遊戲介紹

**Project: Earth Chicken- Carboin 地球趣墾-碳幣大富翁**

Goal: Use Carboin as the new currency in agricultural activities to earn a fortune!

Activity: You will need to find out how to accumulate a large fortune through balancing your capital profit ($P) and carbon coins ($C) in harvesting timber or crop while reducing carbon footprint.

**目標:  找尋適合的氣候、土地條件，種植適合的物產，過程中累積碳足跡與金錢，尋找單位金錢最小碳足跡的勝利方程式。**

#### Play the [Carboin](https://earthchicken.org/" \t "_blank) game!

#### Run the source code yourself: [github/earthchicken](https://github.com/earth-chicken/earthchicken" \t "_blank)

#### Introduction

Carbon is the foundation for food, structure, and life on Earth. One major constituent of carbon, carbon dioxide, is the air we respire and the air we produce through burning fossil fuel. In recent decades, carbon dioxide is the major factor to this changing environment. Many scientific reports show the high level of CO2 we have now is less likely caused by natural events but by anthropogenic ones. One reason is because the level has far exceeded that of ancient records in the last 8 million years. In order to reduce CO2 in the air, many movement and methods have been provided. One of them is carbon trade. Carbon trade is to give a price to activities and compensate with products that can reduce carbon dioxide (amount of the emitted carbon dioxide through activities is also defined as “carbon footprint”). However, pricing on activities or products can potentially fall into the fallacy in producing more carbon if the pricing market becomes unfair. Inspired by Sustainable Development Goals (SDGs) #15 Life on Land, we want to value the nature of terrestrial region in distinction to our present currency system. We construct a new value system, Carbon coin currency, to match with the goal.

碳是地球上最重要的元素之一, 他是食物, 結構, 生命的基礎. 其中一個由碳構成的重要分子, 二氧化碳, 是我們呼吸排出的, 也是燃燒化石燃料的產物. 在近幾十年間, 二氧化碳已成為改變氣候環境的重要因子. 很多科學報告顯示現在空氣中二氧化碳的濃度中, 有很大一部份並不是來自自然因素而是人為影響. 其中一個理由是過去八百萬年之間的大氣濃度都沒有如現在這麼高的濃度. 為了降低二氧化碳濃度, 大家集思廣益想了很多方法, 其中一個即是碳交易. 碳交易是針對任何活動都評量造成的碳釋出(或可稱為碳足跡), 並購買能夠減碳的方式來作為補償. 雖然針對活動或物產進行評價碳價值的作法可能導致反效果, 例如當評價系統不公平的時候就購買減碳的量, 卻沒有中和碳排放, 反而變相鼓勵更多消耗. 我們受到永續發展指標“#15-地上的生命”的啟發, 我們希望能增加自然的評價, 去區分現有的貨幣制度. 我們衡量農業活動中的碳循環, 以碳量來定義新的貨幣系統 (碳幣Carboin), 希望能藉此滿足這項指標.

In an effort to highlight the importance of plants for carbon fixation and the feedback some cultivation activities may cause to the environment, we design Earth Chicken (as interesting farming in mandrain) game and introduce currencies for carbon (Carboin, $C) and economical trading (capital profits, $P). We estimate the impact of the above activities with carbon budget partly on several scientific reports. Two scientific models are: one tights together growth of crops with its consumption for water and nutrients (GAEZ) and another model provides a larger view on ecosystems and show tree's dependency on environment (ORCHIDEE). Many environmental factors constrain plant growth, such as temperature, water, light, and nutrients. We know that natural ecosystem provides various environments for diverse plants and animals, such as ecoregions. When you log onto the current view of the modern Earth, you will see information extracted and modeled from satellites of NASA (GLDAS-NOAH025). You will begin to observe how different it can be within a few years! Now, you are on a mission to earn profits on both sides while reducing the environmental stress across these years. Will Carboin a solution to a sustainable Earth?

