C.6 Study site HVG2 (erect dwarf shrub community)

I *Location*

Name	Location	Latitude	Longitude	Altitude
HVG2	Happy Valley, Arctic North Slope, Alaska, United States of America	69.146928°	-148.852042°	325 m

Happy Valley is located just west of the Dalton Highway in the foothills of the Arctic Slope approximately 82 km (52 mi) north of Toolik Lake, Alaska at an elevation of about 320 m. Within the five subzones of the circumpolar Arctic, Happy Valley is found in subzone E. Green mile marker 334 is positioned just before the turn-off to the site. Three 10 x 10 m grids, designated at the hill crest, midslope and at the footslope have been established at this location in 2002. The goniometer measurements have been carried out next to the midslope / zonal site (HV_ms/z). [*Barreda et al.*, 2006]

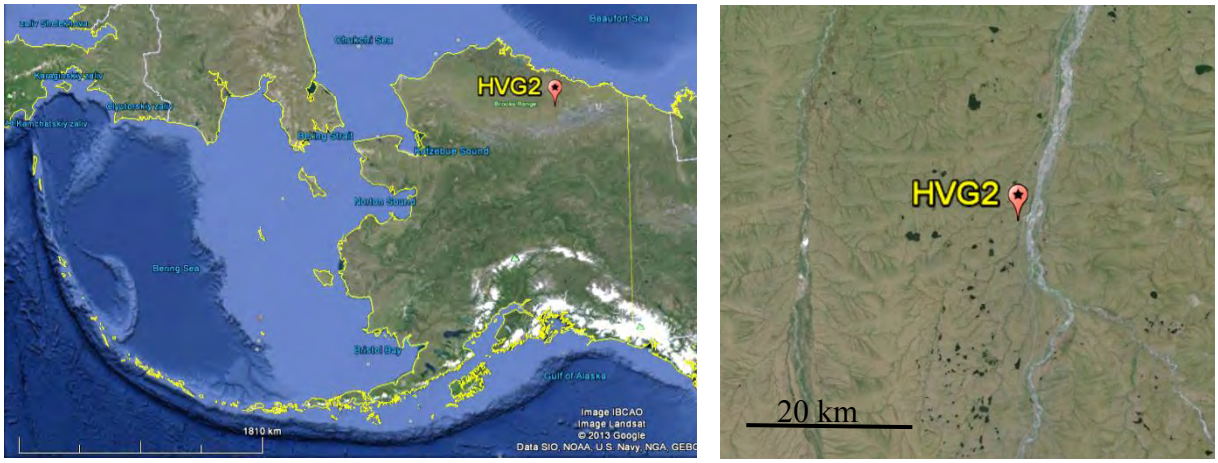

Figure C.6-1: Location of study site HVG2 in Alaska, USA. *Source:* Google Earth, 2013

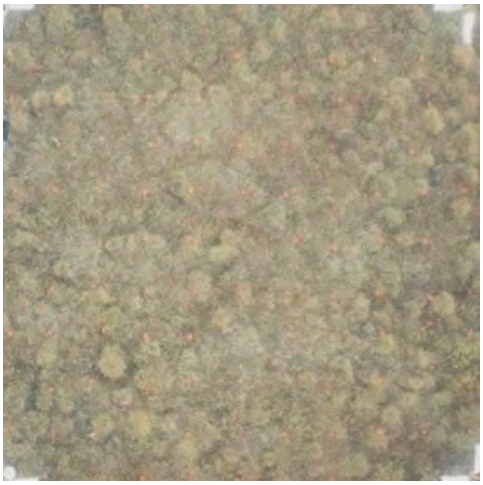

Figure C.6-2: Aerial photo of a 10 x 10 m zonal grid at the Happy Valley study location near the HVG2 site. *Source:* [*Barreda et al.*, 2006]

II *Main Vegetation Description*

The vegetation at the mesic Happy Valley study location corresponds to the zonal vegetation in subzone E. The zonal plant community of bioclimate subzone E in northern Alaska is *Sphagno- Eriophoretum vaginati* [*Walker et al.*, 1994], also called moist acidic tundra (MAT), 'acidic tussock tundra' or 'tussock-sedge, dwarf-shrub, moss tundra' [*Walker et al.*, 2005]. It occurs widely across the foothills of northern Alaska on old upland surfaces not glaciated during the Last Glacial Maximum. At Happy Valley the average soil pH of this plant community is 5.3; the average volumetric soil moisture of the top mineral horizon is 44 %, and average depth of thaw by late summer is 34 cm [*Kade et al.*, 2005]. The vegetation is composed of a mixture of tussock sedges (*Eriophorum vaginatum*), deciduous dwarf shrubs (e.g., *Betula nana, Salix planifolia* ssp. *pulchra*), evergreen dwarf shrubs (e.g., *Ledum palustre* ssp. *decumbens, Vaccinium vitis-idaea, Cassiope tetragona, Empetrum nigrum*), a few forbs (*Polygonum bistorta* var. *plumosum, Petasites frigidus*), mosses (*Hylocomium splendens, Sphagnum* spp., *Aulacomnium* spp., *Dicranum* spp.) and lichens (*Cladina* spp., *Dactylina arctica*, *Cetraria* spp.).

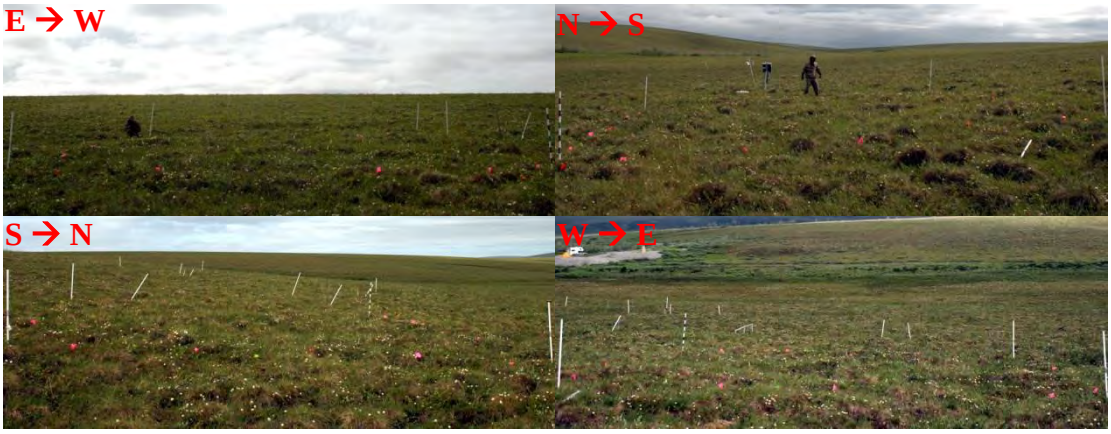

Figure C.6-3: Overview images of MNT tundra at the mesic Happy Valley study location near the HVG2 site. *Source:* [*Buchhorn and Schwieder*, 2012]

III *Vegetation Description of the HVG2 Site*

The focus of the measurements at this goniometer site has been an erect dwarf shrub community between tussock sedges. The 1x1 m plot is homogeneously covered with this dwarf shrub, but with forbs, mosses and lichens in the understory and tussock sedges nearby.

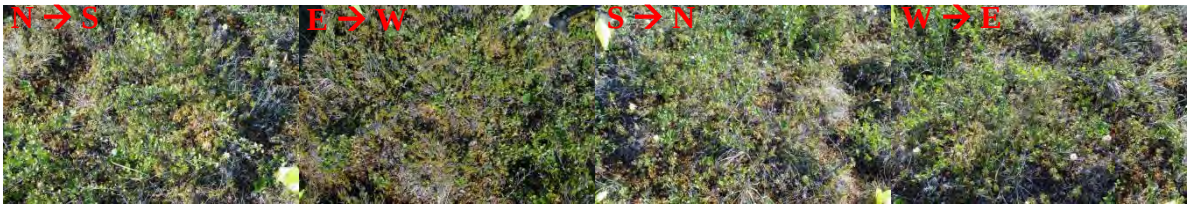

Figure C.6-4: Overview images of the HVG2 vegetation from cardinal directions.

Figure C.6-5: Quasi-nadir image of the HVG2 vegetation (dwarf shrub).

IV *Overview of the Spectro-Goniometer Measurements*

Table C.6-1: Overview of the spectro-goniometer measurements at the HVG2 study site.

Name	Day	Starting Time	Duration	SAA	SZA	Sky
HVG2_01	2012-07-02	9:27:32	20 min	104°	60°	cirrostratus
HVG2_02	2012-07-02	11:32:41	17 min	137°	50°	cirrostratus
HVG2_03	2012-07-02	13:52:06	67 min	189°	46°	cirrostratus
HVG2_04	2012-07-02	15:52:37	18 min	217°	50°	cirrostratus

Table C.6-2: Spectro-directional data of the HVG2_01 spectro-goniometer measurement.

HVG2_01 (SZA = 60°; SAA = 104°)	Viewing Geometry (Viewing Zenith Angle | Viewing Azimuth Angle)																							
	0|0	5|180	5|202.5	5|225	5|270	5|315	5|337.5	5|0	5|22.5	5|45	5|90	5|135	5|157.5	10|180	10|202.5	10|225	10|270	10|315	10|337.5	10|350
HCRF EnMAP blue (479 nm)	0.0355	0.0327	0.0298	0.0360	0.0353	0.0404	0.0364	0.0377	0.0363	0.0355	0.0326	0.0337	0.0312	0.0371	0.0390	0.0393	0.0344	0.0382	0.0371	0.0398
HCRF EnMAP green (549 nm)	0.0900	0.0779	0.0702	0.0759	0.0721	0.0828	0.0849	0.0804	0.0770	0.0761	0.0703	0.0797	0.0677	0.0877	0.0866	0.0997	0.0923	0.0794	0.0825	0.0863
HCRF EnMAP rot (672 nm)	0.0516	0.0499	0.0472	0.0556	0.0558	0.0695	0.0583	0.0585	0.0578	0.0575	0.0542	0.0499	0.0518	0.0537	0.0513	0.0587	0.0508	0.0623	0.0602	0.0631
HCRF EnMAP NIR (864 nm)	0.5252	0.4665	0.4075	0.4120	0.3784	0.4404	0.4764	0.4427	0.4194	0.4105	0.4031	0.4388	0.4005	0.4828	0.4932	0.5334	0.5499	0.5371	0.4254	0.4448	0.4694
ANIF EnMAP rot (672 nm)	1.0000	0.9667	0.9139	1.0774	1.0813	1.3457	1.1293	1.1325	1.1185	1.1142	1.0497	0.9660	1.0026	1.0390	0.9934	1.1359	1.1177	0.9832	1.2070	1.1664	1.2221
ANIF EnMAP NIR (864 nm)	1.0000	0.8882	0.7758	0.7845	0.7205	0.8385	0.9071	0.8429	0.7986	0.7815	0.7676	0.8355	0.7625	0.9191	0.9390	1.0156	1.0470	1.0225	0.8100	0.8468	0.8936
Rel. Blue Absorption Depth	0.8042	0.7282	0.7172	0.6042	0.5839	0.5787	0.7032	0.6132	0.6031	0.6171	0.6198	0.7296	0.6321	0.7249	0.7561	0.8109	0.8108	0.8653	0.5943	0.6521	0.6233
Rel. Red Absorption Depth	3.4336	3.0745	2.7771	2.3216	2.0702	1.9645	2.6656	2.4368	2.2822	2.2766	2.3741	2.8790	2.5042	2.9990	3.2200	3.0207	3.2042	3.5900	2.1279	2.3594	2.3935
NDVI (EnMAP)	0.8209	0.8067	0.7924	0.7620	0.7428	0.7274	0.7819	0.7666	0.7579	0.7541	0.7629	0.7958	0.7710	0.7999	0.8115	0.8018	0.8100	0.8272	0.7444	0.7614	0.7629
Nadir Norm. NDVI (AVHRR)	1.0000	0.9830	0.9640	0.9350	0.9086	0.8915	0.9474	0.9413	0.9303	0.9276	0.9377	0.9732	0.9487	0.9693	0.9898	0.9712	0.9789	1.0000	0.9164	0.9261	0.9365
Nadir Norm. NDVI (MODIS)	1.0000	0.9819	0.9635	0.9340	0.9067	0.8890	0.9469	0.9395	0.9287	0.9254	0.9365	0.9737	0.9464	0.9709	0.9911	0.9731	0.9805	1.0011	0.9129	0.9239	0.9346
Nadir Norm. NDVI (EnMAP)	1.0000	0.9826	0.9652	0.9283	0.9048	0.8860	0.9524	0.9338	0.9232	0.9186	0.9293	0.9694	0.9392	0.9744	0.9885	0.9767	0.9867	1.0077	0.9068	0.9275	0.9293

(cont.)

