

Shoreline Memory

Forty years of the creek mouth's edge, as satellites saw it, each year drawn over the last.

The data

The data are 878 clear satellite pictures of the north creek mouth at La Saladita, taken by Landsat and Sentinel-2 satellites from 1986-2026, each made of squares 30 m on a side. Landsat pictures are public domain; Sentinel pictures are free and open Copernicus data.

The method

In each picture, a water index compares green light with shortwave infrared light. It is above zero over water and below zero over land:

$$\text{MNDWI} = (\text{green} - \text{SWIR1}) / (\text{green} + \text{SWIR1}); \text{line}(\text{year}) = \text{contour at zero of the bicubic x24 upsampled per-pixel median of that year's MNDWI}$$

For each year with at least 3 clear scenes, the middle value of that year's pictures is taken square by square, smoothed, and the line is drawn where the index crosses zero: that year's water's edge. The sea and land behind the lines are the same middle value over all the pictures. The print file was drawn by the same code at 100 x 77.77 cm.

What the checks found

A computer compared the print file with the exact lines: 44 of 44 lines recovered, each in its place, with nothing added. Because the lines are paler than the ground, the check looks for lines lighter than their surroundings; the faintest early-year lines over the sand were confirmed by measuring along each line's own path. Before any of this, the checking software was tried on 9 test cases (lines moved, deleted, added or mirrored, plus unchanged and textured copies), and it caught every broken one. The full technical record is available on request.

Sources & verification

Every line in the finished image matches the geometry computed from the satellite record. All 44 line pieces are there, each in its place, and nothing was added; the faintest early lines were confirmed by measuring along their own paths. The checking software was first tried on deliberately broken copies and caught every one. The full record is available on request, so anyone can rerun the checks.

What the checks establish: every shape in the finished image matches the geometry computed from the data or the published model. They do not test the model against nature itself; that rests on the data and the published science named above.