Some undesirable responses from irrigation of soils in NE Spain

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• Irrigation is needed for a profitable agriculture in the central Ebro valley, one of the most arid regions in Europe.

• In this region, the aridity together with the outcrops of the Miocene saliferous horizontal strata, induce soil salinity in specific geomorphic positions.

• Irrigation, as well as earth movements for land leveling or other purposes, exacerbate the salt redistribution in the landscape.

• Both soil salination and desalination have been documented at several spatial and temporal scales.
The study area

Climate

- Mean annual temp.: 14.3°C
- Mean annual precip.: 525 mm
- Mean annual \( ET_0 \) (FAO Blaney-Criddle): 1304 mm.
- Water deficit lasts from March to October.

Soils

- Temperature regime: thermic.
- Moisture regime: xeric bordering aridic.

Irrigation systems modernization

- Most basin and border flood irrigated schemes built between 1950-1970 are being changed into solid set sprinklers in small plots, and into pivot or lateral machines in the greater plots.
- The investment needed often surpass 10,000 US$ by ha.
Irrigation water

- Irrigation water comes from the snow of Pyrenees.
- EC < 0.4 dS m⁻¹; SAR < 1 (mmol L⁻¹)⁰.⁵.

- This “high-quality” water often induces clay dispersion, which can create infiltration problems for these illitic soils.

Crops

- The major crops are: alfalfa, barley, corn, rice, sunflower, and wheat.
- Rice paddies (flooded from May 1st to September) are frequent in bottoms, on puddled saline or saline-sodic soils.
The behavior of some soils against irrigation differs from an “ideal” porous and homogeneous body.

These behaviors, often ill-known, cannot be described as classic hydraulic processes, then they are not considered in most irrigation engineering models.

The consequences on the irrigated agriculture can be deleterious.

This behavior “rebel to irrigation” is typical, but not exclusive, of some salt-affected soils.

Research inspired by field observations is needed to understand, prevent and remediate.

We need to think how:

- To increase the predictive power of soil surveys
- To develop societal demand for higher quality standards in irrigation design and construction.