HVG2_01 (SZA = 60°; SAA = 104°)	Viewing Geometry (Viewing Zenith Angle | Viewing Azimuth Angle)																							
	10|0	10|10	10|22.5	10|45	10|90	10|135	10|157.5	10|170	20|180	20|190	20|202.5	20|225	20|270	20|315	20|337.5	20|350	20|0	20|10	20|22.5	20|45	20|90
HCRF EnMAP blue (479 nm)	0.0374	0.0374	0.0385	0.0385	0.0351	0.0415	0.0416	0.0357	0.0391	0.0414	0.0434	0.0421	0.0368	0.0399	0.0427	0.0406	0.0377	0.0391	0.0409	0.0418	0.0344
HCRF EnMAP green (549 nm)	0.0828	0.0832	0.0798	0.0835	0.0757	0.0958	0.0893	0.0835	0.0958	0.0994	0.1054	0.1029	0.0952	0.0822	0.0877	0.0864	0.0822	0.0826	0.0841	0.0828	0.0748
HCRF EnMAP rot (672 nm)	0.0594	0.0623	0.0642	0.0627	0.0610	0.0652	0.0639	0.0542	0.0583	0.0616	0.0665	0.0629	0.0559	0.0638	0.0684	0.0644	0.0643	0.0665	0.0694	0.0669	0.0566
HCRF EnMAP NIR (864 nm)	0.4504	0.4552	0.4178	0.4498	0.3998	0.5094	0.4586	0.4549	0.5042	0.5303	0.5568	0.5500	0.5358	0.4397	0.4649	0.4824	0.4559	0.4407	0.4492	0.4270	0.4148
ANIF EnMAP rot (672 nm)	1.1508	1.2067	1.2421	1.2145	1.1818	1.2629	1.2379	1.0486	1.1290	1.1927	1.2868	1.2173	1.0814	1.2352	1.3243	1.2476	1.2441	1.2872	1.3440	1.2951	1.0956
ANIF EnMAP NIR (864 nm)	0.8575	0.8667	0.7955	0.8564	0.7612	0.9699	0.8732	0.8661	0.9600	1.0097	1.0601	1.0472	1.0200	0.8372	0.8851	0.9184	0.8679	0.8390	0.8552	0.8130	0.7897
Rel. Blue Absorption Depth	0.6481	0.6552	0.5895	0.6302	0.6144	0.7007	0.6225	0.7173	0.7683	0.7507	0.7721	0.7699	0.8241	0.5824	0.5747	0.6088	0.6343	0.6097	0.5863	0.5464	0.6301
Rel. Red Absorption Depth	2.4509	2.3364	2.0209	2.2838	2.0337	2.5353	2.2913	2.7412	2.8577	2.8519	2.7495	2.8887	3.2247	2.2009	2.1810	2.4494	2.2392	2.0804	2.0318	1.9921	2.3014
NDVI (EnMAP)	0.7668	0.7592	0.7338	0.7552	0.7351	0.7730	0.7553	0.7872	0.7927	0.7919	0.7867	0.7948	0.8112	0.7466	0.7435	0.7643	0.7529	0.7378	0.7323	0.7292	0.7599
Nadir Norm. NDVI (AVHRR)	0.9364	0.9306	0.9052	0.9151	0.9094	0.9456	0.9250	0.9575	0.9553	0.9590	0.9521	0.9652	0.9809	0.9161	0.9091	0.9386	0.9208	0.9068	0.9046	0.8961	0.9369
Nadir Norm. NDVI (MODIS)	0.9350	0.9286	0.9025	0.9138	0.9067	0.9456	0.9248	0.9589	0.9582	0.9609	0.9532	0.9664	0.9814	0.9144	0.9076	0.9369	0.9177	0.9035	0.9018	0.8942	0.9354
Nadir Norm. NDVI (EnMAP)	0.9341	0.9247	0.8939	0.9200	0.8954	0.9416	0.9200	0.9589	0.9656	0.9646	0.9583	0.9682	0.9881	0.9094	0.9057	0.9310	0.9171	0.8988	0.8920	0.8882	0.9257

(cont.)

HVG2_01 (SZA = 60°; SAA = 104°)	Viewing Geometry (Viewing Zenith Angle | Viewing Azimuth Angle)																							
	20|135	20|157.5	20|170	30|180	30|190	30|202.5	30|225	30|270	30|315	30|337.5	30|350	30|0	30|10	30|22.5	30|45	30|90	30|135	30|157.5	30|170
HCRF EnMAP blue (479 nm)	0.0424	0.0423	0.0399	0.0464	0.0464	0.0512	0.0440	0.0396	0.0370	0.0412	0.0398	0.0334	0.0324	0.0422	0.0387	0.0359	0.0505	0.0482	0.0446					
HCRF EnMAP green (549 nm)	0.0974	0.0940	0.0951	0.1071	0.1052	0.1231	0.1097	0.1008	0.0794	0.0806	0.0786	0.0778	0.0724	0.0867	0.0751	0.0785	0.1092	0.1109	0.1018					
HCRF EnMAP rot (672 nm)	0.0650	0.0638	0.0624	0.0700	0.0703	0.0758	0.0666	0.0586	0.0597	0.0671	0.0657	0.0559	0.0528	0.0694	0.0643	0.0612	0.0746	0.0722	0.0694					
HCRF EnMAP NIR (864 nm)	0.5118	0.4736	0.4979	0.5351	0.5165	0.6146	0.5754	0.5629	0.4435	0.4064	0.4139	0.4482	0.4248	0.4528	0.3987	0.4322	0.5322	0.5327	0.5039					
ANIF EnMAP rot (672 nm)	1.2583	1.2351	1.2084	1.3553	1.3619	1.4682	1.2900	1.1351	1.1551	1.2996	1.2724	1.0825	1.0221	1.3447	1.2451	1.1842	1.4452	1.3987	1.3439					
ANIF EnMAP NIR (864 nm)	0.9744	0.9016	0.9479	1.0187	0.9834	1.1701	1.0956	1.0716	0.8444	0.7738	0.7880	0.8534	0.8088	0.8621	0.7592	0.8229	1.0133	1.0142	0.9594					
Rel. Blue Absorption Depth	0.7012	0.6575	0.7369	0.7138	0.6974	0.7623	0.7912	0.7980	0.6227	0.5285	0.5397	0.7061	0.6581	0.5810	0.5302	0.6512	0.6454	0.7021	0.6973					
Rel. Red Absorption Depth	2.5763	2.3801	2.6224	2.4929	2.3537	2.6879	2.8548	3.2084	2.3521	1.8892	1.9766	2.6164	2.6082	2.0464	1.9160	2.2406	2.3098	2.3431	2.3390					
NDVI (EnMAP)	0.7747	0.7626	0.7772	0.7686	0.7603	0.7803	0.7925	0.8113	0.7629	0.7165	0.7260	0.7782	0.7789	0.7340	0.7222	0.7521	0.7540	0.7612	0.7579					
Nadir Norm. NDVI (AVHRR)	0.9437	0.9267	0.9429	0.9332	0.9214	0.9404	0.9597	0.9833	0.9289	0.8780	0.8919	0.9463	0.9526	0.9007	0.8969	0.9230	0.9155	0.9192	0.9165					
Nadir Norm. NDVI (MODIS)	0.9445	0.9282	0.9449	0.9358	0.9236	0.9433	0.9613	0.9837	0.9270	0.8755	0.8897	0.9452	0.9509	0.8983	0.8939	0.9218	0.9172	0.9217	0.9188					
Nadir Norm. NDVI (EnMAP)	0.9436	0.9289	0.9467	0.9363	0.9261	0.9505	0.9653	0.9883	0.9293	0.8728	0.8843	0.9479	0.9488	0.8941	0.8798	0.9161	0.9185	0.9272	0.9232					

Table C.6-3: Spectro-directional data of the HVG2_02 spectro-goniometer measurement.

HVG2_02 (SZA = 50°; SAA = 137°)	Viewing Geometry (Viewing Zenith Angle | Viewing Azimuth Angle)																							
	0|0	5|180	5|202.5	5|225	5|270	5|315	5|337.5	5|0	5|22.5	5|45	5|90	5|135	5|157.5	10|180	10|202.5	10|225	10|270	10|315	10|337.5	10|350
HCRF EnMAP blue (479 nm)	0.0274	0.0290	0.0287	0.0278	0.0306	0.0312	0.0290	0.0270	0.0296	0.0255	0.0263	0.0263	0.0279	0.0283	0.0325	0.0289	0.0341	0.0309	0.0317	0.0293
HCRF EnMAP green (549 nm)	0.0625	0.0724	0.0621	0.0651	0.0711	0.0694	0.0625	0.0596	0.0632	0.0657	0.0609	0.0657	0.0733	0.0710	0.0757	0.0721	0.0715	0.0695	0.0655	0.0590
HCRF EnMAP rot (672 nm)	0.0456	0.0442	0.0441	0.0457	0.0502	0.0493	0.0433	0.0450	0.0455	0.0375	0.0397	0.0408	0.0415	0.0444	0.0482	0.0435	0.0553	0.0493	0.0511	0.0483
HCRF EnMAP NIR (864 nm)	0.3398	0.3852	0.3267	0.3485	0.3804	0.3700	0.3315	0.3269	0.3202	0.3752	0.3468	0.3700	0.4161	0.3929	0.3983	0.3982	0.3593	0.3723	0.3331	0.3084
ANIF EnMAP rot (672 nm)	1.0000	0.9686	0.9664	1.0009	1.1012	1.0794	0.9489	0.9865	0.9962	0.8216	0.8694	0.8951	0.9089	0.9731	0.9542	1.0552	0.9613	1.2111	1.0803	1.1202	1.0593
ANIF EnMAP NIR (864 nm)	1.0000	1.1337	0.9616	1.0256	1.1194	1.0889	0.9755	0.9622	0.9424	1.1041	1.0206	1.0890	1.2247	1.1563	1.1719	1.1721	1.0889	1.0574	1.0958	0.9804	0.9077
Rel. Blue Absorption Depth	0.6754	0.8002	0.6272	0.7100	0.6978	0.6615	0.6147	0.6433	0.6095	0.8144	0.6972	0.7981	0.8462	0.8086	0.7853	0.7106	0.7185	0.5964	0.6691	0.5755	0.5493
Rel. Red Absorption Depth	2.3546	2.8555	2.3571	2.4478	2.4488	2.3921	2.4158	2.2710	2.1863	3.3081	2.8789	2.9798	3.3260	2.9333	3.0090	2.7161	2.7319	2.0445	2.4210	2.0300	1.9588
NDVI (EnMAP)	0.7632	0.7941	0.7622	0.7683	0.7666	0.7651	0.7689	0.7580	0.7514	0.8183	0.7947	0.8012	0.8187	0.7969	0.8029	0.7843	0.7880	0.7334	0.7662	0.7339	0.7290
Nadir Norm. NDVI (AVHRR)	1.0000	1.0298	0.9996	1.0032	1.0045	1.0059	1.0076	0.9985	0.9841	1.0644	1.0452	1.0467	1.0698	1.0433	1.0481	1.0207	1.0334	0.9663	0.9998	0.9679	0.9644
Nadir Norm. NDVI (MODIS)	1.0000	1.0330	1.0009	1.0035	1.0036	1.0047	1.0072	0.9980	0.9849	1.0671	1.0458	1.0485	1.0725	1.0454	1.0503	1.0233	1.0350	0.9661	0.9999	0.9675	0.9637
Nadir Norm. NDVI (EnMAP)	1.0000	1.0405	0.9986	1.0066	1.0045	1.0024	1.0075	0.9931	0.9845	1.0722	1.0412	1.0498	1.0728	1.0442	1.0519	1.0276	1.0325	0.9609	1.0039	0.9616	0.9552

(cont.)

