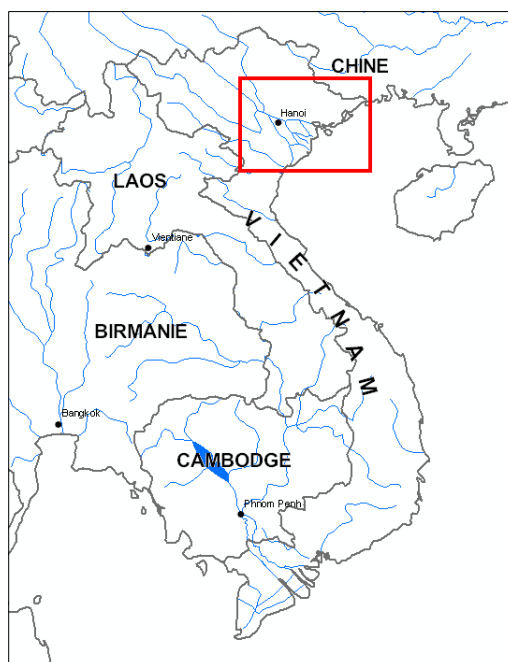


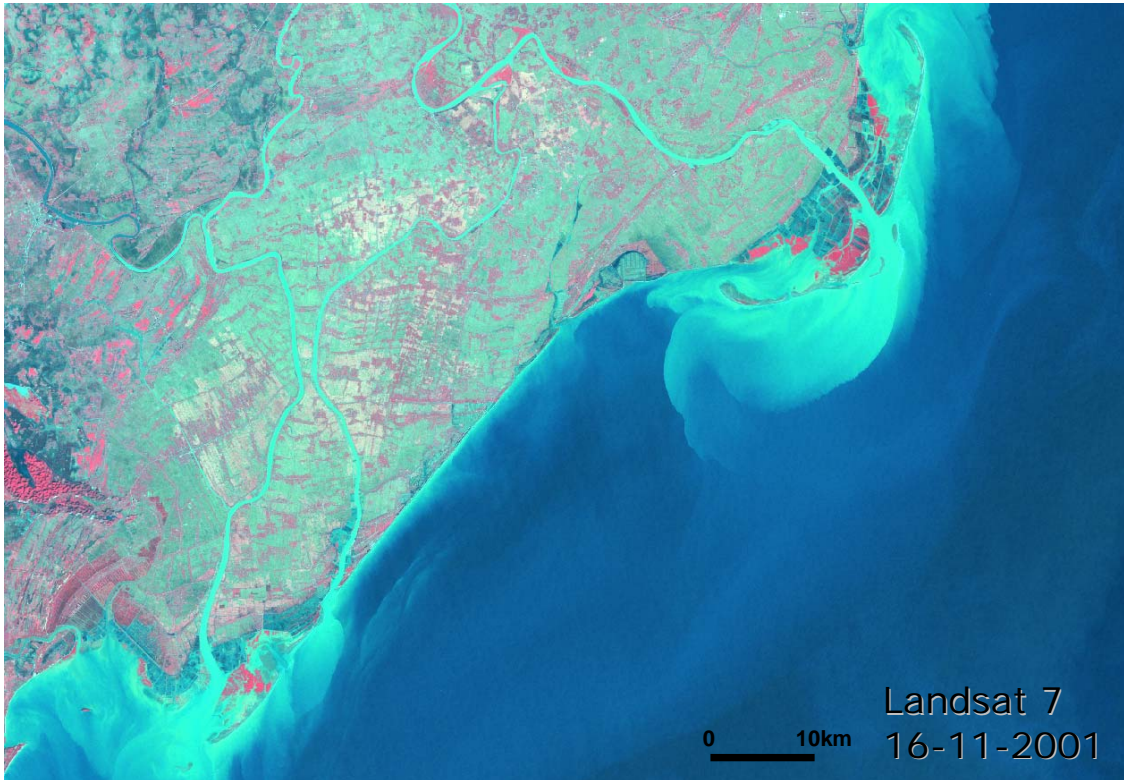
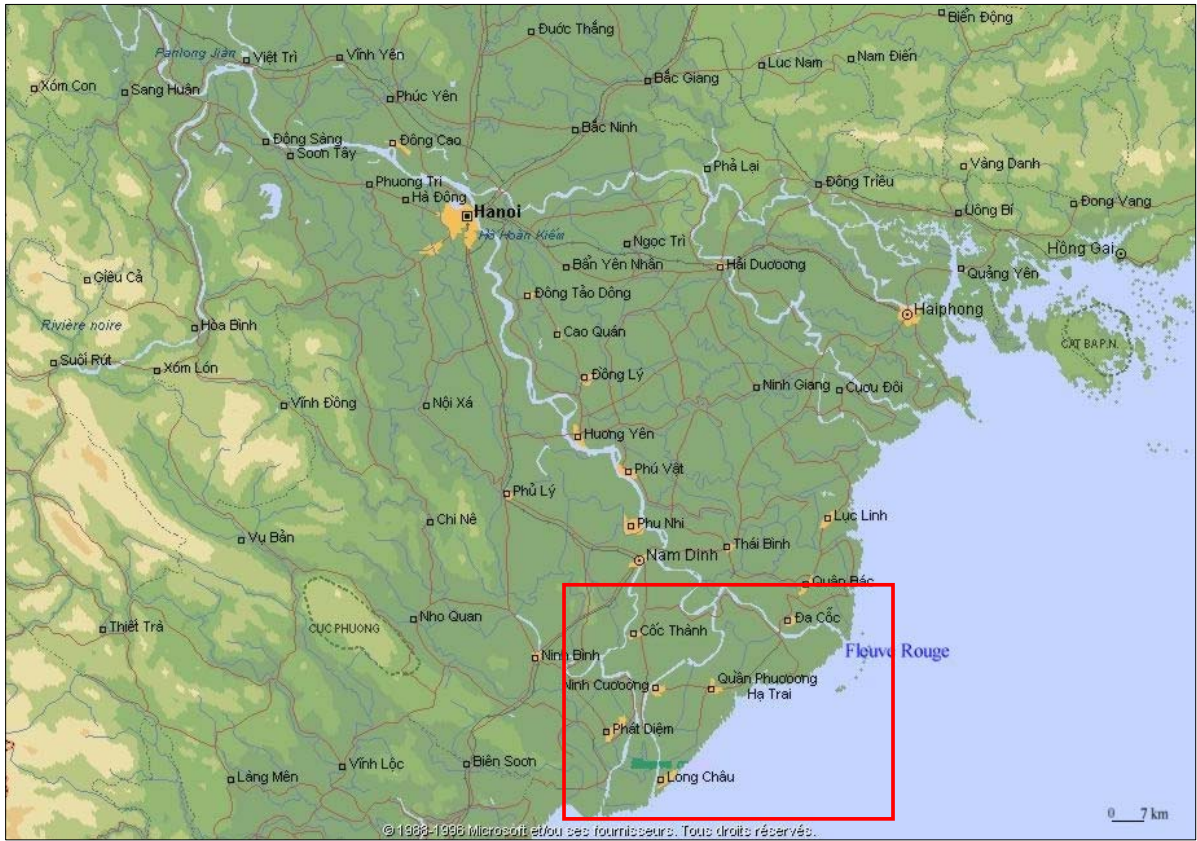
Human pressure and the environment in Vietnam: focus on the Binh Thuan Province

