

SCHEDA DELLE ATTIVITÀ SVOLTE NEL CORSO DI DOTTORATO DI RICERCA/
ACTIVITIES SHEET CARRIED OUT DURING THE PhD COURSE
COORDINATORE/COORDINATOR: Prof. Roberta Bernini

(1) INFORMAZIONI GENERALI DEL DOTTORANDO/GENERAL INFORMATION OF THE PhD STUDENT	
Cognome e nome/Surname and name	Upreti Deepak
Corso di Dottorato/PhD course	Plant and Animal Sciences
Codice del Corso di Dottorato/PhD code	
Ciclo/Cycle	XXXIII
Posizione/Position	<input checked="" type="checkbox"/> con borsa di studio/with scholarship <input type="checkbox"/> senza borsa di studio/without scholarship <input type="checkbox"/> altro/other

(2) ATTIVITA' DI RICERCA/RESEARCH ACTIVITY	
Cognome e nome del tutor (o dei tutor)/ Supervisor(s) surname and name	Casa Raffaele
Università, Ente di Ricerca, Azienda/ University, Research institution, Company	DAFNE, University of Tuscia
Titolo dell'attività di ricerca/Research title	"Exploitation of multi-temporal and multi-sensor satellite data for improving biophysical and agronomic variables retrieval and yield prediction through data assimilation with crop growth model"
Breve descrizione dell'attività di ricerca/Short description of the research activity (Max 2500 caratteri, esclusi gli spazi/Max 2500 characters, excluded spaces)	
<p>We have worked on the comparison of different hybrid machine learning algorithms to retrieve biophysical crop variables from remote sensing data (Sentinel-2 and VENμS). We further have used these retrieved variables from remote sensing data to assimilate into crop growth simulation model Aquacrop, which simulates biomass and yield based on the input parameters. Before assimilating these variables into crop model, we need to assess and quantify the uncertainty contained in the remote sensing data and crop model parameters. So, before proceeding to the data assimilation we identified the most influential parameters of the crop growth simulation model using sensitivity analysis. In performing sensitivity analysis, we here again compared different methods with different climatic years to identify most sensitive parameters to the model output crop yield. After having the list of the most sensitive parameters, we further worked on the Bayesian calibration of these parameters to localize to the crop model for the field level application. Finally, we have worked on the data assimilation, with sequential method: Ensemble Kalman Filter with different satellite data retrieved biophysical variables for getting improved yield estimates at the field level.</p>	

(3) PRINCIPALI ATTIVITÀ FORMATIVE SVOLTE/MAIN TRAINING ACTIVITIES			
(Elencare tutte le principali attività svolte e, per ciascuna di esse, indicare i dati richiesti/List the main activities and for each specify of them the requested data)			
Partecipazione a seminari, corsi, convegni, workshop, scuole/ Participation in seminars, courses, conferences, workshop, schools	Titolo/Title	Località/Location	Data, ore o giorni/ Date, hours or days
Workshop	II Sentinel-2 Validation Team Meeting	ESA, ESRIN, Frascati, Rome	January 2018
Workshop	Land Product Validation and Evolution	ESA, ESRIN, Frascati, Rome	February 2018
Workshop	Small UAV's for Precision Agriculture	ASSAM, Monte Roberto, Ancona, Italy	May 2018
Course	MetroAgriFor	Ancona, Italy	October 2018
Webinar	Exploiting Copernicus data with ILWIS4	ITC, University of Twente, Netherlands	November 2018
Webinar	The Application and Benefits of Synthetic Aperture Radar – Part I	Harris Geospatial Solutions, USA	December 2018
Webinar	Case study of multitemporal wetland mapping using object-based SAR image analysis	PCI Geomatics, USA	December 2018
Webinar	The Application and Benefits of Synthetic Aperture Radar – Part II	Harris Geospatial Solutions, USA	January 2019
Webinar	A deeper dive into SAR: Agriculture and Land Surface deformation	Harris Geospatial Solutions, USA	April 2019
Webinar	Introducing the ENVI deep learning module	Harris Geospatial Solutions, USA	May 2019
Webinar	Full aerial image processing workflow Phase One industrial	PCI Geomatics, USA	May 2019
Webinar	Ecosystems of change: Partnering across sectors to increase the impact of sustainability efforts	Stanford University, USA	May 2019
Webinar	ADS Pushbroom processing to	PCI Geomatics, USA	June 2019