HVG2_02 (SZA = 50°; SAA = 137°)	Viewing Geometry (Viewing Zenith Angle | Viewing Azimuth Angle)																							
	10|0	10|10	10|22.5	10|45	10|90	10|135	10|157.5	10|170	20|180	20|190	20|202.5	20|225	20|270	20|315	20|337.5	20|350	20|0	20|10	20|22.5	20|45	20|90
HCRF EnMAP blue (479 nm)	0.0292	0.0284	0.0299	0.0259	0.0246	0.0269	0.0266	0.0274	0.0339	0.0333	0.0329	0.0356	0.0335	0.0298	0.0269	0.0271	0.0327	0.0281	0.0265	0.0260	0.0286
HCRF EnMAP green (549 nm)	0.0592	0.0632	0.0697	0.0599	0.0600	0.0649	0.0686	0.0686	0.0860	0.0805	0.0718	0.0714	0.0751	0.0642	0.0578	0.0593	0.0692	0.0617	0.0634	0.0559	0.0754
HCRF EnMAP rot (672 nm)	0.0485	0.0483	0.0474	0.0444	0.0370	0.0403	0.0393	0.0420	0.0519	0.0511	0.0513	0.0581	0.0552	0.0495	0.0408	0.0430	0.0503	0.0431	0.0420	0.0415	0.0405
HCRF EnMAP NIR (864 nm)	0.3059	0.3462	0.3779	0.3332	0.3485	0.3453	0.3977	0.3763	0.4335	0.4069	0.3543	0.3507	0.3914	0.3516	0.3201	0.3227	0.3582	0.3348	0.3568	0.3312	0.4347
ANIF EnMAP rot (672 nm)	1.0637	1.0584	1.0395	0.9725	0.8114	0.8836	0.8608	0.9205	1.1369	1.1204	1.1250	1.2724	1.2098	1.0855	0.8935	0.9433	1.1015	0.9456	0.9207	0.9096	0.8881
ANIF EnMAP NIR (864 nm)	0.9002	1.0190	1.1121	0.9806	1.0256	1.0163	1.1706	1.1075	1.2758	1.1974	1.0428	1.0320	1.1518	1.0348	0.9421	0.9498	1.0541	0.9853	1.0499	0.9748	1.2793
Rel. Blue Absorption Depth	0.5593	0.6493	0.6953	0.6940	0.7507	0.7464	0.8199	0.7964	0.8170	0.7592	0.6422	0.5706	0.6685	0.6224	0.6095	0.6347	0.5991	0.6312	0.7219	0.6213	0.8533
Rel. Red Absorption Depth	1.9191	2.2583	2.5455	2.3797	3.0886	2.7551	3.3756	2.9181	2.7272	2.5748	2.1686	1.8332	2.2504	2.2352	2.4911	2.3727	2.2511	2.4433	2.7309	2.5503	3.5955
NDVI (EnMAP)	0.7261	0.7552	0.7770	0.7650	0.8079	0.7909	0.8203	0.7992	0.7862	0.7767	0.7469	0.7159	0.7528	0.7531	0.7741	0.7646	0.7539	0.7717	0.7893	0.7773	0.8294
Nadir Norm. NDVI (AVHRR)	0.9571	0.9888	1.0136	1.0099	1.0594	1.0309	1.0693	1.0402	1.0141	1.0061	0.9728	0.9402	0.9889	0.9921	1.0185	1.0062	0.9888	1.0087	1.0325	1.0256	1.0810
Nadir Norm. NDVI (MODIS)	0.9553	0.9890	1.0142	1.0092	1.0613	1.0339	1.0719	1.0422	1.0188	1.0094	0.9742	0.9397	0.9888	0.9903	1.0192	1.0075	0.9913	1.0101	1.0347	1.0259	1.0838
Nadir Norm. NDVI (EnMAP)	0.9514	0.9895	1.0180	1.0023	1.0586	1.0363	1.0747	1.0471	1.0302	1.0177	0.9786	0.9380	0.9863	0.9867	1.0142	1.0019	0.9878	1.0111	1.0342	1.0184	1.0868

(cont.)

HVG2_02 (SZA = 50°; SAA = 137°)	Viewing Geometry (Viewing Zenith Angle | Viewing Azimuth Angle)																							
	20|135	20|157.5	20|170	30|180	30|190	30|202.5	30|225	30|270	30|315	30|337.5	30|350	30|0	30|10	30|22.5	30|45	30|90	30|135	30|157.5	30|170			
HCRF EnMAP blue (479 nm)	0.0295	0.0311	0.0313	0.0389	0.0374	0.0377	0.0373	0.0362	0.0259	0.0263	0.0250	0.0254	0.0274	0.0246	0.0213	0.0269	0.0291	0.0337	0.0360					
HCRF EnMAP green (549 nm)	0.0679	0.0800	0.0807	0.1013	0.0902	0.0862	0.0828	0.0780	0.0628	0.0582	0.0559	0.0577	0.0604	0.0523	0.0458	0.0679	0.0682	0.0836	0.0930					
HCRF EnMAP rot (672 nm)	0.0455	0.0456	0.0463	0.0563	0.0555	0.0585	0.0587	0.0605	0.0398	0.0408	0.0393	0.0394	0.0418	0.0389	0.0331	0.0401	0.0479	0.0514	0.0524					
HCRF EnMAP NIR (864 nm)	0.3711	0.4207	0.4197	0.4924	0.4362	0.4123	0.3889	0.3895	0.3628	0.3174	0.3216	0.3239	0.3338	0.3066	0.2777	0.3858	0.3559	0.4292	0.4646					
ANIF EnMAP rot (672 nm)	0.9979	0.9996	1.0155	1.2346	1.2160	1.2827	1.2863	1.3254	0.8717	0.8942	0.8604	0.8637	0.9157	0.8523	0.7247	0.8782	1.0506	1.1267	1.1493					
ANIF EnMAP NIR (864 nm)	1.0921	1.2382	1.2353	1.4492	1.2837	1.2135	1.1445	1.1464	1.0678	0.9340	0.9465	0.9533	0.9825	0.9024	0.8174	1.1355	1.0476	1.2632	1.3673					
Rel. Blue Absorption Depth	0.6904	0.8286	0.8255	0.8419	0.7620	0.7051	0.6658	0.6289	0.7544	0.6384	0.6485	0.6719	0.6384	0.6022	0.6104	0.8146	0.7218	0.7914	0.8359					
Rel. Red Absorption Depth	2.6326	3.0366	2.9742	2.8868	2.5580	2.2599	2.1053	2.0466	3.0281	2.4695	2.6486	2.6487	2.5554	2.5127	2.6631	3.2804	2.4016	2.7588	2.9229					
NDVI (EnMAP)	0.7814	0.8044	0.8012	0.7947	0.7743	0.7514	0.7377	0.7312	0.8024	0.7722	0.7824	0.7831	0.7775	0.7749	0.7872	0.8118	0.7626	0.7861	0.7971					
Nadir Norm. NDVI (AVHRR)	1.0228	1.0411	1.0338	1.0234	1.0009	0.9769	0.9588	0.9626	1.0473	1.0145	1.0290	1.0249	1.0239	1.0256	1.0396	1.0640	1.0001	1.0237	1.0305					
Nadir Norm. NDVI (MODIS)	1.0250	1.0450	1.0388	1.0290	1.0054	0.9791	0.9611	0.9625	1.0481	1.0149	1.0298	1.0262	1.0244	1.0255	1.0396	1.0683	1.0025	1.0274	1.0352					
Nadir Norm. NDVI (EnMAP)	1.0238	1.0539	1.0497	1.0412	1.0145	0.9845	0.9666	0.9581	1.0513	1.0117	1.0251	1.0260	1.0187	1.0153	1.0314	1.0637	0.9992	1.0299	1.0444					

Table C.6-4: Spectro-directional data of the HVG2_03 spectro-goniometer measurement.

HVG2_03 (SZA = 46°; SAA = 189°)	Viewing Geometry (Viewing Zenith Angle | Viewing Azimuth Angle)																							
	0|0	5|180	5|202.5	5|225	5|270	5|315	5|337.5	5|0	5|22.5	5|45	5|90	5|135	5|157.5	10|180	10|202.5	10|225	10|270	10|315	10|337.5	10|350
HCRF EnMAP blue (479 nm)	0.0244	0.0227	0.0220	0.0268	0.0274	0.0267	0.0255	0.0269	0.0209	0.0191	0.0199	0.0256	0.0247	0.0241	0.0262	0.0282	0.0323	0.0301	0.0225	0.0220	0.0201
HCRF EnMAP green (549 nm)	0.0654	0.0627	0.0553	0.0572	0.0670	0.0583	0.0518	0.0610	0.0481	0.0428	0.0493	0.0628	0.0620	0.0558	0.0578	0.0604	0.0725	0.0683	0.0521	0.0494	0.0508
HCRF EnMAP rot (672 nm)	0.0363	0.0329	0.0336	0.0433	0.0431	0.0429	0.0431	0.0429	0.0338	0.0298	0.0274	0.0377	0.0388	0.0391	0.0435	0.0451	0.0526	0.0469	0.0367	0.0324	0.0329
HCRF EnMAP NIR (864 nm)	0.3671	0.3650	0.3112	0.2979	0.3470	0.3025	0.2703	0.3199	0.2602	0.2453	0.2846	0.3456	0.3368	0.2994	0.2980	0.2964	0.3548	0.3431	0.2821	0.2724	0.3013
ANIF EnMAP rot (672 nm)	1.0000	0.9059	0.9269	1.1924	1.1890	1.1823	1.1892	1.1825	0.9313	0.8202	0.7555	1.0381	1.0685	1.0779	1.1988	1.2446	1.4499	1.2924	1.0112	0.8935	0.9059
ANIF EnMAP NIR (864 nm)	1.0000	0.9944	0.8479	0.8115	0.9453	0.8240	0.7362	0.8715	0.7089	0.6682	0.7753	0.9415	0.9176	0.8156	0.8118	0.8075	0.9665	0.9346	0.7686	0.7420	0.8208
Rel. Blue Absorption Depth	0.8581	0.9138	0.7994	0.6182	0.7580	0.6398	0.5645	0.6661	0.6837	0.6448	0.7706	0.7723	0.7983	0.7000	0.6560	0.6201	0.6629	0.6801	0.6996	0.6603	0.7851
Rel. Red Absorption Depth	3.3661	3.7645	3.0430	2.1682	2.5840	2.2384	1.8926	2.3925	2.4148	2.6130	3.3675	3.0228	2.8664	2.4422	2.1635	2.0674	2.1448	2.3714	2.4531	2.7027	3.0371
NDVI (EnMAP)	0.8202	0.8348	0.8050	0.7465	0.7789	0.7517	0.7247	0.7636	0.7702	0.7837	0.8243	0.8035	0.7936	0.7690	0.7453	0.7357	0.7418	0.7596	0.7699	0.7873	0.8033
Nadir Norm. NDVI (AVHRR)	1.0000	1.0292	0.9928	0.9240	0.9530	0.9294	0.9027	0.9426	0.9444	0.9757	1.0124	0.9858	0.9748	0.9468	0.9186	0.9040	0.9065	0.9319	0.9487	0.9675	0.9923
Nadir Norm. NDVI (MODIS)	1.0000	1.0268	0.9902	0.9208	0.9520	0.9261	0.8982	0.9389	0.9420	0.9725	1.0118	0.9847	0.9736	0.9444	0.9158	0.9021	0.9042	0.9299	0.9462	0.9653	0.9893
Nadir Norm. NDVI (EnMAP)	1.0000	1.0179	0.9816	0.9101	0.9497	0.9165	0.8837	0.9310	0.9391	0.9555	1.0051	0.9797	0.9677	0.9376	0.9088	0.8970	0.9045	0.9261	0.9387	0.9600	0.9795

(cont.)

