

Agua flash



INTERREG SUDOE

Contamination
Crues
Rivières
Risque

Basins versants
Modélisation
Prototype



MODELING FLUMEN RIVER

Toledo, 15-17 june, 2011

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UPV EHU



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CSIC



INP ENSAT

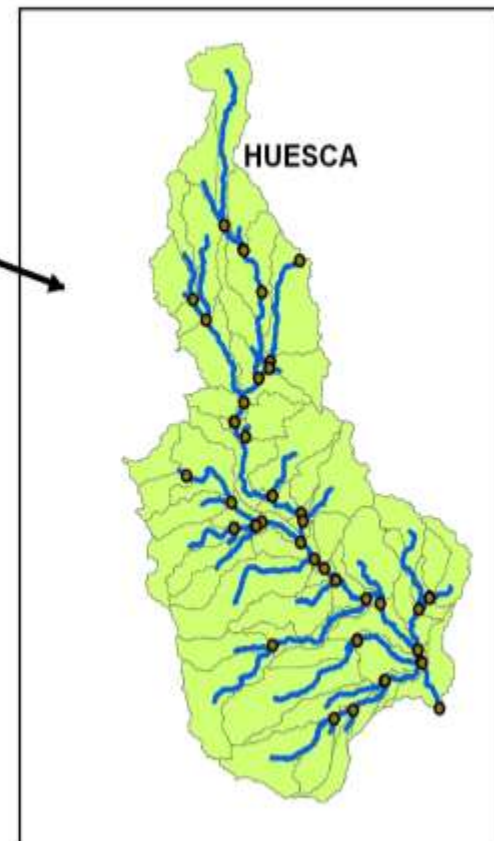


Ministério da
Agricultura,
do Desenvolvimento
Rural e das Pescas

INRB, I.P.
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FLUMEN RIVER WATERSHED



