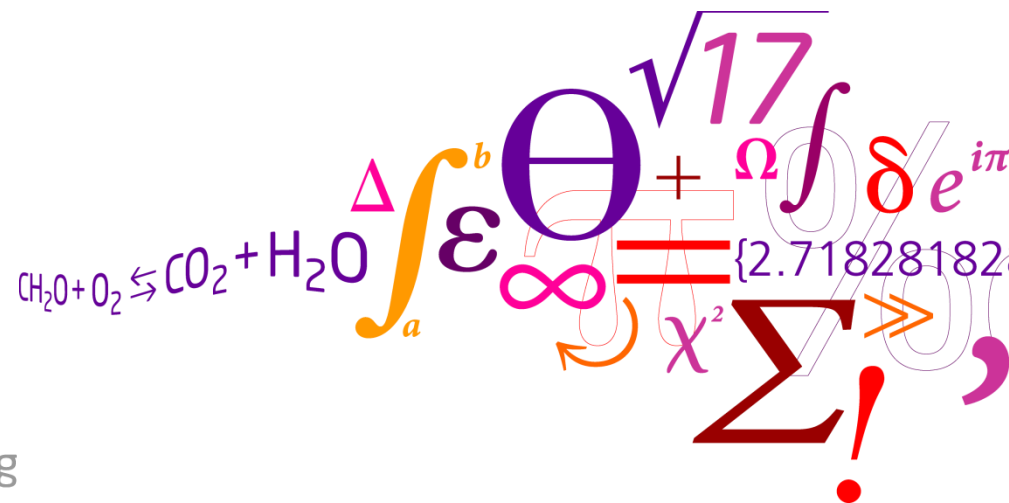


Payloads and Applications using Satellites and Drones – current status in environmental monitoring

Peter Bauer-Gottwein

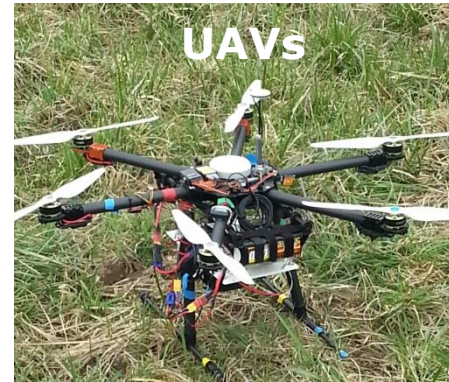
pbau@env.dtu.dk



Satellite vs UAV



- Locked ground track
- Fixed revisit times
- Extensive coverage
- Reliable repeat
- Operation unaffected by weather/conditions on the ground
- Soft payload weight constraints