Pierre Ozer
University of Liege, Belgium

Institute of Geography, Hanoi, 8 March 2011

Vietnam - Delta of the Red River





Landsat 7
16-11-2001



Salines



Aquaculture



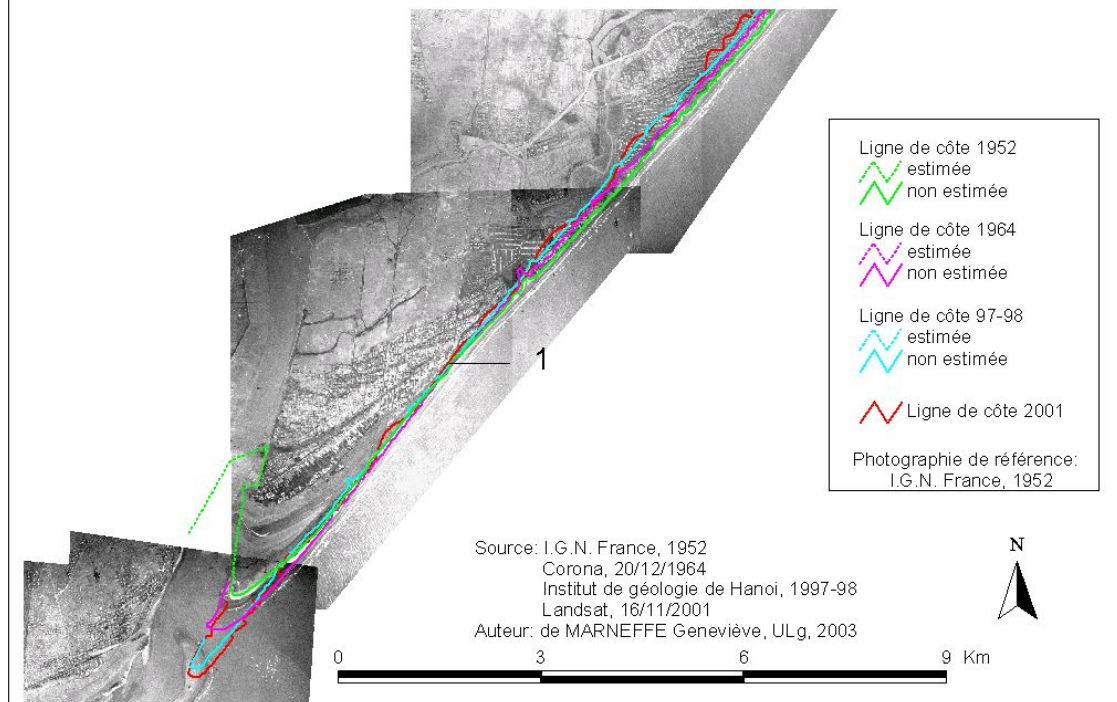
Rice fields



Dams



Evolution côtière entre 1952 et 2001



12-2002



02-2003



12-2003



12-2002

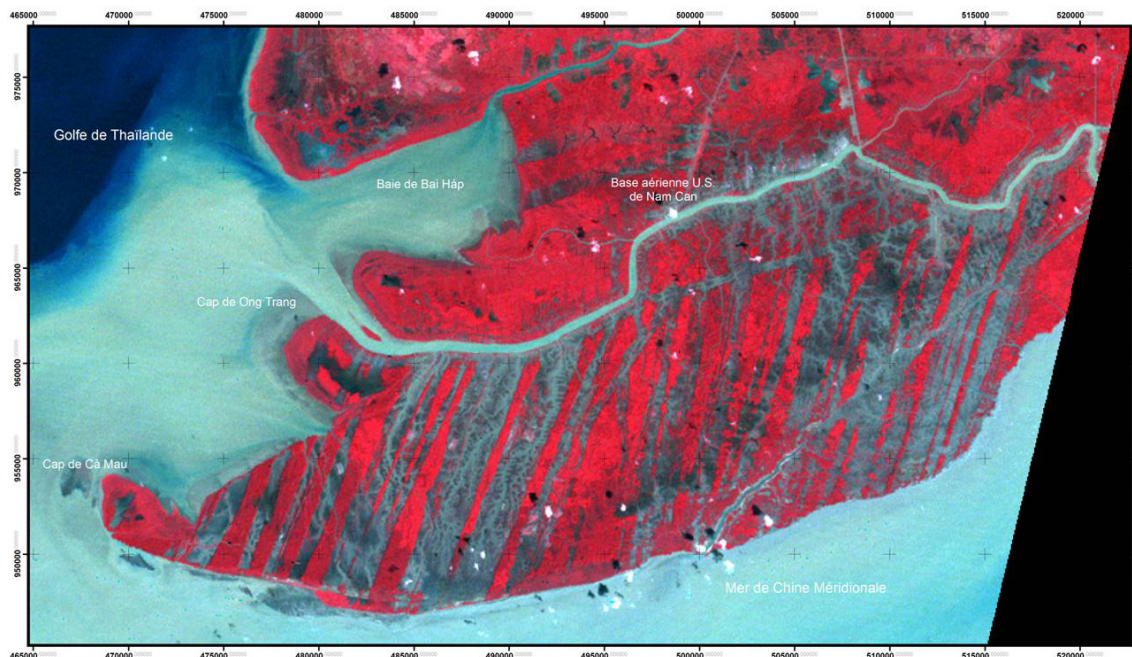


02-2003



12-2003

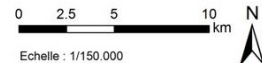




Source :
Landsat 1 - 60 m (03/01/1973)
U.S. Geological Survey - Earth Explorer

Auteur : Benoit BARTIAUX
Ulg - Août 2009

Projection : UTM Zone 48N
Datum : WGS 1984
Coordonnées en mètres



Echelle : 1/150.000



US Army using Agent orange in Vietnam

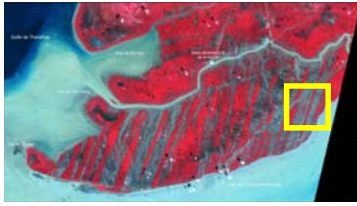
Cà Mau

Consequences of Agent Orange, 1971 (Oatsvall, 2008)

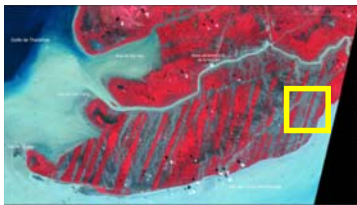
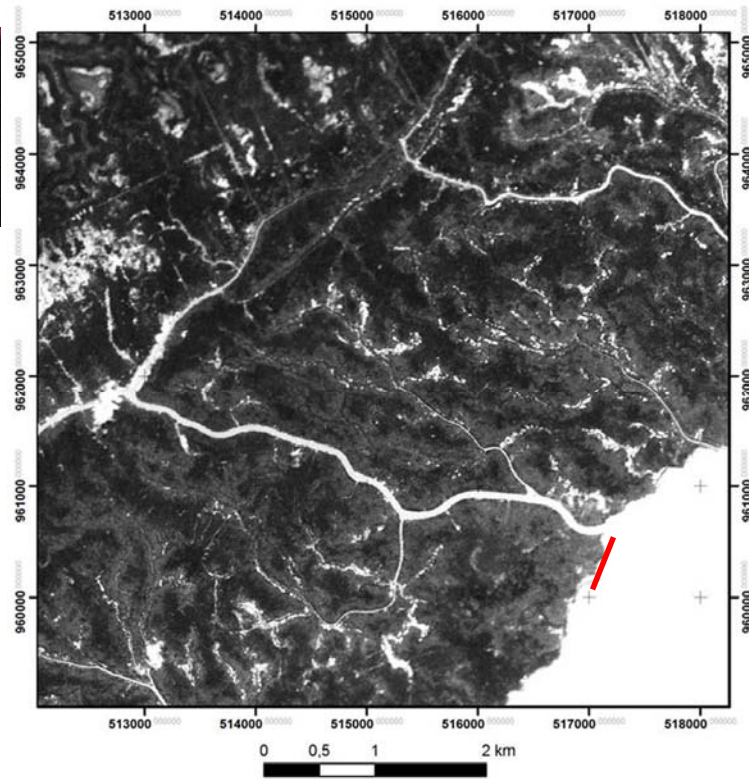


Consequences of Agent Orange, 1970 (Fromard & Kiêt, 2002)

