

Mapping Surface Water Stored in Small Reservoirs in the Volta Basin, West Africa

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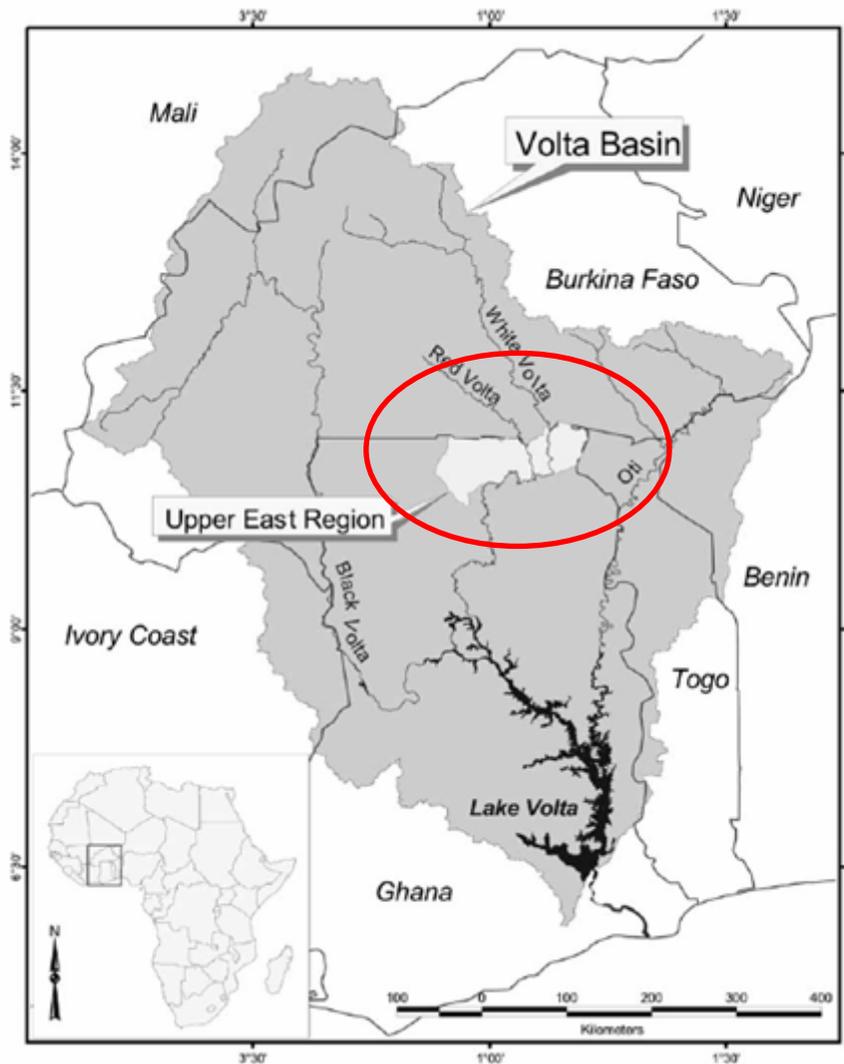
Small Reservoirs, West Africa

Outline

- Small reservoirs
- Surface – area relations
- ASAR (fair weather)
- ASAR (foul weather)



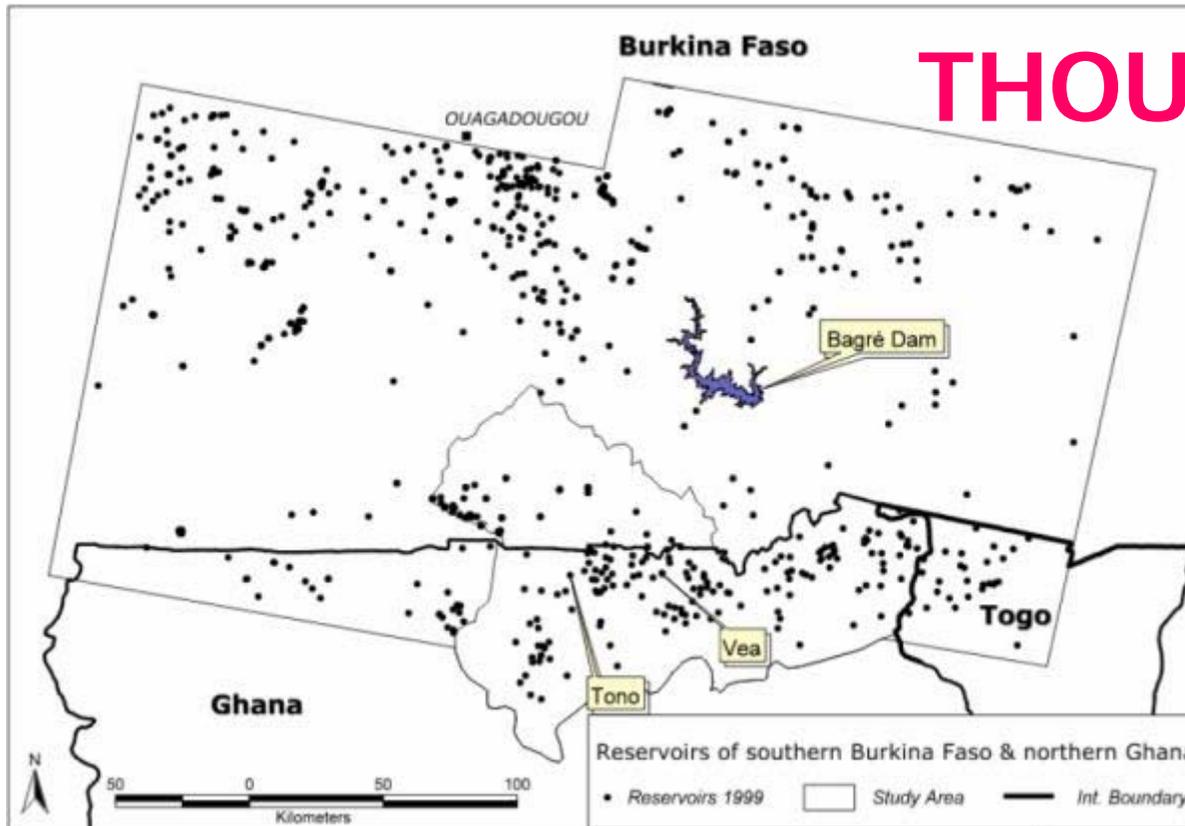
Small Reservoirs, West Africa



**Study area
in Volta Basin**

Small Reservoirs, West Africa

THOUSANDS!



	1984	1999
# Dams	302	710
ha Reservoirs	4134	31200

Small Reservoirs, West Africa



Village level irrigation development



Small reservoirs – Hydrology from Space II



Small Reservoirs, West Africa



Multiple use - Cattle

Small Reservoirs, West Africa



Multiple use - Fishing

Small Reservoirs, West Africa



Large socio-economic impact

Multiple use – Household water

Small Reservoirs, West Africa



Ensemble
impact ?



