



Food and Agriculture
Organization of the
United Nations

5th African Soil Partnership plenary meeting

VIRTUAL MEETING
6-7 JULY 2021

NIGERIA: COUNTRY REPORT OF Global Soil Organic Carbon Sequestration Potential Map

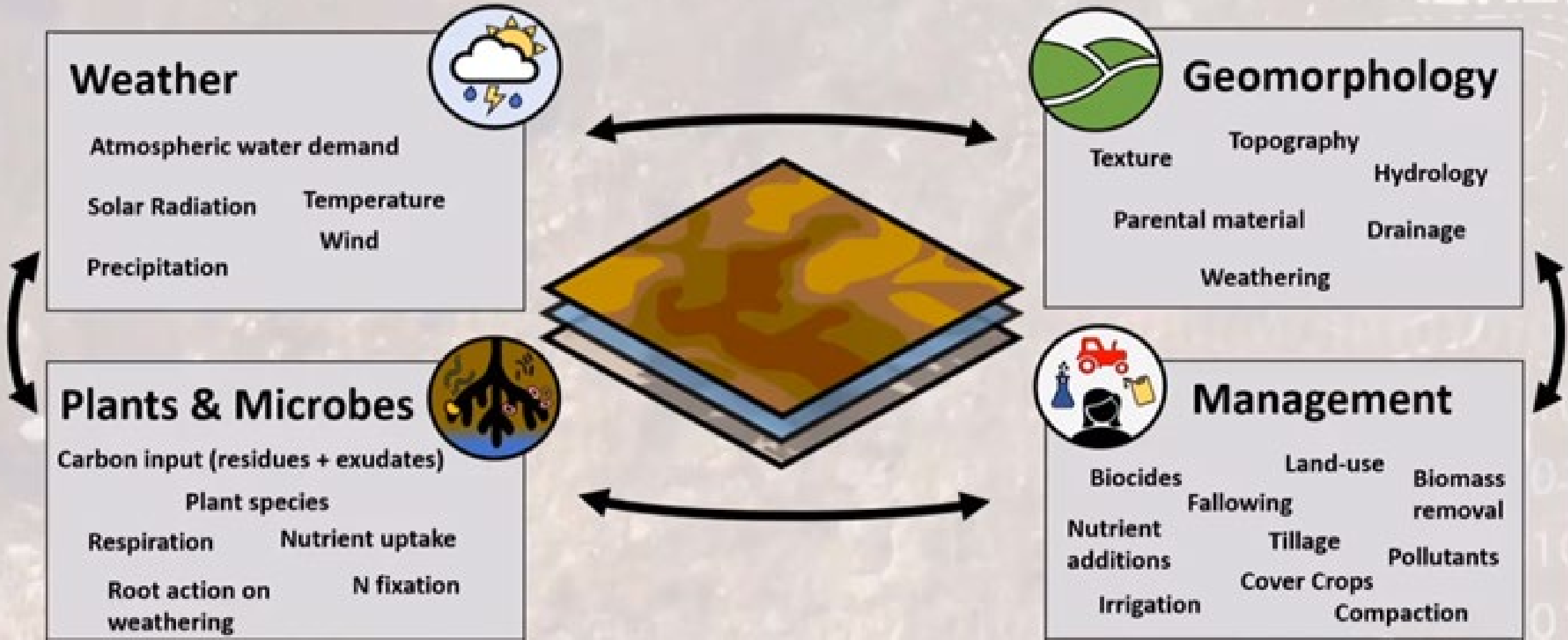
G_{SO}C_{seq}

James Jayeoba



GLOBAL SOIL
PARTNERSHIP

What makes soils dynamic?



Background

- Nigeria was represented at **GSOCseq Africa Workshop - Module I** training held online via Zoom between 14-18 December 2020 by Prof Jayeoba O James, Prof (Mrs) Funmi Ande, Dr Jude Obi and Mr Oderinde Oluwatosin
- The Module I Training workshop ran for 5 days (3 hours/day)
- **Day 1** - Introduction: The GSOCseq Initiative (importance, the process, benefits, timeline), General framework (BAU, SSM1-SSM2-SSM3, Meta-Analysis), Product specifications, discussion and feedback on national capacities;
- **Day 2** - Introduction to sequestration modelling (RothC Basics), Input data requirements; uncertainties, software and tools (R, QGIS and Google Earth Engine to be used during the training);
- **Day 3** - Introduction to R and start running the script (Scripts 0 to 9);
- **Day 4** - Scripts 9-16;
- **Day 5** - Review and interpretation of the results and QA, Preparation instructions for the next session

