



Electric Power Generation from Rice Husk

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Rice Husk - the appropriate Biomass Fuel for Bangladesh

- WHY RICE HUSK ??
- Rice Husk is an unique Biomass Fuel of good calorific value
- (Heat Value : Abt.14 MJ (or 14,000 kJ) per kg & 'Carbon-neutral')
- Bangladesh is a major 'Rice Country'. It produces on the average about 40,000,000 MT of Paddy per Year, the Husk production (@ 20% of Paddy), being about 8,000,000 MT/Year
- Bangladesh has over 100,000 Rice Mills all over the country which uses both thermal energy (of steam produced by burning rice husk for Parboiling of Rice) & Electric Power (from grid).
for entire operation of the mill (milling, boiler pumps, lighting etc.)



The Potential for Power Generation from Rice Husk [P_{theor} & $P_{\text{tech.}}$]

P_{theor} (MW) = 417 MW, say about 400 MW

50% of 8,000,000 MT/Yr. Rice Husk x 1000 kg / MT

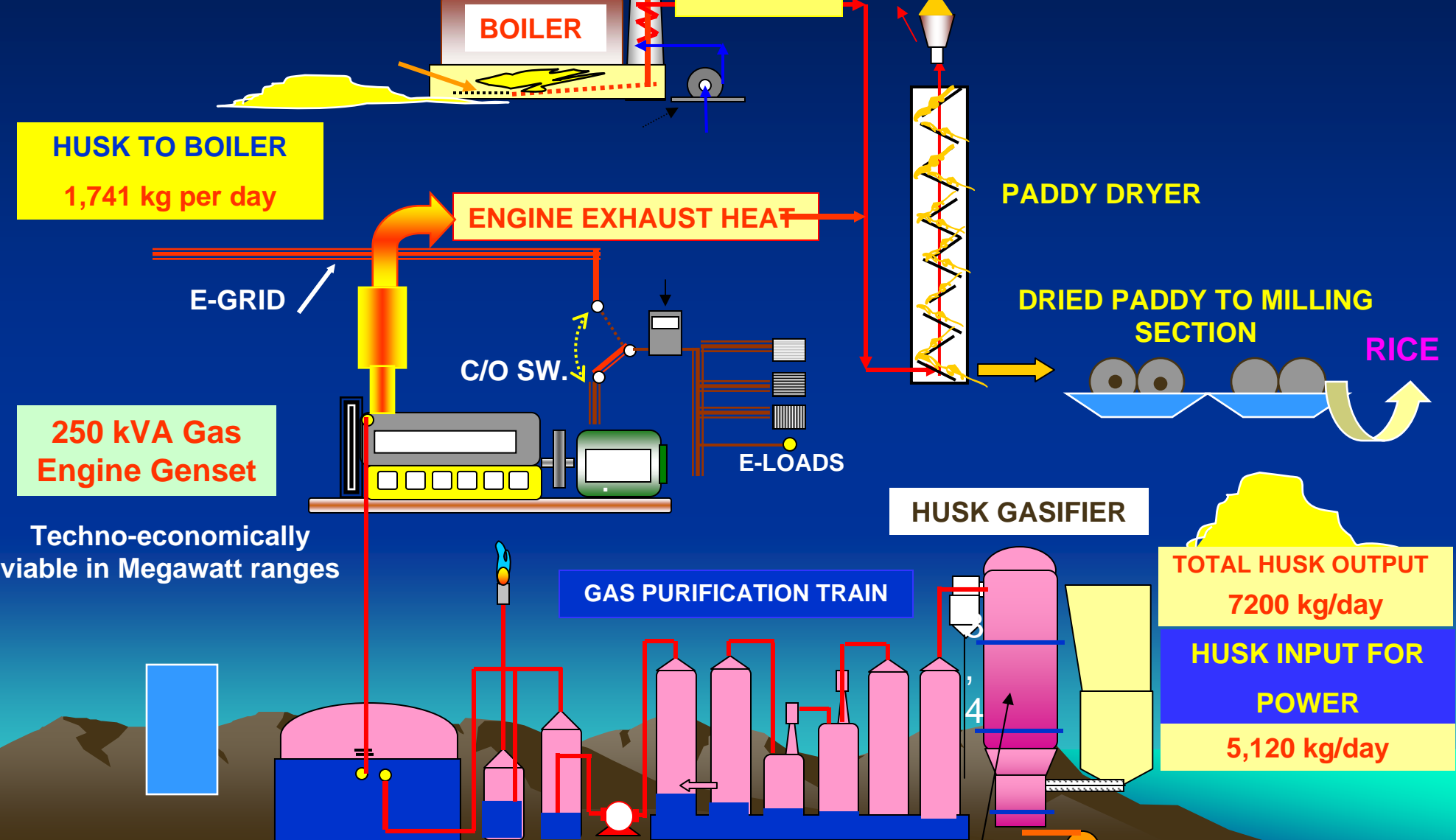
2 kg Husk / kWh x 16 hrs per operation day x 300 d/Yr. x 1000

