

FROM THE SKIES

Optimized Out-of-View World Events for Minecraft

Capstone II · FIU · Spring 2026

Team of 3 · NeoForge · Java 21

Problem Definition

THE CHALLENGE

Vanilla Minecraft lacks dynamic world events that permanently and visibly alter the game world over time.

Players explore a static world with no sense of escalating threat or environmental storytelling.

Existing mods that add enemies don't integrate deeply with world generation or biome systems.

OUR SOLUTION

From the Skies introduces a living alien infection that lands as a meteor, spreads across the surface, and converts entire biomes.

The Breem, an alien civilization, colonizes the world with their own mobs, blocks, trees, and ecosystem.

Players can stop the invasion by finding and destroying the Alien Core.

System Architecture

Biome Takeover

- Infection lifecycle
- Meteor scheduler
- Surface spread
- Biome conversion

Breem Entities

- 4 mob variants
- Diamond barter AI
- GeckoLib animations
- Group alerting

Block System

- Breem grass & dirt
- Breem log & leaf
- Alien core block
- Stripped log
- Beem tree sapling

World Gen

- Breem tree sapling
- Configured features
- Placed features
- Biome modifiers

Implementation Highlights

Biome Takeover Engine

A 5-state lifecycle (DORMANT → ARMED → ACTIVE → STOPPED) drives the entire invasion. After 512 chunks are explored, a meteor lands at a random location and places the Alien Core. From there, surface spread infects adjacent blocks every tick. Once 35% of a chunk's surface is infected, the biome flips to `alien_overnight` using runtime NBT-persisted state.

Breem Mob AI

BreemEntity extends Piglin with custom diamond-based diplomacy. Players wearing diamond armor or holding diamonds are ignored. Offering a diamond triggers a 40-tick inspect animation and a barter reward. When hurt, the mob permanently enters provoked mode and alerts all Breems within 12 blocks.

Breem Tree Worldgen

A full worldgen pipeline: `SaplingBlock` → `TreeGrower` → `ConfiguredFeature` → `PlacedFeature` → `BiomeModifier`. The sapling grows using `ForkingTrunkPlacer` + `BlobFoliagePlacer`, responds to bonemeal, and can be planted on custom `breem_dirt` and `breem_grass` blocks via the `minecraft:dirt` block tag.

Demonstration Overview

01

Force Meteor Landing

Use `/fts takeover force_meteor` to trigger the invasion. The Alien Core block appears at the selected chunk center.

02

Watch the Spread

Use `/fts takeover step 500` to fast-forward spread. Breem Grass replaces surface blocks in real-time, chunk by chunk.

03

Biome Conversion

Once 35% of a chunk is infected, `/fts takeover` status shows converted chunks increasing as `alien_overgrowth` takes over.

04

Breem Mob Interactions

Spawn Breem variants, demonstrate diamond diplomacy and barter system, provoke the mob and observe group alerting behavior.

05

Stop the Invasion

Break the Alien Core to transition to STOPPED state. Future spread is permanently halted, prior changes remain.

06

Breem Tree Growth

Plant a Breem sapling on `breem_dirt`, apply bonemeal, and demonstrate the alien forking tree growing in-world.

Testing & Evaluation Results

Unit / Game Tests

- TakeoverRegistryGameTests covers lifecycle transitions
- State persistence validated across save/load cycles
- Spread adjacency rules enforced, no diagonal jumps
- Biome flip threshold tested at exact 35% boundary

Integration Testing

- Admin commands (/fts takeover) verified in live world
- Core break → STOPPED state confirmed
- Chunk frontier blocking validated on unloaded chunks
- Bonemeal sapling growth tested on breem dirt & grass

Visual QA

- All block textures verified in-game (no purple/black)
- Stripped log rotation on all 3 axes confirmed
- Sapling cross model renders with transparency
- Breem tree shape generated correctly via bonemeal

Challenges & Lessons Learned

Bedrock vs Java model format

Blockbench exports in Bedrock format by default. Java Edition requires a completely different JSON structure. We learned to write block models manually rather than relying on export tools.

Dynamic registry for worldgen

ConfiguredFeature and PlacedFeature must go through DatapackBuiltinEntriesProvider and runData, they cannot be manually placed in src/main/resources. Without datagen, the feature silently fails to register.

Biome conversion via reflection

Minecraft's resendBiomesForChunks is private. We use reflection to call it at runtime, which works but is fragile across NeoForge updates. A better long-term solution would be a NeoForge event hook.

Branch isolation & merge conflicts

Working across 4 branches (main, biome-takeover, block-implementation, worldgen-trees) with different package structures caused duplicate resource files and package conflicts. We learned to run runData after every structural change.

Future Work

Branch Merge

HIGH

Merge all 4 branches into main, resolving the ModBlocks package conflict between block/ and registry/ paths.

Meteor Visual FX

MED

Add a falling meteor particle trail and impact explosion when the core first lands in the world.

Replace Reflection

MED

Replace the reflection-based `resendBiomesForChunks` call with a proper NeoForge event to future-proof the biome conversion system.

Breem Structure Gen

LOW

Generate Breem settlement structures in the `alien_overgrowth` biome, huts.

Sound Design

LOW

Add custom ambient sounds for the alien biome and attack/idle sounds for Breem mob variants.

Variant-Specific AI

LOW

Give each Breem variant distinct behavior, Shaman casts buffs, Brute charges, Soldier patrols, Villager trades.

Thank You

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GitHub: github.com/FT-Sun/FromTheSkies-1.21.X

Built with NeoForge 1.21.1 · GeckoLib · Java 21 · Capstone II Spring 2026