Climate data for an early warning system against sandfly-borne diseases

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Early-warning for surveillance and sandfly-borne disease-related risks forecast is one of the main goals for CLIMOS. These insects (*phlebotomine sand flies*), transmission vectors for diseases such as leishmaniasis, were mainly found around Mediterranean Europe, but displacement towards Northern parts of that geographical area have been documented in recent times.

In order to develop this early-warning system, we would need to identify and quantify climate and environmental factors influencing the sandfly vector population and allowing for their expansion, both from a timeframe and a geographical perspective.

A forecast of such factors would allow us to anticipate the presence of these insects over different timescales – from the coming weeks to the coming decades. The inclusion of these timescales in a single early-warning system undoubtedly constitutes a great scientific and technical challenge for the project.

Thus, CLIMOS will make an intense use of a wide range of climate data that will allow the achievement of the following goals:

- Identifying the most relevant climate factors using a combination of observed climate data.
- Forecasting the presence of sandflies in the short term (over the following seven days) and in the mid term (over the following month).
- Anticipating risks derived from climate change using model simulations results, taking into account different scenarios of greenhouse gas emission.

This data heterogeneity requires from the use of common methodologies and procedures granting scientific exactitude for the

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results. Among other aspects, CLIMOS is paying special attention to official sources and the adoption of the FAIR principles, as well and uncertainty, regionalisation and validation, on which we elaborate below.

Official, open data sources will be used whenever possible. These sources include data provided by the Copernicus Climate Change Service (for example, its seasonal forecast system) and climate projections created by international initiatives such as the Coupled-Model Intercomparison Project, v.6 (CMIP6) or regional simulations by EURO-CORDEX.

The use of open data allows CLIMOS to adopt the **FAIR principles** to grant findability, accessibility, interoperability and reusability of the project outcome.

The different climate data sources suggested present intrinsic features and limitations. For example, an accurate quantification of **uncertainty** is essential over seasonal or climatic timescales.

On the other hand, the use of techniques for information **regionalisation** is vital to transfer information produced by climate models (generally working on tens-of-kilometres spatial scales) to a local scale.

Lastly, of course, the use of **validation** processes for each data source would allow to quantify the forecasting capacity of the early-warning system over different timescales.

All these methodologies will set the foundations for CLIMOS to provide its data scientists with the best possible climate data available aiming to create a state-of-the-art early-warning system.

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