$P_{\text{tech.}}$ (MW) = 100 MW, considering a whole range
of practical parameters. [About 500 Rice Mills x 200 kW

which are of mid to larger sizes and are or will be having sufficient husk surplus
for power generation due to efficient Boilers - existing and to be improved]



Husk Mass Balance Flow Chart
to match thermal & Electrical
Energy need of a 36,000 kg/day
Paddy Processing Capacity



Techno-economically viable in Megawatt ranges

TECHNO-ECONOMIC VIABILITY OF HUSK-BASED POWER PLANTS

- Assumptions : (i) 100% Producer Gas based Engine-Gensets
 (ii) Husk consumption : 1.6 - 1.8 kg per kWhr.
 (iii) Husk Price : Tk. 20/20 kg Bag (Tk.1.00/kg)
 (iv) Fixed Bed Gasifier for 250 kVA, Fluidized Bed for > 600 kVA (up to MW ranges)

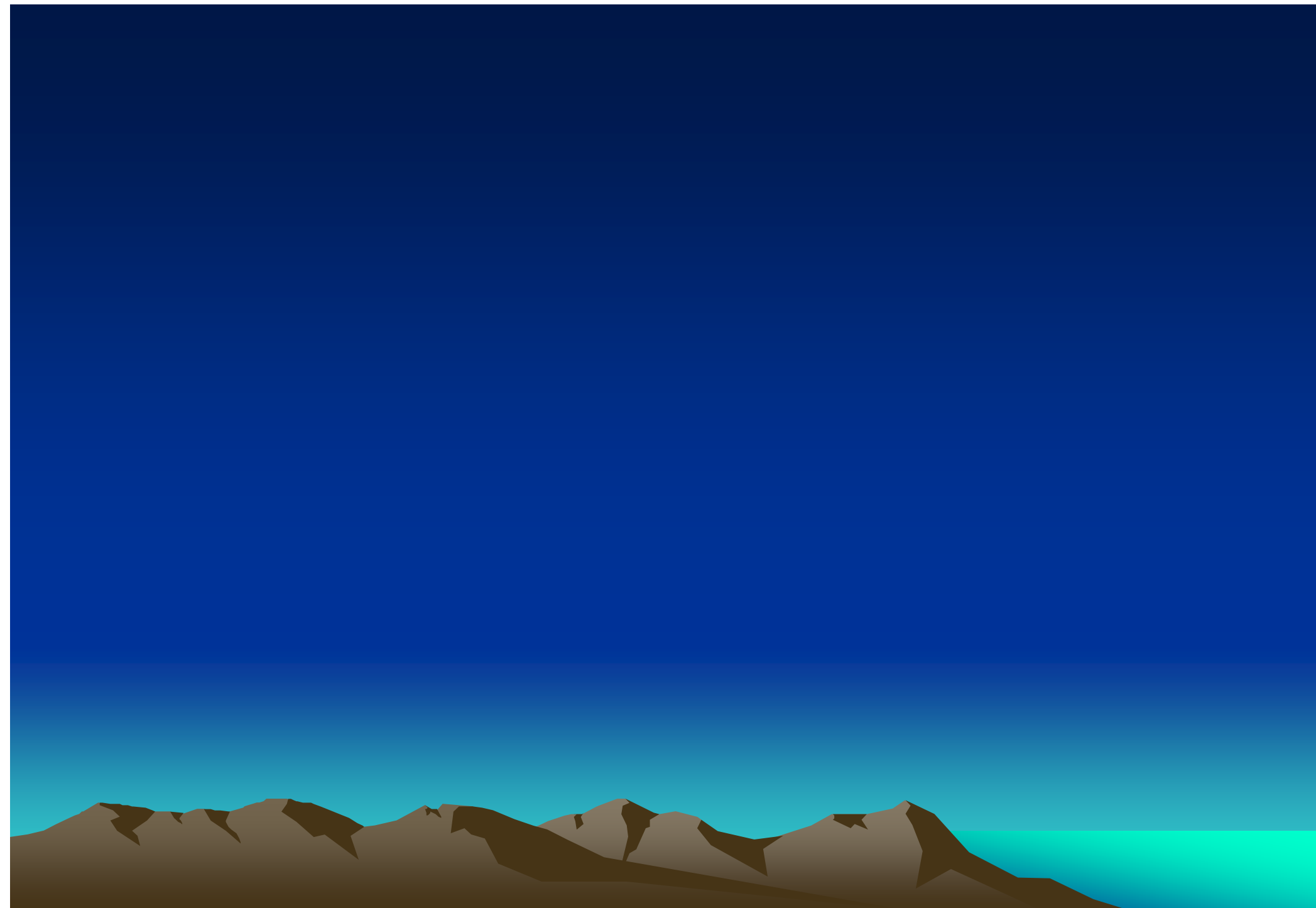
Small / Medium-large Captives Central MW range Plants

| Plant Size | 200 kW | 600 kW | 2 MW | 6 MW |
|---------------------------|-----------|-----------|-------------|-------------|
