

A Comprehensive Step-by-Step Guide to Using Data Science Tools in the Gestion of Epidemiological and Climatological Data in Rice Production Systems

Supplementary Materials

Table S1. Diseases evaluated in the monitoring of SP sensor plots and their causal agents.

Disease	Causal agent	Phenological stage of evaluation*							Variables evaluated		
		2	3	4	5	6	7	8	Presence and absence	Incidence	Severity
Rice Stripe Necrosis Virus (RSNV)	Plasmodio Vector (<i>Polymyxa graminis</i>)	X	X	X	X	X			X	X	
Rice Hoja Blanca (RHBV)	Tenuivirus. Insecto Vector (<i>Tagosodes orizicolus</i>)	X	X	X	X	X			X	X	
Leaf Blast (BI)	<i>Magnaporthe oryzae</i> (=Pyricularia oryzae)	X	X						X	X	X
Brown Spot (BS)	<i>Cochliobolus miyabeanus</i> (=Bipolaris oryzae; Drechslera oryzae)	X	X	X	X	X	X	X		X	X
Sheath Blight (ShB)	<i>Rhizoctonia solani</i>	X	X	X	X	X	X	X		X	X
Narrow Brown Leaf Spot (NBLs)	<i>Sphaerulina oryzina</i> (=Cercospora sp.)	X	X	X	X	X			X	X	X
Leaf Scald (Ls)	<i>Monographella albescens</i> (=Microdochium oryzae;	X	X	X	X	X			X	X	X

	<i>Sin. Gerlachia-Rhynchosporim)</i>								
Rice Sheat Rot (ShR)	<i>Sarocladium oryzae</i> ; <i>Fusarium spp.</i> ; <i>Pseudomonas spp.</i>	X	X	X	X	X	X	X	X
Crown sheath rot (CSR)	<i>Gaeumannomyces graminis</i> ; <i>Sin Ophiobolus sp.</i>	X	X	X	X	X	X	X	X
Panicle Blast (PB)	<i>Magnaporthe oryzae</i> (=Pyricularia oryzae)			X	X	X		X	
Ear Blight (EB)	<i>Bipolaris oryzae</i> ; <i>Cercospora oryzae</i> ; <i>Curvularia lunata</i> ; <i>Fusarium spp</i> ; <i>Cladosporium spp</i>			X	X	X		X	
Bacterial Blight (BB)	<i>Pseudomonas fuscovaginae</i> ; <i>Burkholderia glumae</i> ; <i>Burkholderia gladioli</i>			X	X	X		X	
Rice vane syndrome	<i>Several factors, among them</i> <i>Burkholderia glumae</i> ; <i>Burkholderia gladioli</i>			X	X				X

Phenology: 2) sowing to emergence; 3) seedling to the start of tillering; 4) maximum tillering to start of floral primordium; 5) start of floral primordium to start of budding; 6) maximum clogging to start of flowering; 7) flowering with doughy grain; and (8) harvest

Table S2. Diseases evaluated in the sampling of phytosanitary brigades BF and their causal agents.

Disease	Causal agent	Variables evaluated		
		Presence and absence	Incidence	Severity
Brown Spot (BS)	<i>Cochliobolus miyabeanus</i> (=Bipolaris oryzae; Drechslera oryzae)	X	X	
Sheath Blight (ShB)	<i>Rhizoctonia solani</i>	X	X	
Rice Sheat Rot (ShR)	<i>Sarocladium oryzae</i> ; <i>Fusarium</i> spp.; <i>Pseudomonas</i> spp.	X	X	X
Crown sheath rot (CSR)	<i>Gaeumannomyces graminis</i> ; <i>Sin Ophiobolus</i> sp.	X	X	
Panicle Blast (PB)	<i>Magnaporthe oryzae</i> (=Pyricularia oryzae)	X	X	
Bacterial Blight (BB)	<i>Pseudomonas fuscovaginae</i> ; <i>Burkholderia glumae</i> ; <i>Burkholderia gladioli</i>	X	X	
Mite	<i>Steneotarsonemus spinki</i>	X	X	
Borer	<i>Diatraea saccharalis</i>	X	X	
Rice vane syndrome	Varios factores, entre ellos <i>Burkholderia glumae</i> ; <i>Burkholderia gladioli</i>			X

