APPLICATION OF HD MODEL TO SIMULATE MEKONG RIVER BASIN STREAMFLOW

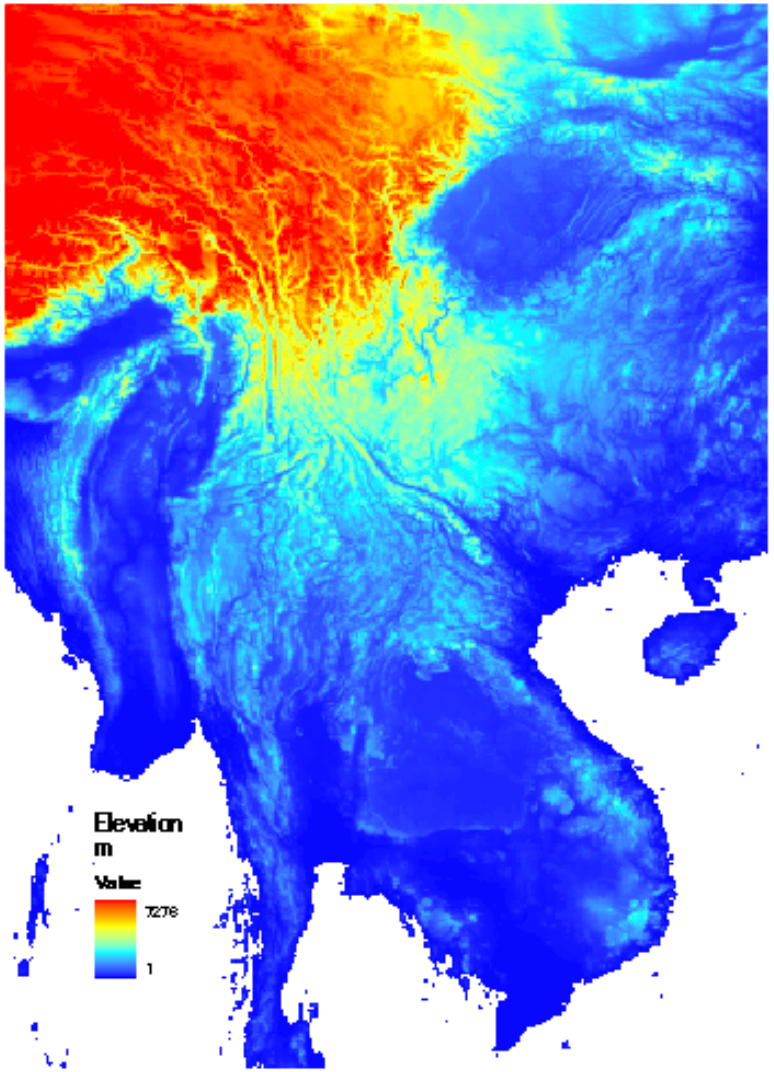
Thanh Cong
College of Science – Vietnam National University at Hanoi
Tung Nguyen
National Institute of Meteorology, Hydrology and Environment

Objective

- Simulate Mekong river basin streamflow using HD hydrological model.
- Familiar with Mandriva Linux operating system.

Description of study area

- Located 8º-35ºN and 92º-110ºE
- 12th longest river in the world
- Drainage area 795,500 km^2
- Main stream length 4,620 km
- Climate: Southwest Monsoon



Description of study area

- Temperature

Site	Altitude masl	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Deqen[1]	4,000	-4	-2	2	5	10	13	13	13	11	11	6	-3
Pleiku	2,460	18	20	23	24	24	23	22	22	22	22	21	19
Dali[2]	1,900	8	10	13	16	19	20	20	18	18	15	12	9
Jinhong[3]	540	15	18	21	24	26	26	25	25	24	23	18	16
Chiang Rai	382	21	22	26	30	29	27	28	27	27	27	23	21
Luang Prabang	305	22	23	26	28	28	28	28	28	27	27	24	21
Vientiane	170	24	25	28	29	29	29	28	28	28	28	25	23
Khon Kaen	166	24	25	28	29	28	28	27	27	26	26	25	23
Pakse	102	26	27	30	30	29	29	28	28	28	28	26	25
Phnom Penh	10	27	28	30	31	30	29	28	28	28	28	27	26

