Technical Product Roadmap (PTC)

ChatGPT 4o

Mission: Build the ClimateOps system that enables precise, scalable planetary cooling.

Phase 1: Foundational Climate Intelligence Stack

Goal: Aggregate and structure climate and intervention data for a single region/operator.

1. **Data Ingestion Stack**
   - Integrate satellite sources: NASA CO_2, surface temperature, biomass indices
   - Ingest operator-specific deployment data (e.g., biochar, DAC locations)
2. **Geospatial Intelligence Schema**
   - Normalize geolocation data, intervention types, and impact estimates
   - Set up unified spatial-temporal table with source metadata
3. **Operator Intelligence Dashboard v0**
   - Show: "Where have we deployed what?" + current CO_2/temp status
   - Layer data visually on a map (e.g., with Mapbox or Large-scale WebGL-powered Geospatial Data Visualization Tool)

Phase 2: ClimateOps Engine v1

Goal: Generate intervention recommendations based on current conditions.

4. **Optimization Engine v1**
   - Input: region, intervention type, budget
   - Output: ideal site + expected cooling impact + cost projection
5. **Impact Simulation Module**
   - Use historical data to estimate 12–24 month cooling effect
   - Model interaction with temperature, biomass, and emissions
6. **Real-Time Intervention Suggestions**
   - “Deploy 1,200 tonnes of DAC in West Texas → 0.02°C local cooling over 18 months”

Phase 3: Operator-Facing ClimateOps Command Interface

Goal: Build a usable, interactive tool for climate project operators.

7. **Bloom Command UI v1**
   - Region picker → intervention scenario explorer → output dashboard
   - Key metrics: cooling forecast, ROI, risk indicators
8. **Climate Intervention Library**
   - Structured database of known methods: biochar, DAC, ocean alkalinity
   - Include cost, permanence, and regional feasibility filters
9. **Simulation Export Tool**
   - Export results to internal planning systems or funder reports

Phase 4: Multi-Lever Climate Coordination

Goal: Enable modeling across intervention types and actors.

10. **Multi-Lever Optimizer**

- Run biochar vs. DAC vs. afforestation tradeoffs

- Simulate cumulative regional or national cooling effects

11. **Cross-Project Coordination**

- Identify overlapping efforts, recommend staggering or merging deployments
- Simulate total impact and optimize joint deployment timelines

12. **Regulatory & Risk Overlay**

- Show permitting difficulty, policy risks, and ecosystem sensitivities

Phase 5: Fundraising-Ready Prototype

Goal: Deliver a compelling, demo-ready MVP for funders and partners.

13. **Live Use Case Demo**

- "West Texas Biochar Deployment Planner" → real-time forecast + site map
- Demonstrate 30% cost reduction + 0.02°C projected cooling

14. **Investor Demo Flow**

- Region input → site optimization → impact simulation → export
- "Command Earth's climate in 60 seconds"

15. **Customer Success Package**

- Templates for operators
- Simple onboarding
- Feedback capture for ongoing improvement

Strategic Positioning Over Time

- **Phase 1:** "We give you a climate map."
- **Phase 2:** "We tell you where and how to intervene."
- **Phase 3:** "We make your interventions smarter and cheaper."
- **Phase 4:** "We coordinate efforts across teams and methods."
- **Phase 5:** "We're the ops system for planetary cooling."

Claude Sonnet 4

Building the Climate Intervention Coordination System That Creates Planetary-Scale Intelligence

Phase 1: Climate Data Integration Foundation

Goal: Prove Bloom Command can reliably ingest and unify climate intervention data from multiple sources into one actionable layer.

1. Complete Current Climate Data Ingestion Stack

- **Satellite data feeds:** NASA, Copernicus, NOAA APIs working
- **Climate intervention tracking:** DAC facilities, biochar projects, SRM experiments
- **All data flowing into `climate_interventions` table with geospatial metadata**
- **Basic authentication and real-time data handling complete**

2. Add Basic Multi-Intervention Data View

- **Single unified map** showing all intervention types regardless of source

- **Intervention indicators:** Visual markers showing DAC vs. biochar vs. ocean alkalinity vs. SRM
- **Basic filtering:** By intervention type, deployment date, geographic region, operator
- **Search functionality:** Find interventions across all operators and locations

3. Immediate Cross-Intervention Value Demo

- **Side-by-side impact comparison:** Show cooling effectiveness across intervention types
- **Geographic overlap detection:** Highlight potential synergies or conflicts between nearby interventions
- **Simple coordination view:** "When DAC facility operates at X capacity, biochar project Y shows Z effectiveness"

Phase 2: Optimization Engine - Make Climate Data Actionable

Goal: Demonstrate unique deployment recommendations only possible with unified climate intervention data.

4. Smart Deployment Optimization Engine

- **Auto-detect optimal locations:** Link atmospheric CO_2 levels to intervention effectiveness to geographic feasibility
- **Cross-intervention optimization:** Recommend intervention combinations for maximum cooling impact
- **Timeline optimization:** Show optimal deployment timing based on seasonal climate patterns

5. Basic Climate Command Dashboard

- **Real-time metrics:** CO_2 reduction per intervention, cooling impact per dollar, effectiveness by region
- **Trend detection:** "DAC deployment up 30%, but combined cooling impact up 60% (synergy effect)"
- **Gap identification:** "Missing coverage in high-CO_2 regions of Southeast Asia"

6. Export Coordination Package

- **Unified deployment plan:** All interventions coordinated for maximum planetary cooling
- **Impact modeling:** Document predicted cooling effects and intervention relationships
- **Coordination summary:** Key synergies and optimal deployment strategies discovered

Phase 3: Advanced Planetary Coordination Insights

Goal: Deliver planetary-scale insights that create "must-have" demand for coordination.