PRINCIPAL CHARACTERISTICS OF THE FLUMEN BASIN

FLOW CONTROL AND ALTERATION



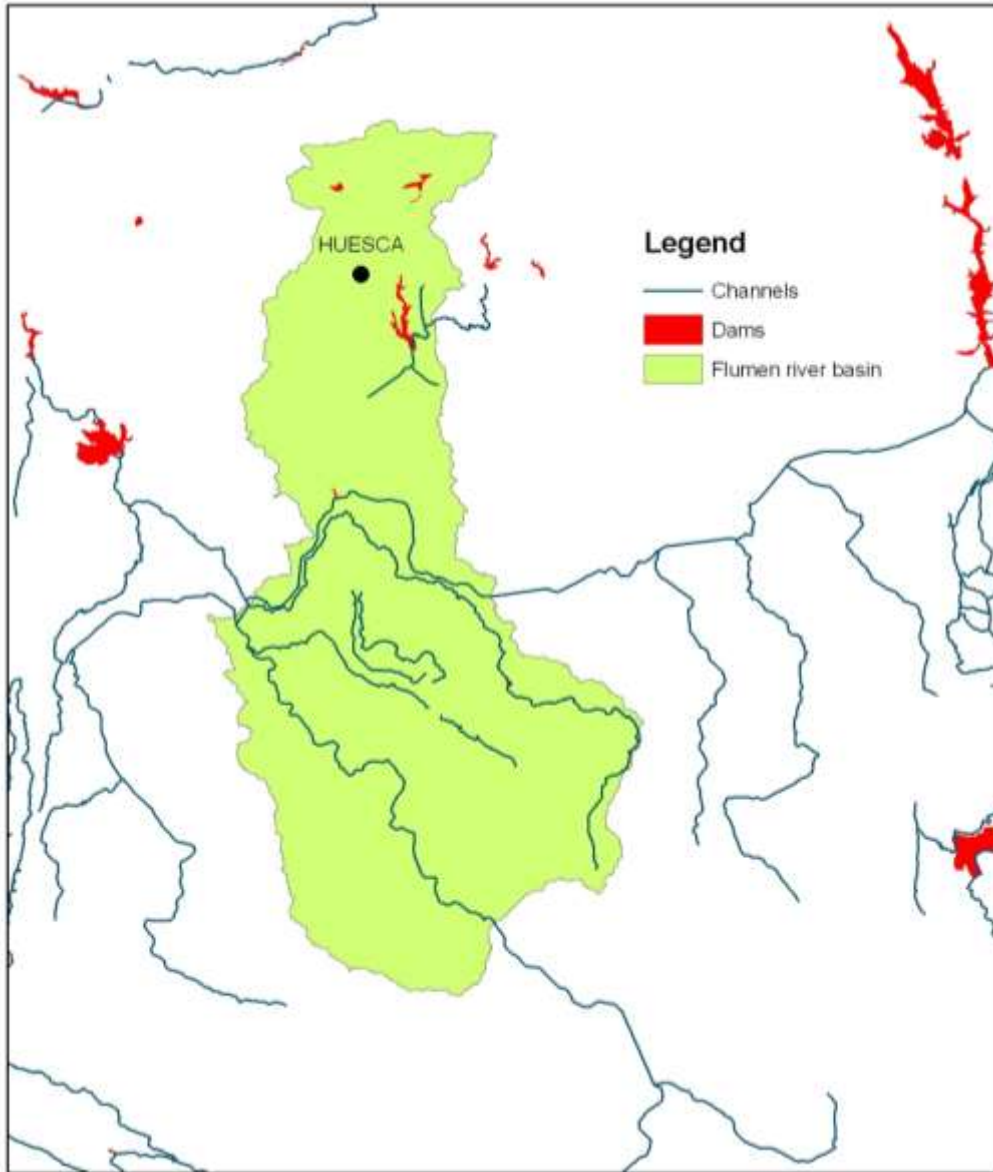
Confederacion Hidrográfica del Ebro



Confederacion Hidrográfica del Ebro



June 15, 2011



Sta. María de Belsué reservoir: detail of dam .



Confederacion Hidrográfica del Ebro

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SEMIARID REGION



MEAN PRECIP = 378.1 mm
ET = 546.1 mm
PET = 1144.1 mm

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VERY IMPORTANT WATER INPUT FOR IRRIGATION



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INFILTRATION TO DEEP AQUIFER IN THE UPPER BASIN PART



Confederacion Hidrográfica del Ebro



Confederacion Hidrográfica del Ebro

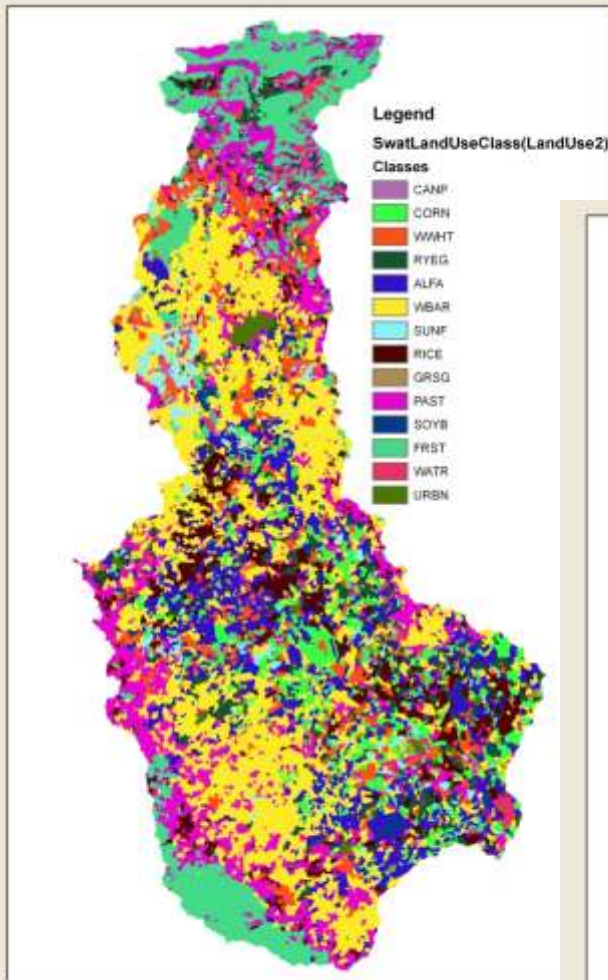
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INTENSIVE AGRICULTURE