Small reservoirs – Hydrology from Space II



Small Reservoirs, West Africa



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VOLTA • LIMPOPO • SAO FRANCISCO



Ensemble
impact ?

AO 2781

Satellite
monitoring



Small reservoirs – Hydrology from Space II

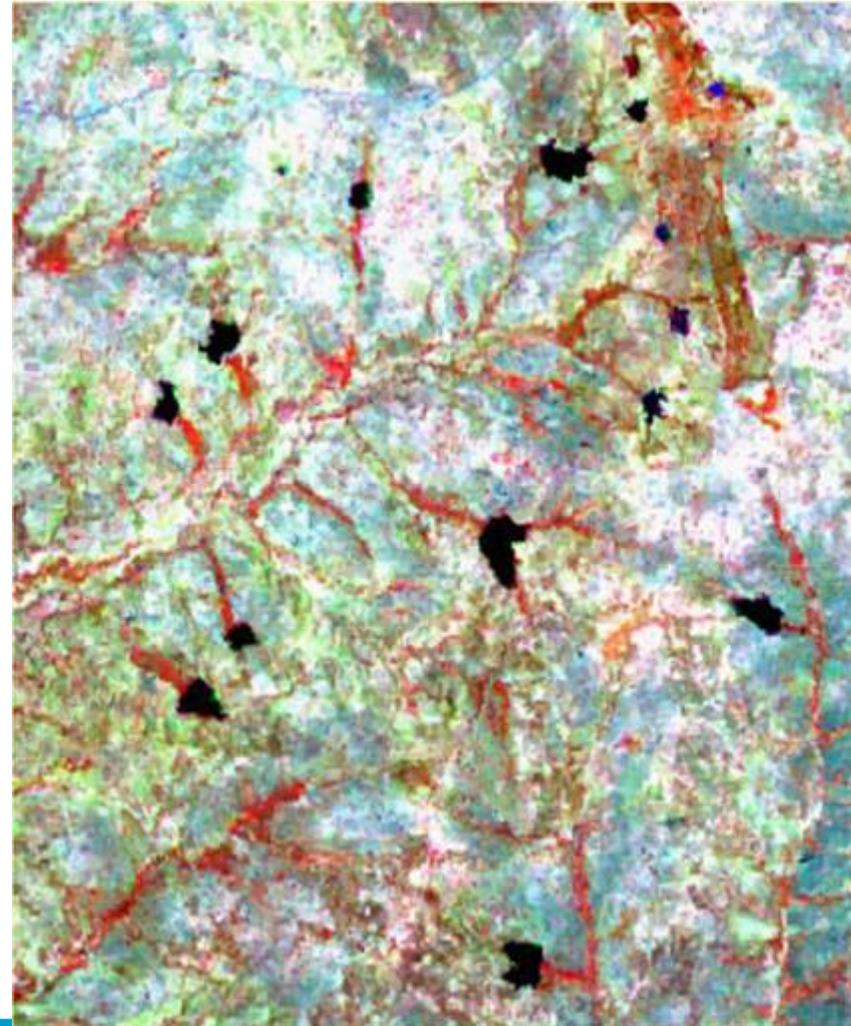


Storage mapping

Step 1:

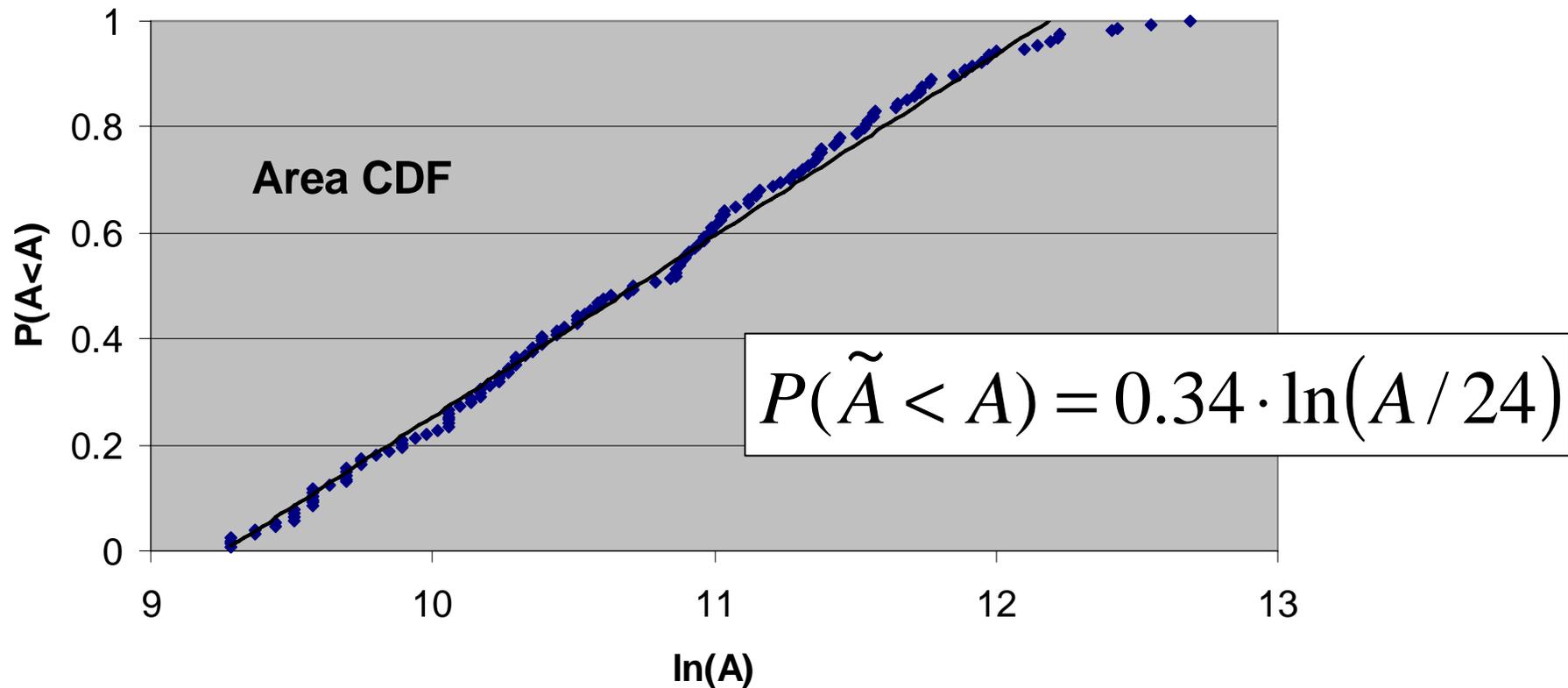
Map all reservoir areas with satellites:

Landsat



Storage mapping

Step 1: Results, distribution



Storage mapping

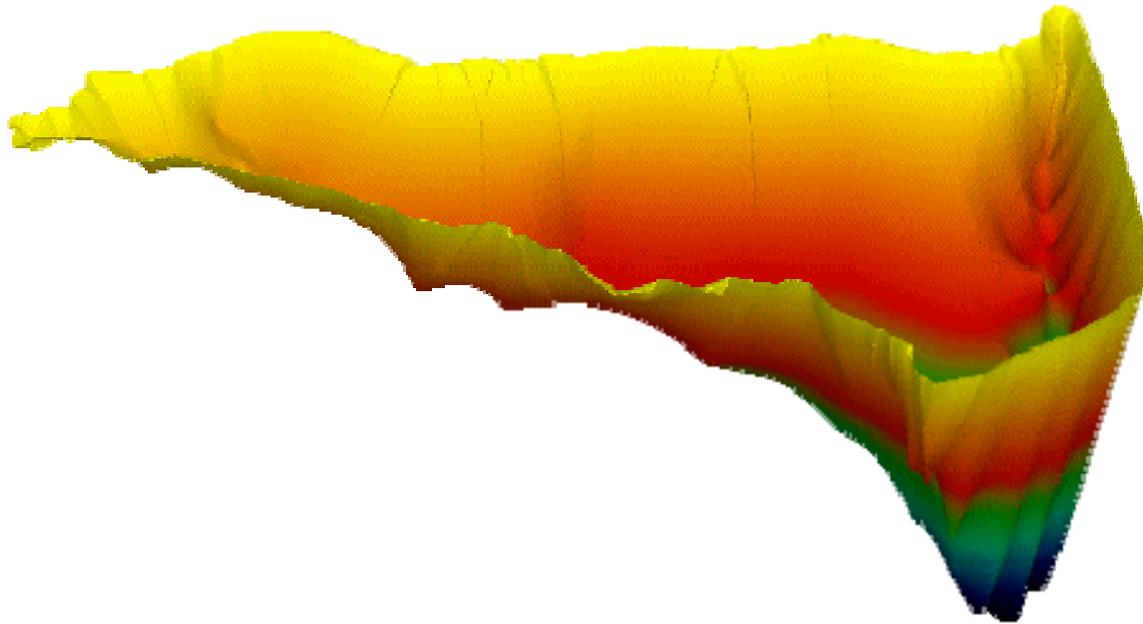
Step 2: Bathymetry



Bathymetric survey – Jens Liebe

Storage mapping

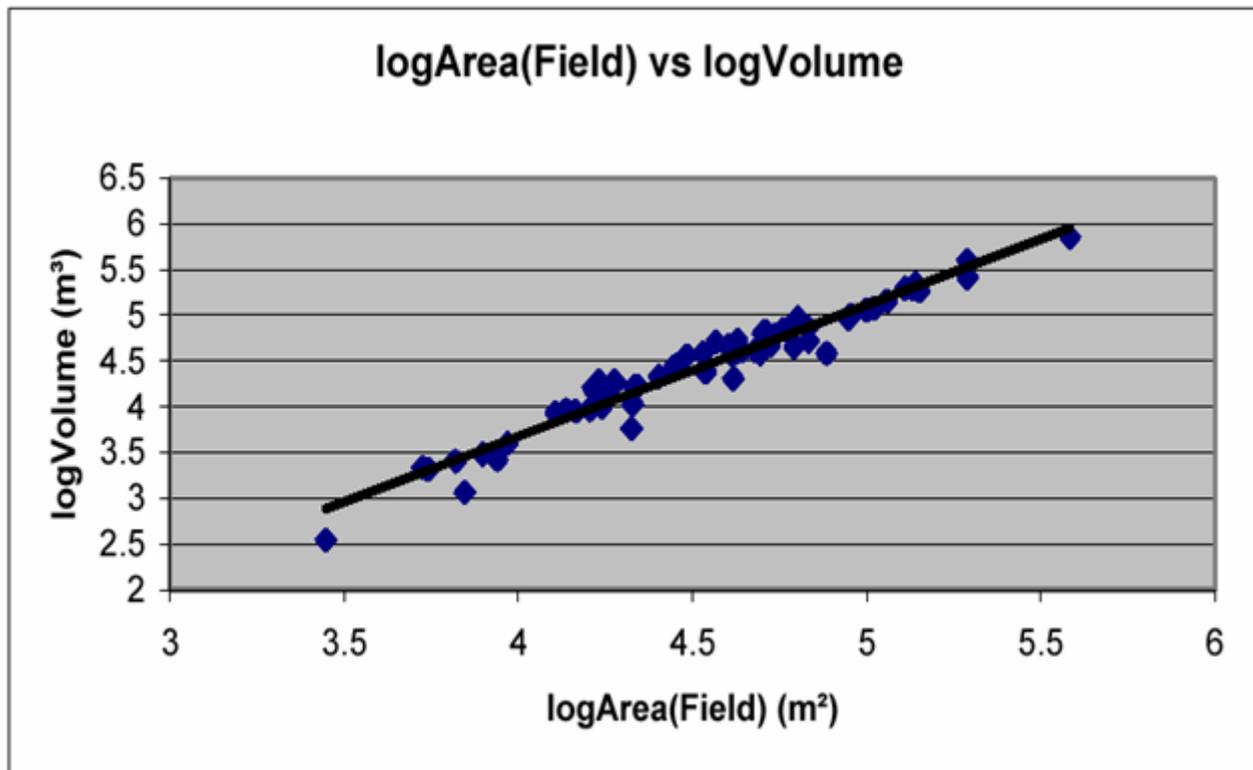
Step 2: Bathymetry



Bathymetric survey

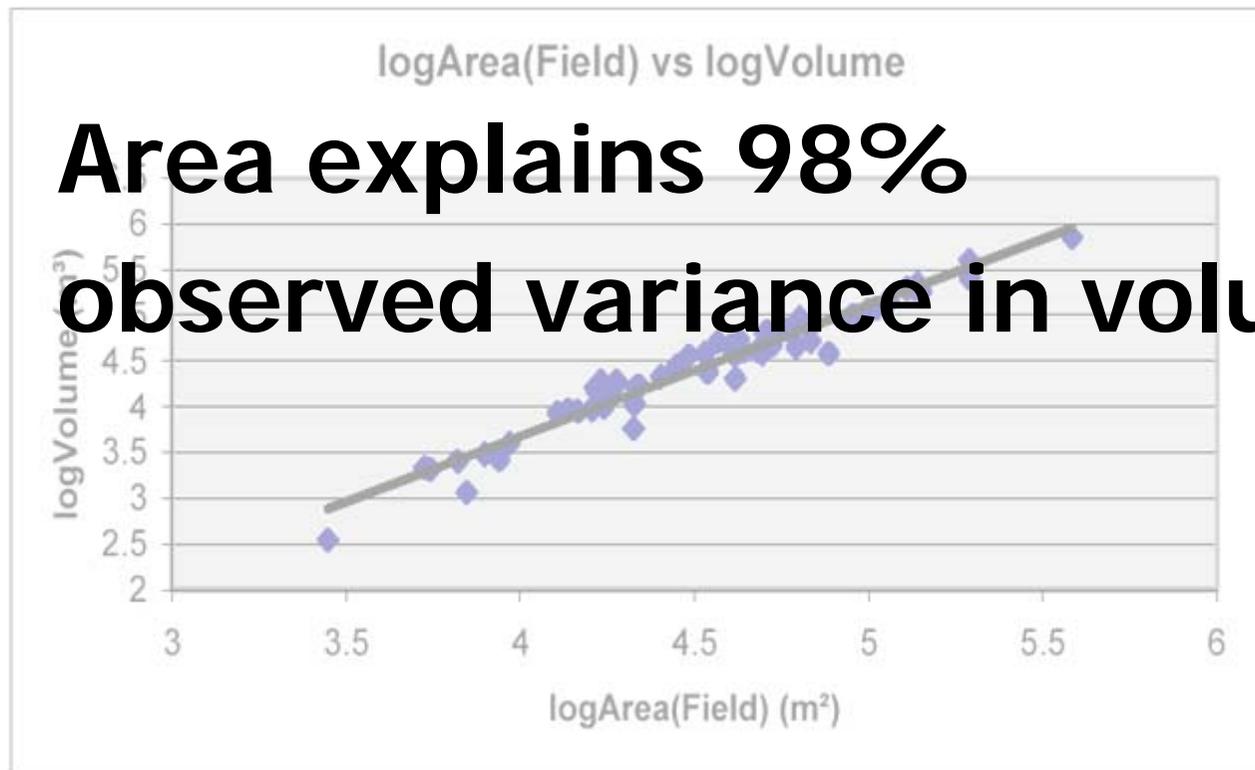
Storage mapping

