NATIONAL INSTITUTE OF FISHERIES AND MARINE RESEARCH
The Need to Strengthen Environmental Monitoring Programs for the Creation of Early Warning Systems
3rd International Ocean Data Conference, Santa Marta, Colombia, 10-11 March 2025
Paulo Coelho
email; poolcoelho@gmail.com, Avenida Mortala Mohamed, Luanda Island C.P 2601 Luanda, Angola

Abstract

Environmental monitoring programs play a crucial role in understanding and managing the impact of human activities and extreme events on ecosystems. The creation of early warning systems, essential for the prevention and mitigation of environmental risks, heavily depends on the effectiveness of these monitoring systems. Strengthening these programs is necessary not only for the timely detection of environmental changes but also for the development of response and adaptation strategies that can protect both the environment and local communities. An effective environmental monitoring system involves the continuous collection of data on various oceanographic parameters, biodiversity, and climate variables. This data is essential for identifying trends, assessing risks, and making informed decisions. Furthermore, it provides early warnings for possible environmental disasters, such as sea-level rise or algal blooms, allowing authorities and communities to take preventive measures in advance. The development of early warning systems based on real-time data and predictive modeling can help in responding to imminent threats, minimizing damage, and protecting human lives and livelihoods. Therefore, investing in strengthening environmental monitoring programs, particularly through the integration of technology and local knowledge, is a key step toward increasing resilience to climate change. This process includes expanding monitoring networks, improving data collection methodologies, and fostering collaboration among national, regional, and global stakeholders. The result will be a more comprehensive and proactive approach to environmental risk management, which will ultimately contribute to sustainable development and environmental protection.
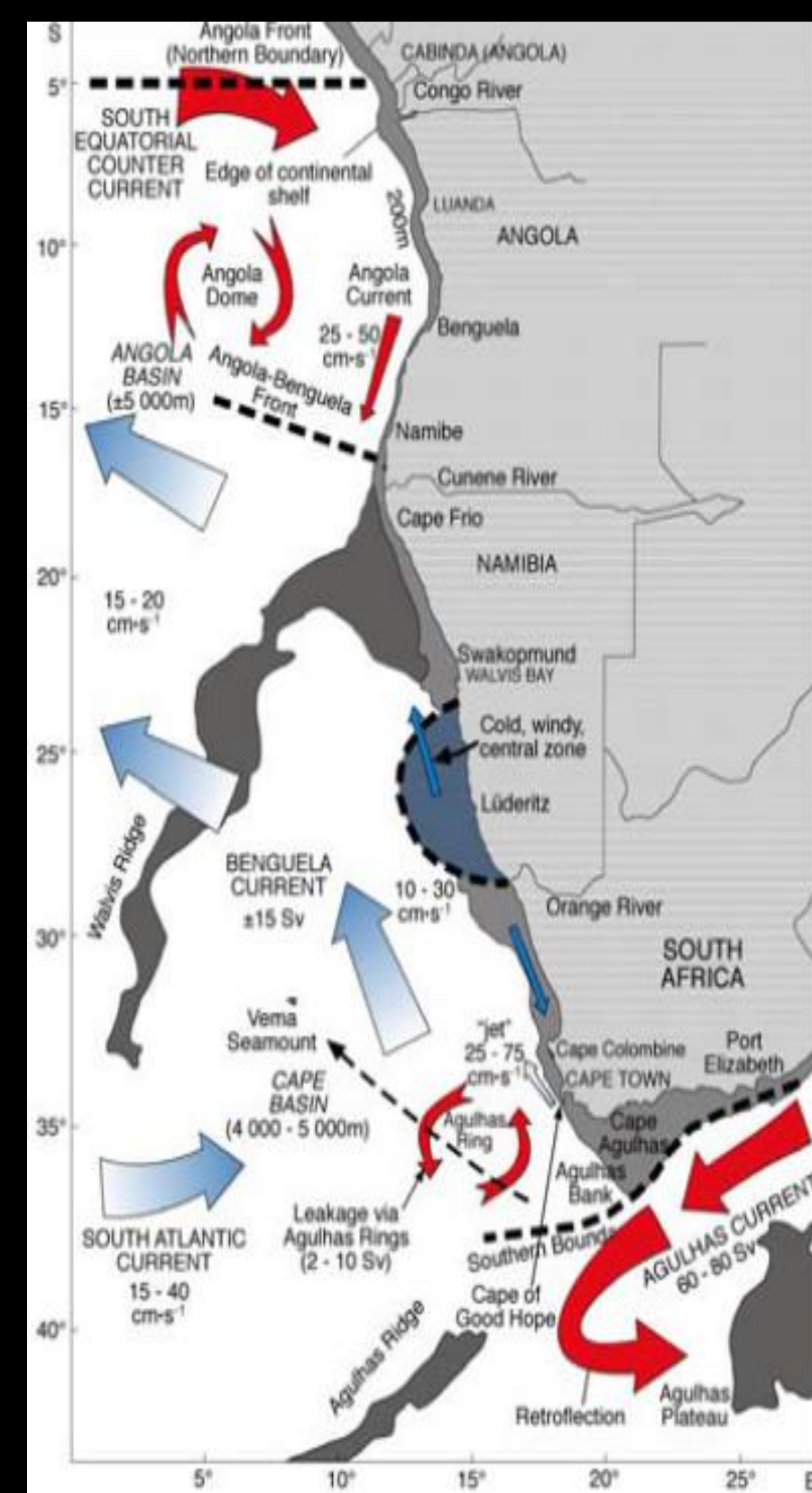
Motivation of Angola