1. North Yunnan-Tibet border 2. Central Yunnan 3. South Yunnan

Description of study area

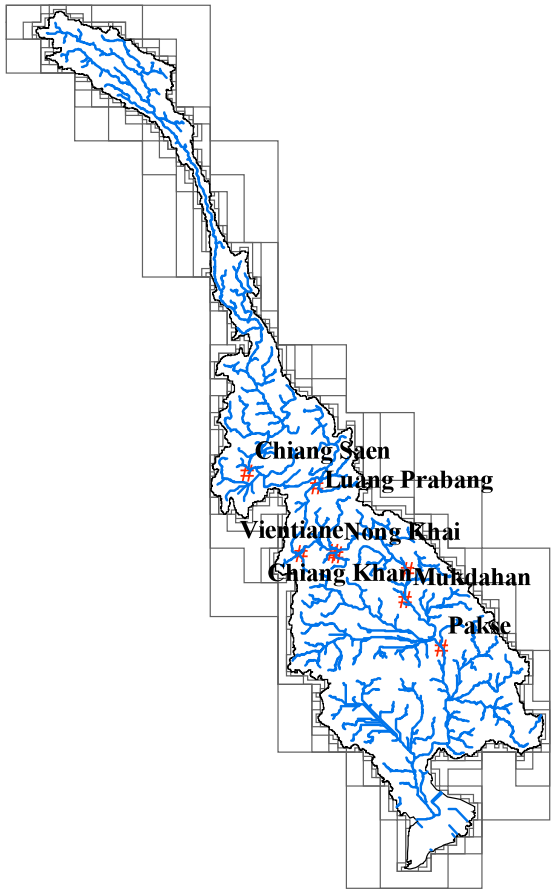
- Rainfall

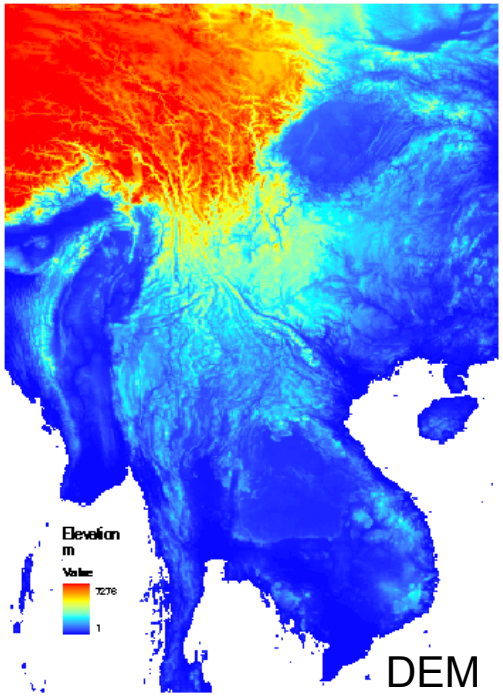
Month	Northern Region	Central Region	Korat Plateau	Central Highlands	Cambodian Floodplain	Vietnam Delta
	Chiang Rai	Pakse	Khon Kaen	Pleiku	Phnom Penh	Chau Doc
Jan	13	2	5	6	8	8
Feb	10	7	15	6	3	3
Mar	20	20	35	25	15	15
Apr	85	70	60	85	65	75
May	190	220	170	225	115	165
Jun	210	380	180	350	125	110
Jul	310	390	160	360	160	140
Aug	390	500	185	460	160	170
Sep	280	320	260	360	265	160
Oct	140	100	120	220	255	250
Nov	60	20	10	75	130	160
Dec	20	3	3	20	20	40
ANNUAL	1,730	2,050	1,210	2,200	1,320	1,300