Step 3: Relate surface to volume



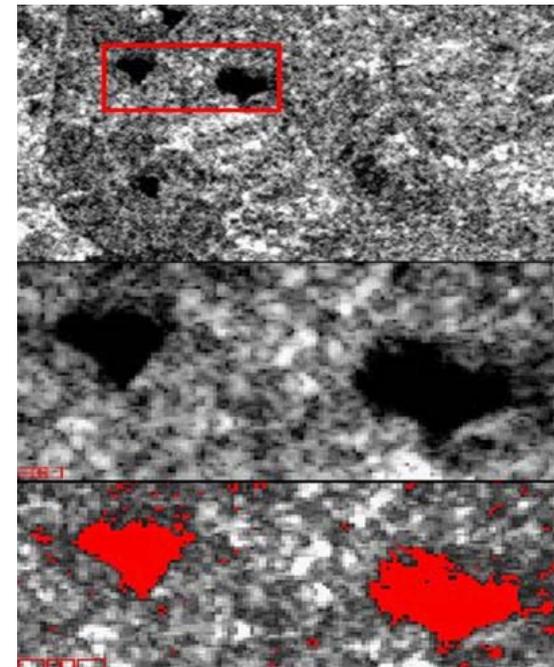
Storage mapping

Step 3: Relate surface to volume



Envisat

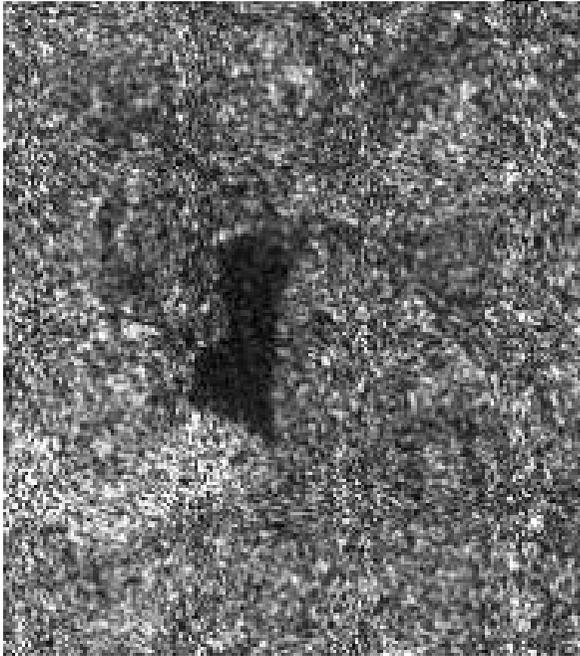
- **Cloud cover**
- **Open water (easy)**
- **Difficulties**



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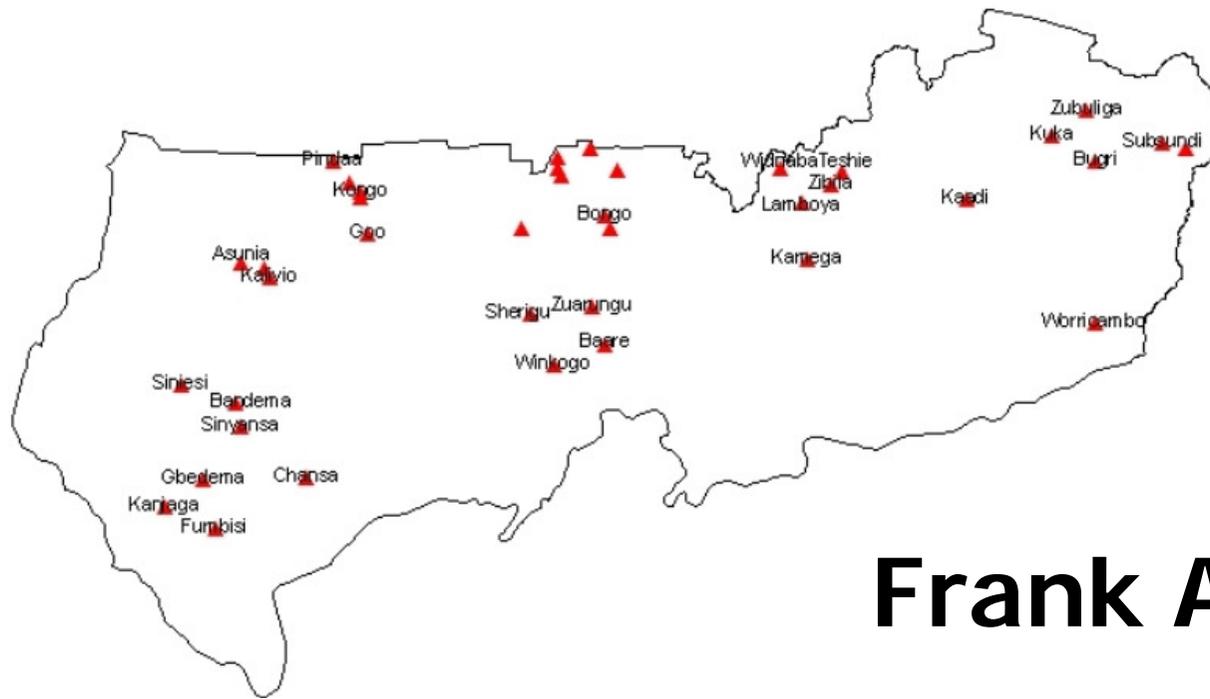
Envisat