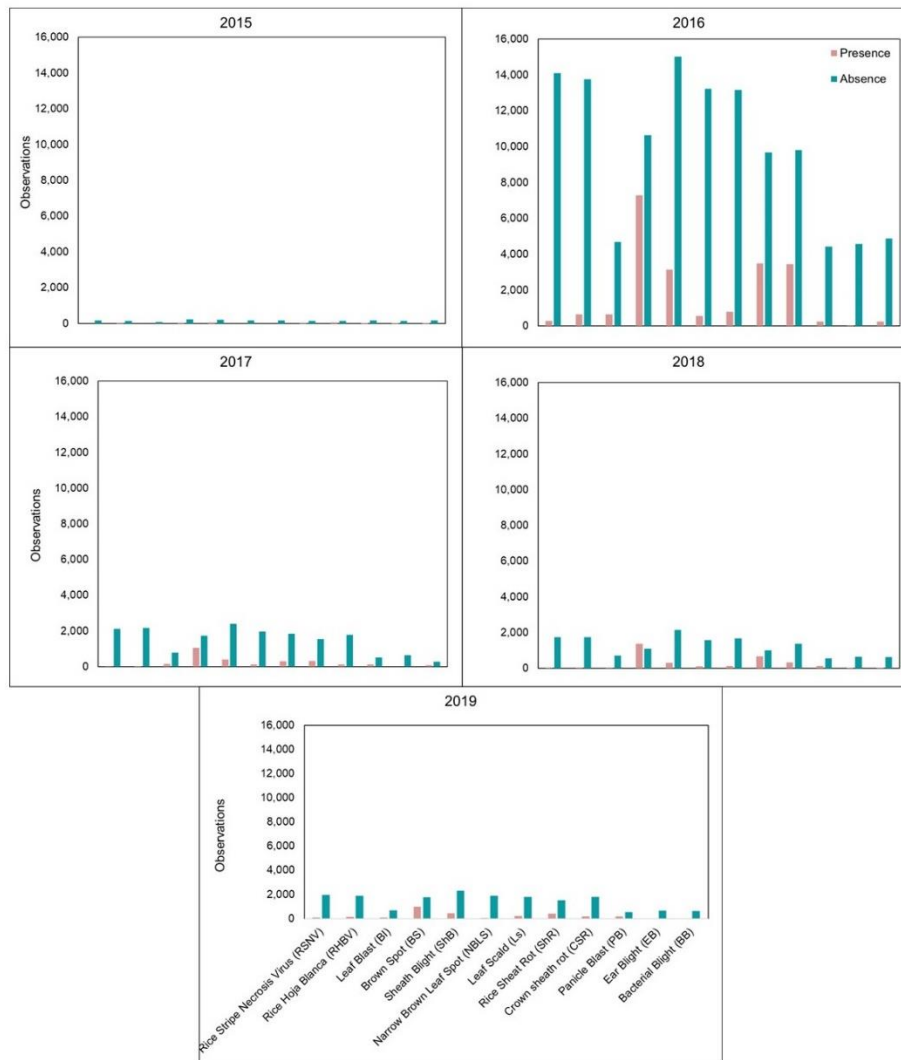


Figure S1. Quantification of the intensity variable of presence and absence due to disease in rice in Colombia based on observations made per year in the sampling of sensor plots (SP).