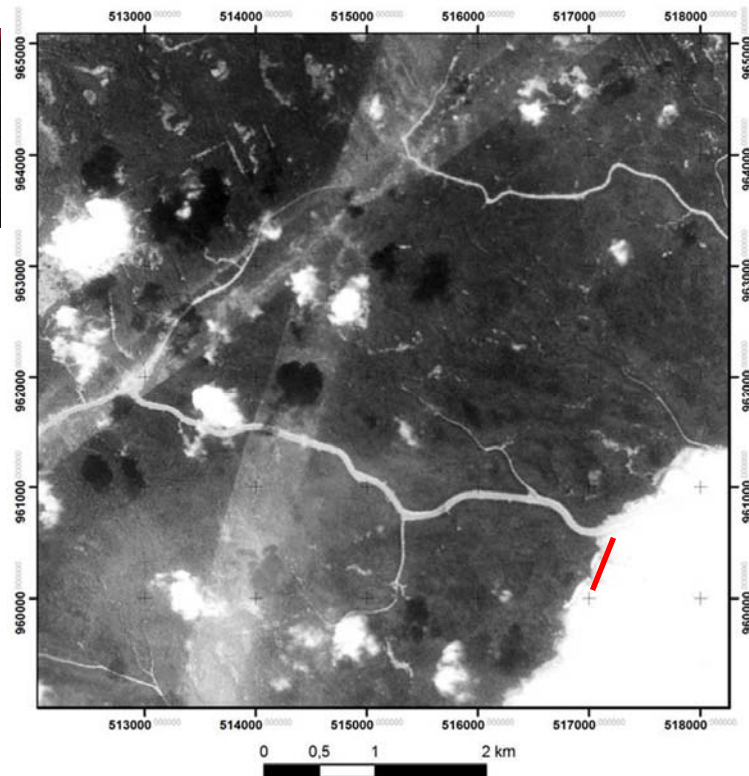


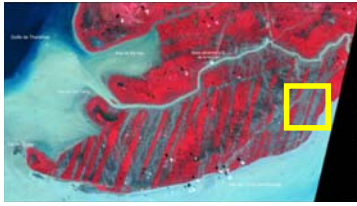


24/02/1967
Corona
U.S.G.S., Earth Explorer

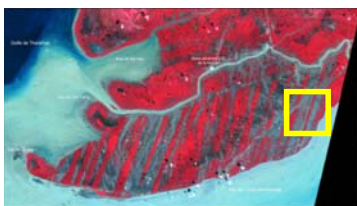
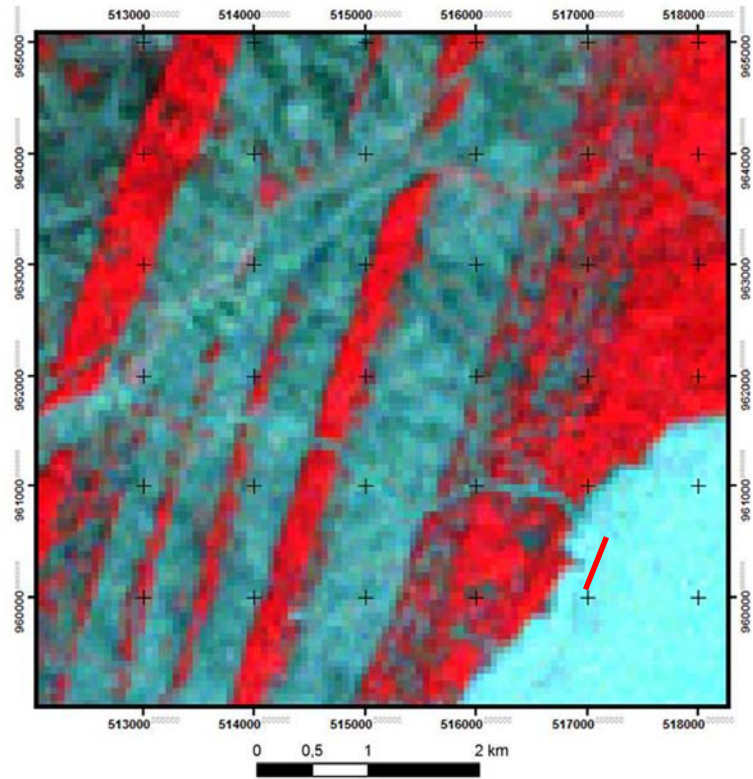


03/02/1968
Corona
U.S.G.S., Earth Explorer

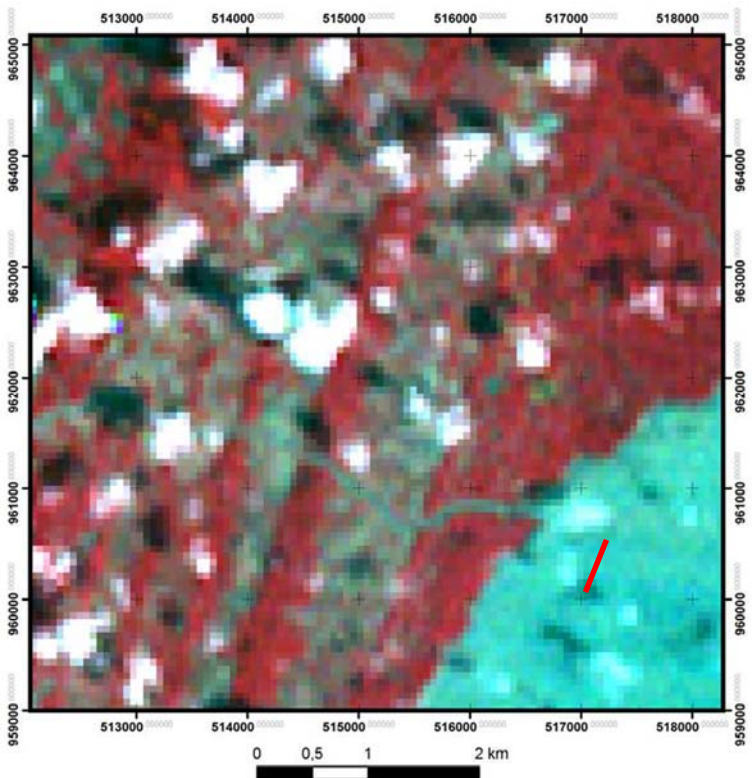


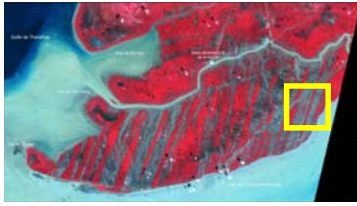


03/01/1973
Landsat 1
U.S.G.S., Earth Explorer

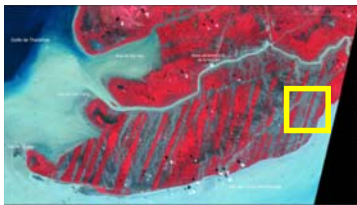
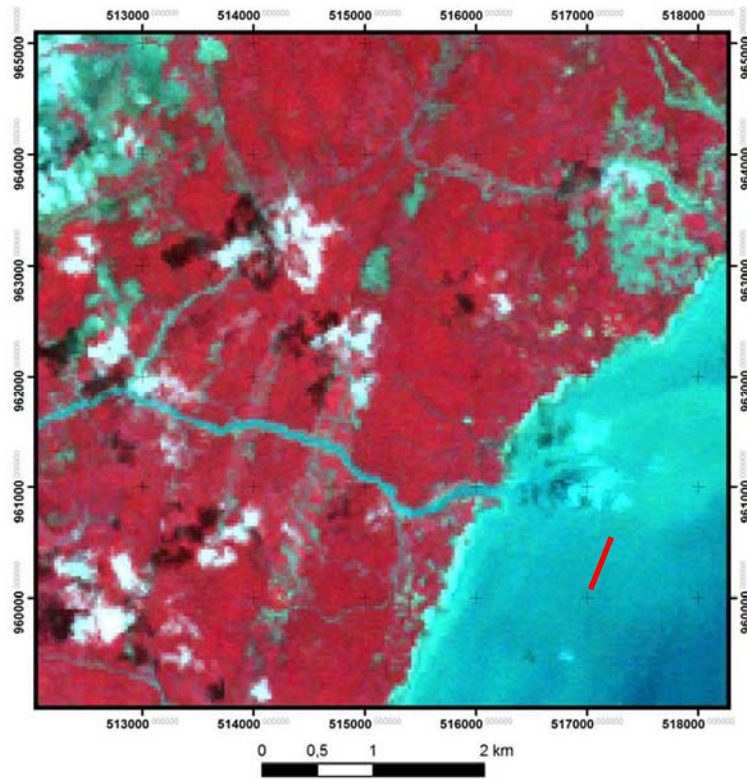


