

Modelling a joint extreme of shoreline evolution to enhance long-term regional coastal flood risk assessment

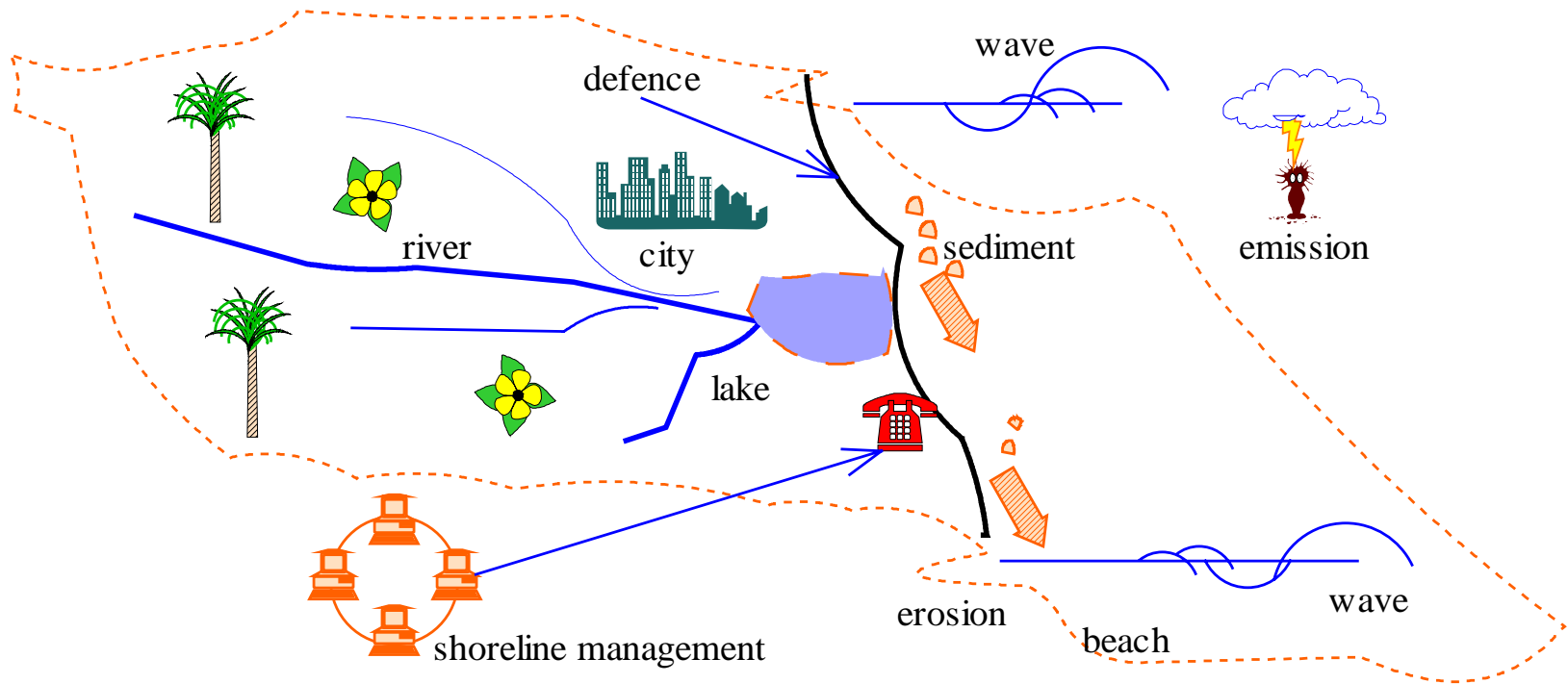
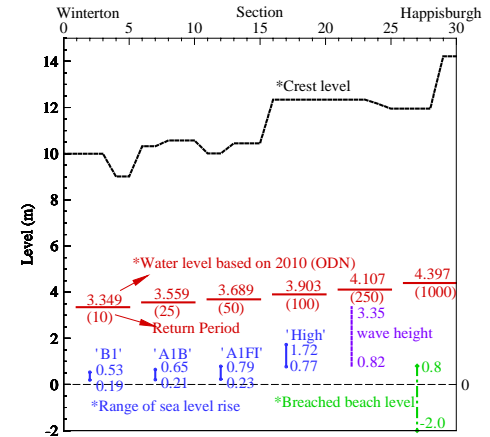
