

Appendix S2 - Compile Landcover Covariates

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If need be, install the `MODISTools2` package. Please note that older versions of `MODISTools` may have problems with broken links! We have found it is better to remove old versions first and install the most up-to-date version

```
remove.packages("MODISTools")
install.packages("https://modis.ornl.gov/files/modissoapservice/MODISTools2.tar.gz",
  repos = NULL, type = "source")
```

Or, if you prefer manual installation, you can manually download `MODISTools2.tar.gz` here (https://modis.ornl.gov/data/modis_webservice.html)

```
install.packages("yourfilepath/MODISTools2.tar.gz",
  repos = NULL, type = "source")
```

Load the previously compiled BBS data from `Appendix_S1`

```
load("./BBS.Data.cleaned/BBS.2003-2009.filtered.Rdata")
```

Gather lats and longs for collecting MODIS landcover data from each unique site

```
coordinates <- data.frame(lat = latlon[, 2], long = latlon[,
  1])
```

Find unique sites

```
library(dplyr)
uniq.coordinates = coordinates %>% group_by(lat, long) %>%
  distinct()
```

Source functions needed for MODIS downloading and processing from NJ Clark's GitHub account

```
source("https://raw.githubusercontent.com/nicholasjclark/
  LandcoverMODIS/master/R/Landcover_functions.R")
```

Download data for the specified years (but don't include years 2010-2012, these are not accessible). This stores the raw downloaded data in a new `LandCover` folder within your working directory. Note that the input `coordinates` file must have colnames `lat` and `long`. Also note that landcover downloads struggle if we access more than ~100 points at a time (depending on your system). Downloading multiple subsets over time is safer

```
download_landcover(years_gather = c(2003:2009), coordinates = uniq.coordinates[1:100,
  ])
```

Repeat the above function until all of the necessary files have been downloaded. Once ALL of the necessary files are downloaded, summarise them. But please not, you should not summarise before all necessary raw files are downloaded (raw files get deleted!). This function writes a `.csv` summary file in the `LandCover` folder and deletes the raw files

```
summarise_landcover()
```