| Fin. Aspects | | | | |
| • INVESTMENT(US\$) | 250,000.- | 500,000.- | 1,400,000.- | 3,900,000.- |
| • FIRR (%) | 13.82 | 18.75% | 24.61% | 26.92% |

STRATEGIC ACTION PLANS & GoB POLICY SUPPORTS RECOMMENDED FOR IMPLEMENTATION

- 1) **A DETAILED SURVEY OF SIZE DISTRIBUTION & ENERGY SITUATION** (BOTH THERMAL & ELECTRICAL) OF RICE MILLS LOCATED IN CLUSTER AREAS TO BE CONDUCTED IMMEDIATELY
- 2) **ONE SMALL (e.g. 250 kVA) AND ONE MID-LARGE SIZED (e.g. 600 kW)** RICE MILL SHOULD BE SUPPORTED BY TECHNICAL ASSISTANCE & FUNDS TO TEST THE 100% PRODUCER GAS BASED TECHNOLOGY & THE PROFITABILITY ON A FAST TRACK BASIS (**CAPTIVE 'FLAGSHIPS'**)
- 3) BASED ON RESULTS OF DETAILED SURVEY (AS UNDER SL. ABOVE MEGAWATT RANGE CENTRAL PLANTS IN RICE MILL CLUSTER AREAS TO BE ENCOURAGED (NORTH BENGAL)
- 4) **SPECIAL POWER PURCHASE TARIFFS** TO BE INTRODUCED BY BERC TO ENCOURAGE HUSK BASED RET POWER.