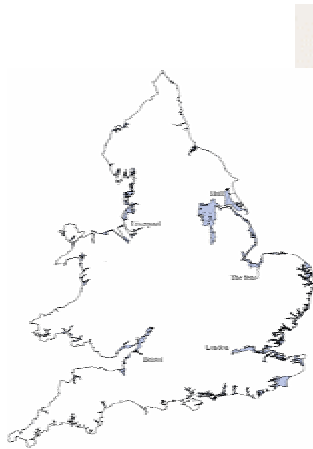
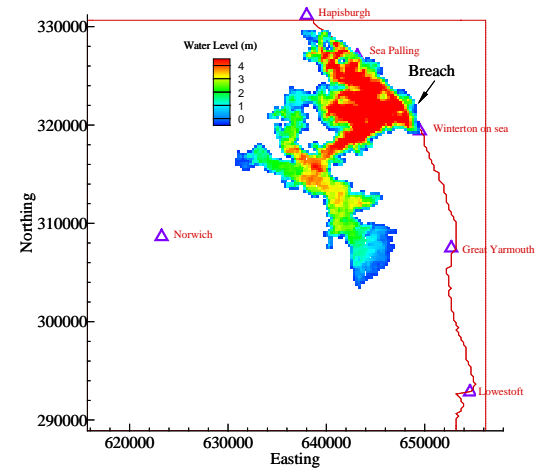
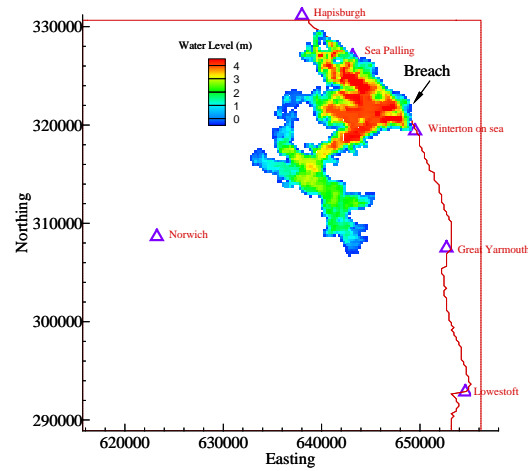
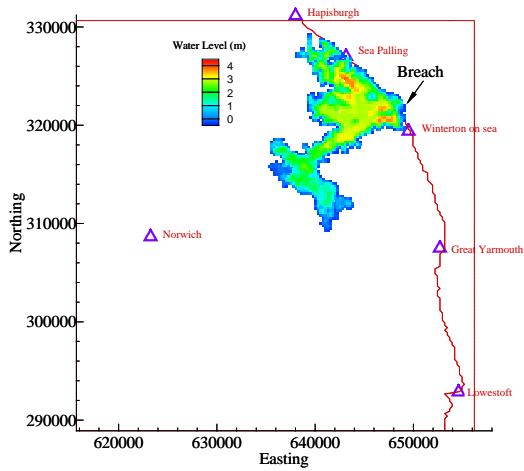