**No wind,
contrasting environment**



Envisat

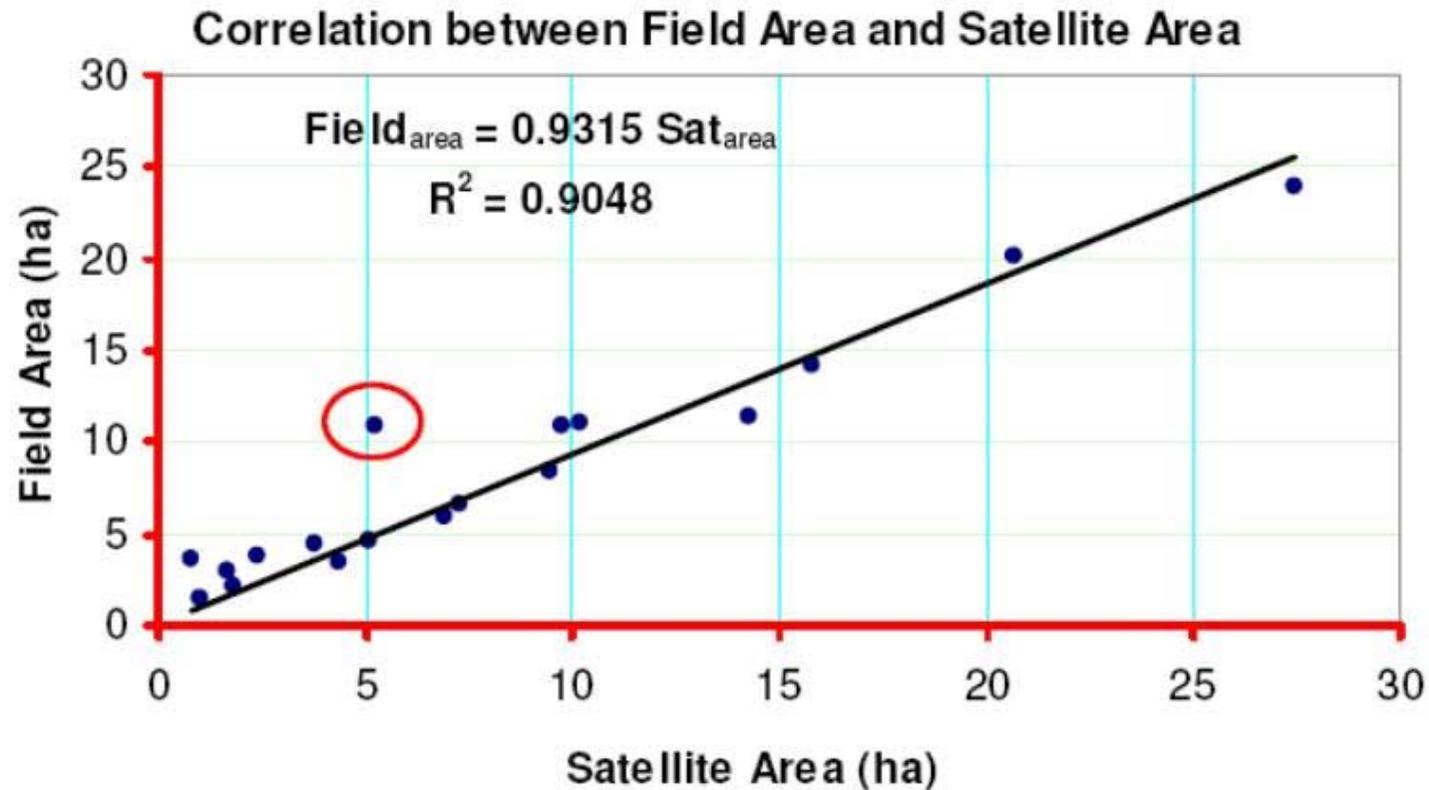
Ground truth



Frank Annor

Envisat

Good results



Envisat Outlier



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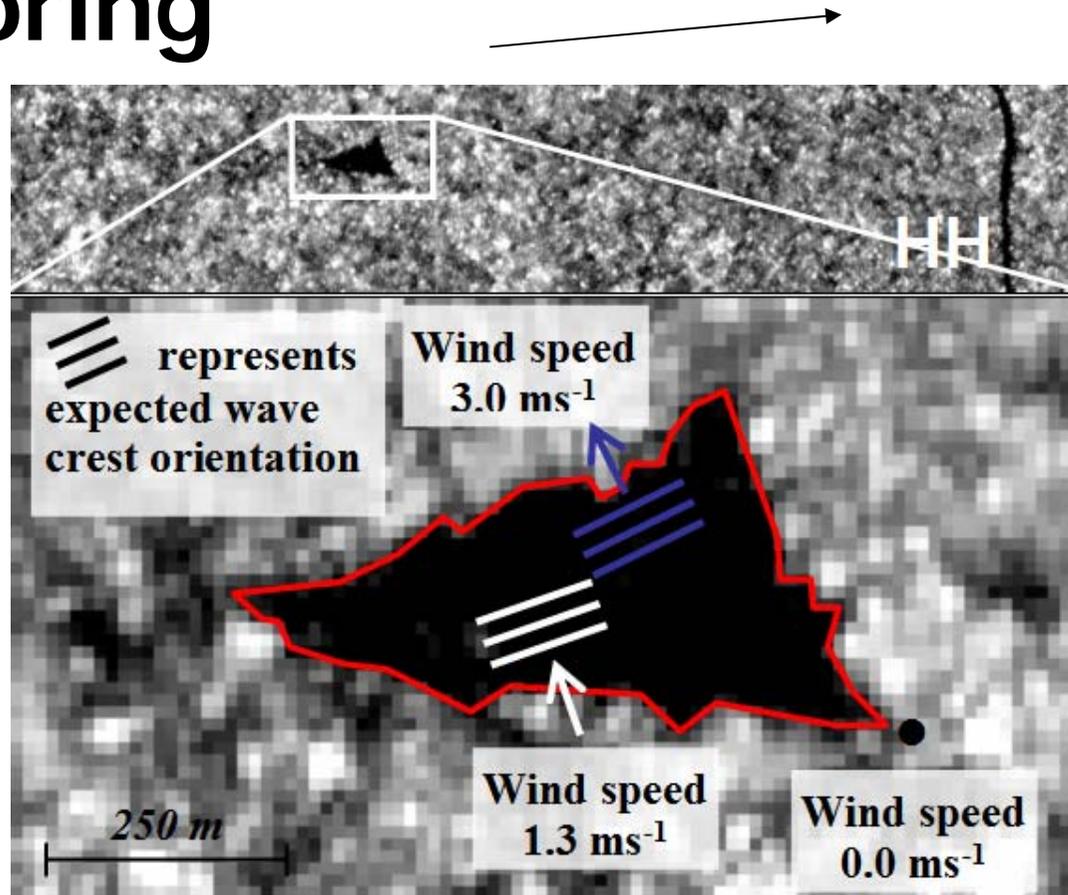
Small reservoirs – Hydrology from Space II



Envisat

NRT monitoring

No Bragg
(2 Sep)

