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Flood Mapping Using Time Series Sentinel-1 Data with A Bayesian Probability Analysis

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1. Study Area

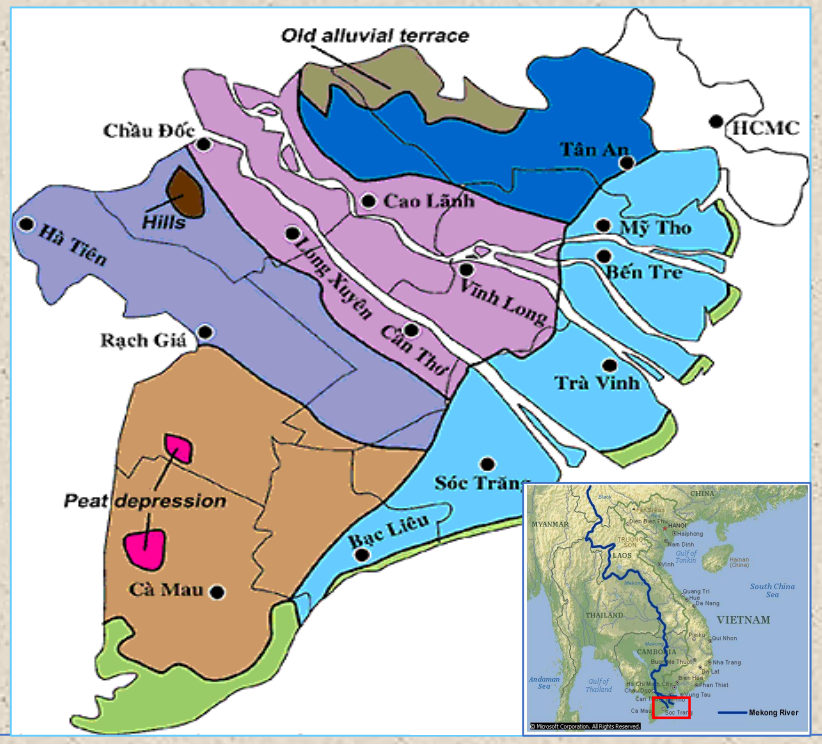
Vietnam

- Area 331,210 km^2
- 97 million people
- GDP grew at 7% 2018
- Dynamic market
- **6th** affected by **climate change** (Germanwatch eV 2019)

1. Study Area

Vietnam Mekong Delta

- key economic region, Diversity
- 40,500 km^2; 17.3 million inhabitants
- “rice bowl of Asia" (M. Garschagen et al 2012)
- fruits; fisheries and aquaculture



