

REMOTE SENSING AND GIS APPLICATION FOR FLOOD MONITORING AND ASSESSMENT IN MEKONG DELTA AND CENTRAL PART OF VIETNAM



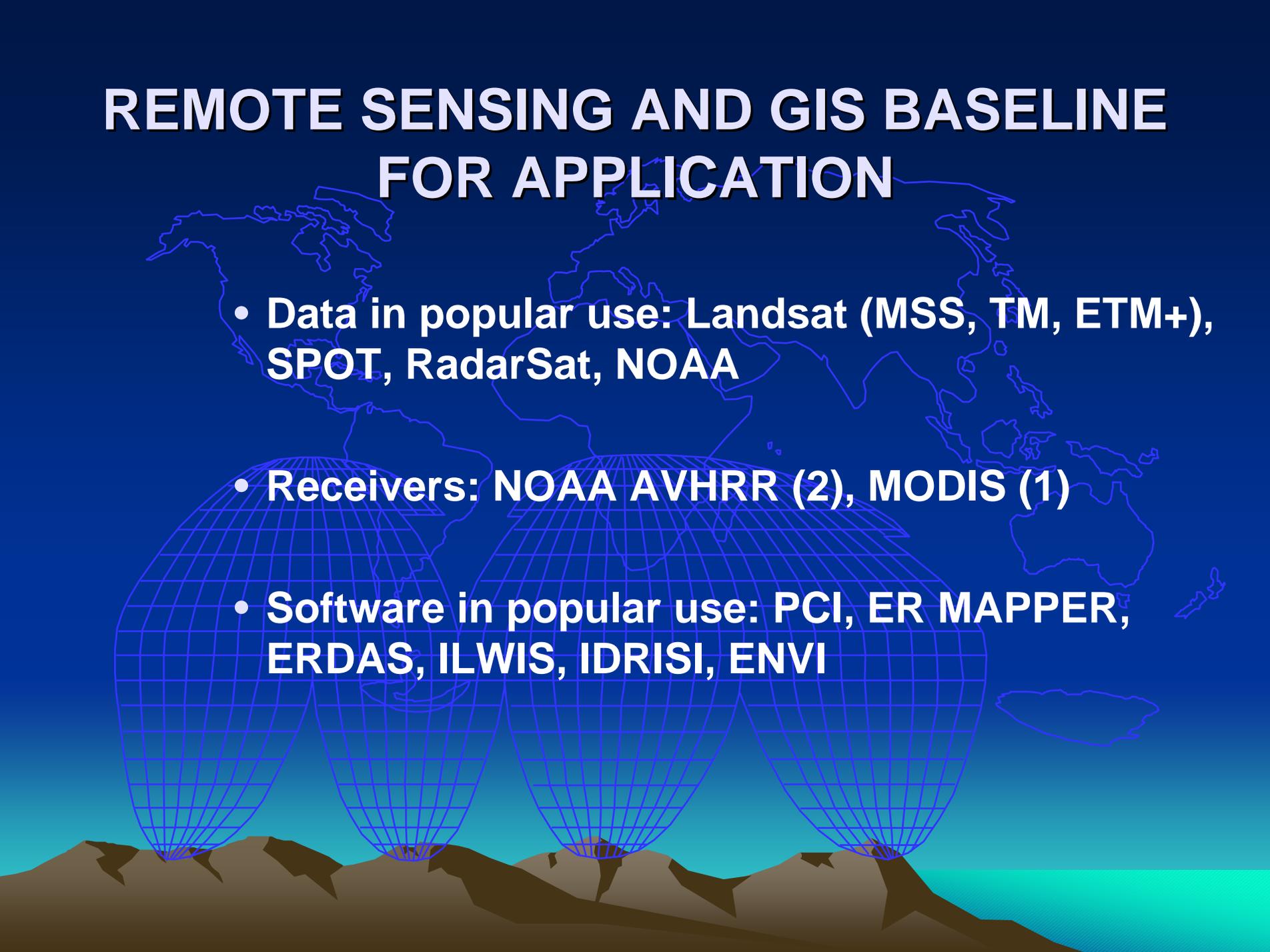
Dr. Tran Minh Y

Dept. of Remote Sensing Technology and GIS,

Institute of Geography,

Vietnamese Academy for Sciences and Technology

REMOTE SENSING AND GIS BASELINE FOR APPLICATION



- **Data in popular use: Landsat (MSS, TM, ETM+), SPOT, RadarSat, NOAA**
- **Receivers: NOAA AVHRR (2), MODIS (1)**
- **Software in popular use: PCI, ER MAPPER, ERDAS, ILWIS, IDRISI, ENVI**

Application Examples



REMOTE SENSING AND GIS APPLICATION

- *Application of Remote Sensing and GIS for monitoring and assessment of flooding influence to Thua Thien - Hue province, Hue City.* By using SPOT, Landsat-TM, AVNIR, RADASAT, damaging status of flooding had been shown and assess, especially at Thuan An River Mount.
- *Application of Remote Sensing and GIS for monitoring and assessment of flooding status at the coastal zone in the Central Part of Vietnam (from Thanh Hoa to Binh Thuan).* By using SPOT, Landsat-MSS,TM, AVNIR, RADASAT, especially RADASAT to indicate the flooding area at different time from 1972-2001. Some serious flooding area had been mapped, and the assessment emphasised on the 2 characterised river basins: Thu Bon (in Quang Nam province) anh Huong (in Thua Thien - Hue province). The tops of flooding by time referenced from Hydro-Meteo Service had been indicated on the images
- *Application of Remote Sensing and GIS for environmental disaster assessment.* Based on multitemporal images, some problems of natural disaster like: soil erosion, forest and soil degradation, forest fire had been find out and assess its' level of influences in some coastal area. Small satellite images like JoSAT-12 and ALSAT-1 also used for processing too.