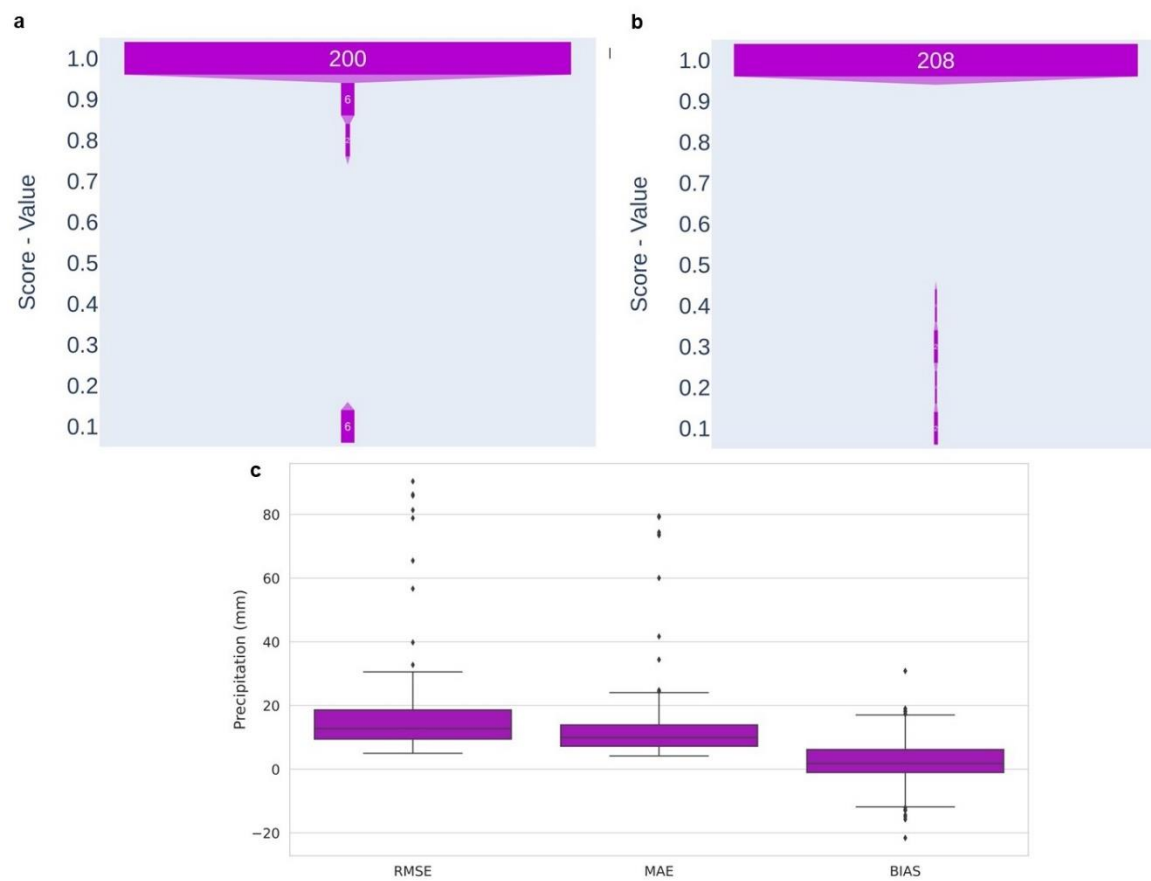


Figure S3. Frequency of *in situ* stations by: (a) value of the coefficient of determination R^2 ; (b) by Pearson correlation (r); and (c) boxplot with calculated values of error metrics RMSE, MAE, BIAS, obtained from the comparison of the climatological normals of the IDEAM for 1917-2000 and 1981 -2010 for the variable PCPT.

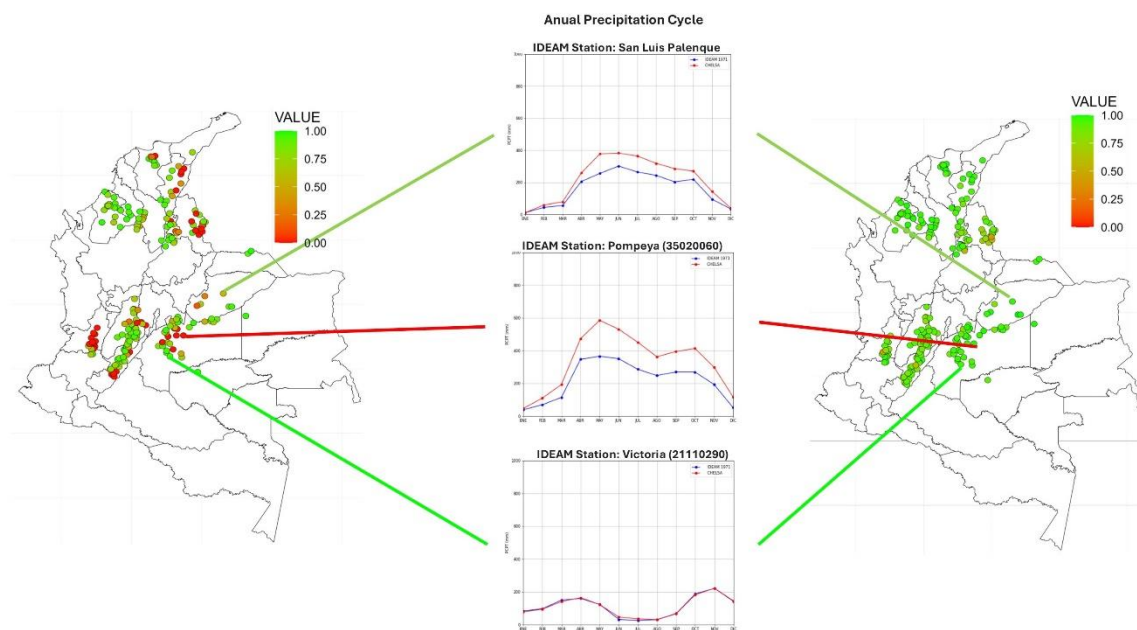


Figure S4. Spatial distribution of R^2 (left) and Pearson coefficient (r) (right) together with climatologies of the multiannual monthly PCPT observed by IDEAM (blue lines) and estimated by CHLSA (red lines) from 3 representative stations. From top to bottom, the San Luis de Palenque station (Casanare department) with a value of $R^2 = 0.57$ and $r = 0.99$; Pompeya Station (Meta department) with $R^2 = -0.23$ and $r = 0.99$; and La Victoria Station (Huila department) with $R^2 = 0.99$ and $r = 1.00$.

Table S3. Principal Components Analysis

Eigenvectors

Variables	e1	e2
etp_sumatoria	-0.11	-0.04
prcp_sumatoria	-0.39	-0.37
tmax_mediana	0.46	-0.11
tmin_mediana	0.34	-0.41
tas_mediana	0.46	-0.22
hr_mediana	-0.20	-0.44
tcc_mediana	0.25	-0.21
vpd_mediana	0.01	0.06
rsds_mediana	-0.22	0.16
indice_aridez	-0.37	-0.38
indice_termico	-5.8E-04	0.47

Correlations matrix

Variables	CP 1	CP 2
etp_sumatoria	-0.21	-0.06
prcp_sumatoria	-0.75	-0.57
tmax_mediana	0.89	-0.16
tmin_mediana	0.65	-0.63
tas_mediana	0.88	-0.34
hr_mediana	-0.38	-0.68
tcc_mediana	0.47	-0.32
vpd_mediana	0.02	0.10
rsds_mediana	-0.43	0.25
indice_aridez	-0.71	-0.58
indice_termico	-1.1E-03	0.71

Table S4. Distribution of the IDEAM station's in the rice-producing areas in Colombia The data that was used corresponds to 214 meteorological stations for PCPT, 227 stations for ET, and 82, 84 and 79 stations for TMIN, TAVE and TMAX, respectively.

