# ARIAFire
# Inside OASIS Climate-KIC project







**ARIA in collaboration with:**
- Imp. College, ForestRe, Willis (UK)
- IUSTI, XLB Courtage (FR)
-Univ Fed Parana, Klabin SA (BR)

## A large R&I project sponsored by Climate-KIC and Lloyd's, to develop a new paradigm of risk calculation for insurance/reinsurance

### 3 components:

**1/ a transparency-compliant open-source version of a cat model** (working on massive-parallel SQLversion by IBM), developed by a UK non-profit company OASIS-LMF

**2/ the maintenance/update/connex services/emarketplace managed by a UK profit company Palm Tree**

**3/an increasing number of pluggable expert modules of hazard/vulnerability on insured risks (Earth quake, floods, fires,...),** fully documented on the methods and assumptions used
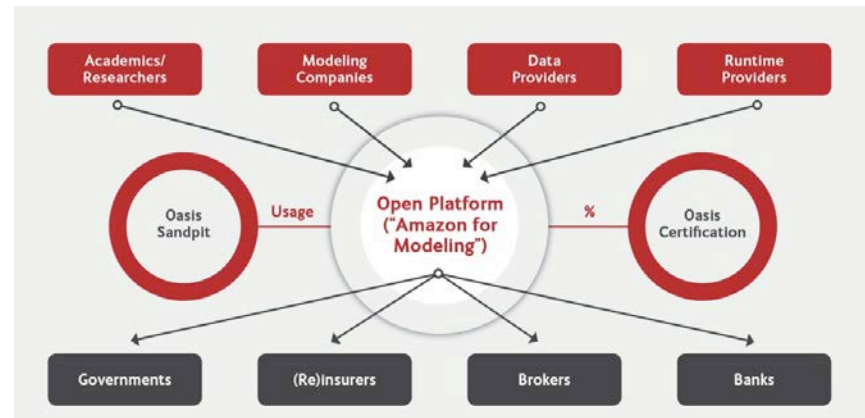


| KIC Partner | Project | Mentor | Hazard | Vulnerability |
|---|---|---|---|---|
| Imperial Physics | China Typhoon | Catlin | x | |
| Imperial Civil | Tropical rain | Willis | x | |
| IPSL/CEA | European Wind Storm | AXA | x | |
| ARIA | Fire / Flood | Willis/CCR | x | |
| TU Delft | Flash flood | Achema | | x |
| Deltares | Dutch Flood | GuyCarp | | x |
| PIK | Central European Flood | Allianz | x | |
| GfZ | Probabilistic Flood Damage | Munich Re | | x |
| Global Climate Forum | Coastal flood | Swiss Re | | x |
| DTU | Nordic flood | Tryg Skade | | x |

Interviews of brokers (London, Sao Paulo, France), analysis conducted with partner ForestRe, has shown that:

- Risk perception for commercial and municipal forestry is based on **retrospective average loss**

- The 'average loss ' **hides huge volatility** and can lead to over-confidence

- Forest fires are slightly manageable, but **potential of control/suppression is often over-estimated**