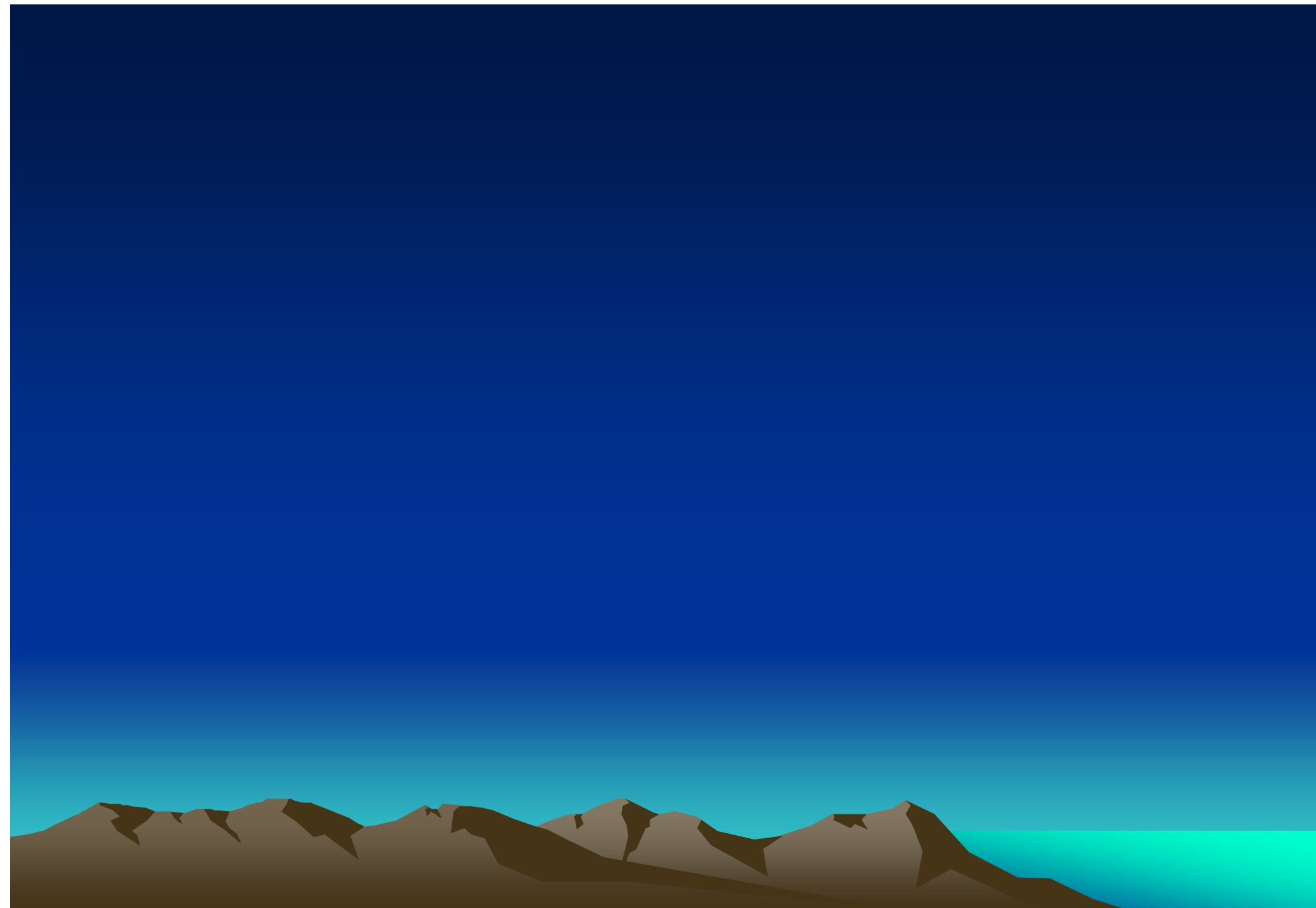


Steel