13/02/1979
Landsat 3
U.S.G.S., Earth Explorer

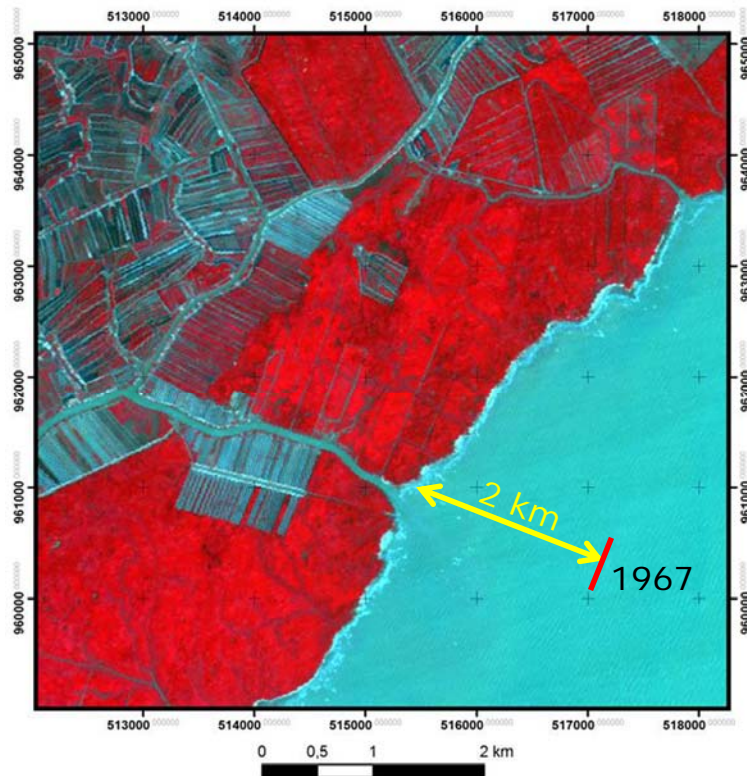




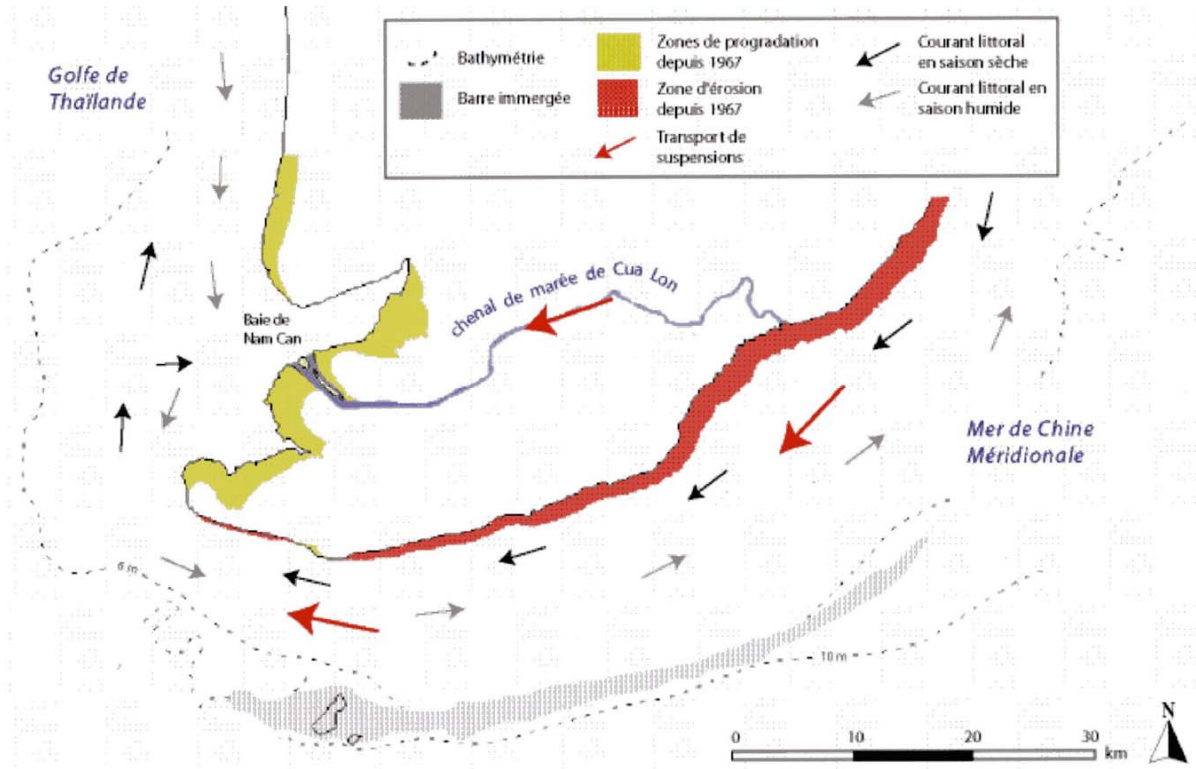
06/04/1989
Landsat 5
University of Maryland