HVG2_03 (SZA = 46°; SAA = 189°)	Viewing Geometry (Viewing Zenith Angle | Viewing Azimuth Angle)																							
	10|0	10|10	10|22.5	10|45	10|90	10|135	10|157.5	10|170	20|180	20|190	20|202.5	20|225	20|270	20|315	20|337.5	20|350	20|0	20|10	20|22.5	20|45	20|90
HCRF EnMAP blue (479 nm)	0.0217	0.0209	0.0228	0.0206	0.0212	0.0266	0.0249	0.0249	0.0322	0.0314	0.0329	0.0330	0.0266	0.0204	0.0190	0.0188	0.0192	0.0208	0.0193	0.0174	0.0208
HCRF EnMAP green (549 nm)	0.0545	0.0501	0.0604	0.0472	0.0521	0.0691	0.0587	0.0616	0.0667	0.0691	0.0753	0.0775	0.0578	0.0461	0.0439	0.0421	0.0433	0.0500	0.0484	0.0423	0.0551
HCRF EnMAP rot (672 nm)	0.0327	0.0319	0.0342	0.0308	0.0307	0.0400	0.0353	0.0372	0.0524	0.0479	0.0515	0.0523	0.0413	0.0303	0.0292	0.0285	0.0302	0.0308	0.0283	0.0254	0.0303
HCRF EnMAP NIR (864 nm)	0.3117	0.3011	0.3530	0.2802	0.2937	0.3744	0.3181	0.3318	0.3214	0.3295	0.3497	0.3908	0.2985	0.2850	0.2691	0.2643	0.2668	0.2990	0.3046	0.2665	0.3226
ANIF EnMAP rot (672 nm)	0.9015	0.8806	0.9425	0.8481	0.8477	1.1040	0.9738	1.0261	1.4450	1.3219	1.4190	1.4425	1.1375	0.8362	0.8047	0.7863	0.8328	0.8480	0.7803	0.6996	0.8365
ANIF EnMAP NIR (864 nm)	0.8492	0.8201	0.9615	0.7632	0.8001	1.0200	0.8664	0.9037	0.8755	0.8977	0.9527	1.0647	0.8131	0.7220	0.7332	0.7200	0.7268	0.8145	0.8297	0.7258	0.8787
Rel. Blue Absorption Depth	0.7762	0.7291	0.8482	0.6881	0.7571	0.8428	0.7159	0.7661	0.6024	0.6562	0.6864	0.7166	0.6216	0.6580	0.6765	0.6556	0.6541	0.7263	0.7738	0.7490	0.8571
Rel. Red Absorption Depth	3.0984	3.0756	3.4550	3.0136	3.0970	3.0942	2.9226	2.9282	1.9073	2.1771	2.1572	2.4219	2.2667	2.8195	2.9320	2.9493	2.7847	3.1865	3.6085	3.4723	3.5754
NDVI (EnMAP)	0.8101	0.8082	0.8234	0.8021	0.8105	0.8068	0.8001	0.7983	0.7196	0.7460	0.7434	0.7639	0.7571	0.7946	0.8043	0.8052	0.7966	0.8134	0.8300	0.8261	0.8280
Nadir Norm. NDVI (AVHRR)	0.9966	1.0018	1.0086	0.9941	0.9946	0.9864	0.9765	0.9802	0.8853	0.9150	0.9046	0.9317	0.9341	0.9785	0.9954	1.0004	0.9880	1.0012	1.0223	1.0241	1.0163
Nadir Norm. NDVI (MODIS)	0.9948	0.9988	1.0076	0.9910	0.9938	0.9862	0.9757	0.9793	0.8826	0.9128	0.9043	0.9296	0.9308	0.9753	0.9923	0.9968	0.9850	0.9995	1.0198	1.0210	1.0149
Nadir Norm. NDVI (EnMAP)	0.9878	0.9854	1.0040	0.9780	0.9882	0.9837	0.9755	0.9733	0.8774	0.9095	0.9064	0.9314	0.9231	0.9689	0.9807	0.9818	0.9713	0.9918	1.0120	1.0072	1.0096

(cont.)

HVG2_03 (SZA = 46°; SAA = 189°)	Viewing Geometry (Viewing Zenith Angle | Viewing Azimuth Angle)																							
	20|135	20|157.5	20|170	30|180	30|190	30|202.5	30|225	30|270	30|315	30|337.5	30|350	30|0	30|10	30|122.5	30|45	30|90	30|135	30|157.5	30|170			
HCRF EnMAP blue (479 nm)	0.0249	0.0265	0.0286	0.0354	0.0358	0.0422	0.0370	0.0252	0.0188	0.0190	0.0190	0.0200	0.0197	0.0192	0.0189	0.0229	0.0246	0.0333	0.0377					
HCRF EnMAP green (549 nm)	0.0622	0.0630	0.0639	0.0829	0.0829	0.0924	0.0859	0.0579	0.0438	0.0428	0.0426	0.0451	0.0463	0.0475	0.0451	0.0600	0.0610	0.0743	0.0831					
HCRF EnMAP rot (672 nm)	0.0360	0.0406	0.0459	0.0552	0.0542	0.0694	0.0618	0.0375	0.0280	0.0291	0.0307	0.0303	0.0281	0.0282	0.0280	0.0337	0.0356	0.0530	0.0595					
HCRF EnMAP NIR (864 nm)	0.3351	0.3157	0.3116	0.3876	0.4035	0.4258	0.4284	0.3136	0.2698	0.2690	0.2733	0.2848	0.2935	0.3065	0.2854	0.3389	0.3220	0.3502	0.3750					
ANIF EnMAP rot (672 nm)	0.9914	1.1187	1.2665	1.5227	1.4953	1.9129	1.7050	1.0325	0.7720	0.8032	0.8451	0.8351	0.7753	0.7773	0.7729	0.9296	0.9816	1.4611	1.6396					
ANIF EnMAP NIR (864 nm)	0.9128	0.8601	0.8488	1.0558	1.0992	1.1600	1.1671	0.8542	0.7349	0.7328	0.7445	0.7759	0.7996	0.8350	0.7775	0.9232	0.8771	0.9541	1.0215					
Rel. Blue Absorption Depth	0.7868	0.7286	0.6704	0.7240	0.7100	0.6464	0.7071	0.6931	0.6920	0.6544	0.6553	0.6504	0.6948	0.7775	0.7299	0.8346	0.7816	0.6736	0.6731					
Rel. Red Absorption Depth	3.0692	2.5027	2.1545	2.2222	2.4129	1.9304	2.1975	2.6634	3.1024	2.9639	2.8377	3.0293	3.4554	3.6369	3.3634	3.3452	2.9443	2.0933	1.9698					
NDVI (EnMAP)	0.8062	0.7722	0.7430	0.7505	0.7630	0.7198	0.7477	0.7866	0.8119	0.8046	0.7983	0.8077	0.8251	0.8315	0.8211	0.8190	0.8009	0.7371	0.7262					
Nadir Norm. NDVI (AVHRR)	0.9810	0.9419	0.9044	0.9161	0.9316	0.8819	0.9170	0.9680	1.0021	0.9950	0.9921	0.9971	1.0149	1.0281	1.0168	0.9960	0.9740	0.9008	0.8842					
Nadir Norm. NDVI (MODIS)	0.9806	0.9418	0.9044	0.9156	0.9318	0.8801	0.9144	0.9657	1.0004	0.9923	0.9883	0.9953	1.0133	1.0250	1.0135	0.9957	0.9742	0.8997	0.8827					
Nadir Norm. NDVI (EnMAP)	0.9829	0.9416	0.9060	0.9151	0.9303	0.8776	0.9117	0.9591	0.9900	0.9810	0.9734	0.9849	1.0061	1.0139	1.0012	0.9986	0.9765	0.8988	0.8855					

Table C.6-5: Spectro-directional data of the HVG2_04 spectro-goniometer measurement.

HVG2_04 (SZA = 50°; SAA = 217°)	Viewing Geometry (Viewing Zenith Angle | Viewing Azimuth Angle)																							
	0|0	5|180	5|202.5	5|225	5|270	5|315	5|337.5	5|0	5|22.5	5|45	5|90	5|135	5|157.5	10|180	10|190	10|202.5	10|225	10|270	10|315	10|337.5	10|350
HCRF EnMAP blue (479 nm)	0.0193	0.0195	0.0205	0.0213	0.0196	0.0174	0.0154	0.0188	0.0166	0.0181	0.0184	0.0190	0.0209	0.0235	0.0259	0.0230	0.0225	0.0198	0.0189	0.0166	0.0184
HCRF EnMAP green (549 nm)	0.0417	0.0434	0.0523	0.0520	0.0407	0.0425	0.0396	0.0481	0.0404	0.0423	0.0468	0.0469	0.0456	0.0530	0.0597	0.0594	0.0536	0.0409	0.0457	0.0434	0.0448
HCRF EnMAP rot (672 nm)	0.0272	0.0296	0.0314	0.0307	0.0316	0.0294	0.0221	0.0269	0.0232	0.0273	0.0271	0.0263	0.0336	0.0368	0.0395	0.0349	0.0331	0.0304	0.0297	0.0251	0.0257
HCRF EnMAP NIR (864 nm)	0.2199	0.2242	0.2803	0.2697	0.2156	0.2445	0.2414	0.2807	0.2441	0.2351	0.2666	0.2591	0.2278	0.2553	0.2850	0.3111	0.2722	0.2126	0.2531	0.2640	0.2642
ANIF EnMAP rot (672 nm)	1.0000	1.0864	1.1540	1.1282	1.1610	1.0793	0.8119	0.9898	0.8520	1.0029	0.9953	0.9648	1.2338	1.3515	1.4501	1.2817	1.2161	1.1152	1.0916	0.9239	0.9451
ANIF EnMAP NIR (864 nm)	1.0000	1.0193	1.2745	1.2262	0.9802	1.1118	1.0975	1.2763	1.1097	1.0687	1.2120	1.1781	1.0359	1.1607	1.2958	1.4147	1.2375	0.9665	1.1505	1.2002	1.2014
Rel. Blue Absorption Depth	0.6063	0.6414	0.7944	0.7496	0.5750	0.7344	0.8006	0.7949	0.7394	0.6901	0.7994	0.7633	0.6292	0.6558	0.6832	0.8063	0.7326	0.5679	0.7252	0.8037	0.7392
Rel. Red Absorption Depth	2.5782	2.3864	2.9570	2.8733	2.1043	2.7139	3.6069	3.4572	3.4978	2.7847	3.2604	3.2426	2.1257	2.2030	2.3211	3.0100	2.6827	2.1581	2.7616	3.4446	3.3875
NDVI (EnMAP)	0.7798	0.7669	0.7985	0.7966	0.7443	0.7855	0.8323	0.8249	0.8264	0.7919	0.8155	0.8160	0.7431	0.7481	0.7567	0.7984	0.7831	0.7501	0.7899	0.8260	0.8226
Nadir Norm. NDVI (AVHRR)	1.0000	0.9843	1.0176	1.0090	0.9655	1.0122	1.0659	1.0537	1.0631	1.0163	1.0415	1.0416	0.9556	0.9559	0.9583	1.0080	0.9937	0.9640	1.0096	1.0530	1.0521
Nadir Norm. NDVI (MODIS)	1.0000	0.9837	1.0181	1.0104	0.9639	1.0117	1.0658	1.0544	1.0624	1.0166	1.0421	1.0418	0.9550	0.9566	0.9593	1.0097	0.9938	0.9633	1.0101	1.0535	1.0529
Nadir Norm. NDVI (EnMAP)	1.0000	0.9836	1.0240	1.0203	0.9546	1.0074	1.0673	1.0578	1.0599	1.0156	1.0458	1.0464	0.9530	0.9594	0.9705	1.0239	1.0044	0.9620	1.0130	1.0594	1.0549

(cont.)