Making







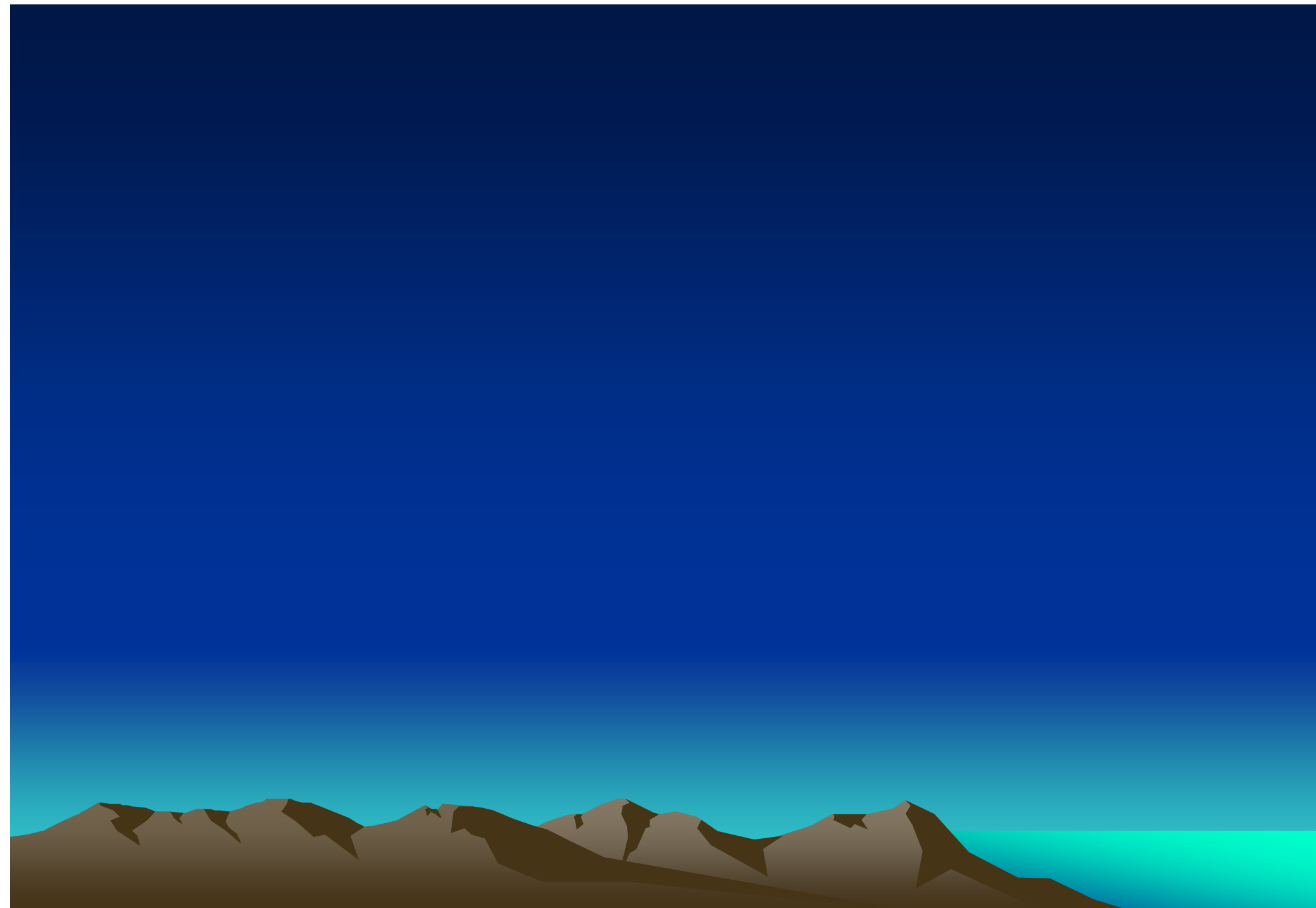




