

MSCMF Studio 2.0 - implemented scope and reproducibility

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Windows: compiled native desktop with 20 workspaces. Apple macOS and Linux: editable Python sources and local build launchers; no native binaries tested. Quantum: target selector and OpenQASM 3 two-qubit interoperability diagnostic. Diagnostic probabilities are checked with a classical simulator. No QPU run, quantum speedup or many-body engineering solution is claimed.

Appearance: five palettes, five font choices, five sizes, transparency/palette effects, tab navigation, zoom, resizable windows, independent workspace windows. Navigation has EN/DE/FR/ES/IT/PL; detailed new controls/manuals remain English. Google Translate opens the official service; there is no automatic API translation. Default export profile is 4K. The desktop fits the physical monitor. It does not turn a lower resolution monitor into 4K. Renderer has 4K/8K/16K GPU snapshot exports, guarded by estimated RAM budget. GPU texture limits can still prevent export. Molecular denotes physical units, not a display resolution. No proprietary holographic display/projection driver is implemented.

3D: Panda3D interactive wing study, mouse orbit and wheel zoom, shaded materials. Shadow mapping was disabled after artifacts on the tested GPU. This viewer is not Unreal Engine and does not yet meet the requested complete photoreal scene. The generated startup image is an artistic concept, not a measured structure. The 640x640 logo and 256x256 icon are packaged from the generated master asset.

Resource policy: floor(2 N/3) workers, at least one. CPU affinity restricts worker processes where supported. Admission is min(2/3 installed RAM, 80% available RAM). Aggregate worker RSS is monitored against the 2/3 RAM ceiling. This is not a hard OS memory reservation; already-running work can overshoot before the next check. The short SHA-256 and 8 MiB copy benchmark calibrates simple task scheduling, not FEM/DFT/GPU throughput. Variant generation exports study JSON and OBJ into BM/Project/assemblies/part/variant directories. It does not generate pressure-rated parts, certified screws, CAM programs or manufacturing release.

LOCAL CLIMATE MODEL: area-normalized homogeneous air/soil control volume. Inputs: hourly temperature, humidity, surface pressure, 10m wind, precipitation, shortwave radiation; soil and heat/moisture-transfer coefficients remain editable. Baseline and intervention share identical historical meteorological forcing. Intervention changes shading, mist water and drip delivery. Outputs hourly air and soil temperature, relative humidity, liquid/total soil water, evaporation, condensation, water application and drainage. Rain, water inflow, evaporation, drainage, radiation, deep-soil conduction and atmospheric exchange all carry energy.

Definitions per square metre: M dry-air mass [kg/m²], w humidity ratio [kg/kg], W total soil water [kg/m²], U air enthalpy [J/m²], Es soil enthalpy [J/m²].
 $u(T,w) = (c_{p_air} + c_{p_vapour} * w) * T + (L_f + L_v) * w$.
Liquid-water enthalpy $h_l(T) = L_f + c_{p_water} * T$; ice $h_i(T) = c_{p_ice} * T$.
Soil phase law: $Es < 0 \rightarrow T = Es / (C_s + c_{p_ice} W)$, liquid=0;
 $0 \leq Es \leq L_f W \rightarrow T = 0$, liquid=Es/Lf;
 $Es > L_f W \rightarrow T = (Es - L_f W) / (C_s + c_{p_water} W)$, liquid=W.
 C_s is dry matrix areal heat capacity [J/(m² K)].

Mass equation: $M \frac{dw}{dt} = A(w_{ext} - w) + E_{soil} + E_{mist} - C_{air}$.
Soil: $dW/dt = P + I_{drip} + I_{mist_ground} - E_{soil} - D + C_{air}$.
 A [kg dry-air/(m² s)] is an empirical ventilation rate; all other mass fluxes are water [kg/(m² s)]. Condensation and soil-air exchange are internal transfers.
Shortwave: $(1 - albedo) * (1 - shade) * SW$. Longwave loss uses emissivity * $\sigma * (T_s^4 - T_{sky}^4)$.
Deep soil conduction: $G * (T_s - T_{deep})$. Convective heat: $H * (T_s - T_a)$.

Sky temperature and transfer coefficients need site calibration.

DISCRETE CONSERVATION IDENTITY: internal exchange transfers $+Q \, dt$ into U and $-Q \, dt$ into Es; condensation transfers the same water and enthalpy from air to soil. Their combined residual is exactly zero algebraically. Boundary exchange uses the same flux in the update and cumulative balance. The reported relative residual is $|\text{state change} - \text{cumulative boundary transfer}| / (1 + \sum |\text{boundary transfer}|)$. This verifies bookkeeping and arithmetic, not the correctness of empirical closure.

Numerical evidence: four warm/humid/frost 72h cases, energy/water residual below $1e-9$; saturation-pressure comparison to PsychroLib, $-70..70 \, ^\circ\text{C}$. Step refinement 300 $\rightarrow$ 150 $\rightarrow$ 75 seconds reduces the tested maximum air difference between steps from $0.642 \, ^\circ\text{C}$ to $0.358 \, ^\circ\text{C}$. No 99.99% temperature-accuracy claim follows. Berlin 2025 integration fixture uses 8760 hours and completes both scenarios. It is a test site, not an automatically selected project location or forecast. Historical forcing cannot predict changes in regional circulation or clouds.

REQUIRED NEXT EVIDENCE: calibrated transfer/soil/optical parameters; sensor time series at untreated and treated reference plots; withheld-season comparison; measurement uncertainty and spatial coverage; grid/time convergence; canopy and root uptake models; regional atmosphere-land coupling and ensemble uncertainty. Snow insulation, snow albedo and vegetation physiology are not implemented. The model does not establish a universal flora/fauna optimum, $28 \, ^\circ\text{C}$ cooling, regional greening, structural safety or production feasibility.

Book library: 12,742 extracted PDF pages and candidate text records available; duplicate/code detection and 12 separately verified mathematical identities are included. The complete source corpus has not been scientifically reconstructed. Books 41/42, encrypted/corrupt variants and image-only equations remain gaps. All-source formulas are data, never executed as supplied code. BM1-6 start is saved; higher stages remain an information option requiring an explicit request.

REFERENCES

<https://github.com/psychrometrics/psychrolib>
<https://www.fao.org/4/x0490e/x0490e06.htm>
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