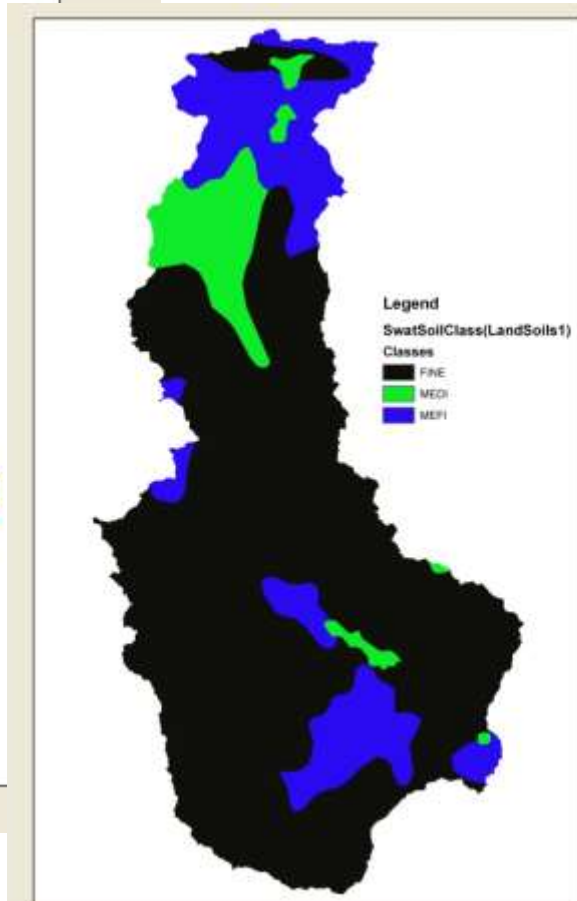


June 15, 2011

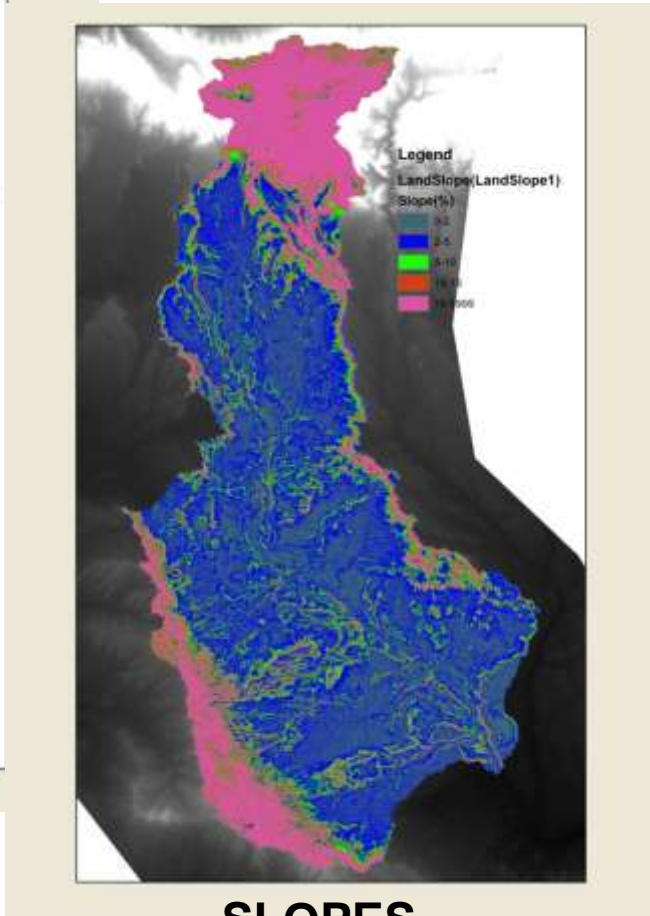
INITIAL MAPS



LANDUSE



SOILS



SLOPES

HRUs ANALISYS

REAL LAND USE DISTRIBUTION

LANDUSE:

Spring Canola-Polish --> CANP	697.0488	1722.4426	0.49
Corn --> CORN	9252.2334	22862.7313	6.46
Winter Wheat --> WWHT	10449.7296	25821.8044	7.30
Italian (Annual) Ryegrass --> RYEG	8309.9093	20534.2014	5.81
Alfalfa --> ALFA	16925.9766	41824.9345	11.83
Winter Barley --> WBAR	41812.8717	103321.6966	29.2
Sunflower --> SUNF	3389.3975	8375.3707	2.37
Rice --> RICE	9536.1637	23564.3372	6.66
Grain Sorghum --> GRSG	489.2119	1208.8670	0.34
Pasture --> PAST	21144.1666	52248.2929	14.77
Soybean --> SOYB	1536.7118	3797.2918	1.07
Forest-Mixed --> FRST	16914.3355	41796.1687	11.82
Water --> WATR	1685.7752	4165.6349	1.18
Residential --> URBN	990.3083	2447.1013	0.69