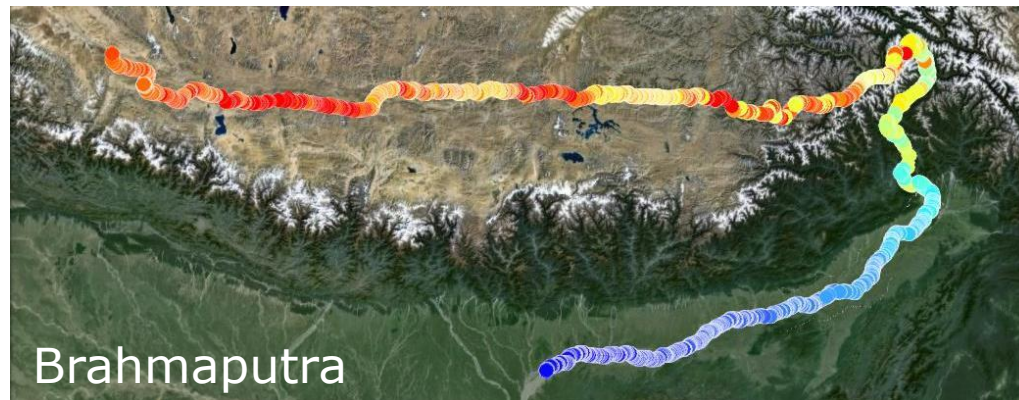
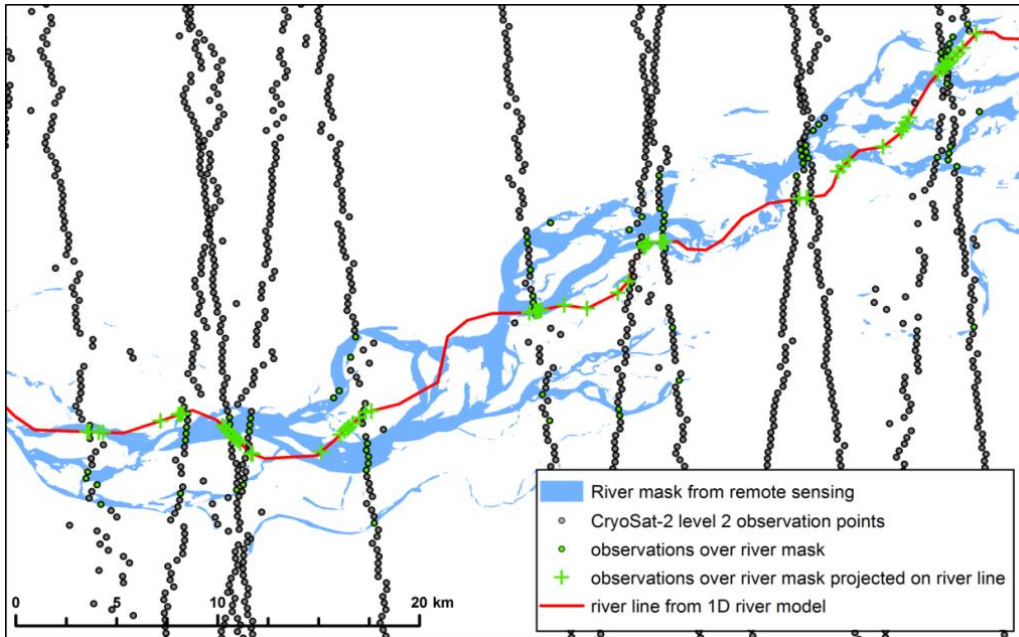
- Flexible ground track
- Flexible survey schedule
- Limited coverage
- Limitations due to weather / ground conditions
- Hard payload weight constraints
- Constraints set by power supply
- Legal constraints

Environmental Applications

Application	Sat	UAV
VNIR multi- and hyperspectral sensing	x	x
Thermal sensing (broadband and spectral)	x	x
Microwave sensing (active and passive)	x	
Photogrammetry	x	x
Ranging	x	x
Velocimetry		x
Gravimetry	x	

