SIMANFOR

Model for *Pinus radiata* stands Galicia (Spain)

Model

Pradiata_stand__gal__v01.py

Model description

- Specie: *Pinus radiata* D. Don
- Spanish Forest Inventory (SFI) code: 28
- Geographical area: Galicia
- Geographical area (administrative): A Coruña, Lugo, Ourense and Pontevedra

Model type

- Category: stand growth
- Model level: stand
- Reproduction methods: seedling forest
- Stand structure: even-aged stands
- Species composition: monospecific stands
- Forest origin: plantation

Model requirements and recommended use

- Initial inventory requirements: age, dominant height and density of the plot
- Geographical area: Galicia, closer places and another places with similar characteristics (assuming differences)
- Stand type: monospecific stands
- Execution recommended time: 1 year executions (survival, growth and ingrowth equations developed by using that criteria)
- Site Index is defined as top height at a base age of 20 years

Figure 1: *Pinus radiata*

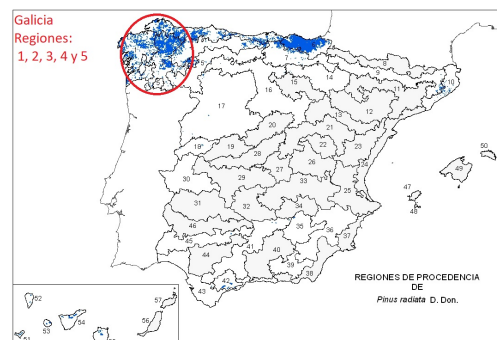Figure 2: Details of *Pinus radiata*

Figure 3: Provenance regions of *Pinus radiata* in Spain

1

Bibliography

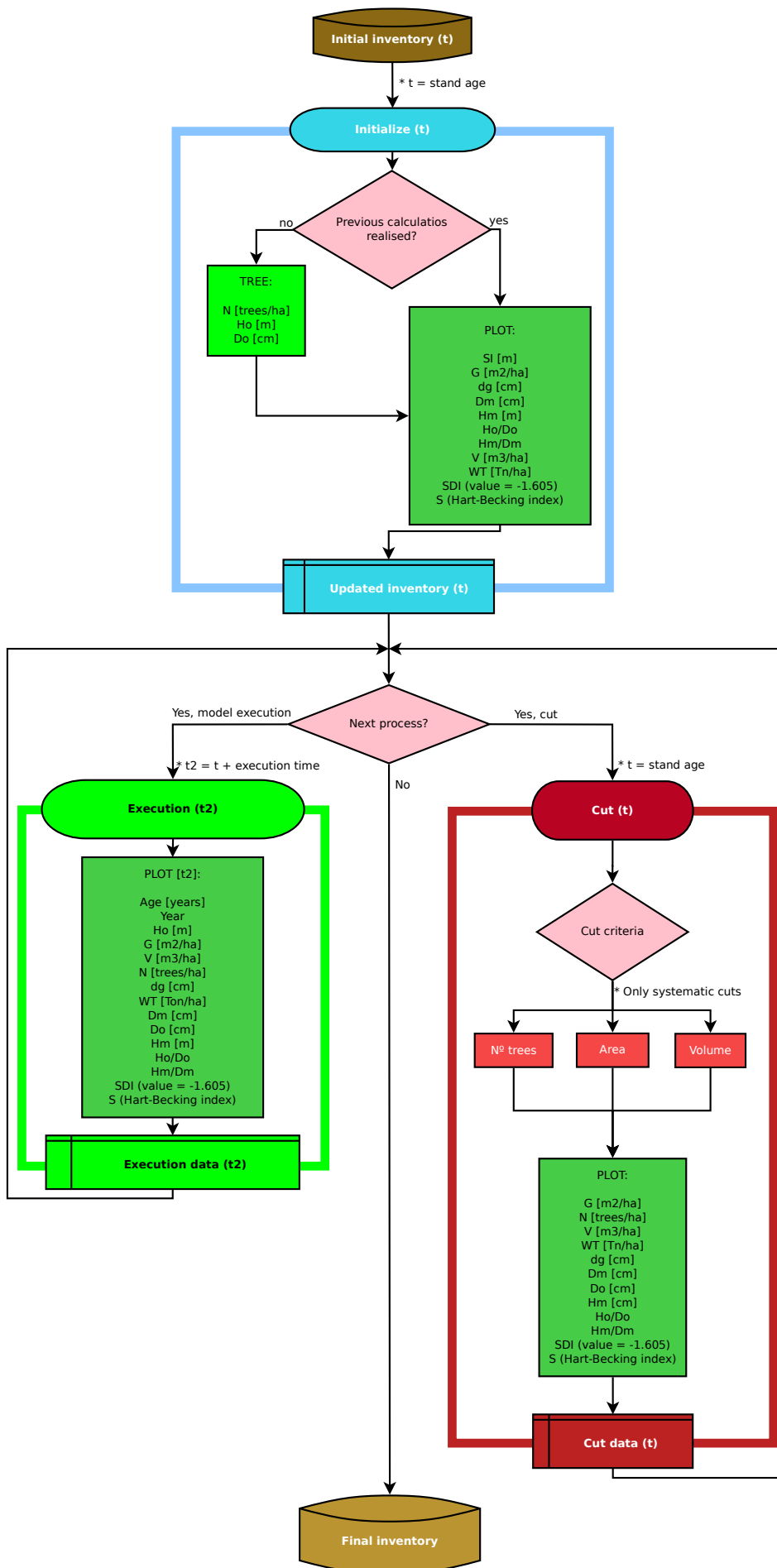**Complete SIMANFOR model recommended citation):**

