Supplemenatry material for "Induced telluric currents play a major role in the interpretation of geomagnetic variations"

Liisa Juusola[1], Ari Viljanen[1], Heikki Vanhamäki[2], and Maxim Smirnov[3]

[1]Finnish Meteorological Institute, Helsinki, Finland
[2]University of Oulu, Oulu, Finland
[3]Luleå University of Technology, Sweden

Correspondence: L. Juusola (liisa.juusola@fmi.fi)

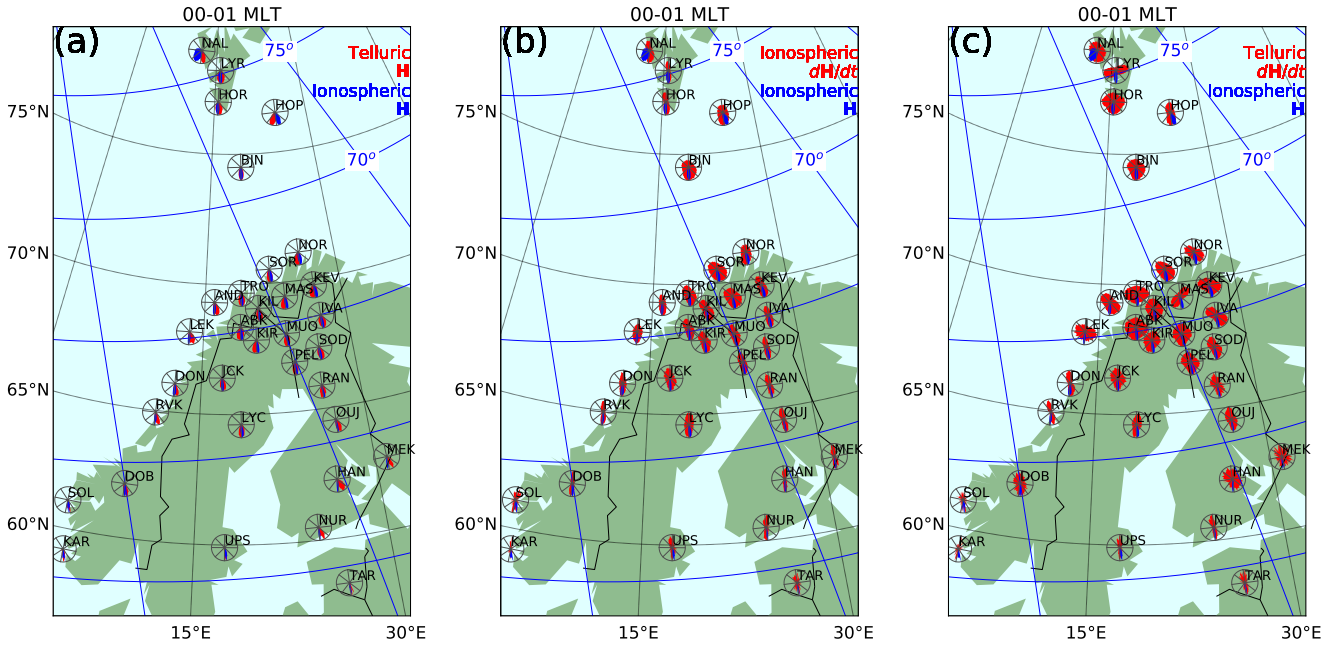

Figure 1. Histograms of the direction of the ionospheric (blue) and telluric (red) horizontal ground magnetic field ($\boldsymbol{H}$) with the amplitude of the time derivative of the horizontal magnetic field $dH/dt > 1$ nTs^{-1} and the magnetic local time restricted to $00 \leq$ MLT < 01 h for IMAGE stations with sufficient amounts of good data available in 1994–2018 (a). The number of such data points is given in Table 1. In (b) the telluric part of the horizontal magnetic field has been replaced by the time derivative ($d\boldsymbol{H}/dt$) of the ionospheric part of the ground magnetic field and in (c) with the time derivative of the telluric part of the ground magnetic field.

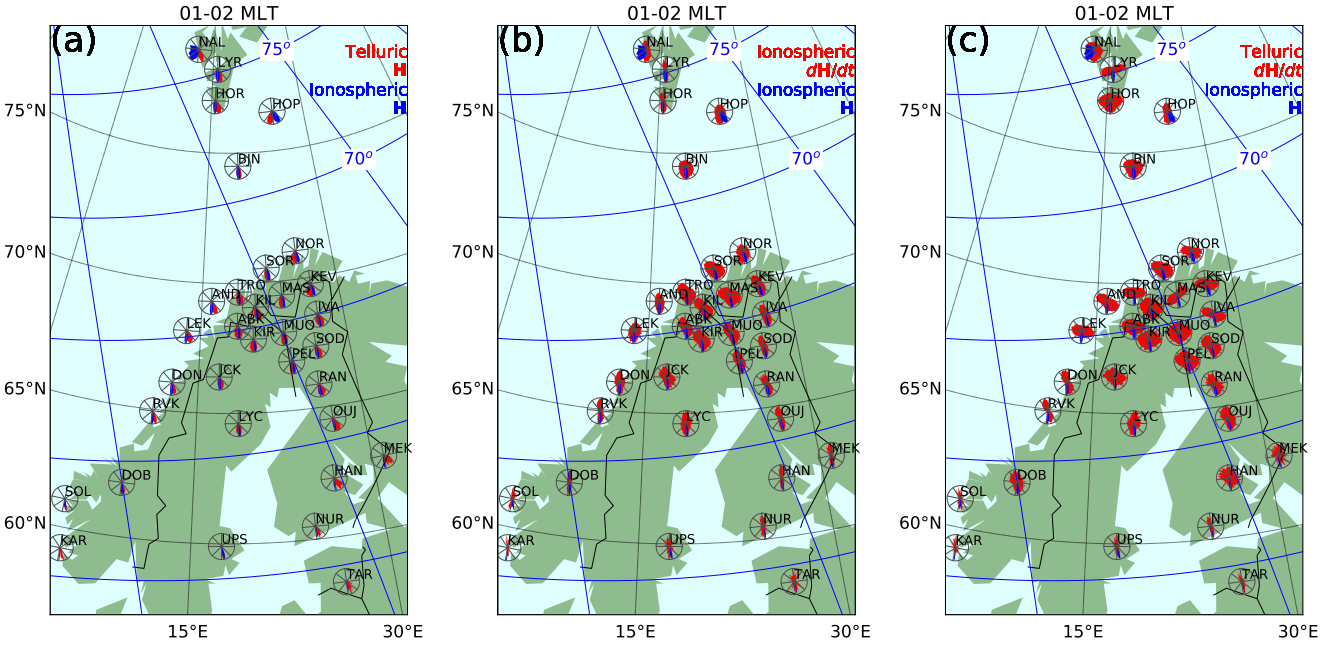

Figure 2. The same as Figure 1 except for $01 \leq \mathrm{MLT} < 02$.

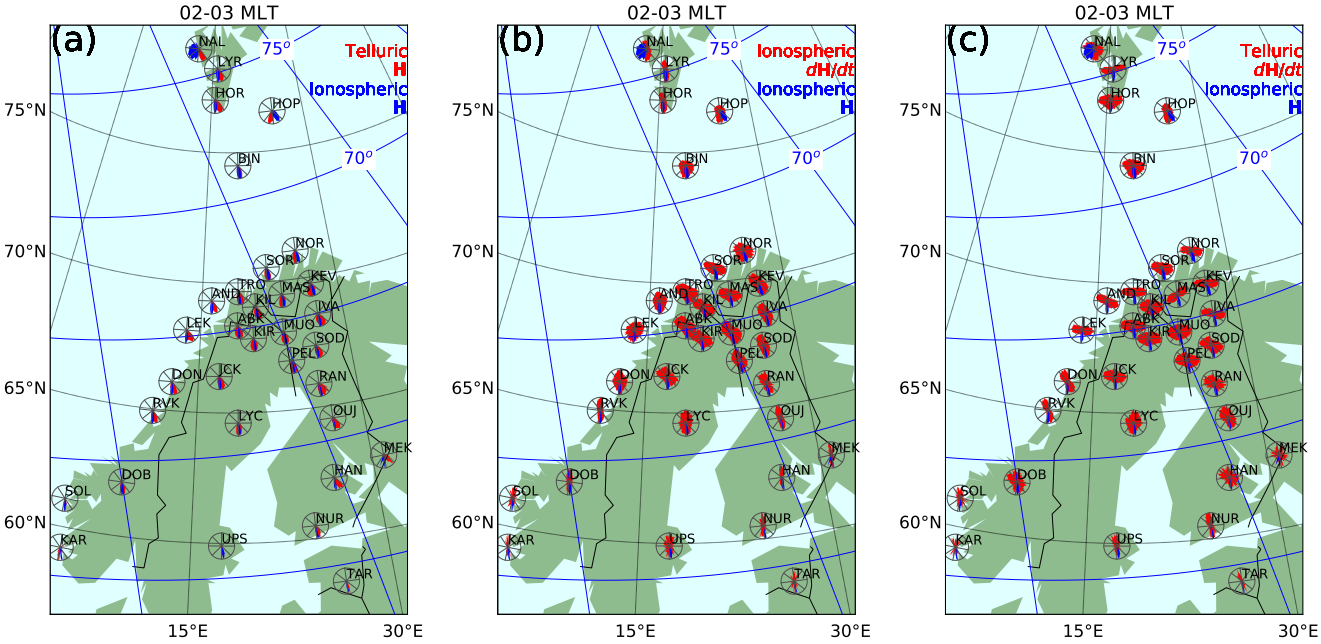

Figure 3. The same as Figure 1 except for $02 \leq \mathrm{MLT} < 03$.