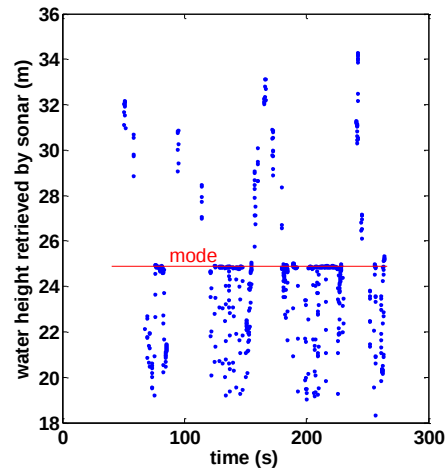
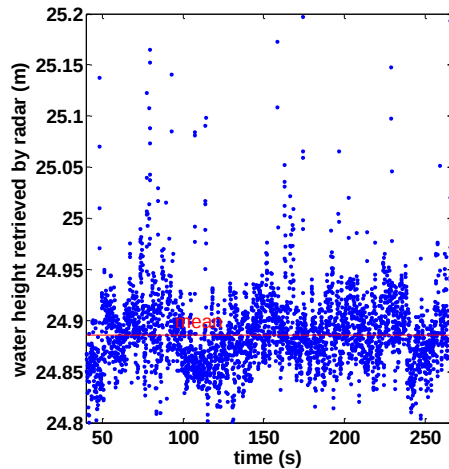
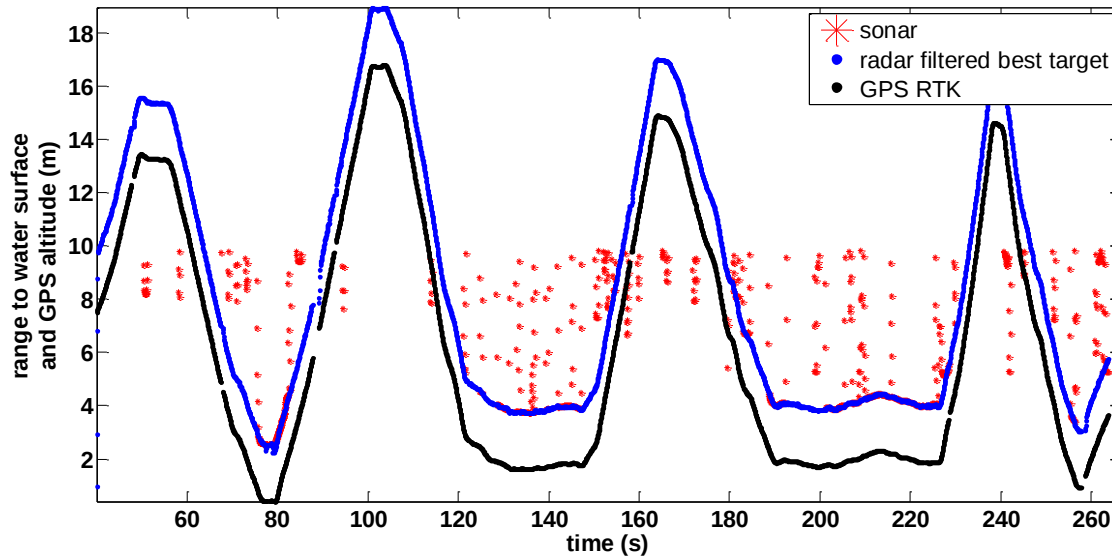
Example: Monitoring of rivers and streams using ranging and velocimetry

Ranging to water surface: Satellite Example



	Assam Valley		headwaters		entire Brahmaputra	
	returns over water	over-flights	returns over water	over-flights	returns over water	over-flights
2010	270	42	198	60	468	102
2011	1005	151	613	195	1618	346
2012	657	145	687	219	1344	364
2013	887	148	625	203	1512	351
total	2819	486	2123	677	4942	1163

Ranging to water surface: UAV example



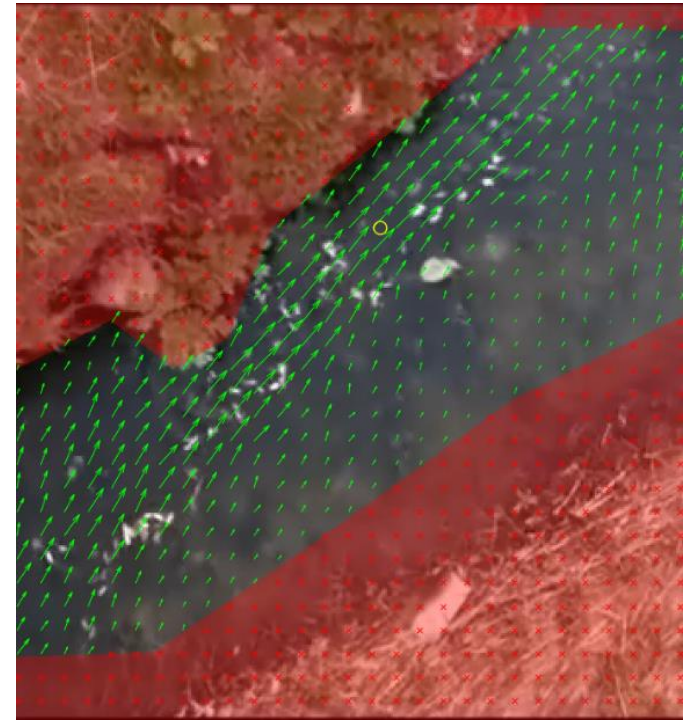
Velocimetry

UAV-borne video capture of Lille Skensved

Particle image velocimetry can be used to estimate surface velocity field and from there eventually river discharge



50 fps airborne video capture



Surface velocity field from PIV

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