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Short-term observation beach hydro-sedimentary dynamics of reef pocket: study case of Sakouli, Mayotte

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Abstract

The **seasonal beach rotation** visible in Sakouli beach reflects : the **two distinct hydrodynamic conditions** that occur in Mayotte and a **residual longshore sediment transport** favored by a low bay indentation. However, the **island subsidence of 10 to 20 cm** since 2018 may have an impact over this equilibrium. Indeed, this could lead to **higher wave energy over the beach**. So, study must be continued and extended to several other beaches on the island.

1. Introduction



Sakouli location map

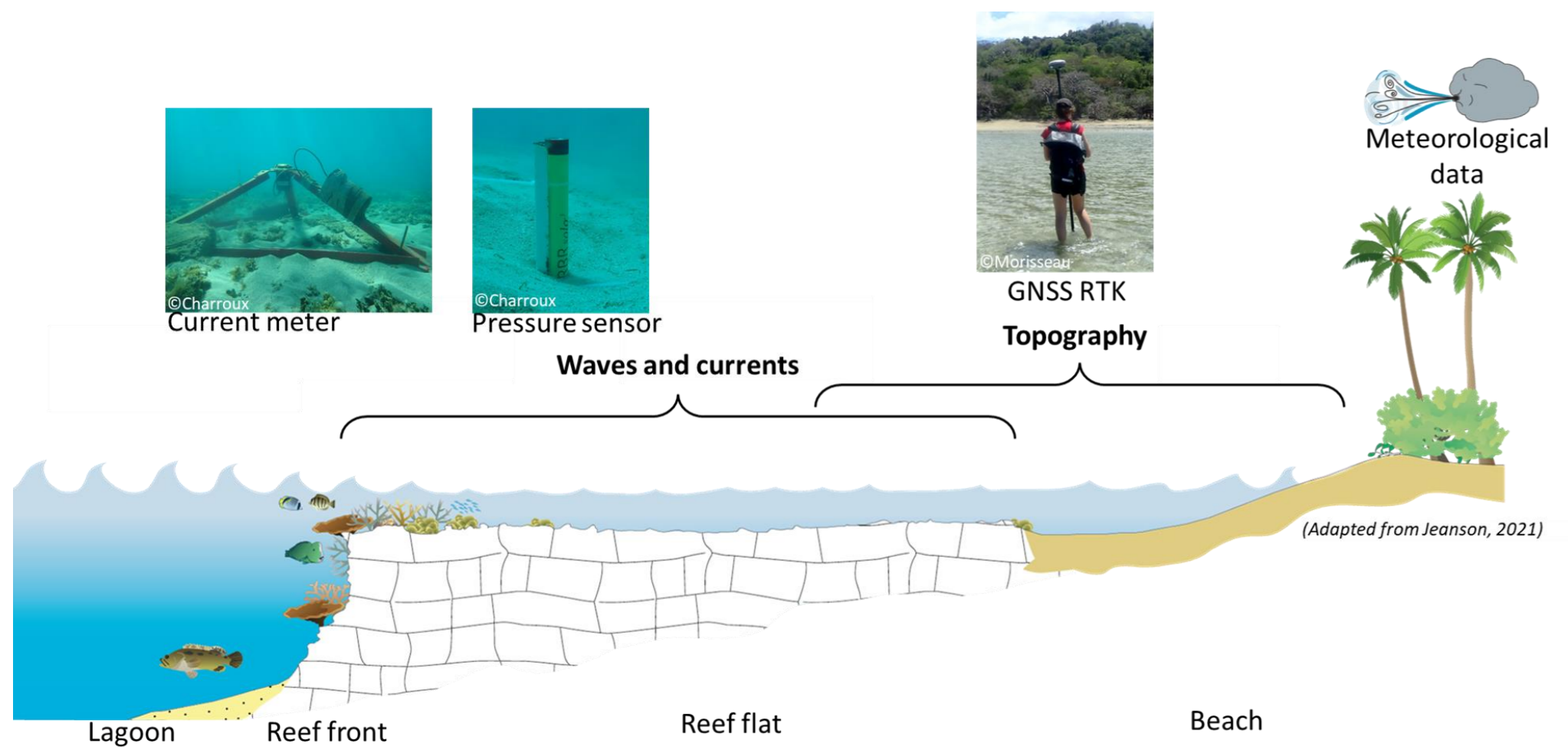
Mayotte is a French island in the **West Indian Ocean**, characterised by a vast lagoon (1,500 km²) sheltering a highly indented shoreline composed of numerous pocket beaches. The island undergoes a tropical climate, with a **wet season** (December – March) and a **dry season** (June – September).