Description of study area

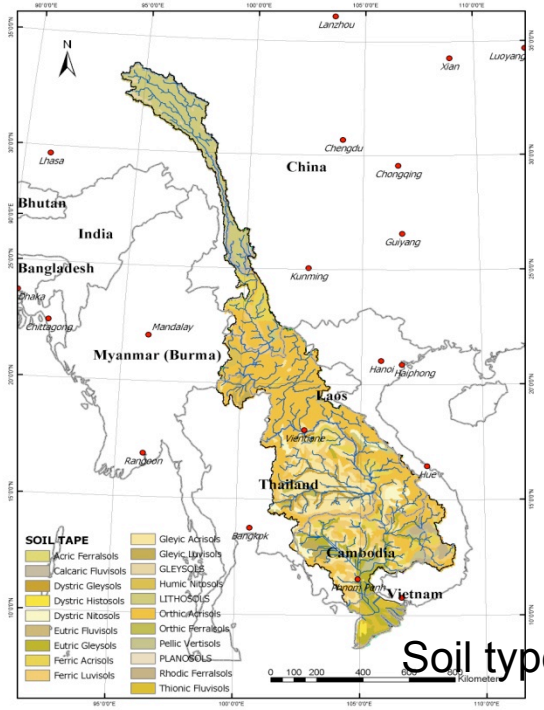
- Streamflow

Month	Mainstream Site						
	Chiang Saen	Luang Prabang	Vientiane	Nakhon Phanom	Mukdahan	Pakse	Kratie
Jan	1,150	1,690	1,760	2,380	2,370	2,800	3,620
Feb	930	1,280	1,370	1,860	1,880	2,170	2,730
Mar	830	1,060	1,170	1,560	1,600	1,840	2,290
Apr	910	1,110	1,190	1,530	1,560	1,800	2,220
May	1,300	1,570	1,720	2,410	2,430	2,920	3,640
Jun	2,460	3,110	3,410	6,610	7,090	8,810	11,200
Jul	4,720	6,400	6,920	12,800	13,600	16,600	22,200
Aug	6,480	9,920	11,000	19,100	20,600	26,200	35,500
Sep	5,510	8,990	10,800	18,500	19,800	26,300	36,700
Oct	3,840	5,750	6,800	10,200	10,900	15,400	22,000
Nov	2,510	3,790	4,230	5,410	5,710	7,780	10,900
Dec	1,590	2,400	2,560	3,340	3,410	4,190	5,710