FLOOD MONITORING AND ASSESSMENT



Materials used

- Annually Report of Hydro-Meteo Service from 1996-2003
- *Remote Sensing data:*
 - Alsat-1 received on 26 June 2003
 - DMC satellite image on 23 October 2003
 - Landsat ETM+, SPOT, RadarSat

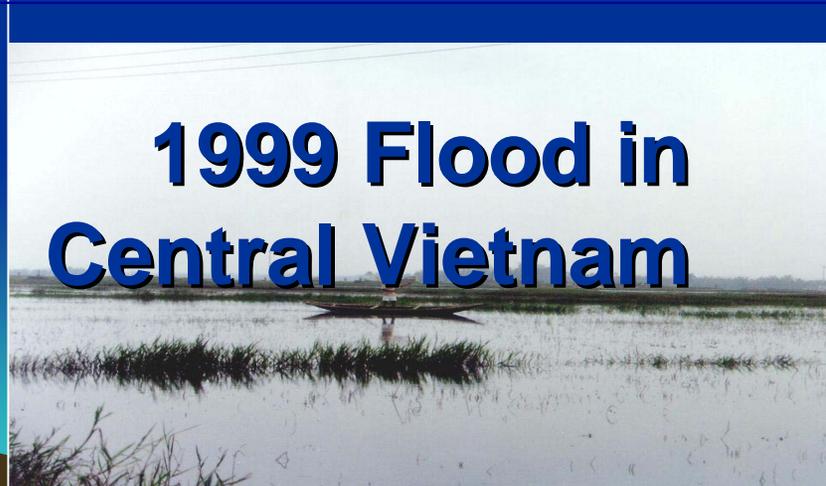
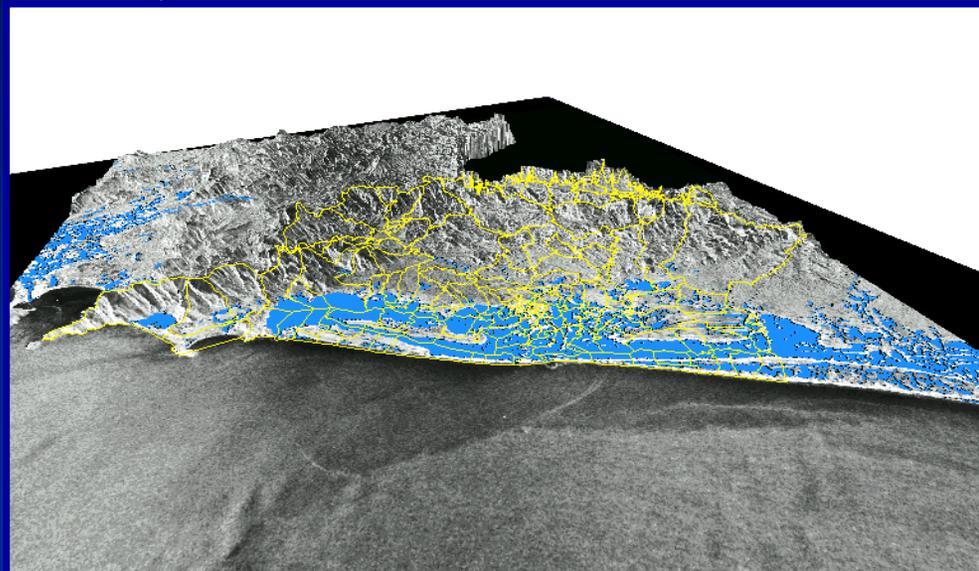


- Flooding is very serious problem in the Central part of Vietnam in the recent years
- Characteristic of flood in those central provinces are:
 - Strong intensity because of high slope level of topography
 - Tops of flooding often on beginning and mid of November (for example: at 3 Nov. 1996, 21 Nov. 1998, 3 Nov. 1999, 18 Nov. 2000 etc.)
 - Most serious flood in 1999, but in the year 2003, the flood is relatively serious too.
 - Much influence to human life every year



