Flomforhold i Nord-Norge

Lars-Evan Pettersson

11
2009

RAPPORT

Flomforhold i Nord-Norge

Norges vassdrags- og energidirektorat
2009

Rapport nr 11 - 2009

Flomforhold i Nord-Norge

Utgitt av: Norges vassdrags- og energidirektorat

Forfatter: Lars-Evan Pettersson

Trykk: NVEs hustrykkeri
Opplag: 40
Forsidefoto: Flom nedenfor vannføringsstasjonen 196.35 Malangsfoss i juni 2005. (Foto: Hydrologisk avdeling - NVE)
ISSN: 1501-2832
ISBN: 978-82-410-693-7

Sammendrag: Flommenes fordeling i tid gjennom året og deres relative størrelse er fremstilt grafisk for ca. 70 vannføringsstasjoner i uregulerte små og mellomstore elver og for 9 vannføringsstasjoner i store elver, alle i Nord-Norge, inklusive deler av Nord-Trøndelag. I tillegg er hypsografiske kurver vist og noen viktige feltparametrer listet opp for stasjonene.

Emneord: Flommer, Flomforhold, FLROSE, Hypsografisk kurve

Norges vassdrags- og energidirektorat
Middelthunsgate 29
Postboks 5091 Majorstua
0301 OSLO

Telefon: 22 95 95 95
Telefaks: 22 95 90 00
Internett: www.nve.no

August 2009

Innhold

Forord **4**

Sammendrag **5**

1 Innledning **6**

2 Metode **6**

3 Flomforhold i uregulerte små og mellomstore vassdrag **8**

3.1 Nord-Trøndelag og Søndre Nordland 8
3.2 Midtre Nordland 14
3.3 Nordre Nordland og Vest-Troms 22
3.4 Øst-Troms og Vest-Finnmark 30
3.5 Øst-Finnmark 38

4 Flomforhold i store vassdrag **44**

Referanser **49**

Forord

Kjennskap til flomforholdene, når på året de oftest opptrer og når på året de største flommene kan ventes, er viktig, både for overvåking av vassdragene og flomvarsling, og for flomberegninger. Denne rapporten er utarbeidet i forbindelse med et utviklingsprosjekt ved Hydrologisk avdeling, Videreutvikling av flomberegningsmetodikken, og kan forhåpentligvis være et nyttig hjelpemiddel for hydrologer som skal utføre flomberegninger for forskjellig formål.

Denne rapporten beskriver flomforholdene ved et antall vannføringsstasjoner i Nord-Norge, inklusive deler av Nord-Trøndelag. En tilsvarende rapport for vannføringsstasjoner i Sør- og Midt-Norge er tidligere utgitt som NVE-Rapport nr. 3-2009.

Oslo, august 2009

Morten Johnsrud
avdelingsdirektør

Sverre Husebye
seksjonssjef

Sammendrag

Flommenes fordeling i tid gjennom året og deres relative størrelse er fremstilt grafisk for ca. 70 vannføringsstasjoner i uregulerte små og mellomstore elver og for 9 vannføringsstasjoner i store elver, alle i Nord-Norge, inklusive deler av Nord-Trøndelag. I tillegg er hypsografiske kurver vist og noen viktige feltparametrer listet opp for stasjonene.

1 Innledning

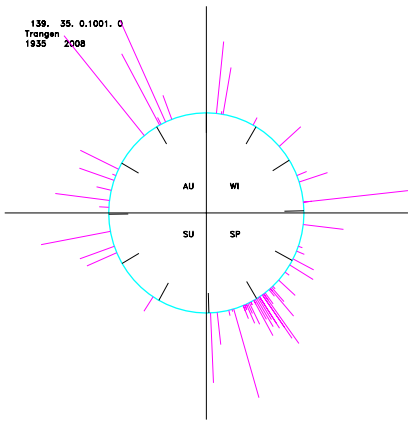
Flomforholdene varierer stort i Norge. Med flomforhold tenker man dels på årstiden når flommene vanligvis opptrer og når de aller største flommene kan ventes, dels på hvor store flommene kan bli, kanskje spesielt i spesifikke størrelser hvis man skal sammenligne flommene fra landsdel til landsdel eller innenfor en landsdel.

Denne rapporten gir en oversikt over når på året flommene er observert ved et antall vannføringsstasjoner rundt i landet. Oversikten vil være nyttig for de som skal utføre en flomberegning, ved å vise hvilken sesong man eventuelt skal legge til grunn for flomfrekvensanalyse. Oversikten vil være nyttig også for å få en generell kjennskap til når på året flommer opptrer og når på året de største flommene er observert. Flomstørrelsenes variasjoner over landet er ikke behandlet i denne rapporten.

Inndelingen av Nord-Norge, inklusive deler av Nord-Trøndelag, i fem deler er gjort av praktiske hensyn i rapporten. Navnene på de forskjellige delene er ikke helt i samsvar med hva man vanligvis kaller landsdelene.

2 Metode

Ett av NVEs dataprogram for hydrologiske analyser og presentasjoner er programmet FLROSE. Det plukker ut alle flommer over en viss terskelverdi og plotter flommene som en vektor ut fra et punkt der lengden er proporsjonal med flomstørrelsen (skalert på standardavviket) og vinkelen er gitt av flomtidspunktet. Den delen av vektoren som faller under terskelen vises ikke. Data leses fra en døgnverditabell i NVEs hydrologiske database HYDRA2. Et eksempel på resulterende diagram er vist i figur 1.

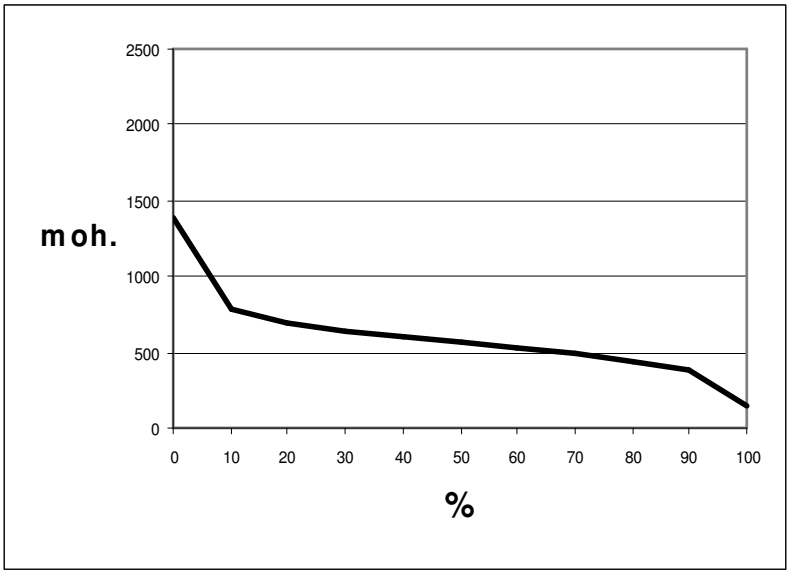


Figur 1. Diagram fra programmet FLROSE for vannføringsstasjonen 139.35 Trangen.

Året er vist i diagrammet slik at januar begynner øverst til høyre for korset, og månedene fortsetter med klokken rundt til desember, som slutter øverst til venstre for korset.

Diagrammet i figur 1 viser at det kan være flommer til alle årets tider ved vannføringsstasjonen Trangen. Fra midten av januar til midten av mars og i juli –august har det vært få og små flommer.

I denne rapporten er FLROSE-diagram tatt ut for ca. 70 uregulerte vannføringsstasjoner i Nord-Norge, inklusive deler av Nord-Trøndelag, og for 9 vannføringsstasjoner i store elver i samme landsdel. Diagrammene er vist på kart som dekker hvert sitt område i landet og plassert på vannføringsstasjonens beliggenhet. Disse diagrammene er i liten målestokk og er ment å gi en regional oversikt over flomforholdene. I tillegg er diagrammet i større målestokk vist sammen med en graf som viser nedbørfeltets høydeforhold ved hver stasjon. Den så kalte hypsografiske kurven viser hvor stor del i prosent av nedbørfeltets areal som ligger over et visst nivå.



Figur 2. Hypsografisk kurve for 139.35 Trangen.

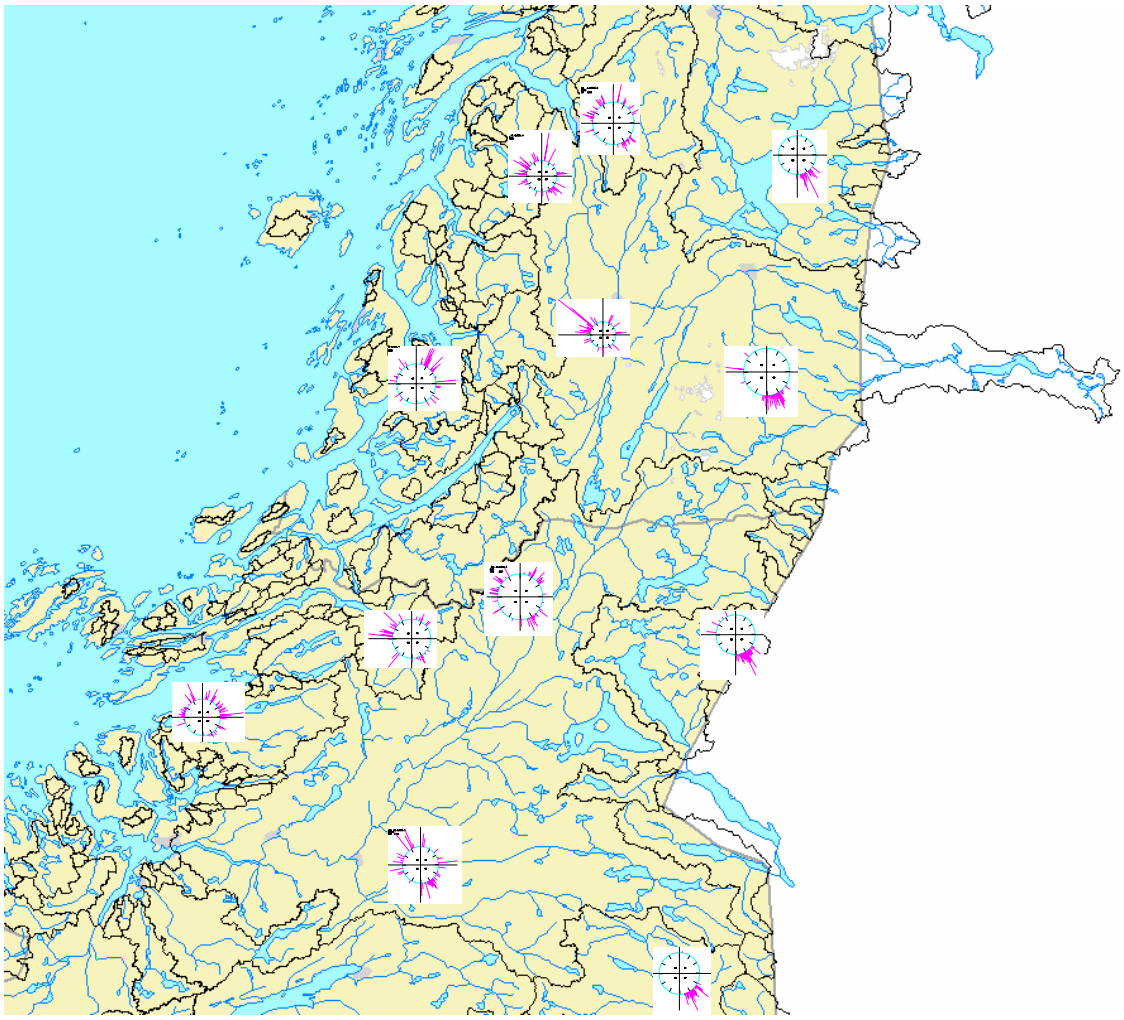
Den hypsografiske kurven i figur 2 viser at høyeste punkt i Trangens nedbørfelt er på knapt 1400 moh., at 50 % av feltet er over ca. 560 moh. og at laveste punkt, vannføringsstasjonen, ligger ca. 140 moh. Alle de hypsografiske kurvene i rapporten er tegnet med samme målestokk for sammenligningens skyld.

I rapporten er egne kart som viser vannføringsstasjonenes beliggenhet. Videre er det tabeller som viser nedbørfeltets areal, effektive sjøprosent og høydeforholdene i feltet (maksimum/median/minimum høyde).

Selv om diagrammene gir en god oversikt over når på året de fleste flommene har funnet sted og når de største flommene har vært, kan man ikke forutsette at de flomforholdene er evigvarende eller at det absolutt gjelder for et område. Det kan ha vært store flommer i et område i en årstid som ellers ikke er markert som særlig flomfarlig, og som ikke er observert ved noen av de vannføringsstasjoner som er tatt med i denne rapporten.

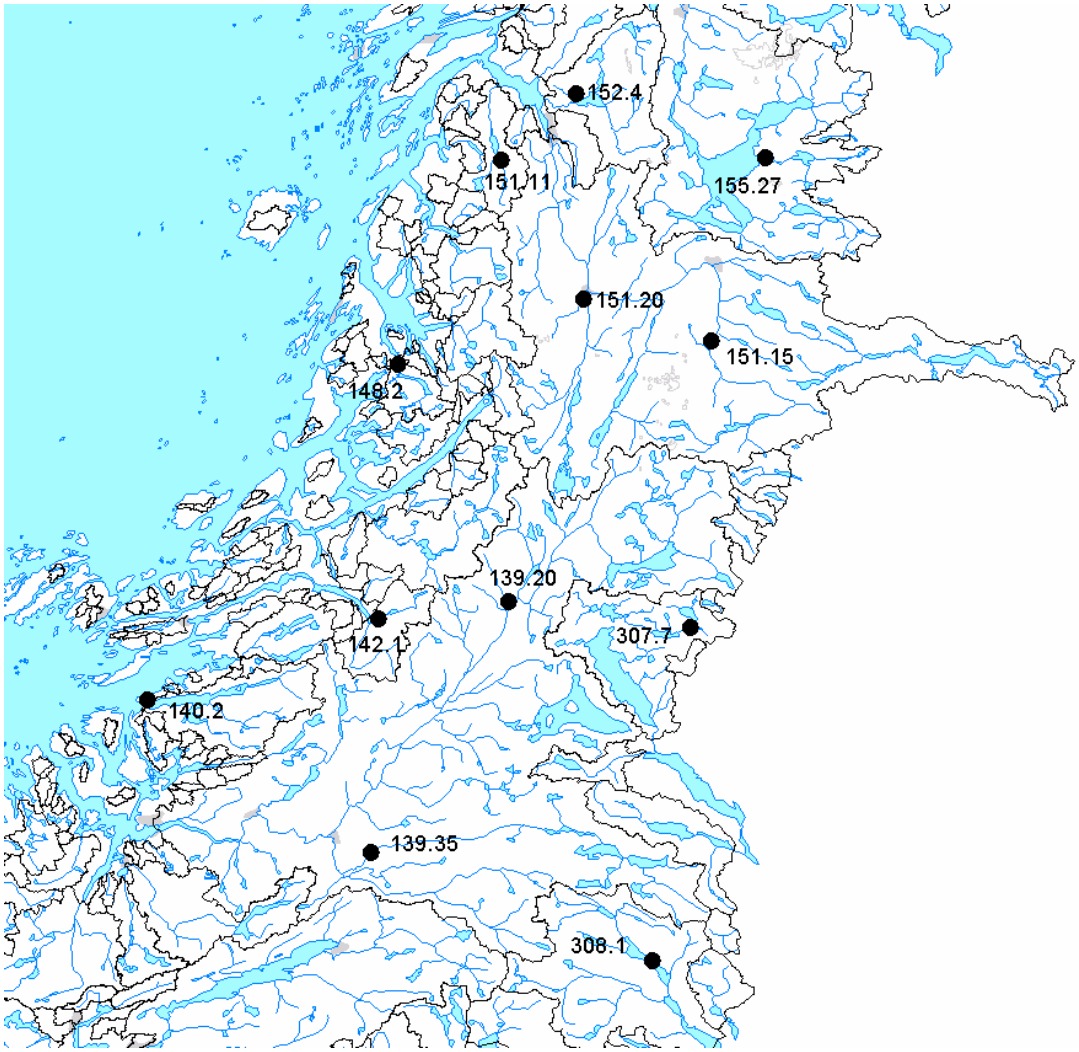
3 Flomforhold i uregulerte små og mellomstore vassdrag

3.1 Nord-Trøndelag og Søndre Nordland



Figur 3. FLROSE-diagrammer for uregulerte vannføringsstasjoner i Nord-Trøndelag og Søndre Nordland.

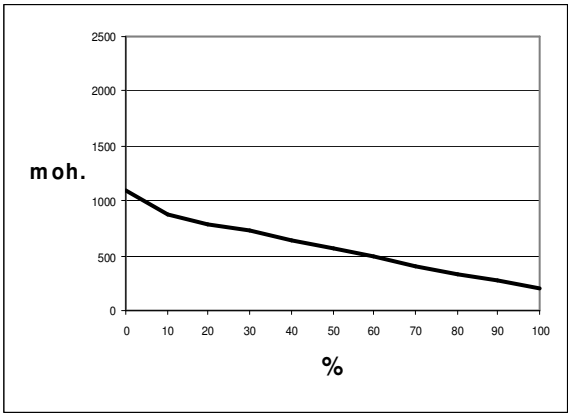
I de innerste delene av landsdelen er vårflommene dominerende, men høstflommer kan forekomme. For øvrig kan det være flommer hele året i landsdelen, færrest i sommermånedene.

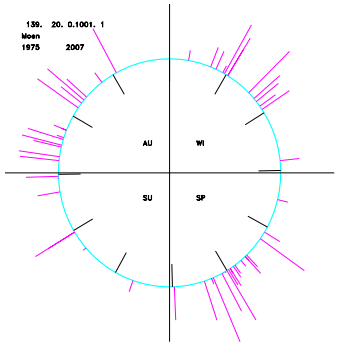


Figur 4. Vannføringsstasjoner i Nord-Trøndelag og Søndre Nordland.