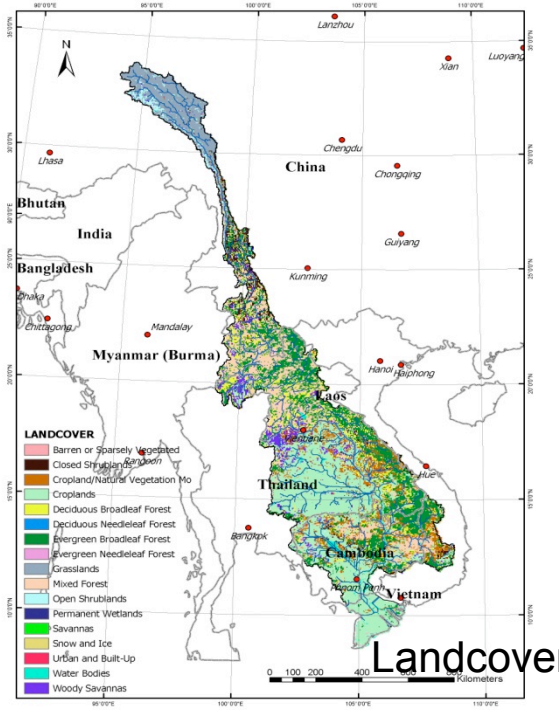




DEM



Soil type

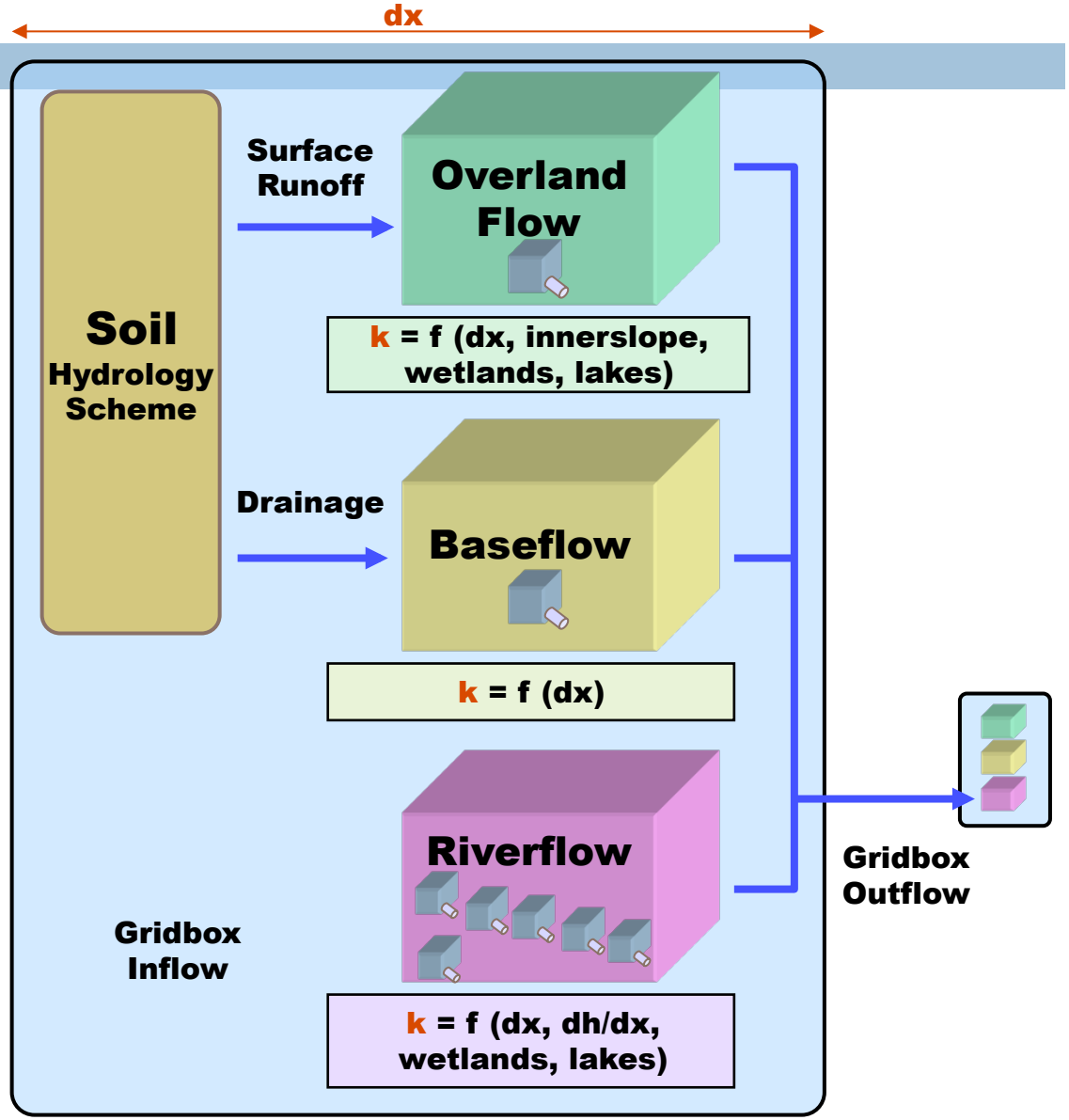


Landcover

After A.W. Jayawardena

Methodology – HD model

- Gridbox flow model
- Applied and validated on global scale at 1/2 deg.
- Part of ECHAM5-MPI-OM
- Linear reservoir routing method