Angola, with a coastline of 1650 km, is located between two current systems, the hot current of Angola and cold current of Benguela.

It is characterized by a specific oceanographic dynamics that induces variability, such as anomalous warm and cold events, which has a significant impact on the dynamics of living resources, especially pelagic species.

Since 1983, mostly bi-annual cruises to Angolan and Namibia upwelling region as part of the FAO EAF-Nansen program
➢Feb. – Apr. (Austral summer)
➢Jul. – Aug. (Austral winter)

Data collection (1)

❖is recorded annually in the warm and cold season6 monitoring lines, namely Congo River, Ambriz (since 2017) Luanda, Lobito, Namibe and Cunene River.

❖The information is recorded using the N/I "Dr Fridtjof Nansen" feature in which the following information

❖ Temperature, salinity, dissolved oxygen and fluorescence.

❖Current speed and direction data (ADCP).

❖Data that allow to calculate abundance and specific composition of the plankton (phytoplankton and zooplankton).

Data collection (cont)

❖ Fixed stations implemented in Luanda, Lobito (Benguela) and Namibe.

❖ Temperature, salinity and dissolved oxygen recorded on the surface.

❖ Fluorescence, collected in Luanda, Lobito and Namibe.

❖ Plankton (Luanda and Lobito) dynamics as well as to predict the occurrence of massive microalgae events.
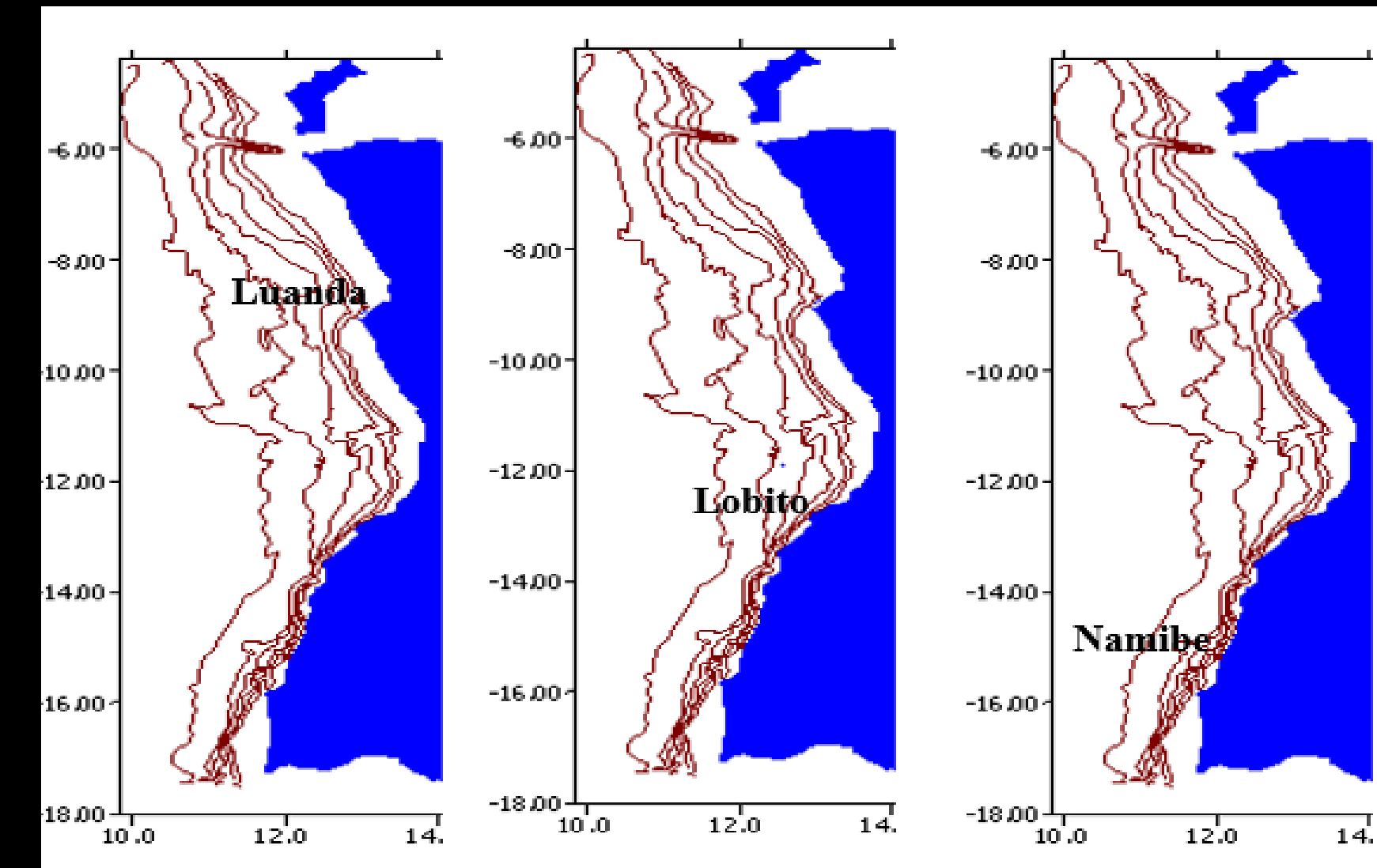
Application of data?

▪ Provide information to the management of fisheries resources.

▪ Preparation of annual Environmental Status Report and registered abnormalities.

