

# How to use the WTSS client for R

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## 1 Introduction

The Web Time Series Service (WTSS) is a lightweight web service which is able to retrieve remote sensing imagery as time series. WTSS bridges the gap between remote sensing applications and their data-access through a simple representation of time series data. The service main goal is to bring to remote sensing research community an easy way for accessing and consuming satellite imagery data in the form of time series, saving researchers' time when dealing with a huge volume of data.

This web service is integrated into *R* through the package *wtss*. This document explains the basic functionality of the *wtss* package.

## 2 Explore the service

To explore the contents of a *WTSS*, you need to create a client object by providing the URL of the service and then using the function for listing coverages:

```
> library(wtss)
> # create a connection using a serverUrl
> server <- wtss::WTSS("http://www.esensing.dpi.inpe.br/wtss/")
> # get the list of coverages provided by the service
> coverages <- wtss::listCoverages(server)
> #print coverages
> coverages

[1] "MOD13Q1"
```

Then, you can ask for a detailed description of any of the coverages provided by the service:

```
> # get the description of the MOD13Q1 coverage
> cv <- wtss::describeCoverage(server, "MOD13Q1")
> # print information about the data
> cv$MOD13Q1$description
```

```
[1] "Vegetation Indices 16-Day L3 Global 250m"
```

```
> # print informaton about the coverage bands  
> cv$MOD13Q1$attributes
```

	name		description	datatype	valid_range.min	valid_range.max
1	mir	250m 16 days	MIR reflectance	int16	0	10000
2	blue	250m 16 days	blue reflectance	int16	0	10000
3	nir	250m 16 days	NIR reflectance	int16	0	10000
4	red	250m 16 days	red reflectance	uint16	0	10000
5	evi	250m 16 days	EVI	int16	-2000	10000
6	ndvi	250m 16 days	NDVI	int16	-2000	10000

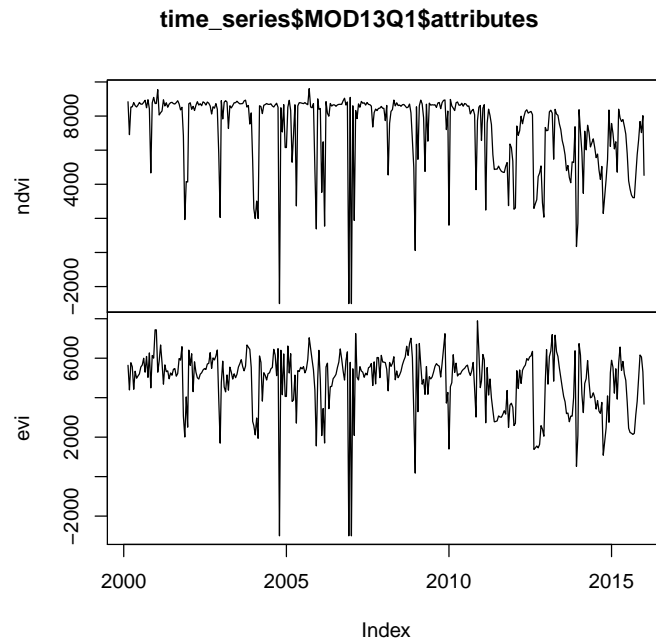
  

	scale_factor	missing_value
1	1e-04	-1000
2	1e-04	-1000
3	1e-04	-1000
4	1e-04	-1000
5	1e-04	-3000
6	1e-04	-3000

### 3 Retrieve data

To retrieve data, you need to specify the coverage names, the bands, latitude and longitude and the time interval :

```
> # get a time series for the "ndvi" attribute  
> time_series <- wtss::timeSeries(server, coverages = "MOD13Q1", attributes=c("ndvi", "evi"),  
+                               latitude=-10.408, longitude=-53.495,  
+                               start_date="2000-02-18", end_date="2016-01-01")  
> # plot the time series  
> plot (time_series$MOD13Q1$attributes)
```



The time series can then be used together with other packages in R. Please take a look at demos provided with the WTSS package, which show how to use a time series of the NDVI index together with different packages to detect when deforestation occurred in the Brazilian Amazon rain forest.