10/03/2008
SPOT 5
Programme ISIS, CNES



Shoreline evolution in Cà Mau since 1967

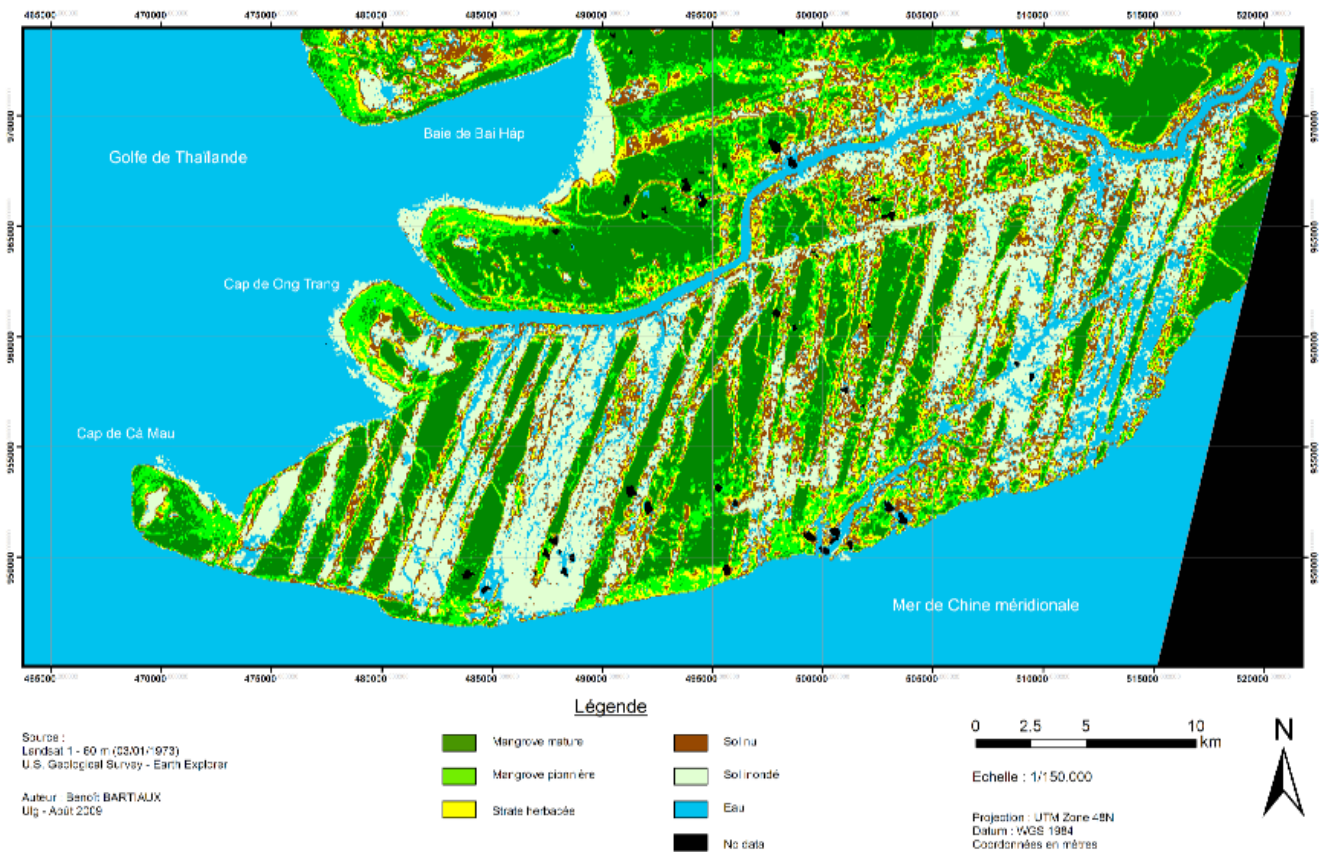


Erosion

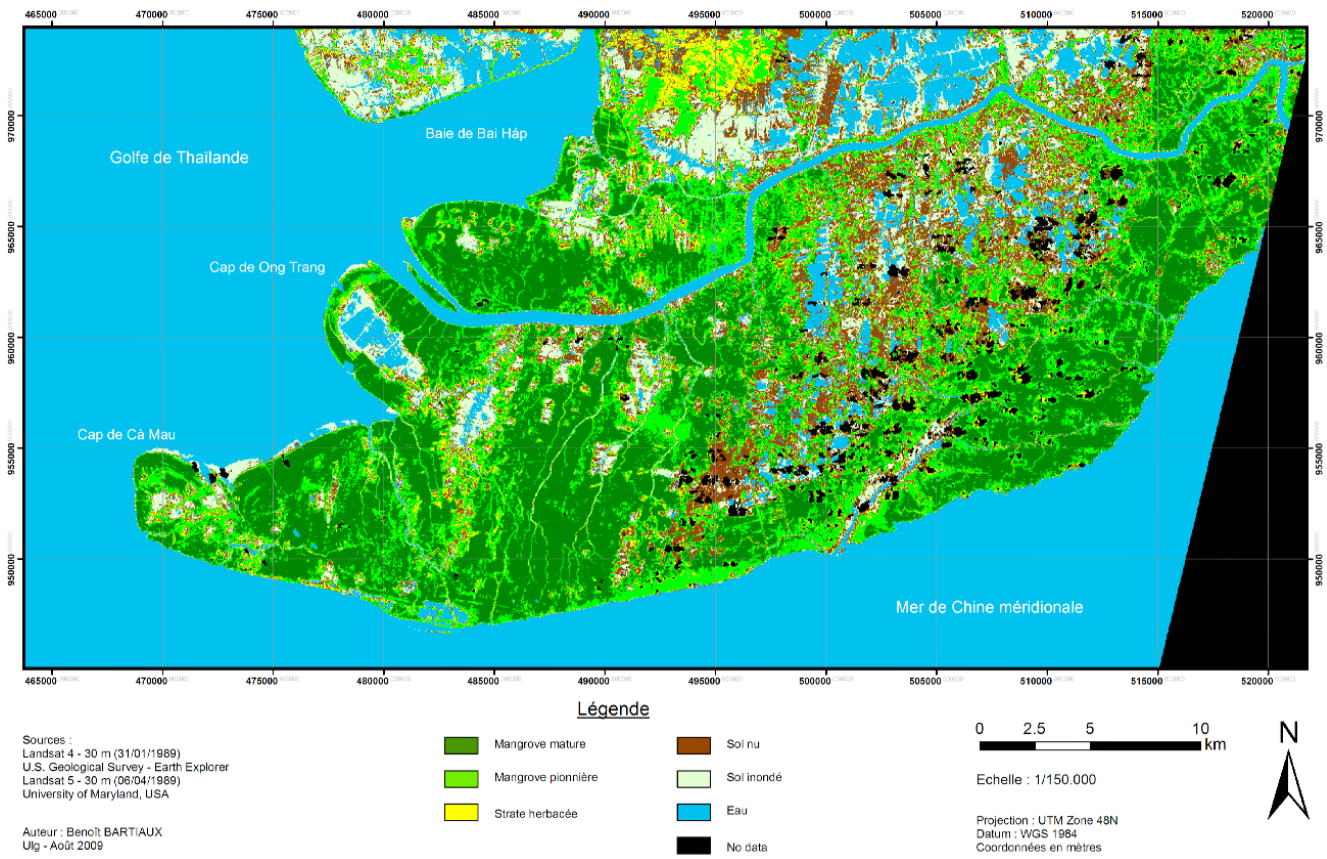




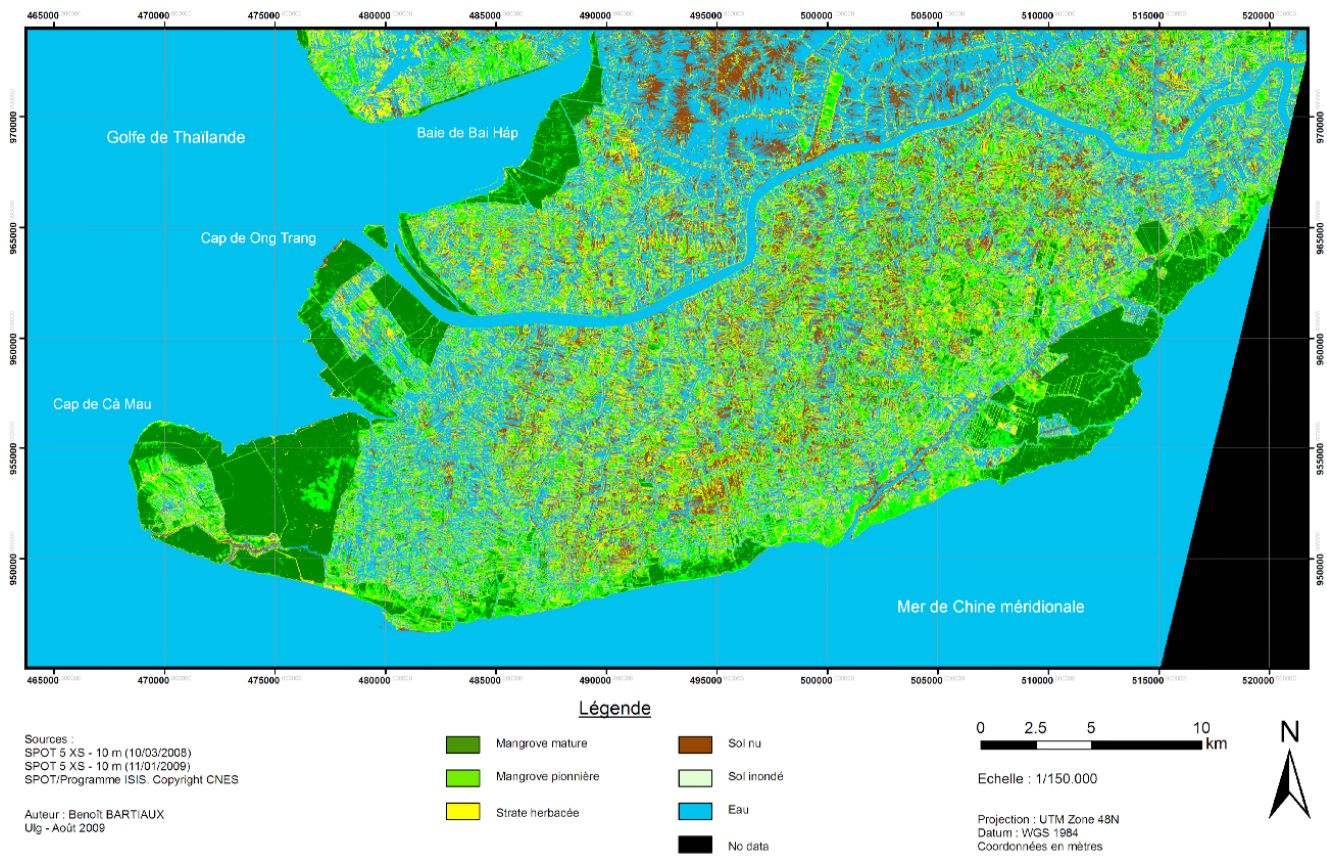
Land use in 1973



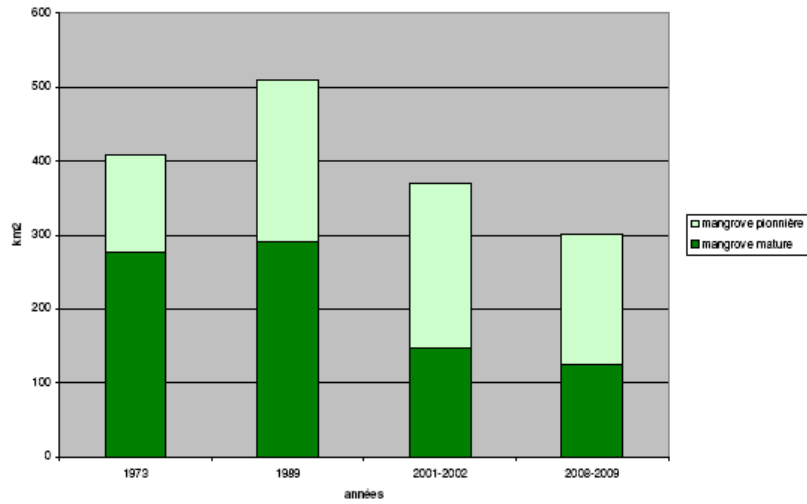
Land use in 1989



Land use in 2009



Années	1973		1989		2001-2002		2008-2009	
	en km ²	en %	en km ²	en %	en km ²	en %	en km ²	en %
Mangrove mature	276	32	290	33	147	16	125	14
Mangrove pionnière	132	15	219	24	223	24	176	19
Superficie totale mangrove	409	47	509	57	370	40	301	33
Superficie totale de la zone	875	100	893	100	913	100	909	100



What about the Binh Thuan Province ?

What about the Binh Thuan Province ?