Fig. 1 A schematic diagram of the integrated flood loss estimation model combined with beach system state

Coastal Flood Inundation Modelling with Newchan



Probabilistic simulations of beach morphological behavior under scenarios of long term change

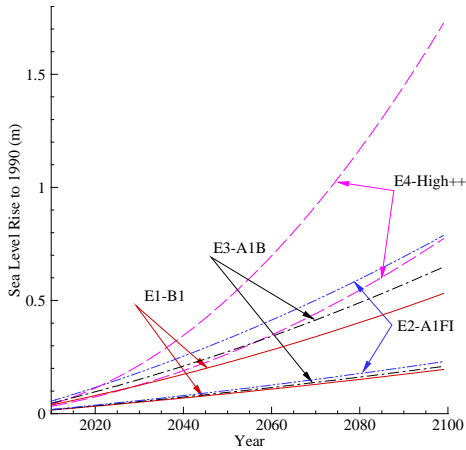


Fig. 1 Sea level projections to 2100 relative to 1990 levels

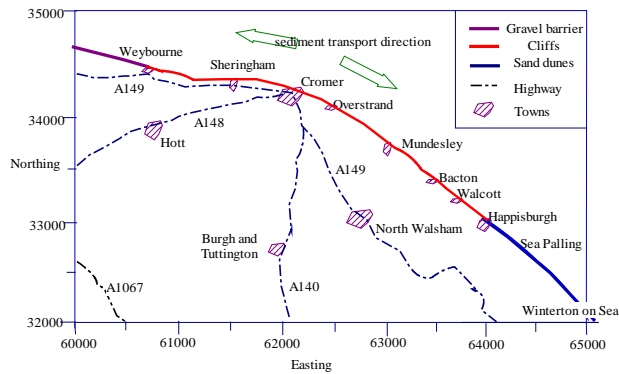


Fig. 3 Map of the cliff erosion area showing principal communication links and settlements

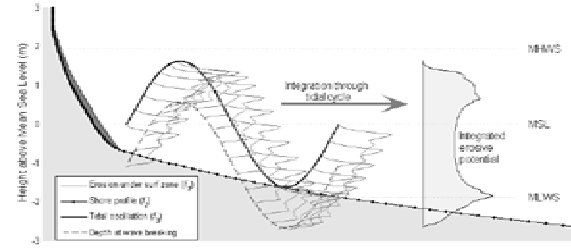


Fig. 2 Integration of the erosion pattern of a breaking wave field during a tidal time step (after Walkden and Hall (2005))

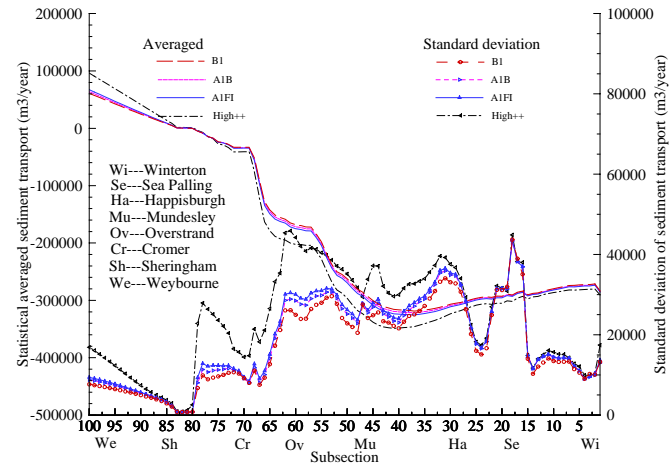


Fig. 10 Statistical annual sediment transport under different emission scenarios and management 'SMP' along the coastline

Spatial distribution of losses

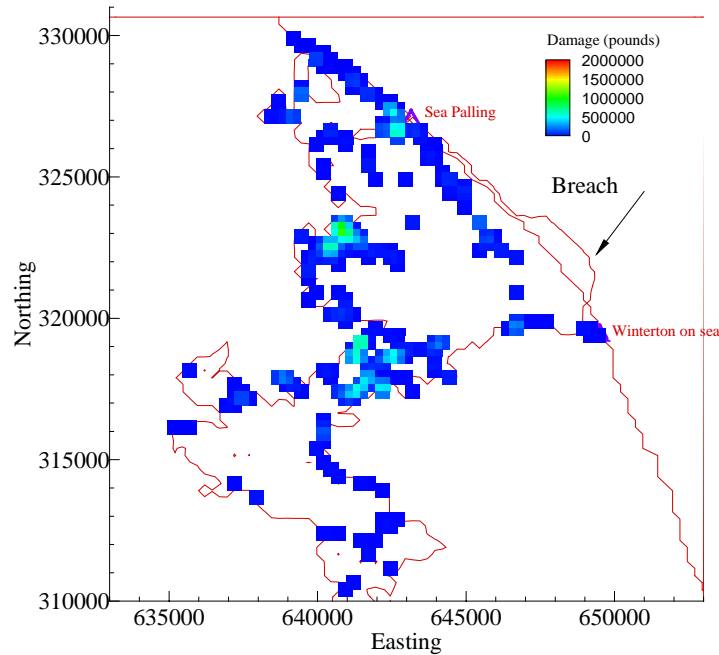


Fig. 16 Primary tangible flood damage of residence properties under inundation scenario 'N1B3' under water level 7m under 'Business as Usual' in 2010