SOILS:

FINE	106590.2276	263389.7820	74.47
MEDI	11341.4330	28025.2480	7.92
MEFI	25202.1794	62275.8453	17.61

SLOPE:

0-2	36650.9786	90566.4006	25.61
10-15	7955.0370	19657.2943	5.56
15-9999	29091.1319	71885.6415	20.32
2-5	50543.6063	124895.7783	35.11
5-10	18893.0862	46685.7607	13.20

HRUs THRESOLD

LANDUSE:

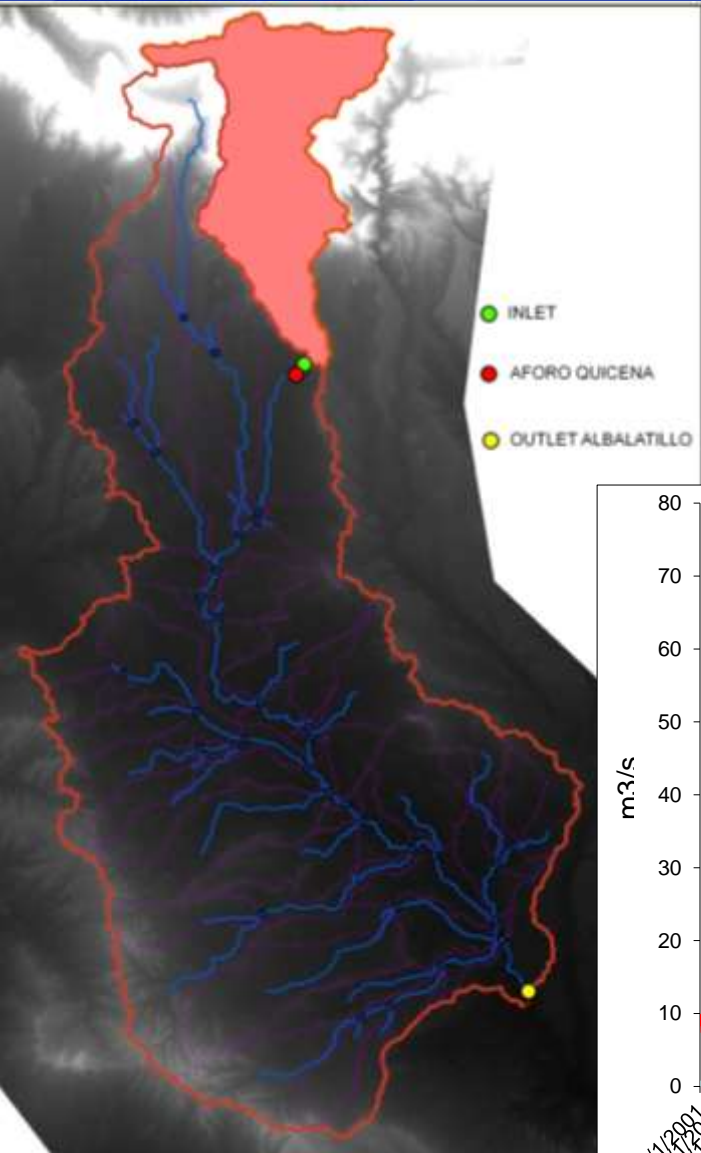
Pasture --> PAST	21813.0929	53901.2431	15.24
Forest-Mixed --> FRST	16935.6327	41848.7951	11.83
Italian (Annual) Ryegrass --> RYEG	8033.2239	19850.4978	5.61
Water --> WATR	1293.0337	3195.1508	0.90
Rice --> RICE	9179.2330	22682.3437	6.41
Winter Wheat --> WWHT	10316.7006	25493.0829	7.21
Winter Barley --> WBAR	44004.7515	108737.9411	30.74
Sunflower --> SUNF	2554.9069	6313.3026	1.78
Alfalfa --> ALFA	17501.6982	43247.5714	12.23
Soybean --> SOYB	919.8717	2273.0489	0.64
Spring Canola-Polish --> CANP	374.7464	926.0171	0.26
Residential --> URBN	792.7639	1958.9592	0.55
Corn --> CORN	9263.8418	22891.4162	6.47
Grain Sorghum --> GRSG	150.3431	371.5053	0.11

SOILS:

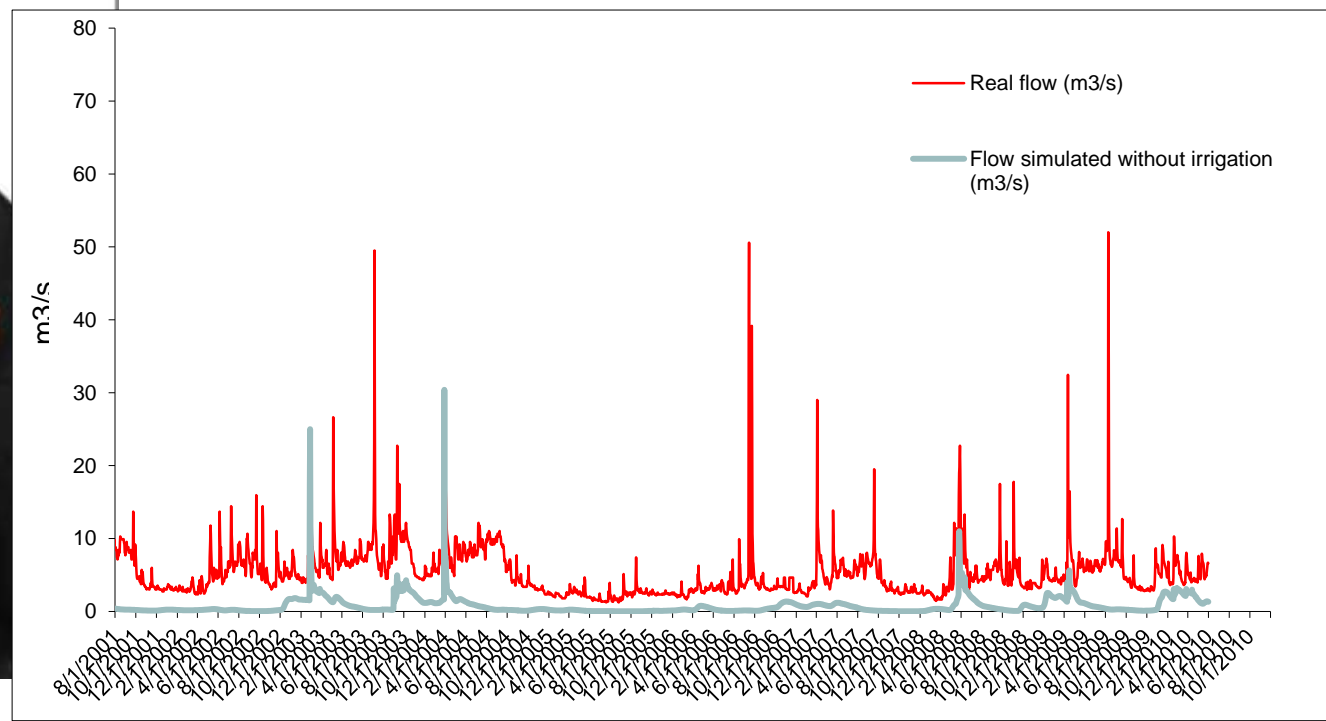
FINE	106532.6855	263247.5926	74.43
MEDI	11487.2285	28385.5160	8.03
MEFI	25113.9259	62057.7667	17.55

SLOPE:

2-5	50791.7823	125509.0338	35.49
10-15	7275.0011	17976.8914	5.08
5-10	18683.3674	46167.5350	13.05
15-9999	29373.8179	72584.1727	20.52
0-2	37009.8713	91453.2425	25.86



FLUMEN WITH NO IRRIGATION



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WATER BALANCE

- CLIMATIC DATA
- IRRIGATION

	m ³ /Ha per year
ALFALFA	9000-12000
CORN	8000-10000
RICE	15000-16000
BARLEY*	3000-4000
WHEAT	4000-5000