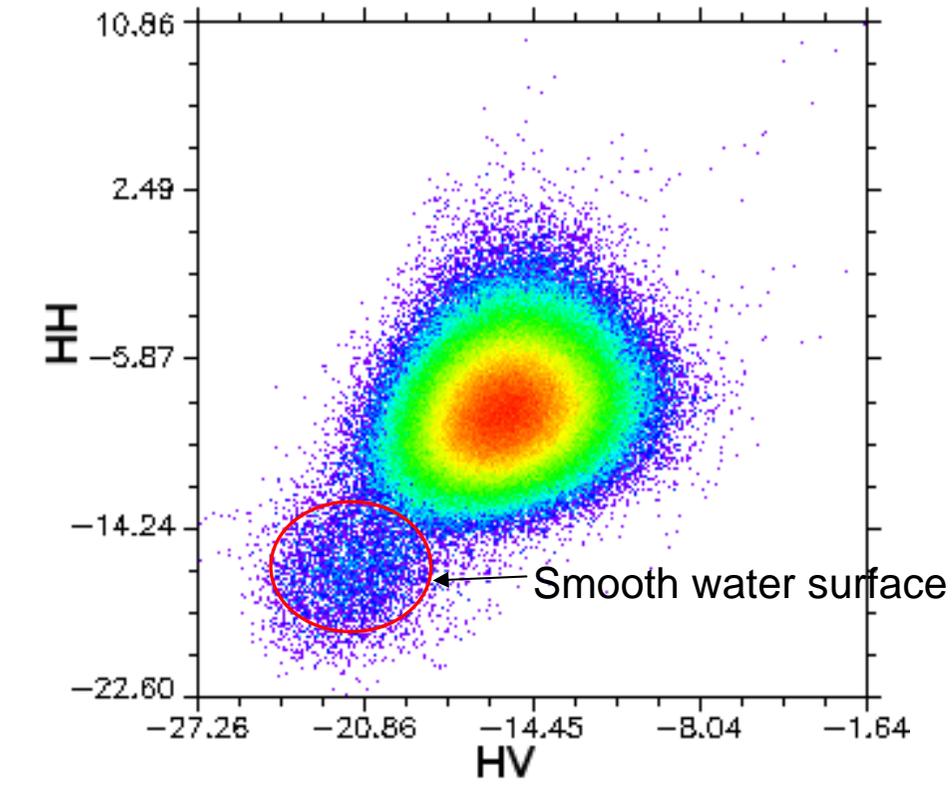


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NRT monitoring

No Bragg

(2 Sep)

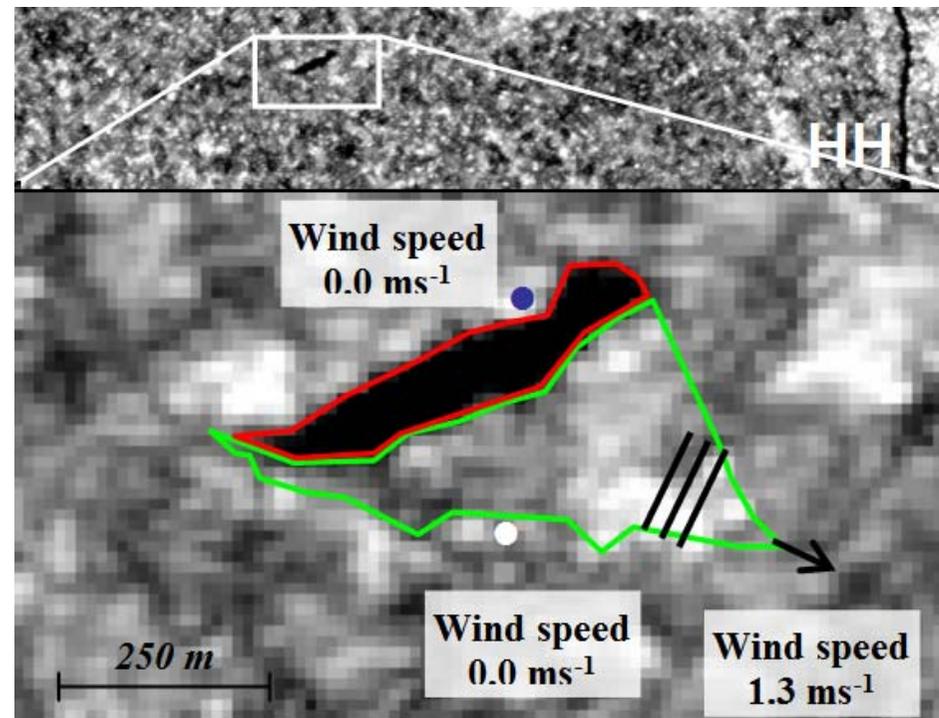


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NRT monitoring

Bragg

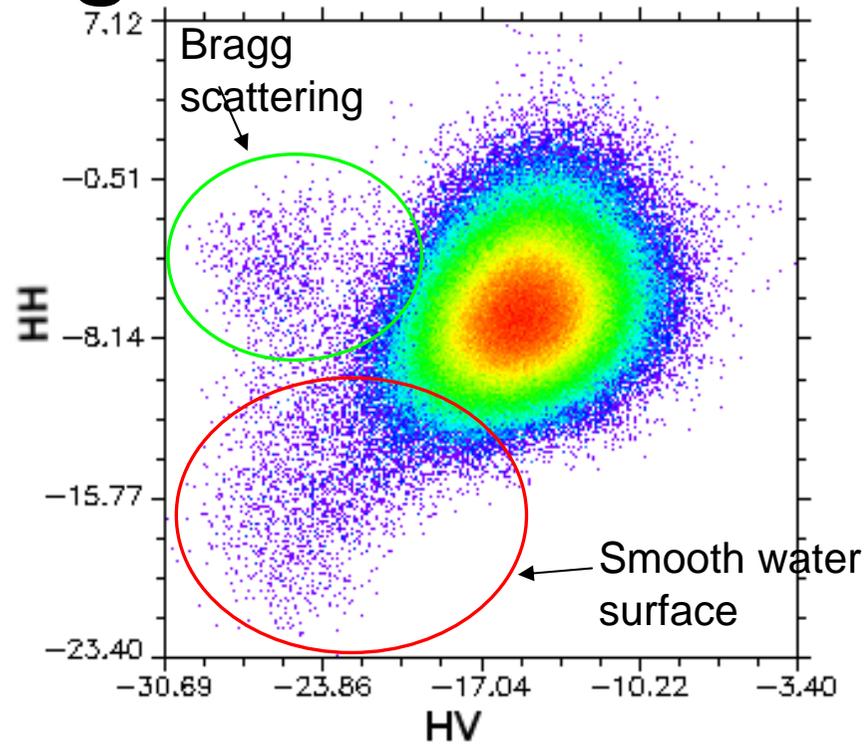
(19 Sep)



