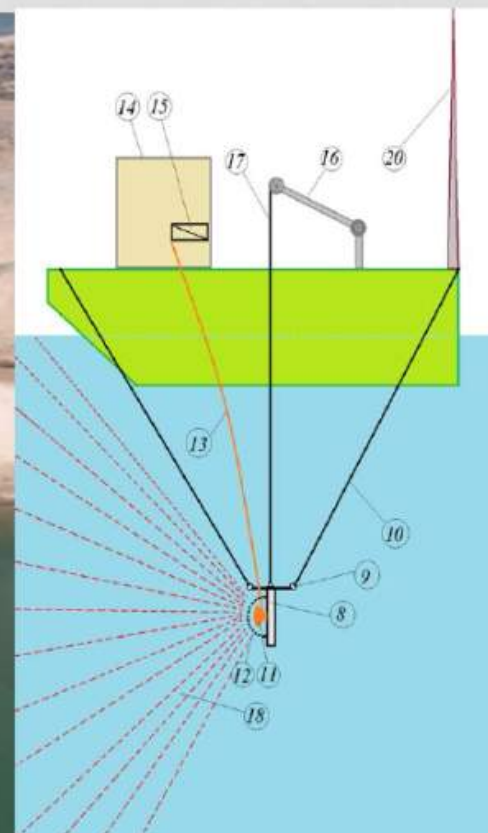


ИД МФСА в РК совместно с Германским обществом по международному сотрудничеству (GIZ) реализуется проект по установке гидроакустического рыбозащитного устройства.

ВОЗМОЖНАЯ КОНЦЕПЦИЯ РЗУ, НА ОСНОВЕ ПАТЕНТА №2763, 2018 Г.
ШИРИНА РУСЛА В МЕСТЕ УСТАНОВКИ 150 М, РАССТОЯНИЕ ОТ ВОДОСБРОСА ПЛОТИНЫ 150 М

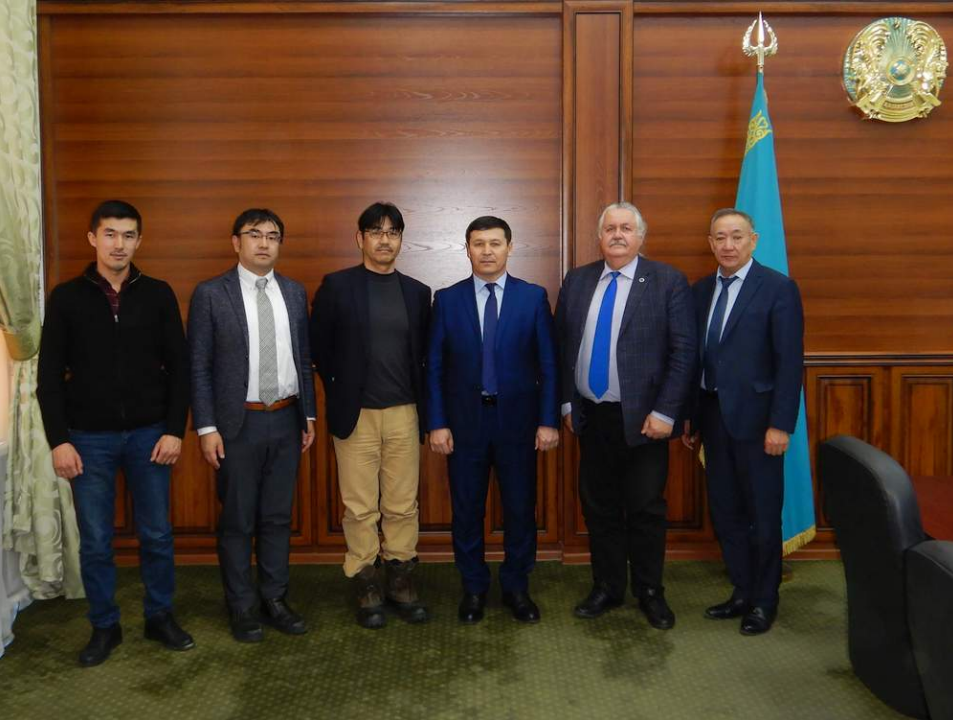


По: Б.К. Бекнияз и др.



ID IFAS together with The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) are implementing a project to install a hydroacoustic fish protection device

- On February 27 - March 11, 2019, a field trip to the Small/Northern Aral Sea took place under the guidance of Professor Junpei Kubota from Japan.
- Our colleagues from Japan and the Republic of Kazakhstan took part in this expedition during the cold season.
- The results of the expedition were published and used to draw up plans for the conservation and rehabilitation of the remains of the Aral Sea.



WHAT SHOULD BE DONE AS A PRIORITY TO CONSERVE THE BIODIVERSITY AND BIOLOGICAL RESOURCES OF THE ARAL SEA

1. Raise the dam in Berg Strait by 2-3 m as soon as possible.
2. To erect a dam in the throat of the Big Sarycheganak Bay and direct part of the flow of the Syrdarya into it.
3. Build a simple dam to the south of the Kulandy peninsula to retain water discharged from the Small Aral.
4. Refuse shallow reservoirs in the Amudarya delta or reduce them to a minimum.
5. Redirect the remainder of the Amu Darya runoff to the Western Large Aral Sea.

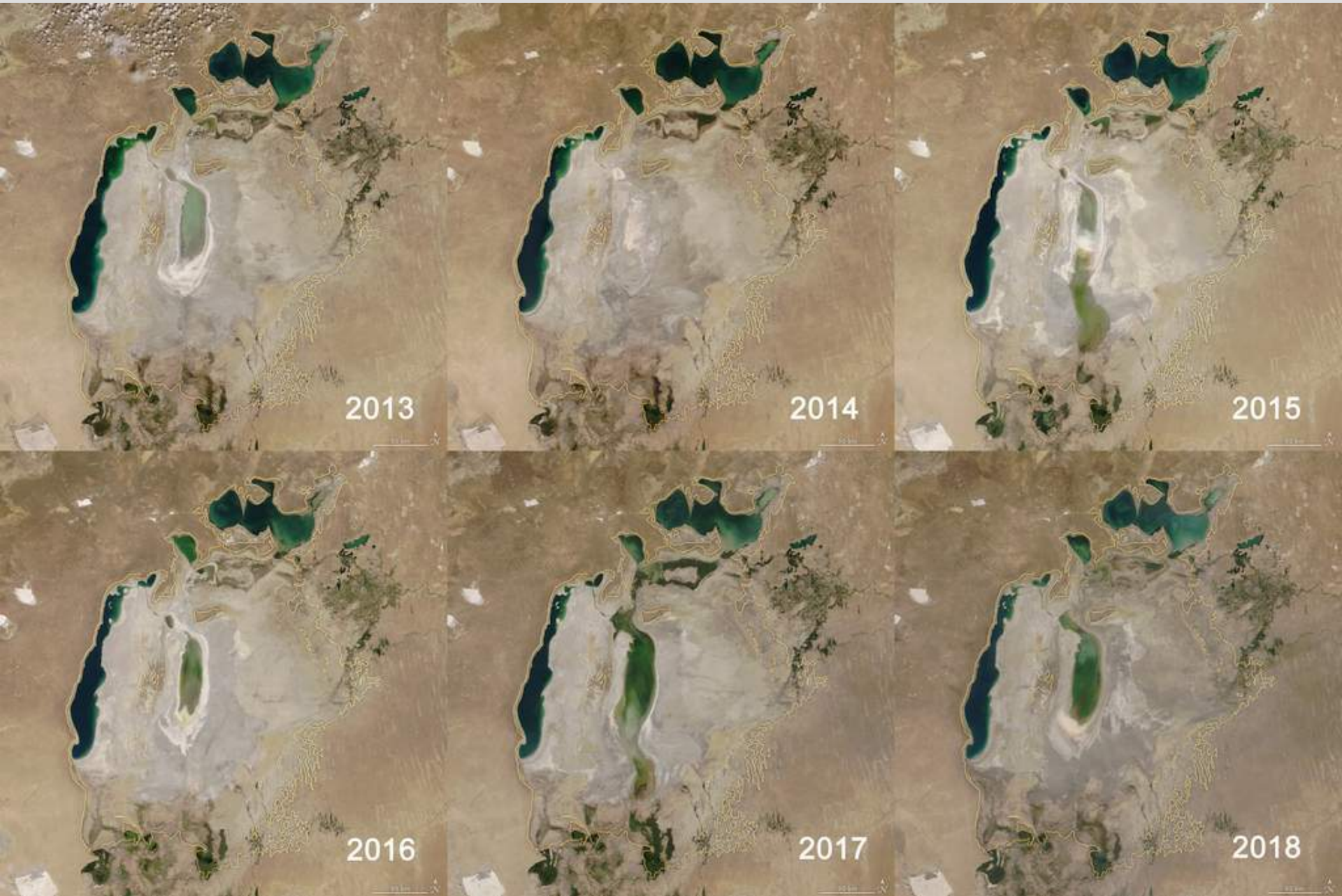
Here is what Novitsky Zinoviy Bogdanovich wrote on April 11, 2019, Doctor of Agricultural Sciences, Academician of the Uzbek Academy of Sciences:

“We have a State program for the ecological improvement of the Aral Sea zone, initiated by the president. We started work on December 10th. I was appointed head of this program and given the rank of colonel. Here I am in charge. All the forces of Uzbekistan were involved - 268 tractors and more than 5,000 people. An environmental battalion of 250 soldiers was created specially in the city of Muynak. This year we will create 500,000 hectares of plantations. Created a green oasis of fruit. In a word, we carry out revolutionary work”.



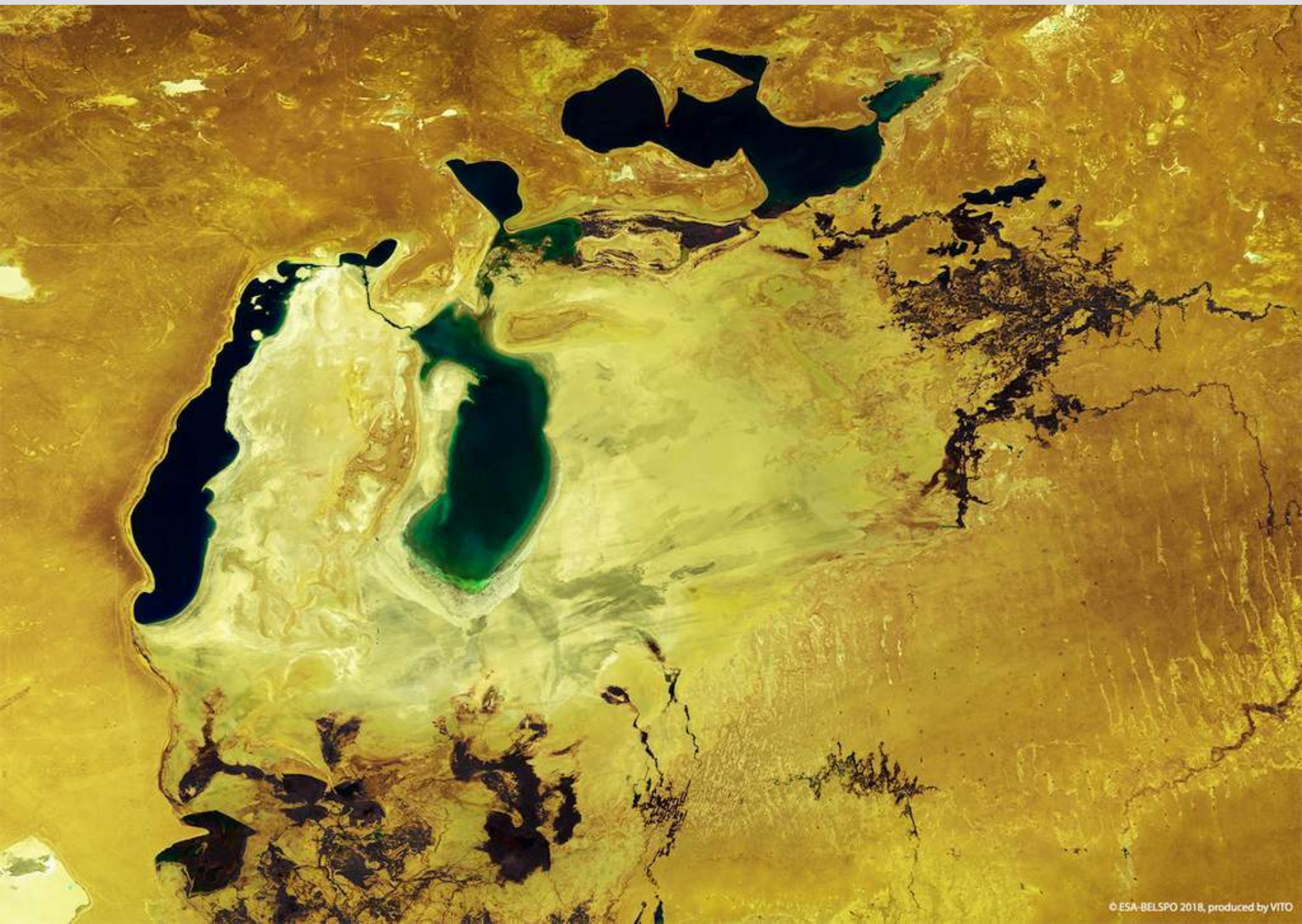
Zinoviy Bogdanovich
Novitsky in the
uniform of a colonel of
the Ministry of
Emergency Situations
of Uzbekistan

Drying up of the Aral Sea (2013-2018)