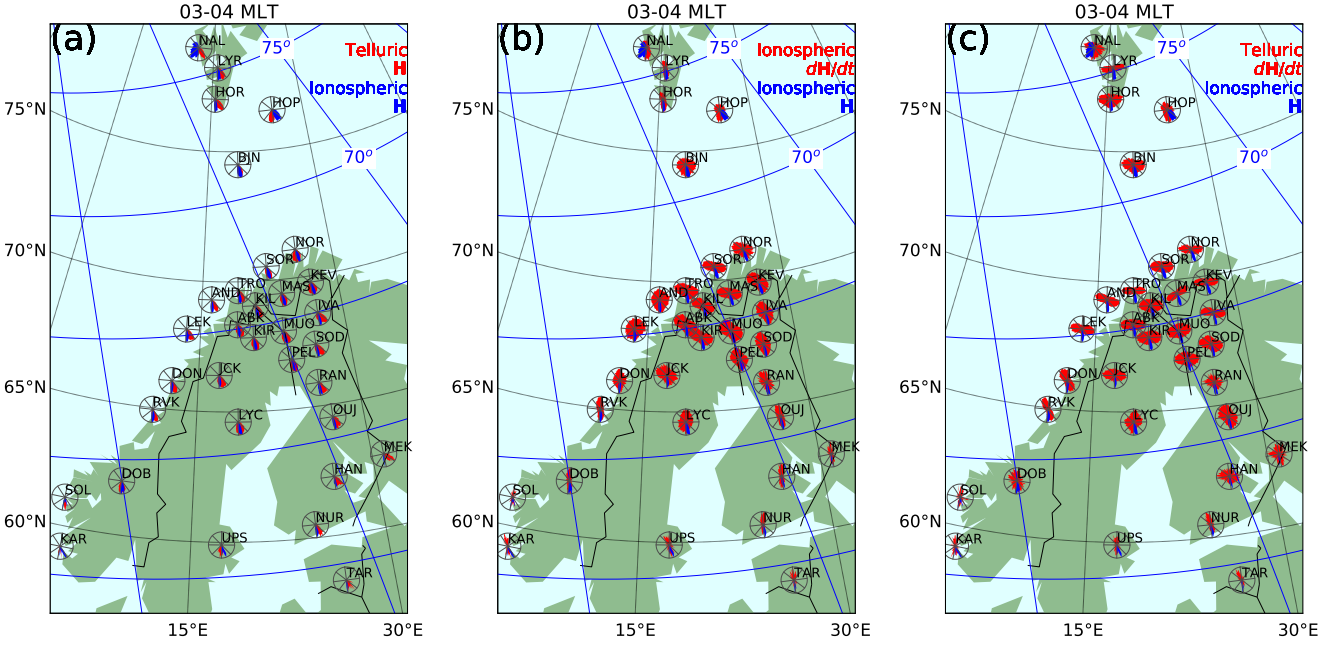

Figure 4. The same as Figure 1 except for $03 \leq \mathrm{MLT} < 04$.

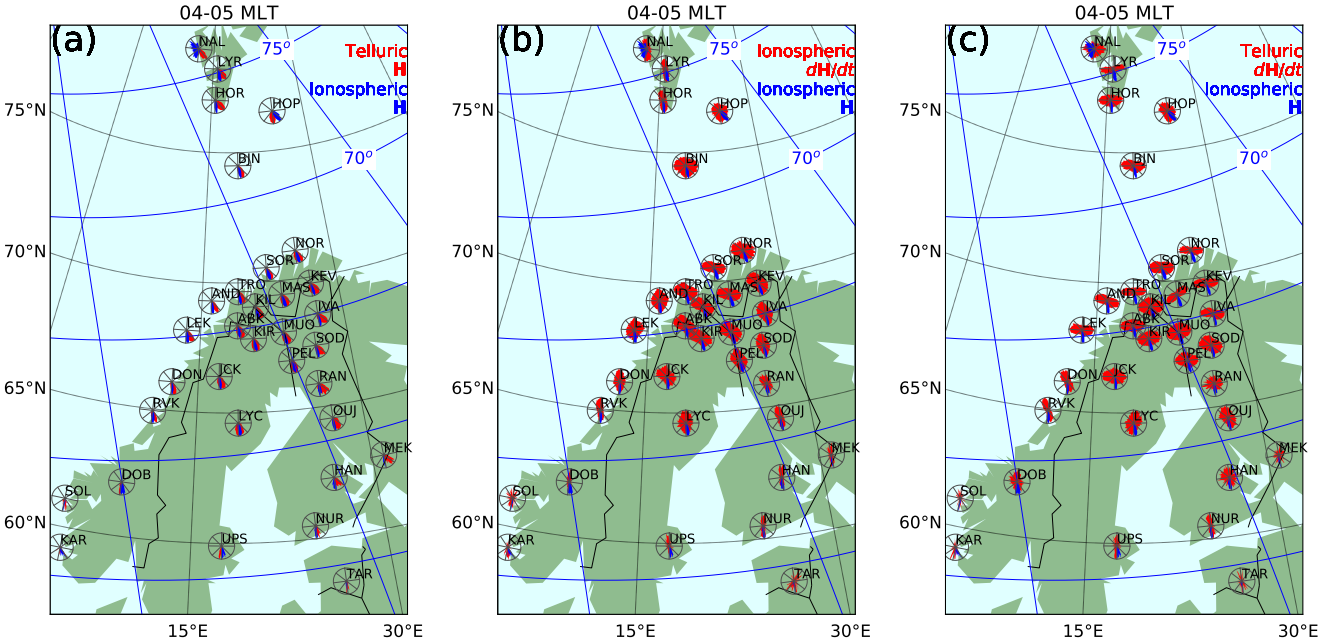

Figure 5. The same as Figure 1 except for $04 \leq \mathrm{MLT} < 05$.

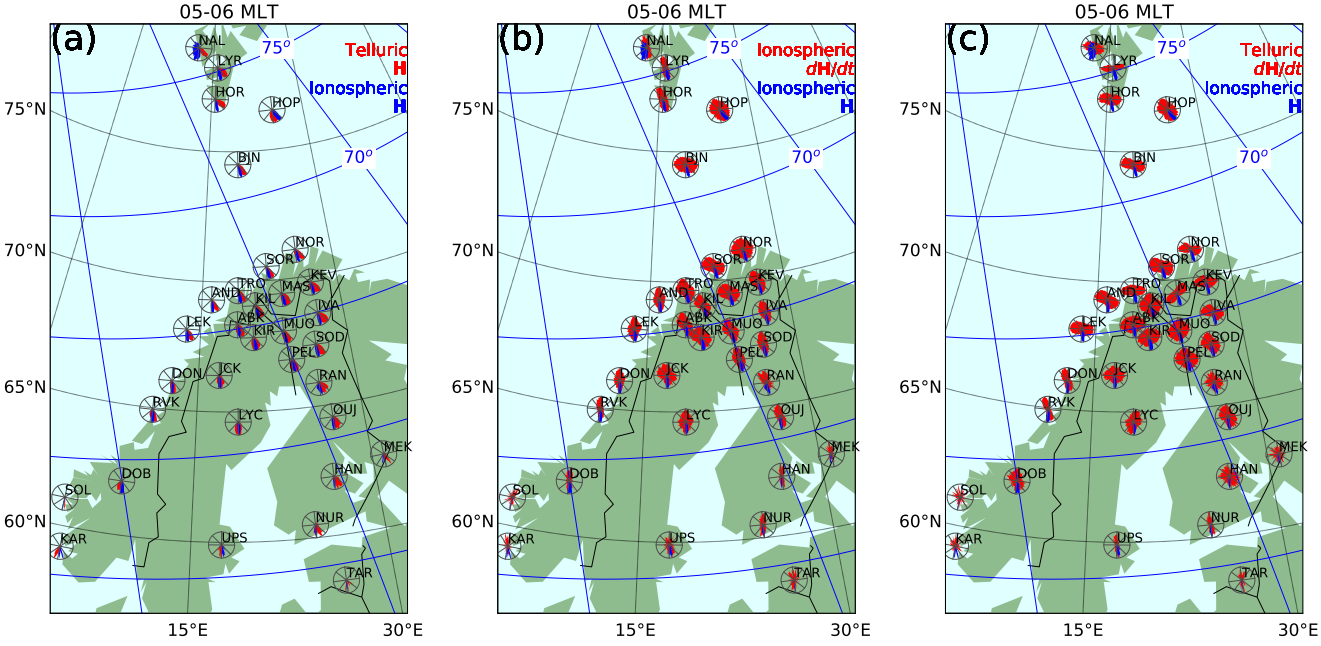

Figure 6. The same as Figure 1 except for $05 \leq \mathrm{MLT} < 06$.

