Renewable energy potential maps for Lesotho
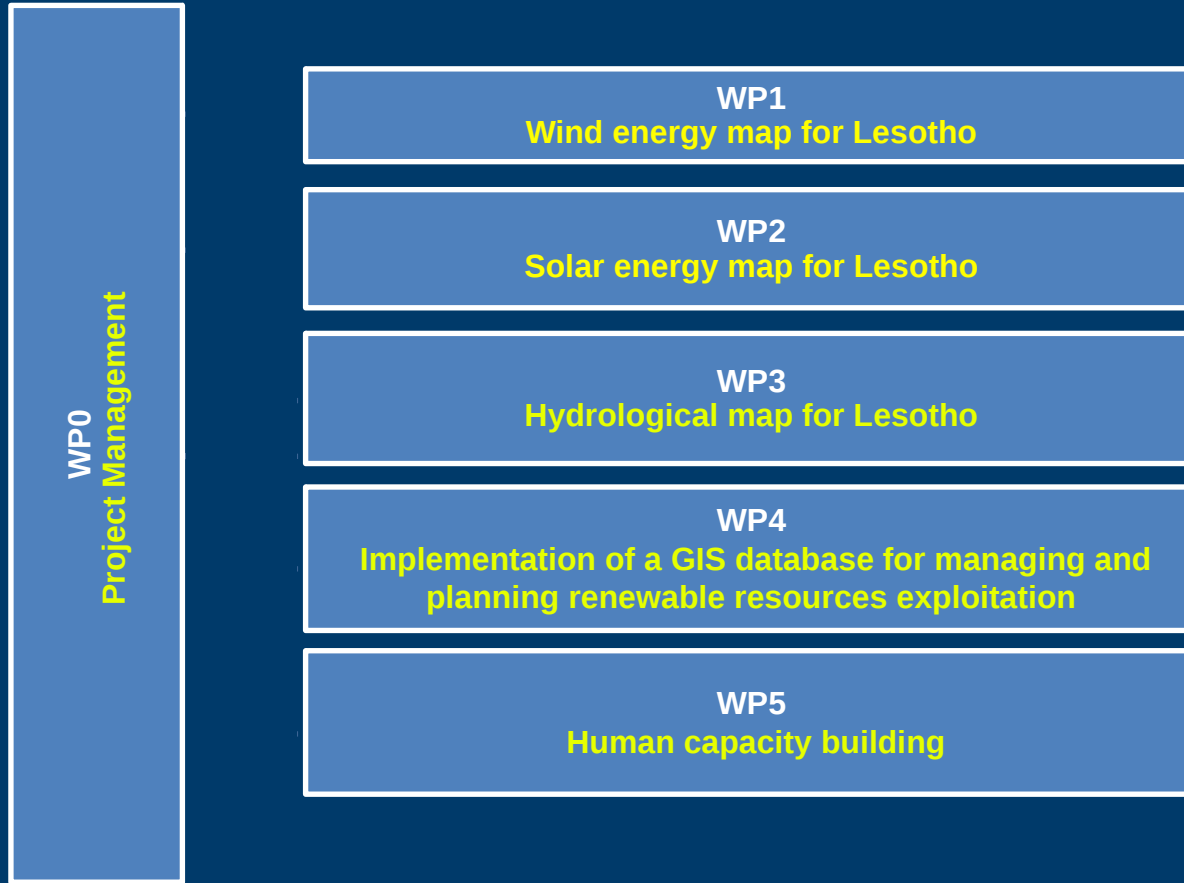
Massimo.D'Isidoro,Guido Guarnieri
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Project Work Packages (March 2018 – March 2020)

WP0
Project Management

WP1
Wind energy map for Lesotho

WP2
Solar energy map for Lesotho

WP3
Hydrological map for Lesotho

WP4
Implementation of a GIS database for managing and planning renewable resources exploitation

WP5
Human capacity building

Solar PV and wind energy maps production

- Solar and wind energy maps were produced by means of the WRF meteorological model.

- One test year WRF hourly simulations at 1km horizontal resolution were performed on ENEA CRESCO HPC facility

- Final maps will rely on 30 years WRF years simulation

WRF application for solar and wind energy

1. One test year (2015)

2. Repeated in four different configurations

3. Comparison with available observations

4. Best model configuration chosen (best statistical scores) to perform 30 years simulation before the end of the project

WRF application within the project

- 2-way nesting configuration, 3 domains:

  - d01: 15km grid spacing

  - d02: 5km

  - d03: 1km

	d01	d02	d03
NLON	85	211	256
NLAT	66	191	274
LEVELS	38	38	38

ECMWF ERA5 reanalysis at boundary (30km, hourly)