Instructors:

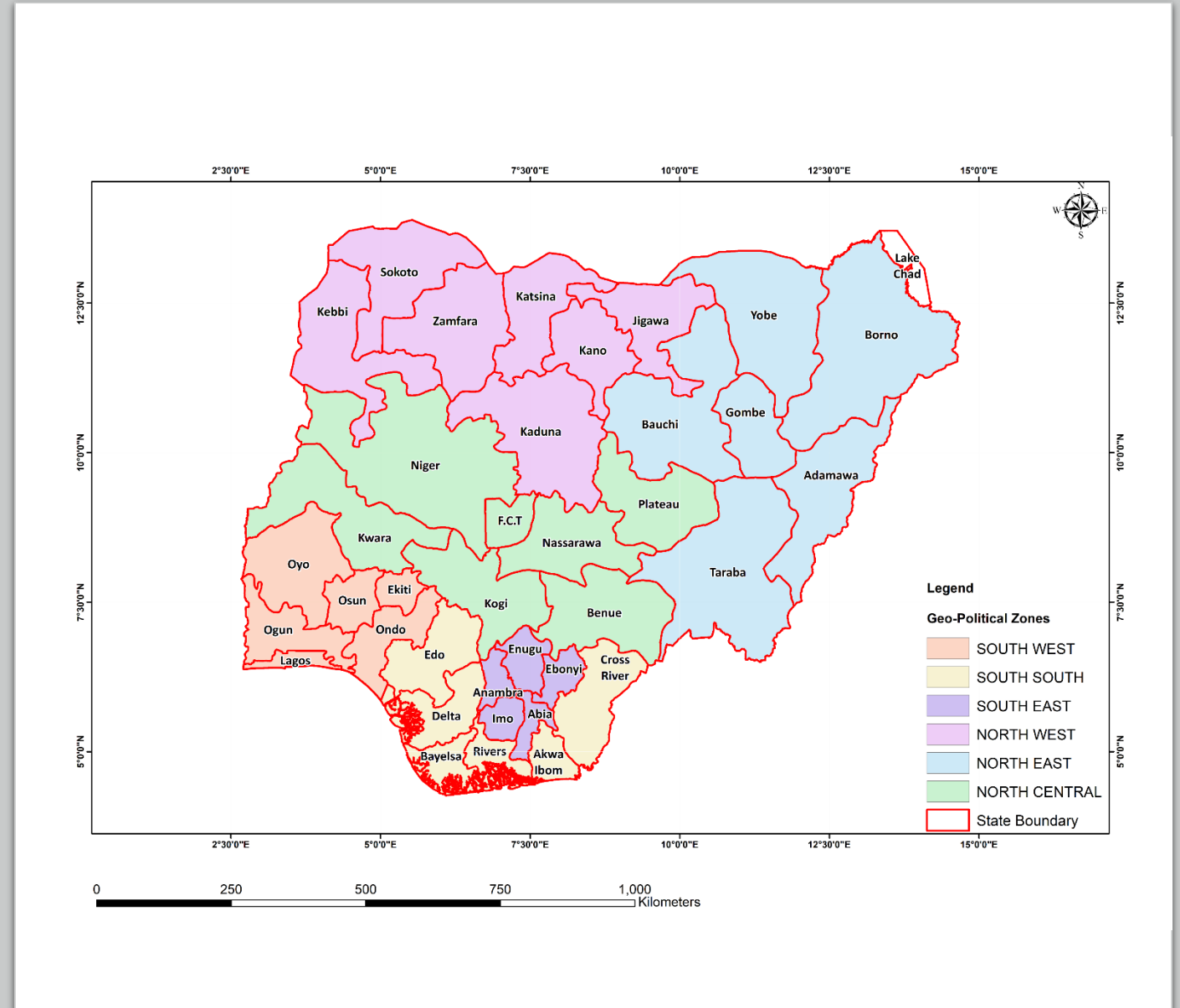
Guillermo Peralta, Luciano di Paolo, Christian Thine, Kostiantyn Viatkin & Isabel Luotto