HVG2_04 (SZA = 50°; SAA = 217°)	Viewing Geometry (Viewing Zenith Angle | Viewing Azimuth Angle)																							
	10|0	10|10	10|22.5	10|45	10|90	10|135	10|157.5	10|170	20|180	20|190	20|202.5	20|225	20|270	20|315	20|337.5	20|350	20|0	20|10	20|22.5	20|45	20|90
HCRF EnMAP blue (479 nm)	0.0171	0.0163	0.0171	0.0190	0.0191	0.0188	0.0219	0.0219	0.0253	0.0276	0.0238	0.0260	0.0207	0.0173	0.0149	0.0182	0.0163	0.0162	0.0166	0.0170	0.0198
HCRF EnMAP green (549 nm)	0.0432	0.0416	0.0430	0.0450	0.0499	0.0441	0.0453	0.0451	0.0589	0.0605	0.0585	0.0627	0.0450	0.0385	0.0350	0.0442	0.0408	0.0415	0.0406	0.0399	0.0536
HCRF EnMAP rot (672 nm)	0.0244	0.0229	0.0241	0.0305	0.0269	0.0267	0.0349	0.0340	0.0396	0.0445	0.0367	0.0394	0.0309	0.0268	0.0223	0.0253	0.0238	0.0238	0.0241	0.0266	0.0289
HCRF EnMAP NIR (864 nm)	0.2661	0.2585	0.2566	0.2610	0.2825	0.2384	0.2231	0.2178	0.2810	0.2799	0.2995	0.3145	0.2337	0.2206	0.2217	0.2714	0.2625	0.2647	0.2513	0.2360	0.3014
ANIF EnMAP rot (672 nm)	0.8947	0.8412	0.8846	1.1193	0.9886	0.9799	1.2821	1.2505	1.4543	1.6360	1.3484	1.4462	1.1339	0.9855	0.8195	0.9313	0.8734	0.8739	0.8853	0.9762	1.0633
ANIF EnMAP NIR (864 nm)	1.2098	1.1752	1.1667	1.1868	1.2844	1.0840	1.0144	0.9901	1.2775	1.2727	1.3616	1.4298	1.0623	1.0028	1.0079	1.2340	1.1933	1.2036	1.1426	1.0730	1.3705
Rel. Blue Absorption Depth	0.7842	0.7970	0.7772	0.7054	0.8449	0.7045	0.5812	0.5722	0.6972	0.6484	0.7548	0.7515	0.6189	0.6312	0.6825	0.7310	0.7737	0.8037	0.7511	0.7003	0.8868
Rel. Red Absorption Depth	3.6334	3.7776	3.5524	2.8269	3.4955	2.9053	2.0052	1.9502	2.2620	1.9756	2.6516	2.6035	2.4132	2.6297	3.1726	3.5518	3.7072	3.7395	3.4699	2.9106	3.4801
NDVI (EnMAP)	0.8323	0.8373	0.8284	0.7910	0.8261	0.7988	0.7295	0.7297	0.7530	0.7255	0.7816	0.7775	0.7666	0.7831	0.8172	0.8292	0.8339	0.8351	0.8250	0.7976	0.8248
Nadir Norm. NDVI (AVHRR)	1.0663	1.0754	1.0647	1.0209	1.0510	1.0158	0.9410	0.9369	0.9541	0.9222	0.9884	0.9847	0.9820	1.0054	1.0470	1.0599	1.0719	1.0765	1.0650	1.0273	1.0473
Nadir Norm. NDVI (MODIS)	1.0664	1.0747	1.0651	1.0205	1.0526	1.0173	0.9404	0.9362	0.9561	0.9223	0.9891	0.9847	0.9821	1.0048	1.0466	1.0607	1.0704	1.0745	1.0637	1.0270	1.0490
Nadir Norm. NDVI (EnMAP)	1.0674	1.0737	1.0625	1.0144	1.0594	1.0244	0.9355	0.9358	0.9657	0.9304	1.0024	0.9971	0.9832	1.0043	1.0480	1.0634	1.0694	1.0710	1.0580	1.0229	1.0578

(cont.)

HVG2_04 (SZA = 50°; SAA = 217°)	Viewing Geometry (Viewing Zenith Angle | Viewing Azimuth Angle)																							
	20|135	20|157.5	20|170	30|180	30|190	30|202.5	30|225	30|270	30|315	30|337.5	30|350	30|0	30|10	30|22.5	30|45	30|90	30|135	30|157.5	30|170			
HCRF EnMAP blue (479 nm)	0.0211	0.0268	0.0253	0.0364	0.0339	0.0323	0.0292	0.0210	0.0173	0.0176	0.0191	0.0190	0.0182	0.0166	0.0158	0.0200	0.0231	0.0306	0.0300					
HCRF EnMAP green (549 nm)	0.0515	0.0563	0.0593	0.0819	0.0732	0.0719	0.0643	0.0491	0.0381	0.0401	0.0455	0.0460	0.0465	0.0378	0.0368	0.0531	0.0539	0.0671	0.0721					
HCRF EnMAP rot (672 nm)	0.0317	0.0434	0.0381	0.0597	0.0548	0.0538	0.0461	0.0287	0.0260	0.0264	0.0264	0.0272	0.0258	0.0238	0.0227	0.0280	0.0342	0.0503	0.0451					
HCRF EnMAP NIR (864 nm)	0.2686	0.2666	0.2848	0.3666	0.3254	0.3386	0.3114	0.2655	0.2296	0.2502	0.2812	0.2889	0.2918	0.2369	0.2206	0.3019	0.2720	0.3109	0.3444					
ANIF EnMAP rot (672 nm)	1.1640	1.5963	1.4016	2.1930	2.0120	1.9754	1.6945	1.0559	0.9547	0.9682	0.9696	1.0000	0.9469	0.8727	0.8330	1.0303	1.2571	1.8473	1.6574					
ANIF EnMAP NIR (864 nm)	1.2213	1.2122	1.2950	1.6669	1.4794	1.5396	1.4160	1.2073	1.0441	1.1375	1.2785	1.3136	1.3269	1.0773	1.0031	1.3727	1.2366	1.4135	1.5659					
Rel. Blue Absorption Depth	0.7527	0.6019	0.7135	0.6735	0.6368	0.6546	0.6520	0.6969	0.6294	0.6587	0.7091	0.7443	0.8058	0.6730	0.6913	0.8516	0.7132	0.6605	0.7373					
Rel. Red Absorption Depth	2.7104	1.9154	2.3720	1.9283	1.8454	1.9616	2.1738	3.0116	2.8018	3.0441	3.5354	3.5743	3.8279	3.2589	3.1676	3.6231	2.5512	1.9317	2.4705					
NDVI (EnMAP)	0.7890	0.7197	0.7638	0.7200	0.7119	0.7259	0.7420	0.8047	0.7967	0.8094	0.8284	0.8278	0.8377	0.8178	0.8136	0.8300	0.7765	0.7216	0.7684					
Nadir Norm. NDVI (AVHRR)	1.0033	0.9261	0.9671	0.9107	0.9006	0.9218	0.9467	1.0251	1.0202	1.0358	1.0574	1.0650	1.0726	1.0550	1.0417	1.0540	0.9865	0.9232	0.9689					
Nadir Norm. NDVI (MODIS)	1.0049	0.9258	0.9685	0.9112	0.9000	0.9214	0.9457	1.0264	1.0192	1.0355	1.0581	1.0642	1.0724	1.0537	1.0419	1.0552	0.9883	0.9230	0.9718					
Nadir Norm. NDVI (EnMAP)	1.0119	0.9230	0.9795	0.9233	0.9130	0.9310	0.9516	1.0320	1.0217	1.0380	1.0624	1.0616	1.0743	1.0487	1.0434	1.0645	0.9959	0.9254	0.9854					

V *Main Spectral Characteristics*

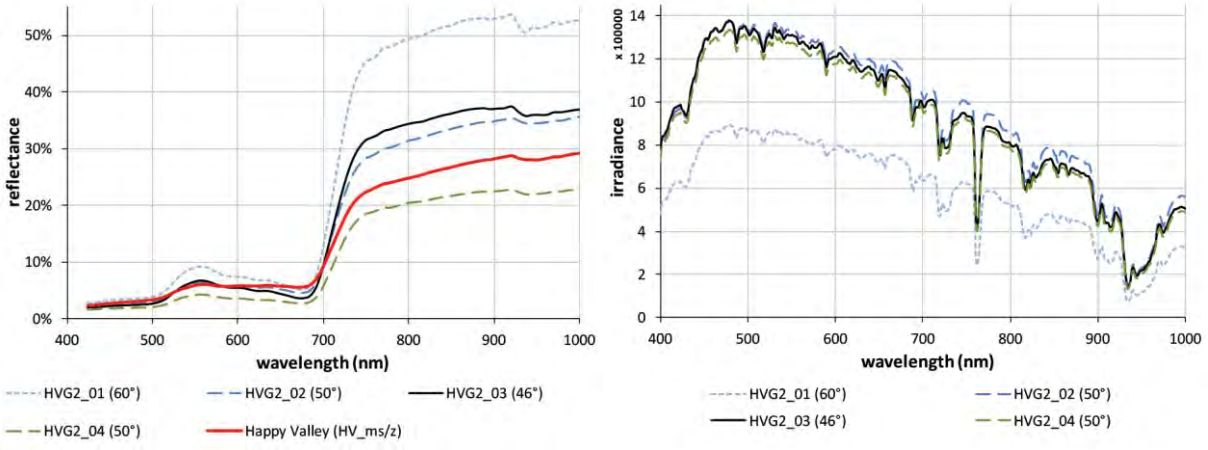

Figure C.6-6: Nadir reflectances and irradiance profiles of the HVG2 site at different sun zenith angles. Left: Comparison of the nadir reflectance signatures with the average zonal vegetation (MAT). Right: Comparison of the total irradiance profiles.

VI *HCRF Visualization*

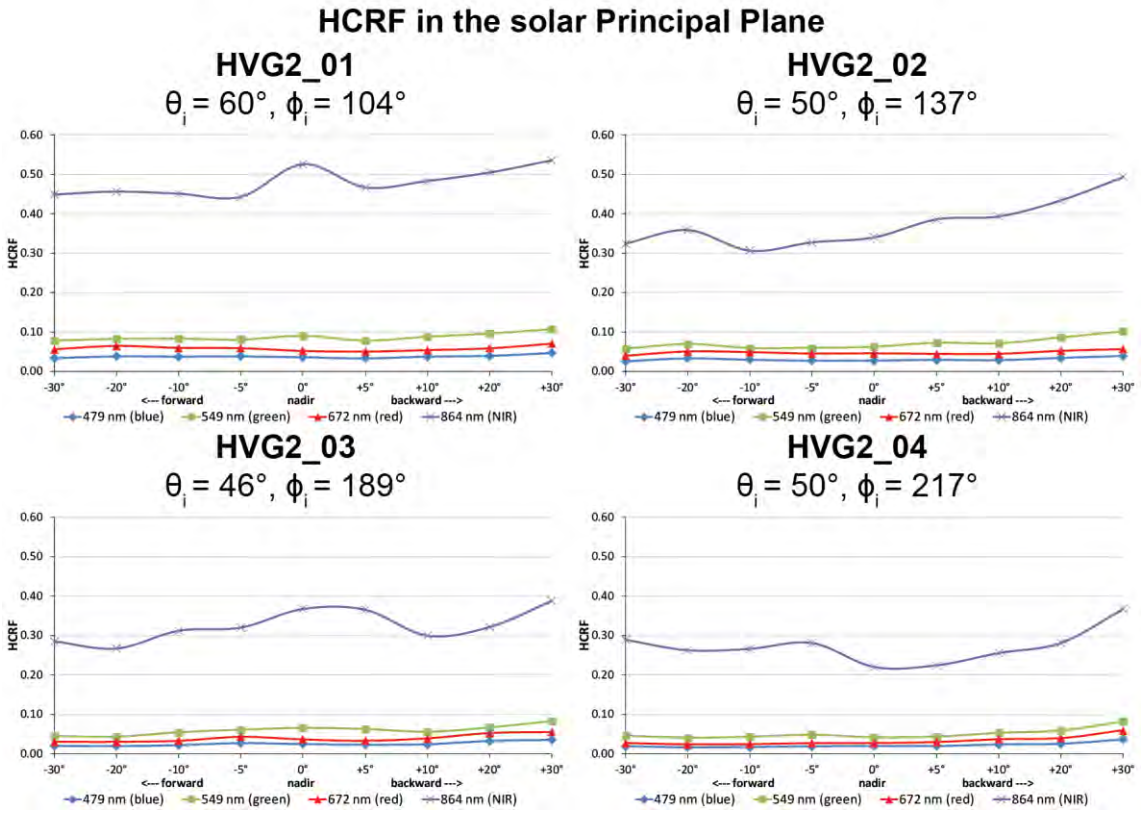

Figure C.6-7: Comparison of the HCRF values at 479 nm (blue), 549 nm (green), 672 nm (red), and 864 nm (NIR) in the solar principal plane of the HVG2 site at different sun zenith angles.