Shorelines erosion





27 March 2006



10 May 2009



10 May 2009



26 April 2010



26 April 2010



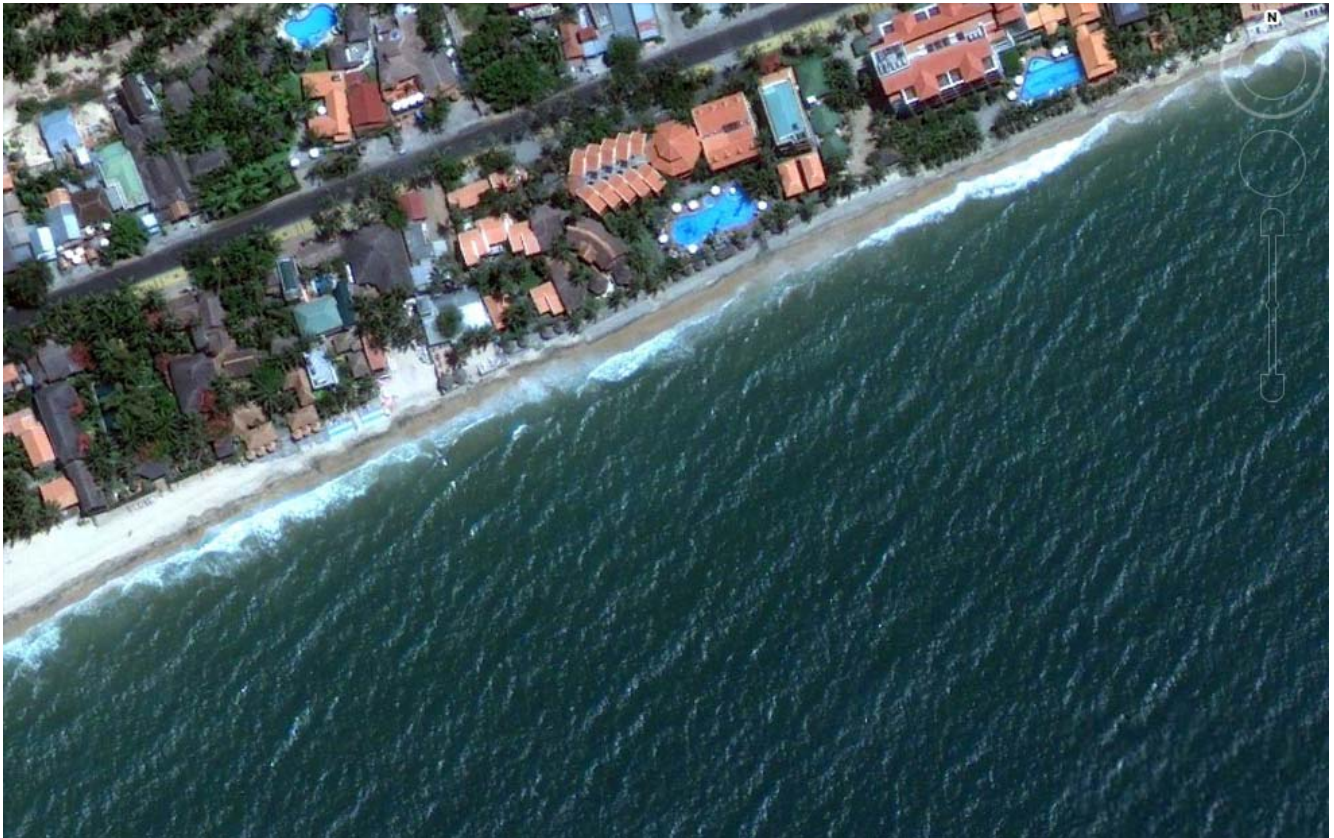


27 March 2006



10 May 2009

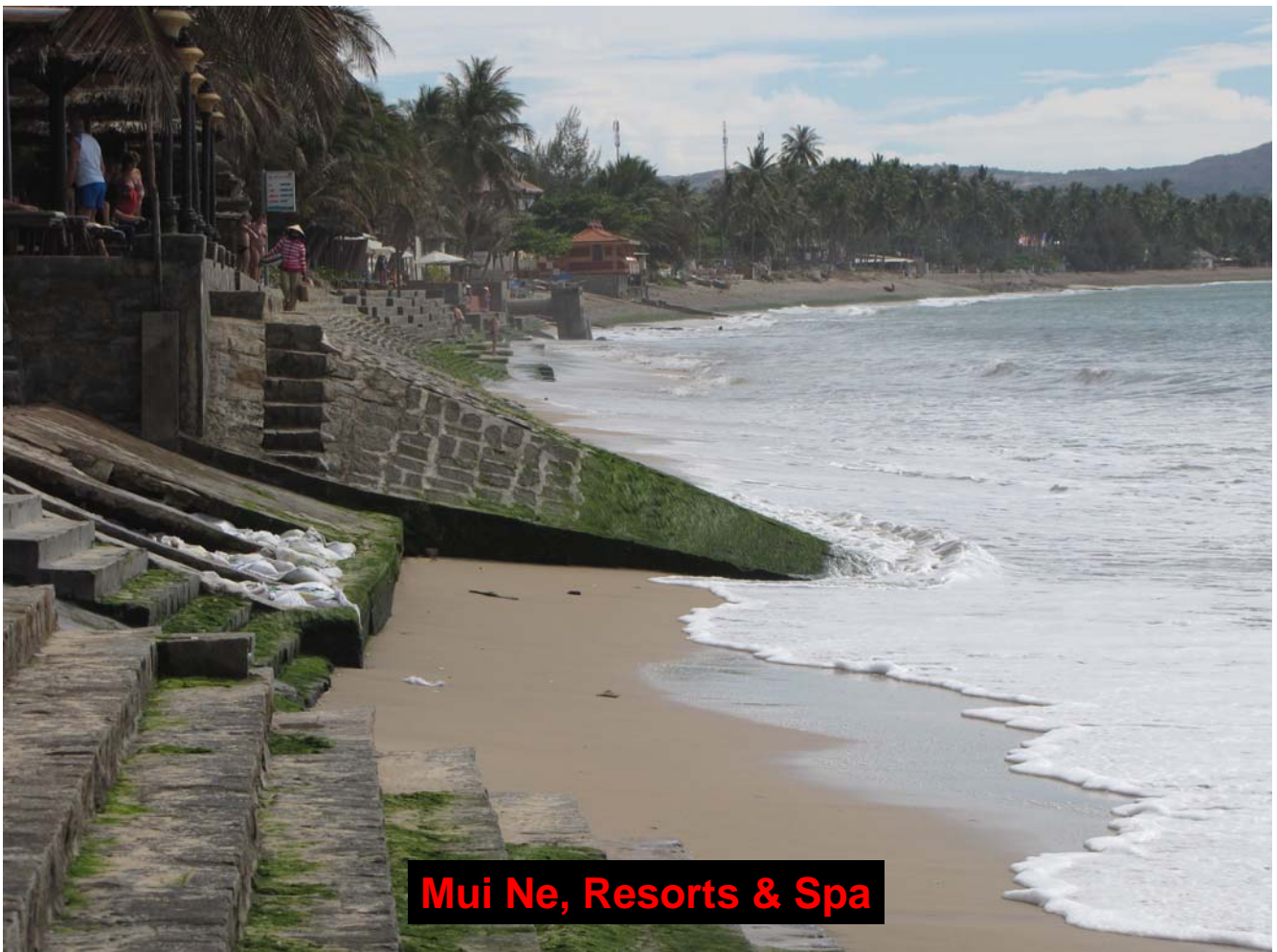




Mui Ne, Resorts & Spa



Mui Ne, Resorts & Spa



Mui Ne, Resorts & Spa

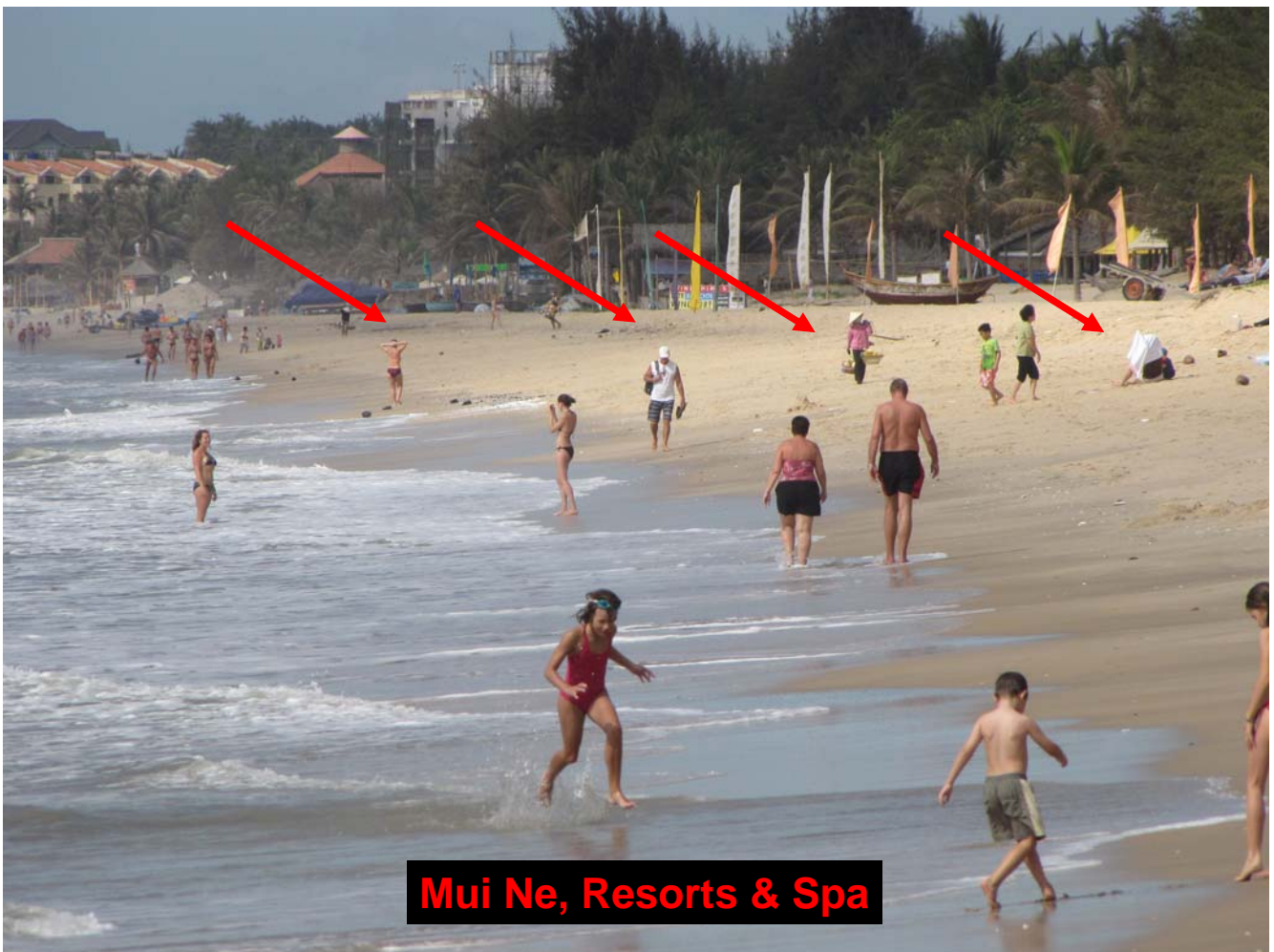


Mui Ne, Resorts & Spa





Mui Ne, Resorts & Spa



Mui Ne, Resorts & Spa





What about the Binh Thuan Province ?

Climate

**Analysis of the evolution of the climate parameters, especially
precipitations et temperatures, in the province of Binh Thuan in
Southern Vietnam based on IPCC models**

Sébastien DOUTRELOUP · Xavier FETTWEIS · Pierre OZER

Table 1 Models and reanalyses used in this study with their short name and spatial resolution. The AOGCMs short names are based on the work of [LELOUP et al. 2007]. Data source: the World Climate Research Programme's (WCRP's) Coupled Model Intercomparison Project phase 3 (CMIP3) multi-model dataset available at <http://www-pcmdi.llnl.gov/>.

Data name	Short name	Spatial resolution
BCCR-BCR2.0	BCCR	2.8° × 2.8°
CCCMA-CGCM3.1(T47)	CCCMA-T47	3.7° × 3.7°
CCCMA-CGCM3.1(T63)	CCCMA-T63	2.8° × 2.8°
CNRM-CM3	CNRM	2.8° × 2.8°
CSIRO-Mk3.0	CSIRO-0	1.9° × 1.9°
CSIRO-Mk3.5	CSIRO-5	1.9° × 1.9°
GFDL-CM2.0	GFDL-0	2.6° × 2.0°
GFDL-CM2.1	GFDL-1	2.6° × 2.0°