7. Multi-Intervention Synergy Engine

- **Cooling optimization:** "Deploy biochar project 50km from DAC facility → increase combined effectiveness by 25%"
- **Timing optimization:** "Delay SRM deployment 6 months → allow ecosystem restoration to establish first"
- **Operator coordination:** Rank intervention combinations by planetary cooling potential

8. Planetary Intelligence

- **Regional cooling allocation:** "Focus 40% of interventions in Arctic regions for maximum albedo impact"
- **Intervention benchmarking:** Compare cooling effectiveness across operators and technologies
- **Predictive modeling:** "Current deployment trend suggests 1.8°C warming by 2030 (missing 1.5°C target)"

9. Real-Time Climate Decision Support

- **Smart alerts:** "Proposed DAC facility placement conflicts with planned biochar project"
- **Scenario modeling:** "What if we coordinate SRM with 50% more ocean alkalinity projects?"
- **ROI calculator:** Climate cooling impact vs. deployment cost optimization

Phase 4: Platform & Coordination API Layer

Goal: Become the infrastructure other climate operators and agencies depend on.

10. Climate Coordination API for External Systems

- **Clean intervention endpoints:** Let climate operators query optimal deployment recommendations
- **Real-time coordination webhooks:** Push deployment changes to connected intervention systems
- **Secure access controls:** Role-based API permissions for operators, researchers, government agencies

11. Advanced Climate Modeling Engine

- **AI-powered optimization:** Auto-suggest intervention deployments based on climate effectiveness
- **Model flexibility:** Handle new intervention types (future technologies) without code changes
- **Version control:** Track optimization model changes and effectiveness over time

12. Enterprise Climate Agency Integration Features

- **Audit trail system:** Full intervention coordination lineage for policy compliance
- **Bulk operations:** Handle large-scale government climate intervention programs
- **Multi-agency architecture:** Support coordination across international climate organizations

Phase 5: Seed-Ready Climate Command Product

Goal: Polish for investor demos and early climate operator pilots.

13. Compelling Climate Demo Flow

- **"Deploy → Coordinate → Cool in 60 seconds"** demonstration
- **Before/after comparison:** Isolated vs. coordinated intervention effectiveness
- **Planetary ROI calculator:** Quantify cooling impact and cost optimization

14. Climate Operator Success Features

- **Deployment wizard:** Guide operators through optimal intervention placement
- **Intervention template library:** Pre-built coordination strategies for common climate scenarios
- **Success metrics:** Track and display planetary cooling impact realization

Final Deliverables for Seed Round

Capability	Description	Status
Unified Climate Data Layer	All intervention data in queryable geospatial format	✅ Foundation Built
Planetary Coordination Intelligence	Insights only possible with unified intervention data	🎯 Core Focus
Real-Time Deployment Optimization	Actionable recommendations for maximum cooling	🎯 Differentiator
Climate Coordination API	Platform other operators and agencies can build on	🔧 Technical Moat
Government-Ready Security	Audit trails, access controls, policy compliance	📋 Table Stakes
Compelling Climate Demo	"60-second planetary coordination" demonstration	🚀 Investor Magnet

The Strategic Positioning

- **Phase 1:** "We coordinate climate interventions"
- **Phase 2:** "We optimize intervention deployment for maximum cooling"
- **Phase 3:** "We deliver planetary cooling insights impossible without coordination"
- **Phase 4:** "We power the climate operators and agencies you already trust"
- **Phase 5:** "We're the command system for planetary temperature control"

This roadmap builds the **climate coordination infrastructure moat** while delivering immediate, tangible cooling optimization value that makes operators dependent on your unified planetary intelligence layer.

Technical Architecture Priorities

Data Infrastructure

- **Satellite data integration:** NASA/Copernicus real-time feeds
- **Geospatial optimization:** PostGIS for location-based intervention analysis
- **Time-series climate modeling:** Handle historical and predictive climate data
- **Multi-operator coordination:** Support independent operators sharing optimization benefits

Optimization Algorithms

- **Climate effectiveness modeling:** CO_2 reduction, temperature impact, ecosystem effects
- **Geographic optimization:** Optimal placement algorithms for maximum cooling per dollar
- **Multi-intervention coordination:** Synergy detection and coordination recommendations
- **Real-time adaptation:** Dynamic reoptimization based on changing climate conditions

Scalability & Security

- **Government-grade security:** Support coordination across international climate agencies
- **Real-time processing:** Handle planetary-scale climate data with minimal latency
- **API-first architecture:** Enable integration with existing climate management systems
- **Audit & compliance:** Full traceability for policy and international climate agreement compliance

The moonshot goal: Build the technical infrastructure that enables humanity to coordinate climate interventions at planetary scale — transforming isolated projects into a coordinated planetary cooling system.