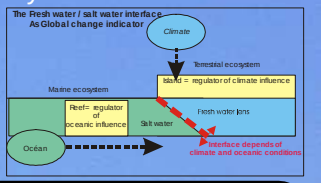
Water resources of small coral islands facing climate change and disasters
The "INTERFACE" Program

Join Jean-Lambert[1,2], Banton Olivier[3], Comte Jean-Christophe[3], Ambrosi Jean-Paul[4], Bigot Lionel[1], Chabanet Pascale[1,2], Nicolini Eric[1], Travi Yves[3], Yamano Hiroya[5]

1. Université de la Réunion, France
2. Institut de Recherche pour le Développement, New Caledonia & Reunion
3. UMR EMMAH - Laboratoire d'Hydrogéologie, Université d'Avignon et des Pays de Vaucluse, France
4. UMR 161 CEREGE CNRS,
5. Center for Global Environmental Research, National Institute for Environmental Studies, Ibaraki, Japan



Study sites (green stars): Glorieuse (Indian Ocean) and M'Ba (below), New Caledonia (Pacific Ocean)

CONTEXT

In the tropics and the subtropics, the impacts of climate change are likely to be further compounded by the environmental sensitivity of coral reefs.

OBJECTIVES

✓The purpose of the project is to predict the vulnerability of coral reef island ecosystems to climate change

✓It focuses on groundwater as its properties reflect both climatic (recharge) and oceanic (discharge) changes

MATERIAL AND METHODS

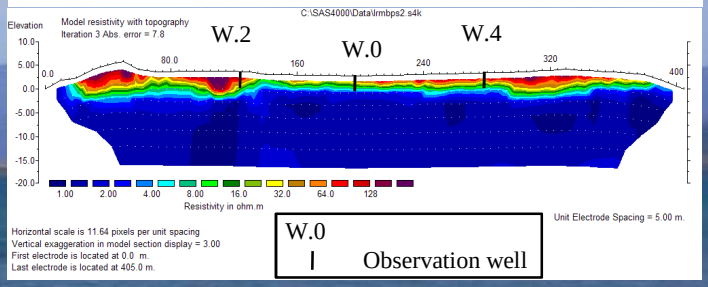
• INTERFACE proposes an effective three-year monitoring of environmental indicators. Study sites are very small coral reef islands, located in protected areas away from human activities.

• The hydrogeological monitoring of the fresh water lens is selected as a reference indicator.

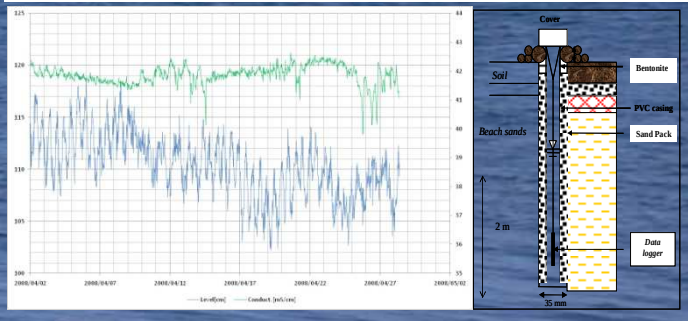
• Other parameters (sedimentological, biological and microbiological parameters) related to climatic changes are simultaneously observed.

• Relationships between these data sets examined over different space-time scales will produce a critical analysis of the relevance of vulnerability indicators. The results will help to focus on new methodologies for the assessment of environmental vulnerability on coral reef islands.

Geoelectrical profile



Water level and conductivity monitoring well « 0 »



Observation well

PRELIMINARY RESULTS

The hydrological monitoring is now implemented on the two islands .

In both islands, geophysical profiles and water sampling reveal brackish waters with conductivity values close to sea water on the whole island.

The spatial salinity distribution depends on topography and marine influence. Marine influence is related to wind exposition and reef barrier efficiency.

Geophysical profiles confirm the absence of "Ghyben Herzberg" fresh water lens. Despite a dense vegetation cover, the hydrological system presents no groundwater reserves.

CONCLUSION

✓ Freshwater lens model development will simulate possible scenarios of climatic changes and environmental impacts associated with these modifications.

✓ A multivariable analysis combining hydrological, geological and biological aspects is necessary to understand the complexity and irregularity of the environment