**Losses in Australian wood company**
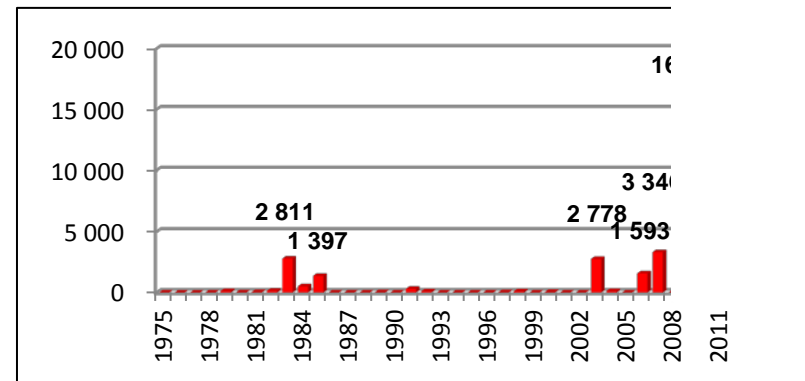


Developing risk perception based not only on past events but on realistic "what-if" scenarios, can help being more objective:
- Understand geophysical possible local fire behaviour,
- Test under extreme weather conditions,
- Test scenarios of possible fire suppresion
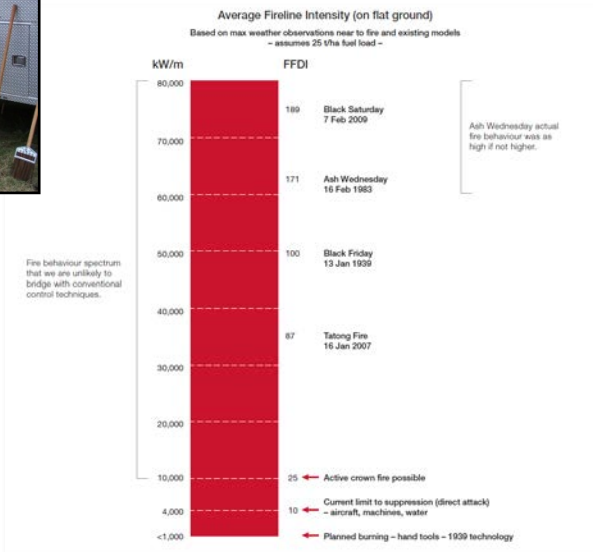
## Build a statistical-dynamical forest fire event generator

Screening the local fire database:
1/ Build adhoc statistical laws for fire occurrence (month-in-year, day-in-week, hour –in-day) and fire duration
2/ Build spatial statistical law of ignition locations (most often near roads and paths)

Monte Carlo simulation of a large set of ignitions in space and date-time, using the weather associated with the date



Apply to each sample firestart the micro-meteorology& fire spread models, using weather data, fine topography and land use « fuel » coverage description (commercial and non-commercial wood)



Classify events and impacts by size classes
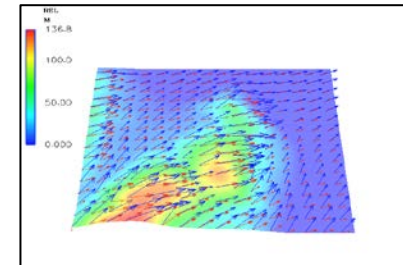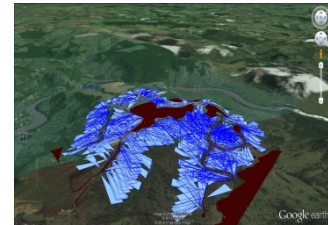
# Fire behaviour model and validation in Brazilian plantation

- A «Small World» social network model
- Connections of cells at short-term distances (immediate conduction, convection)
- Developed by IUSTI lab
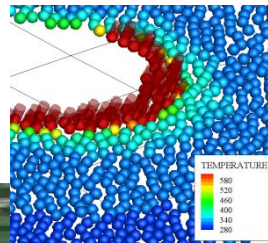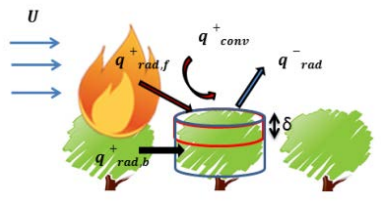
On site visit (Feb 2013)