Large volume of Amudarya runoff in 2015-2018

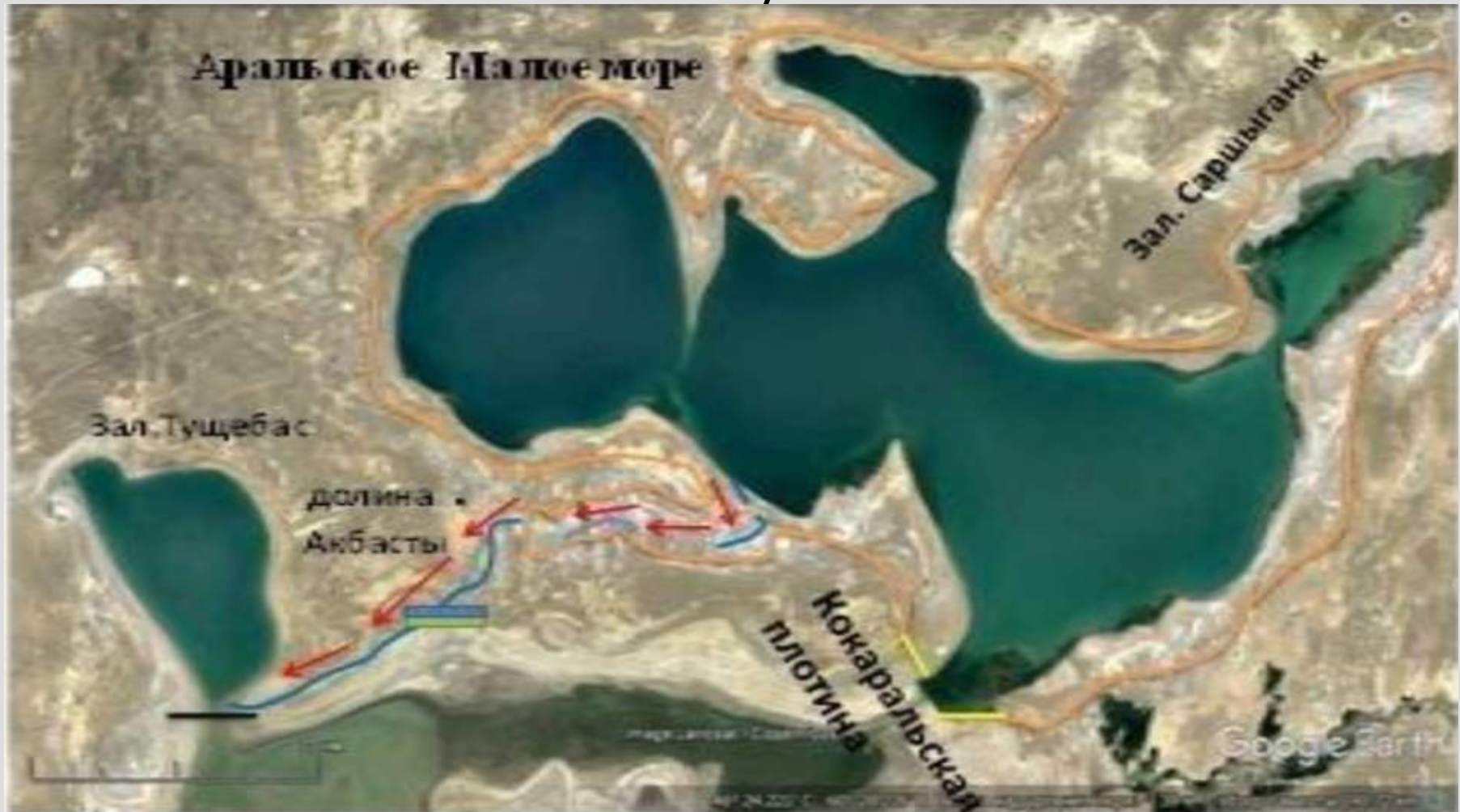
Aral Sea, June 15, 2018. Proba V satellite space image.



Objects of irrigation and drainage works at the mouth of the river. Syrdarya



Existing dam and discharge channel to Tuschybas Bay



— Дамба, — Граница затопления, — Нарастиваемая плотина,
— Грасса сбросного канала, — Вспомогательные
сооружения, (водосброс) — Направления течения

Scheme of the flood boundary at the water edge mark of 48.0 mBS



Proposed route of the discharge channel from the Small Aral



- The Laboratory of Brackish Water Hydrobiology, established at our institute 30 years ago, continued the tradition of studying the Aral Sea, begun within the walls of ZIN in the middle of the 19th century.
- As already mentioned, Academician L. S. Berg made a special contribution to the study of the Aral Sea. His 1908 monograph on this lake is still relevant today. The team of our laboratory managed to confirm L. S. Berg's prediction that the Aral Sea has repeatedly changed its shape in the course of its history.
- During our expeditions, special paleolimnological studies were carried out, which showed the validity of the views of L. S. Berg.

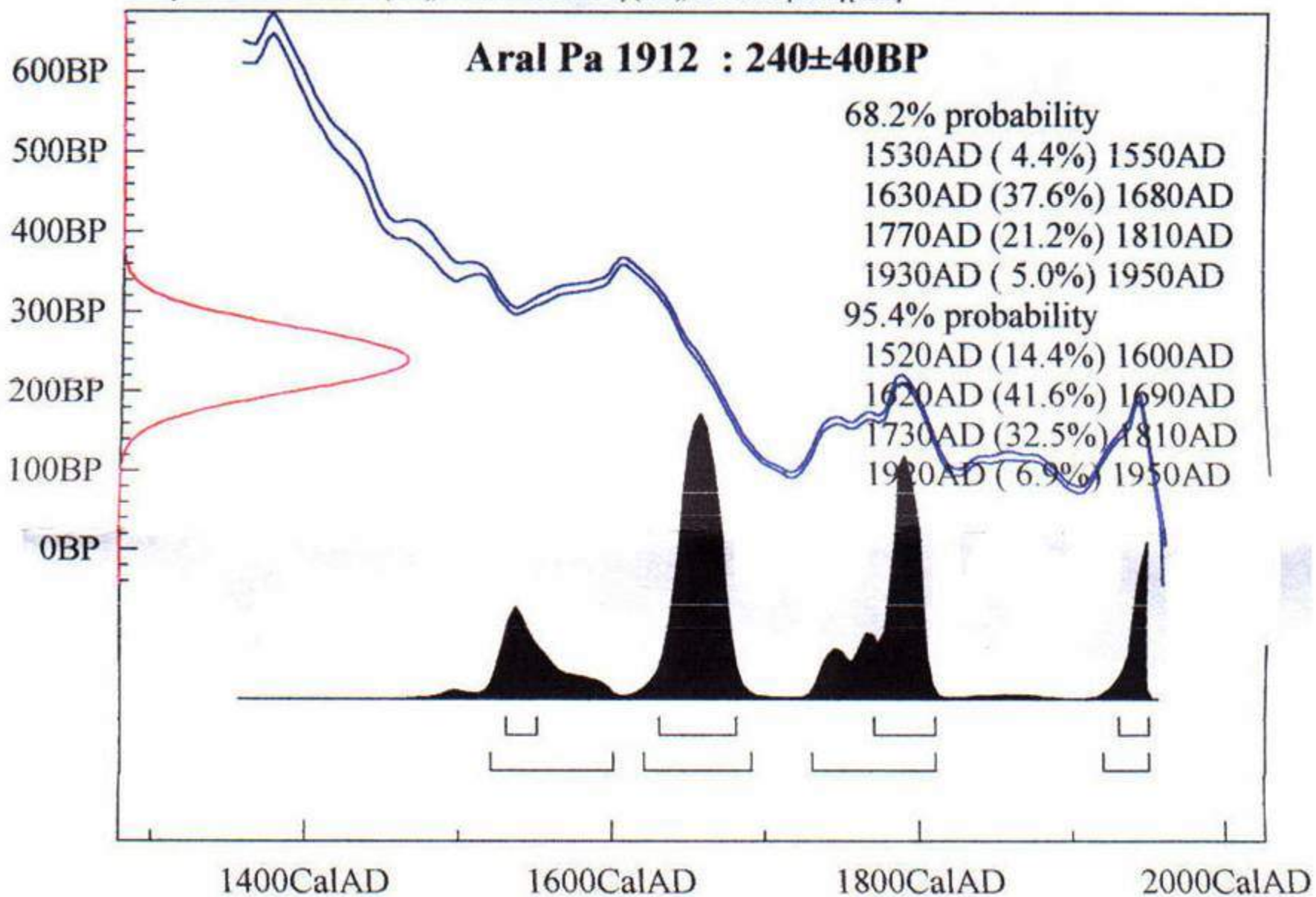


Medieval saxaul stumps found on the dry bottom of the Aral Sea.



