

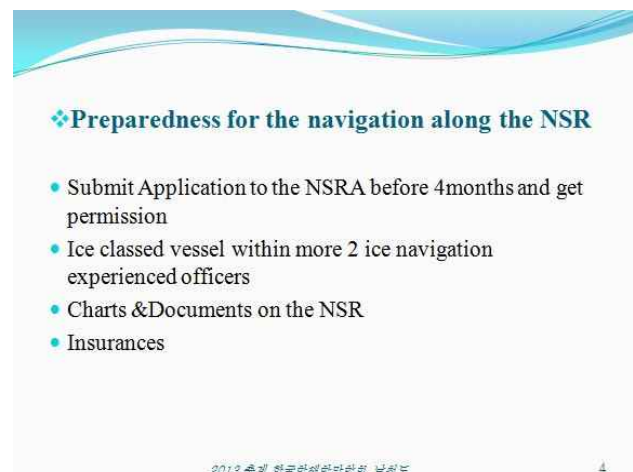
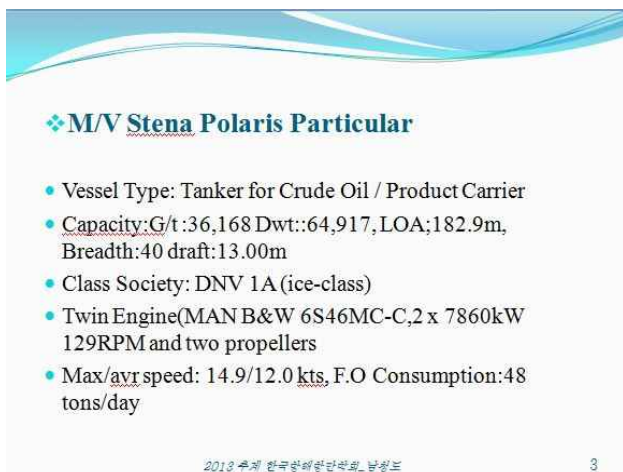
# 지구온난화와 북극해항로 여건변화의 추이

† 남청도


† 한국해양대학교 기관공학부 교수

**요 약** : 최근 지구온난화의 영향으로 하절기 북극해의 얼음이 예상보다 빨리 녹고 있어 북극해항로의 상용화가 더욱 가속화될 전망이다. 지난해 여름 북극해빙의 크기는 1979년 인공위성관측 이래 최소치를 기록하였으며 또한 다년생 얼음구성비율도 낮아져 대부분이 1년생 얼음으로 대체됨으로써 선박의 운항기간도 점차 늘어나게 되었다. 이러한 해빙의 가속화가 지속된다면 2030년경에는 북극해의 얼음이 완전히 녹을 것으로 예측되고 있다. 한편 러시아의 NSR 개방이후 비러시아 선박으로서는 2009년 독일 벨루가 선사 소속의 화물선 두 척이 NSR을 통과한 이래 지난 해에는 46척, 금년에는 그 수가 더욱 급격히 늘어나고 있어 앞으로 한.중.일의 NSR 선점경쟁이 더욱 치열해질 것으로 예상된다.


**핵심용어** : 지구온난화, 기후변화, 북극해항로, NSR, 다년생 얼음, Ice-Class



### ❖ M/V Stena Polaris and her tracking route along the NSR



[Photo of Stena Polaris]



[Tracking route]

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### ❖ NSR Navigation Permission Document



- Number of Application to NSR this year:690 (Oct.14)
- Permission:608
- Refusal:77
- No ice classed vessel permitted:19 except Russian Vessel


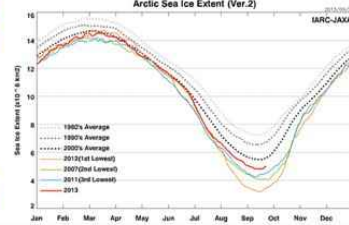
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- Russian Ice-Pilot one person on board at Kirkeness out port(Norway)
- Arrived Time at Vardo port: Sep. 25 08:30, but failed boarding due to rough sea
- So Master shifted vessel into the inner port of Kirkeness
- No allowance of ice pilot due to traffic season
- Recommend the route on the NSR