SIMANFOR (2022). Stand growth model for radiata pine (*Pinus radiata*) in Galicia (Spain).

Model components:

- **Calculations by using tree data** (just in cases when that information is not available at the initial inventory):
  Density and Dominant Height

- **Site Index equation**:
  Diéguez-Aranda U, Burkhart H, Rodríguez-Soalleiro R (2005). Modeling dominant height growth of radiata pine (Pinus radiata D. Don) plantations in north-western Spain. Forest Ecology and Management, 215(1-3), 271-284

- **Dominant Height Growth equation**:
  Diéguez-Aranda U, Rojo A, Castedo-Dorado F, et al (2009). Herramientas selvícolas para la gestión forestal sostenible en Galicia. Forestry, 82, 1-16

- **Survival equation**:
  Diéguez-Aranda U, Rojo A, Castedo-Dorado F, et al (2009). Herramientas selvícolas para la gestión forestal sostenible en Galicia. Forestry, 82, 1-16

- **Initial and Growth Basal Area equation**:
  Diéguez-Aranda U, Rojo A, Castedo-Dorado F, et al (2009). Herramientas selvícolas para la gestión forestal sostenible en Galicia. Forestry, 82, 1-16

- **Initial and Growth Volume equation**:
  Diéguez-Aranda U, Rojo A, Castedo-Dorado F, et al (2009). Herramientas selvícolas para la gestión forestal sostenible en Galicia. Forestry, 82, 1-16

- **Mean Height and Diameter equation**:
  Diéguez-Aranda U, Rojo A, Castedo-Dorado F, et al (2009). Herramientas selvícolas para la gestión forestal sostenible en Galicia. Forestry, 82, 1-16

- **Biomass equation**:
  Diéguez-Aranda U, Rojo A, Castedo-Dorado F, et al (2009). Herramientas selvícolas para la gestión forestal sostenible en Galicia. Forestry, 82, 1-16

- **Quadratic Mean Diameter, Hart and Reineke Index equations**:
  Standard equations

- **Harvest equations**:
  Harvest equations developed by using equations mentioned before.