	generate one to one resolution DEM		
Webinar	Remote Sensing for monitoring land degradation and sustainable sites	ARSET, NASA, USA	July 2019
<u>Certification Course</u>	English for Science, Technology, Engineering and Mathematics	University of Pennsylvania, USA	March 2019
<u>Certification Course</u>	Understanding and Visualizing data with Python	University of Michigan, USA	July 2019
<u>Certification Course</u>	English Communication skills	Georgia Institute of Technology, USA	July 2019
<u>Certification Course</u>	Fitting statistical models to data with Python	University of Michigan, USA	August 2019
Webinar	Sentinel-1 TOPS Processing with Geomatica	PCI Geomatics, USA	February 2020
Webinar	Benefits and Applications of Hyperspectral Imagery from the Space Station	L3Harris Geospatial Solutions, USA	February 2020
Webinar	Machine Learning & Statistics with MATLAB	Mathworks Inc.	June 2020
Webinar	Teaching Machine Learning & Statistics Online with MATLAB	Mathworks Inc.	June 2020
Webinar	Get Started with Deep Learning in MATLAB	Mathworks Inc.	July 2020
Webinar	Teaching Deep Learning Online with MATLAB	Mathworks Inc.	July 2020
Course	Marie Skłodowska Curie Actions – Individual Fellowship	MSCA IF Academy	30 June - 02 July 2020
Webinar	Solving Systematic Food Insecurity with Plenty	Trimble USA	23 July 2020

(4) ATTIVITÀ DI DIDATTICA E DI RICERCA/TEACHING AND RESEARCH ACTIVITIES (Elencare tutte le attività svolte e, per ognuna, indicare i dati richiesti/List all activities and specify for each of them the requested data)	
Attività di tutoraggio e didattico-integrative/Tutorship activities	None

(Specificare/Specify)	
<p>Seminari/Seminars (Indicare il titolo, la località, la data/Specify the title, the location and the date)</p>	<p>Dragon4 Symposium, Xi'an, China, June 2018</p> <p>Big data and Artificial Intelligence, DIBAF, University of Tuscia, November 2018</p> <p>IR Microscopy: tools and methods, DIBAF, University of Tuscia, Viterbo, February 2019</p> <p>Living Planet Symposium, Milan, Italy, May 2019</p> <p>Artificial Intelligence, DIBAF, University of Tuscia, Viterbo, June 2019</p> <p>Dragon4 Symposium, Ljubljana, Slovenia June 2019</p> <p>BioControl, DAFNE, University of Tuscia, Viterbo, July 2019</p>
<p>Pubblicazioni scientifiche/ Scientific publications (Indicare tutte le informazioni bibliografiche dei lavori pubblicati e sottomessi/Indicate all references of published and submitted papers)</p>	<p>Upreti D, Huang W, Kong W, Pascucci S, Pignatti S, Zhou X, et al. A Comparison of Hybrid Machine Learning Algorithms for the Retrieval of Wheat Biophysical Variables from Sentinel-2. <i>Remote Sens.</i> 2019;11(5):481.</p> <p>Casa R, Upreti D, Pelosi F. Measurement and estimation of leaf area index (LAI) using commercial instruments and smartphone-based systems. In IOP Publishing; 2019. p. 012006.</p> <p>Casa R, Upreti D, Palombo A, Pascucci S, Yang H, Yang G, et al. Evaluation and Exploitation of retrieval algorithms for estimating biophysical crop variables using Sentinel-2, Venus and Prisma satellite data. <i>J Remote Sens.</i>, submitted.</p> <p>Upreti, D.; Pignatti, S.; Pascucci, S.; Tolomio, M.; Li, Z.; Huang, W. Casa, R.; A comparison of moment-independent and variance-based global sensitivity analysis approaches for wheat yield estimation with the Aquacrop-OS model. <i>Agronomy</i> 2020, 2020;10(4):607.</p> <p>Upreti, D.; Pignatti, S.; Pascucci, S.; Tolomio, M.; Huang, W.; Casa, R. Bayesian Calibration of the Aquacrop-OS Model for Durum Wheat by Assimilation of Canopy Cover Retrieved from Venus Satellite Data. <i>Remote Sens.</i> 2020;12(16):2666</p> <p>Upreti, D.; Pignatti, S.; Pascucci, S.; Tolomio, M.; Huang, W.; Casa, R. Ensemble Kalman Filter based Assimilation of canopy cover retrieved from Sentinel-2 and Venus satellite data into Aquacrop-OS model for improved durum wheat yield estimation in Central Italy, 2020, in preparation.</p> <p>Upreti, D.; Pignatti, S.; Pascucci, S.; Tolomio, M.; Huang, W.; Casa, R. Field Scale Durum Wheat Yield Mapping by</p>