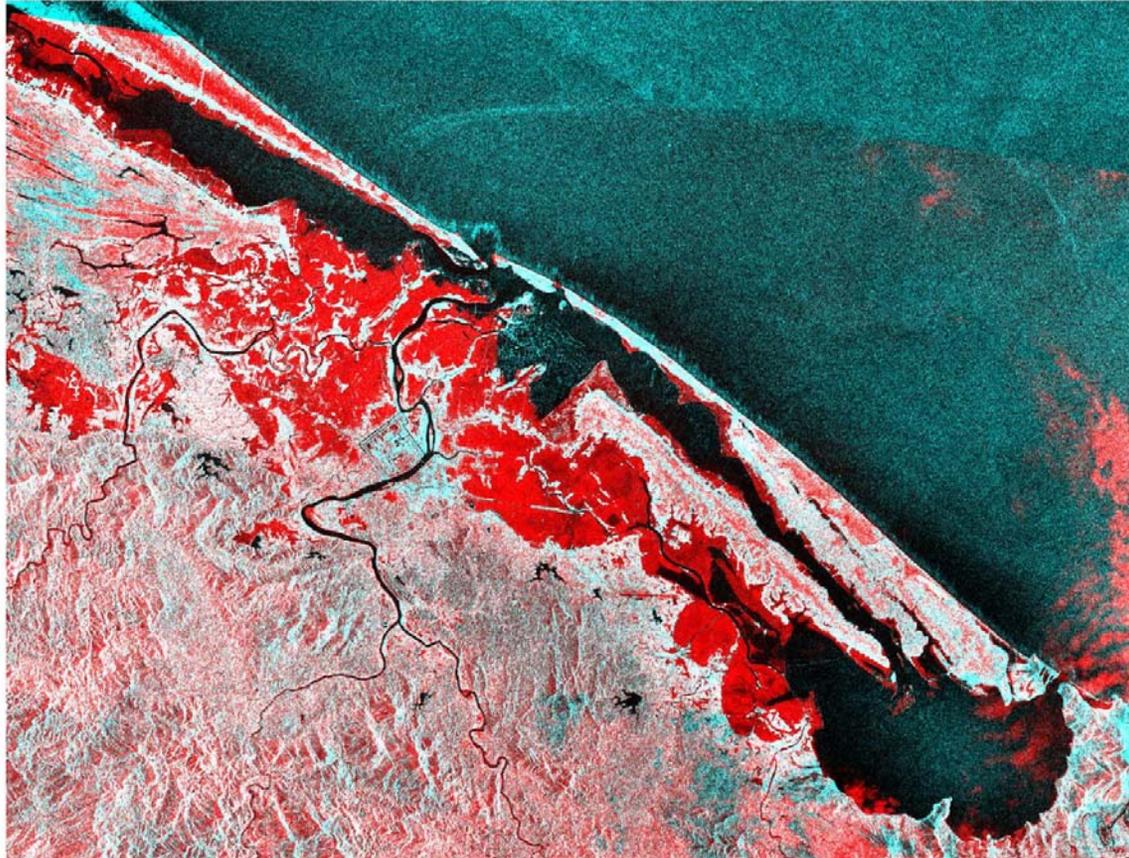
No	Tª n X.	DiÖh (ha)	No	Tª n X.	DiÖh (ha)	No	Tª n x.	DiÖh (ha)
1	H- ñng S- n	1	36	Phó D- ñng	336	71	Qu¶ng C¶ng	811
2	P. Tr- êng An	4	37	Vinh Phó	340	72	Phong Ho¶	843
3	P. ThuËn Ho¶	10	38	Vinh Thanh	341	73	H- ñng To¶n	864
4	P. Phó Hái	10	39	Thuû D- ñng	341	74	Phó Mü	867
5	P. Phó HiÖ	22	40	H- ñng XuÖ	349	75	Qu¶ng Vinh	903
6	P. Vũh Ninh	22	41	D- ñng Ho¶	349	76	§ iÖ M¶n	906
7	P. ThuËn Thunh	26	42	Vinh An	354	77	Phong B¶nh	910
8	XuÖ Léc	27	43	Léc Thuû	369	78	Phó An	932
9	P. Thuû XuÖ	31	44	Phong XuÖ	376	79	Phó TÖ	945
10	Vinh Mü	36	45	Léc Ban	398	80	§ iÖ H¶i	958
11	Léc Ho¶	39	46	H- ñng H¶	407	81	Phong HiÖ	964
12	P. Phó B¶nh	43	47	Phó MËu	410	82	Thuû Ph¶	1005
13	B¶nh Thunh	50	48	Léc TiÖ	414	83	Thuû VÖ	1021
14	P. Kim Long	52	49	Thuû Ph- ñng	415	84	Vinh H- ñng	1029
15	P. Ph- êng § öc	53	50	Léc S- n	437	85	Léc An	1063
16	Phó S- n	73	51	Phong An	455	86	Qu¶ng An	1140
17	P. ThuËn Léc	75	52	Phó ThuËn	479	87	Vinh Giang	1224
18	P. XuÖ Phó	76	53	Thuû TÖ	490	88	Léc Tr¶	1282
19	P. VÛD¶	82	54	Phong Thu	494	89	TT. Phó Léc	1305
20	Vinh H¶i	93	55	Qu¶ng Th¶	514	90	Léc B¶nh	1314
21	TT. Tõ H¶	114	56	P. H- ñng S-	545	91	H- ñng Phong	1317
22	H¶ng VÖ	125	57	H- ñng Vinh	545	92	Phong S- n	1344
23	P. H- ñng Long	196	58	H- ñng VÖ	546	93	Vinh Th. i	1365
24	Phó H¶i	224	59	Qu¶ng Phó	595	94	Phó L- ñng	1424
25	Léc Vũh	226	60	Phó Thanh	605	95	Phó § a	1429
26	Thuû B¶ng	232	61	Phó H¶	618	96	Phong Ch- ñng	1474
27	Thuû BiÖ	241	62	§ iÖ H- ñng	631	97	Léc H¶i	1498
28	Phong H¶i	275	63	H- ñng Ch-	632	98	TT. Sh¶	1528
29	Phó Th- ñng	278	64	H¶i D- ñng	653	99	Vinh HiÖ	1639
30	H- ñng An	279	65	Thuû ChÖ	680	100	Vinh XuÖ	1749
31	Thuû L- ñng	290	66	Qu¶ng Thunh	747	101	Qu¶ng L¶ i	1762
32	Phong Mü	295	67	Qu¶ng Ng¶ n	754	102	Phó XuÖ	1780
33	ThuËn An	305	68	§ iÖ Léc	756	103	Vinh H¶	2351
34	P. Thuû An	314	69	§ iÖ Ho¶	759	104	Léc § iÖ	2883
35	H- ñng V¶ n	329	70	Qu¶ng Th. i	808			