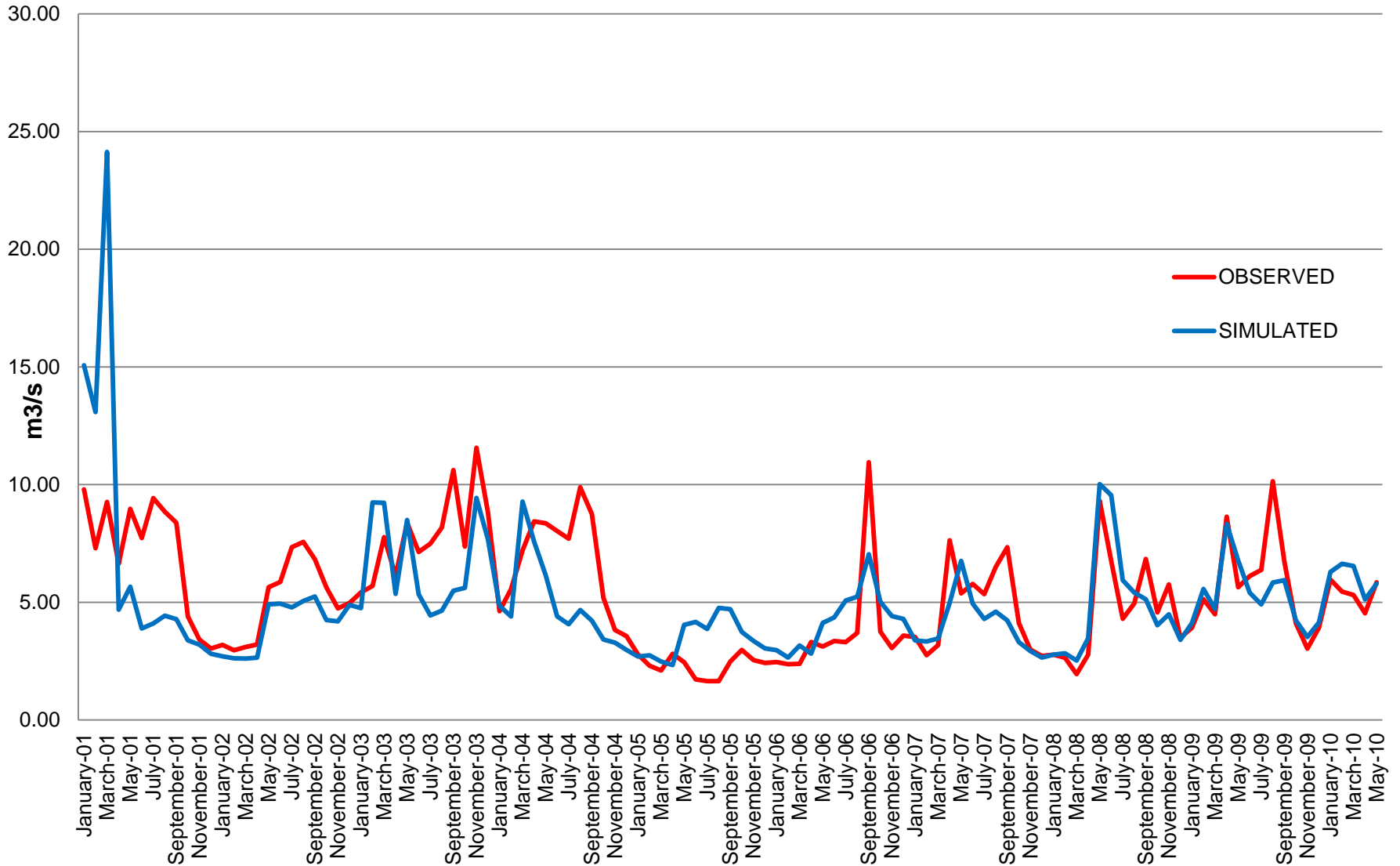
* Only in slopes between 0-5 %

- INLET RESERVOIR
- POINT SOURCE IN EACH CITY AND DEEP AQUIFER RETURNS
- TILE DRAINAGE

SENSITIVITY ANALYSIS FLOW CALIBRATION. **PARAMETERS RANKS**

- 1.- CN2 (not modified)
- 2.- SOL_Z (lack of soil information)
- 3.- GWQMIN
- 4.-ESCO
- 5.- ALPHA_BF
- 6.- SOL_AWC
- 7.- SOL_K
- 8.- CH_K2
- 9.- EPCO
- 10.- GW_REVAP