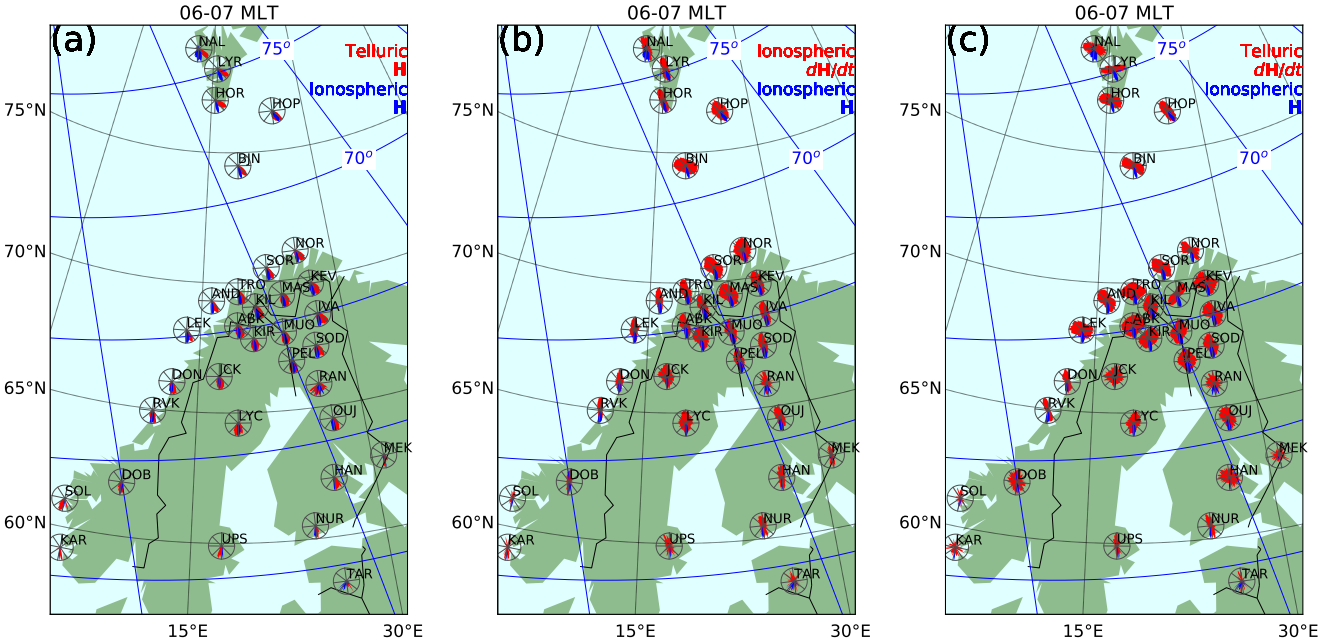

Figure 7. The same as Figure 1 except for $06 \leq \mathrm{MLT} < 07$.

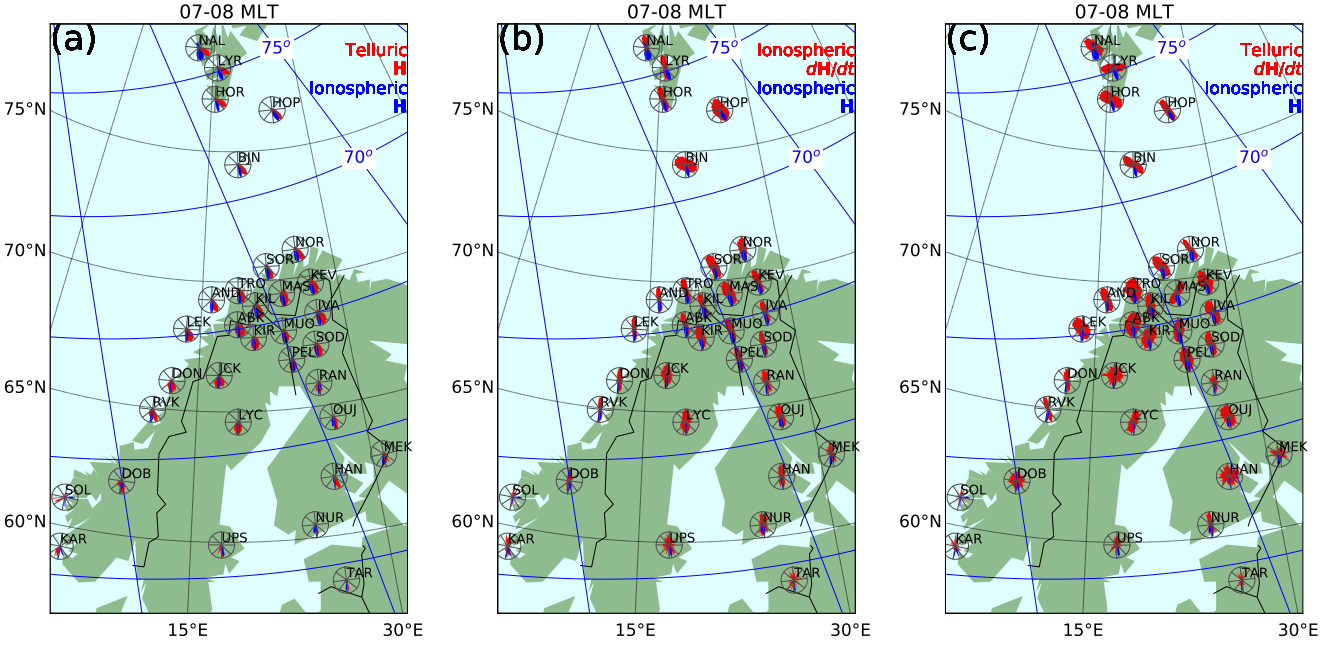

Figure 8. The same as Figure 1 except for $07 \leq \mathrm{MLT} < 08$.

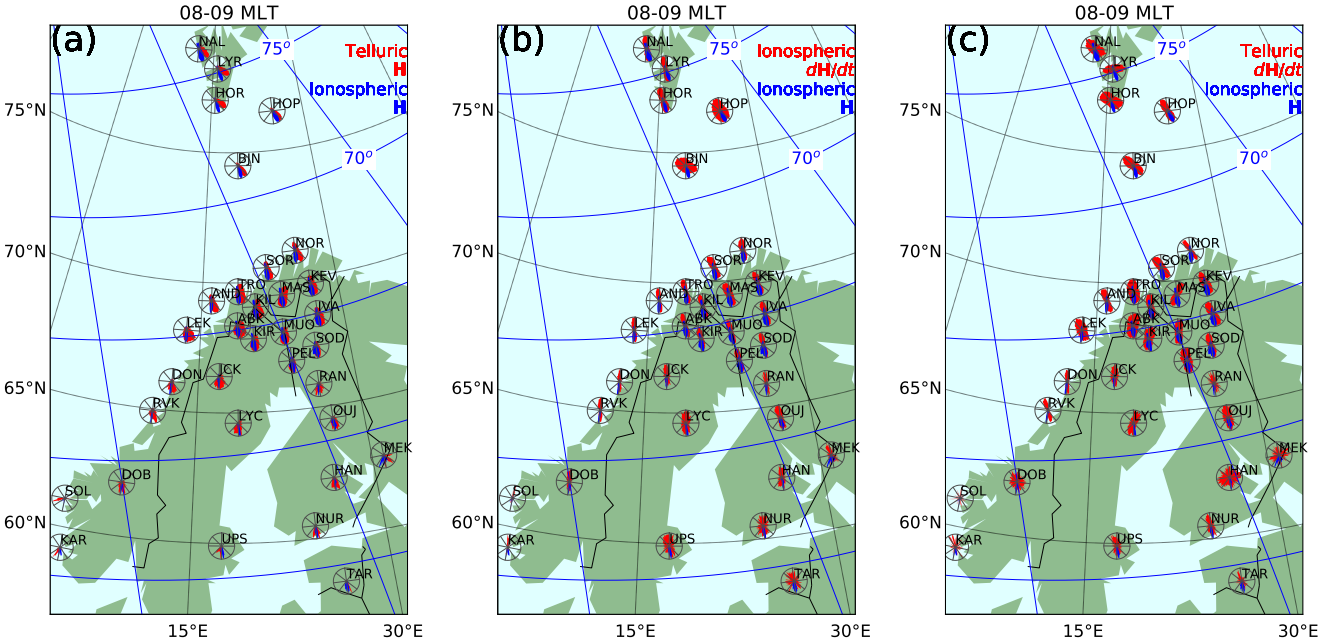

Figure 9. The same as Figure 1 except for $08 \leq \mathrm{MLT} < 09$.