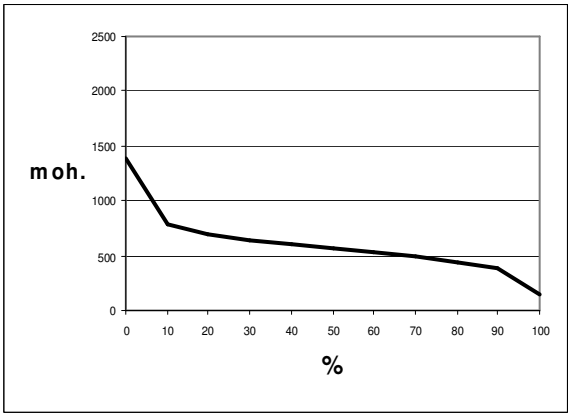
Vannføringsstasjon			Areal	Eff.sjøpr.	Høydeforhold, moh.		
			km²	%	maks.	median	min.
139	20	Moen	64	0.02	1099	558	200
139	35	Trangen	854	2.05	1387	562	138
140	2	Salsvatn	432	10.60	764	270	9
142	1	Første Aunvatn	88	1.63	925	624	20
148	2	Mevatnet	109	3.82	785	158	15
151	11	Lavvatn	74	1.42	999	533	226
151	15	Nervoll	653	0.17	1692	827	345
151	20	Fosstun	588	1.10	1288	482	92
152	4	Fustvatn	526	2.74	1532	436	39
155	27	Lendingosen (Varnvatnet)	159	4.22	1375	642	413
307	7	Landbru limn.	59	6.73	1127	715	479
308	1	Lenglingen	450	4.12	1380	626	354

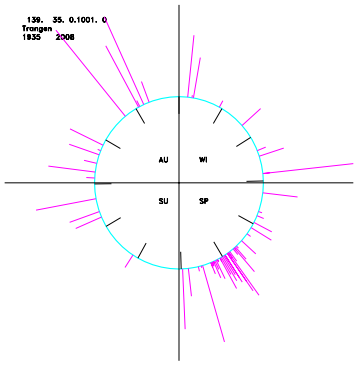
139.20 Moen



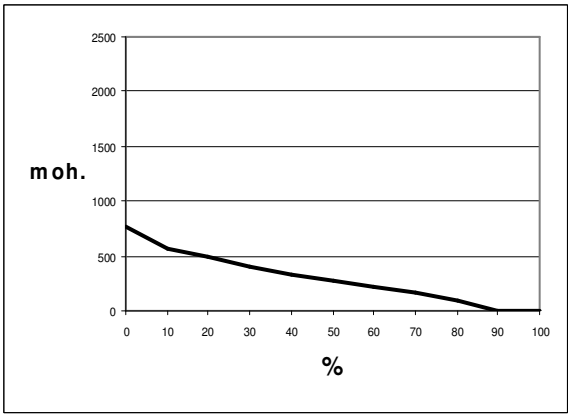


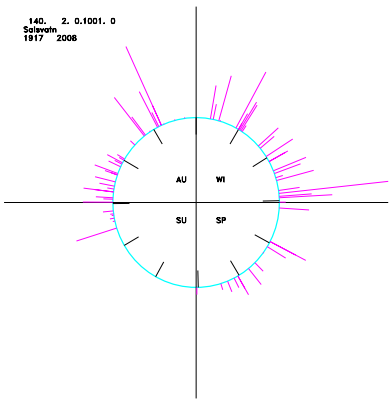
139.35 Trangen



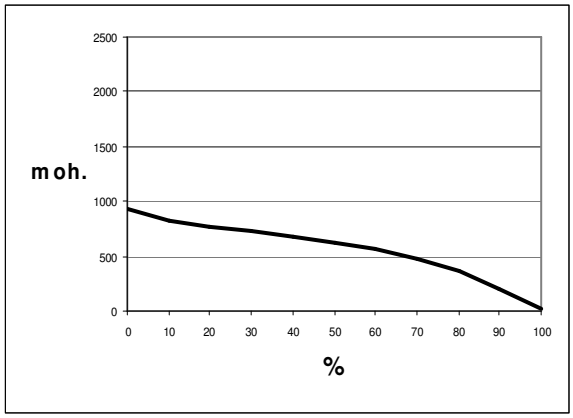


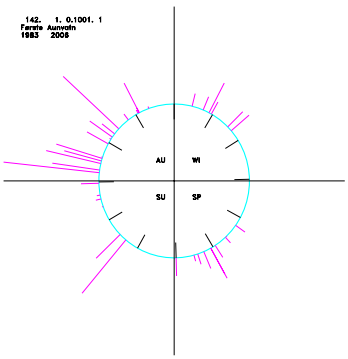
140.2 Salsvatn



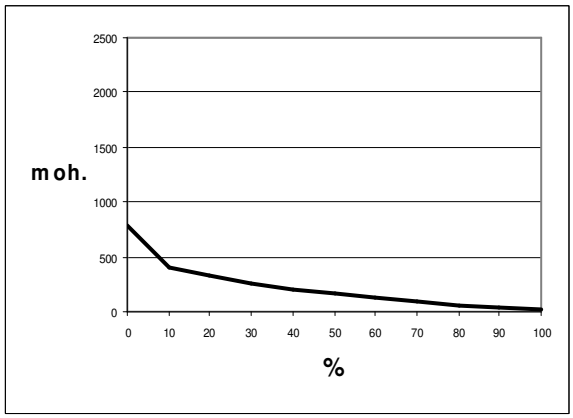


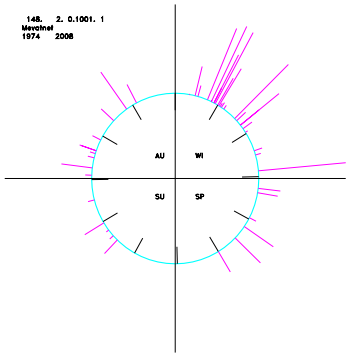
142.1 Første Aunvatn



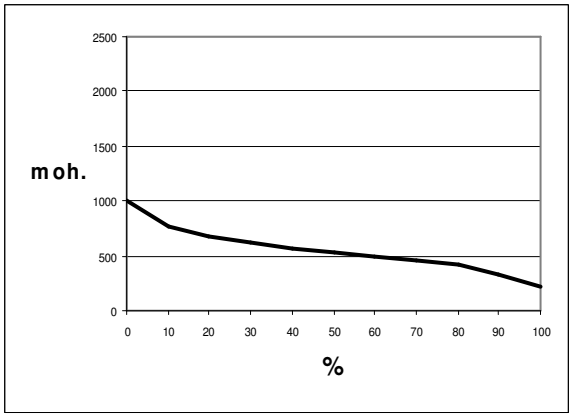


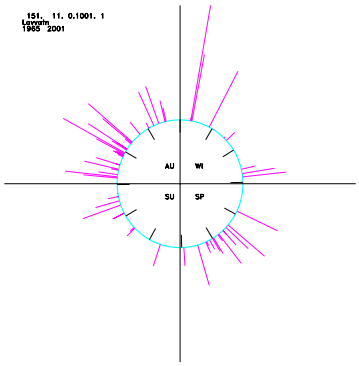
148.2 Mevatnet



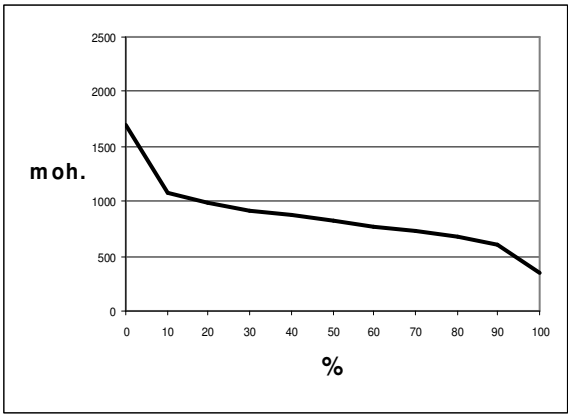


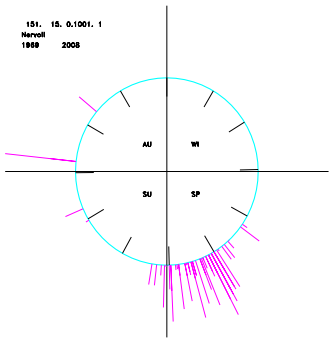
151.11 Lavvatn



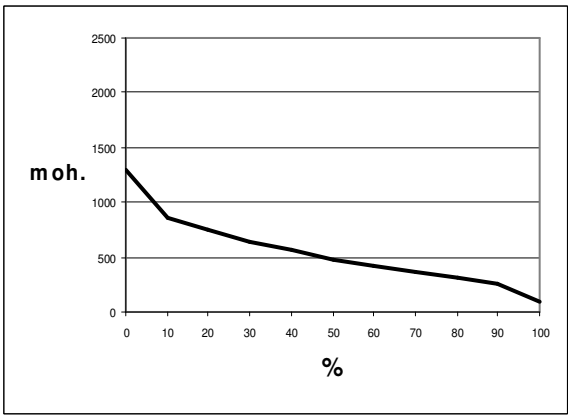


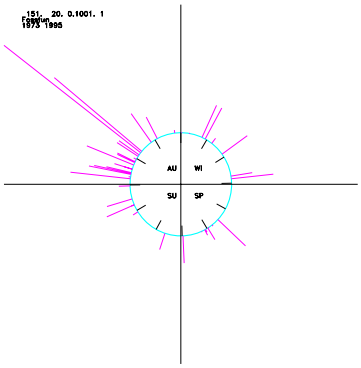
151.15 Nervoll



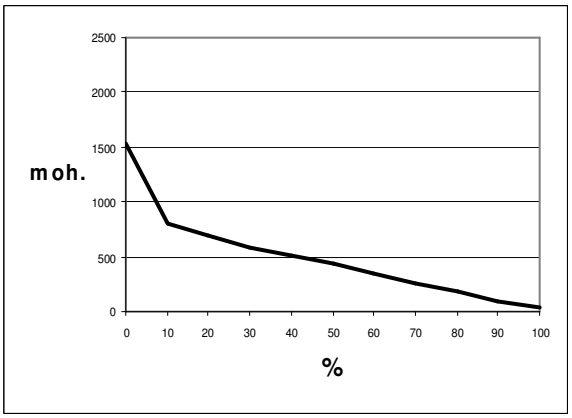


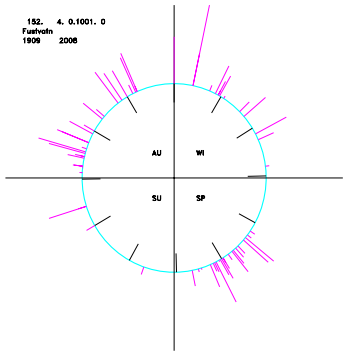
151.20 Fosstun



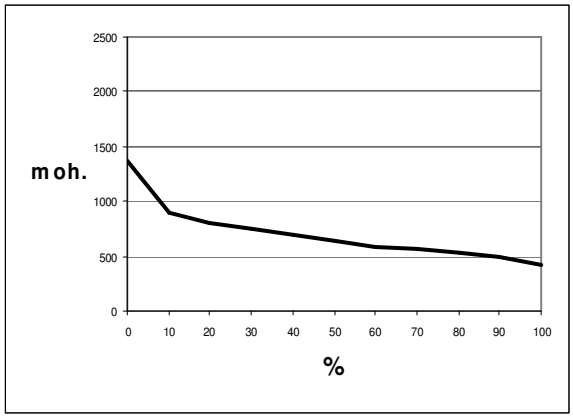


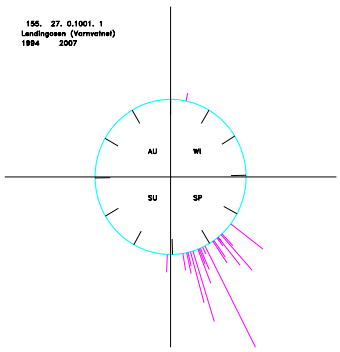
152.4 Fustvatn



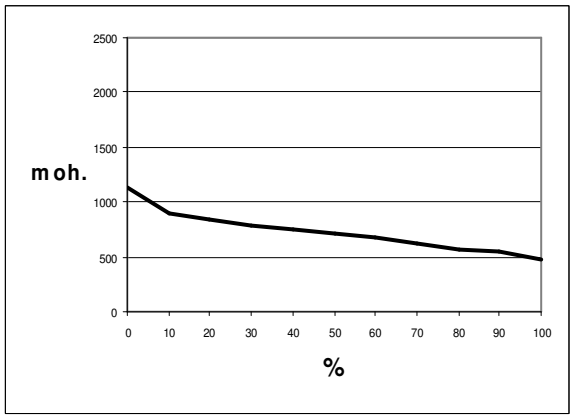


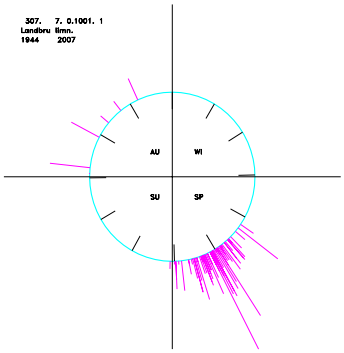
155.27 Lendingosen (Varnvatnet)



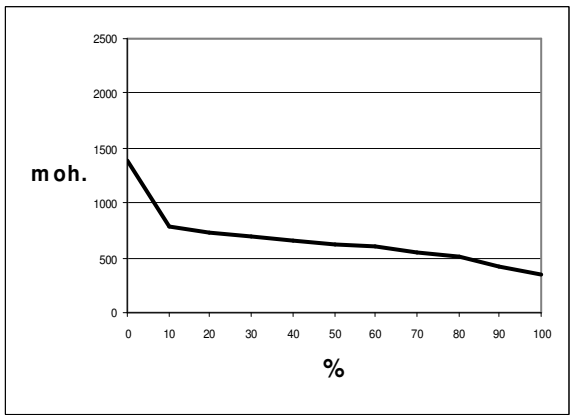


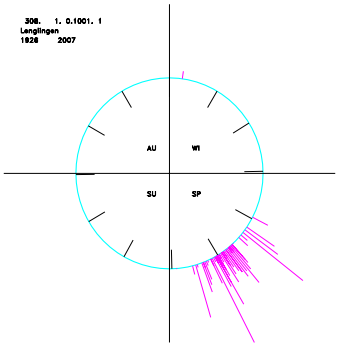
307.7 Landbru limn.



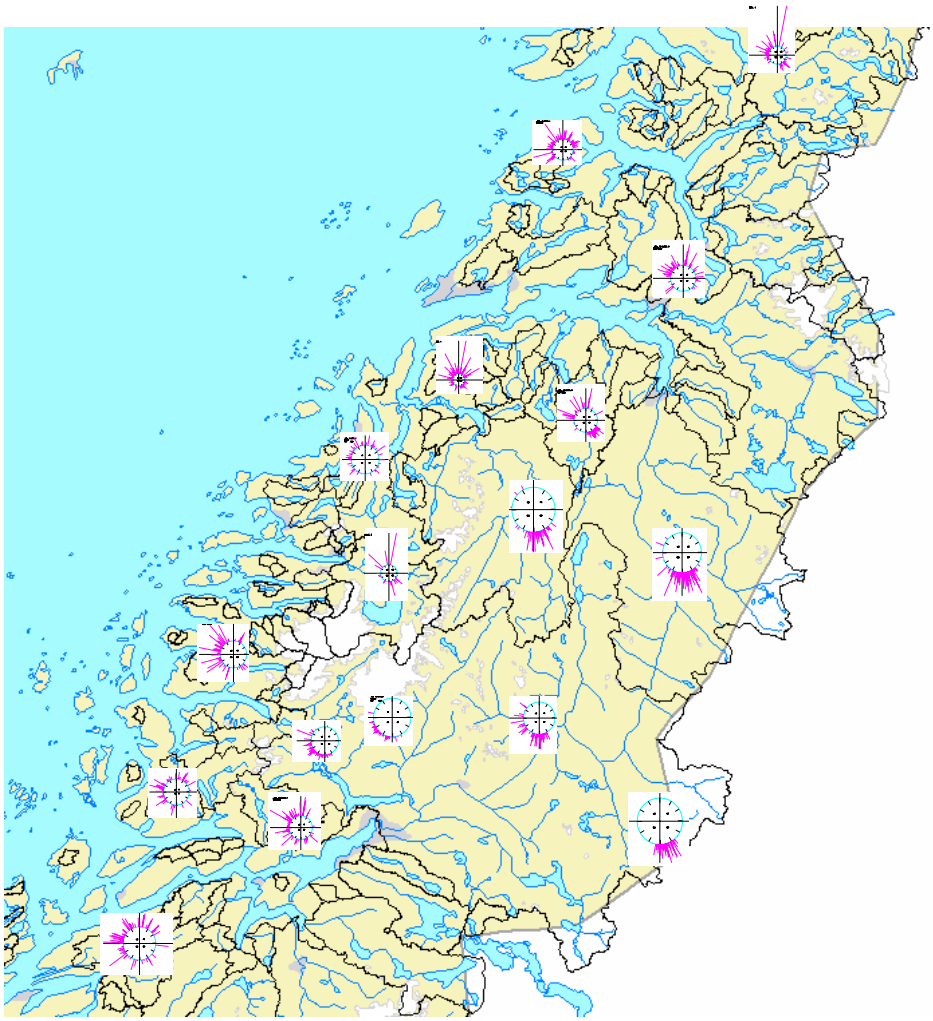


308.1 Lenglingen



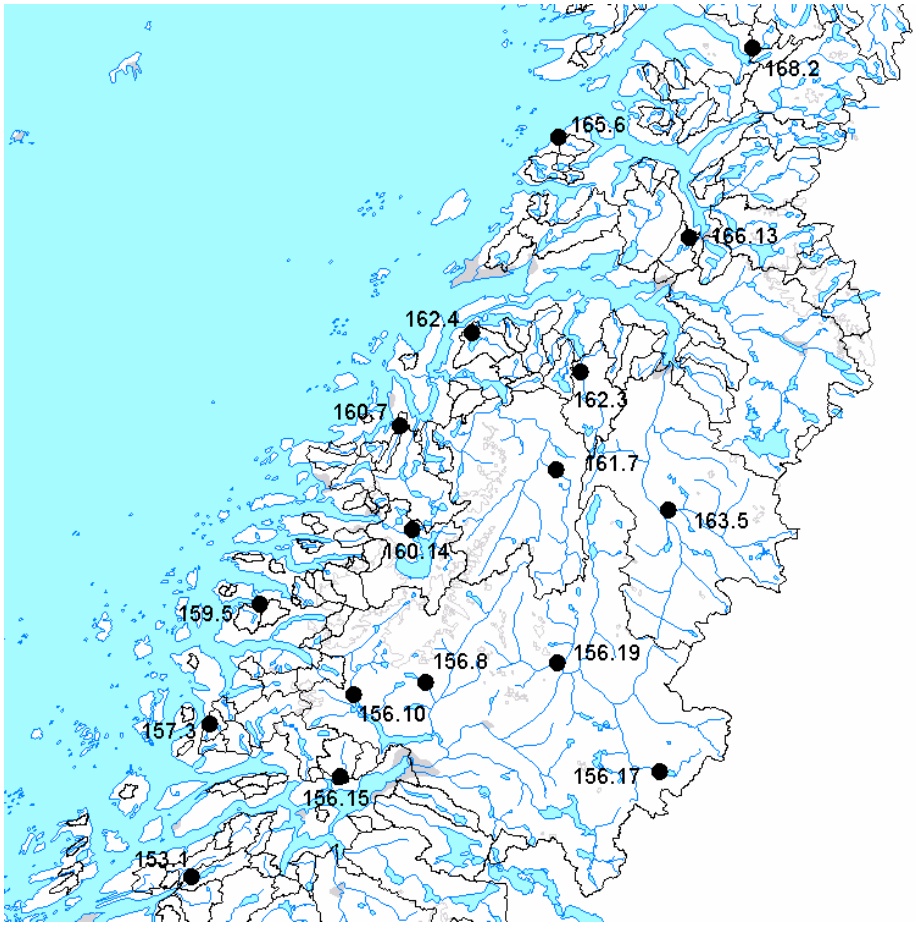


3.2 Midtre Nordland



Figur 5. FLROSE-diagrammer for uregulerte vannføringsstasjoner i Midtre Nordland.