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Study Area

- Nigeria, with a total area of about 920,768 km², lies between Latitude 4 - 14 °N and longitude 2° - 15°E.
- Nigeria comprises of 6 Geo-political Zones
- Annual rainfall ranges from 500 mm in the Sahelian northern border to around 3000 mm at the coastal border of Niger Delta area.
- Major climatic variations combined with soil variations formed the agroecological zones (AEZs) which extends from tropical humid forest in the south to semi-arid and sahel savanna in the north.
- The environmental and anthropogenic factors across these AEZs give rise to a somewhat north-south gradient in Land use/cover (LULC) across Nigeria
- LULC ranges from sparse vegetation and grassland in the fringes of the northern region, through croplands/savannas/shrublands mosaics in the middle belt region to croplands/shrublands/forests mosaics in the coastal southern region



Module II

One on One Interaction with the Instructors online private sessions – March –May, 2021

- Due to the size of Nigeria's land area – we divided the country into 6 zones (South West, South South, South East, North West, North east and North central)

With the assistance of instructors:

- **The Rasters stacks and other input layers were created individually for the 6 zones using:**
- Terra Climate data (4kmx4km / pixel).
- Land use layers from 2001 to 2018 to simulate the land use changes during the warm up phase.
- The GSOC version 1.6.
- The Clay layer from the ISRIC soilgrids.
- The vegetation cover stack was created using a 0.3 . threshold

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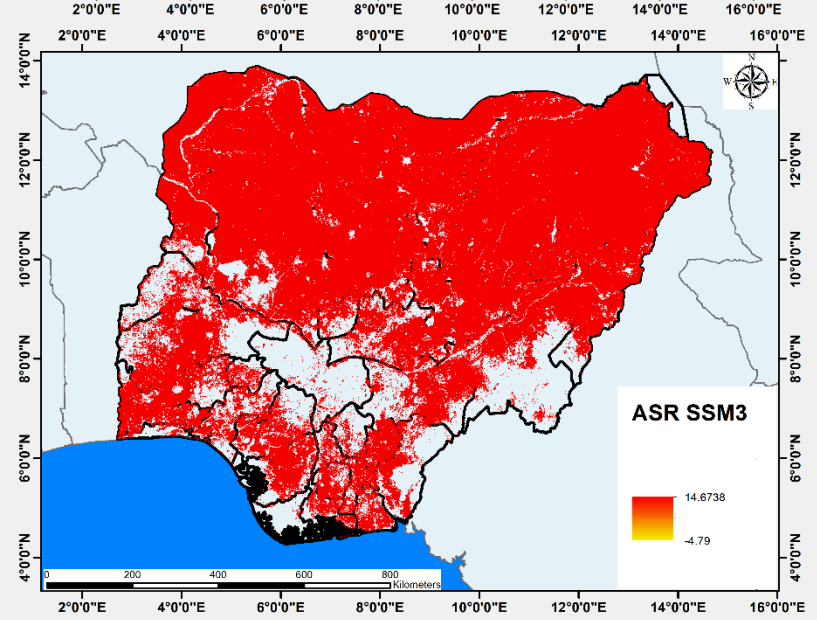
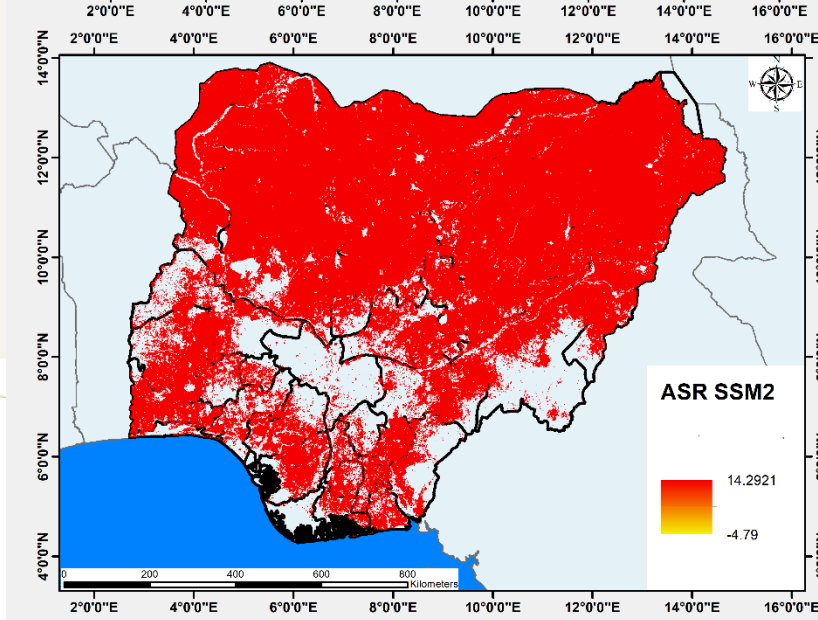
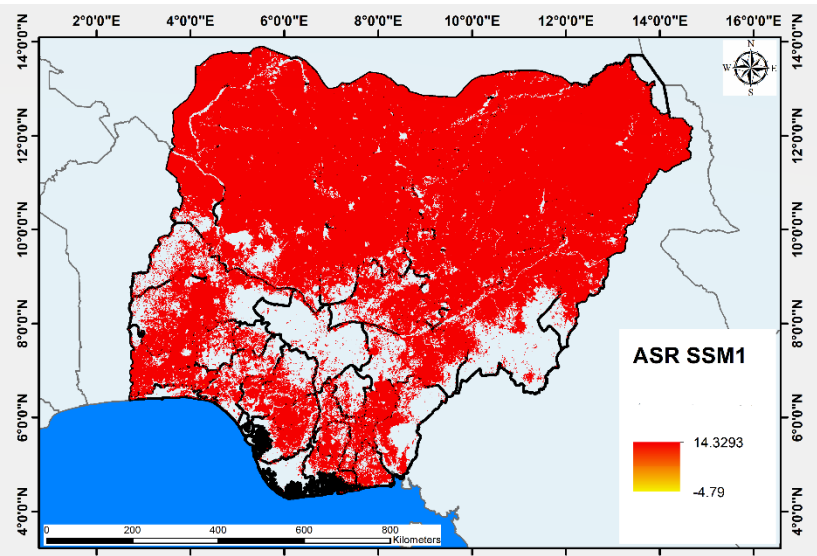
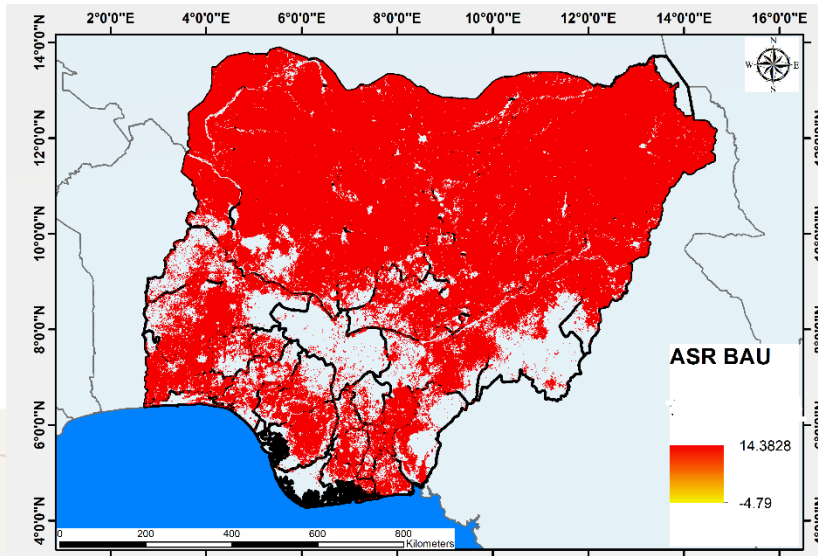