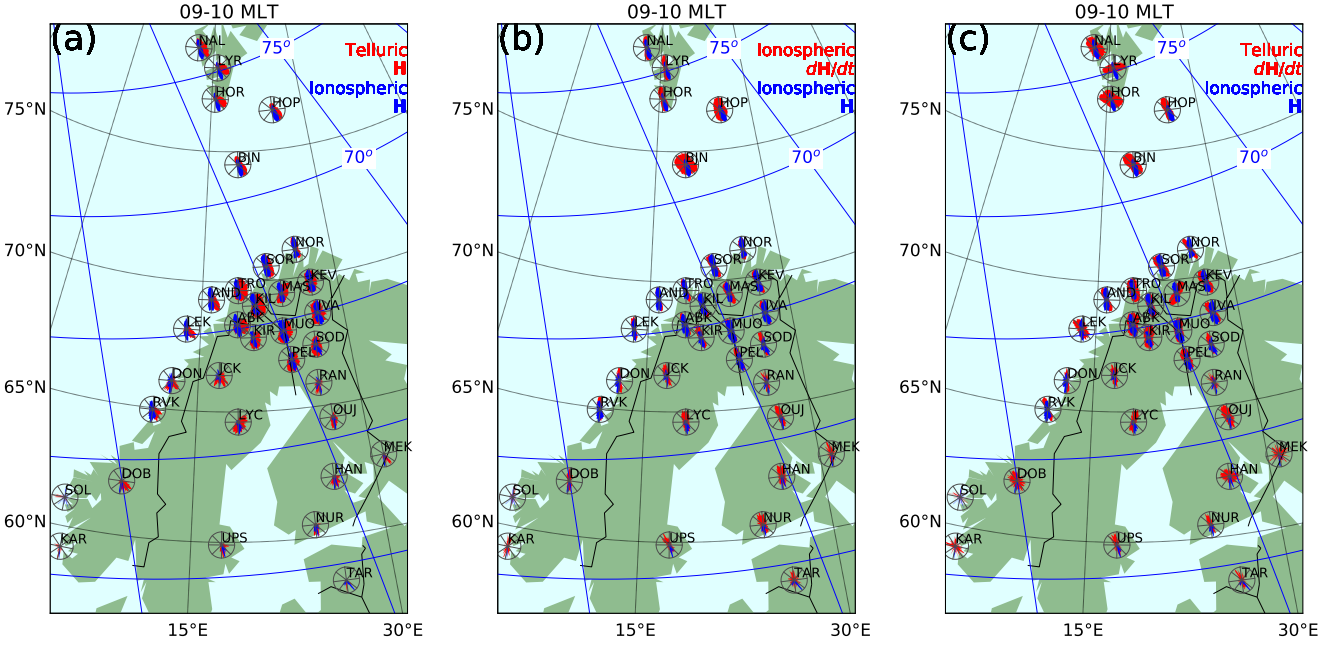

Figure 10. The same as Figure 1 except for $09 \leq \mathrm{MLT} < 10$.

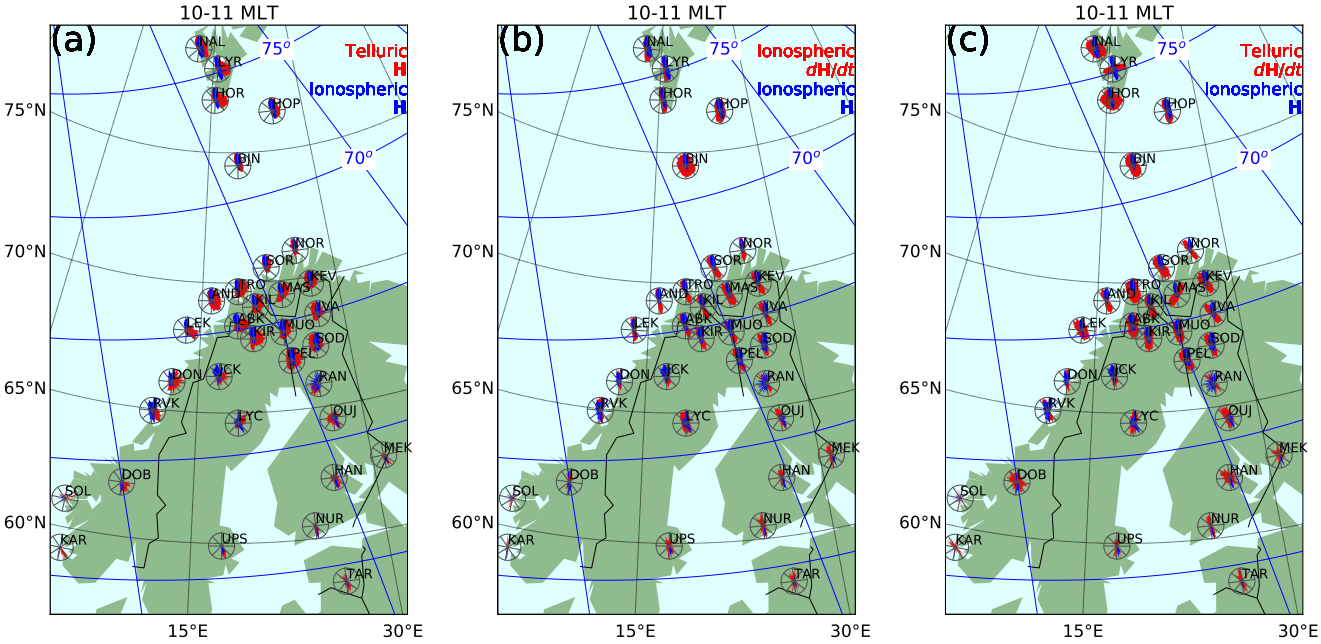

Figure 11. The same as Figure 1 except for $10 \leq \text{MLT} < 11$.

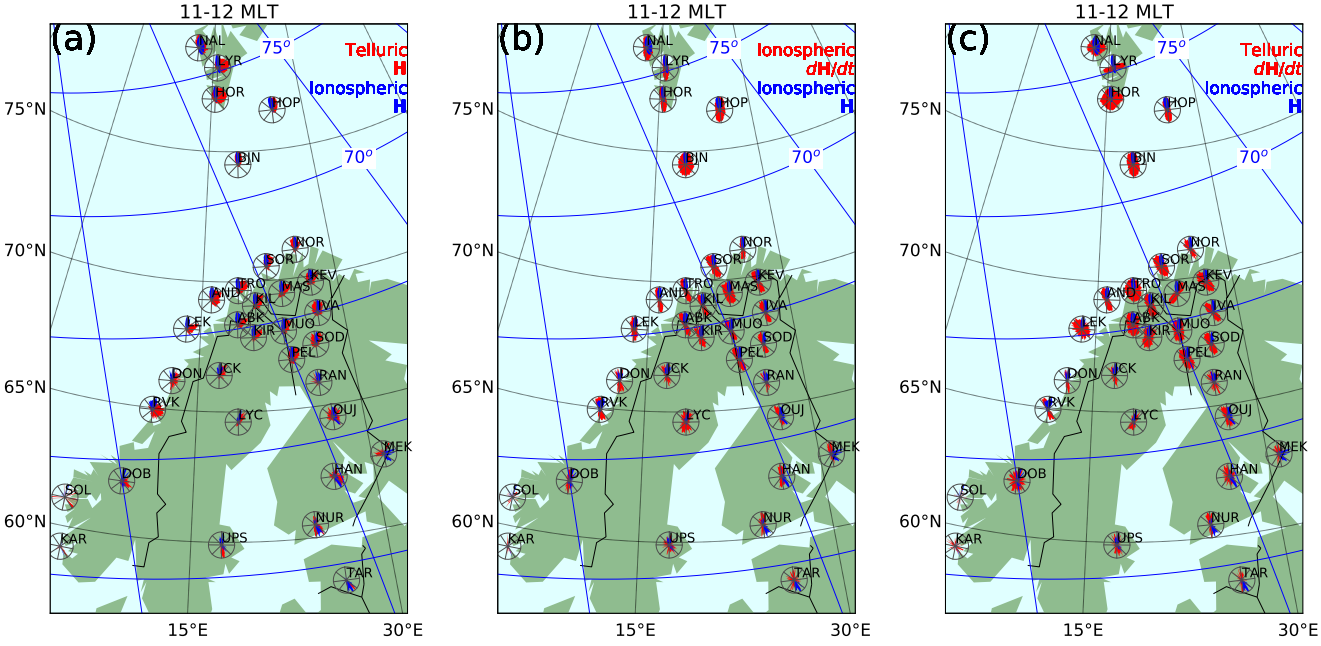

Figure 12. The same as Figure 1 except for $11 \leq \text{MLT} < 12$.