Rice filed

Fish harvesting

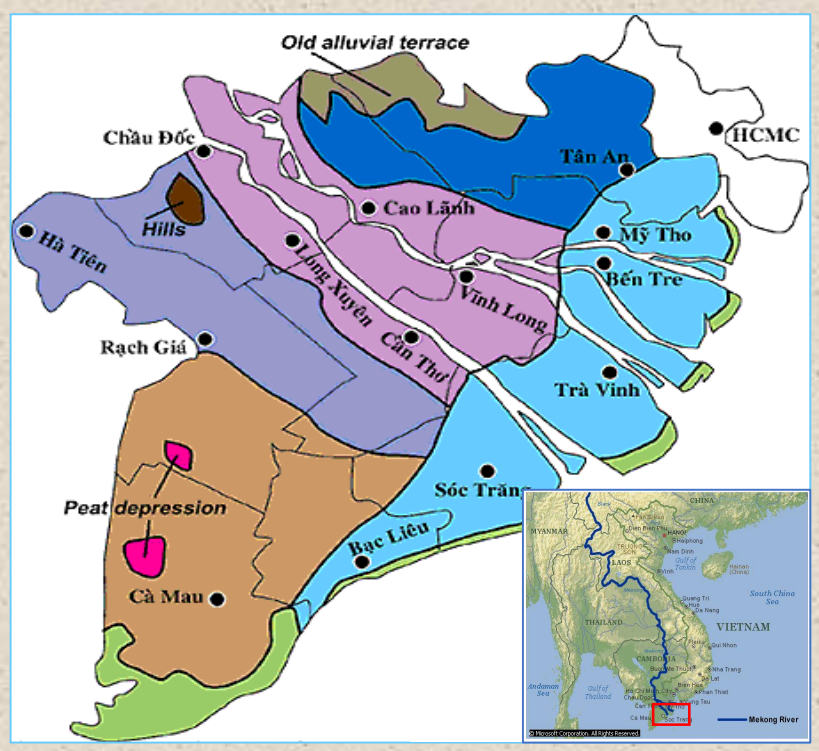
Shrimp harvesting

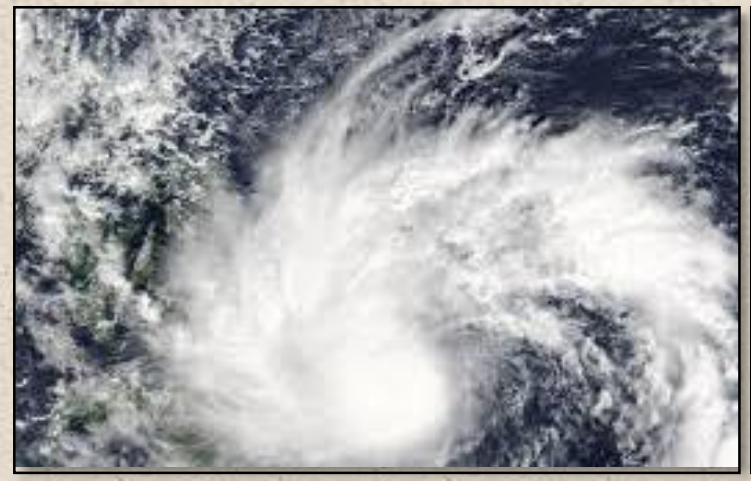
Fruit float market

1. Study Area

Vietnam Mekong Delta

- Climate change - flood, drought, typhoon, landslide, subsidence, saline intrusion, sea level rise, **migration** and other issues.





Typhoon

Drought

Landslide

Sea level rise

2. Flood

Floods in Vietnam Mekong Delta

- Annual
- Usual period: June – December
- Highest flood peak is around 4m – 5m
- Becoming serious, destructive and unpredictable

2. Flood