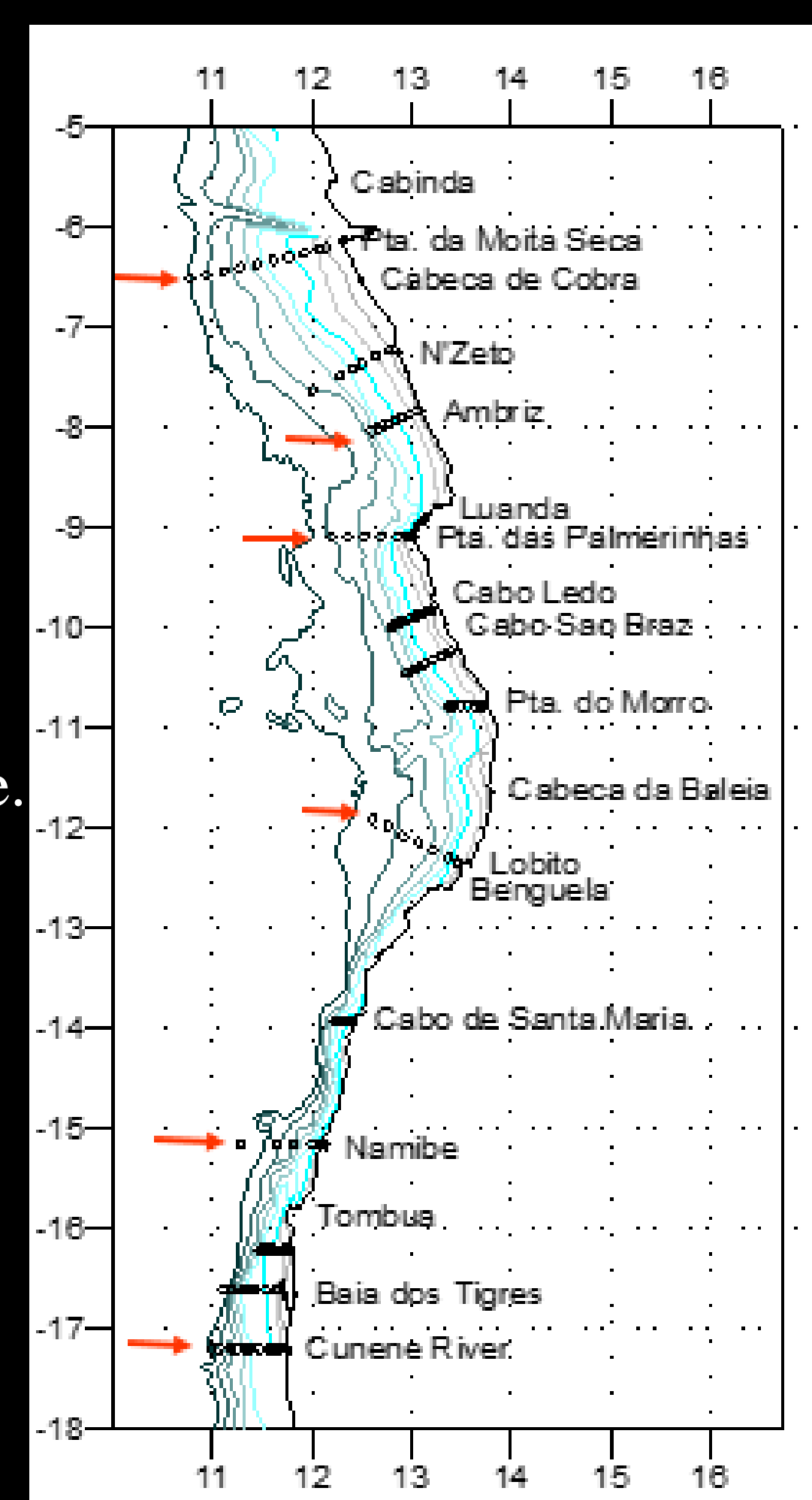▪ Correlate the distribution of physic-chemical, biological and fishing resources.