GISS-AOM	GISS-AOM	4.0° × 3.0°
GISS-EH	GISS-EH	5.0° × 4.0°
GISS-ER	GISS-ER	5.0° × 4.0°
IAP-FGOALS_g1.0	IAP	2.8° × 2.8°
INGV-SXG	INGV	1.1° × 1.1°
INMCM3.0	INMCM	2.8° × 2.8°
IPSL-CM4	IPSL	3.8° × 2.5°
MIROC3.2 (medres)	MIROC-MR	1.1° × 1.1°
MIROC3.2 (medres)	MIROC-MR	2.8° × 2.8°
MIUBECHO-G	MIUB	3.7° × 3.7°
ECHAM5/MPI-OM	MPI	1.9° × 1.9°
MRI-CGCM2.3.2	MRI	2.8° × 2.8°
NCAR-CCSM3	CCSM3	1.4° × 1.4°
NCAR-PCM1	PCM1	2.8° × 2.8°
UKMO-HadCM3	HADCM3	3.8° × 2.5°
UKMO-HadGEM1	HADGEM1	1.9° × 1.2°
ECMWF 40 Year Reanalysis	ERA-40	1.1° × 1.1°
NCEP/NCAR Reanalysis 1	NCEP1	2.5° × 2.5°

Table 2 This table represents the year-averaged value of temperature and the year-amount value of precipitations on the three periods “1970-1999”, “2046-2065” and “2081-2100” for the CCCMA-T47 model in the scenario A1B. The arrows represents the evolution of the future value compared to the value of the past period.

Variable	1970-1999	2046-2065	2081-2100
Temperature (°C)	24.1	25.8 ↗	26.6 ↗
Precipitations (mm/an)	1912	1990 ↗	1955 ↗

Table 3 This table represents the year-averaged value of temperature and the year-amount value of precipitations on the three periods “1970-1999”, “2046-2065”and “2081-2100”for the INGV model in the scenario A1B. The arrows represents the evolution of the future value compared to the value of the past period.