Remains of a medieval saxaul underwater

Radiocarbon determination



Radiocarbon dating of saxaul stumps

Drilling in the Aral Sea. August-September 2002





Cutting a plastic pipe with a column of bottom sediments

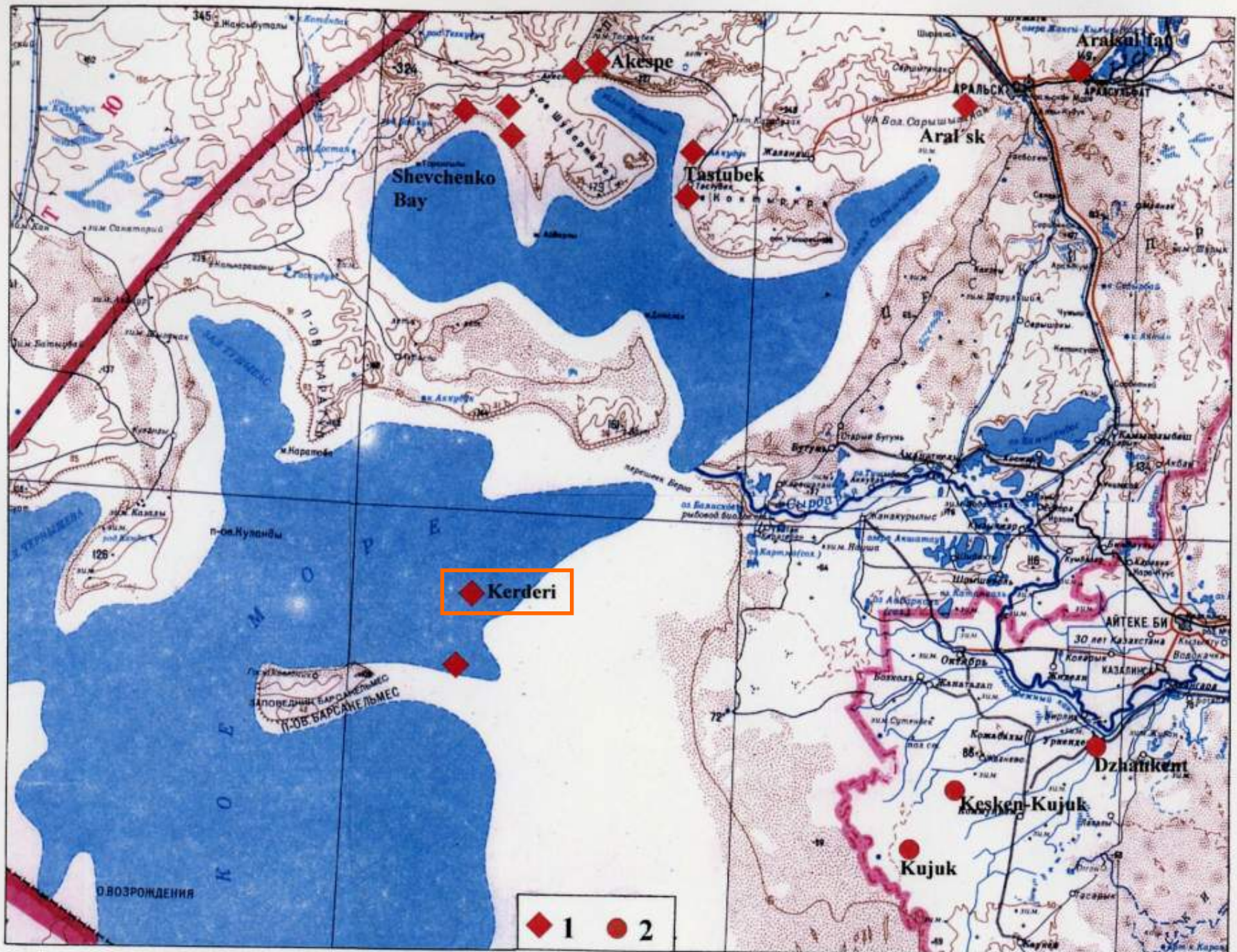


Cutting the core with a metal plate and dividing it into two halves



Cutting cores

Location of the mausoleum of Kerderi





The ruins of a medieval mausoleum found on the dried bottom of the Aral Sea.

The same mausoleum after 4 years. The ruins were covered with ground vegetation.



