satin: a R package for extracting and visualizing satellite data for oceanographic applications

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While physical oceanographers program their own functions (mostly in MATLAB©) to handle remote sensing data like sea surface temperature, chlorophyll concentration and sea wind speed, and although other commercial software also exists for this purpose, the R package _sat_ellite _i_mage _n_avigator (_satin_) aims to provide an easy-to-use –yet flexible– set of functions for the non-expert to extract and display level 3 satellite data for use in oceanographic applications. Currently, data from AVHRR, Aqua MODIS, SeaWiFS and QuikSCAT sensors are supported by _satin_, these are provided by NASA as Hierarchical Data Format files (HDF4) as either uncompressed or compressed format. Our extraction functions depend on the package _hdf5_, thus data files must be previously converted to HDF5 format, which can be achieved with the tools provided by the HDF Group (`http://www.hdfgroup.org/h4toh5`). By providing the file name to be read and the geographic limits for the area of interest (from -90 to 90 degrees of latitude and from -180 to 180 degrees of longitude), _satin_ extraction functions return an object of class "list" with longitude and latitude vectors and the corresponding oceanographic parameter matrix rescaled to appropriate units according to attributes in the HDF file. The extracted data are then available for further analysis (e.g. obtaining isotherms) or can be pass to _satin_ display functions to create georeferenced maps with a suitable colour palette and scale bar by specifying a minimum of input arguments. The display functions are flexible enough to allow the use of customized colours and maps for the more experienced users. The use of the package _satin_ is illustrated with examples from the northwestern Mexico area.