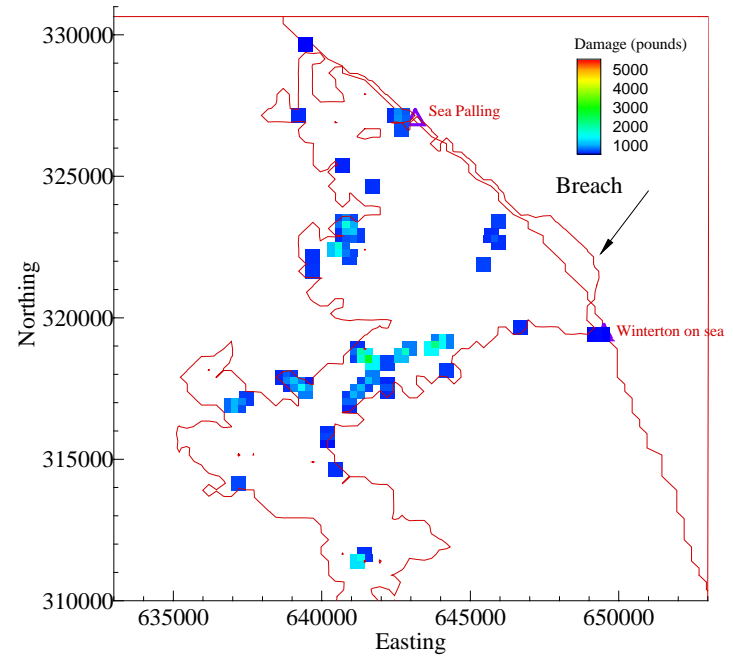


Fig. 17 Primary tangible flood damage of non-residence properties under inundation scenario 'N1B3' under water level 7m under 'Business as Usual' in 2010

Time-varying threshold

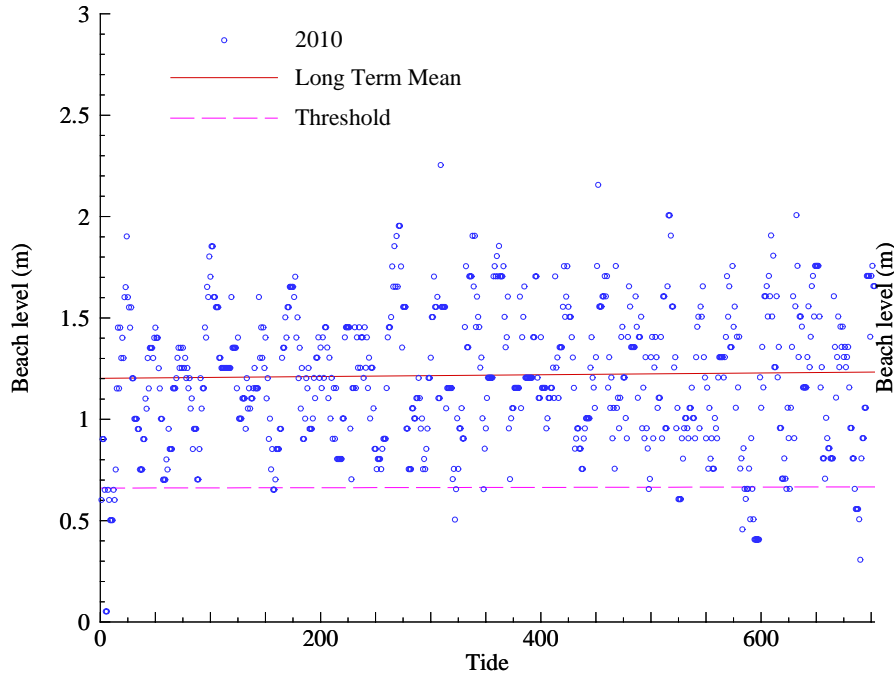


Fig. 2a 'Observed' 2010 tidal beach levels (dots) for the section 3 near Winterton-on-Sea during tide 1 to tide 703