Decorative pottery from the mausoleum



Bones of Homo sapiens and domestic animals found near the mausoleum





**A millstone found near
the Kerderi Mausoleum**





**Fragments of ceramics
and the skull of Homo
sapiens, on the former
bottom of the Aral near
the mausoleum of
Kerderi**





**Broken jugs on the dried
bottom of the Aral near the
mausoleum of Kerderi**



**Traces of human activity found
on the dried bottom of the Aral
Sea near the mausoleum of
Kerderi**

Needle and arrowhead from Kerderi-2

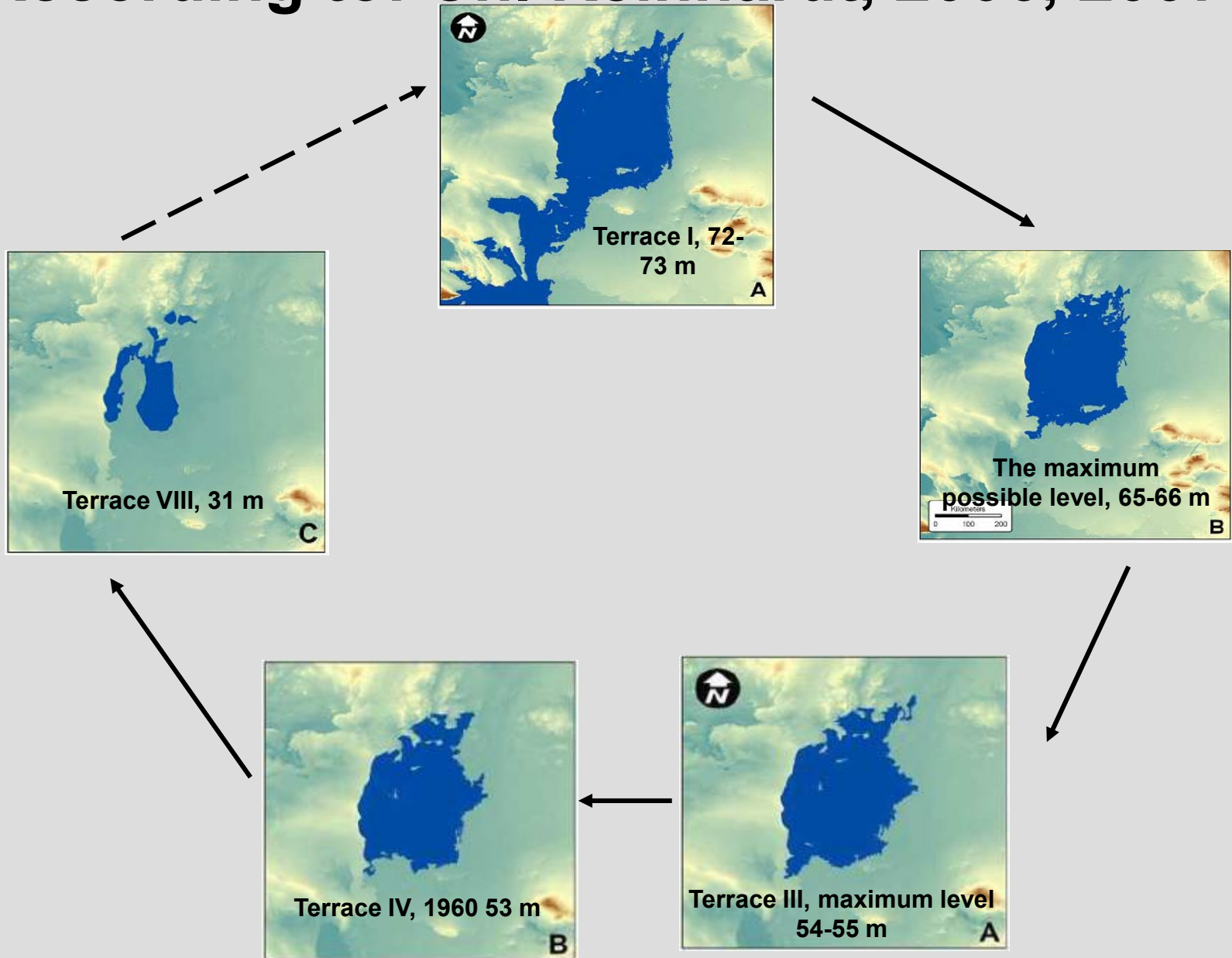


The background features a repeating pattern of stylized, light gray arrows pointing right, interspersed with squares. Each square contains a smaller square with two horizontal bars inside, resembling a simplified representation of a riverbed or a structural element.

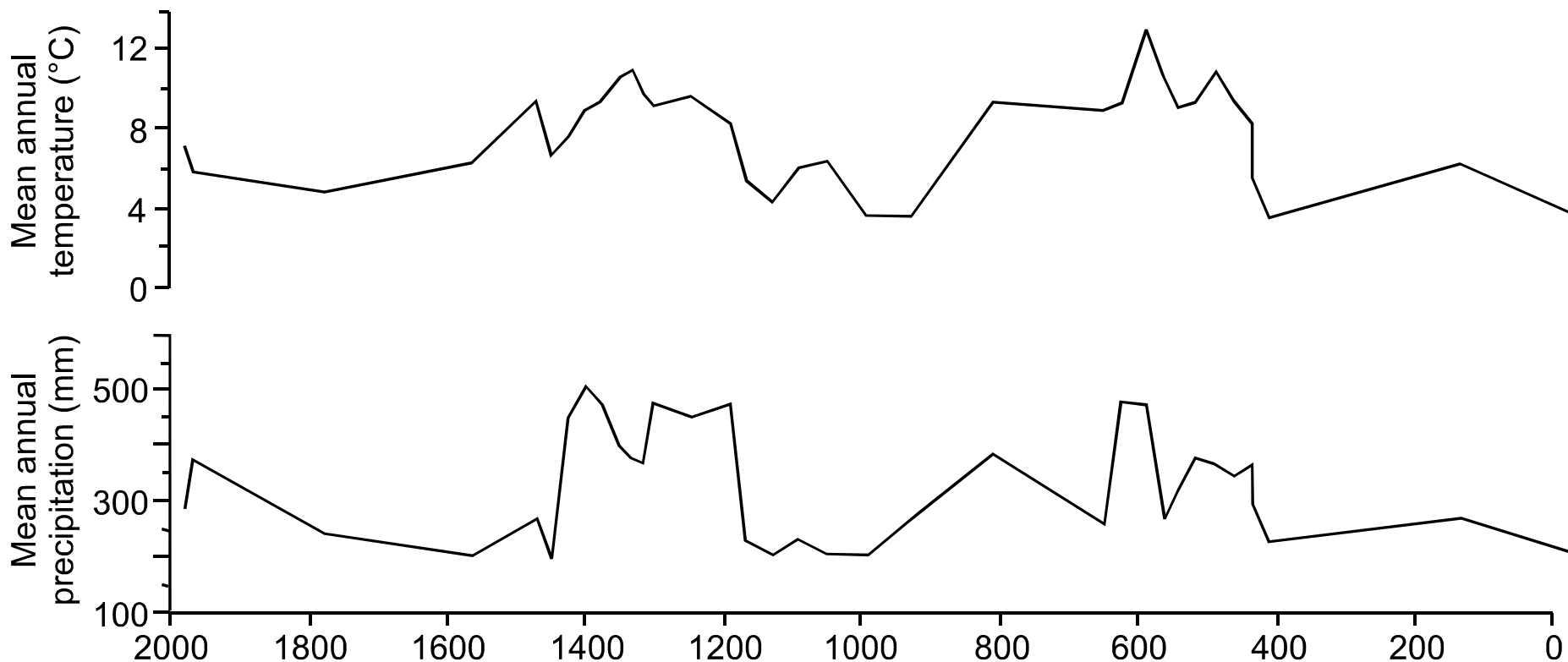
Remains of medieval riverbeds preserved on the former bottom of the Aral Sea