Station's Code	Category	Station's name	Municipality	Department	Altitude (m)	Long X	Lat_Y	PCPT	TMIN	TAVE	TMAX	ET
25020540	PM	Patio Bonito	Nechi	Antioquia	53	-74.71	8.03	X				X
25021480	PM	Esperanza La Radio	Nechi	Antioquia	45	-74.79	8.03	X				X
27030040	PM	Guamo El	Nechi	Antioquia	40	-74.81	7.90	X				X
27045020	CO	Caseri	Caucasia	Antioquia	400	-74.93	7.81		X	X	X	X
37050040	PM	Matezamuro	Arauca	Arauca	150	-70.85	6.97	X				
37055010	SP	Apto Arauca	Arauca	Arauca	128	-70.74	7.07	X	X	X	X	X
23205020	CO	Col Cooperativo	San Pablo	Bolivar	165	-73.93	7.48	X	X	X	X	X
25020330	PM	Caimital	San Jacinto del Cauca	Bolivar	90	-74.57	8.37	X				X
25020350	PM	Guaranda	Achi	Bolivar	25	-74.54	8.49	X				X
25020410	PM	Candelaria La	San Jacinto del Cauca	Bolivar	30	-74.73	8.22	X				X
25020800	PM	Buenavista	Achi	Bolivar	20	-74.53	8.57	X				X
25020810	PM	Astilleros	San Jacinto del Cauca	Bolivar	40	-74.61	8.29	X				X
35180010	PM	Pradera La	Tauramena	Casanare	180	-72.67	4.94	X				X
35180040	PM	Poyata La	Mani	Casanare	147	-72.15	4.44	X				X
35180050	PM	Pto Texas	Mani	Casanare	142	-71.96	4.42	X				X
35190040	PM	Tamarindo	Aguazul	Casanare	290	-72.54	5.01	X				X
35215010	CP	Apto Yopal	Yopal	Casanare	325	-72.39	5.32	X	X	X		X
35220040	PM	Macucuana	Orocue	Casanare	117	-71.53	4.91	X				X
35225020	CO	Modulos	Orocue	Casanare	130	-71.43	4.91	X	X	X	X	X
35230010	PM	San Luis Palenque	San Luis De Palenque	Casanare	170	-71.73	5.42	X				X
35095110	CP	Huerta La Grande	Villanueva	Casanare	255	-72.92	4.66					X
35230020	PM	Pore	Pore	Casanare	300	-71.99	5.72					X
26020470	PM	Japio	Santander de Quilichao	Cauca	1040	-76.44	3.05	X				

Station's Code	Category	Station's name	Municipality	Department	Altitude (m)	Long X	Lat_Y	PCPT	TMIN	TAVE	TMAX	ET
26040310	PM	Rio Palo	Caloto	Cauca	1100	-76.38	3.07	X				X
26045010	CO	Ing Bengala	Puerto Tejada	Cauca	1000	-76.42	3.26	X	X	X	X	X
26065010	CO	Ing Cauca	Miranda	Cauca	1000	-76.35	3.27	X	X	X	X	X
23190110	PM	Libano El	San Alberto	Cesar	164	-73.43	7.84	X				X
23190480	PM	Angeles Los	Rio de Oro	Cesar	228	-73.51	8.10	X				X
23190500	PM	San Alberto	San Alberto	Cesar	134	-73.39	7.76	X				X
23190580	PM	San Daniel Hda	Rio de Oro	Cesar	75	-73.62	8.09	X				X
23190710	PM	Barranca Lebrija	Aguachica	Cesar	50	-73.72	8.01	X				X
23190810	PM	Planes Los	San Alberto	Cesar	650	-73.32	7.81	X				X
23210120	PM	Vega La	La Gloria	Cesar	166	-73.64	8.53	X				X
23210160	PM	Gamarra	Gamarra	Cesar	150	-73.74	8.33	X				X
23215030	CO	Aguas Claras	Aguachica	Cesar	208	-73.60	8.23	X	X	X	X	X
25020090	PM	Tamalameque	Tamalameque	Cesar	20	-73.82	8.86	X				X
25020250	PM	Curumani	Curumani	Cesar	100	-73.55	9.20	X				X
25020660	PM	Zapatoza	Curumani	Cesar	90	-73.75	9.01	X				X
25020690	PM	Poponte	Curumani	Cesar	500	-73.41	9.42	X				X
25025250	CO	Chiriguana	Chiriguana	Cesar	40	-73.59	9.36	X	X	X	X	X
28020460	PM	Codazzi Dc	Agustin Codazzi	Cesar	90	-73.24	10.05	X				X
28020590	PM	Leticia	San Diego	Cesar	140	-73.22	10.15	X				X
28025020	CO	Rincon El	San Diego	Cesar	350	-73.13	10.27	X	X	X	X	X
28025080	CP	Socomba	Becerril	Cesar	170	-73.24	9.69	X	X	X	X	X
28035010	CO	Villa Rosa	Valledupar	Cesar	70	-73.55	10.19	X	X	X	X	X
28035020	CO	Callao El	Valledupar	Cesar	110	-73.32	10.36	X	X	X	X	X
28035040	CO	Guaymaral	Valledupar	Cesar	50	-73.65	9.91	X	X	X	X	X
13030010	PM	Tierralta	Tierralta	Cordoba	100	-76.05	8.18	X				X
13055030	CO	Galan	Monteria	Cordoba	30	-75.97	8.66	X	X	X	X	X