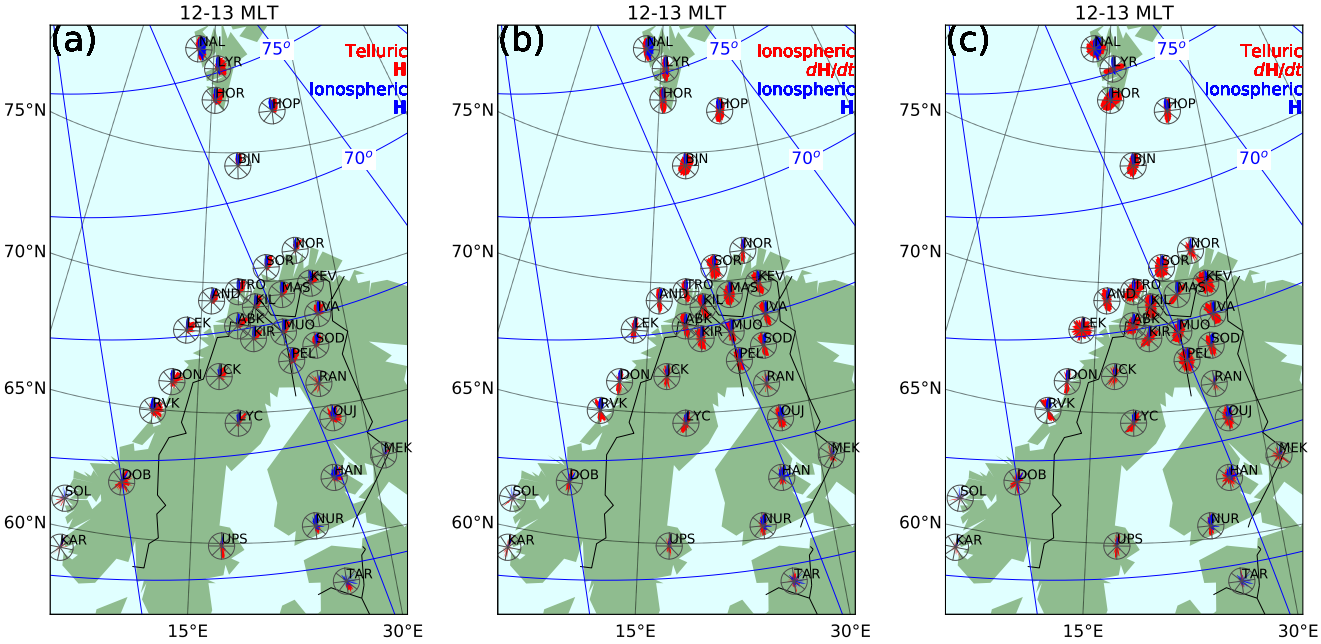

Figure 13. The same as Figure 1 except for $12 \leq \text{MLT} < 13$.

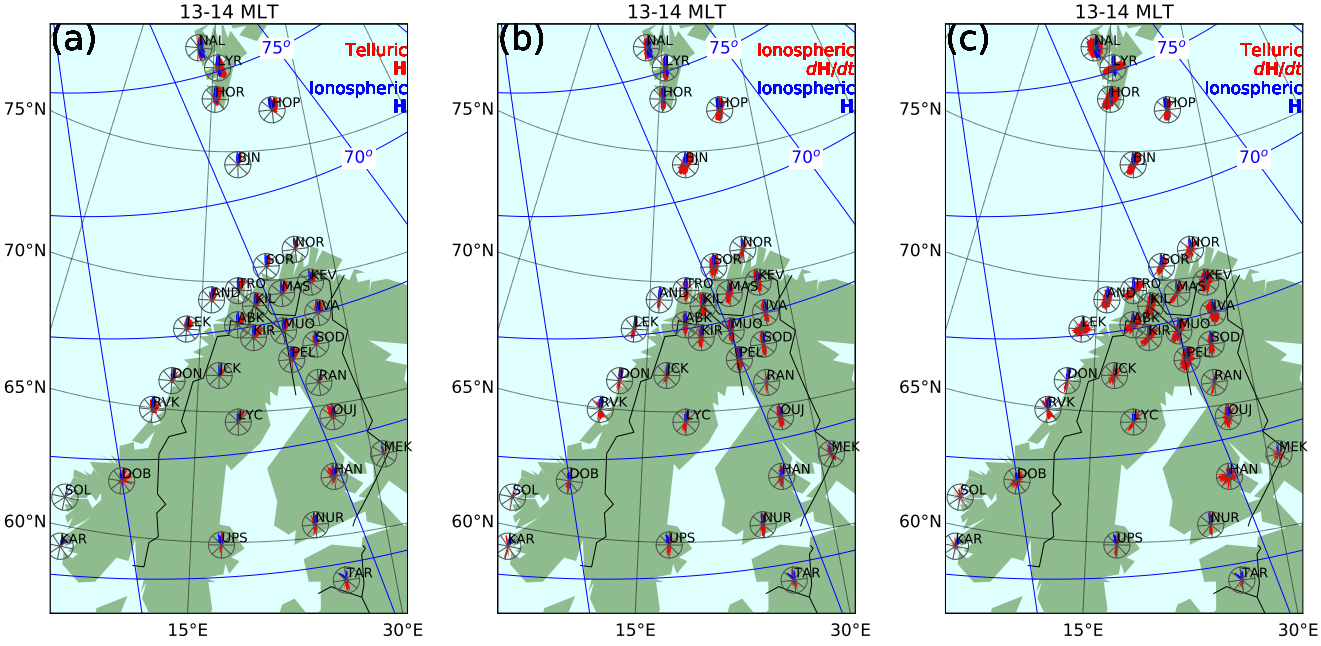

Figure 14. The same as Figure 1 except for $13 \leq \text{MLT} < 14$.

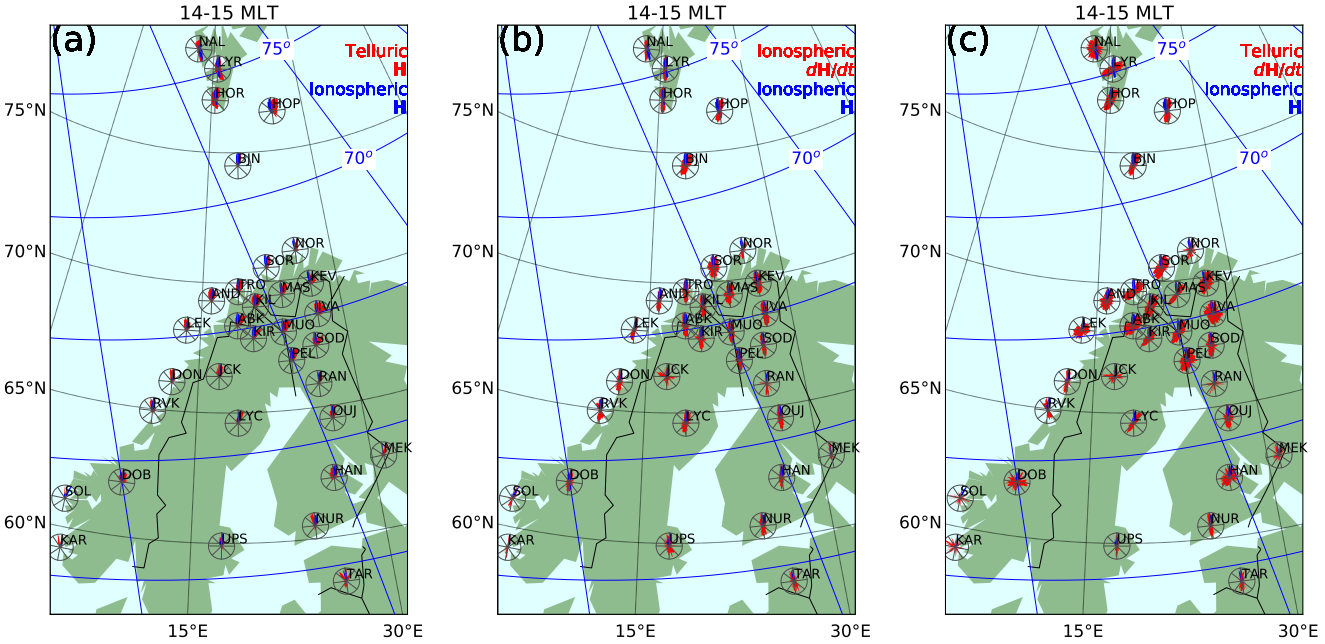

Figure 15. The same as Figure 1 except for $14 \leq \mathrm{MLT} < 15$.

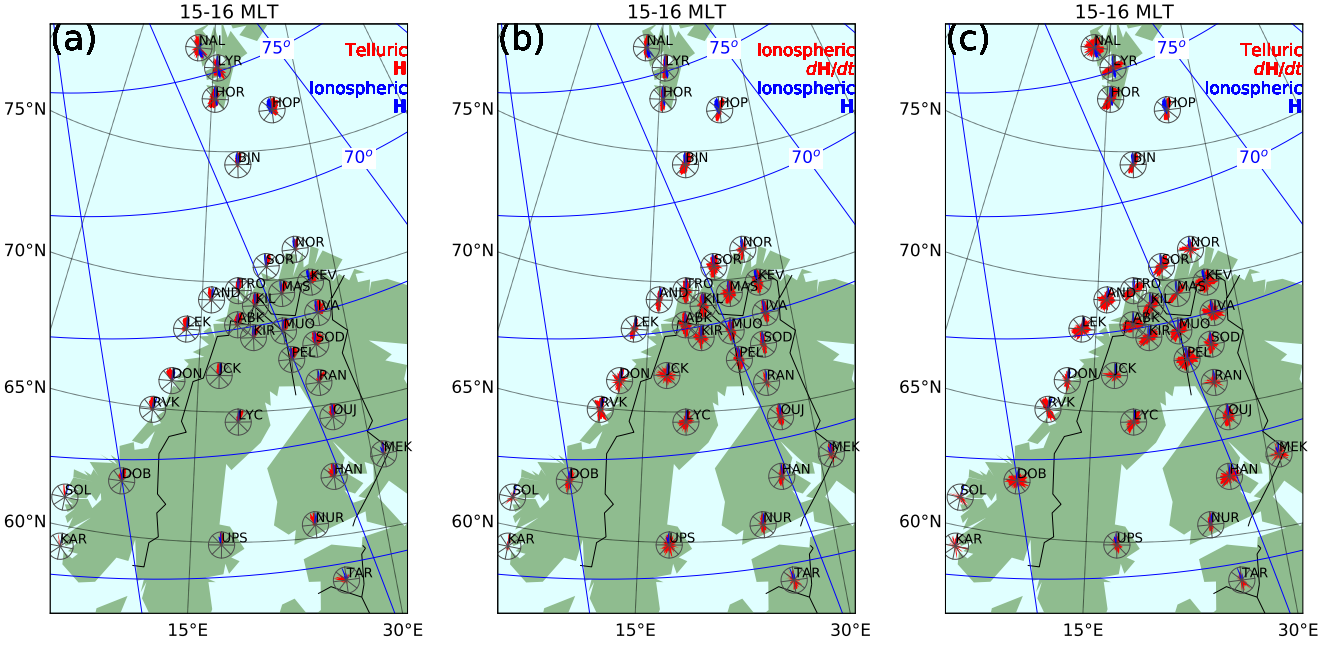

Figure 16. The same as Figure 1 except for $15 \leq \mathrm{MLT} < 16$.