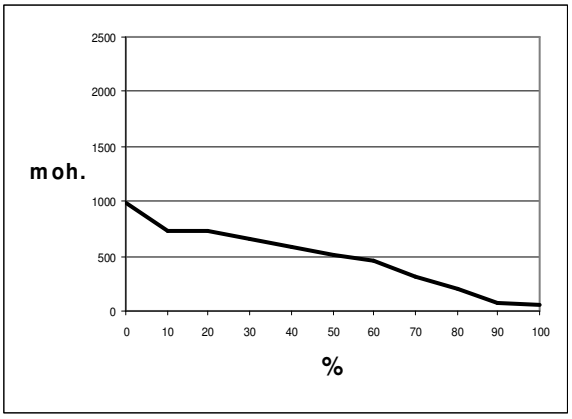
I denne landsdelen er det høst- og vinterflommer som dominerer i de kystnære områdene og sensommerflommer i breområdene. I indre strøk dominerer flommer om våren og tidlig sommer, men høstflommer kan forekomme.

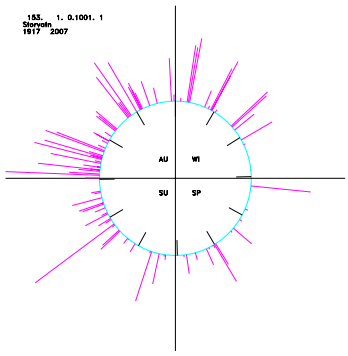


Figur 6. Vannføringsstasjoner i Midtre Nordland.

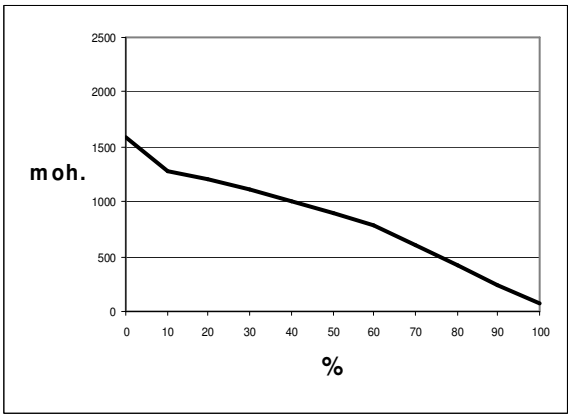
Vannføringsstasjon			Areal	Eff.sjøpr.	Høydeforhold, moh.		
			km^2	%	maks.	median	min.
153	1	Storvatn	48	8.09	991	516	51
156	8	Svartisdal	122	3.73	1583	902	71
156	10	Berget	211	0.78	1587	806	60
156	15	Forsbakk	56	0.06	1194	447	45
156	17	Virvatn	79	3.17	1250	834	642
156	19	Bredek	229	0.01	1487	905	267
157	3	Vassvatn	17	4.86	1165	466	107
159	5	Strømdalen	22	0.18	901	417	77
160	7	Skauvoll	20	0.87	1063	458	232
160	14	Navnløsvatn	7	14.17	775	608	534
161	7	Tollåga	223	0.01	1389	791	374
162	3	Skarsvatn	146	0.50	831	522	162
162	4	Valnesvatn	67	7.34	1118	296	121
163	5	Junkerdalselv	419	0.03	1703	835	117
165	6	Strandå	24	1.83	945	184	15
166	13	Vallvatn	53	2.70	814	95	31
168	2	Mørsvik Bru	31	4.28	1096	368	76

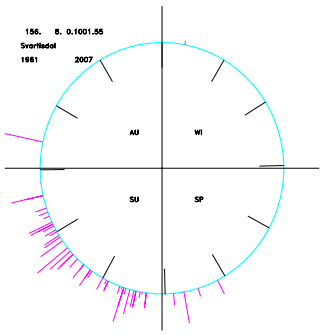
153.1 Storvatn



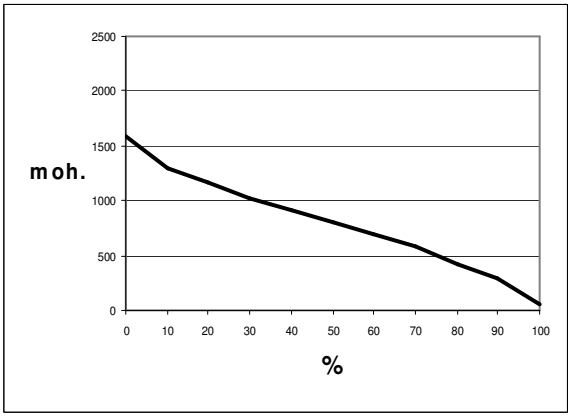


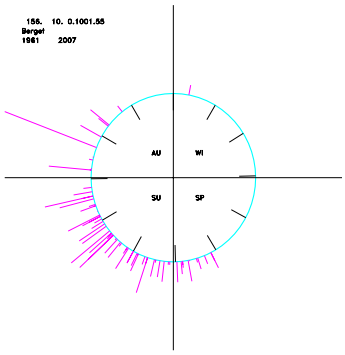
156.8 Svartisdal (stor bredekning i feltet)



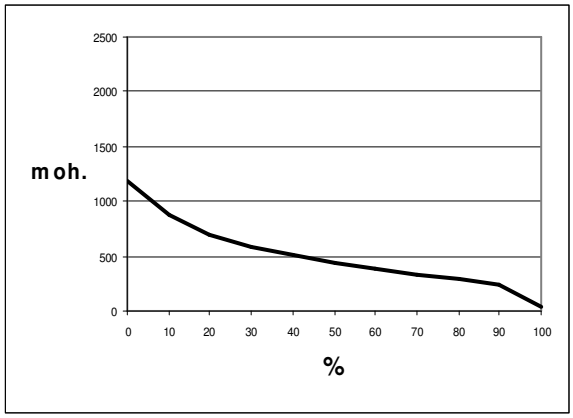


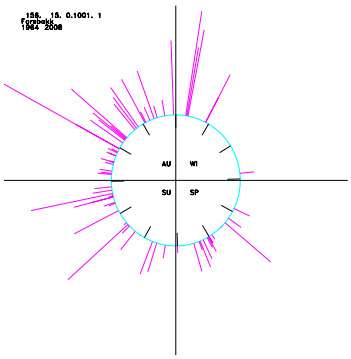
156.10 Berget (stor bredekning i feltet)