Klabin Forestry engineer
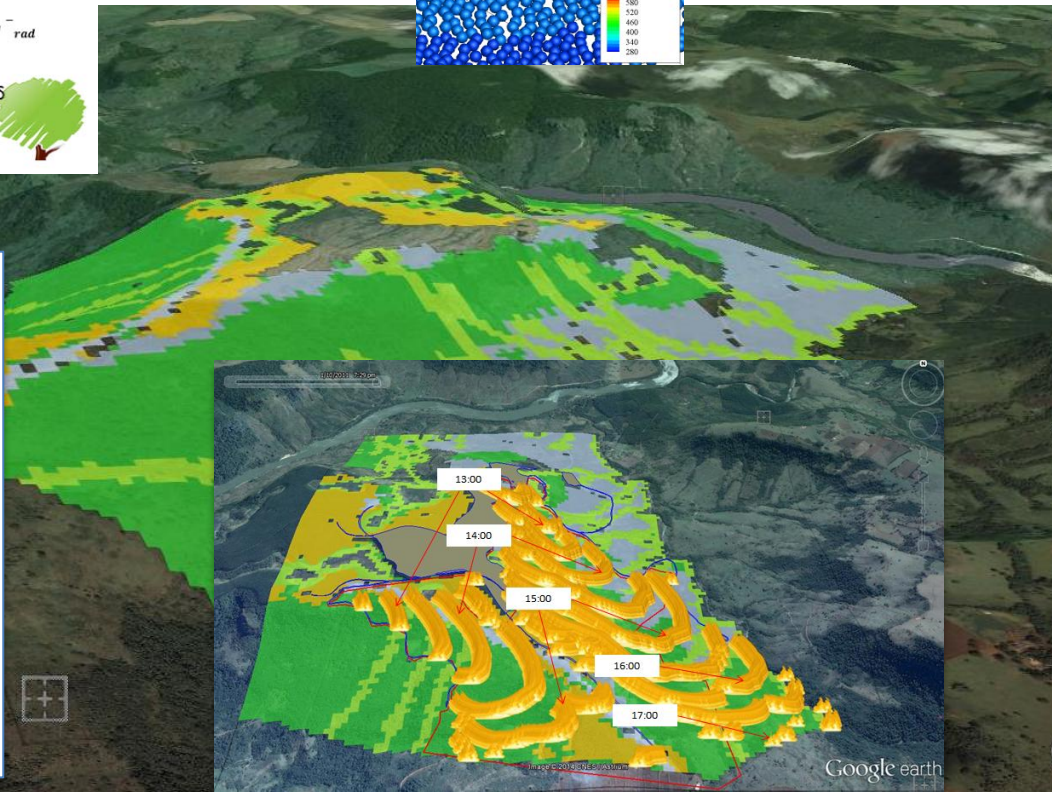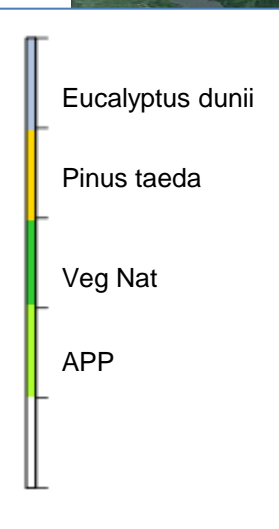Climate-KIC guy
Klabin Fire-fighter
UFPR Pr Batista

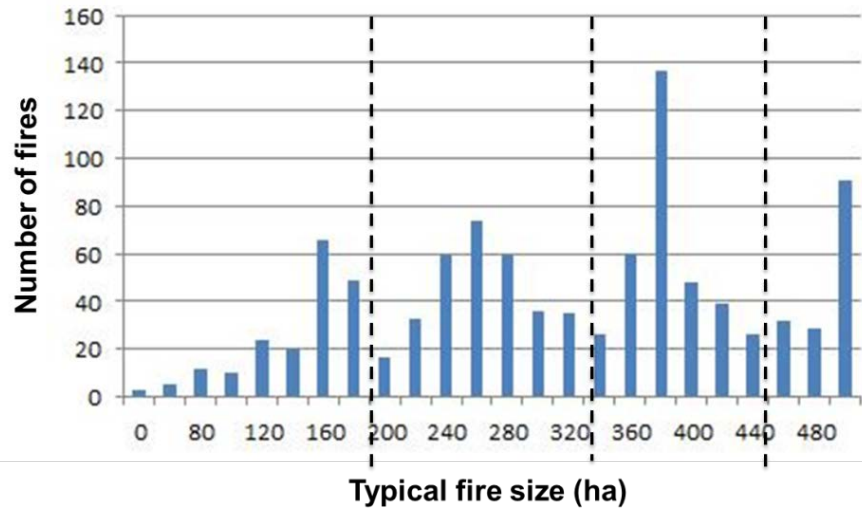Eucalyptus partially burnt

Natural vegetation largely burnt

Young Pinus taeda burnt

Eucalyptus dunii

Pinus taeda

Veg Nat

APP

13:00
14:00
15:00
16:00
17:00

Obtain final results on possible tail of distribution



Obtain precise vulnerability fire risk assessment in the plantation



2 times higher risk in red zone compared to yellow zone

Evaluate firebreaks efficiency