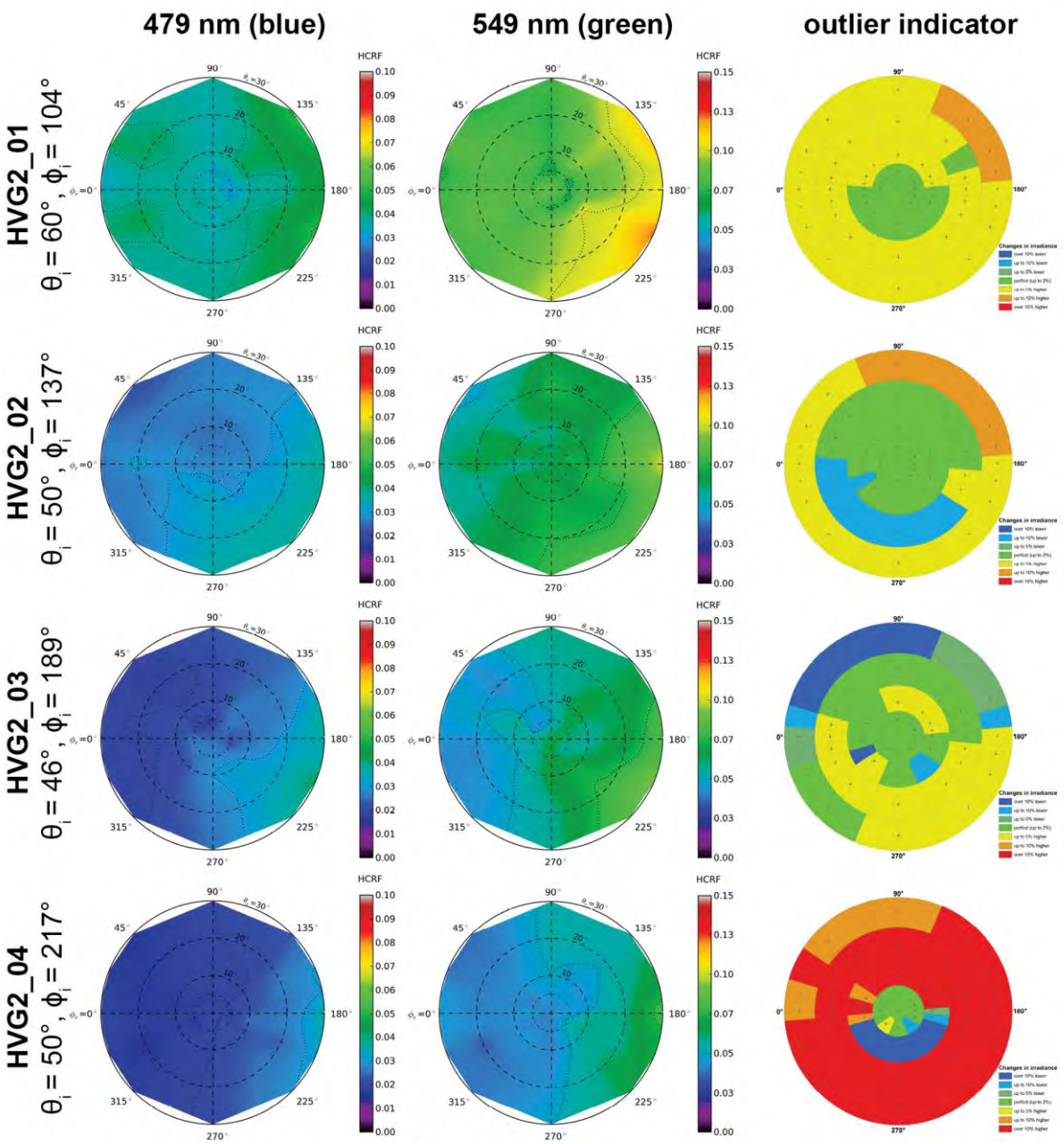

Figure C.6-8: HCRF visualization at 479 nm and 549 nm of the HVG2 site.

Figure C.6-9: Legend of the outlier indicator graphics shown in Figure C.6-8, C.6-10, and C.6-13

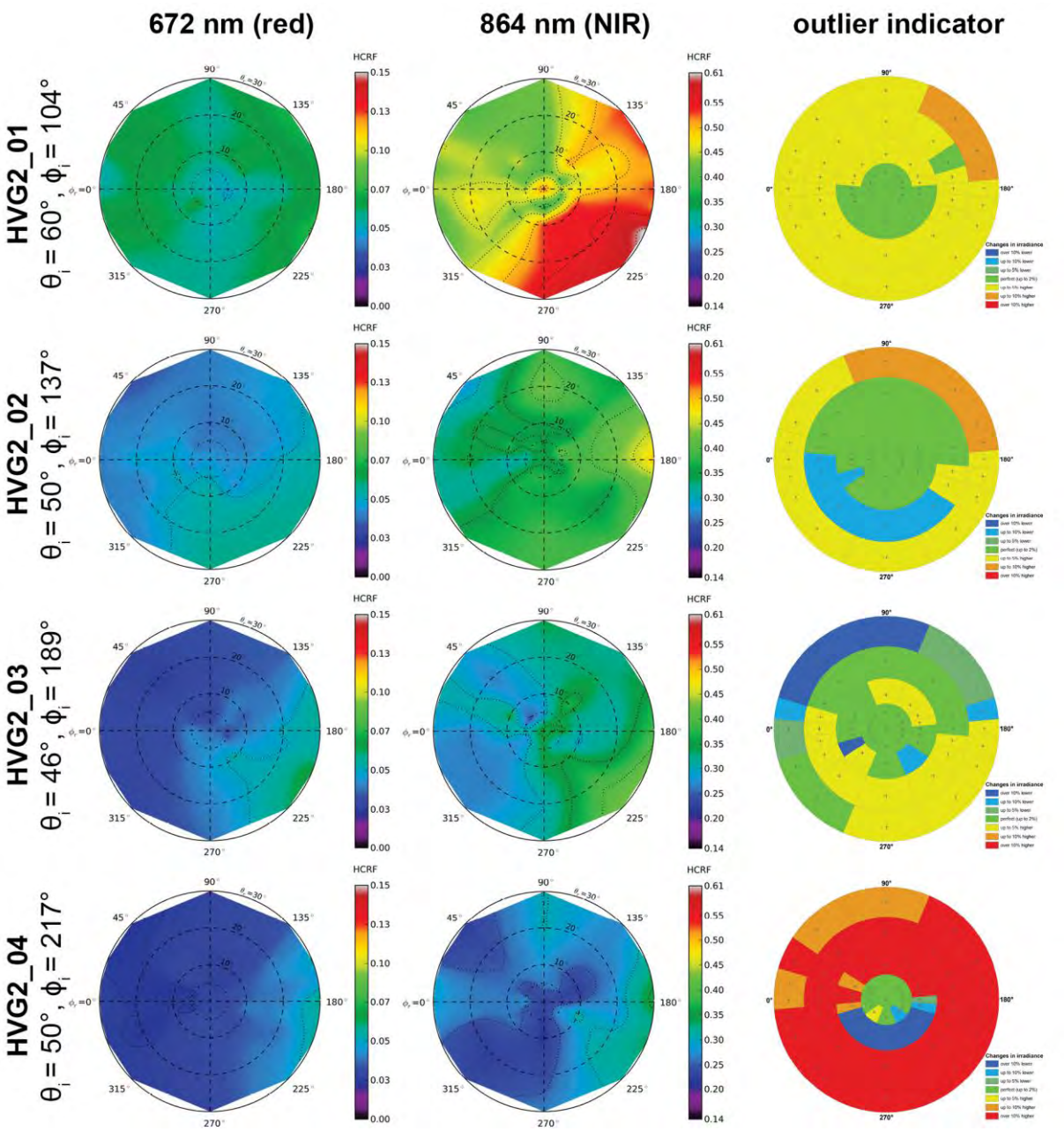

Figure C.6-10: HCRF visualization at 672 nm and 864 nm of the HVG2 site.

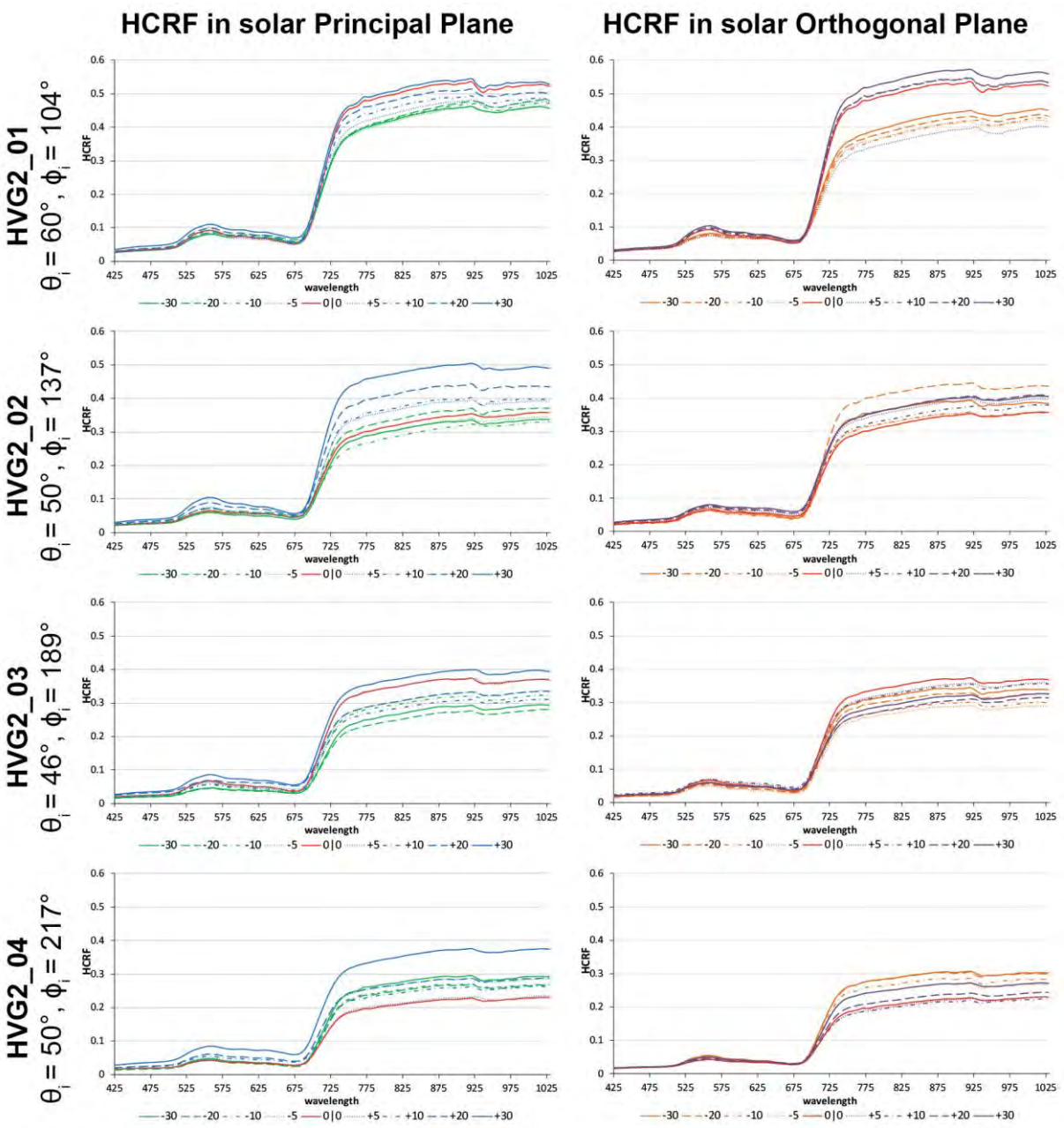

Figure C.6-11: HCRF visualization in principal & orthogonal plane of the HVG2 site.