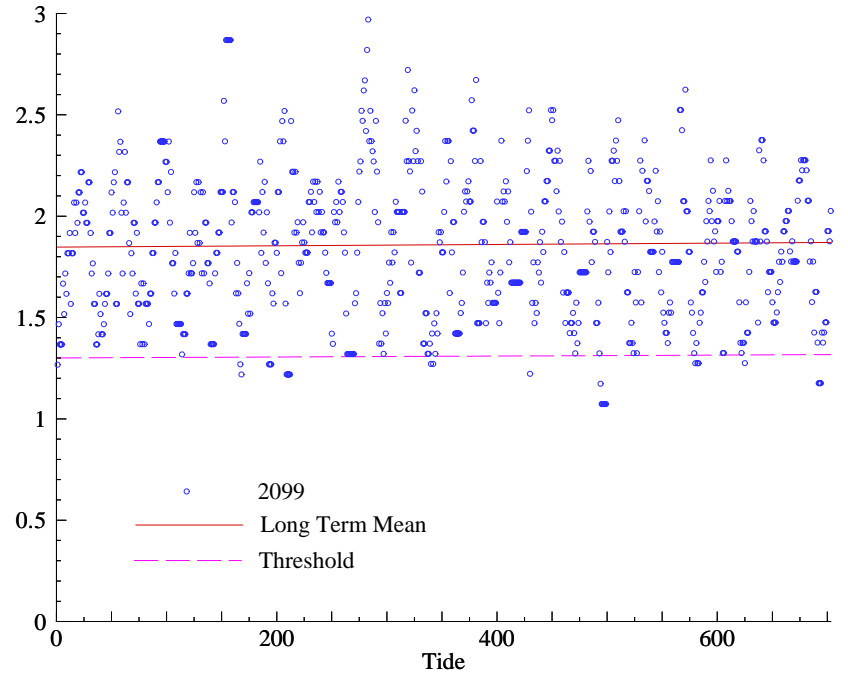


Fig. 2a 'Observed' 2009 tidal beach levels (dots) for the section 3 near Winterton-on-Sea during tide 1 to tide 703

Quantiles of fitted beach level based on GPD and POT

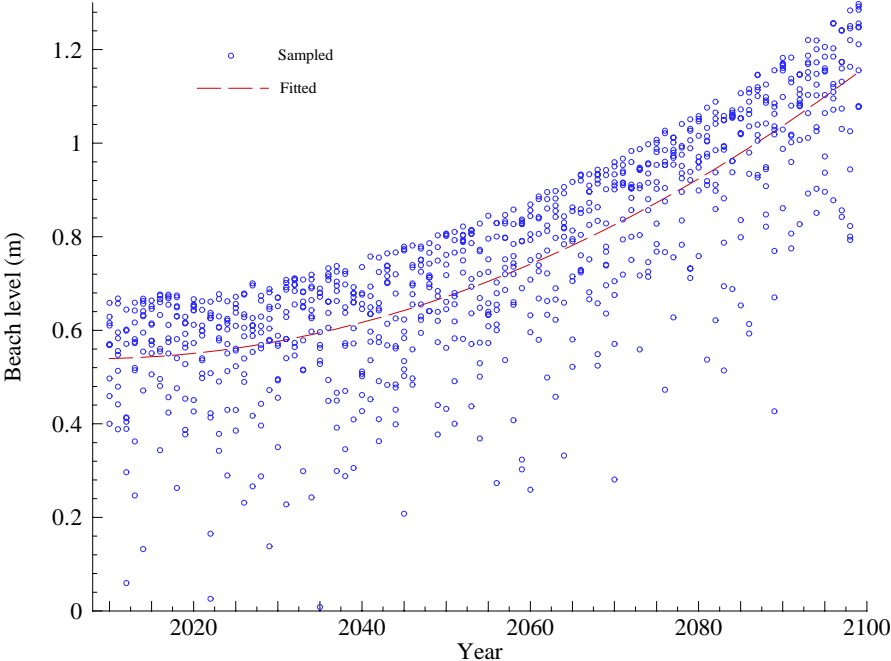


Fig. 10 Beach levels of the 5% quantiles estimated with the GPD-C model (circles) and fitted quadratic regression line of averaged extreme beach levels (dash line).