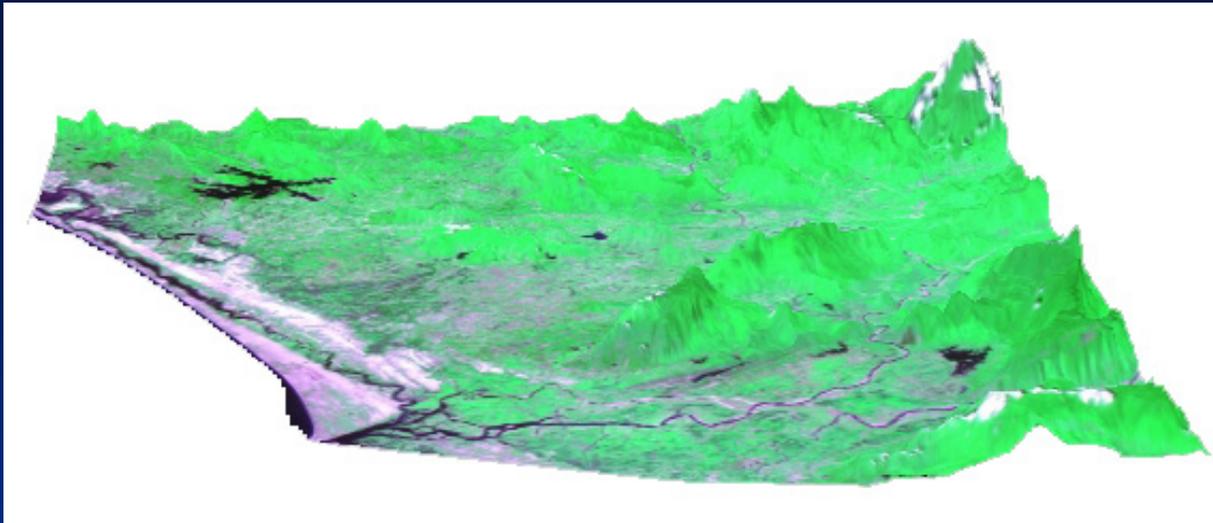
Flooded area (Ha) extracted from Radarsat Image



**1999 Flood in
Central Vietnam**

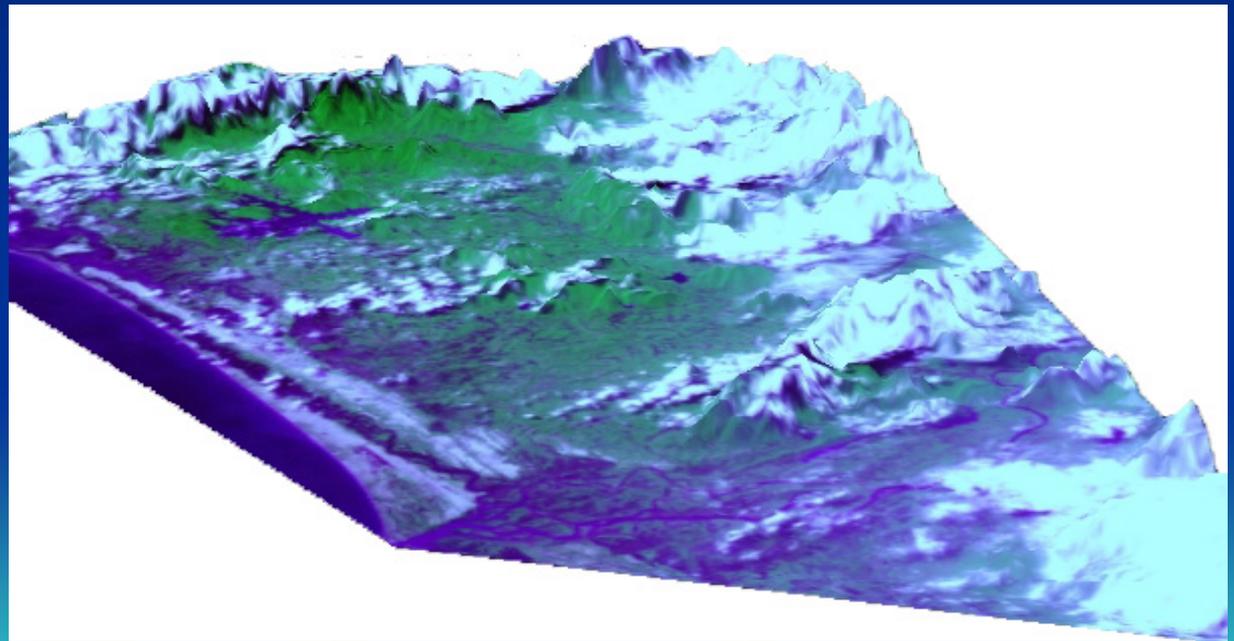
The overlay imageries of RADASAT (Nov. 1999) with LANDSAT-ETM (Jan 1999); The red color showing the inundated area