Benguela Niños events are intermittent, usually peak at the end of the Great warm Season (January-April) and can persist for periods of months.
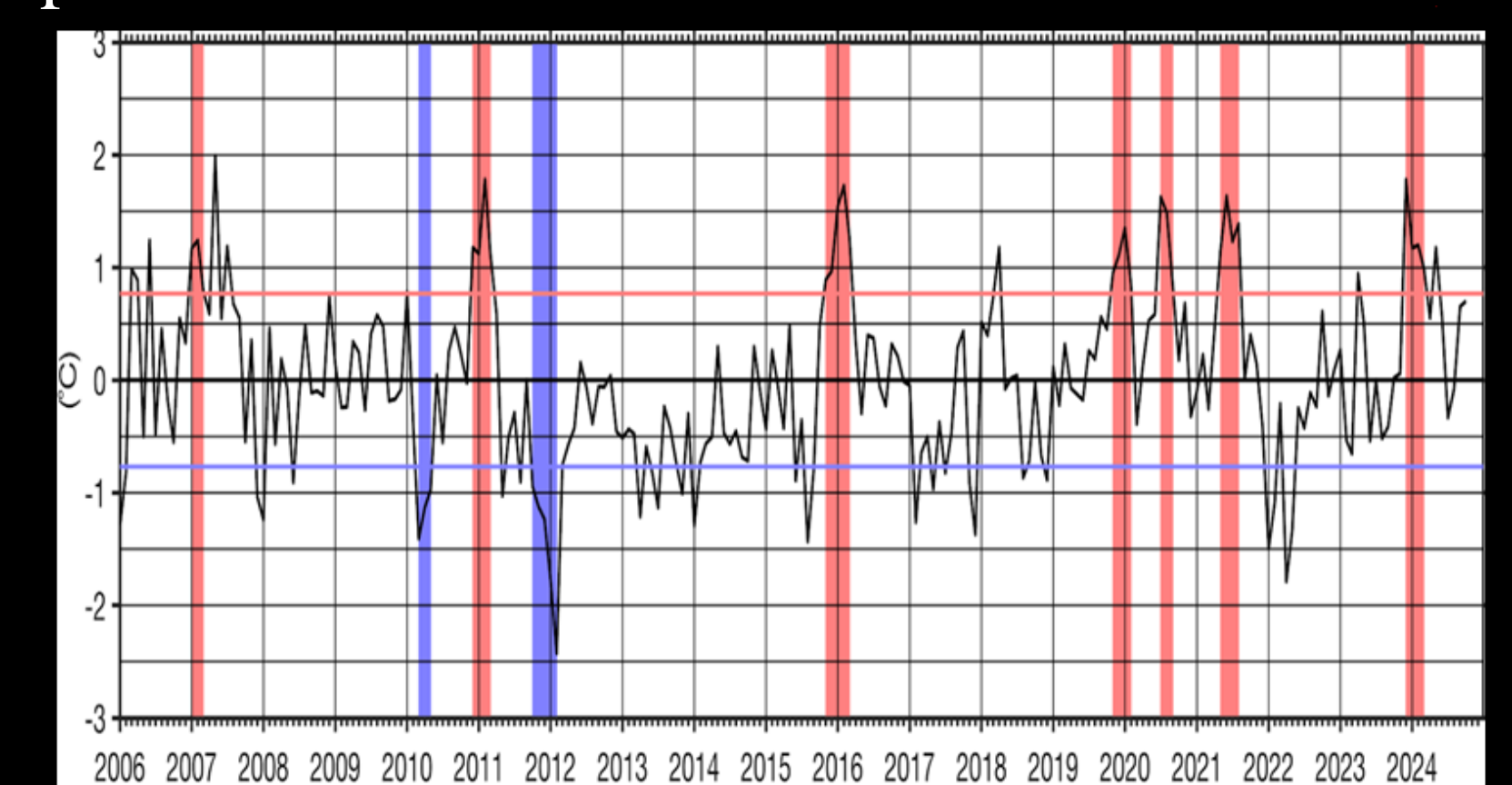
Sea Surface Temperature Anomalies

Challenges

❖ What additional oceanographic data cruises, projects and programs, can we provide to improve knowledge about state of the state marine environment along the Angolan coast?

❖ Creating a Link between biological oceanographic data and fishing resources.

❖ What other analysis for biological data (phytoplankton and zooplankton) can be performed?

❖ Creation of a global oceanic observation system along the coast, with the installation of oceanographic buoys in northern and southern Angola.

Perspectives

Implementation of methods for validation and evaluation of time dries of data.

Formation in the modeling area, with developments of oceanographic and ecological models..

Short- and long-term course in post-cruise data analysis..