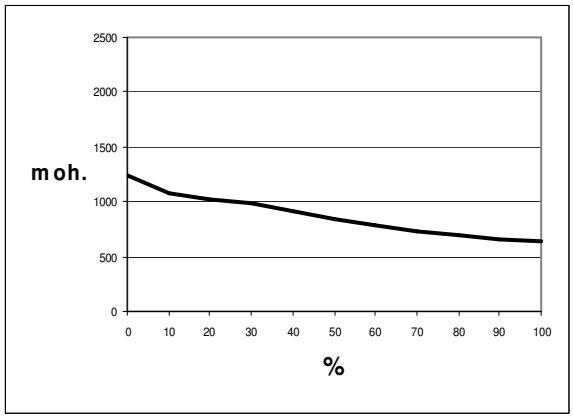


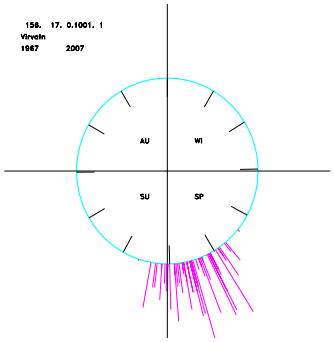
156.15 Forsbakk



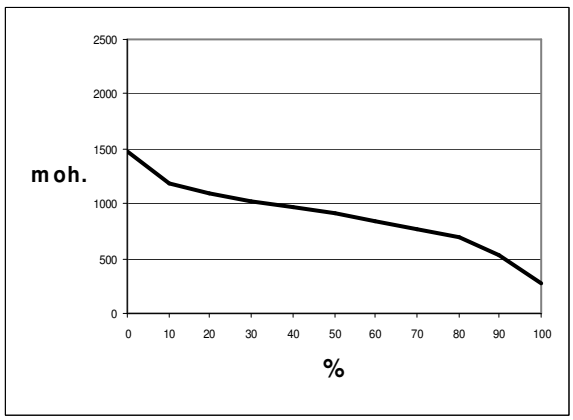


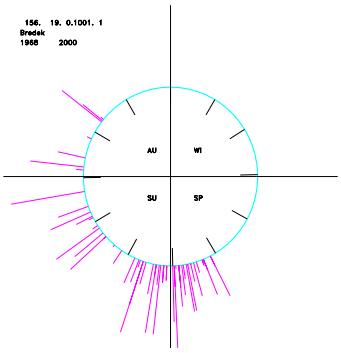
156.17 Virvatn



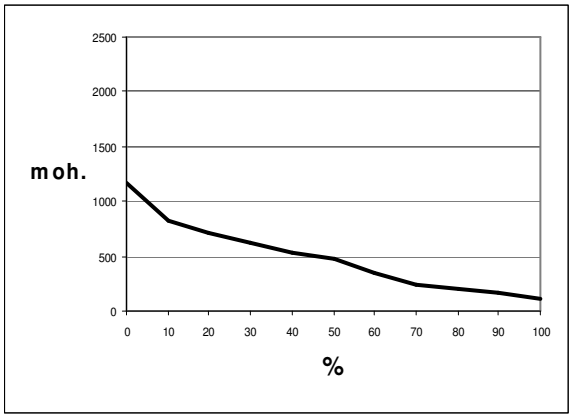


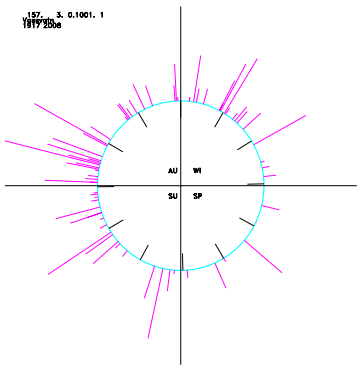
156.19 Bredek



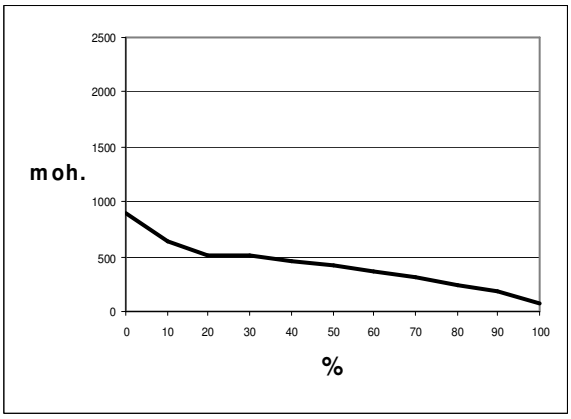


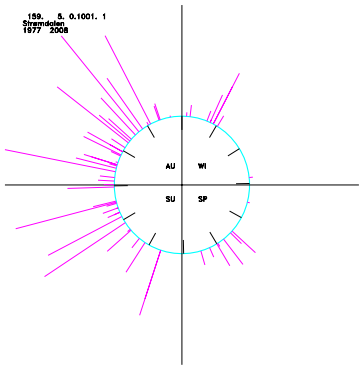
157.3 Vassvatn



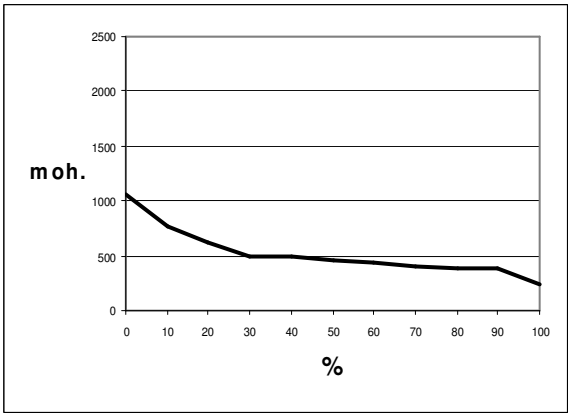


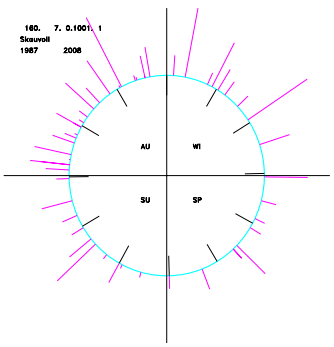
159.5 Strømdalen



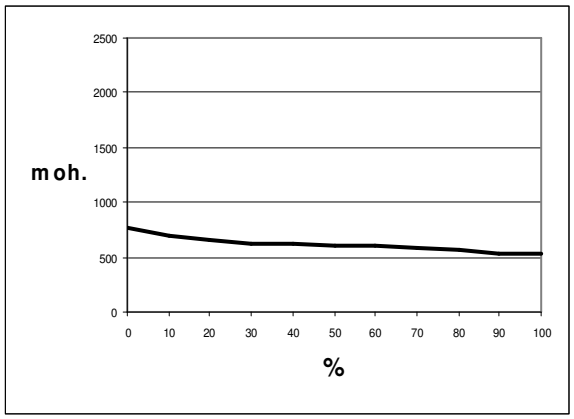


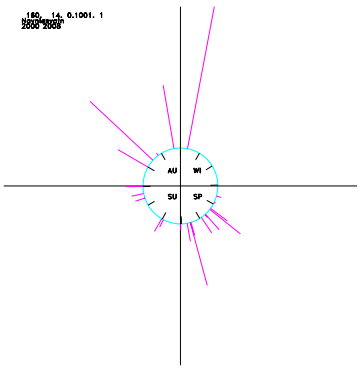
160.7 Skauvoll



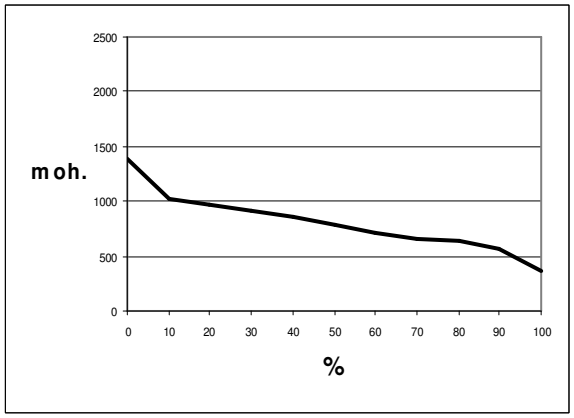


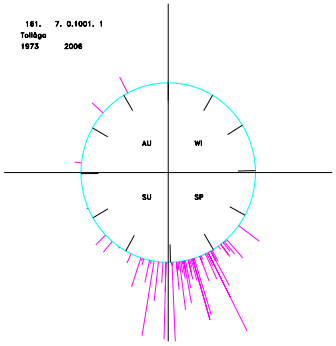
160.14 Navnløsvatn



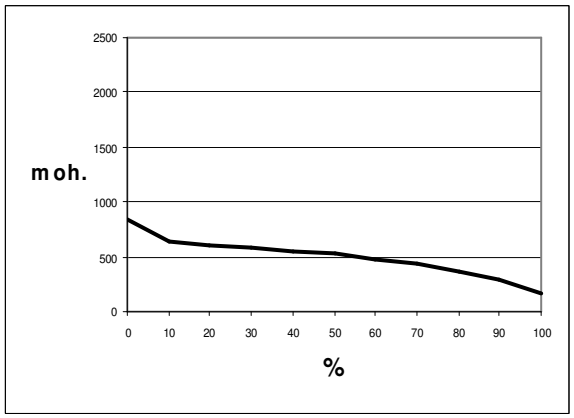


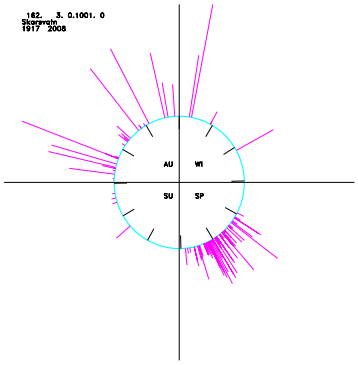
161.7 Tollåga



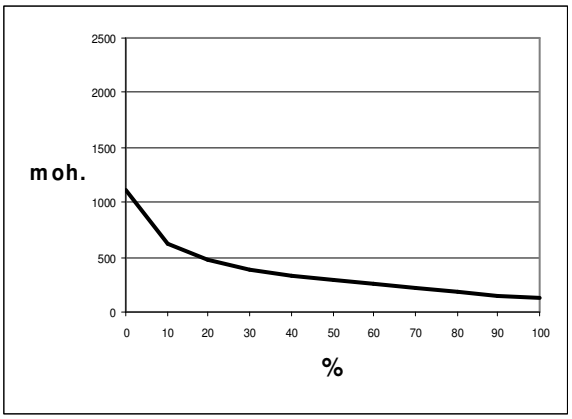


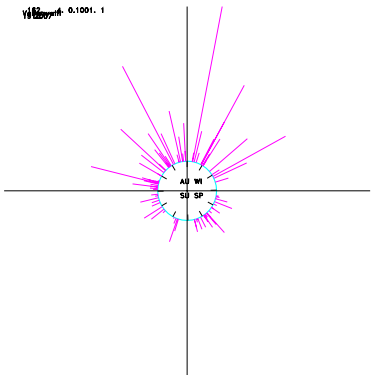
162.3 Skarsvatn



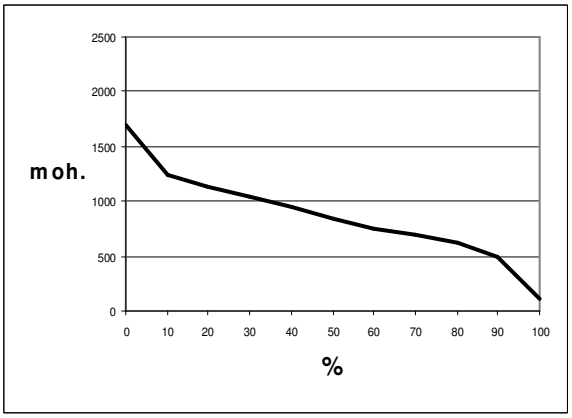


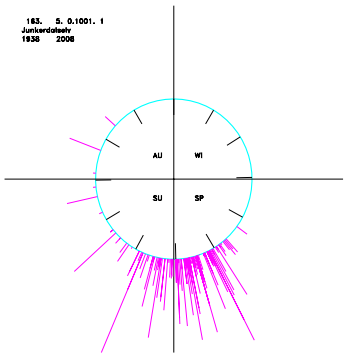
162.4 Valnesvatn



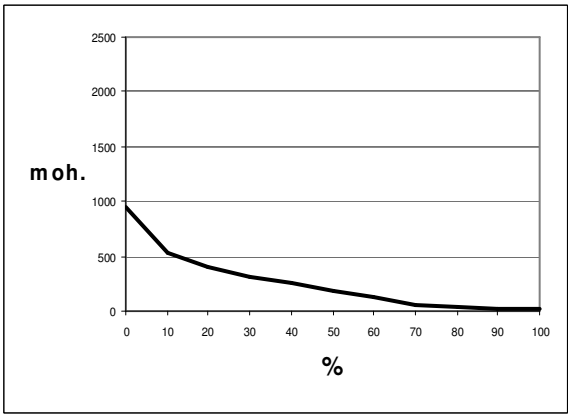


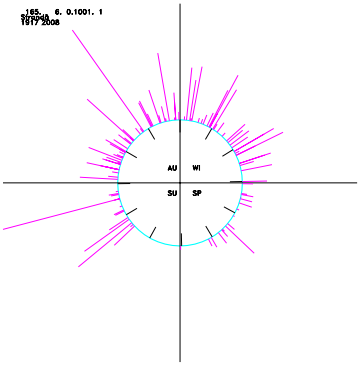
163.5 Junkerdalselv



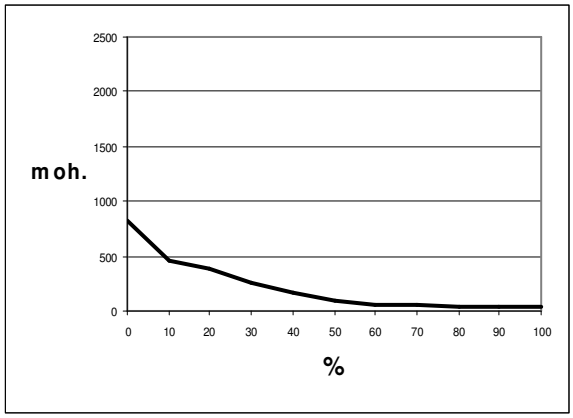


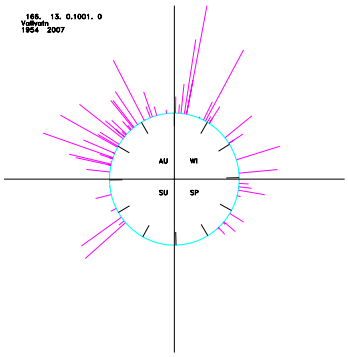
165.6 Strandå



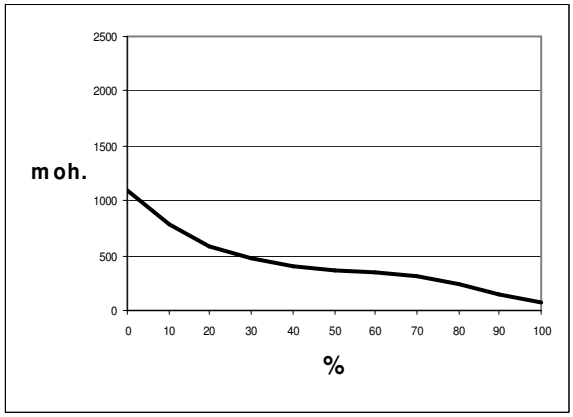


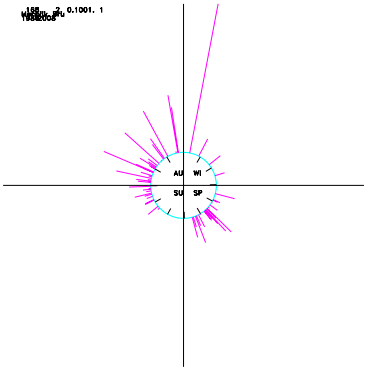
166.13 Vallvatn



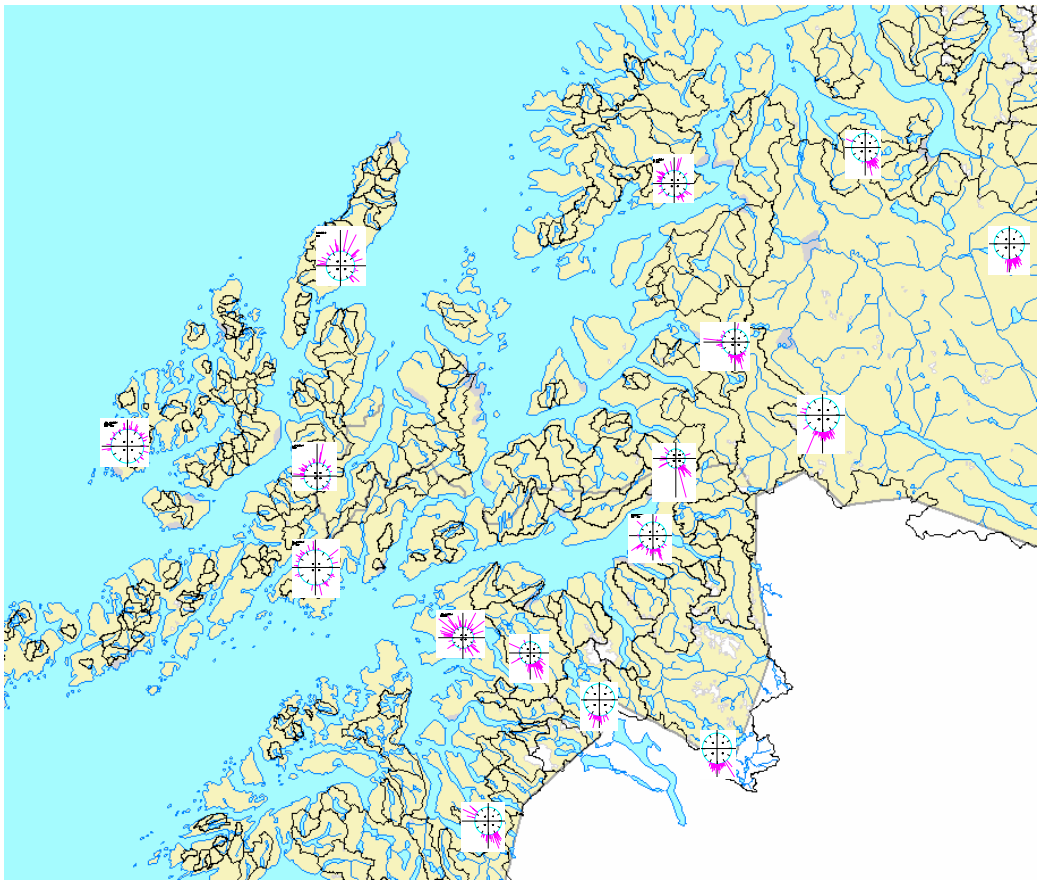


168.2 Mørsvik bru



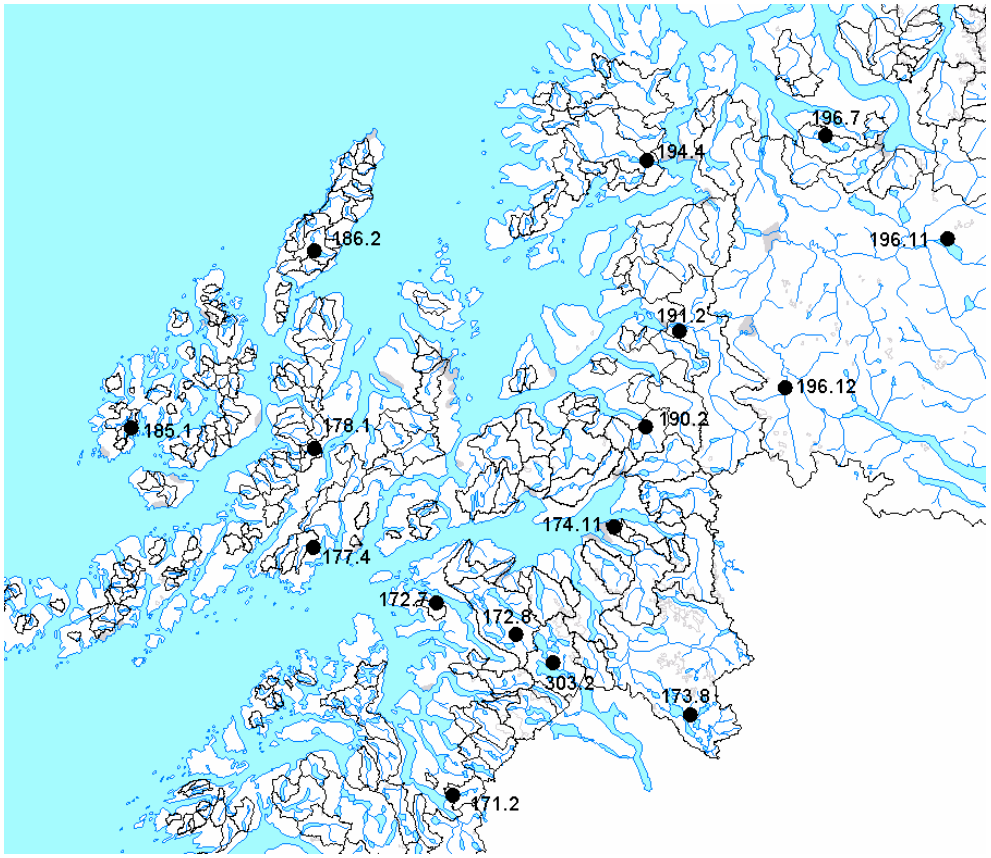


3.3 Nordre Nordland og Vest-Troms



Figur 7. FLROSE-diagrammer for uregulerte vannføringsstasjoner i Nordre Nordland og Vest-Troms.

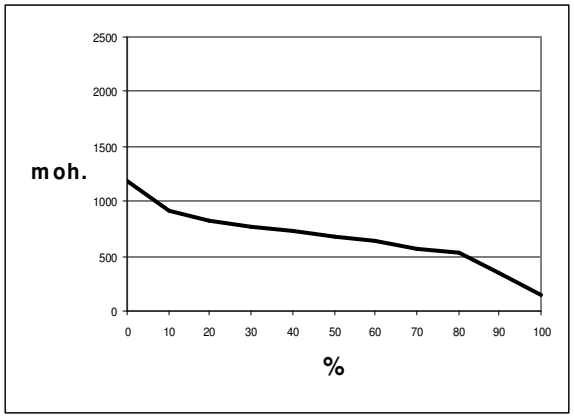
I ytre strøk kan det være flommer hele året, minst markerte flommer om sommeren. Litt lenger inn i landet er vårflommene vanligst, men ofte forekommer store høstflommer også. I de indre strøkene dominerer flommer om våren og tidlig sommer.

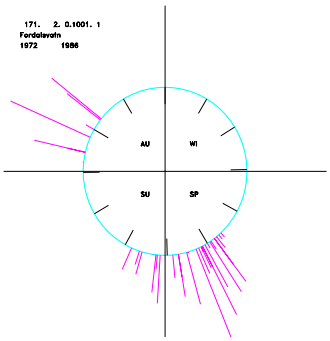


Figur 8. Vannføringsstasjoner i Nordre Nordland og Vest-Troms.

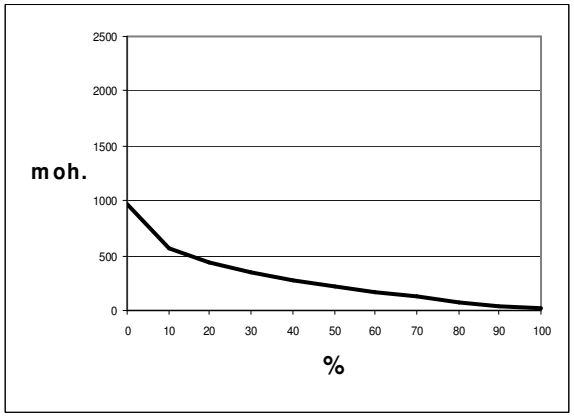
Vannføringsstasjon			Areal	Eff.sjøpr.	Høydeforhold, moh.		
			km^2	%	maks.	median	min.
171	2	Fordalsvatn	44	3.07	1190	683	153
172	7	Leirpoldvatn	19	4.50	964	219	26
172	8	Rauvatn	22	4.82	999	634	472
173	8	Coarveij	64	5.28	1578	1012	917
174	11	Taraldsvikelv	3	0.01	1254		290
177	4	Sneisvatn	30	2.23	970	304	18
178	1	Langvatn	19	6.16	1087	356	27
185	1	Gåslandsvatn	8	19.68	171	34	16
186	2	Ånesvatn	47	0.79	584	104	10
190	2	Storfossen	53	1.28	1328	436	194
191	2	Øvrevatn	526	0.60	1479	566	8
194	4	Mevatn	179	2.20	894	244	14
196	7	Ytre Fiskeløsvatn	54	15.64	1240	272	158
196	11	Lille Rostavatn	637	2.86	1586	740	102
196	12	Lundberg	246	0.01	1565	870	93
303	2	Kobvatn	83	15.75	1620	830	690

