#### ANALYSIS

All data stored at Climate Wikience are directly accessible from R analysis environment. It contains over 5000 packages to



e.o -

0.8

0.7

0.6

date including spatial analysis, time series processing, environmental modeling and much more <u>http://www.r-project.org/</u>

10 wind sod





The diagram center corresponds to zero wind speed which increases radially outward.

Risk of moderate air pollution by SO<sub>2</sub> \*

THE SET OF VARIABLES VISIBLE TO A USER AND R CONNECTIVITY ARE PROVIDED ON DEMAND.

# ACCESS TO DATA SAMPLES

## WWW.WIKIENCE.ORG

### TRACE GASES

 $O_3$ ,  $H_2O$ ,  $SO_2$ ,  $CH_4$ ,  $N_2O$ ,  $NO_2$ , HCHO,  $CO_2$ , CO, BrO, OCIO, Aerosol, CFC-11, CFC-12

### METEOROLOGY

Over 80 variables: atmosphere, ocean, soil temperature; pressure; albedo; clouds, soil, water properties; wind speed and direction; precipitation, evaporation,...

## VEGETATION

NDVI, SRI, EVI, LAI, SGI, FPAR, ARVI, RENDVI, MRESRI, VREI, REPI, PRI, SIPI, RGRI, NDNI, CAI, ...

1 HR – 1 DAY UP 9×14 KM GLOBALLY

# **CLIMATE WIKIENCE**

### LARGE GEODATA VOLUMES



### ACCESS 3D VISUALIZATION ANALYSIS

700+ datasets TBs of data Reanalysis Remote sensing Interactive Intuitive 3D isolines 3D surfaces 3D markers

5000+ packages Spatial Time series Modeling and more

101271,5





01328.0

Monthly  $CO_2$  concentration (ppm) at Ukraine (47°, 35°), solid, and tropics (-11°, 15°), dash. Built using AIRS satellite radiometer data.



The seamless access from R to data available at Climate Wikience allows to forget about NetCDF, HDF, Grib, etc., their big volumes and concentrate on data.

#### **R** code sample for above CO<sub>2</sub> chart:

1 library(RWikience)
2 w <- WikienceConnect()
3 t go2 <- readTimeSeries)</pre>

Mean differences of CO<sub>2</sub> trends (7 years of global daily satellite data processed)\*



**Risk of moderate air pollution by nitrogen dioxide (NO<sub>2</sub>).** The map resolution is ~27,5×18 km. To build the map, daily Aura NO<sub>2</sub> satellite data from 01.10.2004 to 20.06.2012 were processed.



Air pollution risk is defined as the probability of observing a pollutant concentration in a given interval over the territory under investigation\*.



\* **Rodriges Zalipynis R.A.** The place of Ukraine in Europe according to the level of air pollution using Earth remote sensing data, Proceedings of IV All-Ukrainian Congress of Ecologists with International Participation, Vinnytsia, Ukraine, 25 - 27 September, 2013. – 552 pp. – P. 130 – 132. Available at

### www.wikience.org/rodriges

### **ChronosServer**

The Climate Wikience backend, ChronosServer, runs on a computer cluster of commodity hardware and possess scalability, high availability, and fault tolerance properties. It works with diverse storage formats "in-situ" while it was designed and implemented to be inherently distributed. This is the first system combining both in-situ and distributed approach. \*

\* Rodriges Zalipynis R.A., ChronosServer: realtime access to "native" multi-terabyte retrospective data warehouse by thousands of concurrent clients. Informatics, cybernetics and computer engineering, pp. 151–161. Vol. 14 (188), Donetsk, DonNTU, 2011.

Climate Wikience was supported by Civilian Research and Development Foundation (CRDF) of the United States of America during 2011–2013, grant № UKM1-2973-DO-09.

It was a joint research project of Donetsk National Technical University (Ukraine) and University of Minnesota (USA).



Climate Wikience architecture, presented analysis, brochure design by Antonio Rodriges

rodriges@wikience.org