Envisat

NRT monitoring

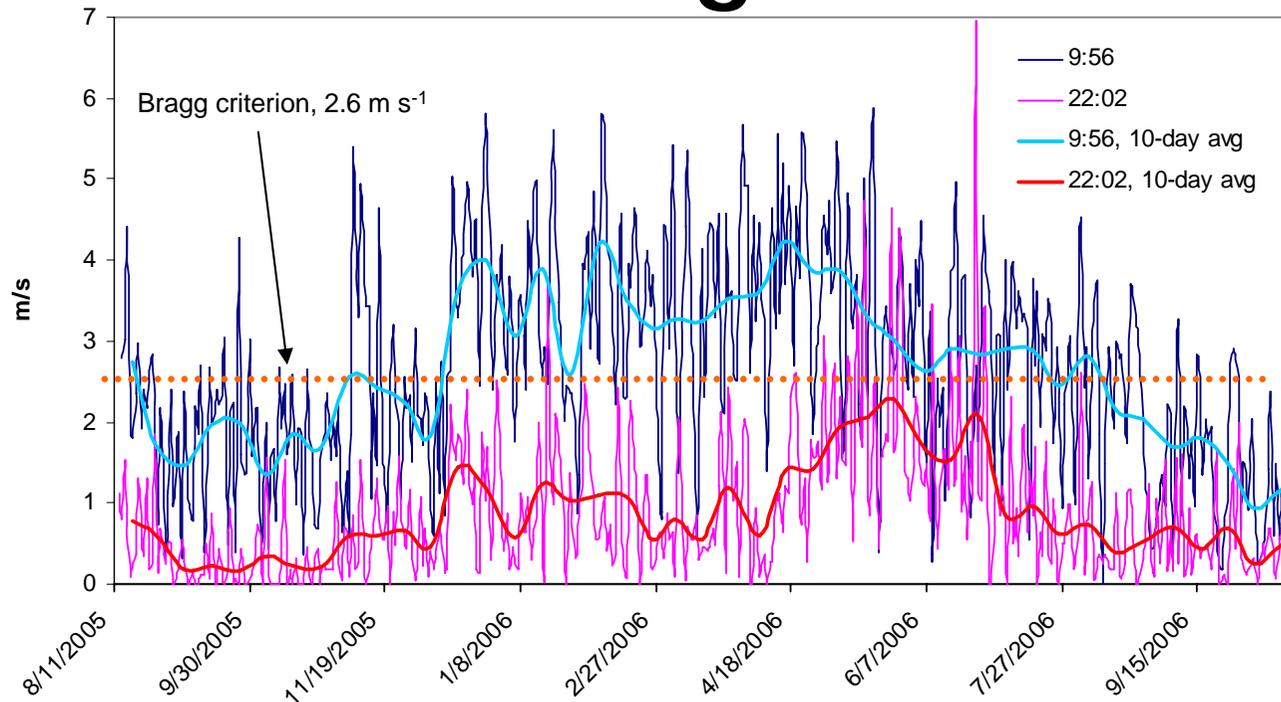
Bragg
(19 Sep)



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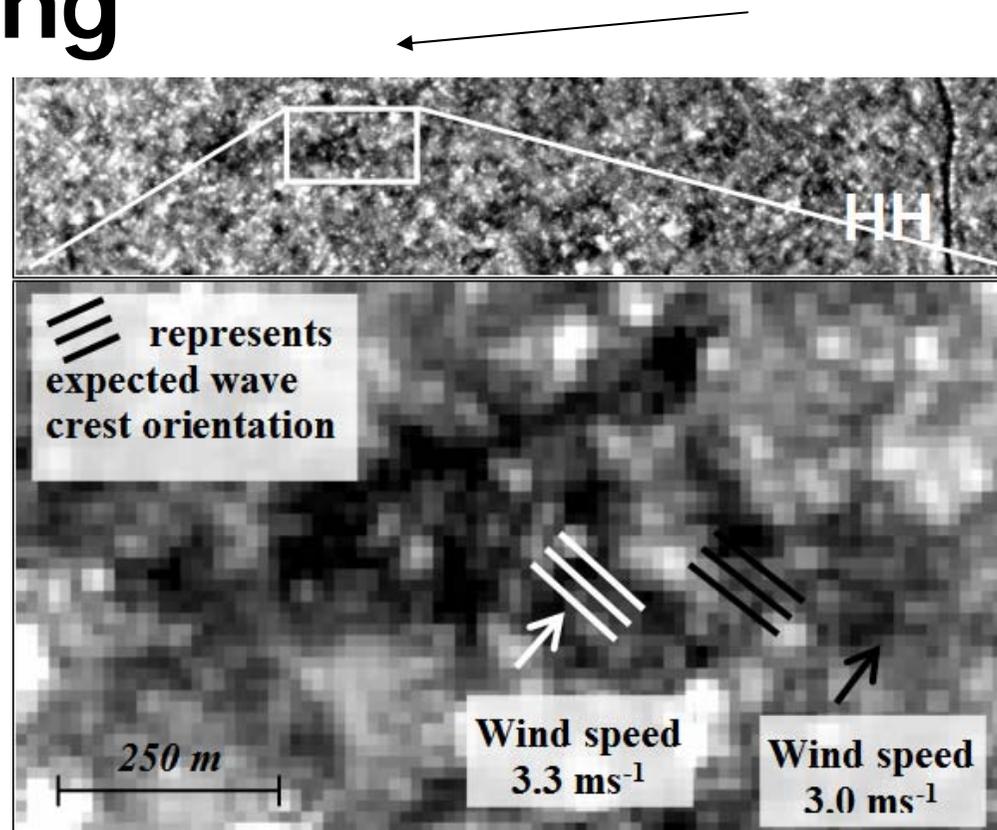
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NRT monitoring



Wind (night time)