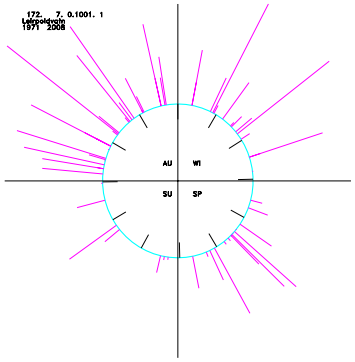
171.2 Fordalsvatn



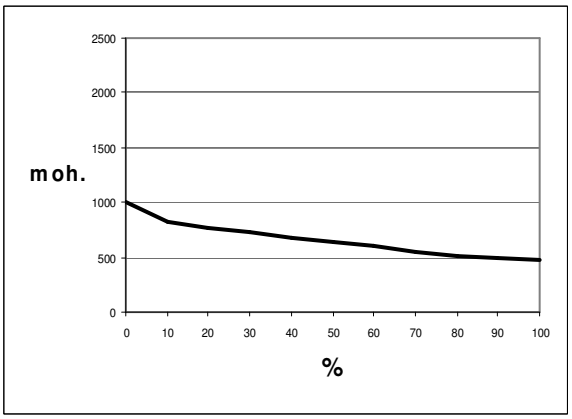


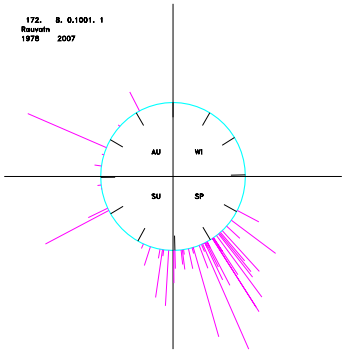
172.7 Leirpoldvatn



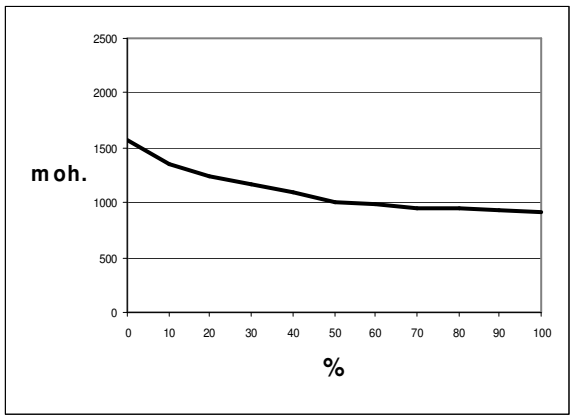


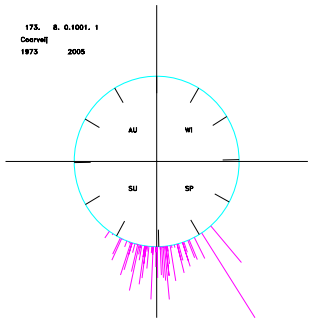
172.8 Rauvatn



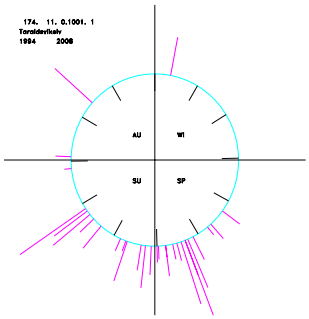


173.8 Coarveij

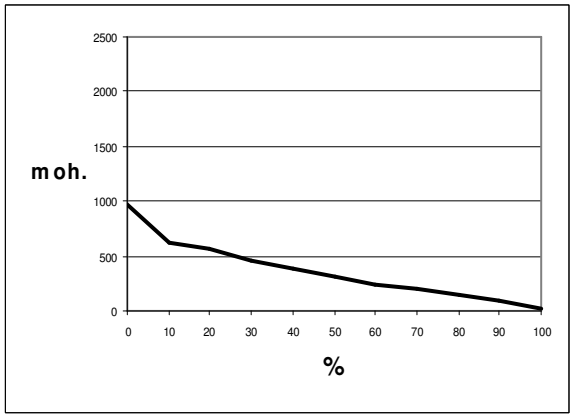


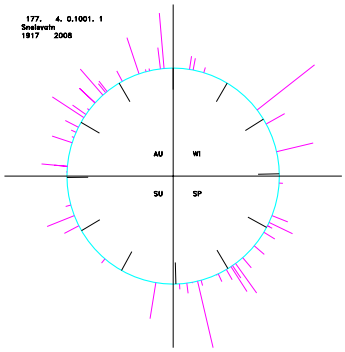


174.11 Taraldsvikelv

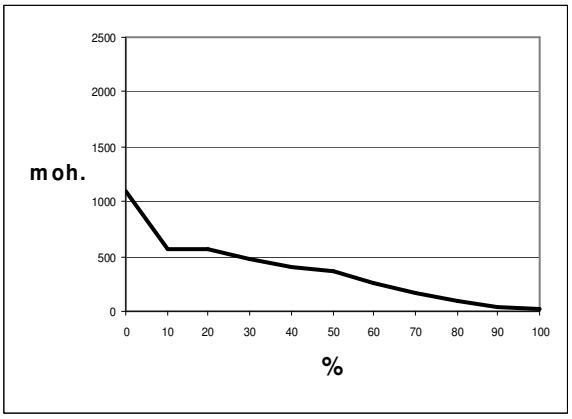


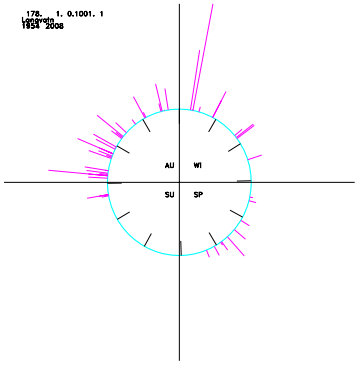
177.4 Sneisvatn



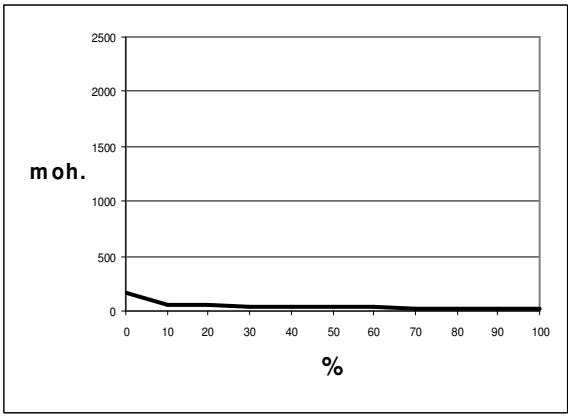


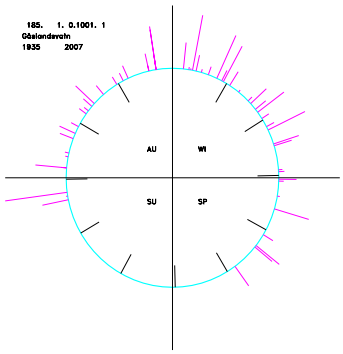
178.1 Langvatn



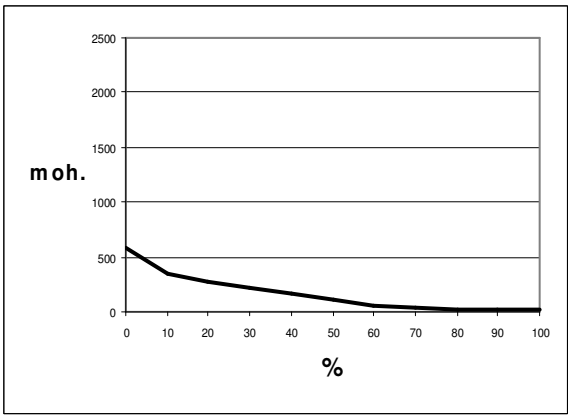


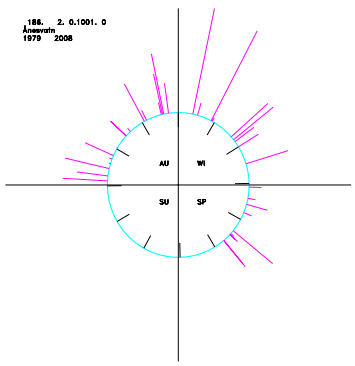
185.1 Gåslandsvatn



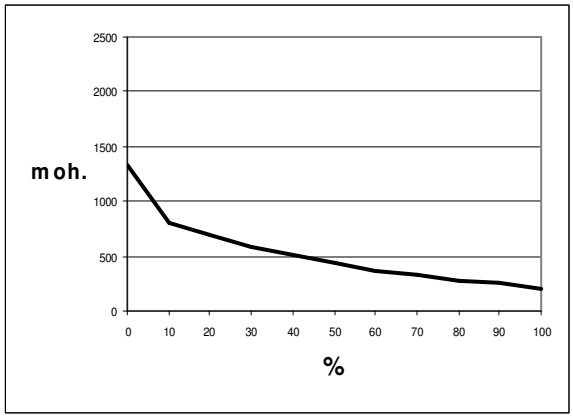


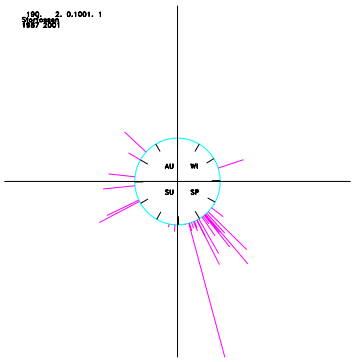
186.2 Ånesvatn



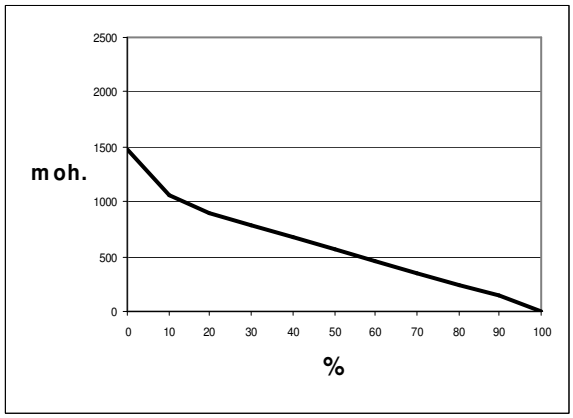


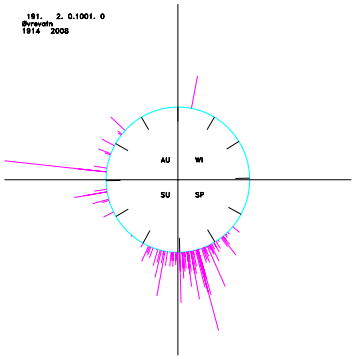
190.2 Storfossen



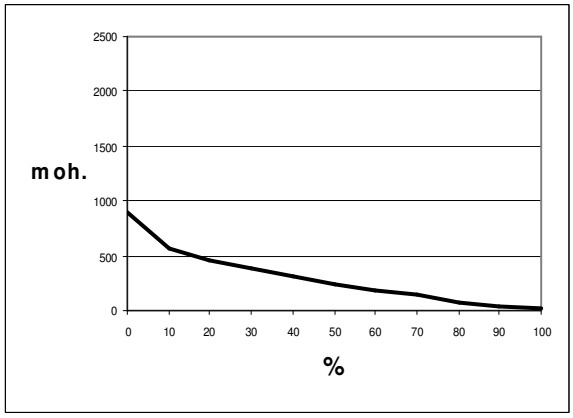


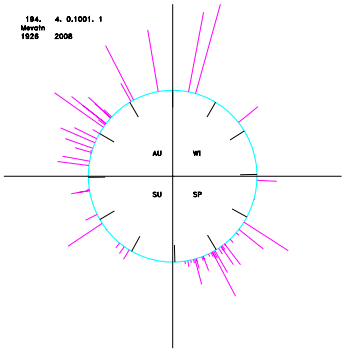
191.2 Øvrevatn



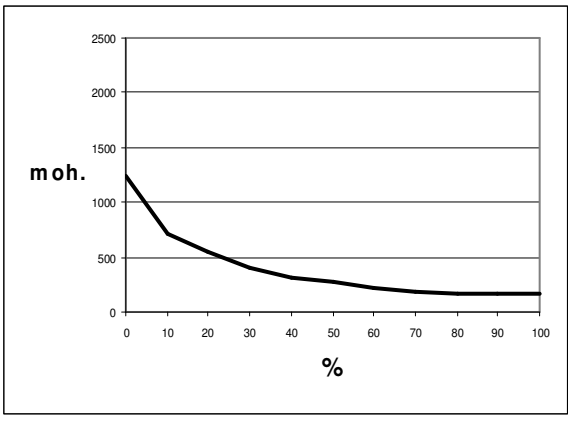


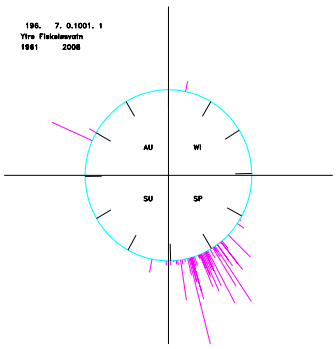
194.4 Mevatn



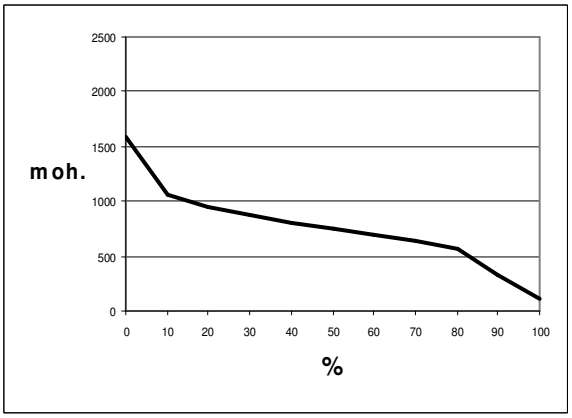


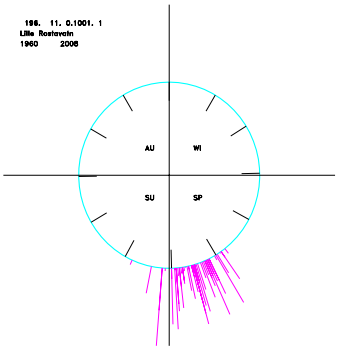
196.7 Ytre Fiskeløsvatn



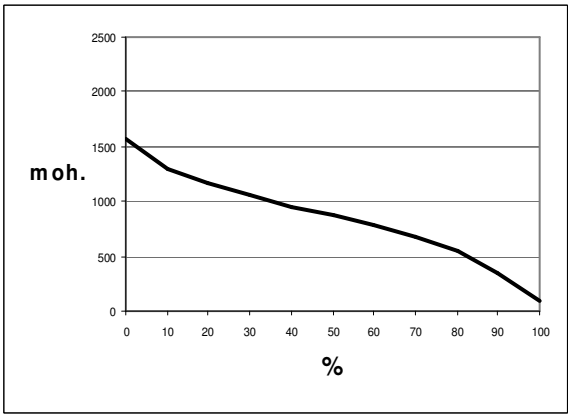


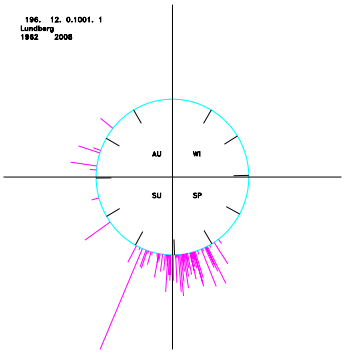
196.11 Lille Rostavatn



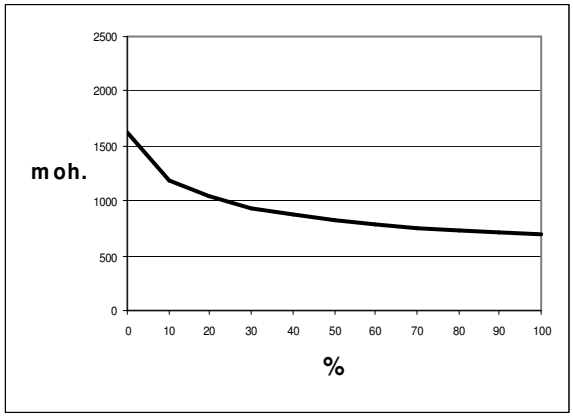


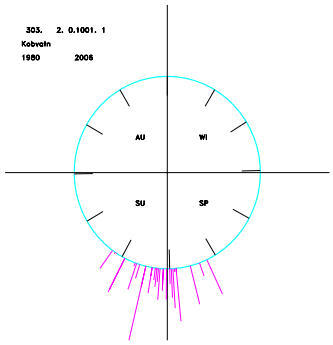
196.12 Lundberg



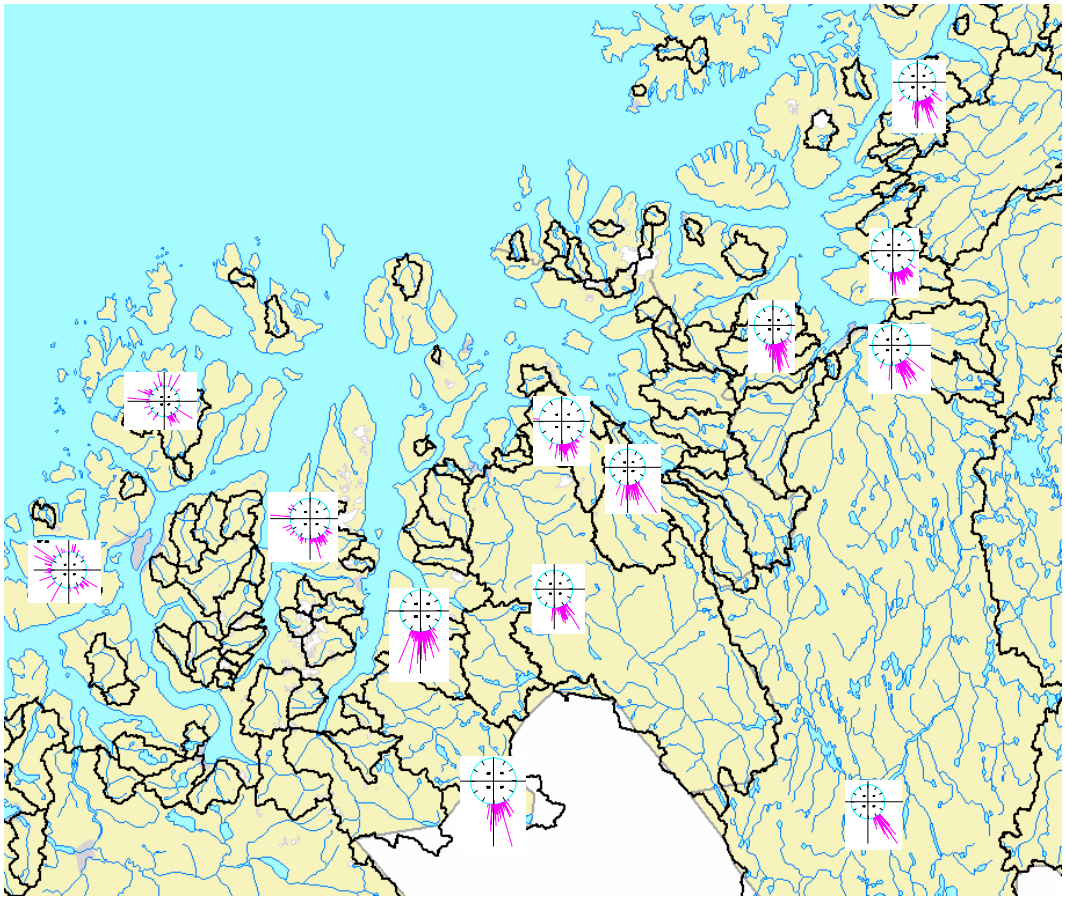


303.2 Kobvatn



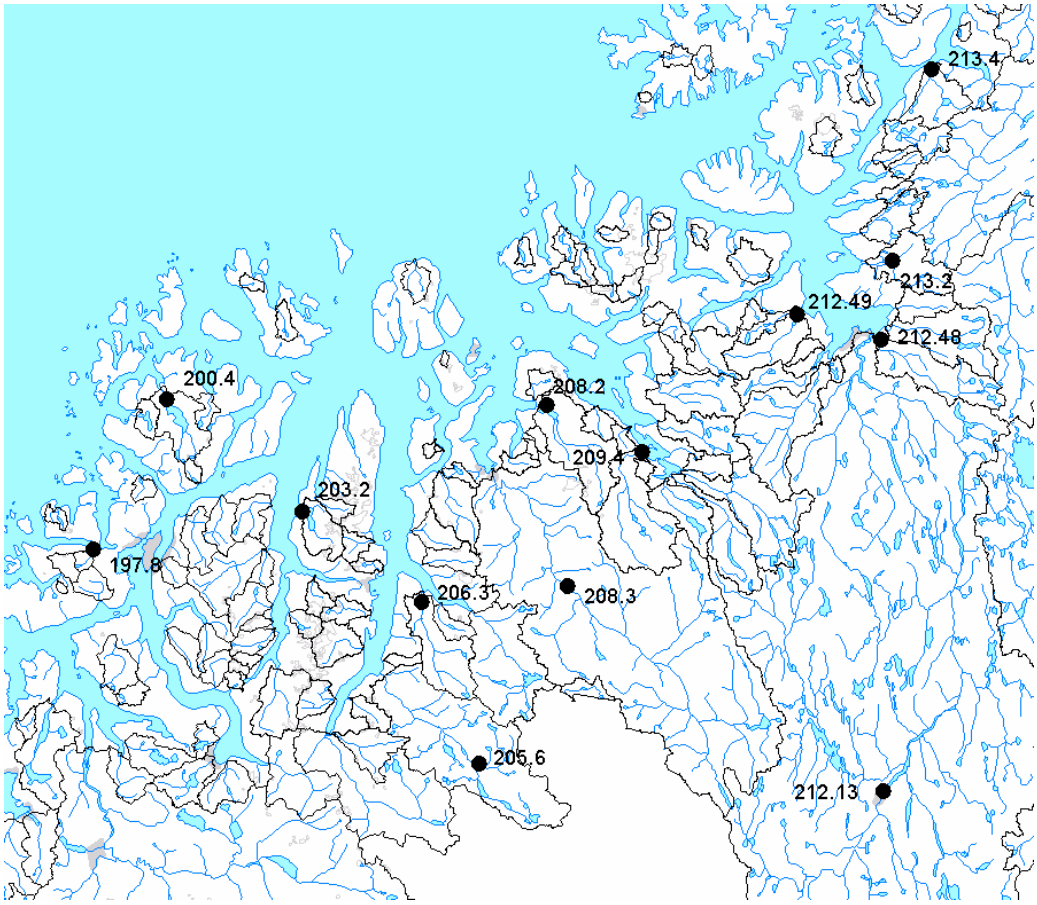


3.4 Øst-Troms og Vest-Finnmark



Figur 9. FLROSE-diagrammer for uregulerte vannføringsstasjoner i Øst-Troms og Vest-Finnmark.

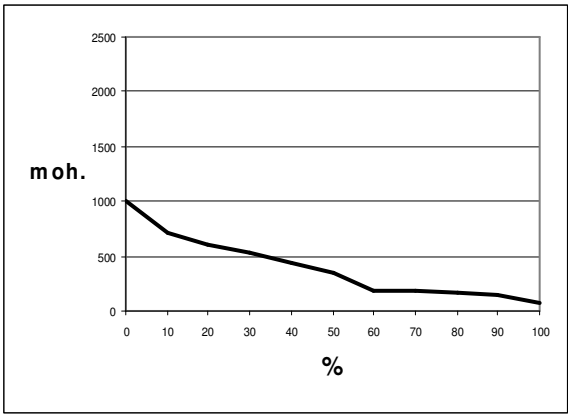
I ytre strøk kan det være flommer hele året, mens i indre strøk er det vårflommer som dominerer.

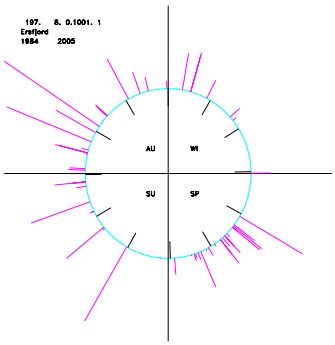


Figur 10. Vannføringsstasjoner i Øst-Troms og Vest-Finnmark.