Joint extreme lower beach levels

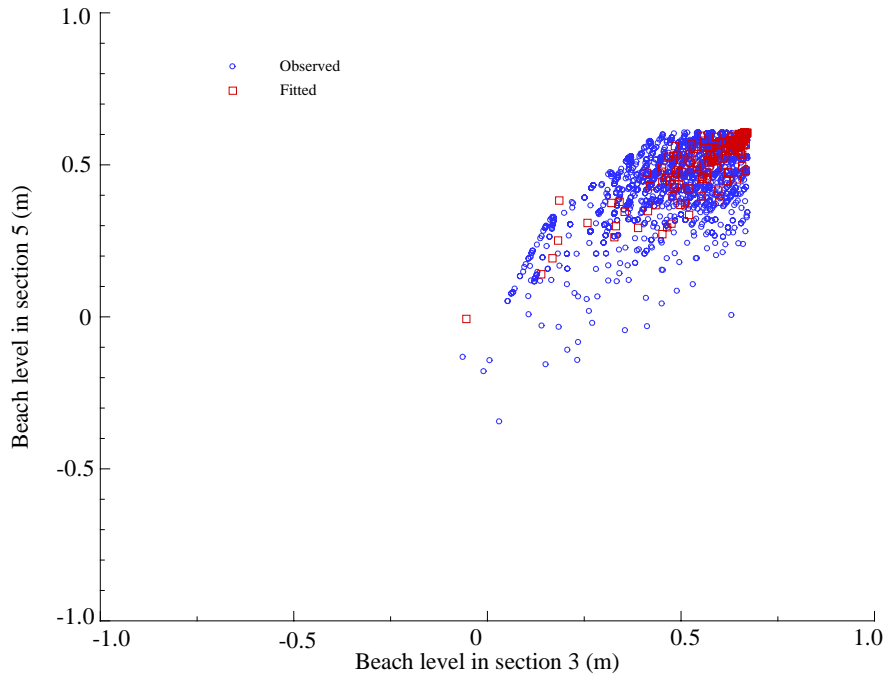


Fig. 5 Scatter plots of observed beach level (samples with square) and simulated beach level (samples with diamond) based on Gumbel copula between beach levels in section 3 and beach levels in section 5 in year 2015