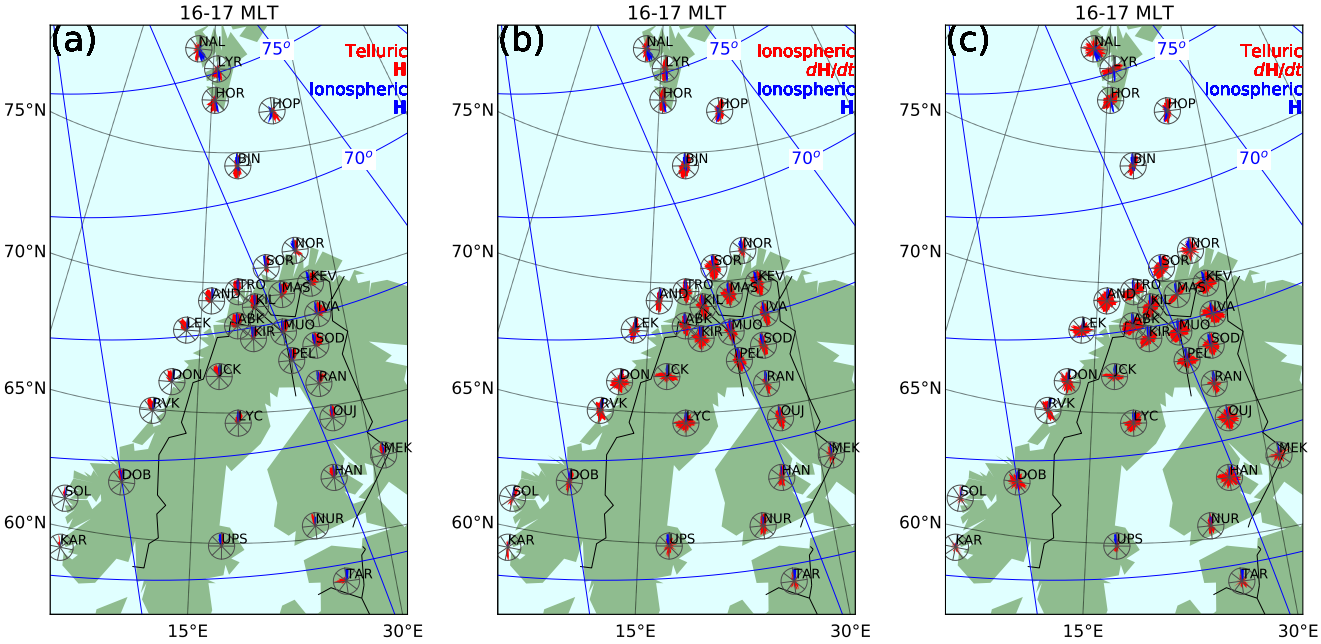

Figure 17. The same as Figure 1 except for $16 \leq \mathrm{MLT} < 17$.

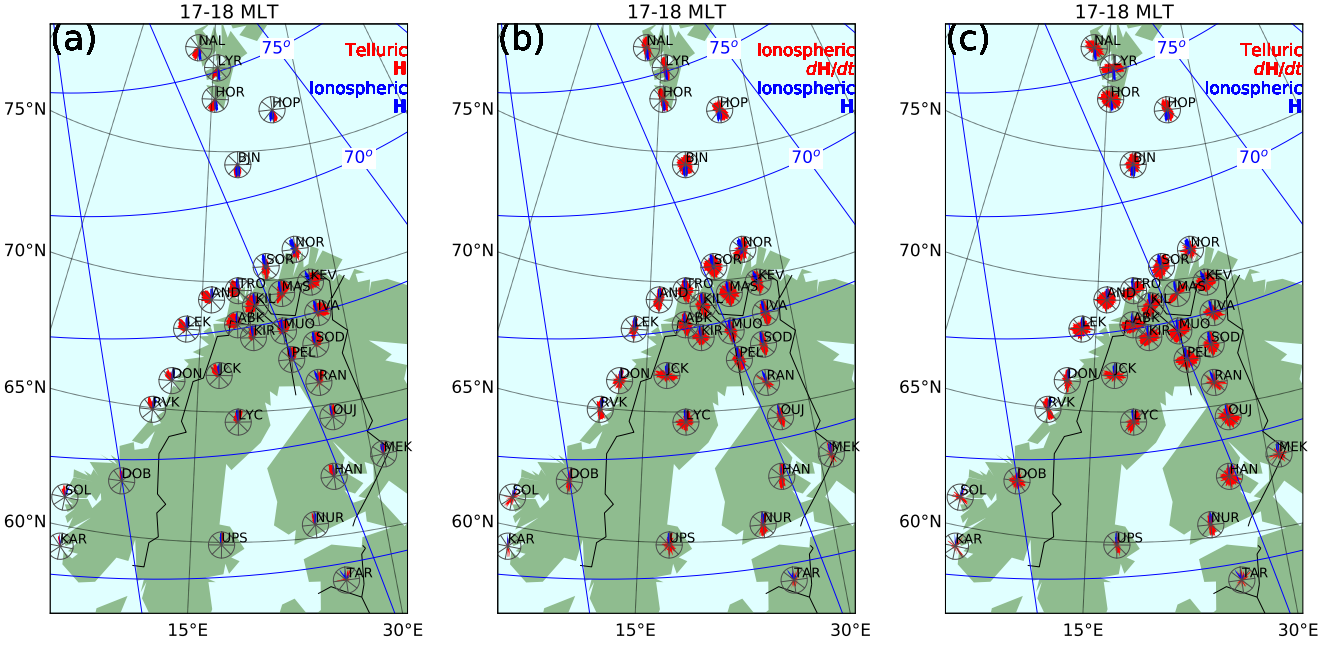

Figure 18. The same as Figure 1 except for $17 \leq \mathrm{MLT} < 18$.

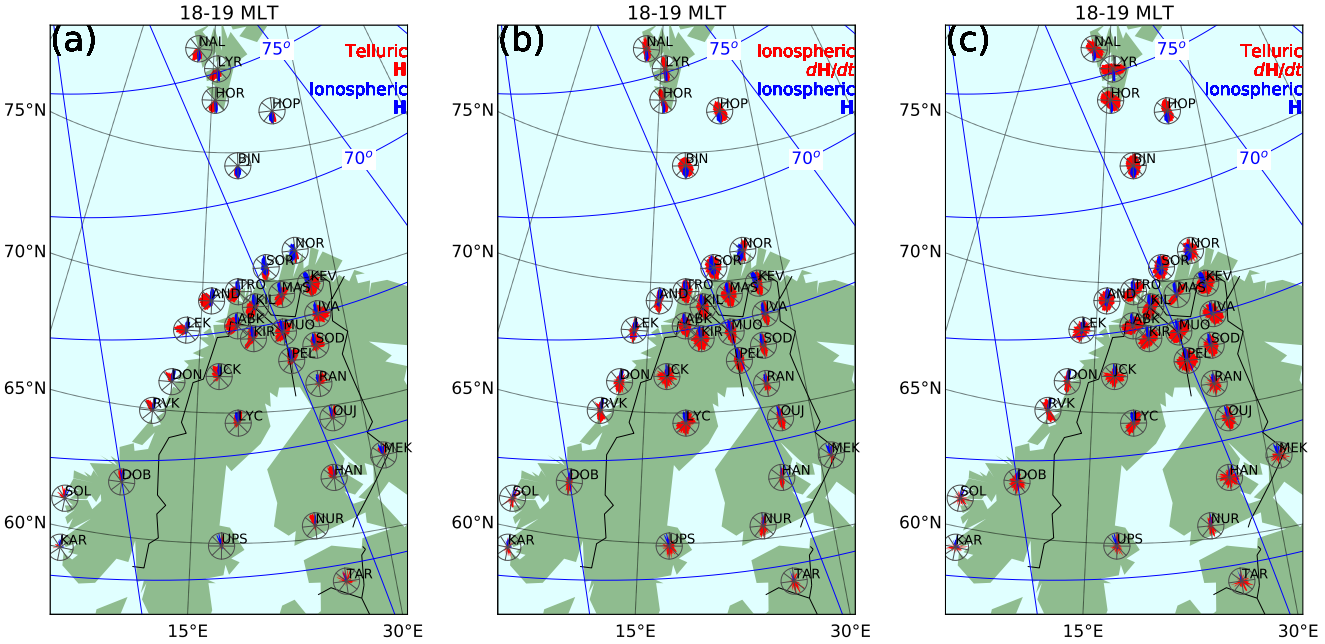

Figure 19. The same as Figure 1 except for $18 \leq \text{MLT} < 19$.