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13070050	PM	Cerete	Cerete	Cordoba	20	-75.79	8.89	X				X
13070070	PM	Boca de La Ceiba	Monteria	Cordoba	20	-75.86	8.83	X				
13070100	PM	Sta Rosa	San Carlos	Cordoba	140	-75.60	8.74	X				X
13070190	PM	Coroza 2	San Carlos	Cordoba	9	-75.77	8.81	X				X
13075010	CO	Chima	Chima	Cordoba	20	-75.62	9.15	X	X	X	X	X
13075020	CO	Salado El	Cienaga de Oro	Cordoba	40	-75.58	8.91	X	X	X	X	X
13075030	AM	Turipana	Cerete	Cordoba	20	-75.80	8.84	X	X	X	X	X
13075050	AM	Univ de Cordoba	Monteria	Cordoba	15	-75.86	8.79	X	X	X	X	X
13085020	CO	Lorica	Lorica	Cordoba	30	-75.84	9.25	X	X	X	X	X
13085030	CO	San Bernardo del V	San Bernardo del Viento	Cordoba	22	-75.95	9.37	X	X	X	X	X
13085040	SS	Apto Los Garzones	Monteria	Cordoba	20	-75.83	8.83	X	X	X	X	X
25015010	CO	Centro Alegre	Planeta Rica	Cordoba	170	-75.63	8.18	X	X	X	X	X
25020720	PM	Jobo El Tablon	Sahagun	Cordoba	130	-75.38	8.64	X				X
25020780	PM	Cecilia	Ayapel	Cordoba	20	-75.03	8.46	X				X
25025150	CO	Ayapel	Ayapel	Cordoba	22	-75.17	8.30	X	X	X	X	X
25025160	CO	Cuba Hda	Montelibano	Cordoba	50	-75.40	8.00	X	X	X	X	X
25025170	CO	Colomboy	Sahagun	Cordoba	125	-75.50	8.74	X	X	X	X	X
25025190	CO	Planeta Rica	Planeta Rica	Cordoba	90	-75.58	8.40	X	X	X		X
21190210	PM	Nilo	Nilo	Cundinamarca	490	-74.65	4.31	X				X
21195060	CO	Pandi	Pandi	Cundinamarca	950	-74.49	4.19	X	X	X	X	X
21230060	PM	Narino	Narino	Cundinamarca	289	-74.83	4.40	X				X
35040010	PM	Retiro El	Medina	Cundinamarca	870	-73.55	4.34	X				X
35050010	PM	Medina	Medina	Cundinamarca	480	-73.35	4.51	X				
35050020	PM	San Juanito	Medina	Cundinamarca	426	-73.40	4.42	X				X
35055010	CO	Japon El	Paratebueno	Cundinamarca	280	-73.30	4.38	X	X	X	X	X
31015010	CO	Trueno El	San Jose del Guaviare	Guaviare	150	-72.64	2.37	X	X	X	X	X

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32105070	CO	San Jose Guaviare	San Jose del Guaviare	Guaviare	165	-72.65	2.55		X	X	X	X
21040040	PM	Pte Balseadero Rad	Agrado	Huila	688	-75.65	2.23	X				X
21045010	CO	Betulia La	Agrado	Huila	780	-75.71	2.28	X	X	X	X	X
21050150	PM	Paez Paicol Radio	Paicol	Huila	788	-75.76	2.46	X				X
21050290	PM	Tesalia 2	Tesalia	Huila	825	-75.73	2.49	X				X
21060070	PM	Gigante 2	Gigante	Huila	850	-75.54	2.39	X				X
21060080	PM	Garzon	Garzon	Huila	990	-75.61	2.19	X				X
21060090	PM	Hobo El	Hobo	Huila	636	-75.44	2.58	X				X
21060110	PM	Rioloro	Gigante	Huila	721	-75.63	2.32	X				X
21080030	PM	Yaguara	Yaguara	Huila	600	-75.53	2.67	X				X
21080070	PM	Sta Rosa Hda	Yaguara	Huila	650	-75.58	2.64	X				X
21080130	PG	Totumo El Hda	Iquira	Huila	790	-75.62	2.59	X				X
21090020	PM	Cucharo El	Palermo	Huila	620	-75.40	2.86	X				X
21090040	PM	Papagayo Hda	Palermo	Huila	460	-75.35	2.78	X				X
21090110	PM	Santa Barbara	Palermo	Huila	454	-75.34	2.87	X				X
21095010	CO	Juncal El	Palermo	Huila	460	-75.33	2.83	X	X	X	X	X
21110040	PM	Hato Milagro	Tello	Huila	548	-75.17	3.08	X				X
21110070	PM	Baraya	Baraya	Huila	615	-75.06	3.15	X				X
21110090	PM	Potosi	Villavieja	Huila	400	-75.17	3.39	X				X
21110120	PM	Yeguera La	Villavieja	Huila	400	-75.20	3.31	X				X
21110160	PM	Mesa Redonda	Tello	Huila	500	-75.20	3.12	X				X
21110180	PM	Hato Bogota	Tello	Huila	591	-75.16	3.04	X				X
21110290	PM	Victoria La	Villavieja	Huila	400	-75.17	3.35	X				X
21110330	PM	Polonia	Villavieja	Huila	429	-75.22	3.19	X				X
21110440	PM	Guadual El	Rivera	Huila	735	-75.24	2.80	X				X
21115020	SS	Apto Benito Salas	Neiva	Huila	439	-75.29	2.95	X	X	X	X	X