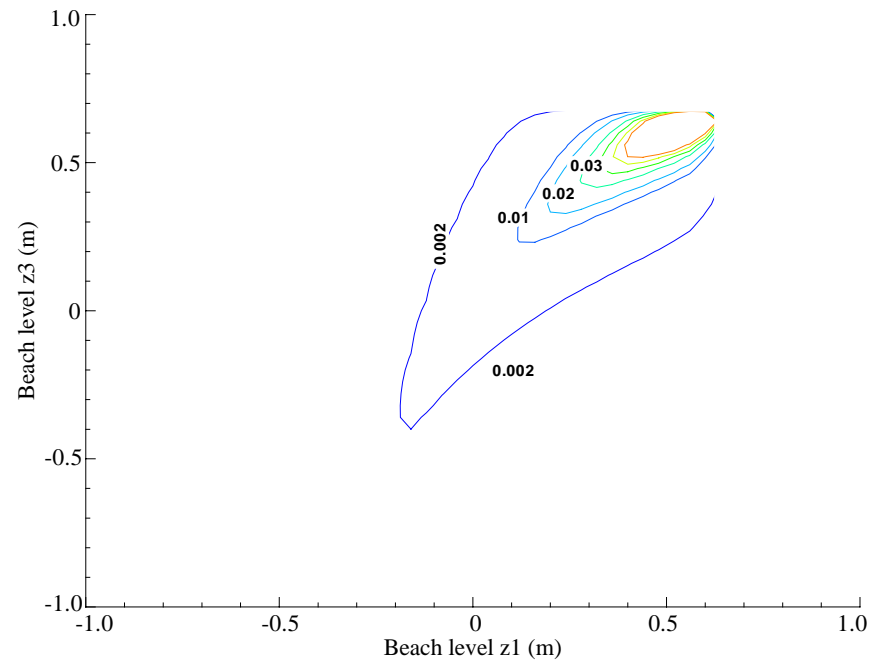


Fig. 6 Contour plot for the pairs of joint probability density function of beach level in section 3 and beach level in section 5 in year 2015

Potential Flood risk

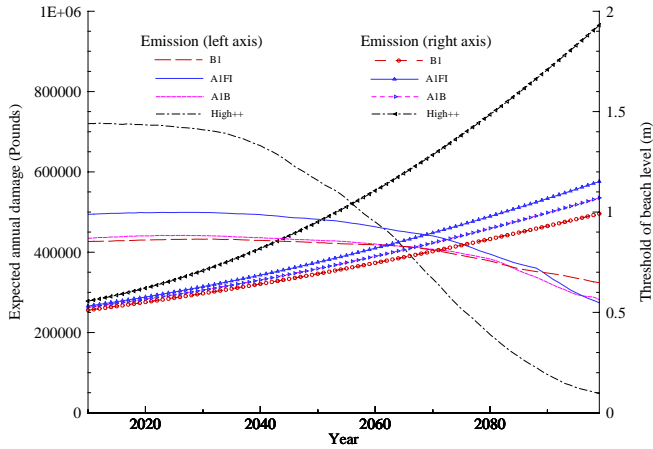


Fig. 11 Temporal distribution of flood risk under various emission scenarios (1-B1, 2-A1FI, 3-A1B, 4-High++) and management 'SMP' and socio-economic 'BL'

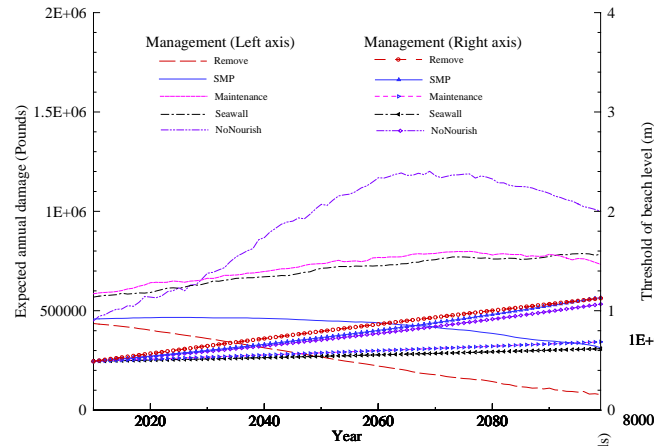


Fig. 12 Temporal distribution of flood risk under various management scenarios (1-Remove, 2-SMP, 3-Maintein, 4-Seawall) with emission 'High++' and socio-economic 'BL'

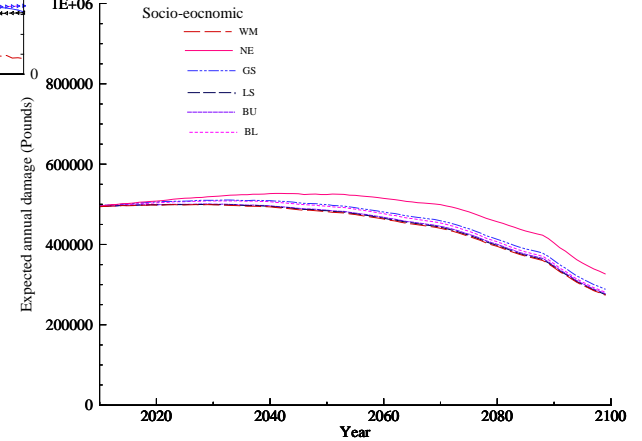


Fig. 13 Temporal distribution of flood risk under various socio-economic scenarios with emission 'A1FI' and management 'SMP'