

# HISTORICO-CARTOGRAPHIC ANALYSIS OF FORMING THE WASHOUT FORMATIONS IN THE COASTAL SYSTEMS OF NON-TIDAL SEAS

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**Introduction.** Within the coast of the World Ocean, various coastal systems with different morpho- and lithodynamic characteristics are distinguished (Шуйский, 1986; Игнатов, 2004). About 13% of the length of all coasts of the globe are represented by abrasion-accumulative and barrier coastal systems (Шуйский, 2000). In the evolution of these coastal systems, the formations described as entrance, inlet, tidal inlet, прорва, промоина, проран are very important (Морская геоморфология, 1980; Gudelis, 1993).



Fig. 1.

The *Curonian Spit* is a large accumulative form, which is characterized by significant maximum and average surface heights. However, even within its limits there are “weak points” where washout formations periodically occur. So, over the past five hundred years, fifteen cases of the transformation of a spit into an island or a system of islands have been recorded: 1497, 1630, 1642, 1673, 1680, 1706, 1714, 1790, 1791, 1792, 1796, 1895, 1899, 1967, 1983 (Gudelis, 1998). Over the past thirty years, through inlets of the spit’s body have not been observed, however, periodically rinses of the frontal avidune took place.

The *Tendra Spit* is the largest sediment formation of the Black Sea, with insignificant maximum and average heights. The corresponding parameters indicate the possibility of its annual flashing and washout, which is why the inlets in the body of the spit are formed regularly and for a long time. The inlets and scours in the body of the spit are periodically formed along its entire length, but most often and for a long time they are formed opposite the islands of Smalenyy and Babin, as well as in the basal part. The lifetime of inlets is quite long from several years to twenty-thirty years (fig. 2).



Fig. 3.

**Conclusions.** Washout formations play an important lithodynamic role in the development of barrier and abrasion-accumulative systems. The process of their formation and development is directly dependent on the morphometric characteristics of sediment formations, the structure of the wind regime, storm activity, and coastline features.

**General Definition.** In a general geographical understanding, all washout formations are morphological elements of barrier and abrasion-accumulating coastal systems, having the form of straits, permanent or temporary, connecting open spaces of oceans and seas with more or less isolated lagoons or bays (Gudelis, 1993; Encyclopedia Of Coastal Science, 2005; Encyclopedia of the World’s Coastal Landforms, 2010) (fig. 1).

**Formulation of the problem.** Washout formations are most fully studied within barrier systems, oceanic regions and tidal seas (Inman, 1989; FitzGerald, 1996; Barnhardt, 2002; Mallinson, 2008). At the same time, similar formations of accumulative forms of non-tidal seas were studied episodically and not purposefully, therefore, generalized information simply does not exist (Правоторов, 1968; Шуйский, 1989; Котовский, 1991; Gudelis, 1998). The study of the natural features of washout formations is necessary to create a theoretical model of the functioning of abrasion-accumulative and barrier coastal systems of non-tidal seas.

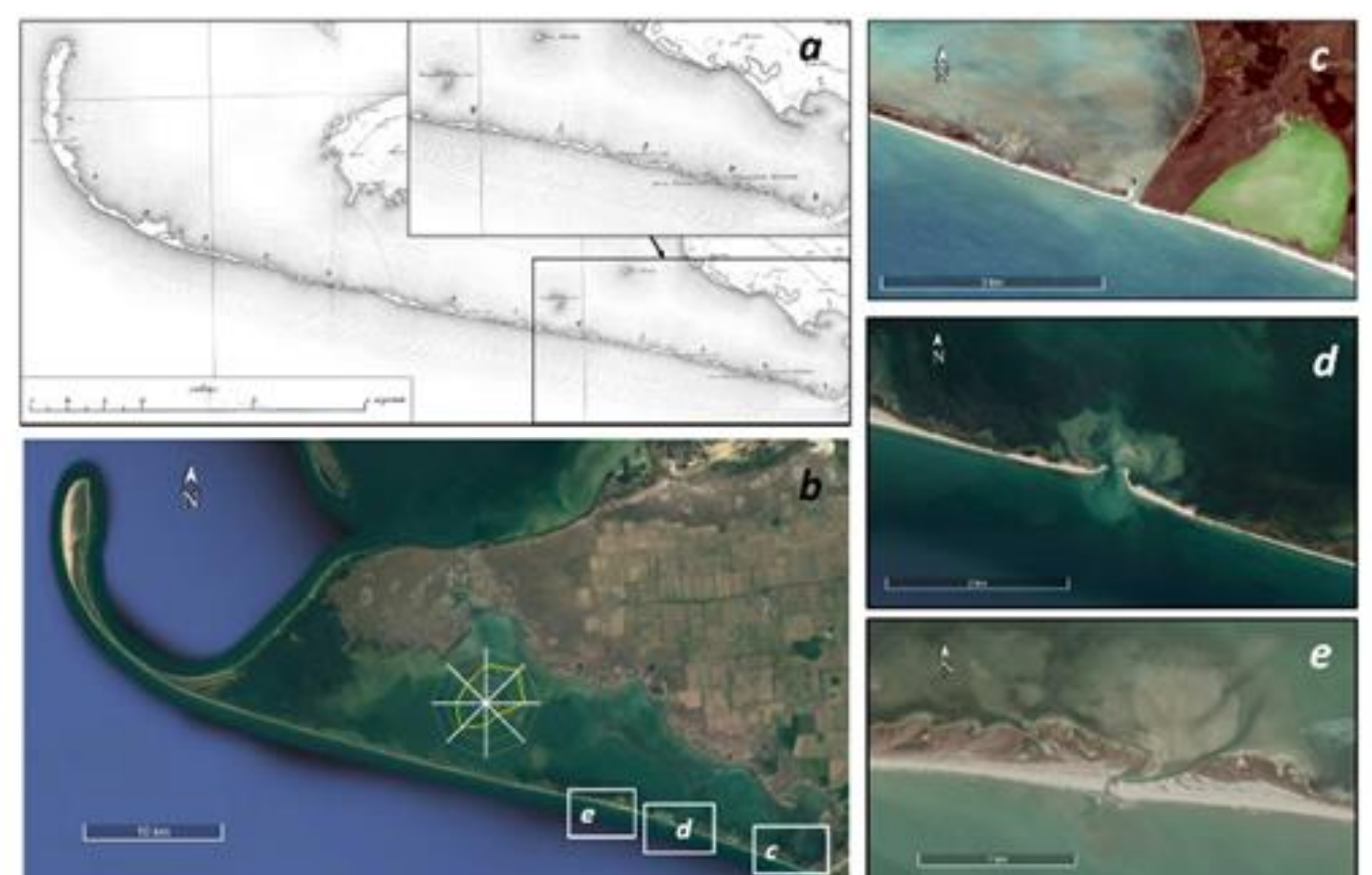


Fig. 2.

The *Arabat* is the largest coastal accumulative form of the Sea of Azov, with a sufficiently high coastal rampart (up to 3-5 m). Despite the rather high elevations of the coastal rampart, the Arabat inlets were observed in other places, but they did not appear for a long time. Based on field research, analysis of regional literature and cartographic material, it was determined that washout formations periodically occurred in the basal part of the bar in the south, in the center (within Shokalinskiy narrowing area) and in the north (in the depression between the villages of Schastlivtsevo and Strelkovoye), from the 18th to the 20th century (fig. 3).