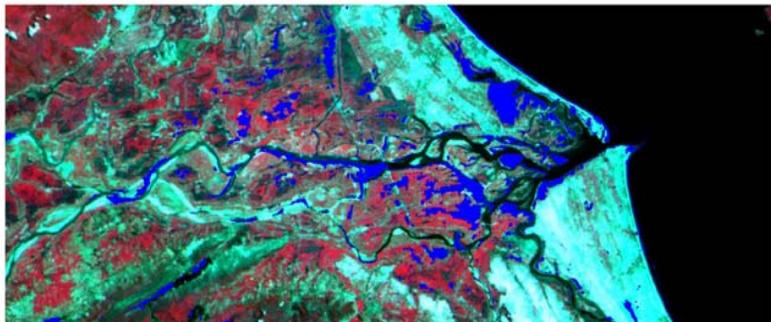


3D model of Thu Bon river basin in the dry season (Compose with Alsat1 image on Jun. 2003)

3D model of Thu Bon river basin in the rainy season (Compose with DMC image on Oct. 2003)

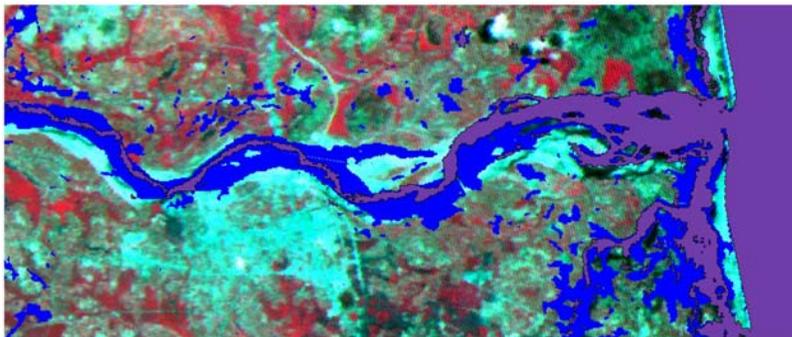


INNUNDATED AREA ON THU BON RIVER BASIN INFLUENCED BY OCTOBER FLOODING



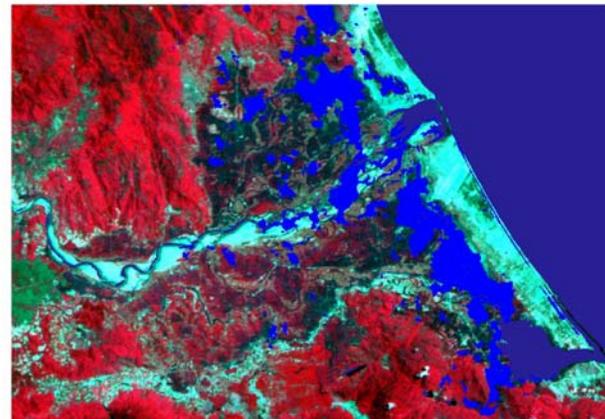
■ Inundated area on October in comparison with June 2003

OVERLAY OF TWO INTERPRETATION RESULTS ON TRA KHUC RIVER BASIN



■ Surface water on June 2003
■ Surface water on October 2003

OVERLAY OF TWO INTERPRETATION RESULTS ON DA RANG RIVER BASIN



■ Surface water on June 2003
■ Surface water on October 2003

Area innundated by districts

in Quang Ngai Province

DISTRICTS	SUM_AREA (ha)
BA TO	2920.30
DUC PHO	6536.12
MINH LONG	722.32
MO DUC	4271.85
NGHIA HANH	9478.31
SON HA	14.06
SON TINH	1430.11
TU NGHIA	145.11
TX.QUANG NGAI	3945.45
Total	29463.63