	<p>Assimilating high resolution Venùs satellite images with Aquacrop-OS model, 2020, in preparation.</p> <p>Upreti, D.; Casa, R.; Pignatti, S.; Pascucci, S.; Huang, W; Li, Z; ; Yang, H; ; Yang, G. Influence of Model Calibration and Sensitivity Analysis in a Data Assimilation Framework for Field-scale Crop Yield Mapping Using Biophysical Variables Retrieved from Sentinel-2 and Venùs Satellite Data; 2020, in preparation.</p>
<p>Comunicazioni a congressi/ Conferences communications (Specificare se comunicazioni poster o comunicazioni orali/Specify if poster or oral communications)</p>	<p>POSTER PRESENTATION – II Sentinel-2 Validation Team Meeting, Frascati, Rome, Italy January 2018</p> <p>ORAL PRESENTATION – Dragon 4 Mid Term Results Symposium, Xi’an, China, June 2018</p> <p>ORAL PRESENTATION – MetroAgriFor, Ancona, Italy October 2018</p> <p>ORAL PRESENTATION - Living Planet Symposium, Milan, Italy May 2019</p> <p>ORAL PRESENTATION – Dragon4 Symposium, Ljubljana, Slovenia June 2019</p>
<p>Altre tipologie di pubblicazioni/ Other publications (Specificare/Specify)</p>	<p>NA</p>
<p>Partecipazione a progetti di ricerca/ Participation in research project (Indicare il titolo e la tipologia/Indicate the title and type)</p>	<p>NA</p>
<p>Stage in Italia e/o all'estero/ Internship in Itali and/or abroad (Indicare la località e descrivere brevemente il tipo di attività svolta/Indicate the location and describe briefly the activity carried out)</p>	<p>September 2019 – October 2019 (Joint Project work between EU-Sino Partners) Institute of Remote Sensing and Digital Earth, Chinese Academy of Science, Beijing, China National Engineering Research Center for Information Technology in Agriculture, Beijing, China</p>
<p>Altre attività formative/ Further educationa activities (Indicare la località e descrivere brevemente il tipo di attività svolta/Indicate the location and describe briefly the activity carried out)</p>	<p>REVIEWED PAPERS –</p> <p>Oscro LP, Ramos APM, Pinheiro MMF, Moriya EAS, Imai NN, Estrabis N, et al. A Machine Learning Framework to Predict Nutrient Content in Citrus-Leaves Hyperspectral Measurement. Remote Sens. 2020;</p> <p>Machine learning methods performance in radiative transfer model inversion to retrieve plant traits from Sentinel-2 data of a mixed mountain forest. 2020</p>



UNIVERSITÀ
DEGLI STUDI DELLA
Tuscia

--	--

Data/Date

21 November 2020

Firma/Signature

Debate apriti