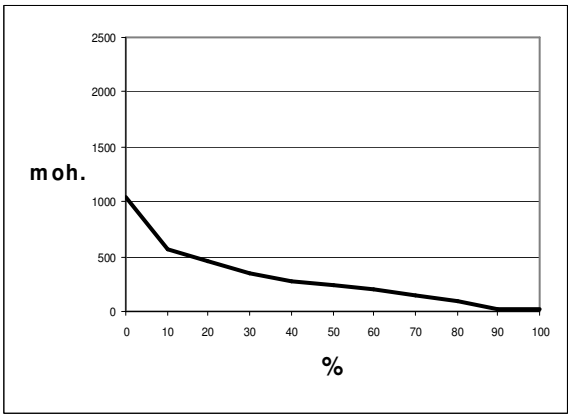
Vannføringsstasjon			Areal	Eff.sjøpr.	Høydeforhold, moh.		
			km^2	%	maks.	median	min.
197	8	Ersfjord	19	0.81	1009	346	65
200	4	Skogsfjordvatn	135	10.12	1047	243	19
203	2	Jægervatn	92	7.87	1533	265	3
205	6	Didnojokka	113	0.48	1173	923	522
206	3	Manndalen Bru	200	0.03	1316	932	20
208	2	Oksfjordvatn	266	2.14	1335	548	8
208	3	Svartfossberget	1929	0.04	1361	673	90
209	4	Lillefossen	331	0.11	1310	805	30
212	13	Kautokeino	1750	0.15	660	437	310
212	48	Sagafoss	234	0.14	633	415	23
212	49	Halsnes	145	0.90	1146	532	30
213	2	Leirbotnvatn	135	1.09	716	457	161
213	4	Kvalsund	125	0.89	710	356	19

