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Data Article

Data supporting the soil salinity evolution appraisals in the Flumen irrigation district, NE Spain

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ABSTRACT

The dataset presented comprises (raw data) scans of the marked paper contact prints from a dedicated photogrammetric flight and a diagram showing the location of each of these photograms. The flight was commissioned specifically for the soil survey presented herein. The scanned paper prints are those used in the field to characterize the soil salinity of 27,500 ha within the Flumen irrigation district, in the semi-arid Central Ebro Basin, in Spain. On these prints, the soil surveyors marked the locations of the sampling sites. IRYDA, the extinct Spanish Ministry of Agriculture agency, in charge of designing and implementing new irrigation districts, commissioned the flight in 1975. These paper prints enabled us to resample the soils years later, to: (i) determine the soil salinity evolution from 1975 to 1985 [1], and from 1975 to 1999 [2]; (ii) apply electromagnetic induction (EMI) [3] for the same purpose; (iii) use multivariate analysis to discriminate the salinity trends from 1975 to 1999 in the different soil units [4]; and (iv) for land evaluation [5]. The report and two volumes of annexes [6–8], prepared by the contractor INYPSA for IRYDA, contain data on the soluble salts and other soil components sampled in 1975 as well as soil descriptions and agronomical data. The aerial photographs presented herein allow the sites sampled in 1975 to be located. This is the first step in exploiting the legacy data to appraise [9] the effects on the salinity and other soil properties recorded in 1975. The irrigation and the change from

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basin and border flooding to pressurized techniques, with the merging of many plots, govern these effects.

Specifications Table

Subject	Soil Science
Specific subject area	Soil salinity monitoring by successive paired observations, including soil sampling, EMI measurements, and future procedures.
Type of data	Pdf images of the aerial photos printed on photographic paper with the 1975 soil sampling sites marked.
How data were acquired	Aerial black and white contact prints 23 cm × 23 cm of photos taken in June 1975, using a 152.48 mm focal length photogrammetric camera. On the contact prints, the soil surveyors marked the sites where they took the soil samples.
Data format	The photogram location diagram is in pdf format, as are the prints of the marked aerial photographs.
Parameters for data collection	The prospectors took soil samples, marking the sites on prints from flight Aeropost 26/75, from June 1975.
Description of data collection	We scanned the print contacts used in 1975 to mark the soil sampling sites. The soil surveyors had marked these sites and certain land features, mainly with wax pencil. Other data were recorded on the back of some prints; these were also scanned. The scanning of these documents resulted in the 142 pdf images.
Data source location	Spain, Flumen irrigation district (Fig. 1), location center is 41°52′57.2″N, 0° 15′ 1.2″W.
Data accessibility	Repository name: Mendeley Data; Data identification number: http://dx.doi.org/10.17632/8k7wfh5j9h.1
Related research article	Herrero, J., Pérez-Coveta, O. 2005. Soil salinity changes over 24 years in a Mediterranean irrigated district. Geoderma 125(3–4): 287–308. DOI: 10.1016/j.geoderma.2004.09.004. [2]

Value of the Data

- The aerial photographs provide a detailed view of the location of the 1975 soil sampling sites, the land management, and the affection by salinity in that year.
- Potential users of this information who could benefit from the soil sampling locations include farmers, engineers, scientists, and environmental or agricultural authorities who need to understand how the soil salinity has evolved in the district after decades of irrigation.
- The dataset presented will allow soil status monitoring. A paired sampling strategy achieved salinity monitoring at the decadal scale [1–4], and this could be repeated at any time. Further research could include trends in other dynamic soil properties, as stressed by Tugel et al. [10].
- Most of this semi-arid area transformed from rainfed agriculture to flood irrigation in the 1950s, and since the 1990s it has been equipped with pressurized irrigation devices, i.e., for sprinkling and drip irrigation, to both save water and combat soil salinity.
- The scarce precipitation and, particularly, the irrigation redistribute the salts from the geological materials in the landscape. For this reason, salinity monitoring is a must because of both productive and environmental concerns, and the value of appraising the results of the techniques applied for soil salinity prevention purposes.
- The use of EMI sensors and complementary techniques has strongly diminished the cost of soil salinity surveying, by reducing the soil sampling efforts required for advanced agriculture [11,12]. This circumstance affords a high value to the heritage data presented.