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21115060	CO	San Jose	Villavieja	Huila	400	-75.18	3.33	X	X	X	X	X
21115160	AM	Manila La Hda	Baraya	Huila	600	-75.08	3.13	X	X	X	X	X
21120090	PM	Totumo El	Palermo	Huila	700	-75.49	2.87	X				X
21120130	PM	Rionegro Hda	Palermo	Huila	560	-75.43	2.91	X				X
21130050	PM	Perez Hda	Aipe	Huila	450	-75.26	3.24	X				X
21140100	PM	San Juanito	Villavieja	Huila	368	-75.11	3.42	X				X
21140110	PM	Tomo El	Villavieja	Huila	444	-75.10	3.35	X				X
21145040	AM	San Alfonso	Villavieja	Huila	440	-75.11	3.37	X	X	X	X	X
21105040	CO	Potosi Hda	Campoalegre	Huila	680	-75.30	2.70		X	X		X
21105060	CP	Hidrobetania	Campoalegre	Huila	500	-75.43	2.71					X
15065040	CO	Paulina La	Fonseca	La Guajira	170	-72.83	10.90	X	X	X	X	X
25025090	SP	Apto Las Flores	El Banco	Magdalena	34	-73.97	9.05	X	X	X	X	X
29060030	PM	Bongo El	El Reten	Magdalena	20	-74.38	10.65	X				X
29060040	PM	Fundacion	Fundacion	Magdalena	40	-74.18	10.52	X				X
29060100	PM	Sta Rosa de Lima	Fundacion	Magdalena	75	-74.11	10.40	X				X
29060150	PM	Destino El	El Reten	Magdalena	20	-74.22	10.57	X				X
29060180	PM	Esperanza La	Puebloviejo	Magdalena	25	-74.31	10.74	X				X
29060190	PM	Florida La	El Reten	Magdalena	26	-74.26	10.61	X				X
29060200	PM	Maria La	Aracataca	Magdalena	30	-74.19	10.54	X				X
29060270	PM	Palo Alto	Puebloviejo	Magdalena	25	-74.27	10.72	X				X
29060560	PM	Dona Maria	Fundacion	Magdalena	50	-74.18	10.38	X				X
29065020	CO	Padelma	Zona Bananera	Magdalena	20	-74.20	10.72	X	X	X	X	X
29065030	CO	Prado Sevilla	Zona Bananera	Magdalena	18	-74.16	10.76	X	X	X	X	X
32060020	PM	Mesa de Yamanes	El Castillo	Meta	600	-73.90	3.53	X				X
32070010	PM	Campo Alegre	Vistahermosa	Meta	260	-73.75	3.20	X				X
32070020	PG	Cano Blanco	Fuente de Oro	Meta	240	-73.52	3.25	X				X

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32070040	PM	Pinalito	Vistahermosa	Meta	245	-73.63	2.98	X				
32070060	PM	Fuente de Oro	Fuente de Oro	Meta	300	-73.63	3.47	X				
32070080	PM	Tierra Grata	Puerto Lleras	Meta	191	-73.23	3.09	X				
32070100	PG	San Juan de Arama	San Juan de Arama	Meta	410	-73.89	3.38	X				X
32075030	CO	Vista Hermosa	Vistahermosa	Meta	325	-73.75	3.12	X	X	X	X	X
32075040	CO	Holanda La	Granada	Meta	360	-73.72	3.52	X	X	X	X	X
32075050	CO	Mesetas	Mesetas	Meta	620	-74.04	3.38	X	X	X	X	X
32080010	PM	Pto Rico	Puerto Rico	Meta	230	-73.21	2.94	X				X
35010010	PM	Pto Lopez	Puerto Lopez	Meta	182	-72.94	4.11	X				X
35010020	PM	Acacias	Acacias	Meta	525	-73.77	4.00	X				X
35010040	PM	Cano Hondo	Guamal	Meta	800	-73.82	3.92	X				X
35010060	PM	Toro El	Castilla La Nueva	Meta	230	-73.40	3.79	X				X
35010070	PM	Guamal	Guamal	Meta	525	-73.76	3.88	X				X
35010080	PM	Nare	Puerto Lopez	Meta	200	-73.15	3.79	X				X
35010090	PM	San Martin	San Martin	Meta	420	-73.70	3.75	X				X
35020060	PM	Pompeya	Villavicencio	Meta	260	-73.37	4.04	X				X
35025020	AM	Libertad La	Villavicencio	Meta	336	-73.47	4.06	X	X	X	X	X
35030050	PM	Ojo De Agua	Villavicencio	Meta	300	-73.45	4.09	X				X
35035020	SP	Apto Vanguardia	Villavicencio	Meta	423	-73.62	4.16	X	X	X	X	X
35045020	CO	Cabana La Hda	Cumaral	Meta	305	-73.36	4.30	X	X	X	X	X
35100020	PM	Cabuyaro	Cabuyaro	Meta	180	-72.79	4.28	X				X
35120010	PM	Pto Gaitan	Puerto Gaitan	Meta	150	-72.08	4.31	X				X
35125010	CO	Margaritas Las Hda	Puerto Lopez	Meta	150	-72.16	4.34	X	X	X	X	X
35180030	PM	Fundo Nuevo Humapo	Puerto Lopez	Meta	155	-72.39	4.33	X				X
32075080	CO	Pto Lleras	Puerto Lleras	Meta	245	-73.37	3.27		X	X	X	X
35015050	CO	Barbascal	San Martin	Meta	250	-73.35	3.63		X	X	X	X

