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Dynamic Material Flow Analysis with Python for Designing Eco-civilization

Tutorial Example III: GloBus Global Dynamic Building-sand Model

Jingyang Song, Nankai University, jerrysong0128@nankai.edu.cn

Zhi Cao, Nankai University, zhicao@nankai.edu.cn*

College of Environmental Science and Engineering, Nankai University

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ODYM Applications

ODYM

Open Dynamic Material Systems Model

Repo: *https://github.com/IndEcol/ODYM*

BUMA

BUilding MAterials model – *2020 Journal of Cleaner Production*

Repo: *https://github.com/SPDeetman/BUMA*

Deetman, S., Marinova, S., Van Der Voet, E., Van Vuuren, D. P., Edelenbosch, O., & Heijungs, R. (2020). Modelling global material stocks and flows for residential and service sector buildings towards 2050. Journal of Cleaner Production, 245, 118658. https://doi.org/10.1016/j.jclepro.2019.118658
Marinova, S., Deetman, S., Van Der Voet, E., & Daioglou, V. (2020). Global construction materials database and stock analysis of residential buildings between 1970-2050. Journal of Cleaner Production, 247, 119146. https://doi.org/10.1016/j.jclepro.2019.119146

GloBUME

Global Building Material Demand and Embodied GHG emissions – *2021 Nature Communications*

Repo: *https://zenodo.org/records/5171943*

Zhong, X., Hu, M., Deetman, S., Steubing, B., Lin, H. X., Hernandez, G. A., Harpprecht, C., Zhang, C., Tukker, A., & Behrens, P. (2021). Global greenhouse gas emissions from residential and commercial building materials and mitigation strategies to 2060. Nature Communications, 12(1), 6126. https://doi.org/10.1038/s41467-021-26212-z

GloBus

Global Dynamic Building Sand Model – *2022 Nature Sustainability*

Repo: *https://github.com/Zh-xy/GloBus*

Zhong, X., Deetman, S., Tukker, A., & Behrens, P. (2022). Increasing material efficiencies of buildings to address the global sand crisis. Nature Sustainability, 5(5), 389–392. https://doi.org/10.1038/s41893-022-00857-0

GloBus Tutorial

Repo: *https://github.com/jerrysong0128/GloBUS_Tutorials*

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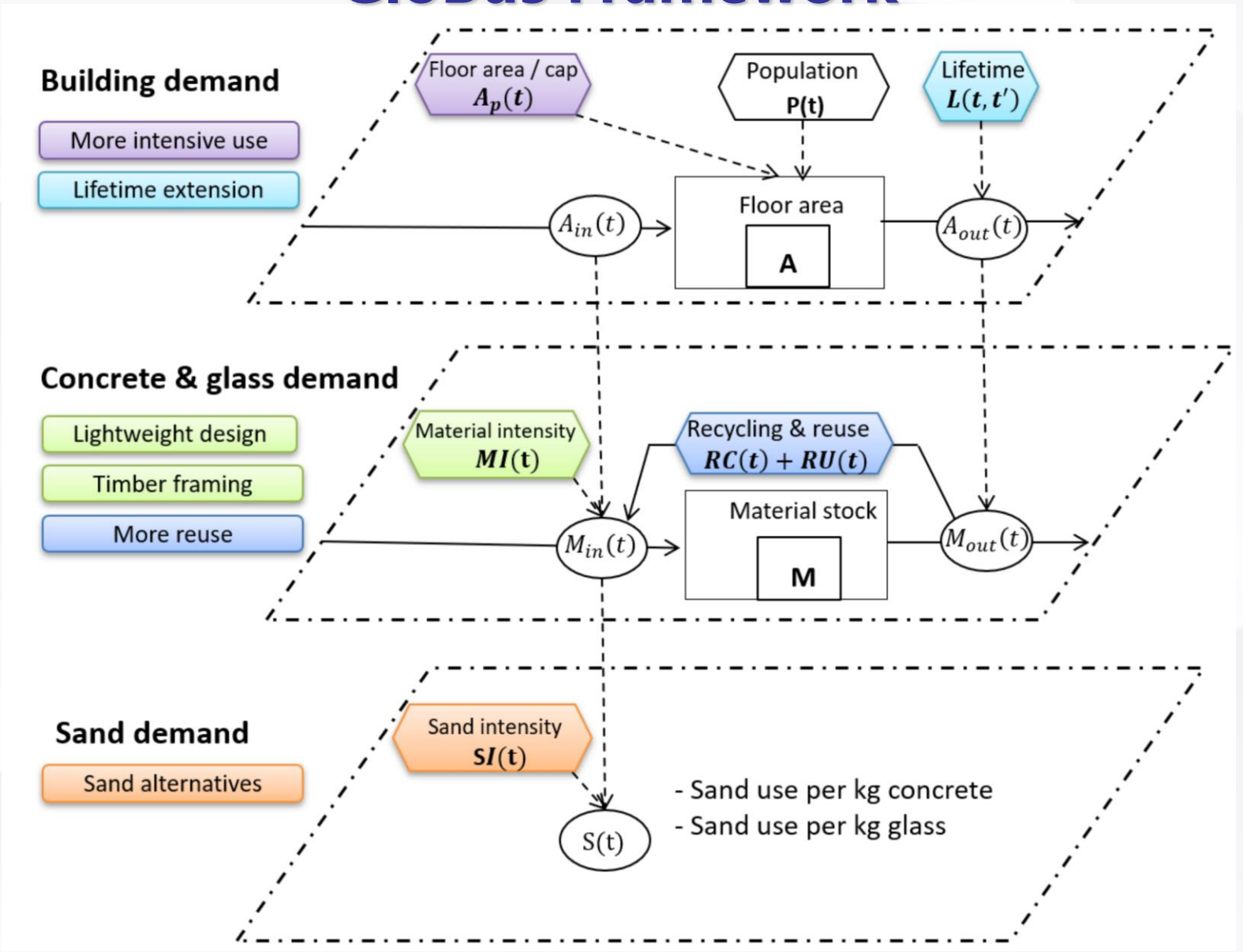
GloBus Framework



