INTRODUCTION

Sea level rise directly impacts low-lying coastal areas. In Belgium, 400,000 people are protected by a first line of sea defense consisting of dunes or dikes. Every 6 years, the safety level of this sea defense against an extreme storm surge (return period of 1000 yrs) is evaluated. To maintain however a safe and climate resilient coast, it is utterly important to bridge the knowledge gap between its current safety level and its safety level under sea level rise. That’s why this year’s safety assessment includes also 3 mean sea level rise scenario’s: +0.3, +0.8 and +1.5m. It allows us to quantify the strength of the sea defense under changing hydraulic conditions and, possibly, identify its tipping point.

CHARACTERISTICS BELGIAN COAST

Situated between the French and Dutch border, the Belgian coast stretches out over merely 67km. The densely populated coastal plain is protected by dunes (2/3 of the alongshore length) and dikes (1/3) (Figure 1). The foreshore is generally very shallow, making wave breaking and infragravity wave motion important physical phenomena to take into account. To facilitate the safety assessment, the Belgian coast is subdivided in 255 coastal sections (alongshore).

HYDRAULIC BOUNDARY CONDITIONS

Applying joint probability analysis and extreme value statistics on long time series of field data (monitored on the Belgian continental shelf) results in combinations of wind, water level and significant wave height having a specific (higher) return period. These combinations are then transformed from offshore to nearshore (= just outside the surf zone) using SWAN. Calculation of their exceedance frequencies leads to the boundary conditions for water level and waves (height, period, directional spreading) of the extreme storm surge at every coastal section, and for all sea level rise scenarios (Vuik et al., 2020). The inclusion of wave directional spreading is essential since it reduces the energy transfer from short to infragravity waves, and hence, influences erosion, wave run-up and overtopping.

RESULTS OF THE 2022 SAFETY ASSESSMENT

The presentation will highlight the main findings of the 2022 safety assessment, focusing on the coastal resilience capacity against sea level rise. It is expected that, under current conditions (no sea level rise), the coast is generally safe because it benefits from the further realisation of the Master Plan Coastal Safety (started in 2011).

REFERENCES