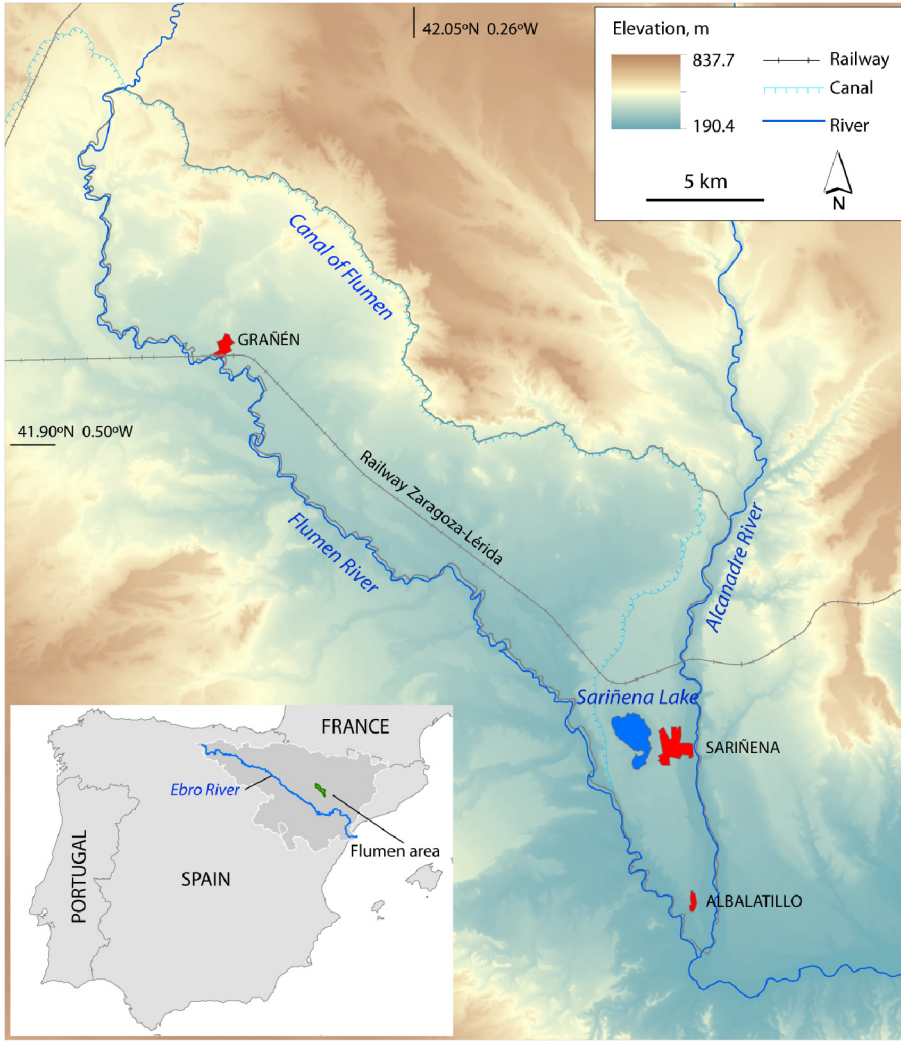

Fig. 1. The Flumen irrigation area studied is located in the Central Ebro Basin, NE Spain. The Flumen Canal conveys the irrigation water, originating in the Pyrenees.

1. Data Description

We uploaded to Mendeley the dataset "Flumen irrigat. 1975" containing 143 pdf files. Firstly, the file "Flight diagram Aeropost Flumen June 1975.pdf" shows the relative location of the photograms on a sketch map that delimits the study area. The boundaries are the Flumen Canal to the north, the Alcanadre River to the west, and the Flumen River to the east. Both rivers flow southwards until the Flumen joins the Alcanadre, near the town of Albalatillo. The diagram also shows the main roads, railway, towns, and location and designation of the sheets according to the official 1:50 000 topographic map of Spain for the target area.

