COMPARISON OF SMAP-DERIVED SOIL MOISTURE PRODUCTS FOR NEAR REAL-TIME ROOT-ZONE SOIL MOISTURE ESTIMATION

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The objective of this research is to compare the LEVEL 4 Root Zone Soil Moisture product with a proposed, new product using the Level 2 Surface Soil Moisture from SMAP and the Soil Water Index (SWI) as a surrogate of the root-zone soil moisture. The study period spans from March, 31 to December, 31 2015.

- SMAP L2_SM_P

Product	Description	Gridding (Resolution)	Latency**	
L1A_Radiometer	Radiometer Data in Time-Order	-	12 hrs	Instrument Data
L1A_Radar	Radar Data in Time-Order	-	12 hrs	
L1B_TB	Radiometer T_B in Time-Order	(36×47 km)	12 hrs	
L1B_S0_LoRes	Low-Resolution Radar σ_o in Time-Order	(5×30 km)	12 hrs	
L1C_S0_HiRes	High-Resolution Radar σ_o in Half-Orbits	1 km (1–3 km)#	12 hrs	
L1C_TB	Radiometer T_B in Half-Orbits	36 km	12 hrs	
L2_SM_A	Soil Moisture (Radar)	3 km	24 hrs	Science Data (Half-Orbit)
L2_SM_P*	Soil Moisture (Radiometer)	36 km	24 hrs	
L2_SM_AP*	Soil Moisture (Radar + Radiometer)	9 km	24 hrs	
L3_FT_A*	Freeze/Thaw State (Radar)	3 km	50 hrs	Science Data (Daily Composite)
L3_SM_A	Soil Moisture (Radar)	3 km	50 hrs	
L3_SM_P*	Soil Moisture (Radiometer)	36 km	50 hrs	
L3_SM_AP*	Soil Moisture (Radar + Radiometer)	9 km	50 hrs	
L4_SM	Soil Moisture (Surface and Root Zone)	9 km	7 days	Science Value-Added
L4_C	Carbon Net Ecosystem Exchange (NEE)	9 km	14 days	

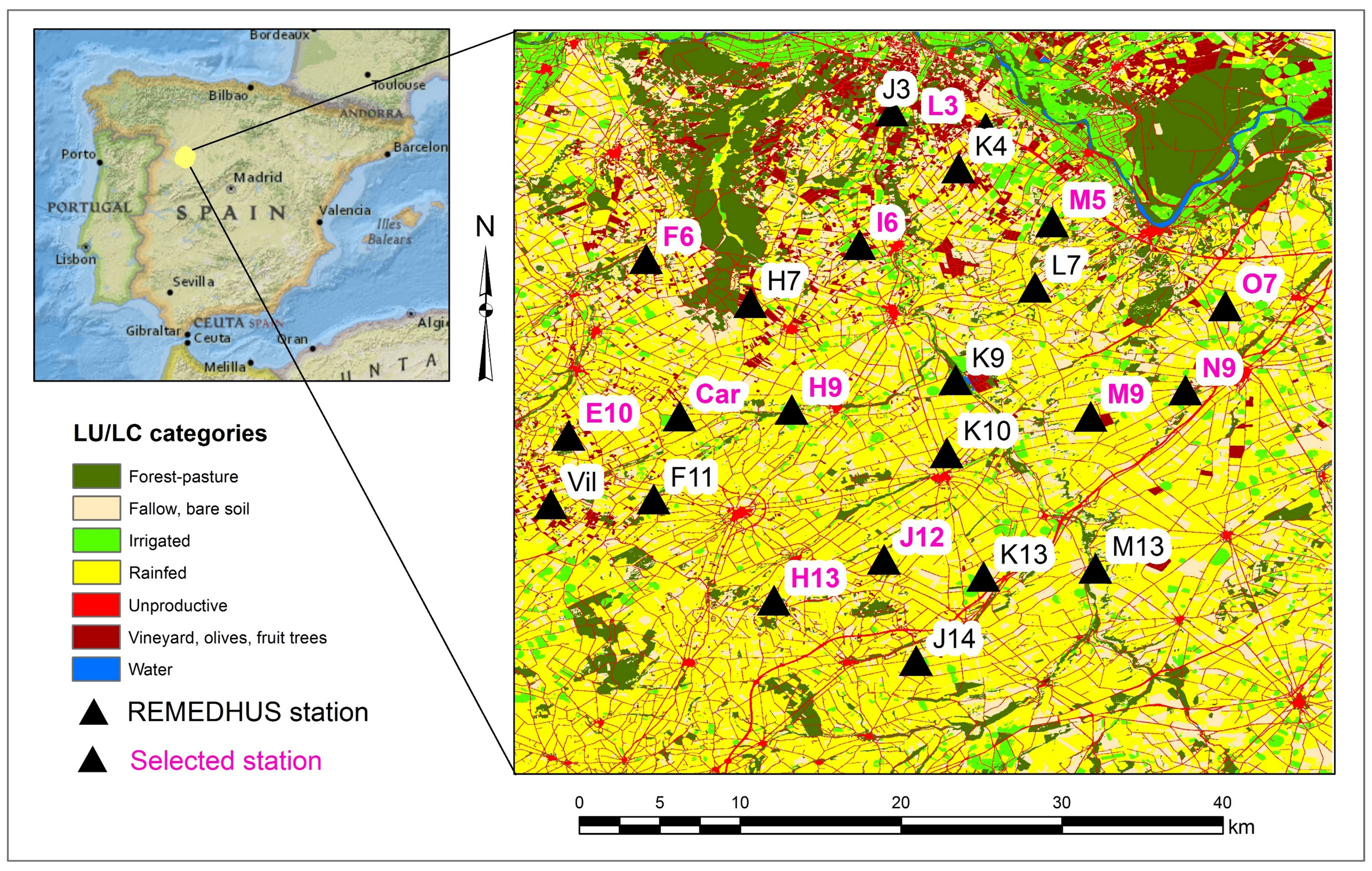
- SMAP L4_SM

- Using the L2_SM to estimate root zone soil moisture the latency can be improved from 7 days to 24 hours!

(REMEDHUS)

	R	RMSD (m³m⁻³)	cRMSD (m³m⁻³)	BIAS	N
L2 Surface SM	0.69	0.064	0.043	0.047	152
L4 Surface SM	0.54	0.109	0.038	-0.085	2159

	R	RMSD (m³m⁻³)	cRMSD (m³m⁻³)	BIAS	N
25 cm	0.44	0.087	0.035	-0.068	2156
50 cm	0.21	0.076	0.035	-0.037	2156
100 cm	-0.22	0.069	0.029	-0.030	2123
0-100 cm	0.43	0.062	0.023	-0.048	2123



proposed model

E10	r	p-value	RMSD	cRMSD	bias	N
25 cm	0.59	0.00	0.052	0.045	0.027	95
50 cm	0.43	0.00	0.252	0.035	0.250	95
100 cm	0.30	0.00	0.221	0.029	0.219	95
Area-Average						
25 cm	0.58	0.00	0.095	0.044	0.073	122
50 cm	0.27	0.00	0.107	0.033	0.088	119
100 cm	-0.34	0.00	0.135	0.032	0.128	121

improves the

accuracy

24 h

smaller latency

- Both L4 and L2-derived products have shown an acceptable relationship with ground measurements, but further research is needed when a longer period of data is available.
- The proposed experimental product is a potential root-zone product derived from the original L2_SM as a input and a simple, easy-to-implement model. A challenging scenario of new products is opened from the SMAP family products and applications.

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