SUPPLEMENTARY MATERIAL

Description of Photographs and Methods of Image Analysis

The short-term evolution of the salt marsh was explored in detail through the interpretation of the 1938, 1955, 1961, 1968, 1974, 1975, 1978, 1984, 1987, 1995, 1999, 2005, and 2006 aerial photographs, and Ikonos and QuickBird panchromatic satellite images acquired in 2001 and 2003, respectively.

All the photographs were available in TIFF format. Images from 1938 to 1999 were obtained by scanning paper photos at 600 dpi. Aerial photographs taken in 1938, 1955, 1961, 1968, 1978, and 1984 were in black and white, whereas those acquired in 1974, 1975, 1987, 1995, 1999, 2001, 2003, 2005, and 2006 were color pictures. Even if other images collected in different years existed, they were not considered, since they were not of such high quality to guarantee accurate and detailed results during photo-interpretation. Consequently, only the images enabling a clear identification of the morphological changes of the salt marsh (including little variations of the tidal creek network) were selected. On the other hand, some photos were rejected since they covered only a very small part of the study area.

Initially, none of the images were georeferenced, except those acquired in 2001, 2003, 2005, and 2006. As a consequence, georeferencing was absolutely necessary before starting the comparative analyses. Moreover, since the spatial location of the 2003, 2005, and 2006 pictures was not perfect, they were subjected to a further georeferencing process to correct minor distortions. Digital topographic maps at the 1:5,000 scale were used (Italian National System "Gauss-Boaga", Zone 2 - East), and some ground control points (recognizable on the map and on the pictures) were established. Then, after minimizing residuals, geographic coordinates were assigned to each of them.

During photo-interpretation, salt marsh margin, tidal creeks, and ponds were manually digitized using a Geographic Information System mapping software; finally, the obtained maps were superimposed and compared to exactly identify salt marsh modifications. This procedure and the high quality of the selected photographs allowed to achieve sub-meter accuracy.

After quantifying geomorphological changes over the whole period, the collected data were inserted into a data base and used to draw diagrams; then, the most representative curves were

compared to better highlight the morphological responses of the different salt marsh features to sea level variations.