The remaining 142 files are color scans of the aerial photo contact prints, i.e., 97 scans of the fronts plus 45 scans of the backs of the prints with annotations. We named the files with the

corresponding photograph number. For prints with annotations on the back, the letter "a" after the number denotes the front and "b" is the back.

The surveyors' marks stand out as they used blue or red wax pencil on the black and white photographs. The scans also captured the marginal information on the photograms: the names of the contractor (AEROPOST) and the promoter (IRYDA), the time, scale, fly track number, photograph number, red north arrow, and a red filing number for the prospectors.

2. Experimental Design, Materials, and Methods

The camera angle of view is 3°. The average size of the coverage for each photogram is 2.8 × 2.8 km, and the average pixel resolution is 1 × 1 m. The flying altitude is 2200–2300 m.

Table 1 shows the list of sampling points studied, with their coordinates taken in 1999 using an Ashtech Reliance GPS device, and summarizes the reasons they were not studied in past articles [1–3]. These reasons are: legibility issues relating to the copies of the IRYDA report available in the different sampling years; the impossibility of finding the exact point in the field; or other circumstances.

Table 1
Soil sampling points with UTM coordinates in the 30 T Zone within the 100 km square YM, geographic coordinates, the reasons they are absent, and their inclusion in the articles [1–3].

						Points included in cited publications		
Sampling point/ Pedon number	UTMX ED50	UTMY ED50	Longitude E	Latitude N	Absent coordinates	SMAGUA 1987 [1]	Geoderma 2005 [2]	J.Hydrol. 2011 [3]
Fl-1					Dryfarmed			
Fl-2					Abandoned			
Fl-3					Missing			
Fl-4					Dryfarmed			
Fl-5	716,799	4,653,369	−0.3836	42.0006			x	x
Fl-6	719,838	4,652,510	−0.3472	41.9921			x	x
Fl-7	721,415	4,652,038	−0.3284	41.9874		x	x	
Fl-8	714,405	4,650,068	−0.4137	41.9716			x	x
Fl-9	715,196	4,650,871	−0.4038	41.9786			x	x
Fl-10	715,768	4,648,826	−0.3977	41.9600		x	x	x
Fl-11					Inaccesible, flooded road	x		
Fl-11b	715,597	4,647,779	−0.4001	41.9507		x	x	x
Fl-12	716,986	4,648,532	−0.3831	41.9571		x	x	
Fl-13	717,980	4,650,489	−0.3704	41.9744		x	x	x
Fl-14					Dryfarmed			
Fl-15	719,902	4,650,204	−0.3473	41.9713		x	x	x
Fl-16	720,723	4,649,324	−0.3378	41.9632			x	
Fl-17	721,690	4,650,280	−0.3258	41.9715		x	x	x
Fl-18	720,220	4,648,178	−0.3443	41.9530		x	x	
Fl-25	719,172	4,646,200	−0.3576	41.9355		x	x	x
Fl-26	720,877	4,646,350	−0.3370	4.1936			x	x
Fl-27	721,588	4,647,573	−0.3280	41.9472		x	x	x
Fl-28	722,986	4,649,838	−0.3103	41.9671		x	x	x
Fl-29	723,623	4,648,864	−0.3030	41.9582			x	
Fl-30	724,549	4,647,903	−0.2922	41.9493		x	x	
Fl-31	720,529	4,644,901	−0.3418	41.9234		x	x	x
Fl-32	720,221	4,643,145	−0.3461	41.9077		x	x	
Fl-33	720,903	4,643,863	−0.3376	41.9140		x	x	
Fl-34	722,581	4,645,718	−0.3167	41.9302			x	x
Fl-35	724,664	4,646,472	−0.2914	41.9364			x	x
Fl-36	722,684	4,643,812	−0.3162	4.1913		x	x	