- Sakouli beach is :
- **650m long,**
 - **fringed by a 220m reef flat.**
 - NE oriented.



Sakouli beach

2. Methodology



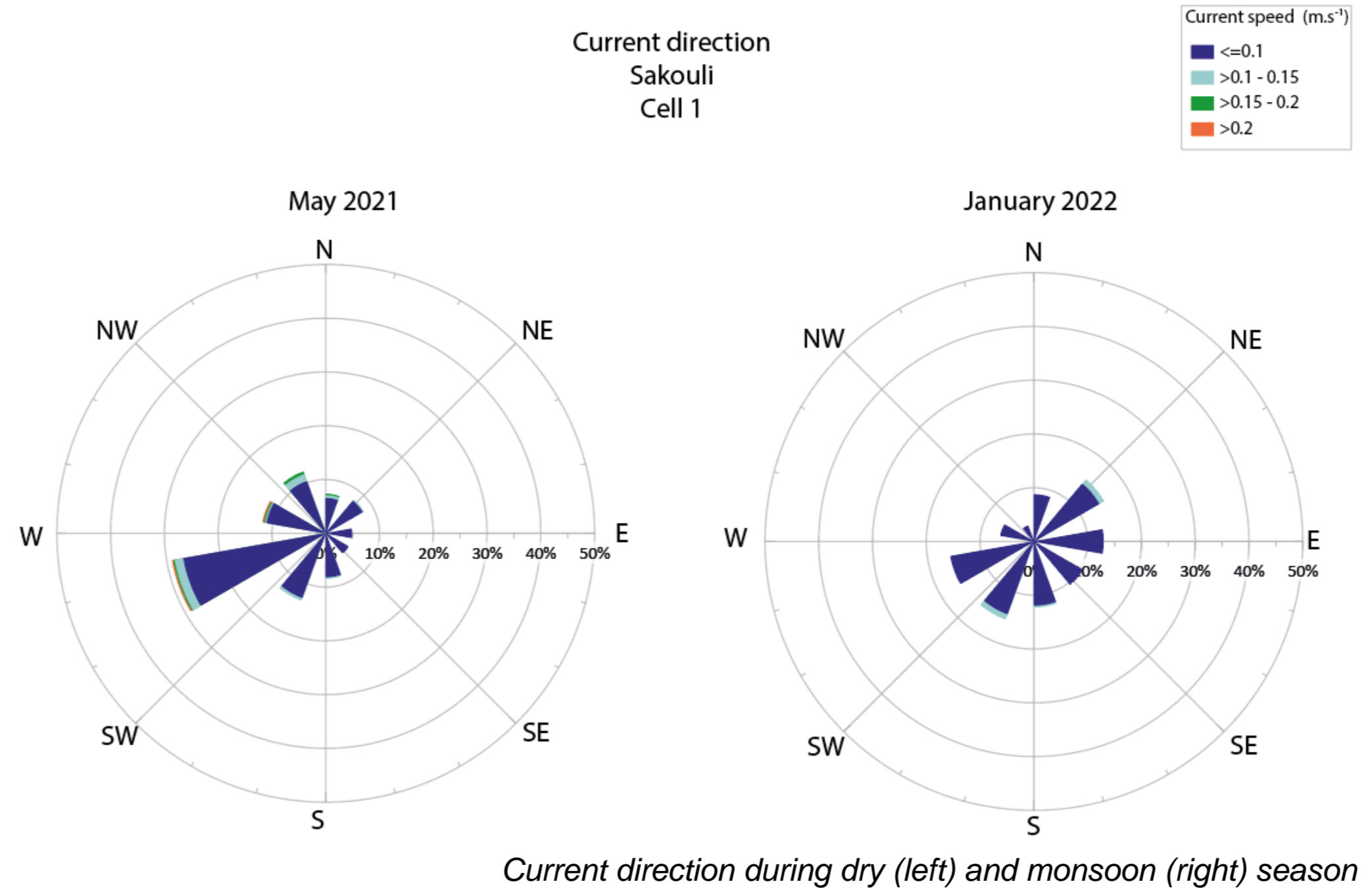
Schema of the methodology

3. Results

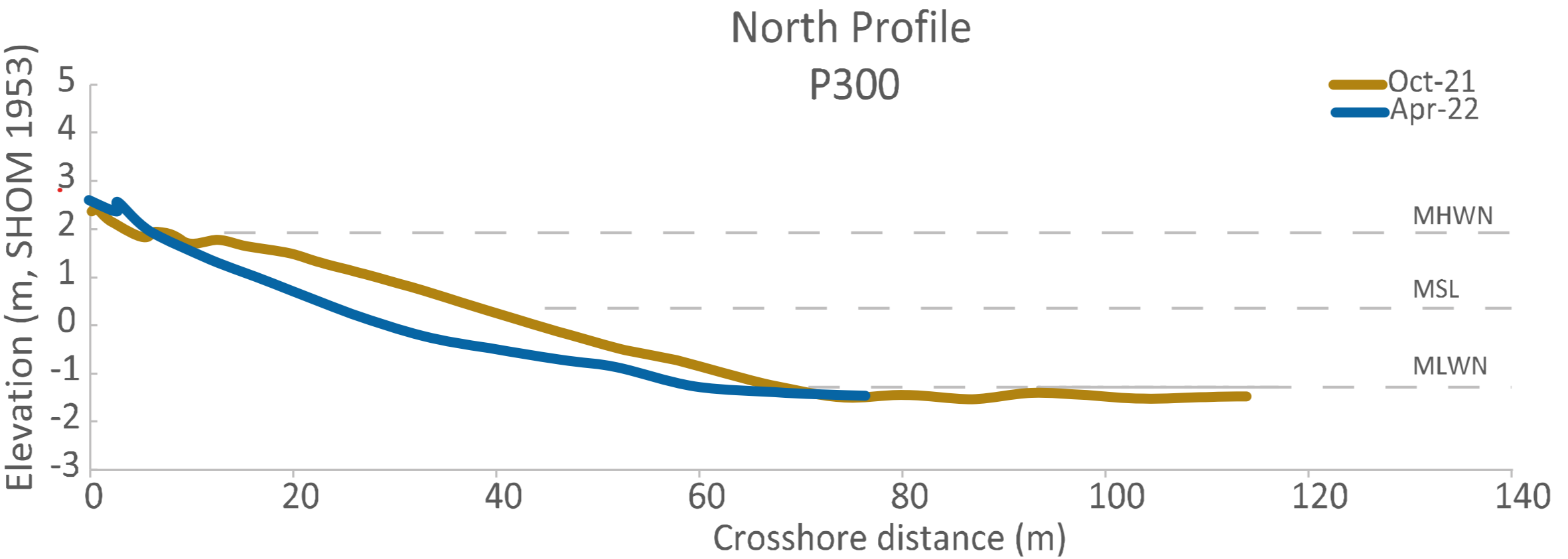
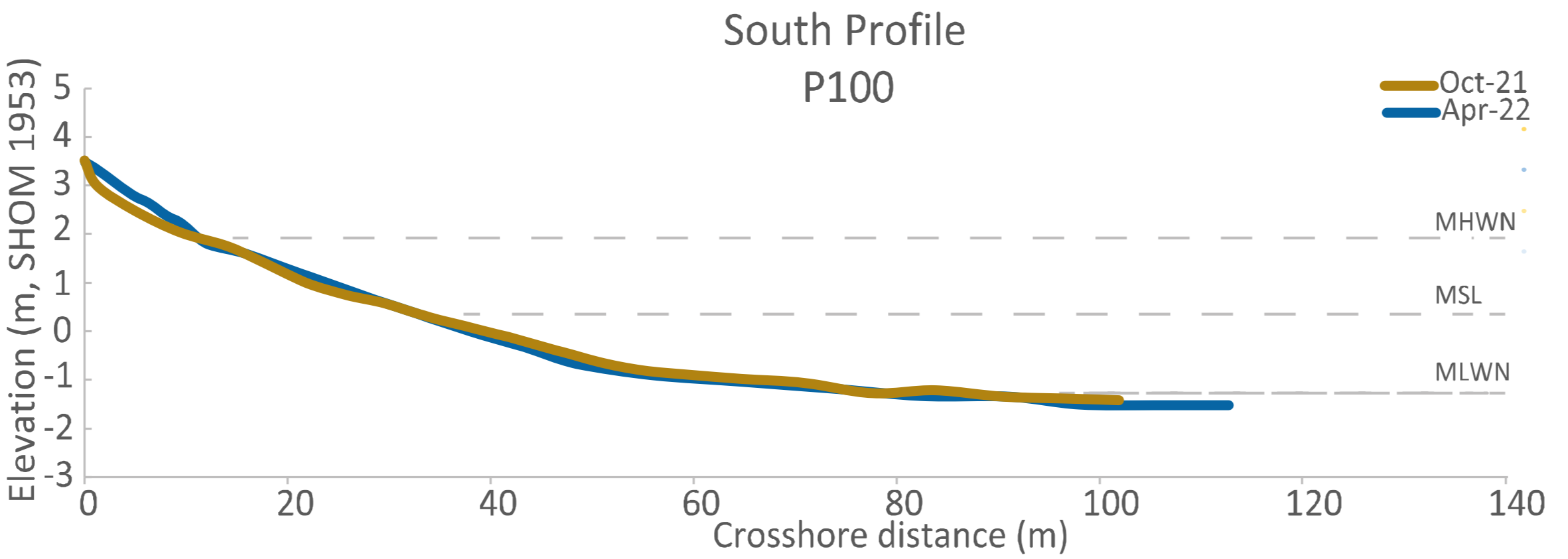
Hydrodynamic

Mayotte is subject to a mesotidal range (3.2 m) which have a big impact. The **highest energy** wave patterns noted at Sakouli occurred during **dry season**. Changes in waves origins : dry season, **waves are generated by wind blowing toward South** while during monsoon season stronger **wind blew toward WNW to NWW**.

→ Sakouli reef flat is **more affected by southerly wind** so even though winds were stronger in January wave periods were less driven by winds and there were more sea swell than during dry season.



Current direction during dry (left) and monsoon (right) season



Morphodynamic

The **South profile does not show significant seasonal variations** due to its location on the beach.

The **North profile experiences a loss of sand** in the wet season.

→ **Temporal alternations in erosion and recovery** that maybe a response to the seasonal changes in wave directions.

Crossshore elevation profile for the south part (up) and north part (down)

4. Conclusion

Sakouli is characterized by a **seasonal beach rotation**, with sand accumulation and sand loss at the end of the beach, between monsoon season and dry season. **Those changes are induced by drift in wind and waves leading to longshore drift.**



5. Contact

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