為了能夠讓玩家能更理解植物固碳的功能以及買賣作物當中對環境做的影響, 我們設計了這個地球墾趣遊戲, 以種植植物來獲取碳幣($C)與賣出獲取金錢($P) 的活動, 套入各種活動引起的環境變異, 來理解這兩種貨幣系統的特色與糾葛. 遊戲中引用的兩種科學估算模式一是由聯合國農糧署針對經濟作物所作的估算 (GAEZ), 另者由科學家發表的生態系統對養分的使用效率以及初級生產量進行的估算(ORCHIDEE). 影響植物生長的重要環境因素包括氣溫, 水環境, 陽光, 與養分. 同時我們也知道原始氣候條件已提供生態系統的多樣性, 例如植物群系(Ecoregions). 當你登入這個遊戲, 你會先看到從衛星(NASA-GLDAS-NOAH025)實際觀測與推估出的狀況如何. 你會開始注意到遊戲的時間內, 環境狀況在這幾年的變化! 現在, 你有任務了, 要怎麼同時積累碳幣與貨幣呢? 碳幣可以拯救地球嗎？

#### Datasets:

1. FAO of UN: Global Agro‐Ecological Zones ([GAEZ v3.0](http://www.fao.org/fileadmin/user_upload/gaez/docs/GAEZ_Model_Documentation.pdf)): the parameters used in maize is in Appendix 73. Take Meize as an example, click [here](http://www.iiasa.ac.at/Research/LUC/GAEZv3.0/docs/Crop_summ_table_description.xlsx).
2. [NASA GLDAS Version 2 Data Products](https://disc.gsfc.nasa.gov/datasets/GLDAS_NOAH025_M_2.1/summary?keywords=GLDAS)
3. [Ecoregions of the world](https://www.fs.fed.us/rm/ecoregions/products/map-ecoregions-continents/) (published by Bailey 1989)

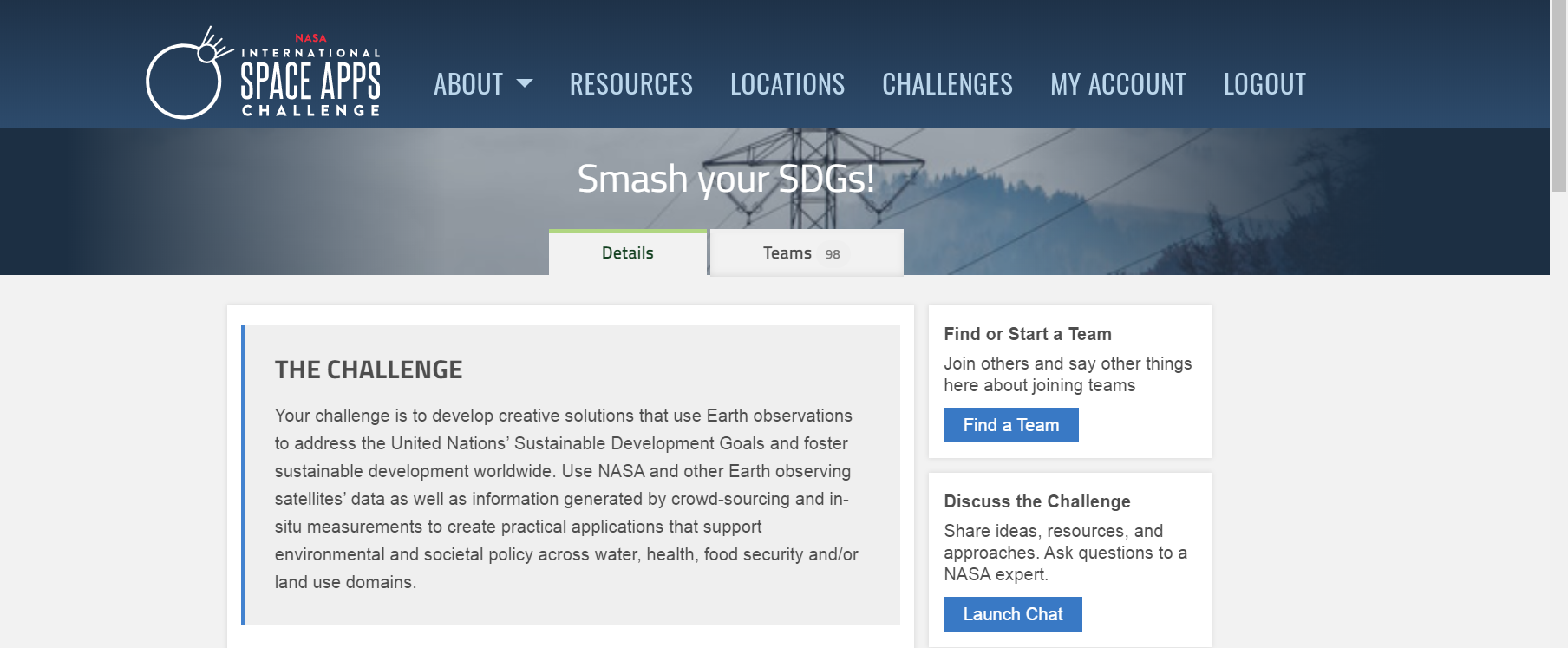
#### Plants in the Carboin system:

1. Cedar (i.e. *Calocedrus formosensis*): a type of softwood commonly found in temperate regions
2. Acasia (i.e. *Acacia confusa*): a type of hardwood commonly found in tropical and subtropical regions
3. Rice (i.e. *Oryza sativa subsp. japonica*): second largest produce of staple food of the world
4. Meize (i.e. *Zea mays*): the most consumed crop of the world as it is adaptive to various climate
5. Wheat (i.e. *Triticum aeostivum*): grow under temperate climate and widely distribute to the rest of the world

#### References:

Vuichard, N., Messina, P., Luyssaert, S., Guenet, B., Zaehle, S., Ghattas, J., Bastrikov, V., and Peylin, P. 2018 Accounting for Carbon and Nitrogen interactions in the Global Terrestrial Ecosystem Model ORCHIDEE (trunk version, rev 4999): multi-scale evaluation of gross primary production, Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2018-261>, in review.

Fischer, Günther & Nachtergaele, F. & Prieler, Sylvia & Teixeira, Edmar & Toth, Geza & Velthuizen, Harrij & Verelst, Luc & Wiberg, David. 2012 Global Agro‐Ecological Zones (GAEZ v3.0) - Model Documentation.

遊戲規則

**THE CHALLENGE**

Your challenge is to develop creative solutions that use Earth observations to address the United Nations’ Sustainable Development Goals and foster sustainable development worldwide. Use NASA and other Earth observing satellites’ data as well as information generated by crowd-sourcing and in-situ measurements to create practical applications that support environmental and societal policy across water, health, food security and/or land use domains.

**Background**

In September 2015, world leaders worked together to adopt a universal agenda for all countries and stakeholders to use as a blueprint for progress on economic, social and environmental sustainability. The 2030 Agenda for Sustainable Development is comprised of 17 Sustainable Development Goals (SDG), 169 Targets, and a Global Indicator Framework, providing countries a management tool to implement development strategies and to monitor and achieve progress.

Earth observations and geospatial information are uniquely suited to being integrated into national information systems and monitoring frameworks to: support the generation of high-quality and timely information; address data gaps; and contribute to the disaggregation of SDG indicators.

You are invited to join global champions in improving world health and education, reducing inequality, and spurring economic growth – all while tackling climate change and working to preserve our oceans and forests. **Your task is to inform the general public and support local managers and public agencies (national statistical offices, ministries, national mapping agencies) by using Earth observations for the tracking, monitoring, and reporting on progress on SDG targets and indicators, with an emphasis on: SDG 3 (Health and Well-Being), SDG 6 (Clean Water and Sanitation), SDG 11 (Sustainable Cities and Communities), SDG 14 (Life Below Water), and SDG 15 (Life on Land).**

The power to change the world and make it a better place is now in your hands!

Areas of particular interest include:

* Earth observation solutions to address SDG interlinkages and trade-offs, e.g., linking land use/land cover change or management to freshwater and coastal pollution, and addressing multiple SDG targets through one solution.
* Solutions to identify, monitor, and address or improve environmental factors affecting human health.
* Solutions to map and analyze urban population patterns including the proportion of urban population living in informal settlements or inadequate housing.
* Visualizations or interactive applications to showcase the interconnectedness of SDGs in people’s lives via the use of NASA Earth observation data as well as information generated by crowd-sourcing, social media, and in situ measurements.