VII *ANIF Visualization*

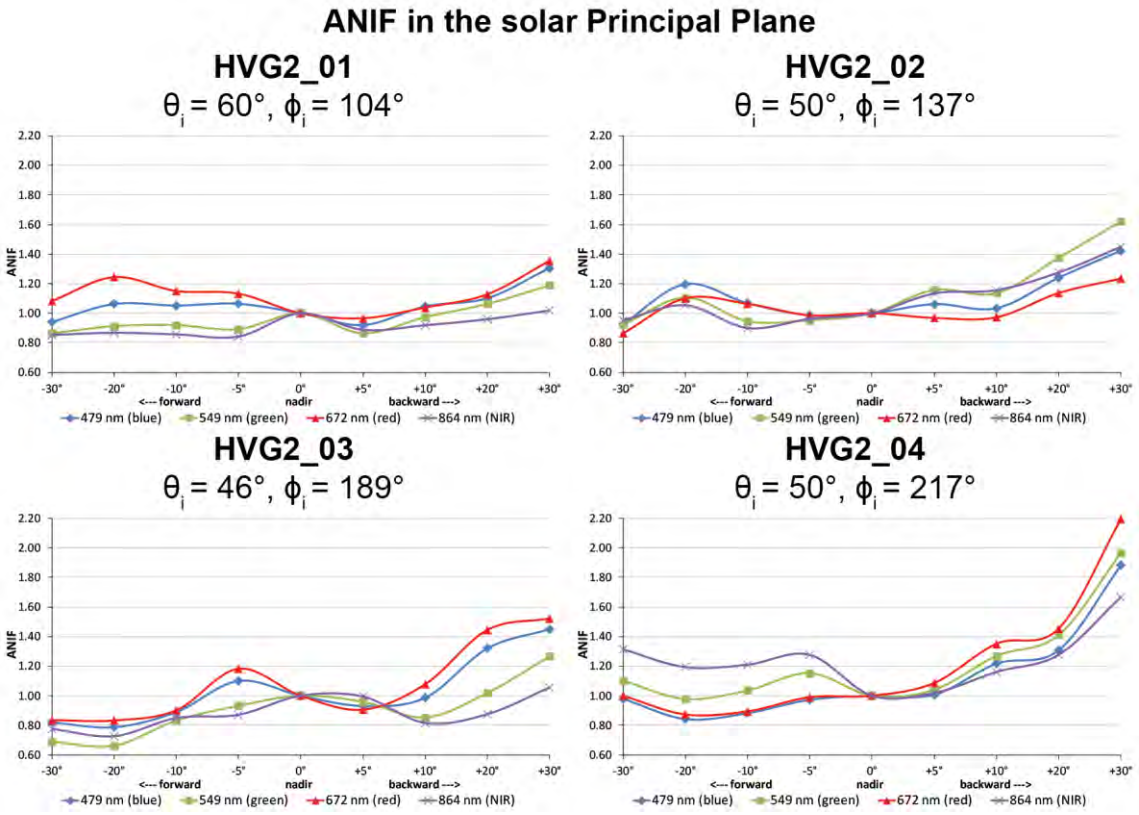

Figure C.6-12: Comparison of the ANIF values at 479 nm (blue), 549 nm (green), 672 nm (red), and 864 nm (NIR) in the solar principal plane of the HVG2 site at different sun zenith angles.

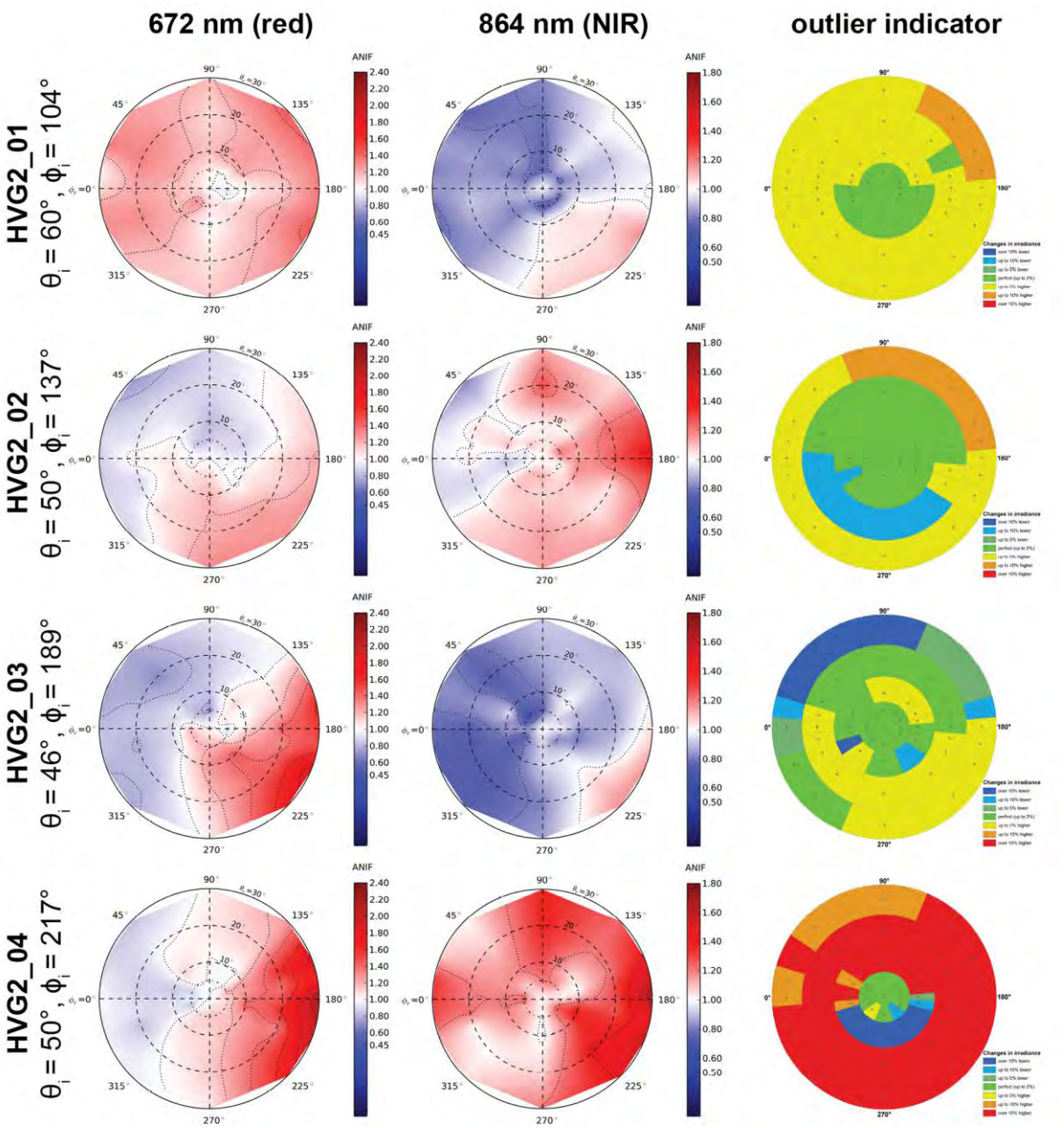

Figure C.6-13: ANIF visualization at 672 nm and 864 nm of the HVG2 site.

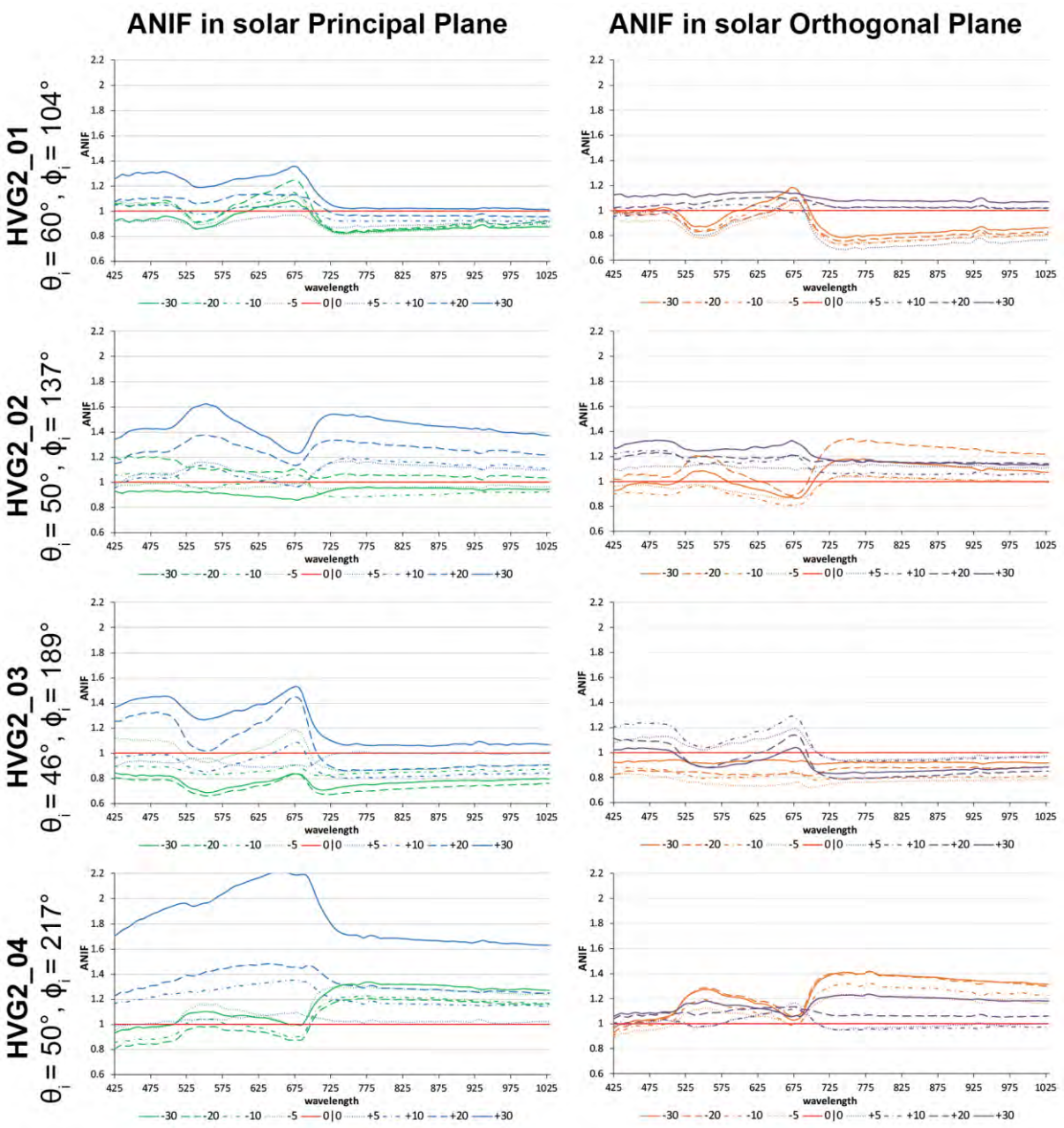

Figure C.6-14: ANIF visualization in principal & orthogonal plane of the HVG2 site.

VIII *ANIX Visualization*

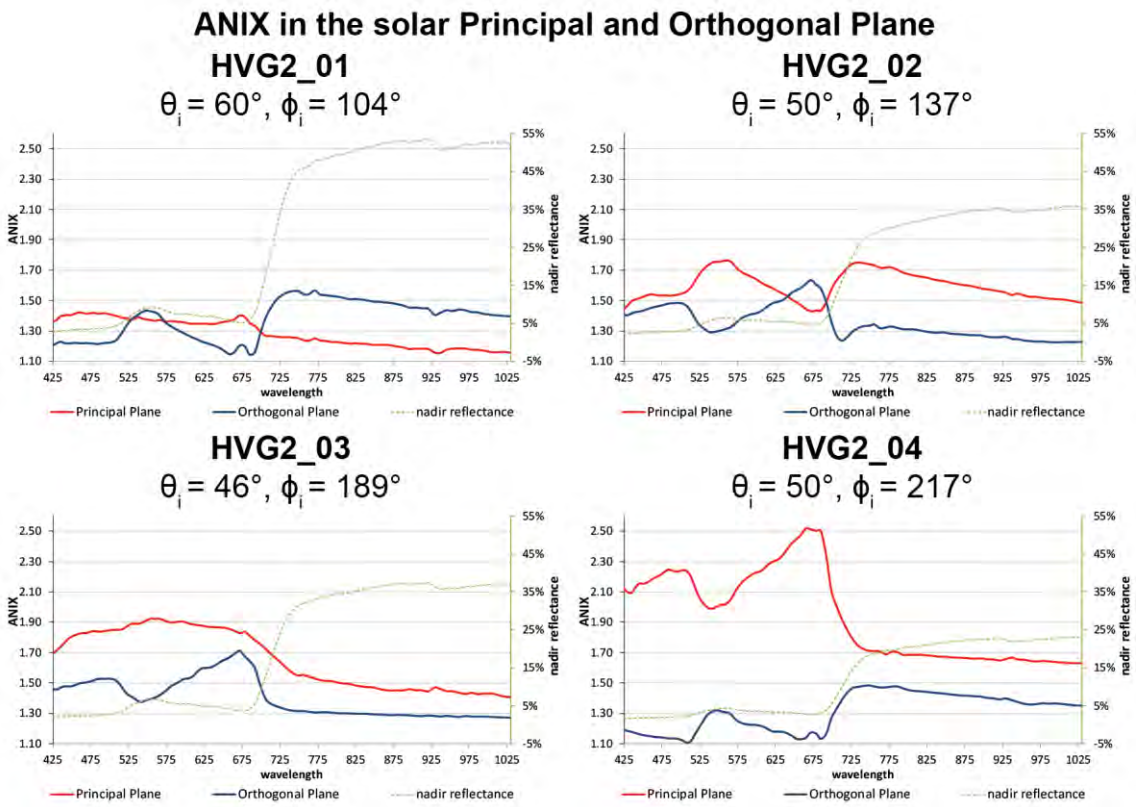

Figure C.6-15: Comparison of the ANIX in the solar principal and orthogonal plane with the nadir reflectance of the HVG2 site at different sun zenith angles.

