

Measuring port berth utilisation with Automatic Identification System (AIS) data

Studying the berth utilisation of Oslo Fjord container ports

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AGENDA

- Background
- Research questions
- Method and data collection
- Findings
- Conclusion

Background: Container port performance

- The time each individual berth is utilised by a ship is essential for both economic and environmental reasons
- Unit of analysis: Berths at container terminals
- Challenge: Cost-efficient way to collect ship and port data

Research question

- Can ships' berth utilization be measured based on AIS?
- What are the berth utilization of the container ports in the Oslo Fjord?

Method and data collection



- Static AIS information
IMO number, ship
name, etc.
- Dynamic AIS
information:
GPS position



Year:	2015
Total number of ships:	2 347
Total number of AIS data:	2 428 608
Number of container ports:	7
Number of Lo-Lo ships:	97

Finding: Container ship calls

	Calls to container quays		Ratio of Lo-Lo container ships to all ships	Container flow per year	Average container flow per Lo-Lo container ship
	Lo-Lo container ships	Other ships			
	[No.]	[No.]	[%]	[TEU/year]	[TEU/Lo-Lo ship call]
Oslo	485	9	98	195 466	403
Drammen	206	11	95	59 464	289
Moss	301	30	91	63 107	210
Borg	189	91	68	45 879	243
Larvik	262	20	93	61 807	236
Brevik	154	241	39	34 557	224
Kristiansand	327	111	75	51 460	157
			Total	511 740	

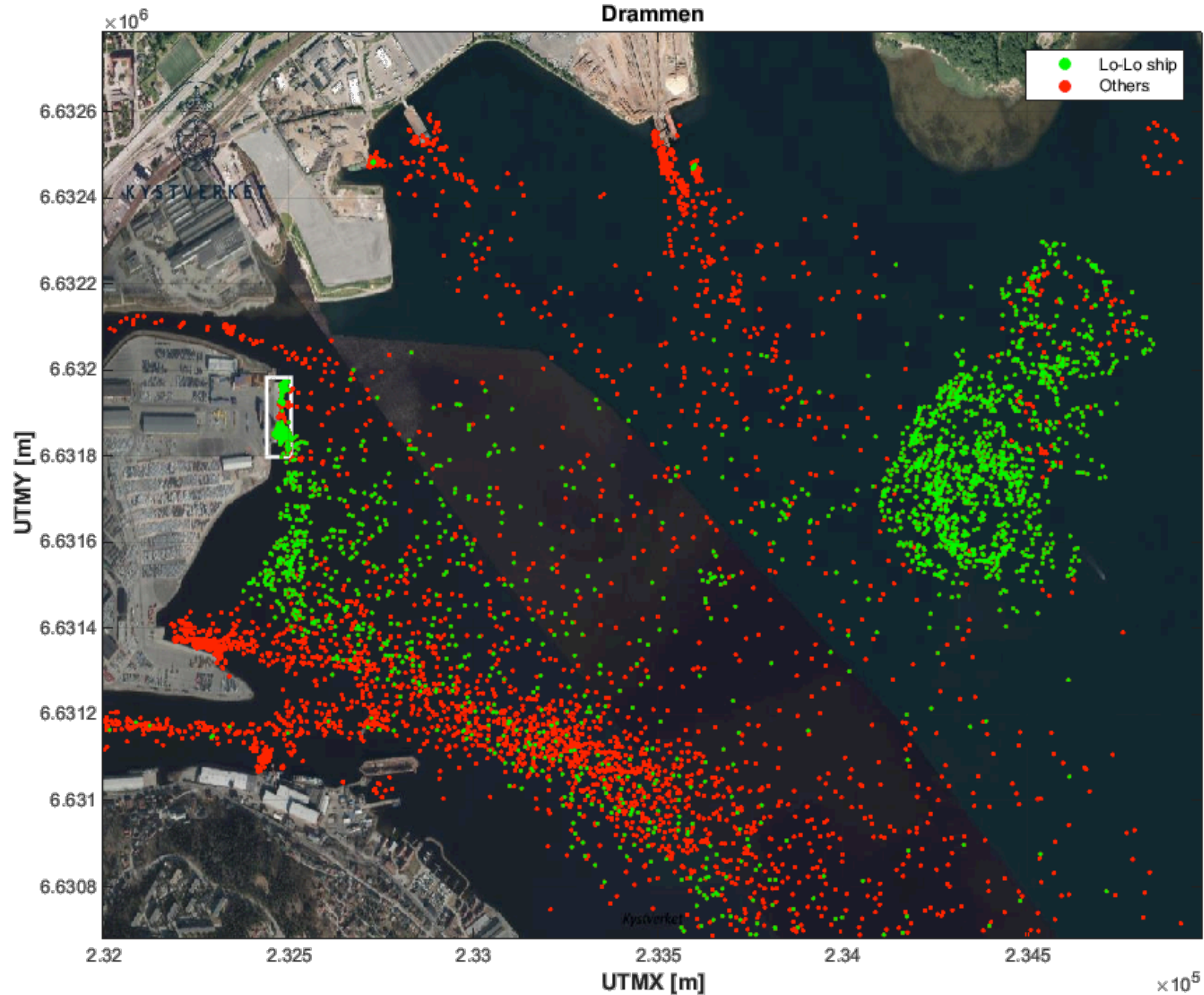
From Statistics
Norway



Finding: Ship traffic mix



Example: Port of Drammen



Findings: Berth utilisations

No. of ships berthed simultaneously	0	1	2	3	No. of berths
Oslo, Sjursøya	66.2	30.9	2.8	0.1	3
Oslo, Ormsund (north)	99.1	0.9	-	-	1
Oslo, Ormsund (south)	79.9	20.1	-	-	1
Drammen	75.7	24.3	-	-	1
Moss (north)	82.8	17.2	-	-	1
Moss (south)	98.5	1.5	-	-	1
Borg	82.0	19.0	-	-	1
Larvik	73.5	26.5	-	-	2
Brevik	86.6	13.4	-	-	1
Kristiansand (west)	98.9	1.1	-	-	1
Kristiansand (east)	75.3	22.3	2.4	-	2
Total no. of berths					15

Conclusion

- A method to measure container ship berthing with AIS is developed
- Oslo Fjord: 7 container ports with 15 berths are identified
- Oslo Fjord container ports' berth utilisations are measured, providing evidence on which ports may have under- or overinvested in quay infrastructure for container business
- The method and empirical findings can –among others- be applied to study berth availability, duration of ship's stay in port and liner operator's route choice, impacting on energy efficiency and air pollution