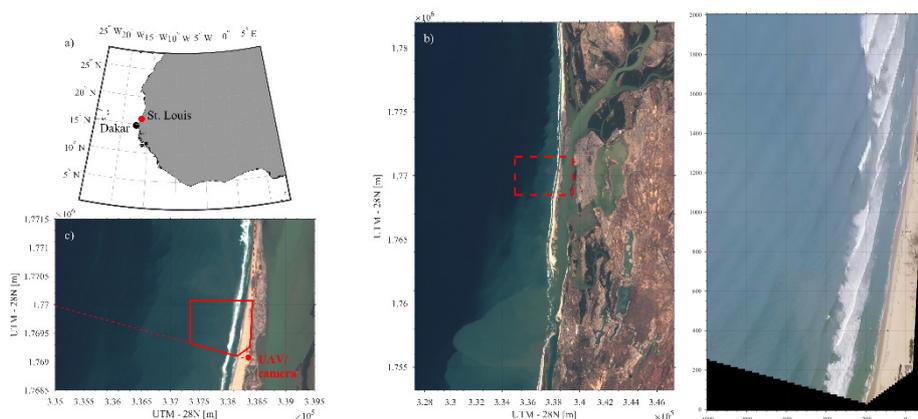


# Multi-scale coastal evolution from the combination of satellite and video bathymetry

Sept 2019 - Sept 2022

To accurately estimate wave and sea-level induced coastal erosion, we need to know coastal bathymetry. There is currently no information on the regional morphology of coastal dynamics and our understanding of coastal morphodynamics faces an observational gap from local to regional scale. In this PhD, the student will carry out a demonstrator to unlock the observational issues by implementing a new method for estimating coastal bathymetry by optical satellite (Bergsma et al., 2019; Almar et al., 2019) and optical video imaging (Bergsma and Almar, 2018). This will open up the possibility of having an evolving coastal bathymetric from local to regional scale, from short event scale to seasonal scale, and investigate the link between them. This will allow to assess the contribution of coastal processes at sea level to the coast and, therefore, risk exposure appropriately.

The city of Saint Louis is located at the mouth of the Senegal River (West Africa), in a sandy area with a high hydro-sedimentary dynamic. The central zone is eroding by several meters per year and entire areas of the L'Anse de Barbarie sandspit have already been nibbled away. The construction/urbanization of this natural coast promotes an acceleration of the phenomenon by limiting the natural resilience capacity of the coast. This sandspit is located in an oceanic environment dominated by strong oblique waves (Almar et al., 2019) leading to one of the most powerful coastal drifts in the world, in the order of 800,000 m<sup>3</sup> of sediment per year.



This PhD aims to set up a complete monitoring of the area by a multi-scale approach using innovative remote sensing technologies (video, satellite) to quantify the effectiveness and impact of the protection structure to be built in early 2019. Specifically, the student will work on:

- Quantification of the exchanges between the large and small scale (downscaling/upscaling)
- Processes we miss when using small scale high frequency video data
- Processes we miss when using regional scale low frequency satellite data

The PhD candidate should have good skills in image processing, remote sensing, programming, coastal dynamics. He will be based in LEGOS (Toulouse) and will go on mission to UNSW (Sydney) and Saint Louis (Senegal).

Supervising team: Rafael Almar (Researcher IRD-LEGOS), Erwin Bergsma (Postdoc CNES-LEGOS)

Ian Turner (Professor UNSW), Mitch Harley (Assistant Professor, UNSW)

Applications to [rafael.almar@ird.fr](mailto:rafael.almar@ird.fr)

Funded by Agence Francaise de Development and IRD.