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35035070	CP	Unillanos	Villavicencio	Meta	340	-73.58	4.08		X	X	X	X
35105050	CO	Guaicaramo	Barranca de Upia	Meta	190	-72.95	4.47					X
32070110	PG	Aguas Claras	Granada	Meta	520	-73.86	3.47					X
16010010	PM	Villa del Rosario	Villa del Rosario	N. Santander	431	-72.48	7.82	X				X
16010020	PM	Donjuana La 2	Bochalema	N. Santander	770	-72.60	7.70	X				X
16010040	PM	Sta Rita	Cucuta	N. Santander	72	-72.37	8.19	X				X
16010060	PM	Jarra La	Cucuta	N. Santander	87	-72.43	8.20	X				X
16015010	SP	Apto Camilo Daza	Cucuta	N. Santander	250	-72.51	7.93	X	X	X	X	X
16020030	PM	Santiago Caimito	Santiago	N. Santander	411	-72.72	7.86	X				X
16020180	PM	Cerro Pelao	Cucuta	N. Santander	300	-72.50	8.01	X				X
16020190	PM	Cornejo	San Cayetano	N. Santander	250	-72.63	7.90	X				X
16020320	PM	Aguablanca	Cucuta	N. Santander	250	-72.48	8.04	X				X
16020340	PM	Planadas	Cucuta	N. Santander	100	-72.44	8.22	X				X
16025010	CP	Carmen de Tonchala	Cucuta	N. Santander	285	-72.57	7.85	X	X	X	X	X
16025030	CP	Salazar	Salazar	N. Santander	860	-72.83	7.78	X	X	X	X	X
16025040	CP	Cinera-Villa Olga	Cucuta	N. Santander	100	-72.47	8.17	X	X	X	X	X
16030030	PM	Campo Tres	Tibu	N. Santander	40	-72.70	8.52	X				X
16030060	PM	San Gil	Sardinata	N. Santander	480	-72.86	8.22	X				X
16035010	CO	Tibu	Tibu	N. Santander	50	-72.73	8.64	X	X	X	X	X
16035020	CO	Petrolea	Tibu	N. Santander	62	-72.58	8.47	X	X	X	X	X
16035030	CO	Sardinata	Sardinata	N. Santander	320	-72.80	8.08	X	X	X	X	X
23180040	PM	Porvenir El	Sabana de Torres	Santander	154	-73.48	7.45	X				X
23180050	PM	Establo El	Sabana de Torres	Santander	98	-73.60	7.54	X				X
23180070	PM	Sabana de Torres	Sabana de Torres	Santander	176	-73.49	7.39	X				X
23180080	PM	Eloy Valenzuela	Sabana de Torres	Santander	132	-73.68	7.49	X				X
23185010	CP	Villa Leiva	Sabana de Torres	Santander	328	-73.54	7.46	X	X	X	X	X