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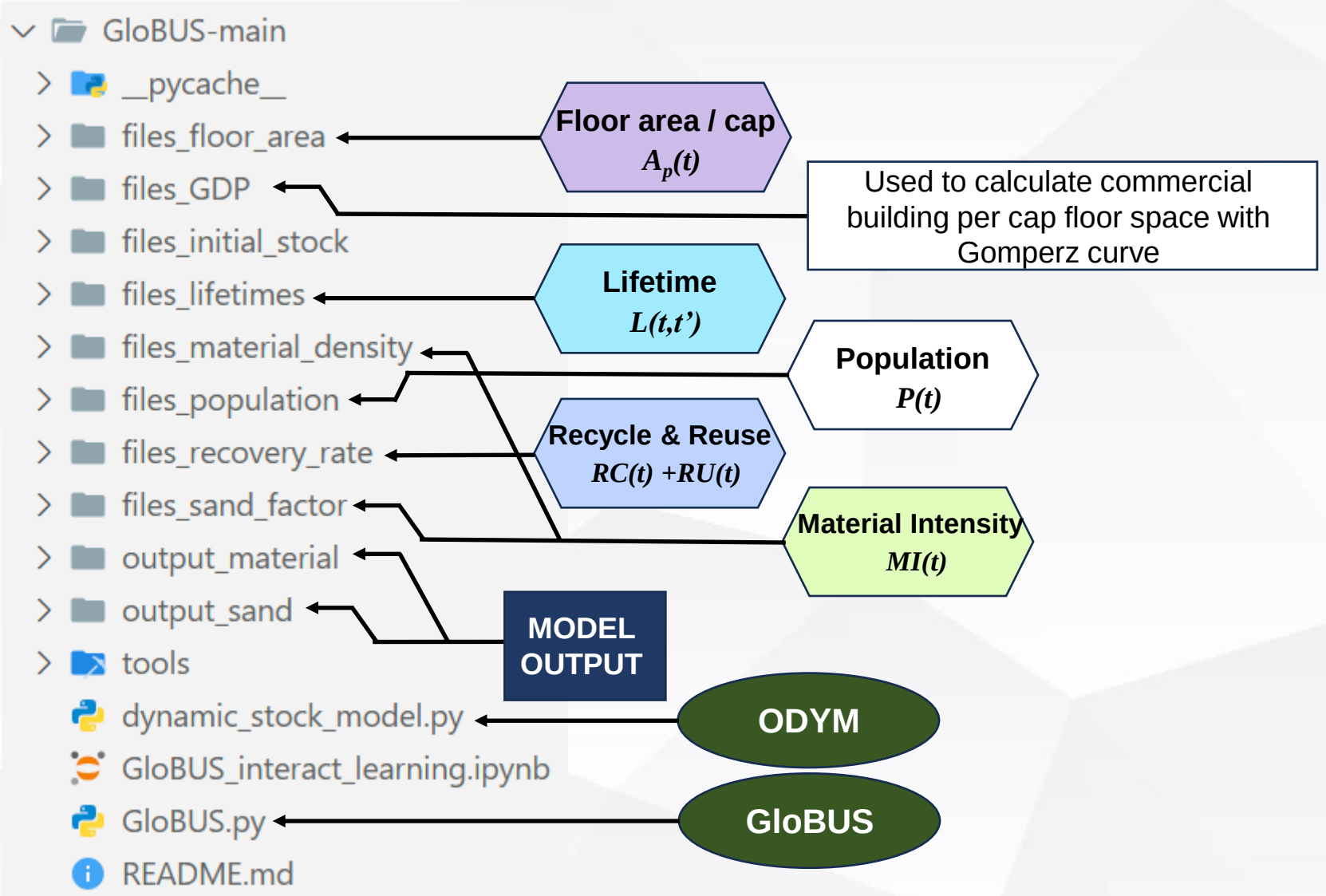
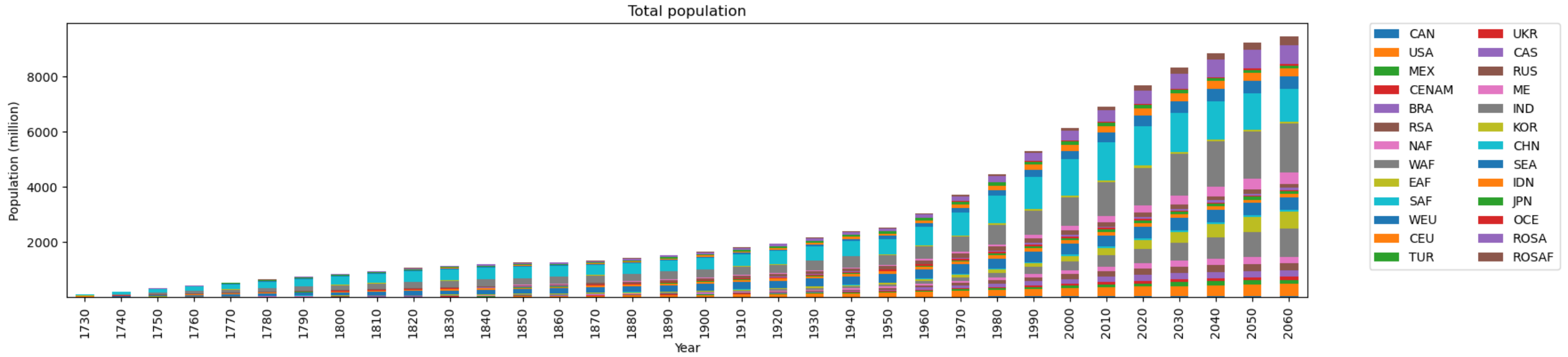