Solving Differential Equation (Nigeria Experience)

- Using the default method to solve the differential equations from the soilassessment package (Isoda), we ran the scripts across the zone with a rather slow system.
- The process took over 60 days to complete, however error of 0 value points were observed in all the zones
- With the assistance of Isabel, the 0 value points were isolated across the zones and were re-ran using a new version of script 13, 14 and 15, with the SoilR package (Dechow method for the Spin up and the Euler method for the warm up and forward phase).
- Though this method was much more slower than Isoda, it was less tedious due to the intervention of Prof V O Chude who Provided a better system (Intel(R) Core(TM) i5-8265U CPU @ 1.60GHz, 1800 Mhz, 4 Core(s), 8 Logical Processor(s) 12GB Ram)
- This process took another over 30 days to complete

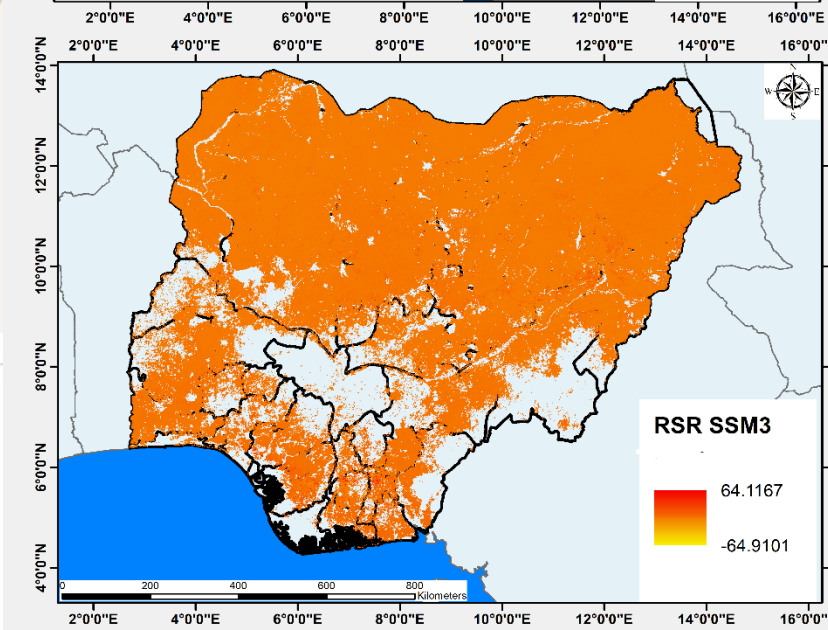
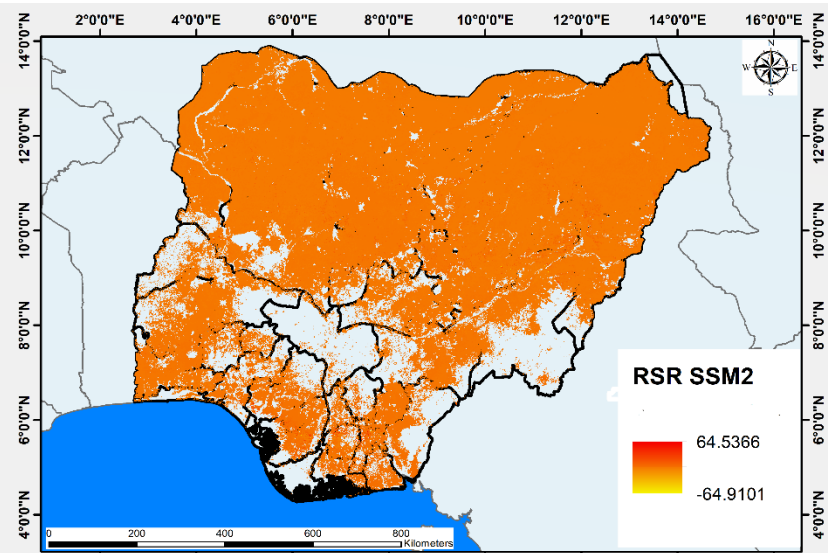
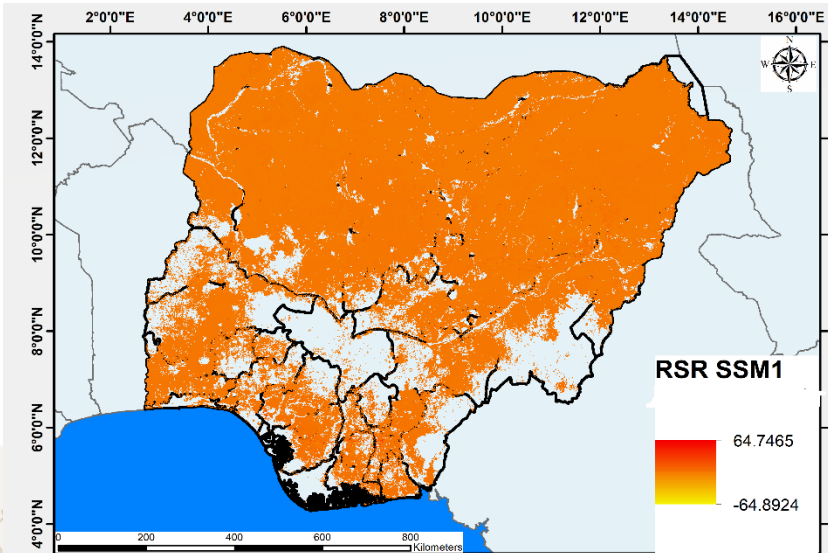
Merging the Outputs from the Zones

- Again with the assistance of Isabel, a new script for merging the zonal products into one for the country was developed and successfully ran.
- All the expected outputs were successfully produced for the Country (though Process of Quality assurance is on going.)



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