Aral Sea at different levels

According to: Ch. Reinhardt, 2006, 2007

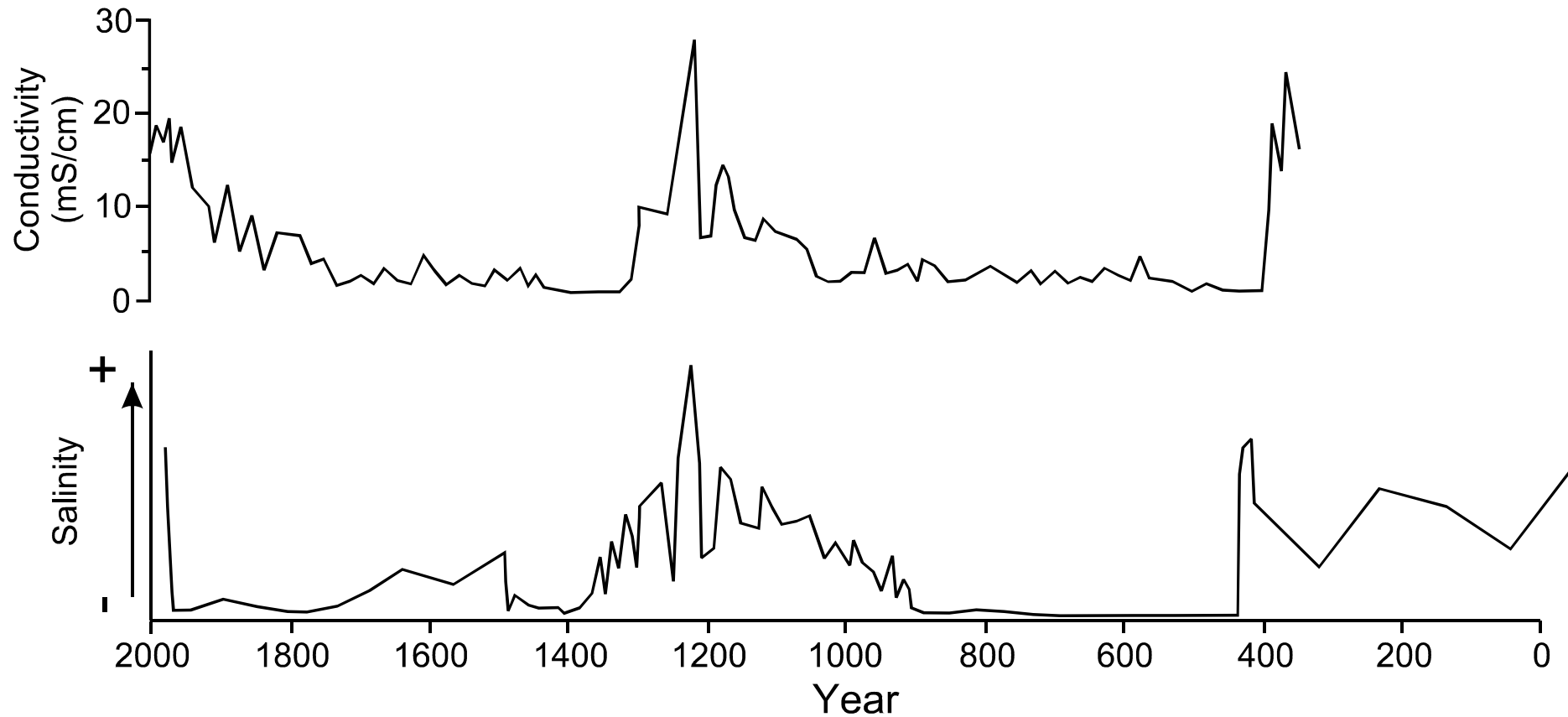


Changes in temperature and precipitation in the Aral Sea region over the past 2000 years



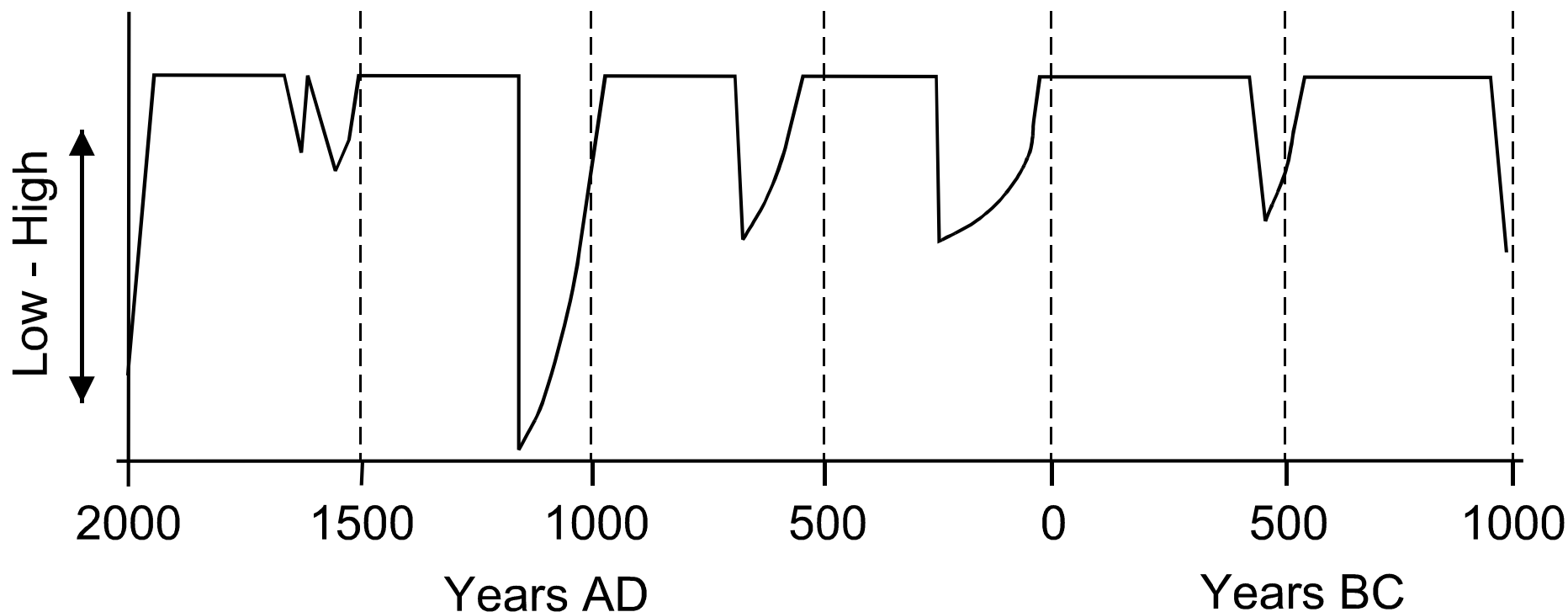
По: I.Boomer et al., 2008

Reconstruction of paleosalinity of the Aral Sea for the last 2000 years (based on paleolimnological data)



По: I.Boomer et al., 2008

Change in the level of the Aral Sea over the past 3000 years (based on paleolimnological data)



По: N.Boroffka, 2006 (из: I.Boomer et al., 2008)

Changing the outlines of the Aral Sea

Middle Ages



**Mid 19th
century**



**Beginning of
the 21st**



Paleolimnological data allow us to hope that the ways of conservation and rehabilitation of the Aral Sea discussed today will bring its revival closer in the 22nd century.

On October 23-29, 2017, at the invitation of colleagues from Uzbekistan, some employees of our laboratory at the "International Conference on the Comprehensive Innovative Development of the Zarafshan Region: Achievements, Problems and Prospects" in Navoi, in collaboration with scientists from Uzbekistan and Germany, made a report "The Spread of Cancers (crustaceans) in the Zarafshan river basin and their suitability for aquaculture".

On November 22, 2021, at the invitation of the Minister of Innovation and Technology of Uzbekistan, from the scientific team of our laboratory in Tashkent, at the international conference “Transformation of the Aral Sea region into a zone of environmental innovation and technology”, a report was made on “Biological diversity and biological resources of the Aral Sea and its residual water bodies”.

- The tragic fate of the Aral Sea in Soviet times worried not only scientists. In the late 1980s, representatives of literature and art initiated the Aral-88 scientific and journalistic expedition.
- The participants of this expedition published its results in the Novy Mir magazine (No. 5, 1989), and also made a popular science film Diagnosis.
- The highest state bodies of the USSR maintained contact with this expedition and prepared a set of measures to overcome the ecological crisis in the Aral Sea.