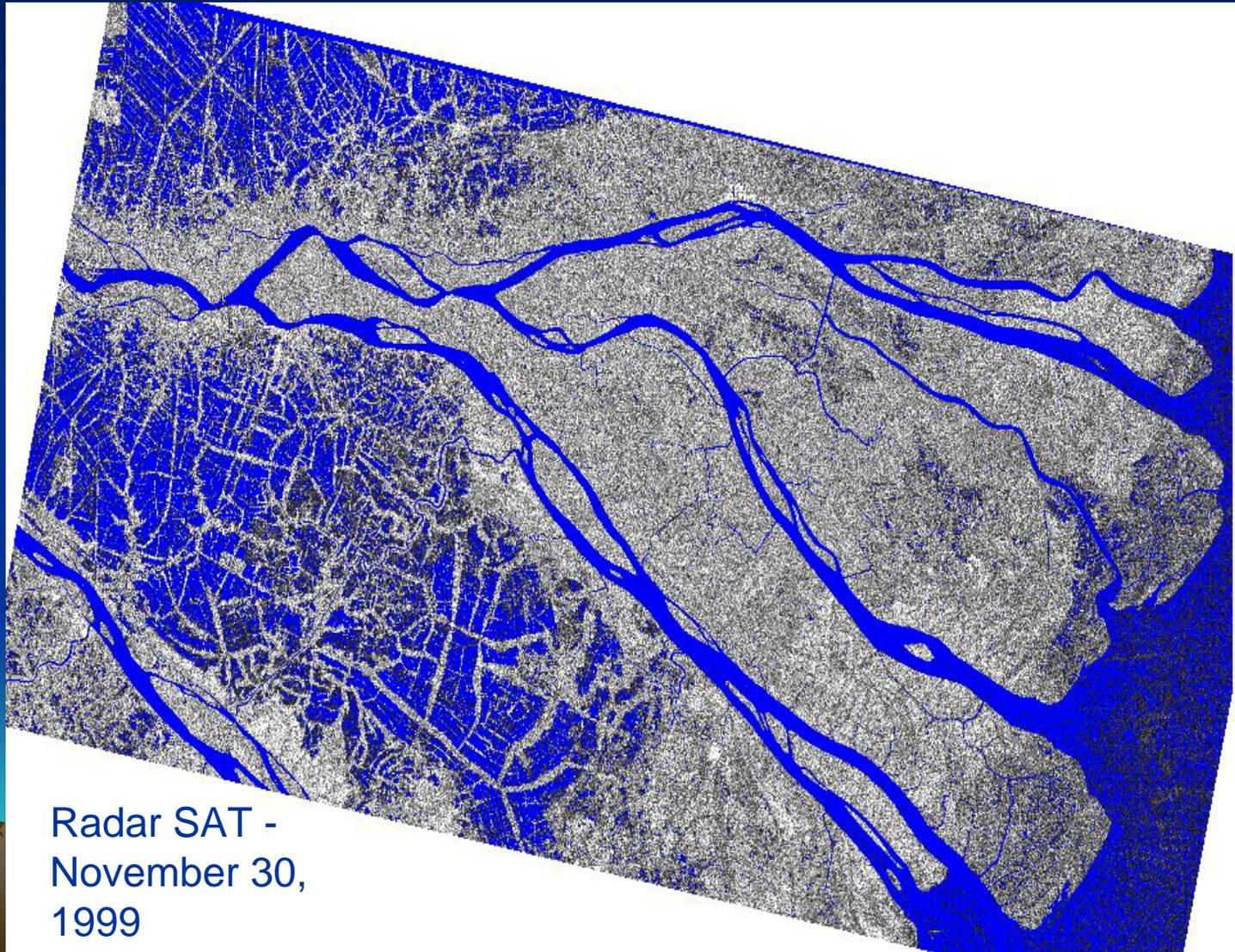
in Binh Dinh Province

DISTRICTS	SUM_AREA (ha)
AN NHON	7408.20
PHU CAT	52.57
QUY NHON TOWN	956.38
TAY SON	3405.58
TUY PHUOC	11456.39
VAN CANH	2142.72
Total	25421.86

in Phu Yen Province

DISTRICTS	SUM_AREA (ha)
DONG XUAN	1142.37
SON HOA	240.85
SONG CAU	1188.93
SONG HINH	874.39
TUY AN	1170.99
TUY HOA	6326.96
TUY HOA TOWN	490.86
Total	12246.63

Multi temporal change of flood area in the Lower Mekong Delta

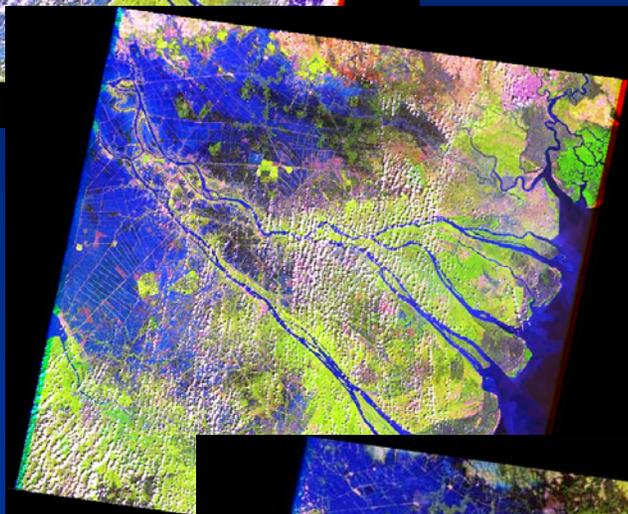
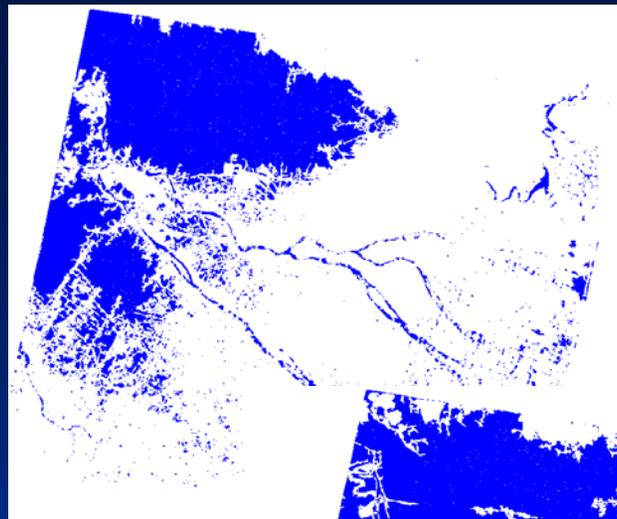