https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5

ENEA
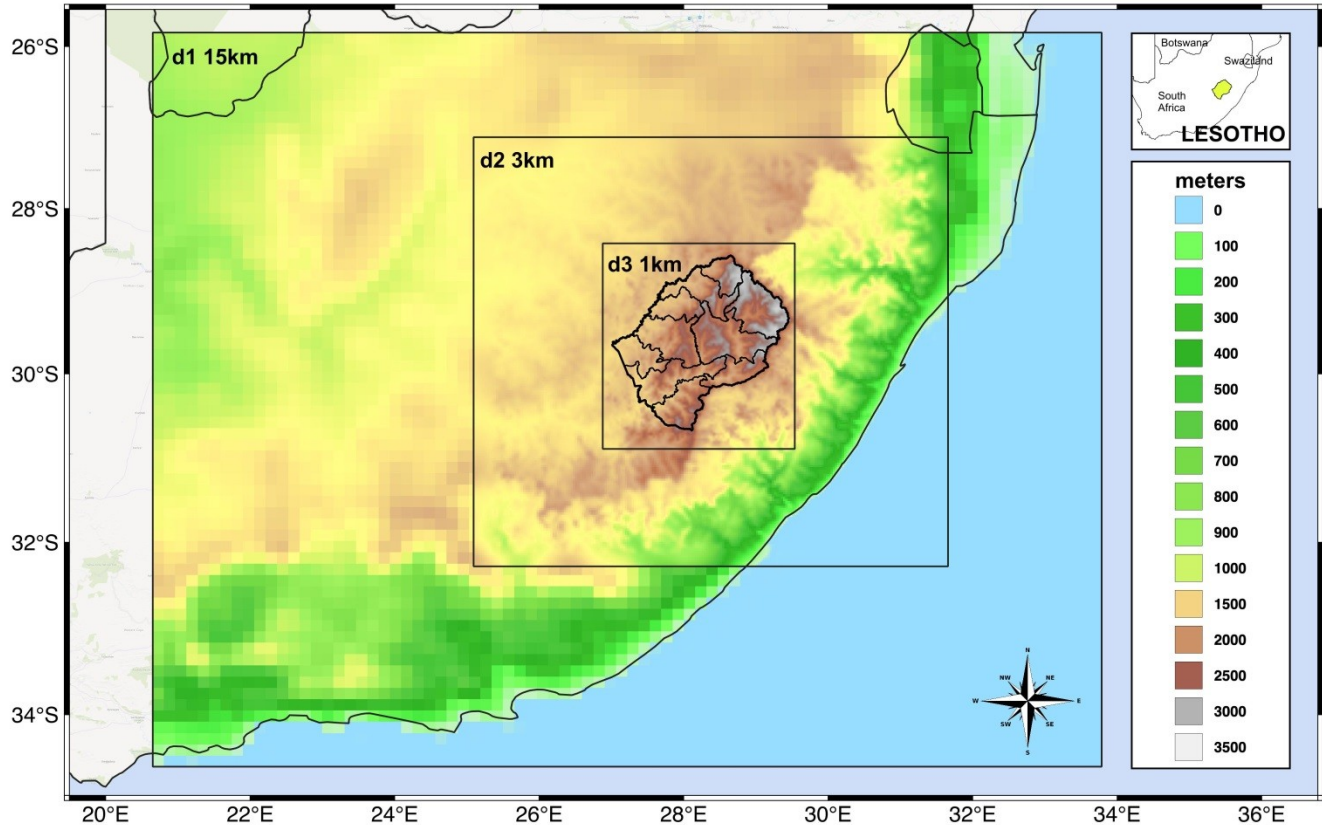
Maseru, 25 February 2020

WR

- 2-way n
  - d01: 1
  - d02: 5
  - d03: 1

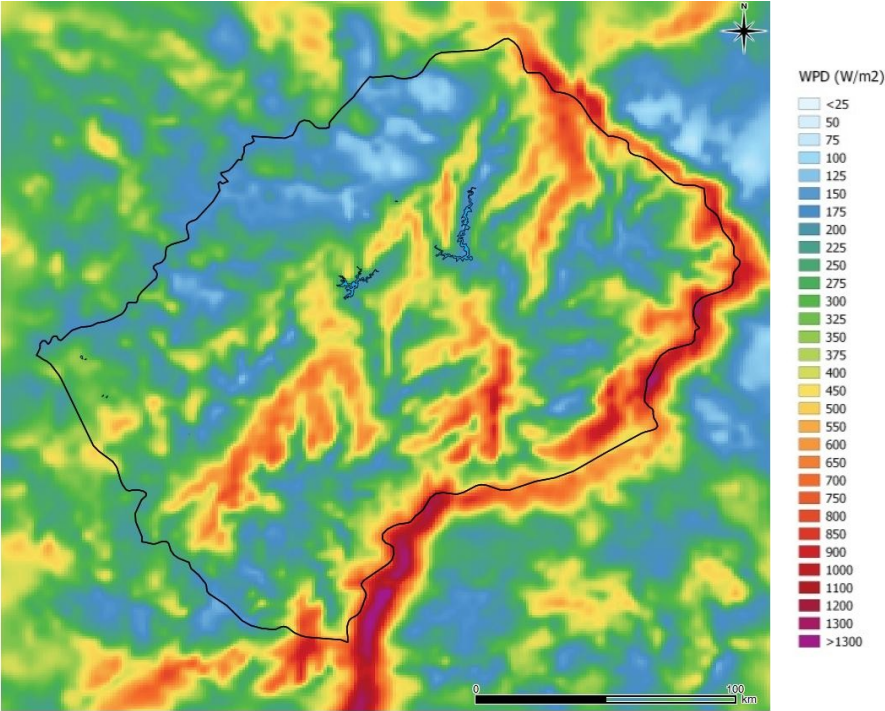ECMWF ER

https://www.

WRF application within the project

Storage(HPC high speed parallel storage, DDN-GPFS)

- One year (hourly outputs) -> 1.7TB, 4 configurations: 6.8TB

Computational time

- Simulations performed over CRESCO6 cluster (224 cores)

- 1 simulated day in 70 min. -> one year in 18 days

Results: preliminary wind power density produced for one year (2015)

Results: preliminary photovoltaic power produced for one year (2015)