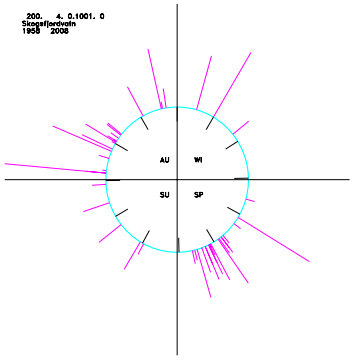
197.8 Ersfjord



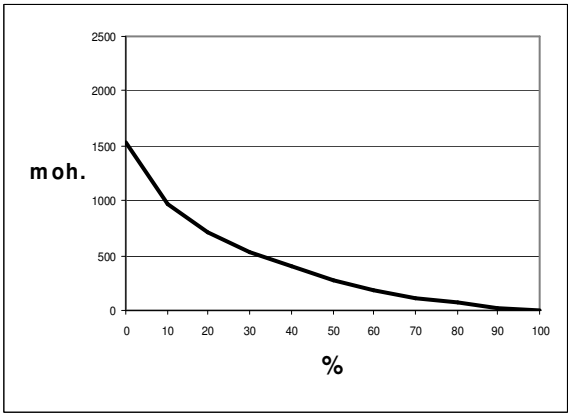


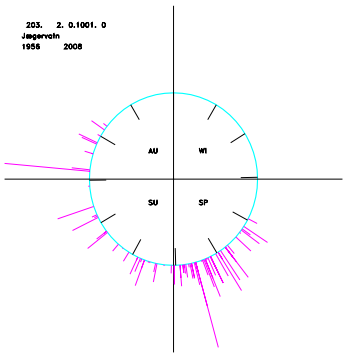
200.4 Skogsfjordvatn



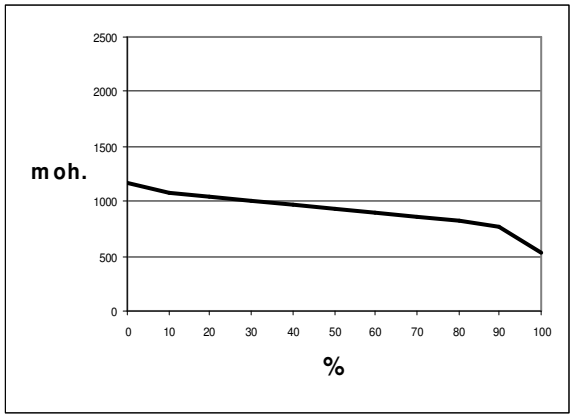


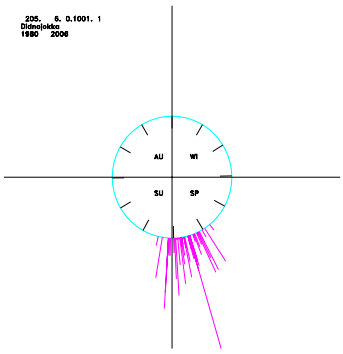
203.2 Jægervatn



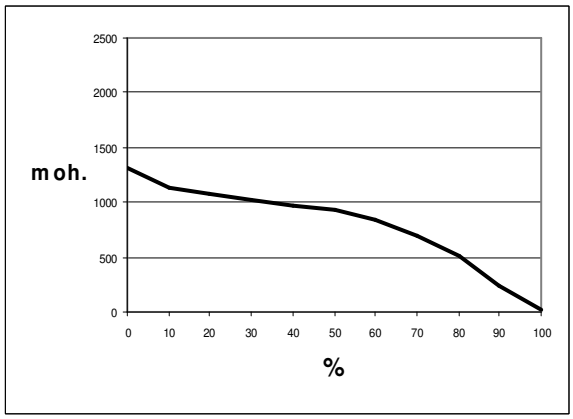


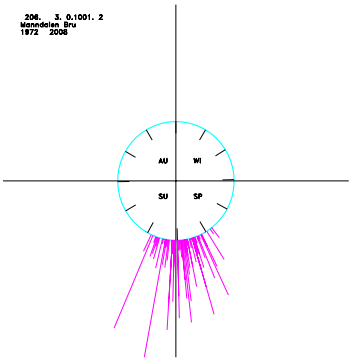
205.6 Didnojokka



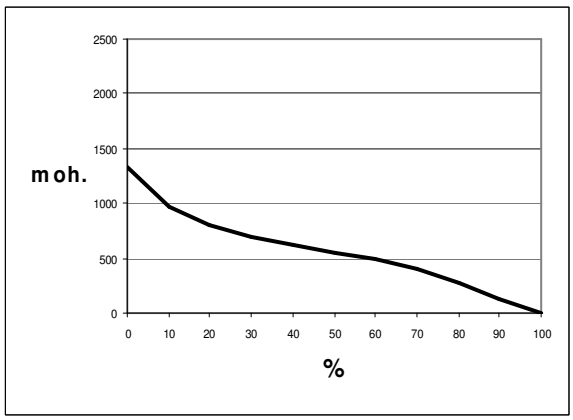


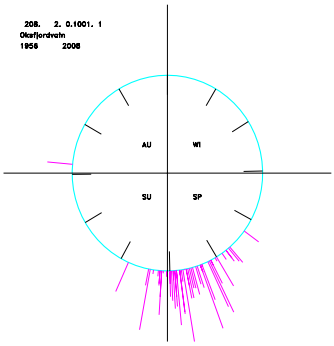
206.3 Manndalen bru



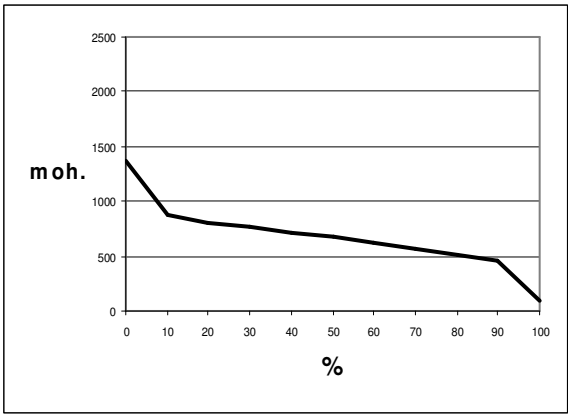


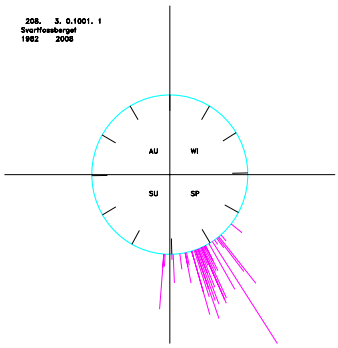
208.2 Oksfjordvatn



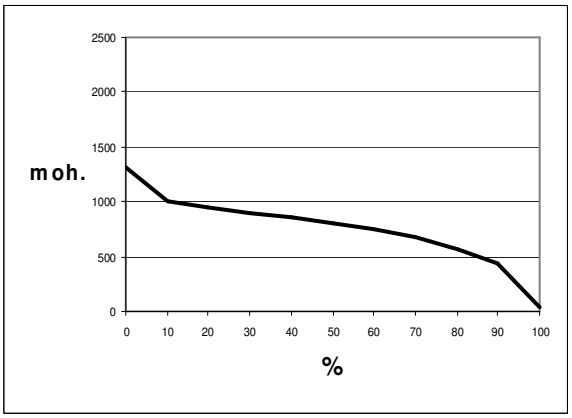


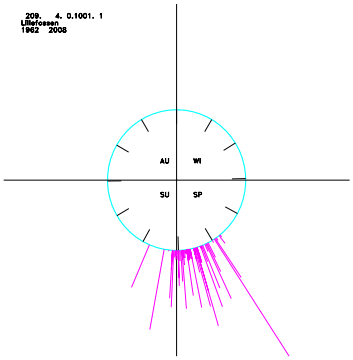
208.3 Svartfossberget



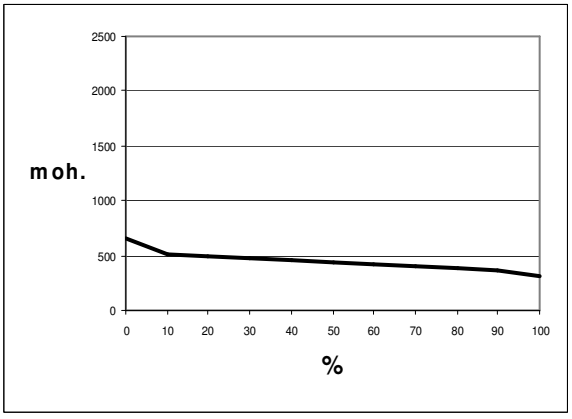


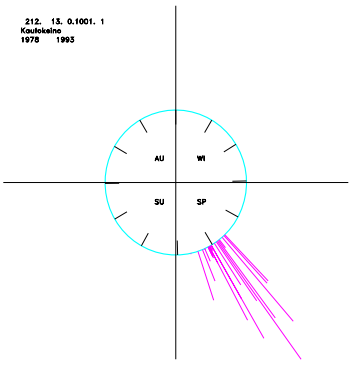
209.4 Lillefossen



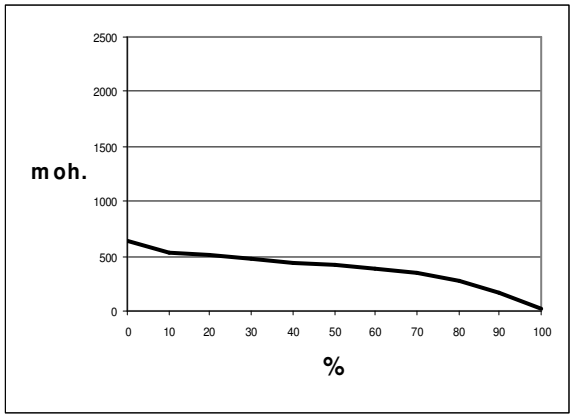


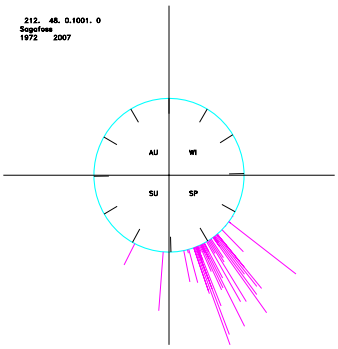
212.13 Kautokeino



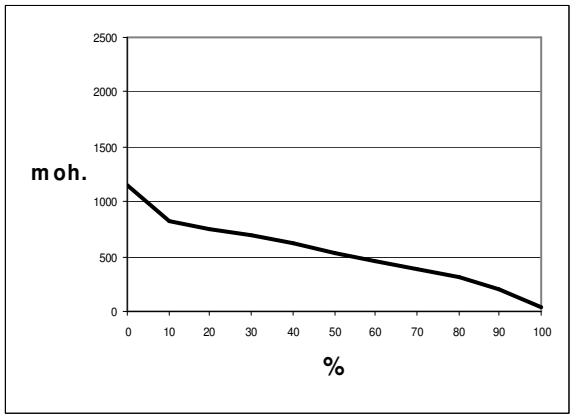


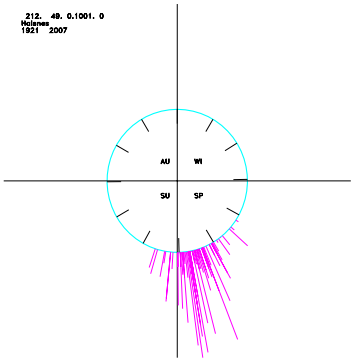
212.48 Sagafoss



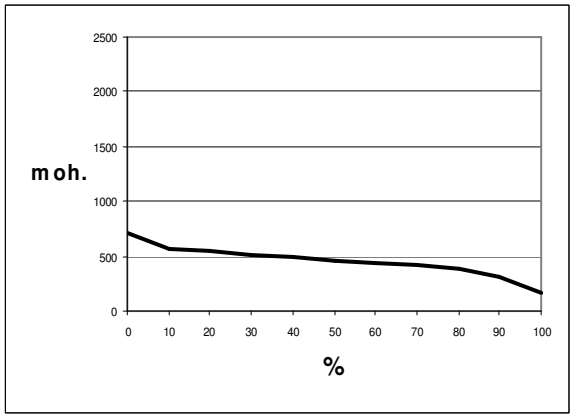


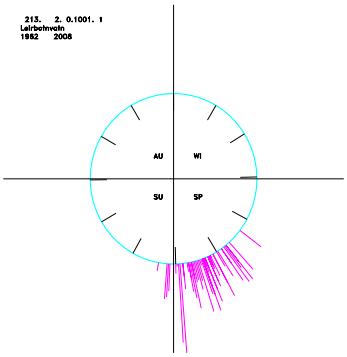
212.49 Halsnes



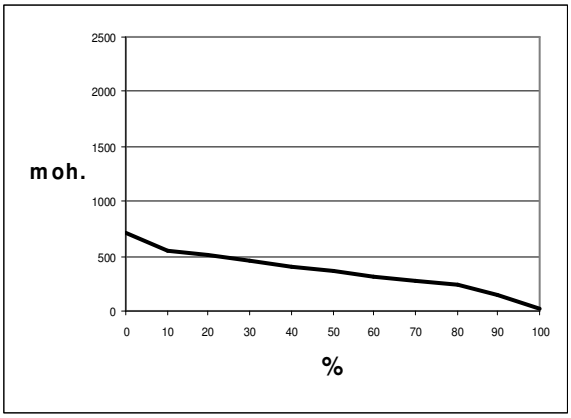


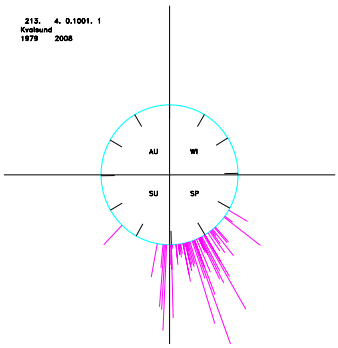
213.2 Leirbotnvatn



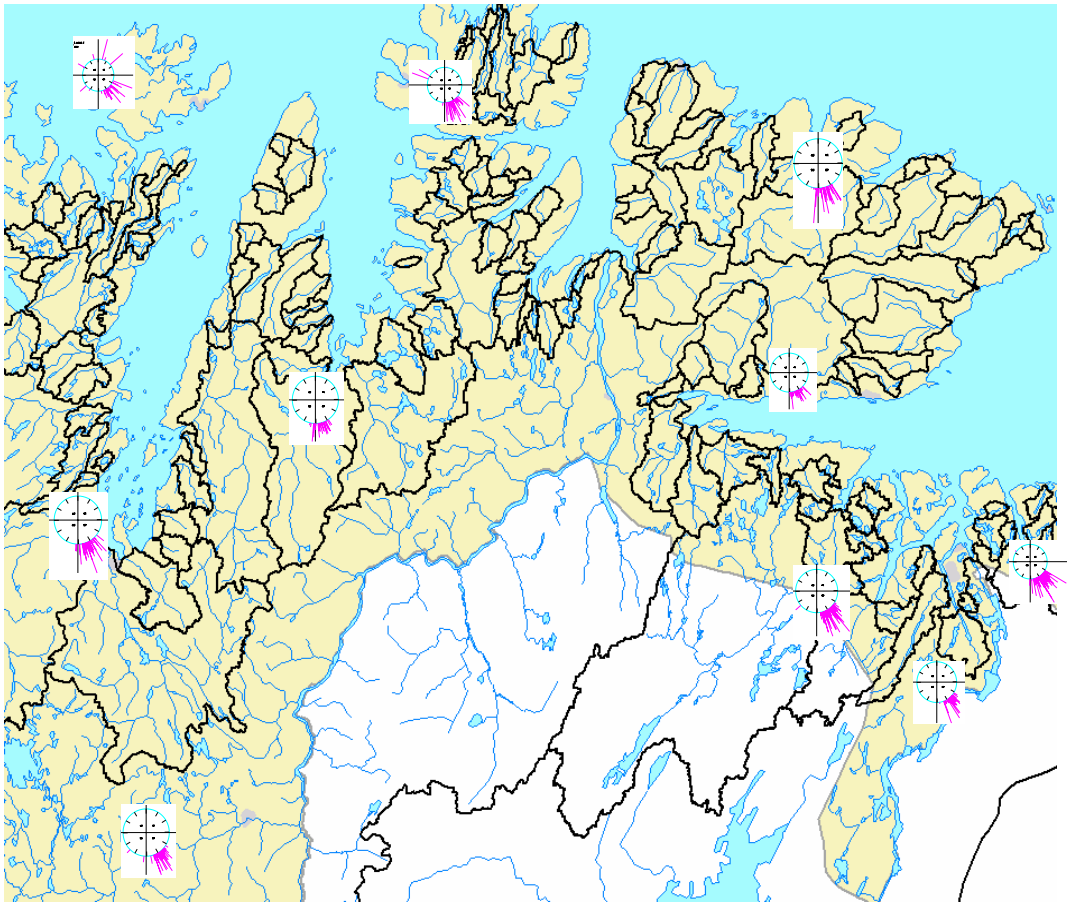


213.4 Kvalsund



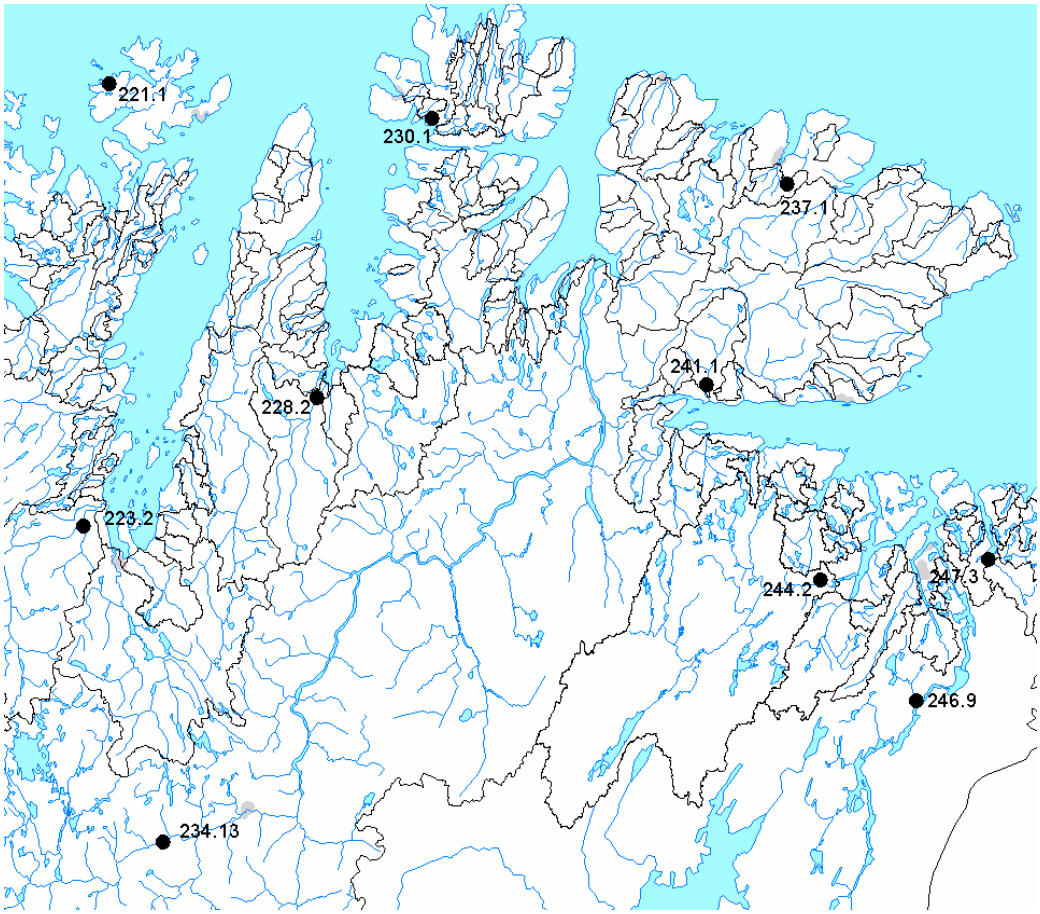


3.5 Øst-Finnmark



Figur 11. FLROSE- diagrammer for uregulerte vannføringsstasjoner i Øst-Finnmark.

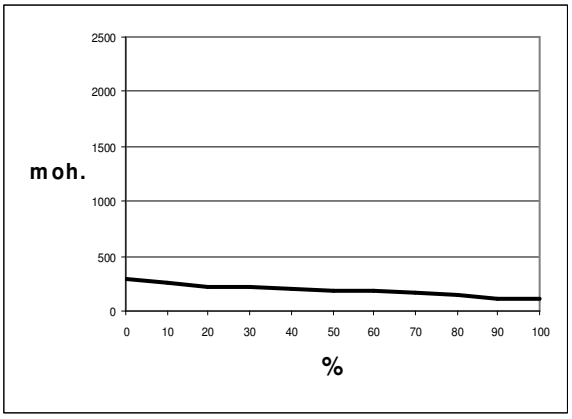
I hele området er det vårflommene som dominerer. I ytre strøk kan også store høst- og vinterflommer forekomme.

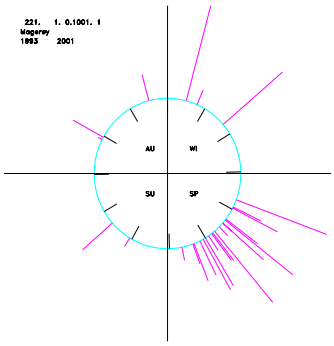


Figur 12. Vannføringsstasjoner i Øst-Finnmark.

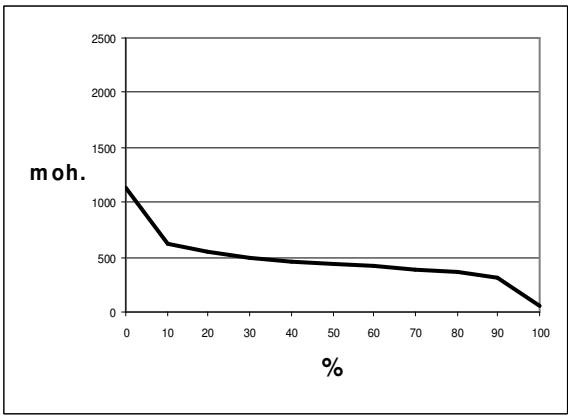
Vannføringsstasjon			Areal	Eff.sjøpr.	Høydeforhold, moh.		
			km^2	%	maks.	median	min.
221	1	Magerøy	3	7.10	297	187	108
223	2	Lombola	878	0.11	1136	435	58
228	2	Kunes	683	0.11	1002	483	39
230	1	Nordmannset	19	3.56	370	247	72
234	13	Vækkava, Iesjokka	2078	0.85	1020	413	178
237	1	Båtsfjord	22	1.44	480	285	142
241	1	Bergeby	248	0.03	470	236	24
244	2	Neiden	2963	0.64	440	213	32
246	9	Sametielv	260	1.61	295	132	39
247	3	Karpelva	138	0.32	404	196	20