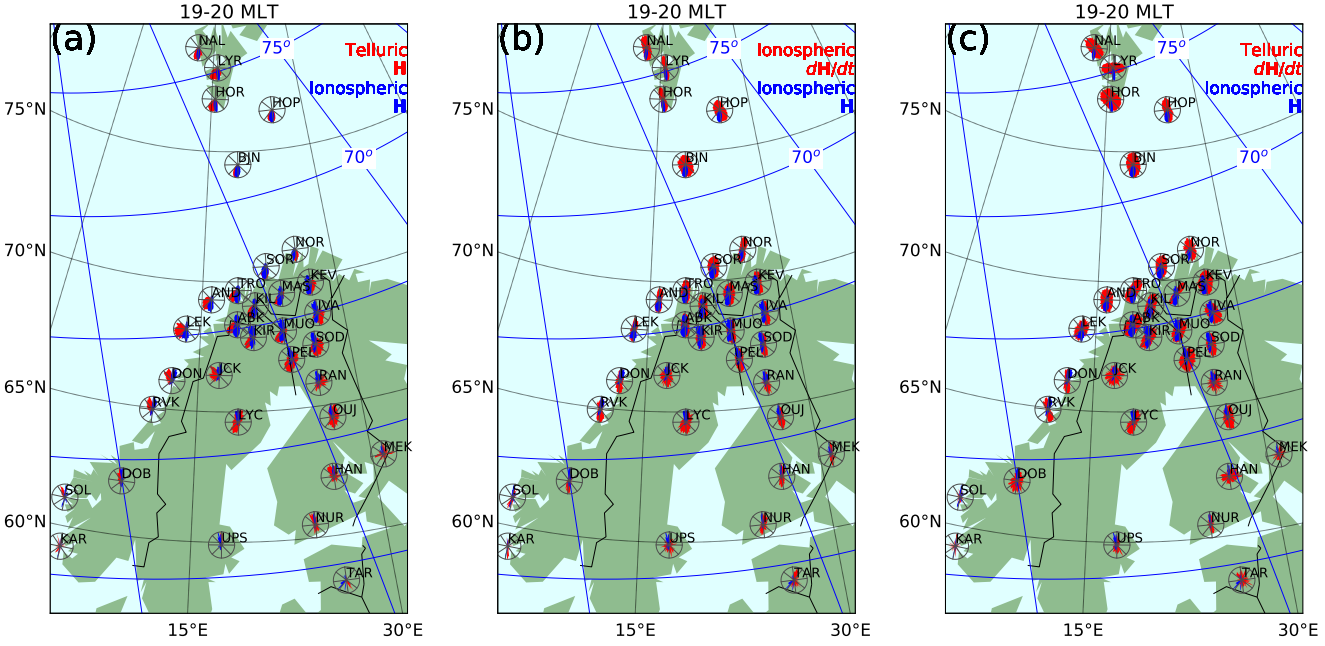

Figure 20. The same as Figure 1 except for $19 \leq \text{MLT} < 20$.

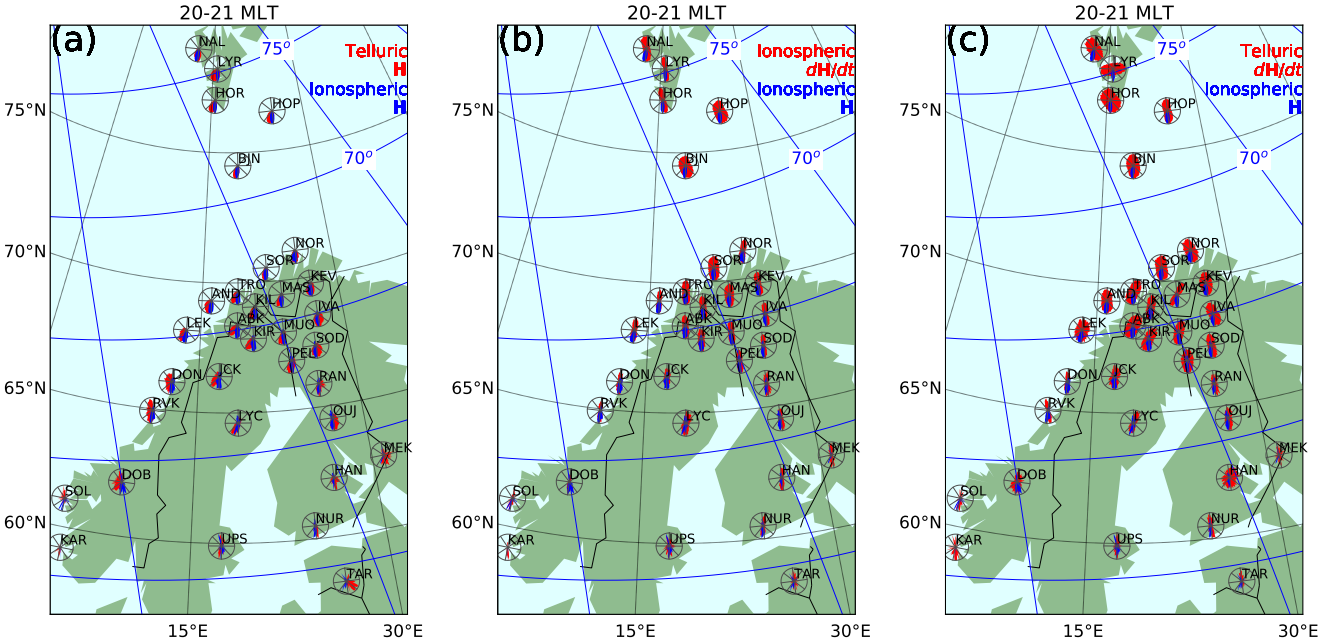

Figure 21. The same as Figure 1 except for $20 \leq \text{MLT} < 21$.

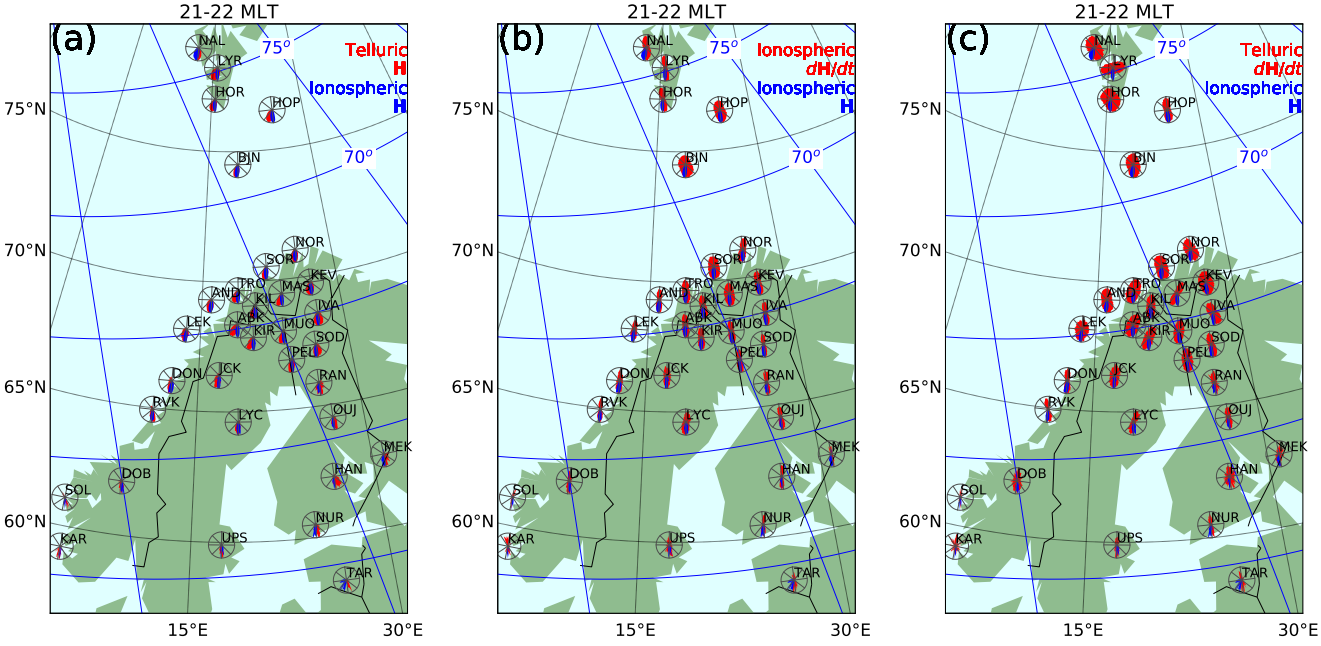

Figure 22. The same as Figure 1 except for $21 \leq \text{MLT} < 22$.