Floods in Vietnam Mekong Delta

❖ **Historical flood in 2000**

- Highest peak 5.06m at Tan Chau station (Vietnam Academy for Water Resources, 2011)
- 539 deaths (over 300 are children), 212 injured, half a million people have emergency relief
- 890,000 houses, 224,508 ha of rice were flooded, 86,000 ha of damaged crops
- Total destruction estimated ~ 200 million USD

❖ **Flood in 2018**

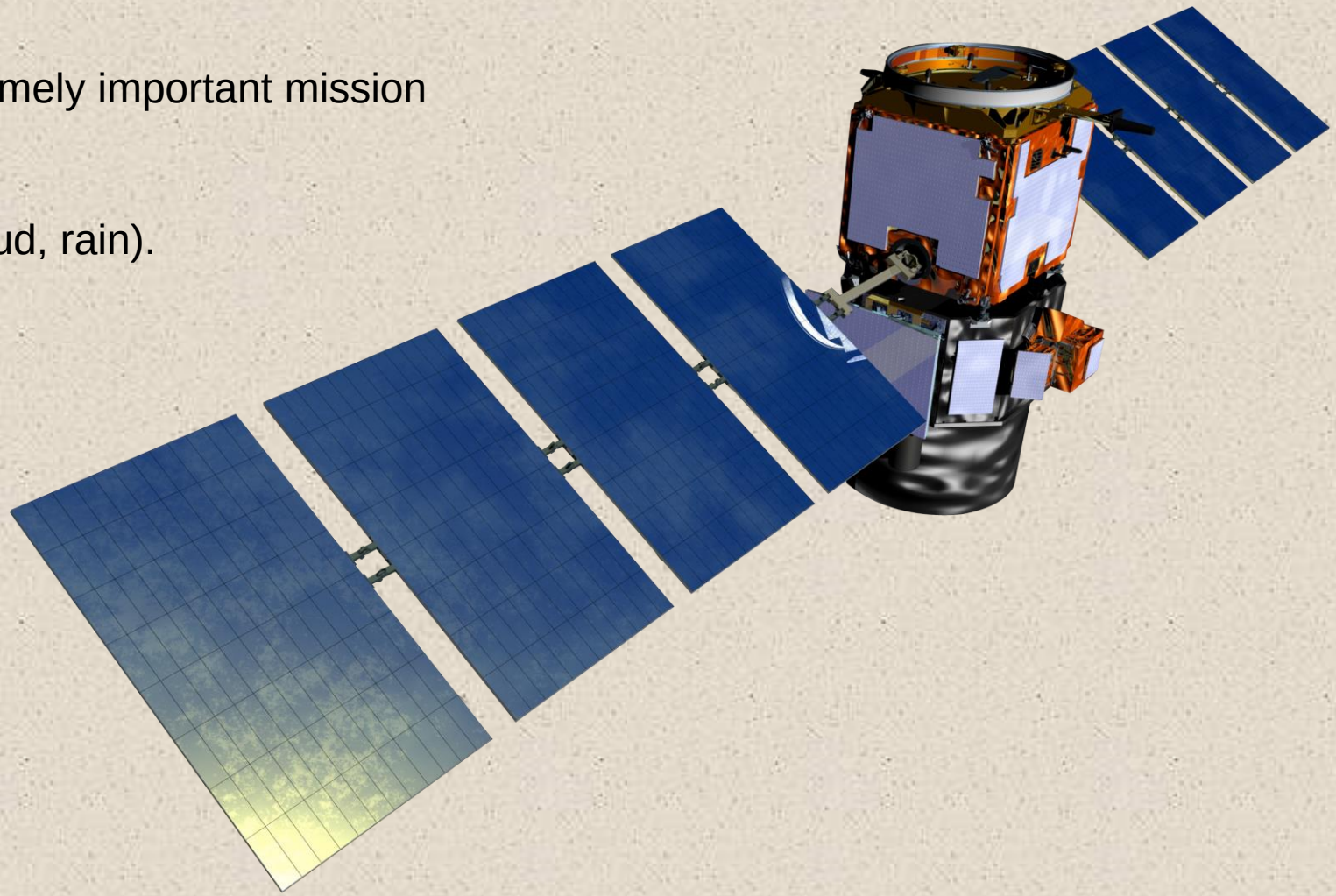
- Highest peak 4.09 at Tan Chau station
- Over 2000 ha rice field were flooded completely
- Many loses about people and property.