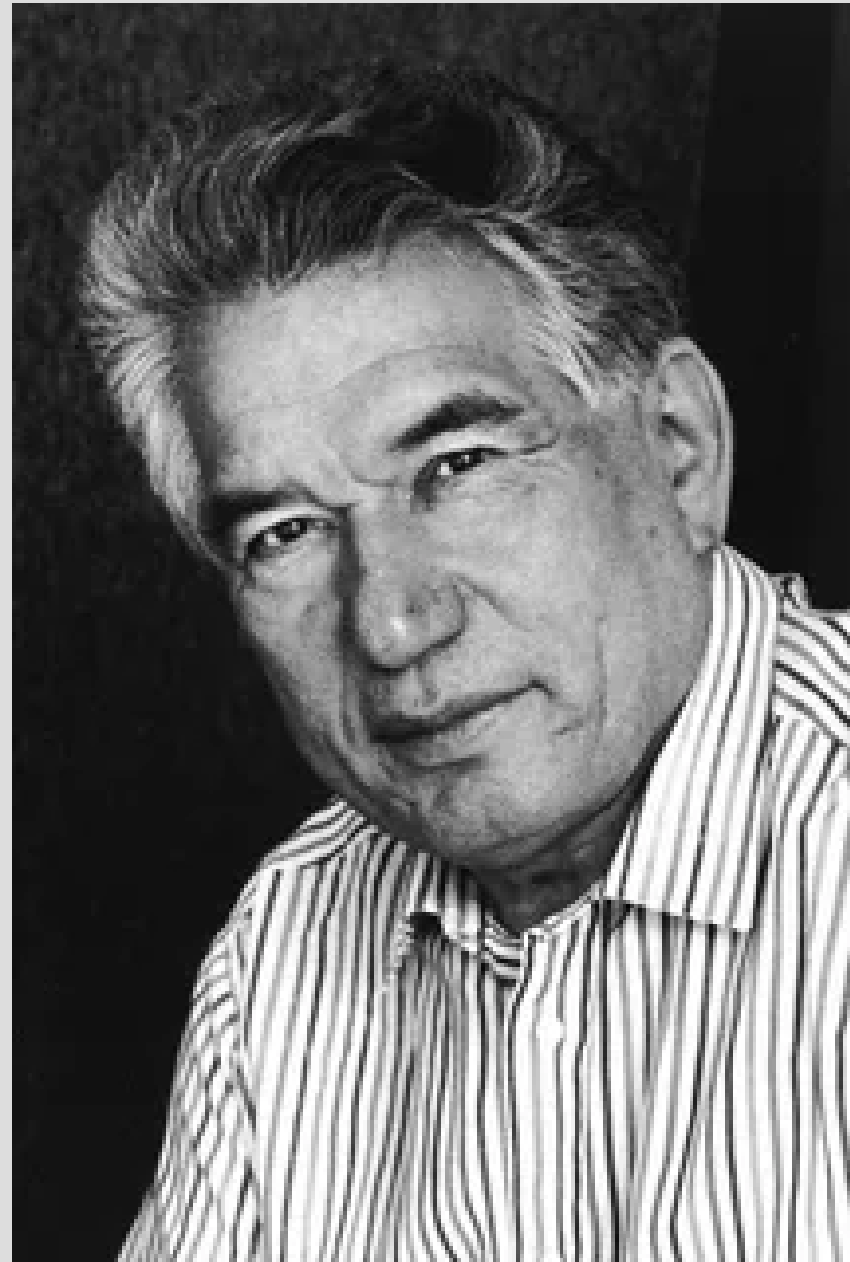
- When the expedition began work in Karakalpakstan, the decision of the Central Committee of the CPSU No. 1110 on the Aral Sea was published.
- For the participants of the expedition, this decision was personally explained by Kakimbek Salykovich Salykov, who at that time was the first secretary of the Karakalpak regional committee of the Communist Party of the Uzbek SSR.
- This man directed all his knowledge and energy to save the Aral Sea. He was a wonderful poet and a just person.



- The participation of many writers and artists in the Aral-88 expedition deserves attention.
Let's list just a few.
- Sergey Zalygin
Gregory Reznichenko
Orazbay Abdiraxmanov
Muxtar Shahanov
Chingiz Aitmatov
Tulepbergen Kaipbergenov
Abdijamal Nurpeisov.

- Chingiz Aitmatov and Tulepbergen Kaipbergenov made an invaluable contribution to the Aral Sea theme.
- And after the completion of the Aral-88 expedition, they continued to do everything possible for a better future for the peoples of the Aral Sea region and the most long-suffering Aral Sea.

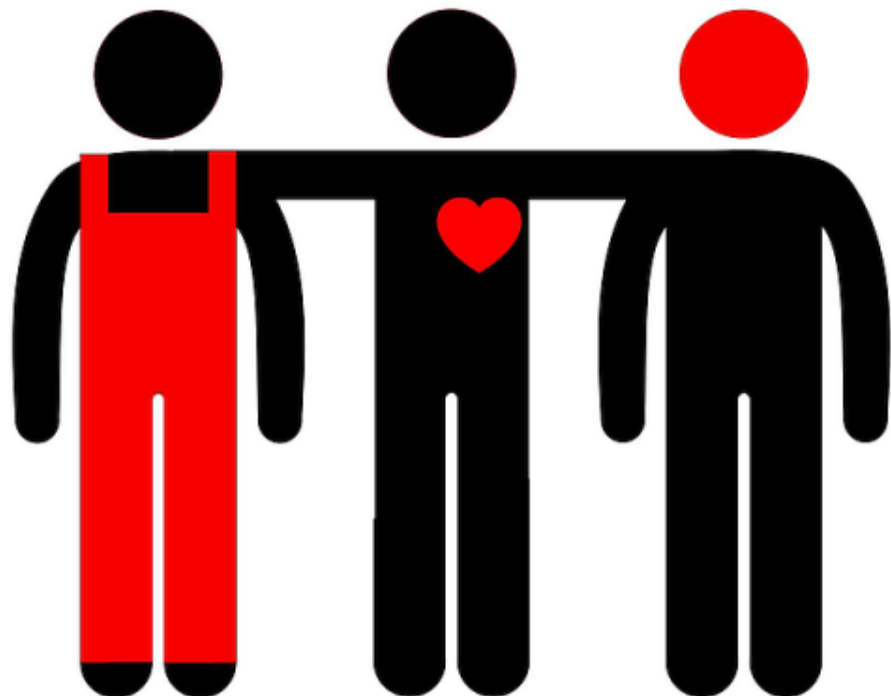
- Chingiz Aitmatov - Kyrgyz and Russian writer, diplomat. Hero of Socialist Labor (1978), Hero of the Kirghiz Republic (1997), People's Writer of the Kirghiz SSR (1968), Academician of the Academy of Sciences of the Kirghiz SSR (1974), laureate of Lenin (1963) and three State Prizes of the USSR (1968, 1977, 1983).



- Tulepbergen Kaipbergenov is a Karakalpak Soviet writer. Hero of Uzbekistan (2003), People's Writer of Uzbekistan (1993), People's Writer of the Karakalpak ASSR (1974).