Radar SAT -
November 30,
1999

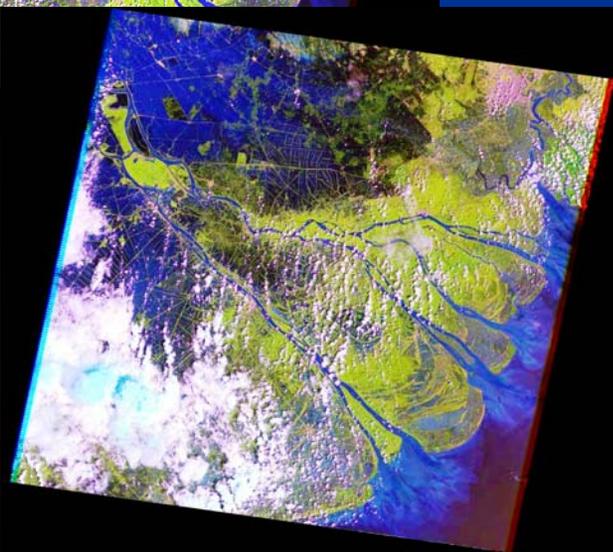
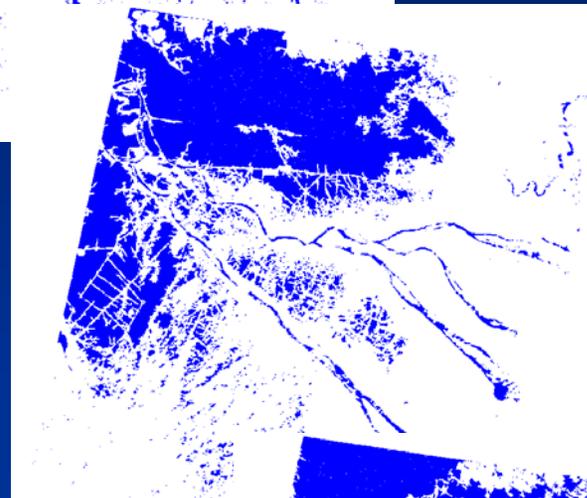
Landsat ETM
Images