3. Flood Mapping

3.1 Data

❖ Mapping and monitoring floods is extremely important mission

- Quick; cost-effective; accurate
- Overcome the weather conditions (Cloud, rain).
- Radar data >< Optical data resources.



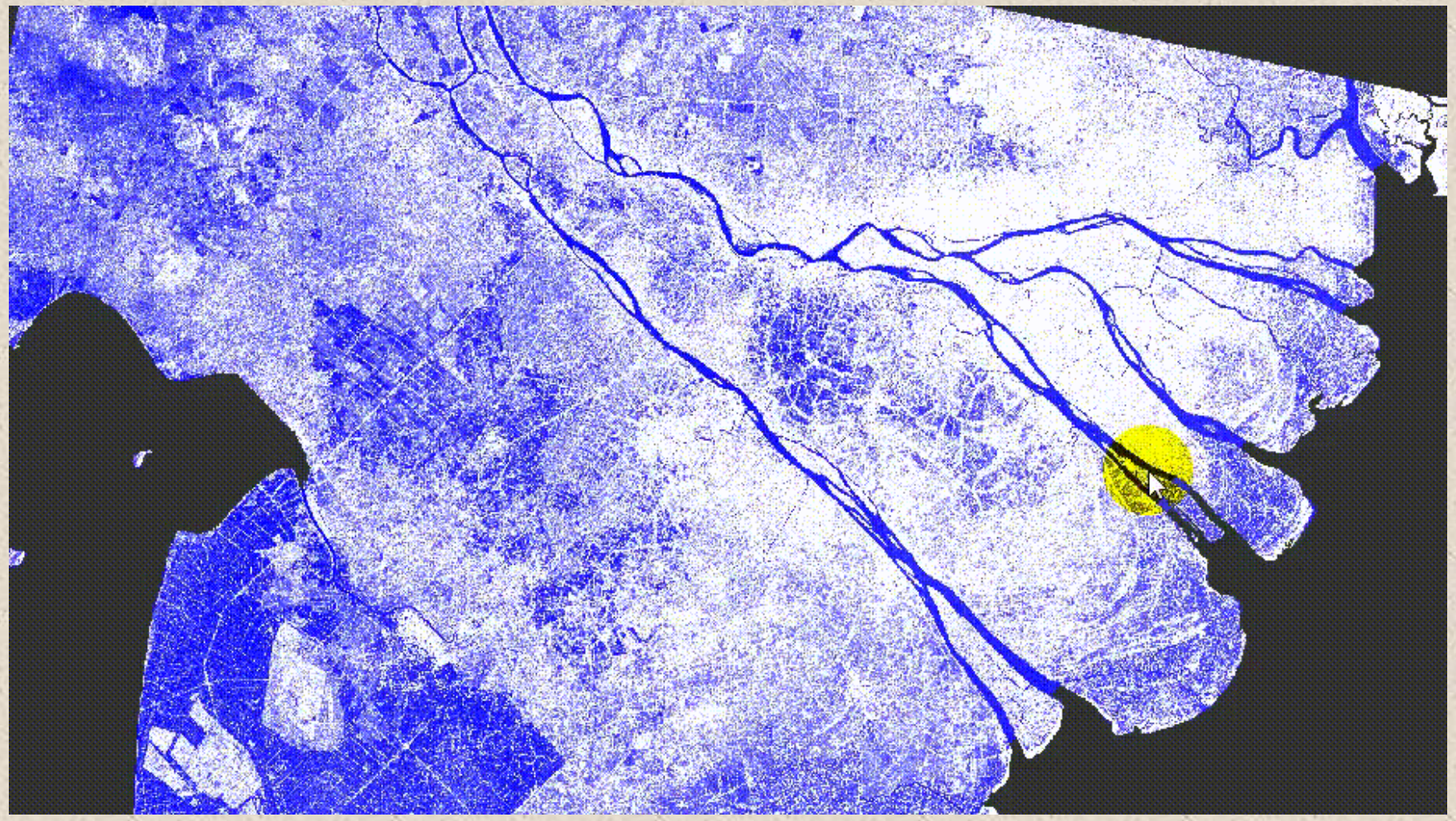
Sentinel - 1 data

- All weather
- high spatial resolution
- short-revisit time
- Free

3. Flood Mapping

3.2 Flood event in Vietnam Mekong Delta

- Between Dry season and Flood season in 2017



3. Flood Mapping

3.3 Issues

3.3.1 Submerged vegetation

- The **double-bounce interactions** occurs when the radar signal penetrates through the vegetation and reaches the water surface. (Plank et al. 2017; Tsyganskaya et al. 2018).
- **Increase** significantly **backscatter intensities** and induce the errors in delineation. (Plank et al. 2017; Tsyganskaya et al. 2018).



3. Flood Mapping

3.3 Issues

3.3.2 Temporary open water

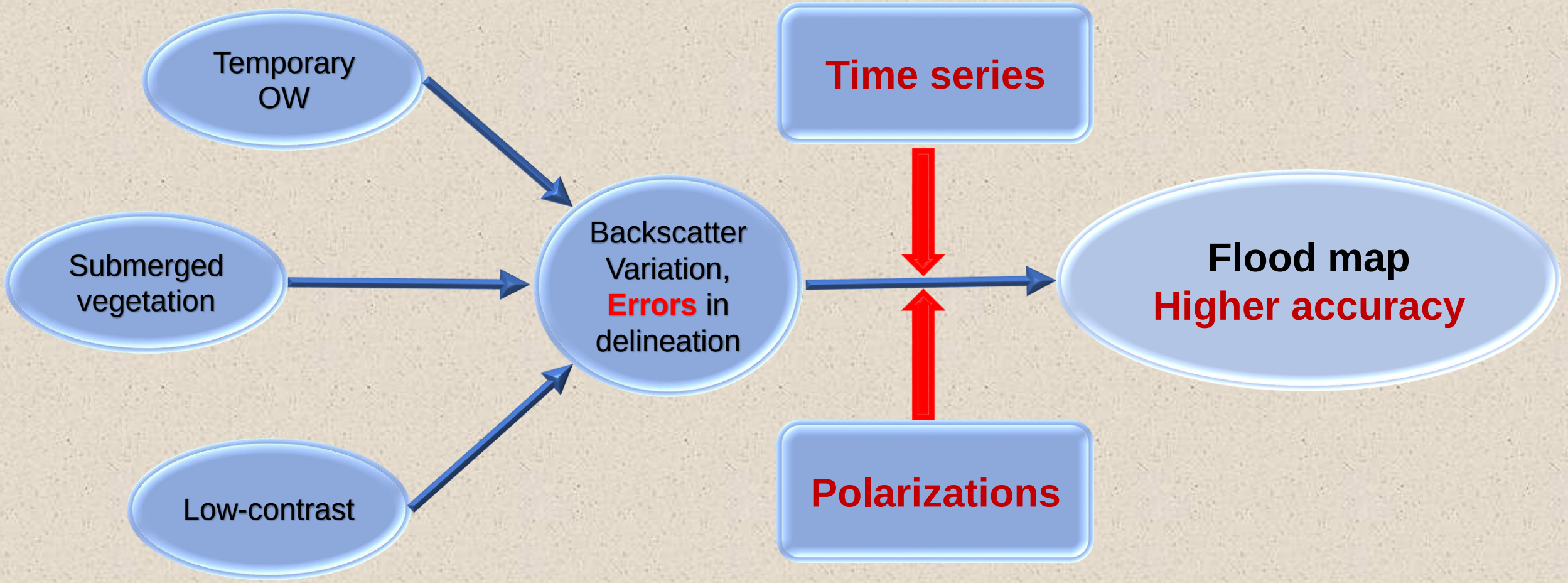
- An increase and decrease in the backscatter values occurring in the flood duration (Tsitsi Bangiraa et al. 2018).

3.3.3 Low land-water contrast

- Low contrast between land-water at the reservoirs occur in the rainy season and in the dry season. It also creates the change in backscatter intensities (Dirk Eilander et al. 2014).

3. Flood Mapping

3.4 Goals



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