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## II. Climate Change

- Ice concentration on Sep.22 2013 in the Arctic Sea

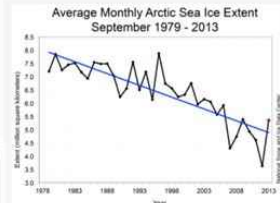




[Arctic Sea Ice Extent graph]

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### ❖ Arctic Sea Ice Extent Decline

- Recent Arctic Sea Ice Extent of September →

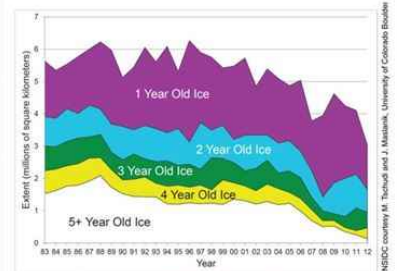



← Comparison of decline trend between observation and modeling

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### ❖ Construction Ratio of the Arctic Sea Ice

- Changes of the construction ratio of 1 yr ice for years



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❖ Recent Minimum Extent of the Arctic Sea Ice and the dates

Year	Min. Ice Extent (million km <sup>2</sup> )	Date
2007	4.17	Sep.18
2008	4.59	Sep.20
2009	5.13	Sep.13
2010	4.63	Sep.21
2011	4.33	Sep.11
2012	3.41	Sep.16
2013	4.81	Sep.13
1979 to 2000 avr	6.70	Sep.13
1979 to 2010 avr	6.14	Sep.15

❖ Recent Transited Vessels on the NSR

	2009	2010	2011	2012	2013
No. of Vessls	2	4	34	46	More 60
Cargo	24,000	111,000	820,789	1,261,545	1,500,000

❖ List of Vessels entered into Korean Ports in 2012 <source: Rosatomflot>

No.	Name of the Ship	Owner	Cargo(t)	Loading port	Dest.	start/transit- time(day)	avg. speed (kt)
1	Marilee (Norway)	Marinvest	gas condensate (60,505)	Murmansk	Inchon	Jul.10, 12(11.3)	9.6
2	Stena Poseidon (Sweden)	Stena Bulk, AB	jet oil (66,416)	Yosu	Pervo (Finland)	Jun.30, 12(11.5)	9.4
3	Paiya (Finland)	Neste Oil	gas condensate (60,310)	Murmansk	Daejeon	Jul.23, 12(8.8)	12.3
4	Marinor (Norway)	Marinvest	gas condensate (60,992)	-	-	Aug.30, 12(8.4)	12.4
5	Stena Poseidon	Stena Bulk, AB	gas condensate (60,370)	-	-	Sep.08, 12(7.9)	13.2
6	Paiya (Finland)	Neste Oil	jet oil (66,275)	Yosu	Pervo	Sep.05, 12(8.5)	11.8
7	Two Million Waves (Cyperus)	Nagilo shipping co.	gas condensate (60,841)	Murmansk	Inchon	Sep.26, 12(8.0)	12.5
8	Marika (Norway)	Marinvest	gas condensate (61,266)	Murmansk	-	Sep.30, 12(8.6)	11.6
9	Ob River (Mashal island)	Lance Shipping S.A	Ballast	Yosu	Montoir (France)	Sep.30, 12(7.8)	12.8
10	Maribel (Norway)	Marinvest	gas condensate (61,138)	Murmansk	Daejeon	Oct.17, 12(7.8)	12.8

❖ Impedimenta to navigate along the NSR

- Limited seasonal navigation period
- Ice floe
- Shallow depth
- High Ice-breaker service fee
- Bad Weather & weak infrastructure
- Crew education for ice navigation

❖ Economical Assessment

- Charter fee
- Insurance fee
- Crew allowances
- Fuel consumption

### III. Conclusion

- Ice floes were more than last year during the this testing voyage of the NSR
- Few items should be settled as like Russian Charts, Communication with ice-breaker
- Needs of ice-education and practice for crew
- Need Governmental Assistances for the Studying Center of the Arctic Shipping Route
- Establishing Control Tower for the governance of the NSR

• Thank you for your attention!