IX *NDVI and Relative Absorption Depth Visualization*

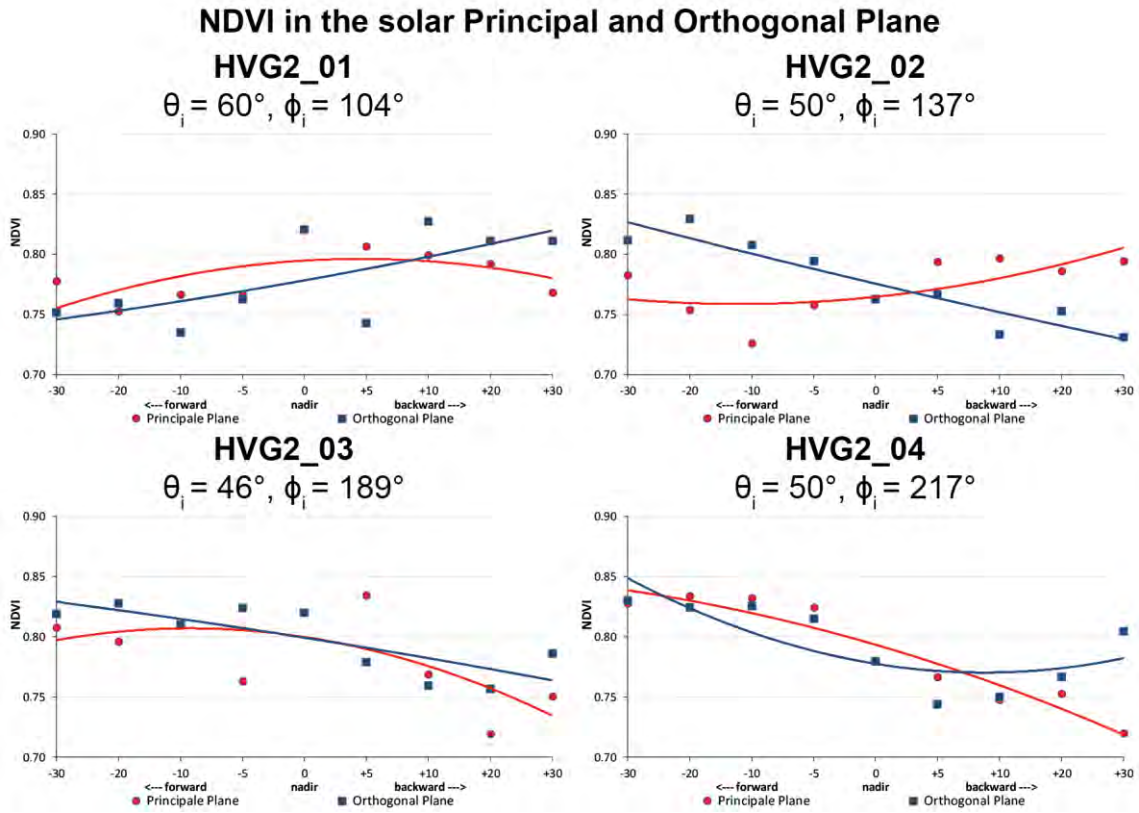

Figure C.6-16: Comparison of the NDVI in the solar principal and orthogonal plane of the HVG2 site at different sun zenith angles.

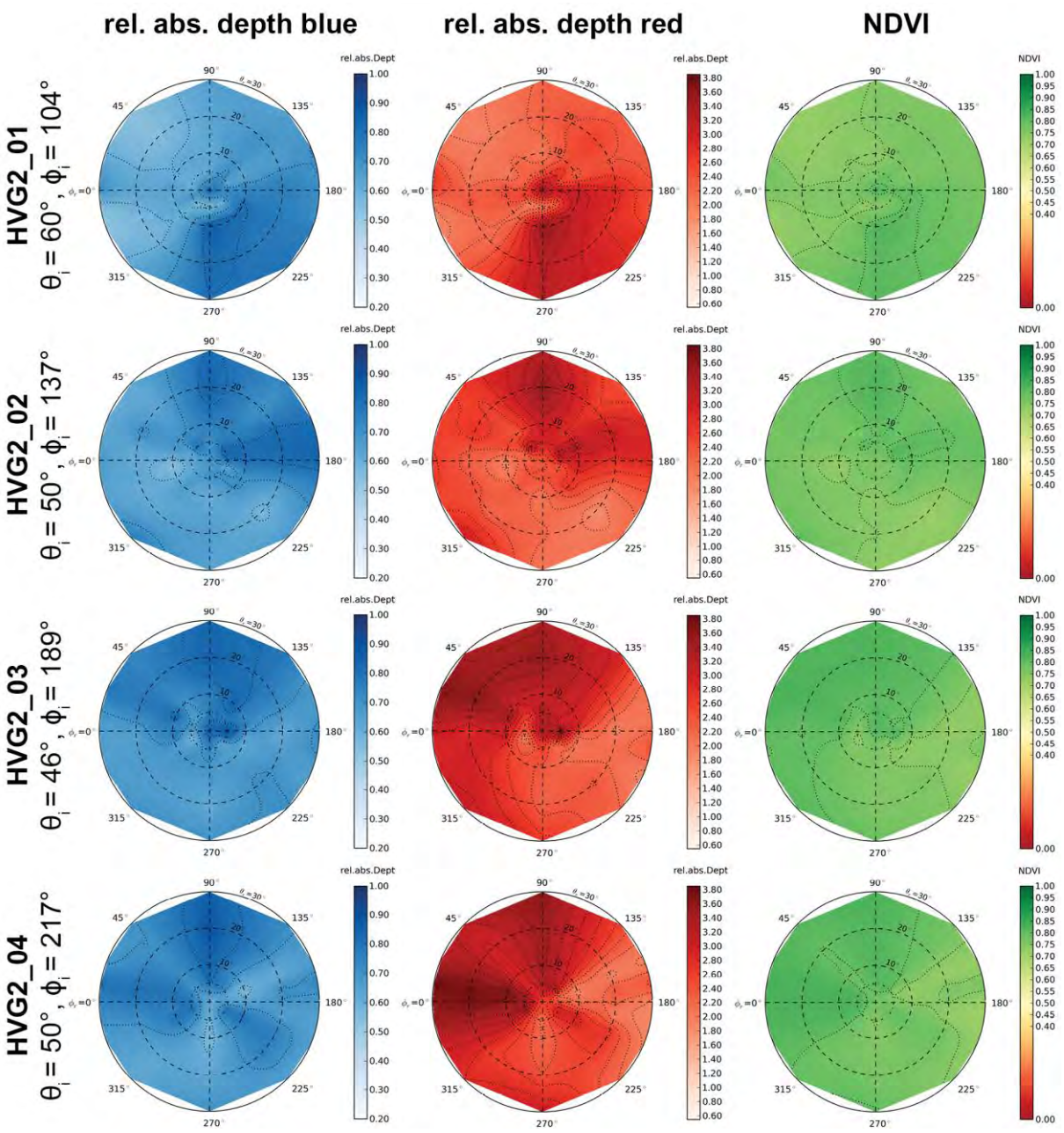

Figure C.6-17: Visualization of relative absorption depth & NDVI of the HVG2 site.

X *NDVI Comparison of Different Sensors*

Table C.6-6: Center wavelengths & band widths of broadband and narrowband NDVIs, based on the spectral response curves of the AVHRR, MODIS and EnMAP sensors.

NDVI	Sensor	Sensor band	Center wavelength (nm)	band width (nm)
$NDVI_{AVHRR}$ [broadband]	AVHRR/3	red: band 1 NIR: band 2	630 865	100 275
$NDVI_{MODIS}$ [broadband]	MODIS	red: band 1 NIR: band 2	645 859	50 35
$NDVI_{EnMAP}$ [narrowband]	EnMAP	red: band 47 NIR: band 73	672 864	6.5 8

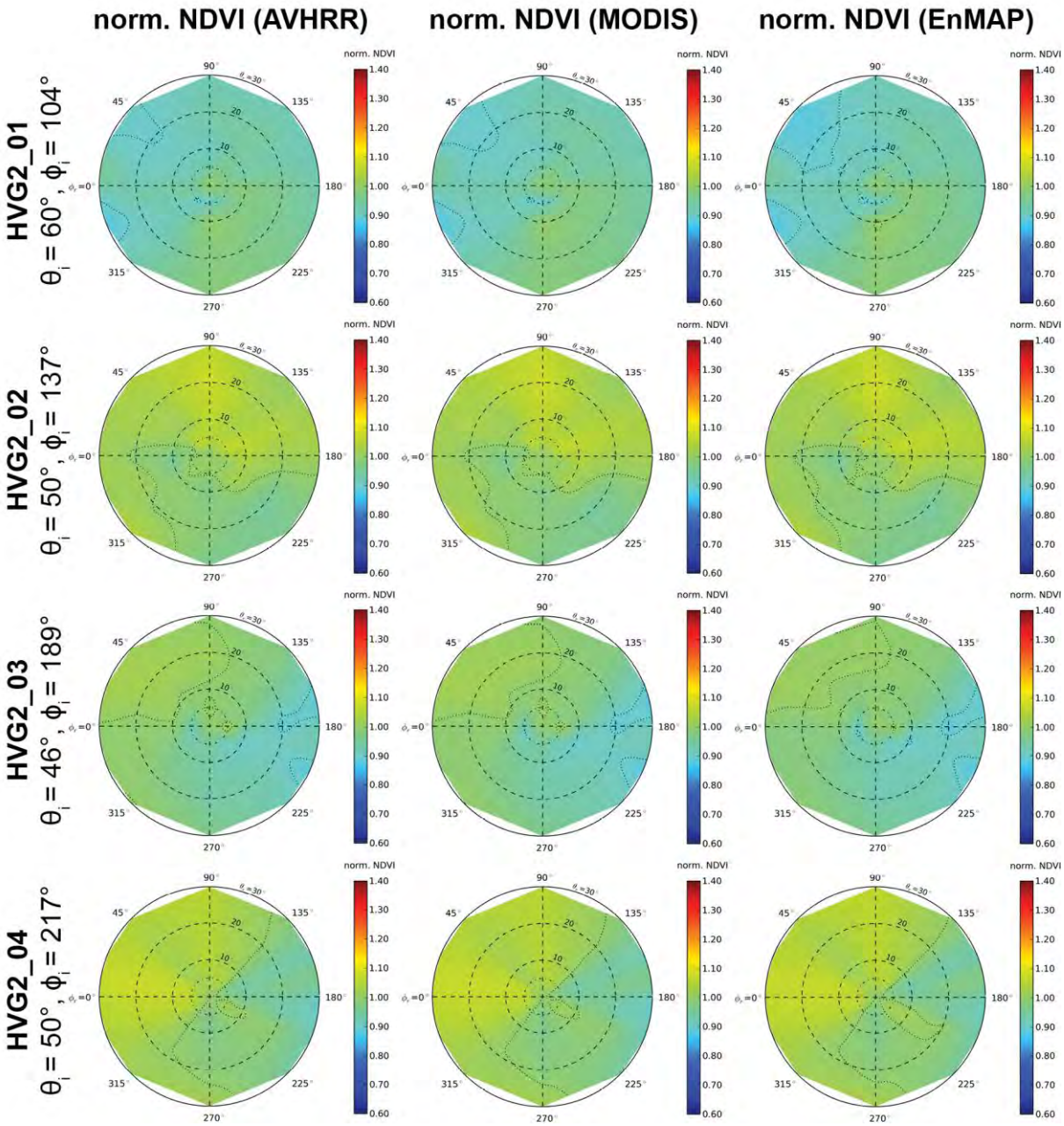

Figure C.6-18: Comparison of AVHRR, MODIS & EnMAP NDVI of the HVG2 site.