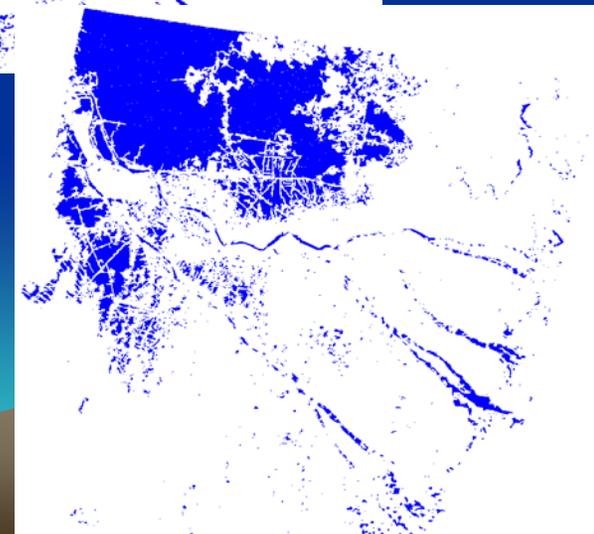
2000

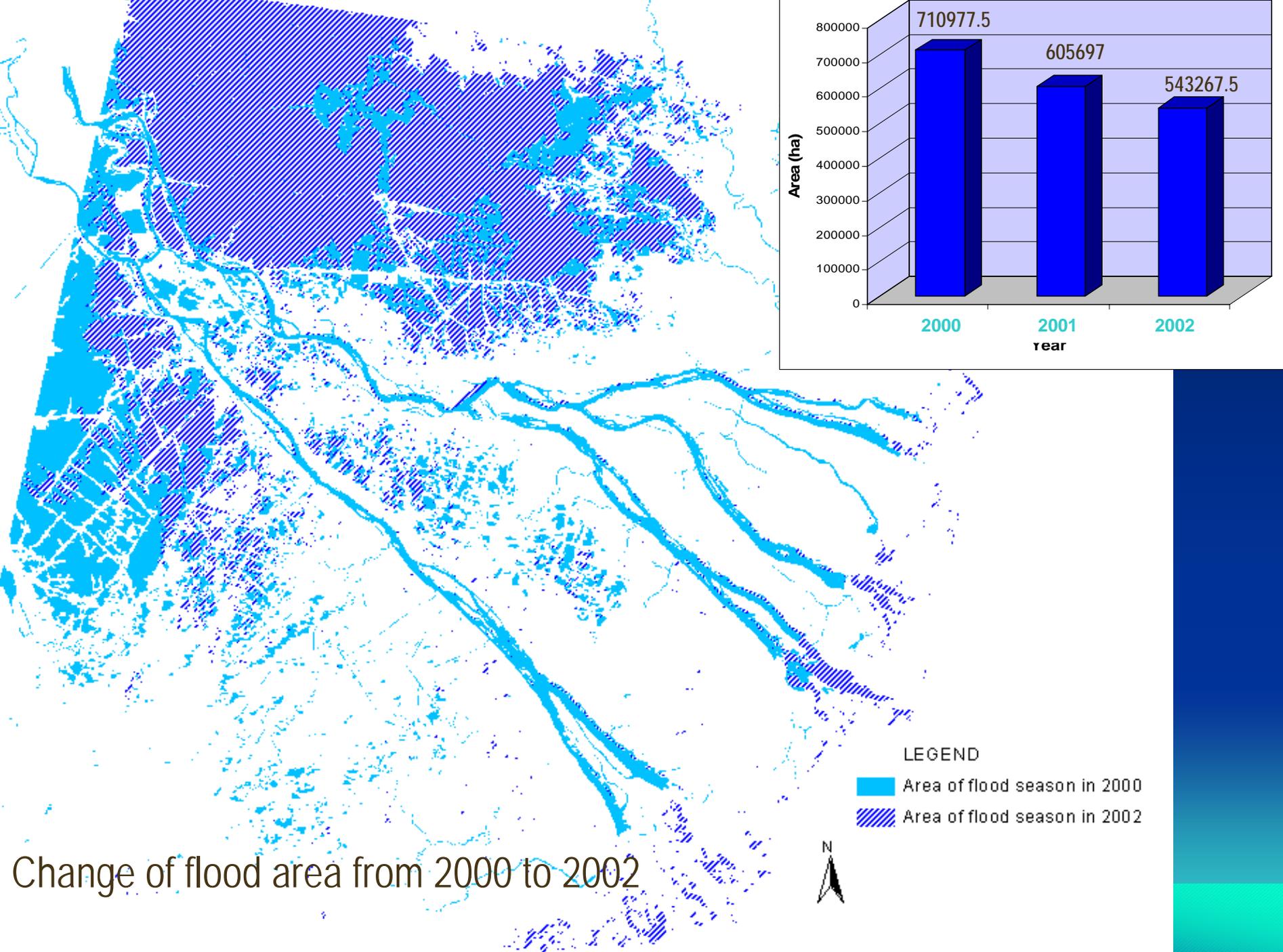


2001



2002





Change of flood area from 2000 to 2002

Dry season

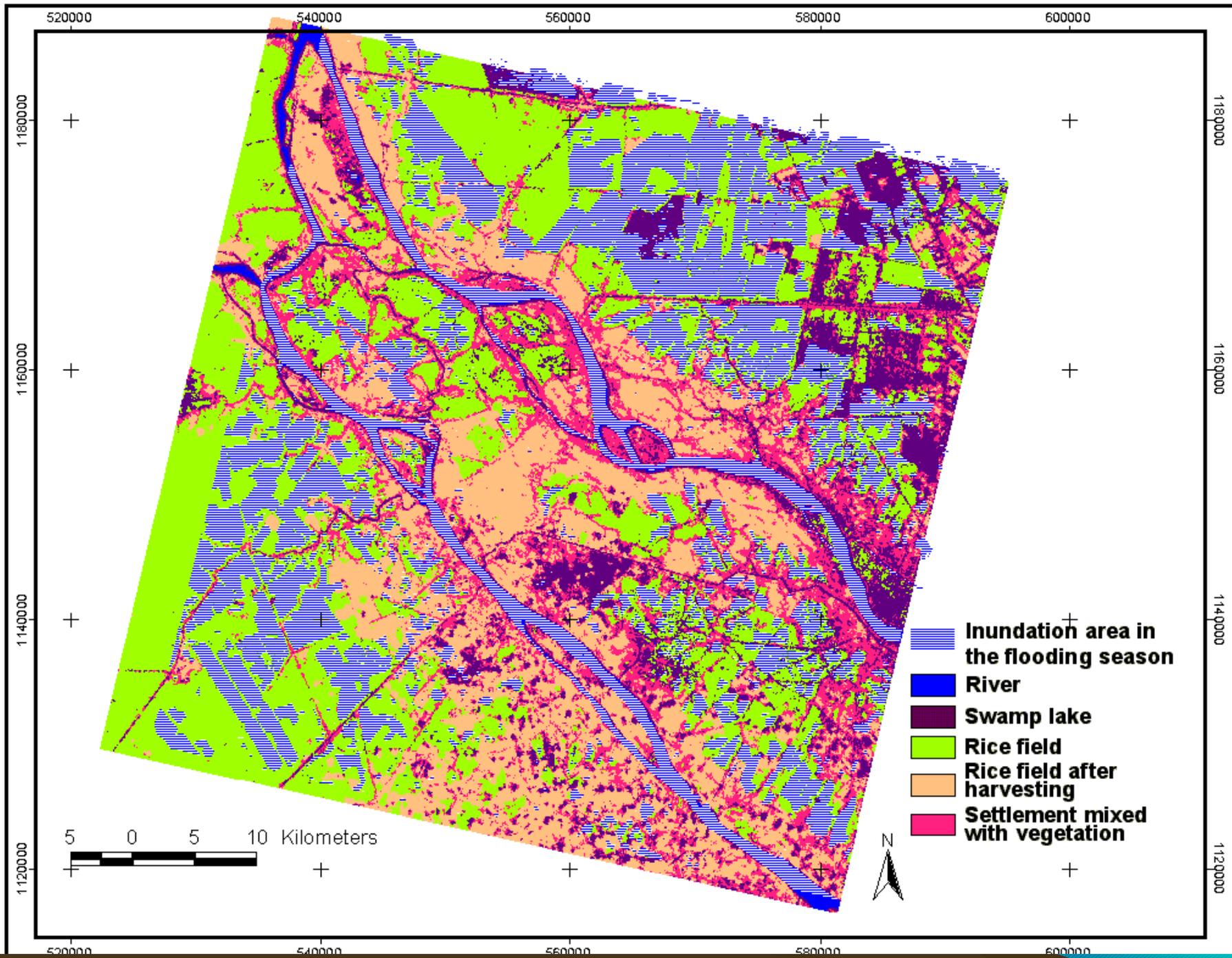


Spot image February 18, 2004

Rainy and flooding season



Spot image November 30, 2004



Conclusion

- Flood is very serious natural disaster of Vietnam in many years. It bring to much loss for the human life
- Every year, from 800 to thousand people had die because of flood and typhoon, more than million houses had been damaged, some hundreds thousands ha of paddy field had been innundated etc. The total loss caused by flood and typhoon estimated from 5000 to 7000 billions VND (300-400 millions USD).
- Application of Remote Sensing and GIS for environmental assessment caused by flooding is very useful for many last years. It should be more effective tool if several studies can be combined, exchange the technology, experiences and data so that we can come to estimation and forecast for future limitation of loss.
- The big problem for Vietnam side on the application of Remote Sensing and GIS is lack of Remote Sensing data.



Thank you