Figures:

- **Figure 1:** licensed under CC BY 2.0, `https://commons.wikimedia.org/w/index.php?curid=550387`

- **Figure 2:** by 'Manual de selvicultura del Pino Radiata en Galicia', website:
  `http://www.agrobyte.com/publicaciones/pinoradiata/cap1.html`

- **Figure 3:** extracted from MAPA

```
                    ┌─────────────────────┐
                    │  Initial inventory (t) │
                    └─────────────────────┘
                              │
                              │ * t = stand age
                              ▼
                    ┌─────────────────────┐
                    │     Initialize (t)     │
                    └─────────────────────┘
                              │
                              ▼
                    ◇ Previous calculatios ◇
           no  ◄────    realised?    ────► yes
            │                                  │
            ▼                                  ▼
   ┌──────────────┐              ┌─────────────────────┐
   │ TREE:        │              │ PLOT:               │
   │              │              │                     │
   │ N [trees/ha] │              │ SI [m]              │
   │ Ho [m]       │              │ G [m2/ha]           │
   │ Do [cm]      │              │ dg [cm]             │
   └──────────────┘              │ Dm [cm]             │
            │                    │ Hm [m]              │
            └──────────────┐     │ Ho/Do               │
                           │     │ Hm/Dm               │
                           │     │ V [m3/ha]           │
                           │     │ WT [Tn/ha]          │
                           │     │ SDI (value = -1.605)│
                           │     │ S (Hart-Becking index)│
                           │     └─────────────────────┘
                           │                │
                           ▼                ▼
                    ┌─────────────────────┐
                    │ Updated inventory (t)  │
                    └─────────────────────┘
                              │
                              ▼
                    ◇    Next process?    ◇
 Yes, model execution ◄──────        ──────► Yes, cut
          │                   │ No                │
          ▼                   │                   ▼
 * t2 = t + execution time    │          * t = stand age
          │                   │                   │
          ▼                   │                   ▼
 ┌─────────────────┐          │          ┌─────────────────┐
 │  Execution (t2)  │          │          │     Cut (t)      │
 └─────────────────┘          │          └─────────────────┘
          │                   │                   │
          ▼                   │                   ▼
 ┌─────────────────┐          │          ◇   Cut criteria   ◇
 │ PLOT [t2]:       │          │                   │
 │                  │          │      * Only systematic cuts
 │ Age [years]      │          │                   │
 │ Year             │          │       ┌───────────┼───────────┐
 │ Ho [m]           │          │       ▼           ▼           ▼
 │ G [m2/ha]        │          │   ┌────────┐ ┌────────┐ ┌────────┐
 │ V [m3/ha]        │          │   │Nº trees│ │  Area  │ │ Volume │
 │ N [trees/ha]     │          │   └────────┘ └────────┘ └────────┘
 │ dg [cm]          │          │       │           │           │
 │ WT [Ton/ha]      │          │       └───────────┼───────────┘
 │ Dm [cm]          │          │                   ▼
 │ Do [cm]          │          │          ┌─────────────────┐
 │ Hm [m]           │          │          │ PLOT:           │
 │ Ho/Do            │          │          │                 │
 │ Hm/Dm            │          │          │ G [m2/ha]       │
 │ SDI (value=-1.605)│         │          │ N [trees/ha]    │
 │ S (Hart-Becking  │          │          │ V [m3/ha]       │
 │    index)        │          │          │ WT [Tn/ha]      │
 └─────────────────┘          │          │ dg [cm]         │
          │                   │          │ Dm [cm]         │
          ▼                   │          │ Do [cm]         │
 ┌─────────────────┐          │          │ Hm [cm]         │
 │ Execution data (t2)│        │          │ Ho/Do           │
 └─────────────────┘          │          │ Hm/Dm           │
                              │          │ SDI (value=-1.605)│
                              │          │ S (Hart-Becking index)│
                              │          └─────────────────┘
                              │                   │
                              │                   ▼
                              │          ┌─────────────────┐
                              │          │  Cut data (t)   │
                              │          └─────────────────┘
                              │                   │
                              ▼                   │
                    ┌─────────────────────┐       │
                    │   Final inventory     │◄──────┘
                    └─────────────────────┘
```

Contacts

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Interest Links

SIMANFOR - Support system for simulating Sustainable Forest Management Alternatives. Accessed 11 May 2021, in `https://www.simanfor.es/`

iuFOR - Sustainable Forest Management Research Institute UVa-INIA. Accessed 11 May 2021, in `http://sostenible.palencia.uva.es/`

ETSIIAA Palencia - Higher Technical School of Agricultural Engineering of Palencia. Accessed 11 May 2021, in `http://etsiiaa.uva.es/`

UVa - University of Valladolid. Accessed 11 May 2021, in `https://www.uva.es`