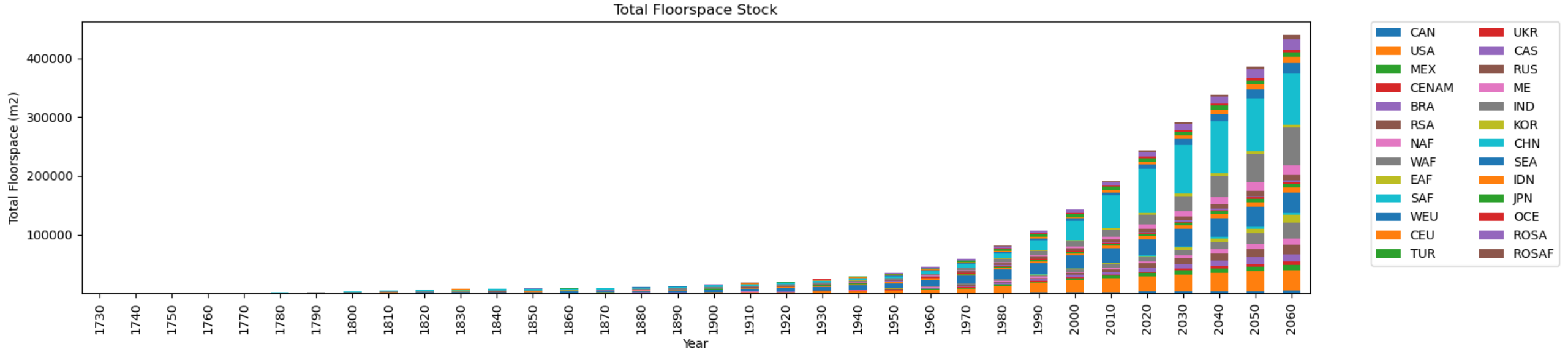
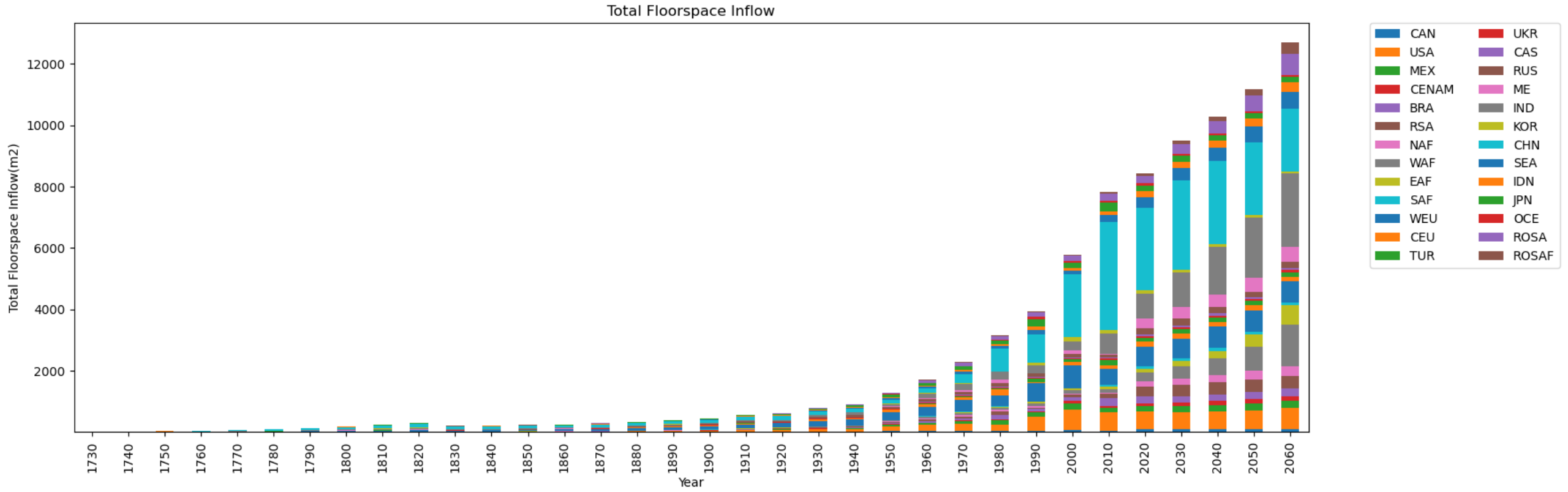
GloBUS Tutorial Folder Structure