(*continued on next page*)

Table 1 (*continued*)

Sampling point/ Pedon number	UTMX ED50	UTMY ED50	Longitude E	Latitude N	Absent coordinates	Points included in cited publications		
						SMAGUA 1987 [1]	Geoderma 2005 [2]	J.Hydrol. 2011 [3]
Fl-37	725,005	4,644,043	−0.2882	41.9144		x	x	
Fl-38	726,084	4,643,452	−0.2754	41.9088		x	x	
Fl-39					Dryfarmed	x		
Fl-40	724,883	4,640,712	−0.2909	41.8845		x	x	x
Fl-41	727,465	4,642,743	−0.2590	4.1902		x	x	x
Fl-50	726,511	4,640,145	−0.2715	41.8789		x	x	x
Fl-51	728,472	4,640,706	−0.2477	41.8834		x	x	x
Fl-52	730,018	4,640,405	−0.2292	41.8803		x	x	
Fl-53	730,253	4,642,658	−0.2255	41.9005		x	x	
Fl-54	731,446	4,641,238	−0.2117	41.8873		x	x	
Fl-56	735,107	4,640,769	−0.1678	41.8820			x	x
Fl-57	736,653	4,640,901	−0.1491	4.1883		x	x	x
Fl-58	725,382	4,638,643	−0.2857	41.8657			x	x
Fl-59	726,386	4,639,122	−0.2734	41.8698		x	x	x
Fl-60					Missing			
Fl-61	729,567	4,638,011	−0.2356	41.8589		x	x	x
Fl-62	731,066	4,637,754	−0.2176	41.8561		x	x	x
Fl-63	731,466	4,636,892	−0.2131	41.8482		x	x	
Fl-63b	731,351	4,636,733	−0.2146	41.8468		x	x	
Fl-64	732,751	4,638,745	−0.1970	41.8645		x	x	
Fl-65	733,565	4,637,742	−0.1876	41.8553		x	x	x
Fl-66	735,683	4,638,575	−0.1617	41.8621			x	x
Fl-67	736,820	4,638,781	−0.1480	41.8636		x	x	x
Fl-68	735,370	4,636,092	−0.1665	4.1840		x	x	x
Fl-69	736,735	4,635,537	−0.1503	41.8345		x	x	x
Fl-70	733,592	4,634,109	−0.1887	41.8226		x	x	
Fl-71	736,321	4,635,208	−0.1554	41.8317			x	x
Fl-75	730,404	4,634,216	−0.2270	41.8245		x	x	x
Fl-76	730,716	4,634,900	−0.2229	41.8305		x	x	x
Fl-77	735,527	4,632,856	−0.1659	41.8107		x	x	x
Fl-78	736,341	4,633,398	−0.1559	41.8154		x	x	
Fl-79	733,063	4,631,869	−0.1959	4.1803		x	x	x
Fl-80					Missing			
Fl-81	734,299	4,629,042	−0.1822	41.7768			x	x
Fl-82					Missing			
Fl-83	735,982	4,627,146	−0.1627	41.7592			x	
Fl-84	737,067	4,625,947	−0.1501	41.7481			x	x
Fl-1007					Missing			
Fl-1008	733,196	4,639,462	−0.1913	41.8709			x	
Fl-1012	735,460	4,640,374	−0.1637	41.8784			x	
Fl-1017	736,972	4,640,474	−0.1455	41.8788			x	
Fl-1018	733,110	4,636,679	−0.1935	41.8458			x	
Fl-1027	731,474	4,639,924	−0.2119	4.1876			x	
Fl-1015-s1	722,790	4,643,745	−0.3150	41.9124			x	x
Fl-1015-s2	722,823	4,643,739	−0.3146	41.9123			x	x
Total					**11**	**44**	**65**	**40**

Ethics Statement

Not applicable.

CRediT Author Statement

Juan Herrero: Writing – original draft, Writing review & editing; **Carmen Castañeda:** Writing – original draft, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that have, or could be perceived to have, influenced the work reported in this article.

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