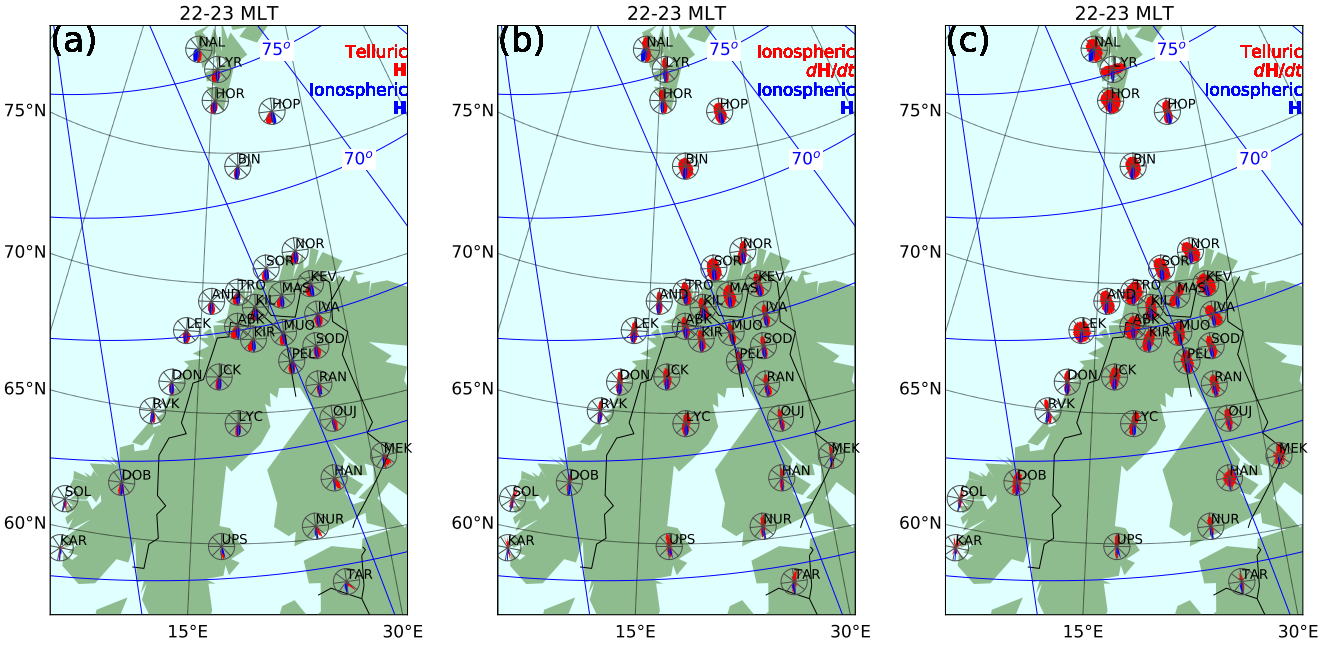

Figure 23. The same as Figure 1 except for $22 \leq \text{MLT} < 23$.

Table 1. IMAGE station and number of data points N with $dH/dt > 1$ nTs^{-1} in 1994–2018, binned according to magnetic local time.

Station	00-01	01–02	02–03	03–04	04–05	05–06	06–07	07–08	08–09	09–10	10–11	11–12	12–13	13–14	14–15	15–16	16–17	17–18	18–19	19–20	20–21	21–22	22–23	23–24
NAL	22308	16561	11483	8624	6522	6663	6723	9078	14314	17693	19030	15340	13494	10863	6364	3319	1734	3413	8447	17260	22980	30106	30107	26709
LYR	42311	28874	18629	15154	12488	12202	16149	25850	39686	45707	42020	32929	26811	20824	12707	7114	4169	6650	17064	31113	41392	52828	55675	50663
HOR	65494	41950	26064	21537	19391	23247	33437	59775	84739	88321	75414	52818	36323	27131	17815	10362	5903	10596	24482	46525	62558	81697	88066	81753
HOP	48026	30021	20359	16078	16320	22456	32459	47349	58613	60021	45609	30115	21014	14832	10954	7590	4699	9195	17449	32040	48852	61606	65976	63761
BJN	71877	43486	26651	21957	24387	37198	56775	77176	77950	63937	49042	30275	17777	12446	8344	6600	6080	10132	20896	40847	60838	81879	94856	93441
NOR	20059	15512	10884	10115	12767	16830	16952	13770	11875	8170	4738	2646	1271	889	760	1091	1455	2637	4262	8147	12825	21665	25844	25968
SOR	63801	51678	41565	43892	55472	65281	66320	56977	47237	34809	24456	14236	9073	7066	6784	6630	8160	10996	17470	26519	41616	59394	70744	73021
KEV	62654	51757	42576	44942	54682	56942	52474	41289	33735	26595	18457	11012	7353	5836	5414	5609	7061	10389	15747	23112	36544	53945	65103	68322
TRO	93284	77720	67825	70562	81693	90572	87420	72188	58194	43421	30474	18980	12835	9712	9285	9368	12294	15897	23180	33533	53066	77217	97905	101142
MAS	63796	55924	48754	50638	58240	58831	55926	45904	37380	28417	21354	13779	9711	8048	6589	7318	9120	10836	15351	22824	36274	53110	65016	67163
AND	65309	52966	45122	48720	56901	61729	57322	45640	37089	26158	17837	10929	7885	6468	6416	5824	8834	10929	17049	24112	36872	53311	69746	71221
KIL	74785	64129	55982	57140	64440	69109	65242	53620	43656	32949	22894	15065	10479	8355	7834	7968	10849	12811	19287	28398	42415	59046	76584	79453
IVA	48154	44818	41257	42781	44330	41537	35093	28750	24057	18103	14193	9019	6416	5532	5231	4758	6707	8260	11239	17586	24214	34947	45738	51323
ABK	64140	55489	49942	53090	56704	55825	49474	38282	31182	22849	16191	10634	8012	7197	7699	7498	10905	12793	18114	24474	34260	46759	63977	65709
LEK	17915	16603	16985	19254	20802	21436	20064	15635	12062	9704	6074	4627	3437	3135	2934	2804	3712	4585	5951	8591	10128	13695	17643	18222
MUO	48203	46410	43545	46713	49466	47076	40754	32795	25995	20693	15541	10395	7622	6583	6454	6266	8615	10340	13786	20094	27902	35414	47151	48442
KIR	35695	32874	30491	31435	32788	27550	23437	15953	11614	8386	5586	3327	2648	2507	3125	3338	4089	6096	8584	11247	15726	22023	30866	33331
SOD	44513	42650	39613	41934	40131	35012	27629	20858	16147	12138	9367	6004	4610	4250	4743	4668	6140	8564	11192	15302	21362	28484	37787	41984
PEL	54663	52724	50238	50352	47768	40416	32928	25396	20790	16993	12973	9228	6960	5890	6805	6957	8898	11245	13946	19700	25549	34365	45480	49276
JCK	13120	13132	12132	11630	11569	9156	6908	4423	3437	1908	1426	700	495	589	786	1246	1893	2347	3612	3633	5573	8233	11514	12172
DON	18964	17184	17278	15021	13136	10369	7511	5338	4034	2741	1726	1270	981	879	1114	1845	2434	2505	3905	4486	6716	10329	14336	16713
RAN	4664	4443	3749	3906	3639	2377	1568	1223	769	488	537	329	116	170	214	572	955	802	1318	1818	2485	2440	3972	4246
RVK	26455	24277	23914	23335	21101	18105	14627	10855	9205	7533	5369	4686	3820	4137	4179	4962	6271	6709	8329	9984	12271	15847	19218	23567
LYC	15863	15067	14195	14524	12789	11178	9007	6270	5146	3599	2324	1774	1706	1734	2268	2532	3946	4209	6191	6869	7339	10167	12655	14848
OUJ	19538	19562	16777	15615	13579	11698	10083	6833	5542	5023	3934	2887	2605	2730	3437	3887	5462	6072	7141	9046	10275	11005	14841	16107
MEK	2011	1794	1479	1480	927	707	874	722	638	635	582	478	291	322	310	560	745	758	706	891	779	1039	1223	1315
HAN	5672	4880	4386	4199	2900	3496	3333	2724	2375	2572	1878	1485	1507	1333	1766	2328	2866	3256	2740	3191	3687	3024	4130	4119
DOB	5471	4898	4786	4150	4342	4144	3028	2688	2756	2140	1421	1395	1064	1302	1547	1948	2370	2330	2746	3773	2957	3614	3363	5031
SOL	940	832	943	431	381	522	384	64	82	59	43	19	42	92	231	236	295	366	522	425	335	296	559	532
NUR	3305	3024	2687	2262	1474	1949	2117	1995	2160	2311	1525	1220	1351	1346	1701	2039	2152	2167	1887	2129	2609	2047	2829	2800
UPS	2003	1584	1792	936	1099	1232	1223	1155	1518	1348	650	653	635	747	1130	1342	956	969	1128	1521	1258	1573	1627	1725
KAR	401	435	336	381	385	585	413	406	313	350	148	77	106	169	271	250	226	227	377	184	219	362	229	336
TAR	590	569	472	574	305	466	304	298	693	557	381	308	347	586	623	639	441	313	439	529	522	562	1137	785