Total population
Population (million)
8000
6000
4000
2000
1730 1740 1750 1760 1770 1780 1790 1800 1810 1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050 2060
Year
CAN
USA
MEX
CENAM
BRA
RSA
NAF
WAF
EAF
SAF
WEU
CEU
TUR
UKR
CAS
RUS
ME
IND
KOR
CHN
SEA
IDN
JPN
OCE
ROSA
ROSAF


Total Floorspace Stock
Total Floorspace (m2)
400000
300000
200000
100000
1730 1740 1750 1760 1770 1780 1790 1800 1810 1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050 2060
Year
CAN
USA
MEX
CENAM
BRA
RSA
NAF
WAF
EAF
SAF
WEU
CEU
TUR
UKR
CAS
RUS
ME
IND
KOR
CHN
SEA
IDN
JPN
OCE
ROSA
ROSAF


Total Floorspace Inflow
Total Floorspace Inflow(m2)
12000
10000
8000
6000
4000
2000
1730
1740
1750
1760
1770
1780
1790
1800
1810
1820
1830
1840
1850
1860
1870
1880
1890
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
2020
2030
2040
2050
2060
Year
CAN
USA
MEX
CENAM
BRA
RSA
NAF
WAF
EAF
SAF
WEU
CEU
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KOR
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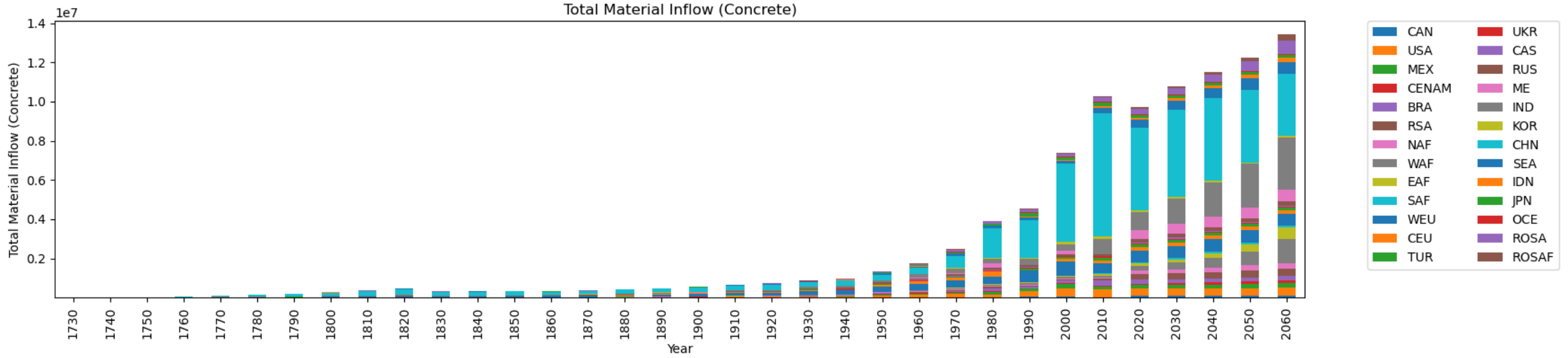
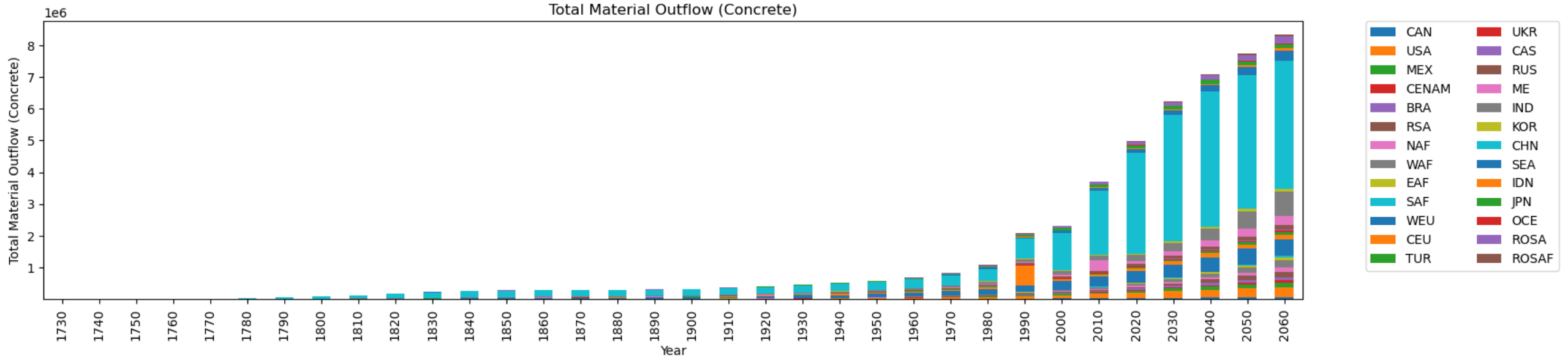
OCE
ROSA
ROSAF


Total Material Inflow (Concrete)
1e7
Total Material Inflow (Concrete)
Year
CAN
USA
MEX
CENAM
BRA
RSA
NAF
WAF
EAF
SAF
WEU
CEU
TUR
UKR
CAS
RUS
ME
IND
KOR
CHN
SEA
IDN
JPN
OCE
ROSA
ROSAF


Total Material Outflow (Concrete)
1e6
Total Material Outflow (Concrete)
Year
CAN
USA
MEX
CENAM
BRA
RSA
NAF
WAF
EAF
SAF
WEU
CEU
TUR
UKR
CAS
RUS
ME
IND
KOR
CHN
SEA
IDN
JPN
OCE
ROSA
ROSAF