FLOW CALIBRATION

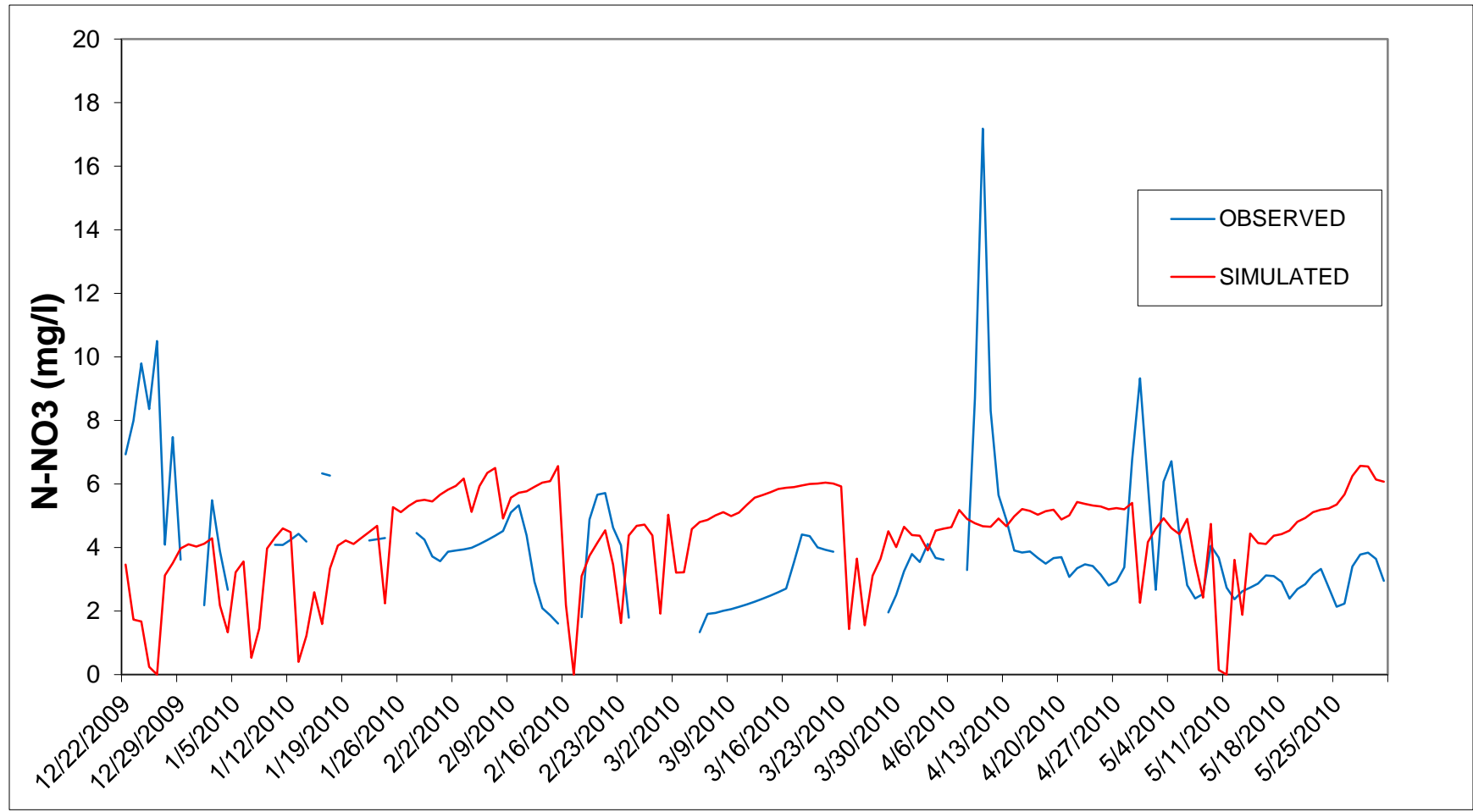


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WATER ANUAL AVERAGE BALANCE (mm)