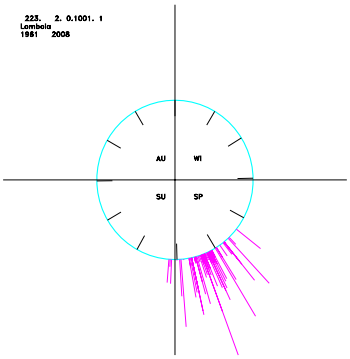
221.1 Magerøy



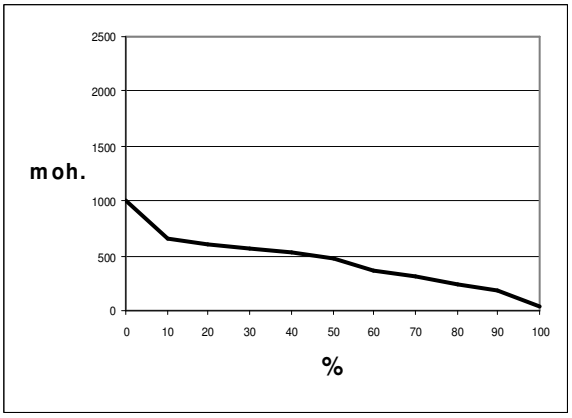


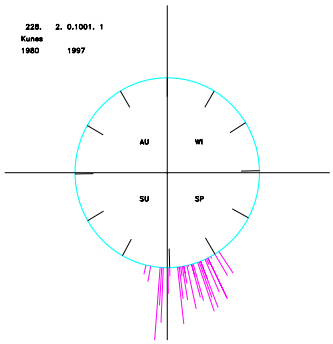
223.2 Lombola



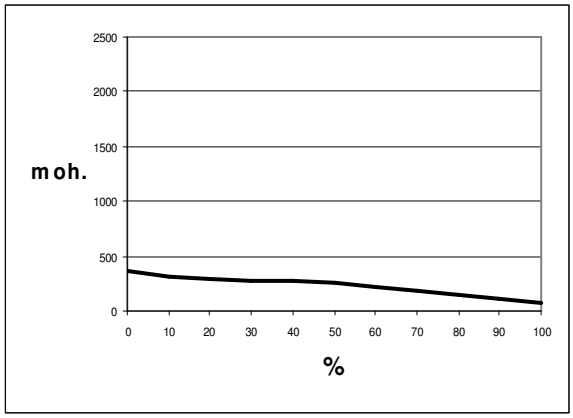


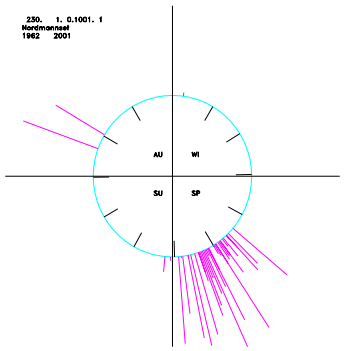
228.2 Kunes



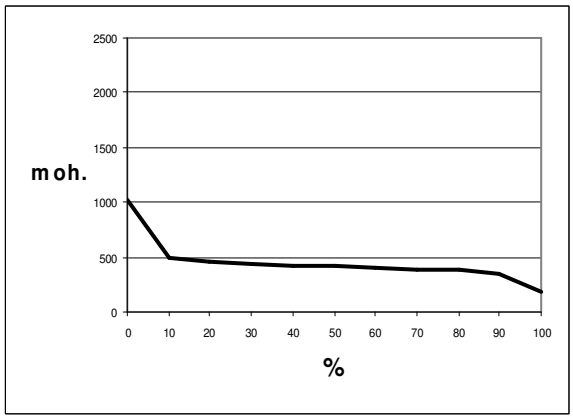


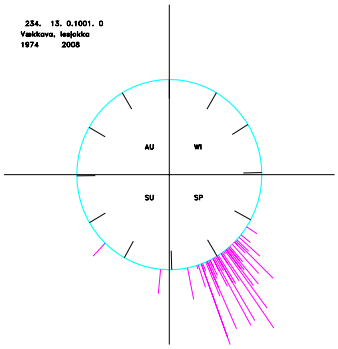
230.1 Nordmannset



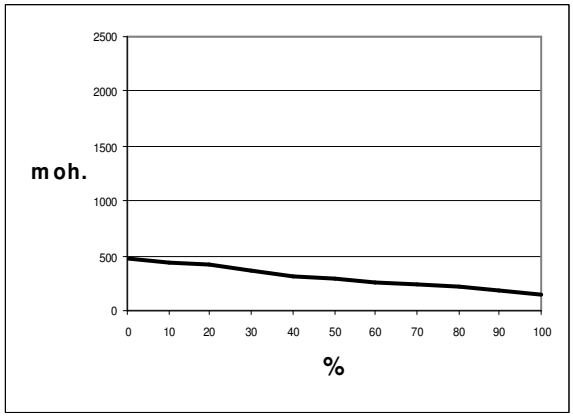


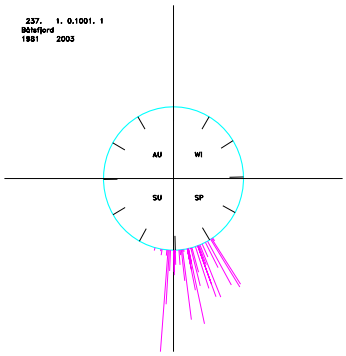
234.13 Vækkava, Iesjokka



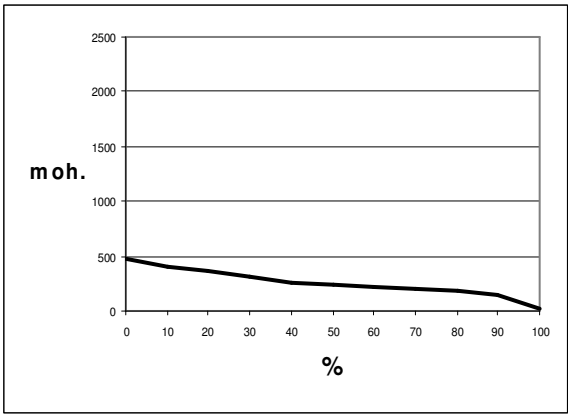


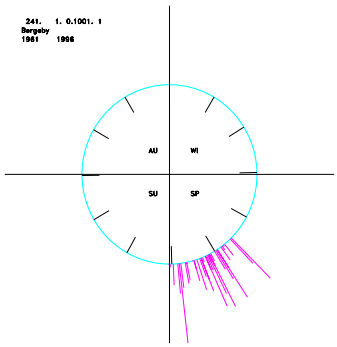
237.1 Båtsfjord



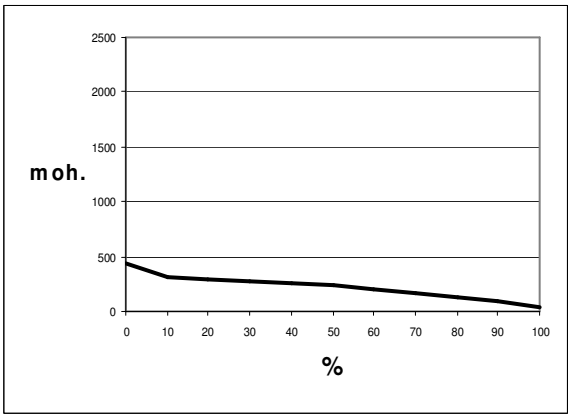


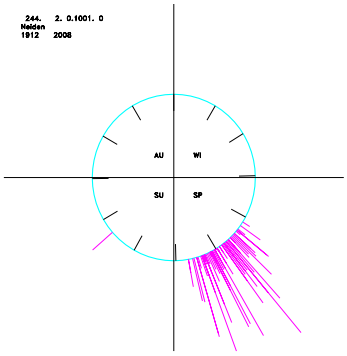
241.1 Bergeby



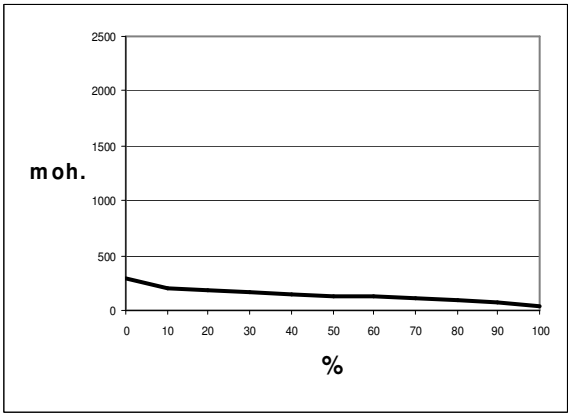


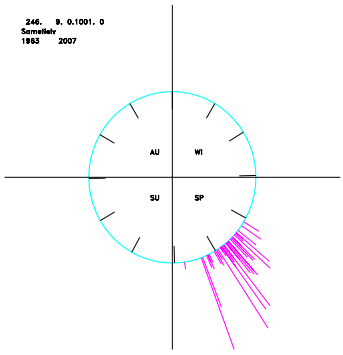
244.2 Neiden



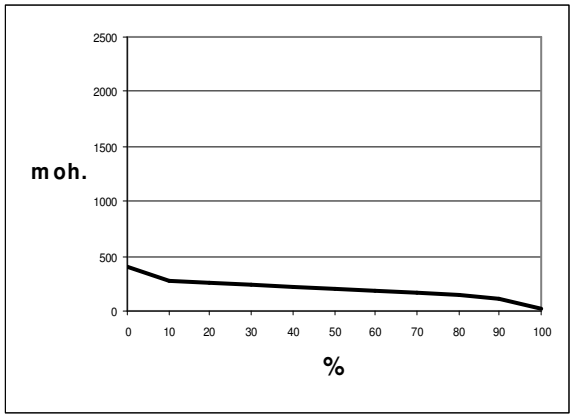


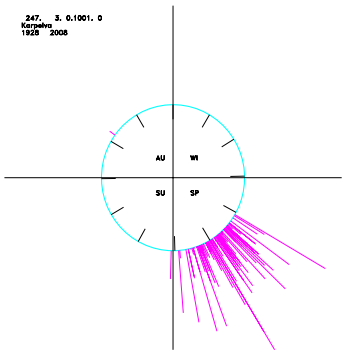
246.9 Sametielv





247.3 Karpelva

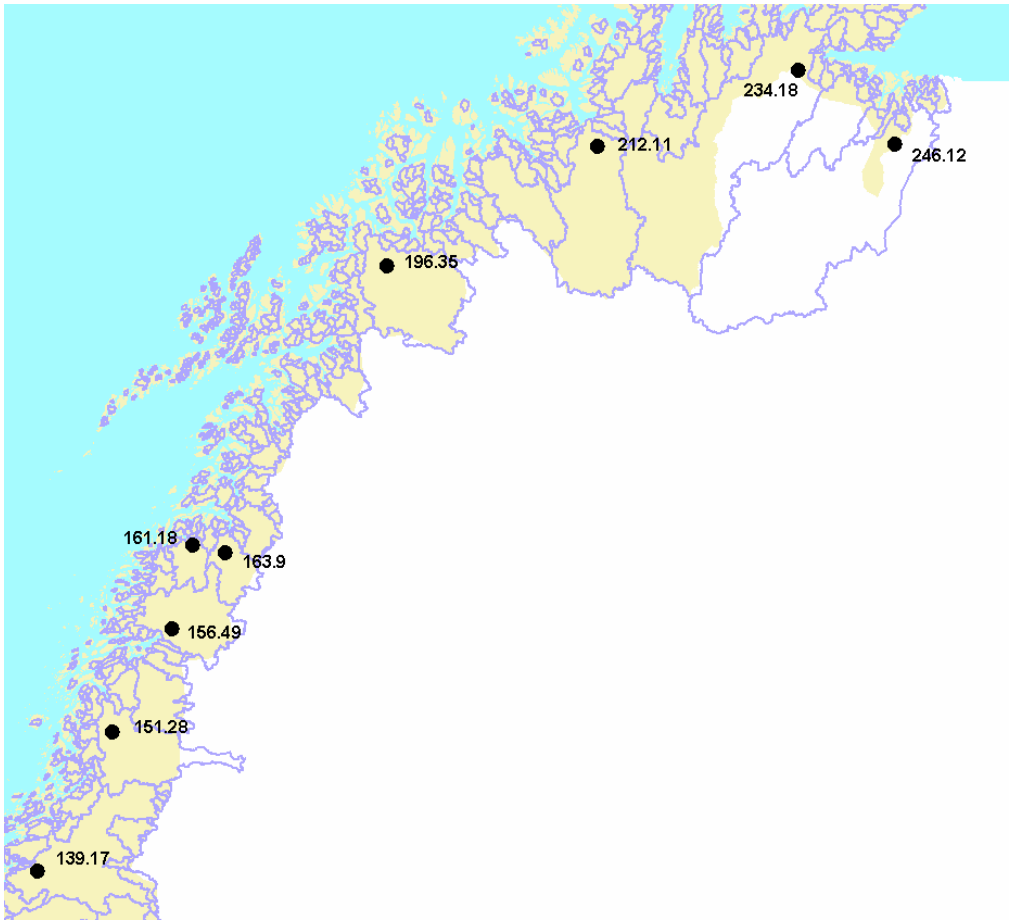




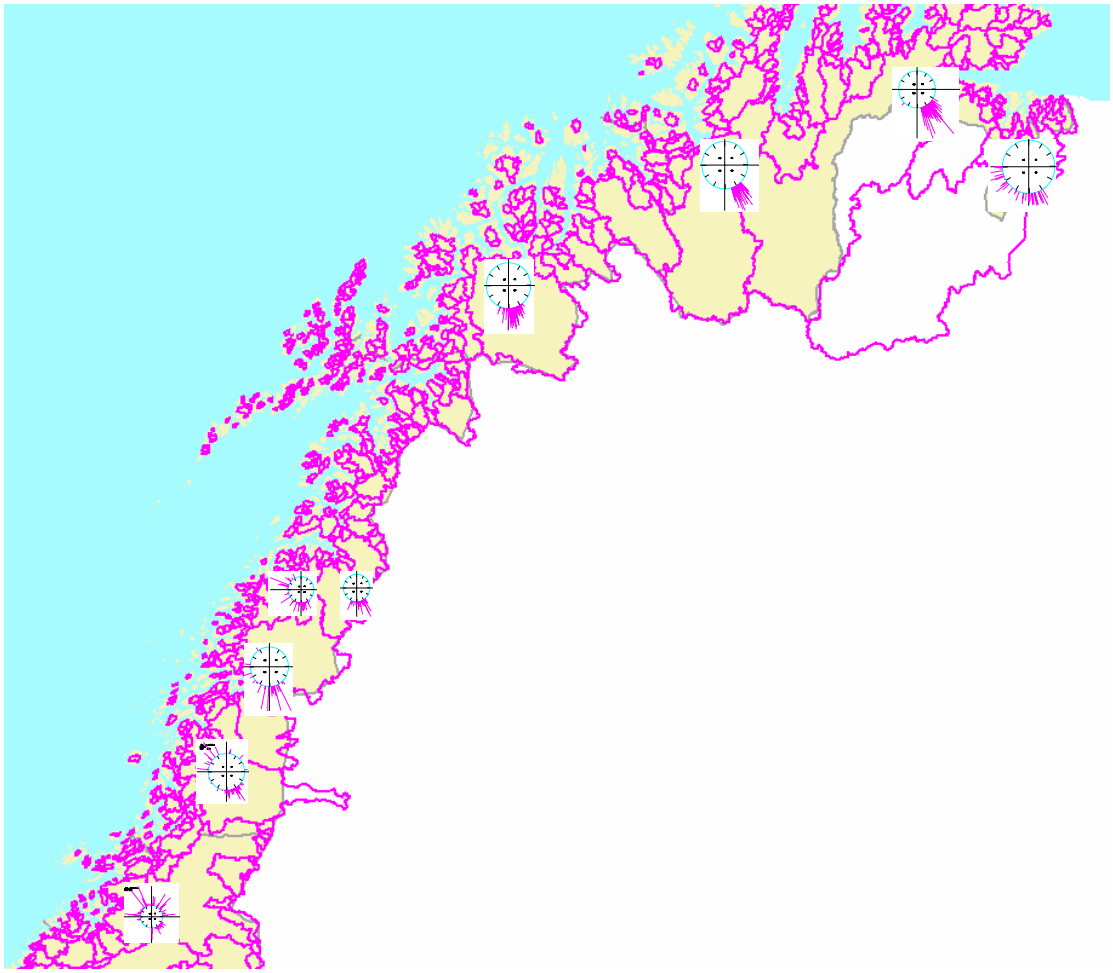
4 Flomforhold i store vassdrag

Med store vassdrag menes her hovedvassdrag der vannføringsstasjonenes nedbørfelt er større enn 1000 km^2. Et unntak er målestasjonen 161.18 Selfoss bru i Beiarelva, som har et felt på ca. 800 km^2, men som allikevel er tatt med. De fleste av vannføringsstasjonene som nevnes i tabellen er mer eller mindre påvirket av reguleringer. De stasjoner som er helt uregulerte er 234.18 Polmak nye i Tana og den nå nedlagte 163.9 Russånes i Saltelva.

I Namsen, målestasjon 139.17 Bertnem, og Vefsna, 151.28 Laksfors, er det store flommer både vår og høst. I Namsen forekommer det også store vinterflommer. I Beiarelva kan det være store flommer både vår, sommer og høst. I Rana og de store vassdragene lenger mot nord er det vårflommen som er helt dominerende. Ved 246.12 Skogfoss kraftverk i Pasvikelva kan det drøye ut på sensommeren før flommen kommer på grunn av den fordrøyende effekten som den store Inarisjøen har på vannføringene.



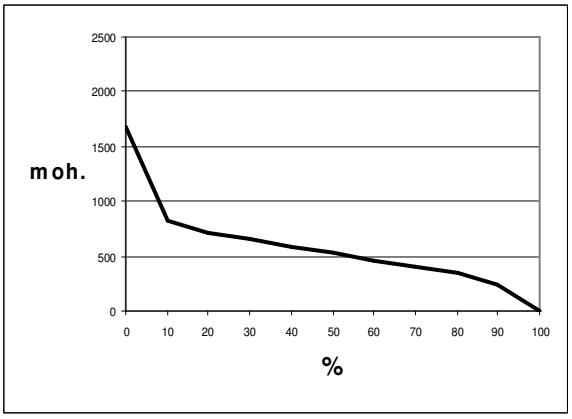
Figur 13. Vannføringsstasjoner i Nord-Norge.

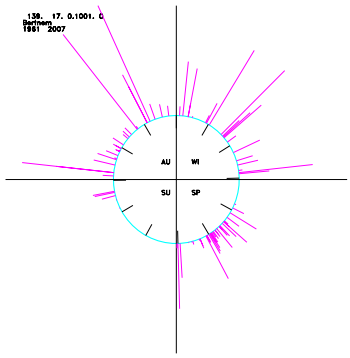


Figur 14. FLROSE-diagrammer for vannføringsstasjoner i store vassdrag i Nord-Norge.

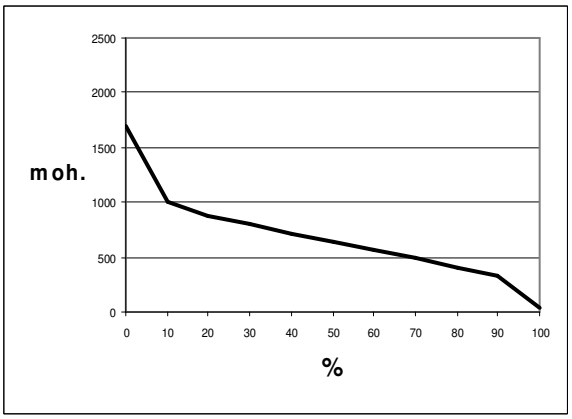
Vannføringsstasjon			Areal	Eff.sjøpr.	Høydeforhold, moh.		
			km^2	%	maks.	median	min.
139	17	Bertnem	5163	0.33	1683	524	8
151	28	Laksfors	3651	0.22	1692	645	40
156	49	Reinfossen ndf.	3173		1745	771	18
161	18	Selfoss bru	786	0.01	1629	695	10
163	9	Russånes	1040	0.02	1745	848	48
196	35	Malangsfoss	3239		1714	716	24
212	11	Kista	6186	0.41	1085	449	40
234	18	Polmak nye	14157	0.02	1067	355	20
246	12	Skogfoss kraftverk	17192		618	161	50

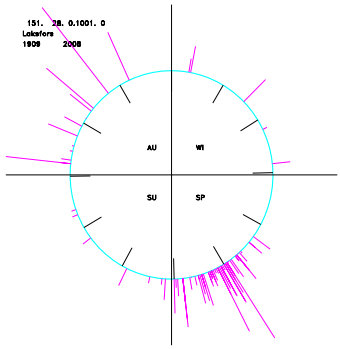
139.17 Bertnem (i Namsen)



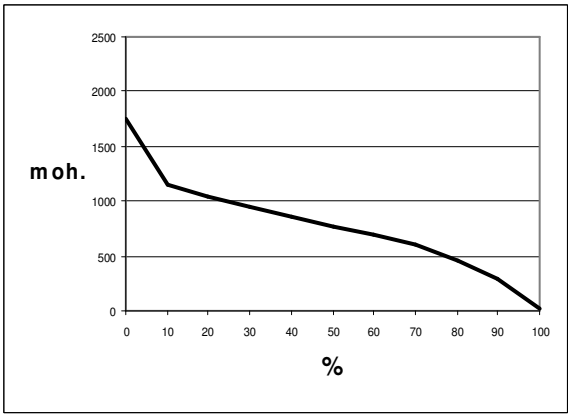


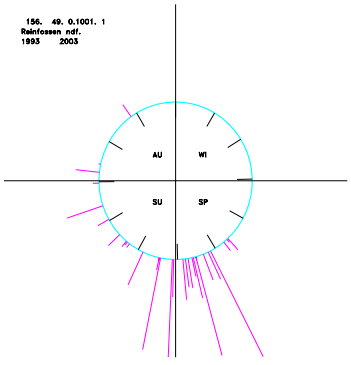
151.28 Laksfors (i Vefsna)



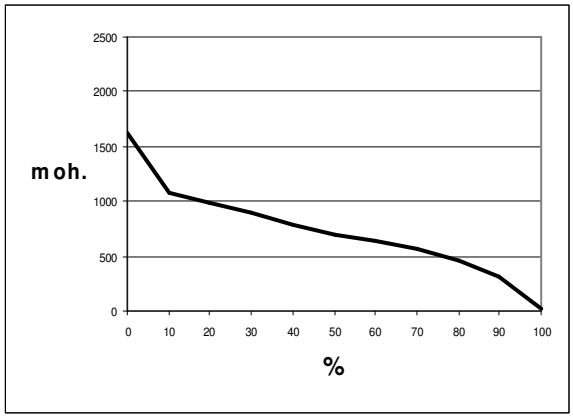


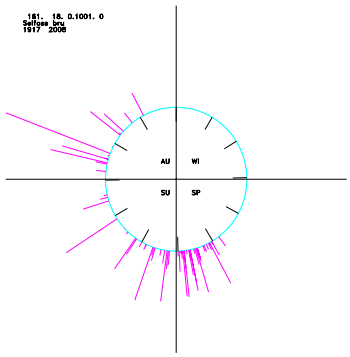
156.49 Reinfossen ndf. (i Rana)



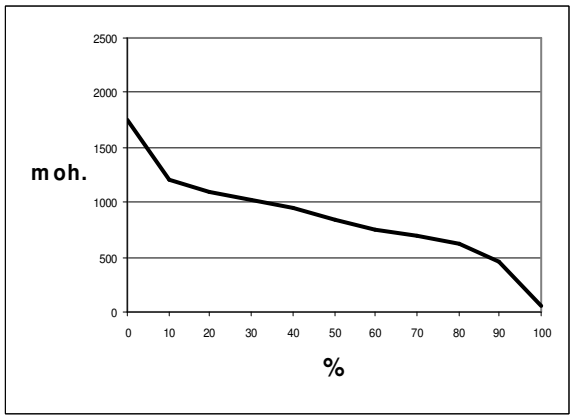


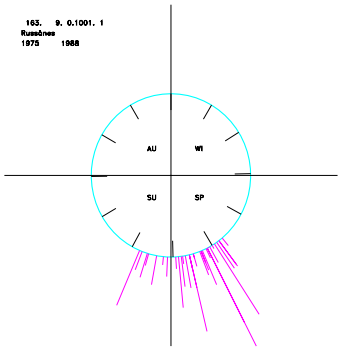
161.18 Selfoss bru (i Beiarelva)



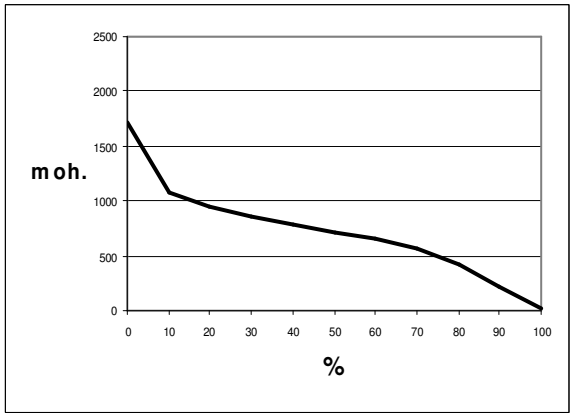


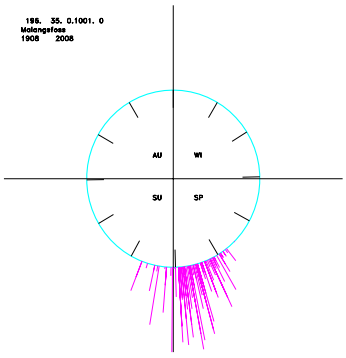
163.9 Russånes (i Saltelva)



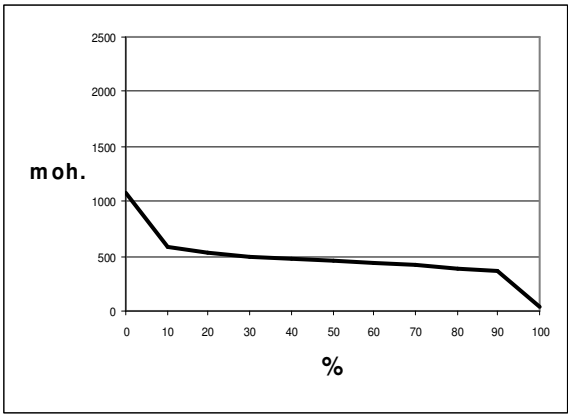


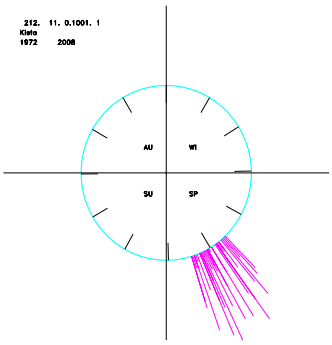
196.35 Malangsfoss (i Målselva)



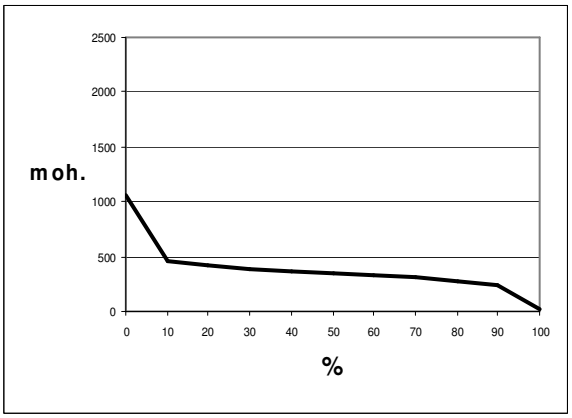


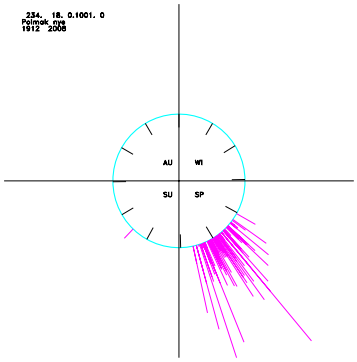
212.11 Kista (i Altaelva)



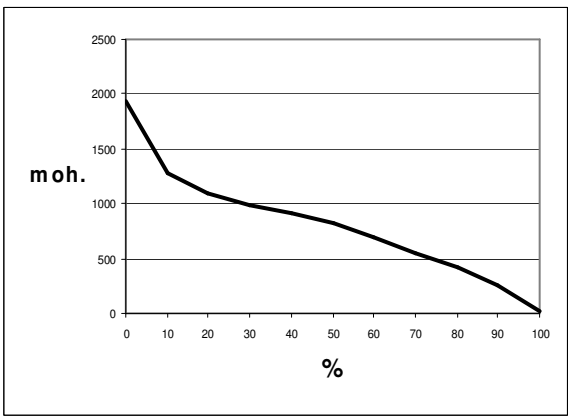


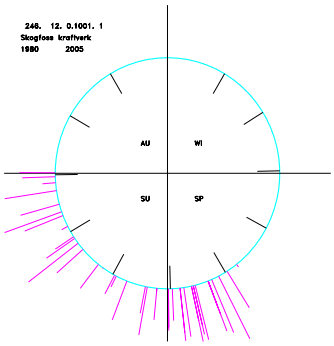
234.18 Polmak nye (i Tana)





246.12 Skogfoss kraftverk (i Pasvikelva)





Referanser

Pettersson, L.-E., 2004: Aktive vannføringsstasjoner i Norge. NVE-Rapport nr. 16-2004.

Pettersson, L.-E., 2009: Flomforhold i Sør- og Midt-Norge. NVE-Rapport nr. 3-2009.

Roald, L. A., 2008: Rainfall floods and weather patterns. NVE-Oppdragsrapport A nr. 14-2008.

Denne serien utgis av Norges vassdrags- og energidirektorat (NVE)

Utgitt i Rapportserien i 2009

Nr. 1 Ellen Skaansar (red.): Kvartalsrapport for kraftmarkedet, 4. kvartal 2008

Nr. 2 Tiltak for å redusere sannsynligheten for at et område er strømløst over lang tid Regelverksprosjektet mellom NVE, DSB og Statnett (64 s.)

Nr. 3 Lars-Evan Pettersson: Flomforhold i Sør- og Midt-Norge (67 s.)

Nr. 4 Jørn Opdahl, Hervé Colleuille: Nasjonalt overvåkingsnett for grunnvann og markvann (fysiske parametere) Drift og formidling 2008 (37 s.)

Nr. 5 Kirsten Westgaard, Helge Ulsberg og Svein Olav Arnesen (red.): Tilsynsrapport 2008 (20 s.)

Nr. 6 Ellen Skaansar (red.): Kvartalsrapport for kraftmarkedet, 1. kvartal 2009

Nr. 7 Jon Endre Hausberg og Liss M. Andreassen: Satellittbasert brekartlegging i Lyngen (20 s.)

Nr. 8 Anne Haugum (red.): Årsrapport for utførte sikrings- og miljøtiltak i 2008 (77 s.)

Nr. 9 Eva Widenoja, Widenoja Design AS, Aase Skaug, Asplan Viak AS, Christian Aastorp, Widenoja Design AS: Landskapstilpasset mastedesign En metodisk tilnærming for landskapstilpassing av 132- 420 kV høyspentmaster (78 s.)

Nr 10 Hege Fadum Sveaas (red.): Avbruddsstatistikk 2008 (s.)

Nr 11 Lars-Evan Pettersson: Flomforhold i Nord-Norge (49 s.)