Variable	1970-1999	2046-2065	2081-2100
Temperature (°C)	24.7	26.3 ↗	27.0 ↗
Precipitations (mm/an)	1501	1438 ↘	1478 ↘

Table 4 This table represents the year-averaged value of temperature and the year-amount value of precipitations on the three periods “1970-1999”, “2046-2065”and “2081-2100”for the IPSL model in the scenario A1B. The arrows represents the evolution of the future value compared to the value of the past period.

Variable	1970-1999	2046-2065	2081-2100
Temperature (°C)	26.5	28.5 ↗	28.6 ↗
Precipitations (mm/an)	1848	1753 ↘	1986 ↗

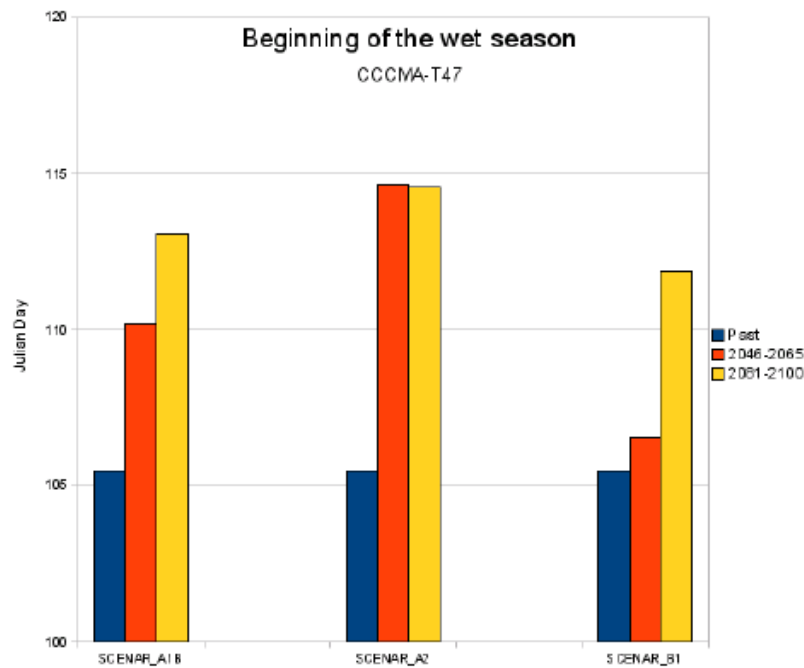


Fig. 34 Comparison of the beginnings of the wet season of the model CCCMA-T47 over the past period (blue bar) and the future periods 2046-2065 (red bar) and 2081-2100 (yellow bar) and with the 3 scenarios A1B, A2 and B1.

Table 10

CCCMA-T47 model Variables	Past	Scenario A1B		Scenario A2		Scenario B1	
	1970-1999	2046-2065	2081-2100	2046-2065	2081-2100	2046-2065	2081-2100
Mean Temperature (C)	24,1	25,74	26,57	25,92	27,34	25,45	25,78
Sum Precipitation (mm/year)	1911,88	1990,47	1955,17	2019,51	2186,22	1879,96	1976,21
Standard-Error Temperature (C)	3,6	4,21	4,2	4,11	4,23	4,07	4,1
Standard-Error Precipitation (mm)	9,64	10,32	10,56	4,11	13,2	8,72	10,22
Maximum Temperature (C)	30,47	33	34,08	32,16	34,5	32,84	32,96
Minimum Temperature (C)	13,28	16,38	16,16	14,75	16,47	14,38	15,62
Maximum Precipitation (mm)	171,39	193,11	149,61	170,47	186,12	146,22	166,98
Centile 50 of the Temperature (C)	24,26	25,89	26,64	26,02	27,43	25,56	25,86
Centile 50 of the Precipitation (mm)	2,29	2,12	1,95	2,07	1,99	2,09	2,19
Centile 99 of the Temperature (C)	28,43	30,19	31,44	30,55	32,15	29,84	30,52
Centile 99 of the Precipitation (mm)	49,05	52,57	53,77	54,47	71,13	45,82	54,72

Table 11

CCCMA-T47 model	Past	Scenario A1B		Scenario A2		Scenario B1	
	1970-1999	2046-2065	2081-2100	2046-2065	2081-2100	2046-2065	2081-2100
Persistence of less than 2mm							
Sum of events over 10 years	304	289	299	287	275	296	287
Mean of days in one event	5,76	6,21	6,15	6,28	6,63	6,07	6,22
Maximum days in one event	93	75	84	93	101	93	121
Sum of days in event over 10 years	1750	1794	1838	1801	1824	1796	1786

Table 12

INGV model	Past	Scenario A1B		Scenario A2	
	1970-1999	2046-2065	2081-2100	2046-2065	2081-2100
Variables					
Mean Temperature (C)	24,7	26,31	26,95	26,12	27,38
Sum Precipitation (mm/year)	1458,76	1438,1	1478,36	1540,2	1465,11
Standard-Error Temperature (C)	3,36	3,98	4,02	3,93	4,08
Standard-Error Precipitation (mm)	7,08	7,48	8,19	3,93	8,29
Maximum Temperature (C)	29,84	31,75	33,67	31,74	34,2
Minimum Temperature (C)	17,88	18,69	18,92	19,32	19,63
Maximum Precipitation (mm)	218,51	102,97	171,45	115,53	176,29
Centile 50 of the Temperature (C)	24,7	26,29	26,85	26,1	27,3
Centile 50 of the Precipitation (mm)	0,97	0,8	0,69	0,96	0,68
Centile 99 of the Temperature (C)	28,31	30,34	31,36	30,23	32,08
Centile 99 of the Precipitation (mm)	27,97	32,96	35,01	35,15	34,86

Table 13

INGV model	Past	Scenario A1B		Scenario A2	
	1970-1999	2046-2065	2081-2100	2046-2065	2081-2100
Persistence of less than 2mm					
Sum of events over 10 years	462	458	435	450	433
Mean of days in one event	4,68	4,97	5,31	4,87	5,29
Maximum days in one event	81	97	79	96	143
Sum of days in event over 10 years	2162	2274	2309	2190	2291

Table 16 Summary table of the results of the analysis of the climographs on the three models on the period 2046-2065. The evolution is represented by the arrows refer to the past period and the range is created by the minimum and maximum value of the analysis. A \uparrow means that the evolution is strictly positive. A \nearrow means that the evolution is positive or equal to zero. A \rightarrow means that the evolution is equal to zero. A \searrow means that the evolution is negative or equal to zero. A \downarrow means that the evolution is strictly negative. A \emptyset means that the evolution has no general trend.

2046-2065	CCCMA-T47	INGV	IPSL
Beginning of the wet season (days)	\nearrow [0 : +10]	\nearrow [0 : +10]	\uparrow [+10 : +15]
Ending of the wet season (days)	\downarrow [-30 : -10]	\searrow [-30 : 0]	\searrow [-10 : 0]
Late spring summit of precipitation (%)	\uparrow [+5 : +20]	\downarrow [-11 : -4]	\searrow [-4 : 0]
Late summer summit of precipitation (%)	\uparrow [+15 : +33]	\emptyset [-2 : +10]	\uparrow [+5 : +14]
Annual sum of precipitation (%)	\emptyset [-2 : +6]	\emptyset [-4 : +3]	\downarrow [-5 : -4]
Annual mean of temperatures ($^{\circ}$ C)	\uparrow [+1.3 : +1.8]	\uparrow [+1.4 : +1.6]	\uparrow [+1.5 : +2.1]

Table 17 Same legend as the 16 but with the period 2081-2100.

2081-2100	CCCMA-T47	INGV	IPSL
Beginning of the wet season (days)	↑ [+10 : +15]	↑ [+30]	↑ [+15]
Ending of the wet season (days)	↘ [-10 : 0]	→ [0]	↘ [-10 : 0]
Late spring summit of precipitation (%)	↑ [0 : +27]	↘ [-14 : -11]	↓ [-18 : -1]
Late summer summit of precipitation (%)	↑ [+24 : +56]	↑ [+8 : +13]	∅ [-3 : +50]
Annual sum of precipitation (%)	↑ [+2 : +14]	↓ [-2]	∅ [-8 : +1]
Annual mean of temperatures (°C)	↑ [+1.7 : +3.2]	↑ [+2.2 : +2.6]	↑ [+2.1 : +3.7]

Thank you

More details:

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Management

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