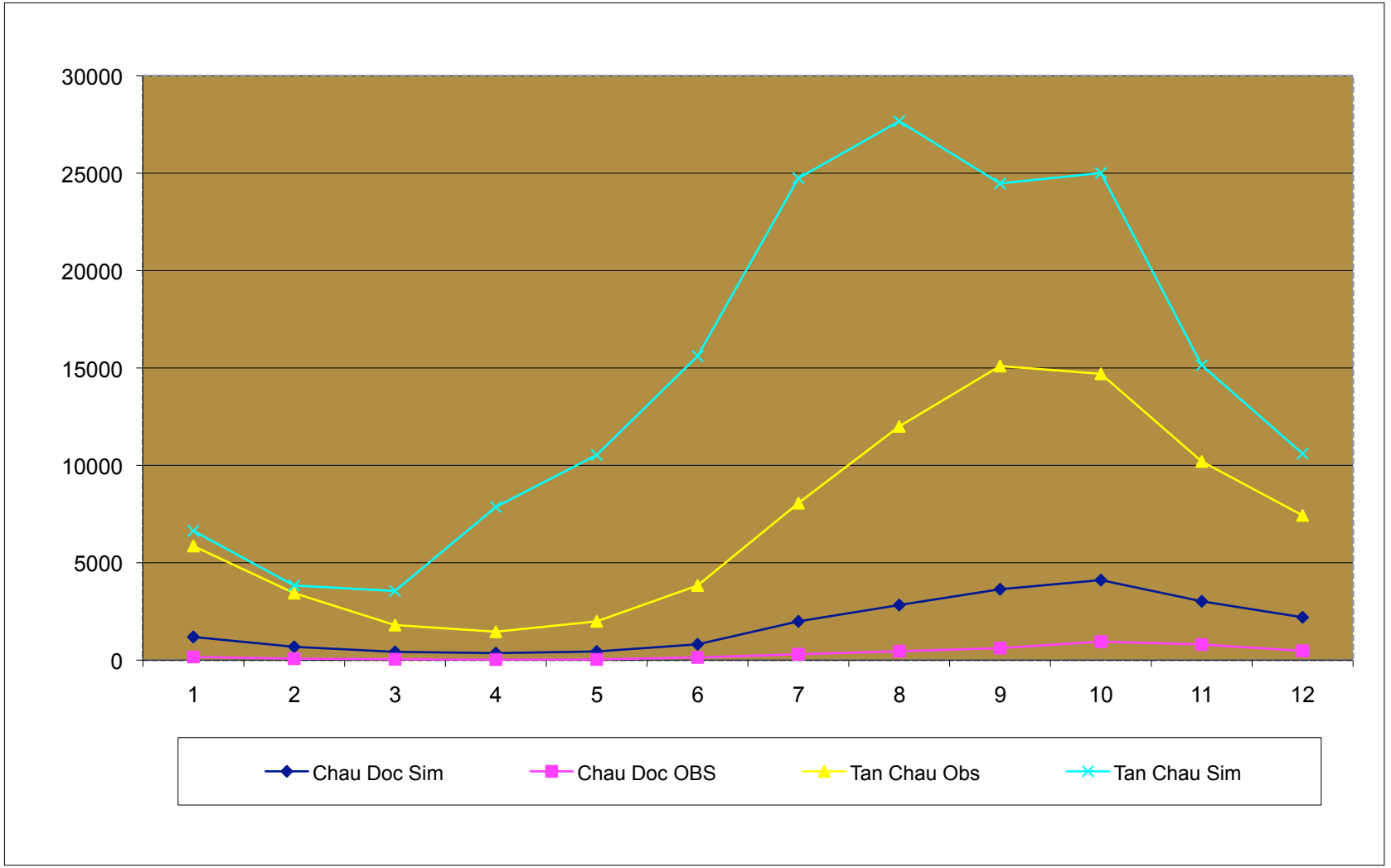


Hagemann & Dumenil

Methodology

- Data used
  - Daily surface runoff and drainage simulated with the SL scheme using ERA40 data for 1998.

Results


30000
25000
20000
15000
10000
5000
0
1
2
3
4
5
6
7
8
9
10
11
12
Chau Doc Sim
Chau Doc OBS
Tan Chau Obs
Tan Chau Sim

Discussion

- Sources of error
  - Hydrological process in the soil are not well represented in ERA;
  - Overestimate of discharge due to bias in precitipitation data ERA40;

THANK YOU