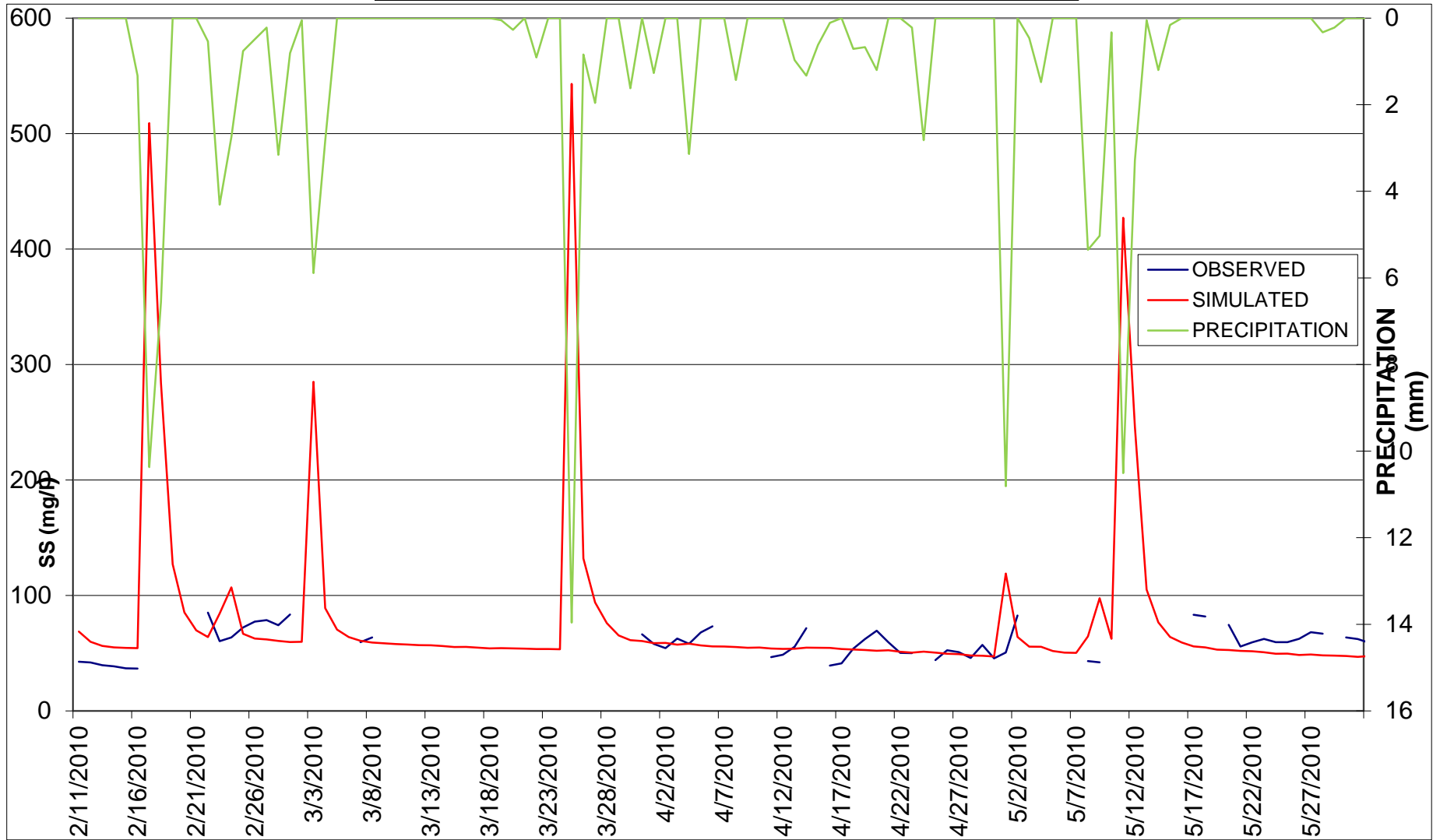
PRECIP	378.1
ET	534.4
PET	1144.1
SURFACE RUNOFF Q	10.50
LATERAL SOIL Q	3.84
GROUNDWATER	26.15
REVAP (SOIL/PLANT)	1.05
DEEP AQ RECHARGE	1.42
TOTAL AQ RECHARGE	28.49
TOTAL WATER YLD	53.66
PERCOLATION OUT OF SOIL	27.69
TILE Q	13.55

NITRATES CALIBRATION



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SEDIMENT CALIBRATION



CONCLUSIONS

- The high amount outside water (urban and irrigation) and the intensive agriculture difficult the flow calibration.
- Is necessary to improve the flow calibration. There are periods with changes in the agricultural methods (improve irrigation system).
- Sediment, fertilizer and pesticides not calibrated.



NEXTS STEPS

1. SEDIMENT, FERTILAZER AND PESTICIDE MANUAL CALIBRATION TO GET DE CRITICAL RANGES OF THE MOST IMPORTANT PARAMETERS
2. SENSITIVITY ANALYSIS
3. MANUAL CALIBRATION WITH THE SENSITIVITY ANALYSIS RESULTS
4. AUTOCALIBRATION AND UNCERTAINTY ANALYSIS
5. MANUAL CALIBRATION WITH THE AUTOCALIBRATION AND UNCERTAINTY ANALYSIS RESULTS

THANKS FOR YOUR ATTENTION