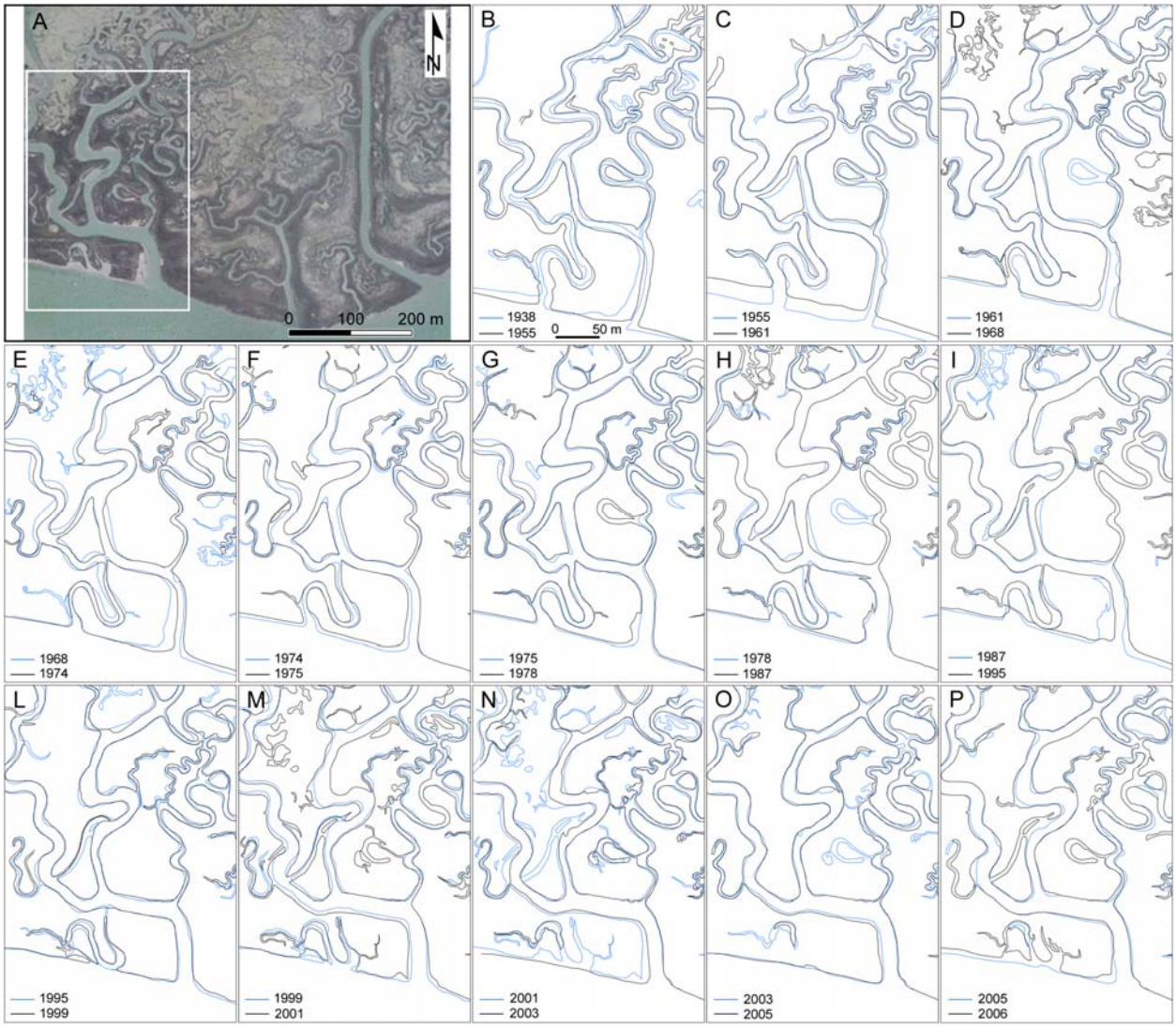

Figure DR1. Modifications of the tidal creeks and salt marsh margin occurred in the western part of the study area, chosen as example because it was more affected by high waters during flood and by stronger hydrodynamic processes than the eastern one, owing to its close proximity to the Lido inlet. A: Location of the analyzed salt marsh area. B to P: Geomorphological evolution of the selected area in the following periods: 1938-1955 (B), 1955-1961 (C), 1961-1968 (D), 1968-1974 (E), 1974-1975 (F), 1975-1978 (G), 1978-1987 (H), 1987-1995 (I), 1995-1999 (L), 1999-2001 (M), 2001-2003 (N), 2003-2005 (O), 2005-2006 (P).

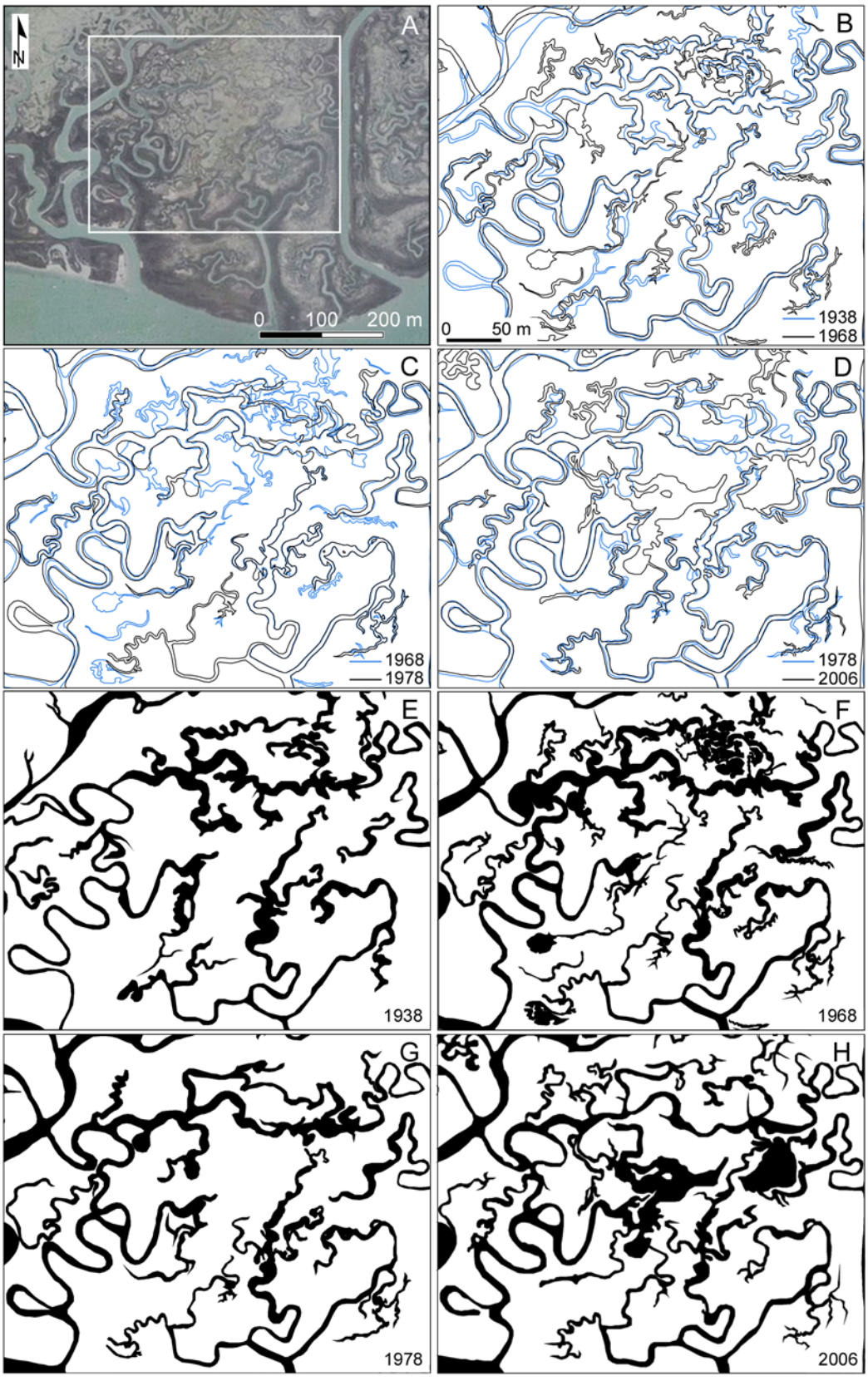
A
N
0 100 200 m
B
0 50 m
1938
1968
C
1968
1978
D
1978
2006
E
1938
F
1968
G
1978
H
2006

Figure DR2. Modifications of the tidal creek network in the central part of the salt marsh. A: Location of the analysed area. B: Changes of channel morphology between 1938 and 1968. C: Changes of channel morphology between 1968 and 1978. D: Changes of channel morphology between 1978 and 2006. E: Tidal creek network in 1938. F: Tidal creek network in 1968. G: Tidal creek network in 1978. H: Tidal creek network in 2006.