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23190460	PM	Papayal	Rionegro	Santander	100	-73.65	7.62	X				X
23190560	PM	San Rafael	Sabana de Torres	Santander	96	-73.56	7.57	X				X
24065010	CO	Brisas Las Hda	Puerto Wilches	Santander	138	-73.79	7.25	X	X	X	X	X
23190320	PM	Provincia	Sabana de Torres	Santander	172	-73.44	7.40					X
23190210	PM	Magara	Sabana de Torres	Santander	80	-73.68	7.59					X
25020740	PM	Eureka Hda	San Marcos	Sucre	20	-75.09	8.58	X				X
25020820	PM	Zapata	Majagual	Sucre	50	-74.70	8.60	X				X
25020940	PM	Villanueva	Guaranda	Sucre	40	-74.74	8.33	X				X
25020980	PM	Caimito	Caimito	Sucre	20	-75.12	8.79	X				X
25021470	PM	Torno El Hda	San Marcos	Sucre	60	-75.09	8.58	X				X
25021660	PM	Mirasol	San Marcos	Sucre	30	-75.26	8.60					X
21130180	PM	Altamira Dc Hda	Natagaima	Tolima	500	-75.15	3.45	X				X
21135020	CO	Jabalcon	Saldana	Tolima	425	-75.02	3.86	X	X	X	X	X
21135030	CP	Anchique	Natagaima	Tolima	415	-75.11	3.57	X	X	X	X	X
21135040	CO	Media Luna	Coyaima	Tolima	485	-75.12	3.77	X	X	X	X	X
21150030	PM	Tinajas	Natagaima	Tolima	290	-75.06	3.57	X				X
21160040	PM	Aco	Prado	Tolima	360	-74.81	3.75	X				X
21160050	PM	Pinalito Hda	Prado	Tolima	800	-74.84	3.67	X				X
21160080	PM	Boqueron	Prado	Tolima	322	-74.90	3.75	X				X
21165030	CO	Lozania	Purificacion	Tolima	400	-74.77	3.90	X	X	X	X	X
21170040	PM	Mesas Las	Suarez	Tolima	860	-74.82	3.91	X				X
21180040	PM	Rovira 2	Rovira	Tolima	950	-75.24	4.24	X				X
21180120	PM	Lorena La Hda	San Luis	Tolima	450	-75.11	4.03	X				X
21180160	PM	Suarez	Guamo	Tolima	300	-74.84	4.06	X				X
21185020	AM	Nataima	Espinal	Tolima	431	-74.96	4.19	X	X	X	X	X
21185040	CO	Apto Santiago Vila	Flandes	Tolima	286	-74.80	4.28	X	X	X	X	X

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21190300	PM	Salero El	Melgar	Tolima	650	-74.61	4.24	X				X
21215080	CO	Chicoral	Espinal	Tolima	475	-75.00	4.23	X	X	X	X	X
21215140	ME	Cementos Diamante	Ibague	Tolima	780	-75.08	4.33	X	X	X	X	X
21250070	PG	Sierra La	Lerida	Tolima	477	-74.94	4.80	X				X
21250430	PM	Campamento Ambalem	Ambalema	Tolima	241	-74.77	4.78	X				X
21250460	PM	Venadillo	Venadillo	Tolima	430	-74.92	4.66	X				X
21255140	CP	Quinta La	Lerida	Tolima	500	-74.92	4.82	X	X	X	X	X
22045010	CO	Demostracion Gja	Chaparral	Tolima	1040	-75.50	3.72	X	X	X	X	X
22050090	PM	Molino Murra	Saldana	Tolima	410	-75.02	3.92	X				X
22055030	CO	Sta Helena	Purificacion	Tolima	300	-74.90	3.99	X	X	X	X	X
22060090	PM	Olaya Herrera	Ortega	Tolima	475	-75.33	3.82	X				X
23015040	SS	Apto Mariquita	San Sebastian de Mariquita	Tolima	475	-74.89	5.21	X	X	X	X	
21165010	CO	Pst de Monta	Prado	Tolima	349	-74.92	3.79		X	X	X	X
21255150	CP	Garcia Hda	Lerida	Tolima	350	-74.89	4.86		X	X	X	X
21195080	CO	Base Aerea Melgar	Melgar	Tolima	319	-74.64	4.21			X		X
21240080	PM	Alvarado	Alvarado	Tolima	439	-74.95	4.57					X
21210200	PM	Buenos Aires	Ibague	Tolima	750	-75.07	4.34					X
21220050	PM	Aceituno El	Ibague	Tolima	680	-75.05	4.35					X
21170030	PM	Maporita La Dc Hda	Suarez	Tolima	280	-74.86	3.95					X
26055070	CP	Univ del Valle	Cali	Valle del Cauca	985	-76.53	3.38	X	X	X	X	X
26075010	AM	Palmira Ica	Palmira	Valle del Cauca	1050	-76.32	3.51	X	X	X	X	X
26075040	SP	Apto A Bonilla	Palmira	Valle del Cauca	961	-76.39	3.53	X	X	X	X	X
26075050	CO	Ing Manuelita Porv	Palmira	Valle del Cauca	1058	-76.28	3.57	X				X
26075080	AM	Cenicana	Florida	Valle del Cauca	1013	-76.30	3.36	X	X	X	X	X
26080070	PM	Vijes	Vijes	Valle del Cauca	987	-76.43	3.70	X				X
26080290	PM	Mediacanoa-Alertas	Yotoco	Valle del Cauca	944	-76.35	3.89	X				X

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26085120	SS	Base Aerea MFS	Cali	Valle del Cauca	954	-76.50	3.46	X		X		X
26095230	AM	Vinculo El	Guadalajara de Buga	Valle del Cauca	979	-76.30	3.84	X	X	X	X	X
26105160	SP	Apto Farfan	Tulua	Valle del Cauca	955	-76.22	4.09	X	X	X	X	X
34015010	SP	Gaviotas Las	Cumaribo	Vichada	171	-70.93	4.55	X	X	X	X	X
TOTAL								214	82	84	79	227