

by the IPCC (Watson et al., 1997), the “*coastal systems should be considered vulnerable to changes in climate*”. In these areas, amongst the most serious impacts of sea-level rise (Nicholls, 1996) are erosion and marine inundation. Thus, the coast of metropolitan France, being composed of 30% sandy coasts, is potentially vulnerable. Within this context, the present paper will give the methodology for the modeling approach to analyze the vulnerability of several beaches on the French coast. Here we will have more particularly a study on a Mediterranean beach. All these studies are involved in the VULSACO project.

The coastal morphology evolution can not be represented with average climatic conditions but need to simulate the extreme events as the storms and therefore, in a long term approach, the morphological evolution is the result of the combination of storm events and calm periods.

The morphological evolution in the near shore region, including its large-scale features, was first investigated using a combination of a commercial 2DH model and a Multi1DH model (Camenen and Larroude, 2003, 2003b). Simulation of the wave-driven currents was carried out with Telemac, a finite-volume elements model, and the Sisyphé sand transport module served to compute sediment transport rates and bed evolution. Since the sediment transport in the surf zone is mainly controlled by undertow, an undertow model (based on Svendsen, 1984) was added to account for that process.

These models were used in the framework of a simulated meteorological cycle describing the seasonal evolution of hydrodynamic factors. Results from monthly 2DH evolution simulations show a perfect fit with field data obtained on the beaches in Sete (Certain, 2002). Morpho-hydrodynamic feedback of a bar having undergone reinforcing is also examined. All these assumptions should, of course, be systematically checked, the purpose of the exercise being to assess, through mid-term bathymetric evolution simulation. Then, vulnerability can be studied: the vulnerability of coast/beach will be defined and studied based on in-situ observations and model results will be taken into account as a modulator of the physical vulnerability.

Sea surface temperature and Mekong River discharge estimated by multi-element analysis of coral skeletons from the south of Vietnam

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Tropical climate is one of the most important factors connected with the global climate system. In addition, recent human activity has serious influences on the climate system, as most remarkably manifested as the global warming. On the other hand, we do not have enough accumulation of meteorological/environmental data for understanding the tropical-global connection and anthropogenic influences on global climate. The South China Sea (SCS), especially its southern part, is likely to be one of the most important regions in connection with the global climate system, because it is close to the Western Pacific Warm Pool that generates the world's most active convection, and is also dominated by Southeast Asian monsoon. The meteorological data in the southern SCS are very limited, mostly spanning the past few decades after the late 1970s or early 1980s. To extend the limited meteorological data, a Vietnamese coral sample (*Porites* sp.) with annual bands of AD 1948-2000 was used as archives of the past climate and environment. The annual bands in the coral sample were visualized by X radiography and UV-luminescence photography and confirmed by ¹⁴C measurements detecting a signal of atmospheric nuclear tests in the late 1950s and early 1960s.

The Sr/Ca, Mg/Ca and Ba/Ca ratios in the annual bands were determined at a temporal resolution of about one month, using a high-precision CCD simultaneous ICP-OES. The Sr/Ca time series shows clear annual cyclicity and is mainly controlled by sea-surface temperature (SST). In the coral sampling site, instrumental SST observation has been made since 1980. The instrumental SST data was compared with the Sr/Ca data to establish a Sr/Ca thermometer as follows: Sr/Ca (mmol/mol) = 9.905 - 0.03897 x SST (°C). Application of the thermometer to the whole Sr/Ca time series provides a SST reconstruction from 1948 to 2000. The

reconstructed SST variation shows general correlation with El Niño-Southern Oscillation (ENSO) and a sea-surface warming of $\sim 0.7^{\circ}\text{C}$ in the latter half of the 20th century. The Mg/Ca time series exhibits indistinct annual cyclicality, indicating that the previously-reported strong correlation between coral Mg/Ca ratio and SST is disturbed by some factors. The Ba/Ca time series shows annual spikes coincident with annual bright UV-luminescence lines. The Ba/Ca spike and the bright UV-luminescence line occur in September to November (the wet season) when seawater salinity decreases to a minimum value. Since the coral sampling site is only 90 km distant from the mouth of the Mekong River, the Ba/Ca spikes and bright UV-luminescence lines may be related with the discharge from the Mekong River. This study is the first attempt in the southern SCS to reconstruct past ocean environment by multi-element analysis of coral skeletons and has demonstrated its usefulness for understanding the environmental changes in Southeast Asia.

Mangrove reforestation as one of the activities to curtail global warming

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The climate change that leads to global warming is becoming one of the important world issues. Continuing increase in atmospheric temperature has led nations, corporations, and individuals to implement actions to try to curtail global warming. One of important innovations has been the development of green house gas emissions trading through which companies, in conjunction

with government, agree to cap their emission or to purchase credits from those below their allowances. Reforestation is one of the activities that can be used for this kind of carbon trading. A case study of mangrove reforestation in Thailand can be used as a successful example of carbon credit.

Mangrove forest areas increased in Thailand during 1997-2004 after a long decline for at least the past 40 years. This mangrove recovery was amounting to the increase of 85,384 ha of forest area. The rate of mangrove forest increase during 1997-2004 was greater than the greatest recorded loss rates during 1980-1986. Mangrove recovery was a result of several efforts for instance the keen public awareness of mangrove forest values, wide spread use of intensive shrimp farming culture technology that no longer benefits from use of mangrove areas, termination of mangrove forest concession by the government, and mangrove reforestation programs supported by both public and private sectors. The Royal Family also strongly supported mangrove preservation and reforestation. Mangrove forest areas in Thailand are expected to continue increasing on the strength of the momentum created by these efforts. In calculating the mangrove recovery back to carbon deposition, this amount of carbon can be used for trading. This activity complies with the concept of clean development mechanisms (CDM) set by the Kyoto Protocol.

Yangtze river 2006: low water discharge and salt water intrusion of extreme drought event

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The year 2006 is currently considered to be the fifth warmest year on record and it's been marked by warmest Autumn in Europe, severe drought in Australia, extreme drought and heavy Exceptional low water discharge had happened over Yangtze River in 2006. Based on meteorological data, historical current & sediment data and the data collected in October 2006 in Yangtze River basin and in estuary, the analyses of exceptional low water discharge characteristics, effect on suspended sediment and the cause of strong salt water intrusion were carried out. The results showed that: 1) 2006 discharge is characterized by exceptional low