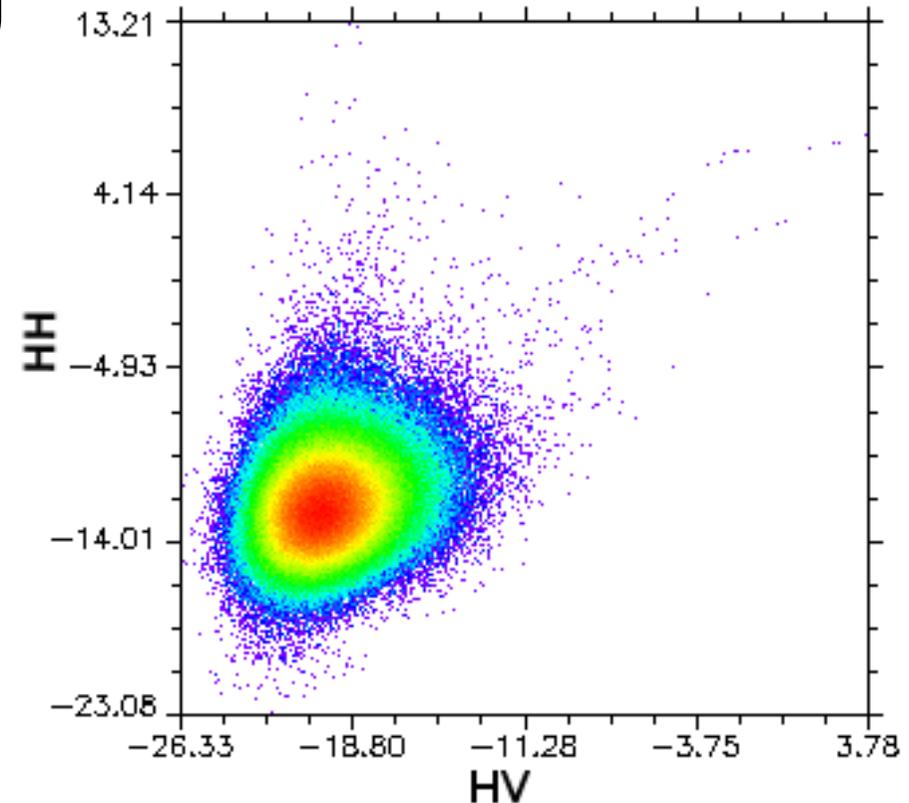
Envisat NRT monitoring



Wind & low contrast environment...

Envisat NRT monitoring

Bad luck...

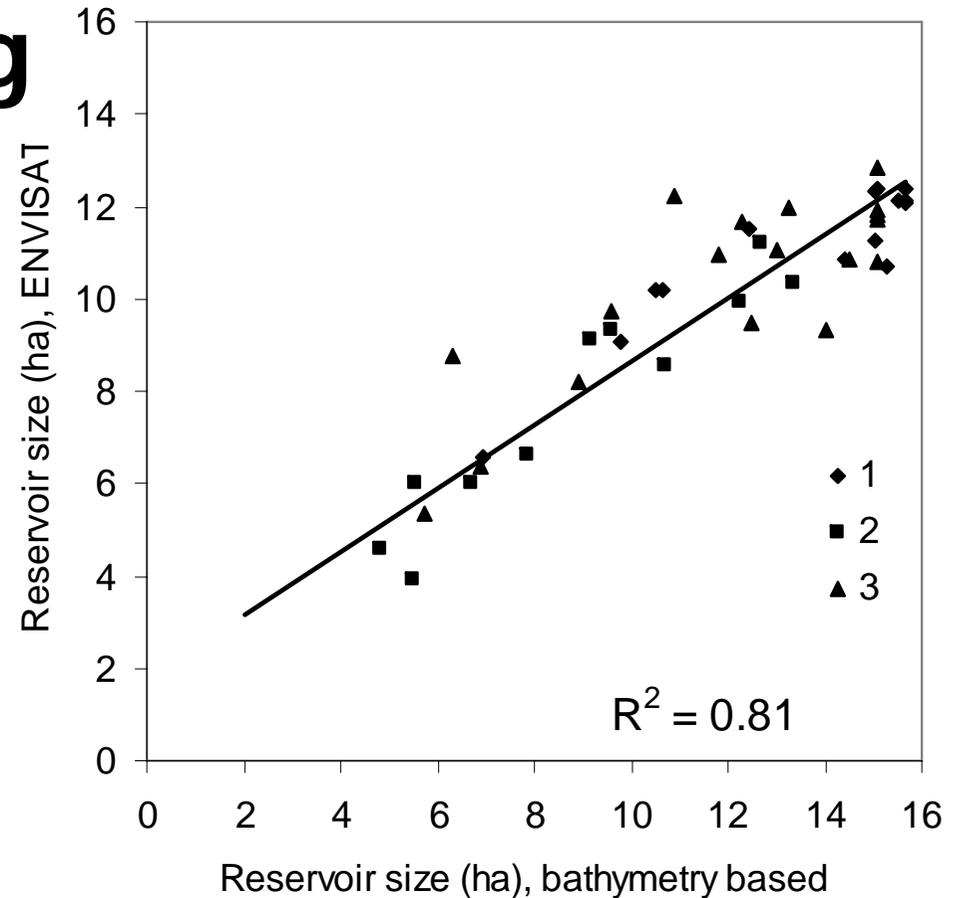


Wind & low contrast environment...

Envisat

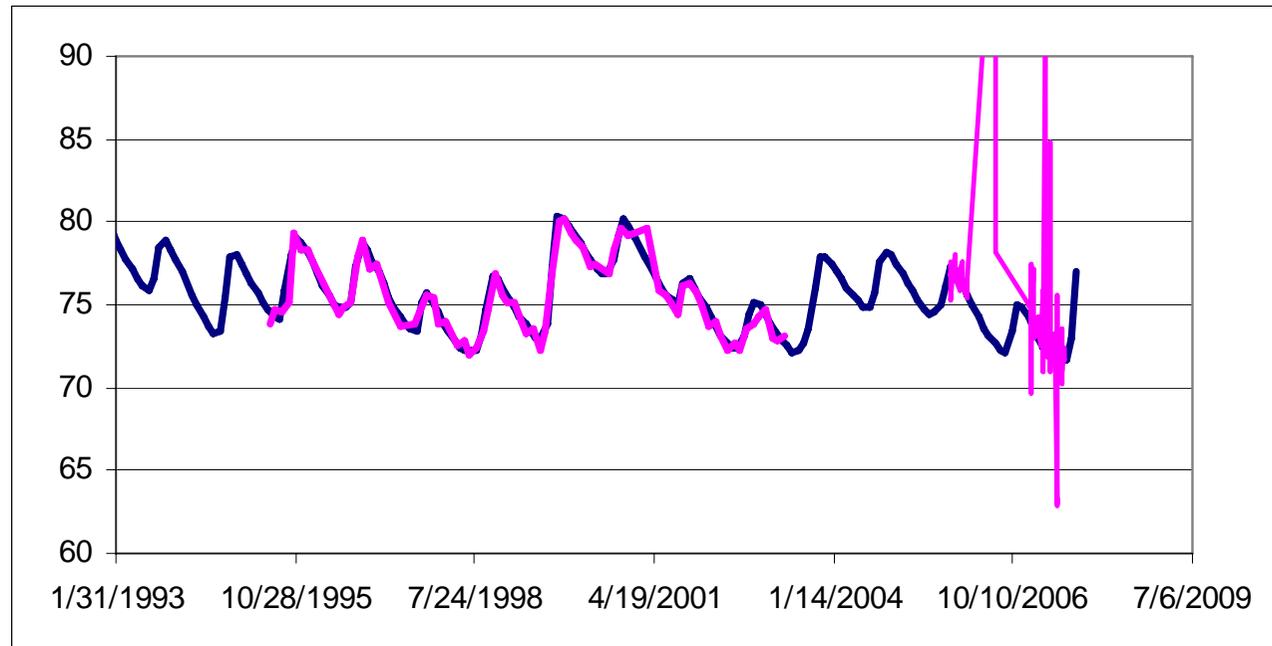
NRT monitoring

Acceptable
or noisy?



Envisat

NRT monitoring



River&Lake over Lake Volta



Conclusions

- Good correlation area-volume
- ASAR Envisat works
- Time series will have gaps

Thank you for your attention!



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