**Potential Considerations**

Some examples of potential solutions include (but are not limited to!):

* A decision support tool that helps monitor disease patterns, identify environmental factors that contribute to the spread of diseases, such as vector-borne diseases, and specify areas requiring disease-control planning.
* A user-friendly product that integrates national and global level data including in situ observations from regular monitoring stations for coastal eutrophication/pollution.
* An interactive application and/or data visualization tool that tracks and visualizes how marine litter/garbage circulates (and is transported) around the world – its origins and/or factors that influence its movement (e.g. ocean currents, other).
* An analysis and visualization tool that demonstrates how Earth observations can help assess SDG interlinkages and tradeoffs, especially as they relate to the sustainable use of natural resources.

**PLEASE BE SURE TO SPECIFY the SDG(s)/Target(s)/Indicator(s) your solution is aiming to address.**

The most compelling solutions to this challenge will clearly manifest benefits for user communities – local and national authorities responsible for SDG monitoring and reporting, UN agencies, other major groups and stakeholders – by helping them use Earth observations to address specific SDG targets and indicators on a local, national or global scale.

**挑戰**

您面臨的挑戰是開發利用地球觀測來解決聯合國的可持續發展目標並促進全球可持續發展的創造性解決方案。使用NASA和其他地球觀測衛星的數據以及通過眾包和現場測量生成的信息來創建實際應用，以支持在水，健康，食品安全和/或土地使用領域的環境和社會政策。

**背景**

2015年9月，世界各國領導人共同努力，通過了一項全球議程，供所有國家和利益攸關方用作經濟，社會和環境可持續性發展的藍圖。《 2030年可持續發展議程》由17個可持續發展目標（SDG），169個目標和一個全球指標框架組成，為各國提供了實施發展戰略，監測和取得進展的管理工具。

地球觀測和地理空間信息非常適合集成到國家信息系統和監視框架中，以：支持生成高質量，及時的信息；解決數據缺口；並有助於對SDG指標進行分類。

邀請您加入全球倡導者的行列，以改善世界衛生和教育，減少不平等現象並促進經濟增長，同時應對氣候變化並努力保護我們的海洋和森林。您的任務是通過使用地球觀測來跟踪，監視和報告可持續發展目標和指標的進展情況，從而向公眾提供信息並支持地方管理人員和公共機構（國家統計局，政府部門，國家製圖機構），重點是：SDG 3（健康與福祉），SDG 6（淨水與衛生設施），SDG 11（可持續城市與社區），SDG 14（水下生活）和SDG 15（陸上生活）。

現在，改變世界並使其變得更美好的力量就在您手中！

特別感興趣的領域包括：

* 地球觀測解決方案，以解決SDG的相互聯繫和取捨，例如，將土地利用/土地覆蓋的變化或管理與淡水和沿海污染聯繫起來，並通過一種解決方案解決多個SDG目標。
* 識別，監視，解決或改善影響人類健康的環境因素的解決方案。
* 繪製和分析城市人口模式的解決方案，包括居住在非正式定居點或住房不足中的城市人口比例。
* **通過使用NASA地球觀測數據以及通過眾包，社交媒體和現場測量生成的信息，可視化或交互式應用程序展示了SDG在人們生活中的相互聯繫。**

**潛在註意事項**

潛在解決方案的一些示例包括（但不限於！）：

* 一種決策支持工具，可幫助監控疾病模式，識別導致疾病傳播的環境因素，例如媒介傳播的疾病，並指定需要疾病控制計劃的領域。
* 一種用戶友好的產品，集成了國家和全球級別的數據，包括常規監測站對沿海富營養化/污染的現場觀測。
* 交互式應用程序和/或數據可視化工具，用於跟踪和可視化海洋垃圾/垃圾如何在世界範圍內循環（和運輸）–其起源和/或影響其運動的因素（例如洋流等）。
* 一種分析和可視化工具，展示了地球觀測如何幫助評估SDG的相互聯繫和平衡，特別是與可持續利用自然資源有關的情況。

**請確保指定解決方案旨在解決的SDG /目標/指標。**

**解決這一挑戰的最引人注目的解決方案將通過幫助用戶使用地球觀測來解決可持續發展目標中的特定可持續發展目標和指標，從而明顯地為用戶社區（負責可持續發展目標監測和報告的地方和國家當局，聯合國機構，其他主要團體和利益相關方）帶來好處。地方，國家或全球規模。**