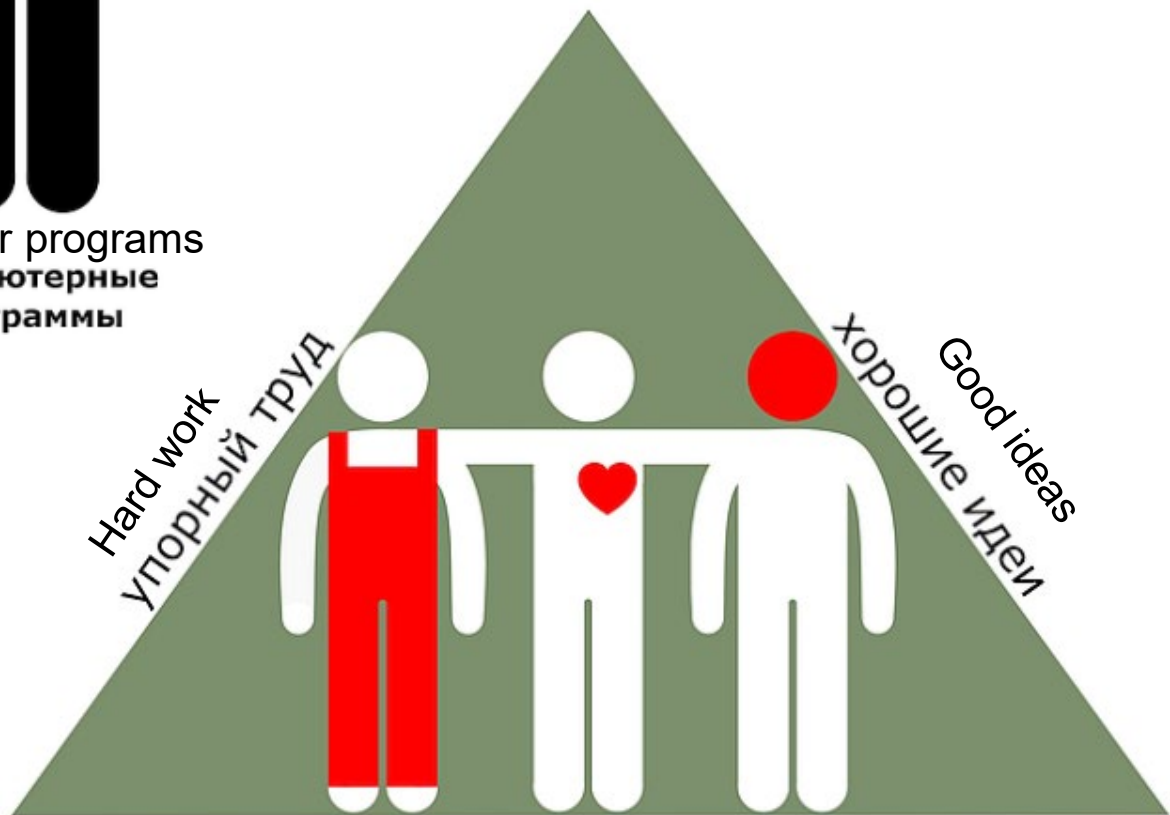
доброе сердце Noble heart



Scientific equipment
научное
оборудование

Computer programs
компьютерные
программы

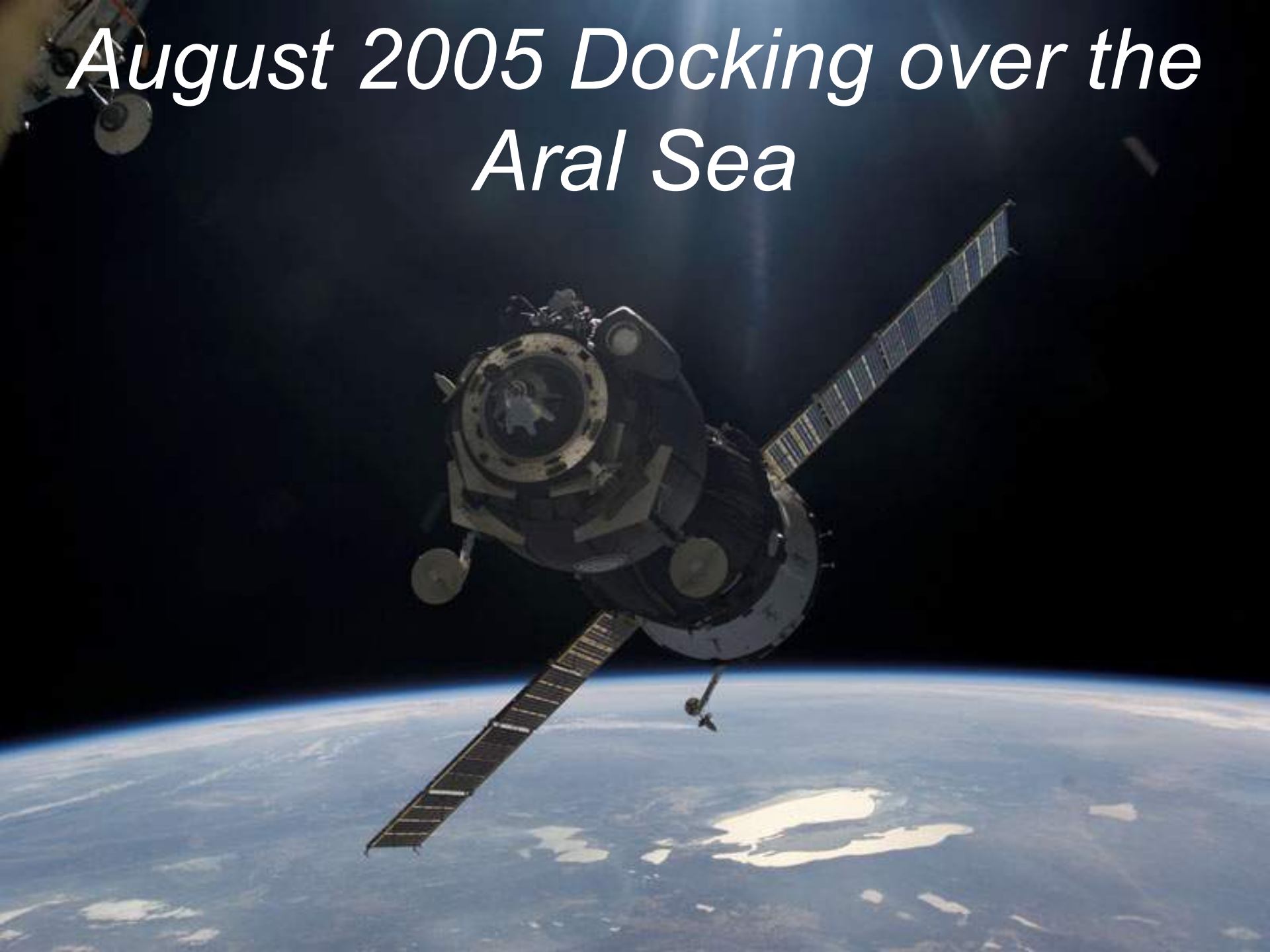
Hard work
упорный труд



Good ideas
хорошие идеи

доброе сердце Noble heart

August 2005 Docking over the Aral Sea



July 20, 2016 What's left of the Aral Sea



<http://www.artemjew.ru/en/2016/07/20/aral16/>



Thank you for your attention
the Aral Sea has a future