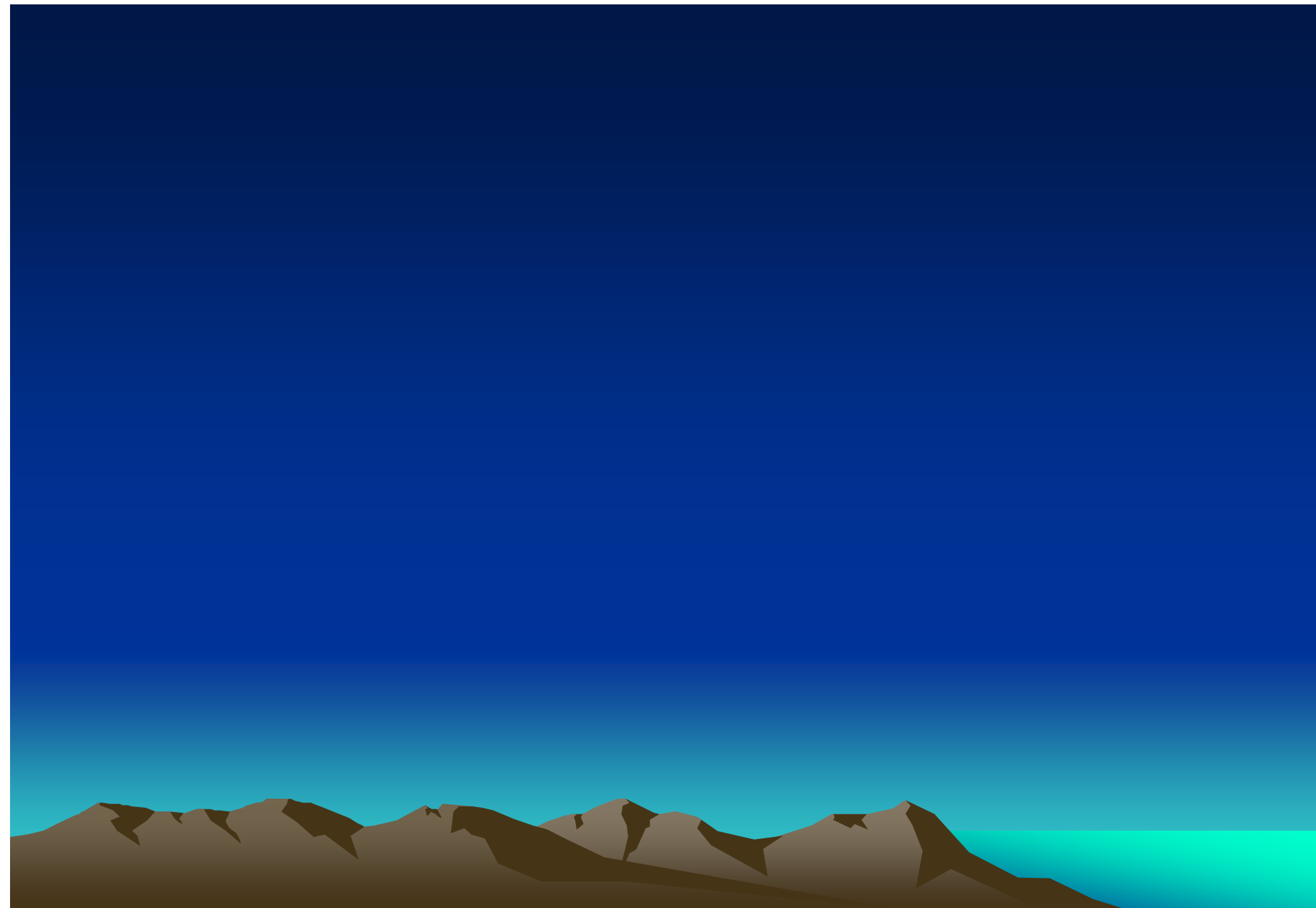






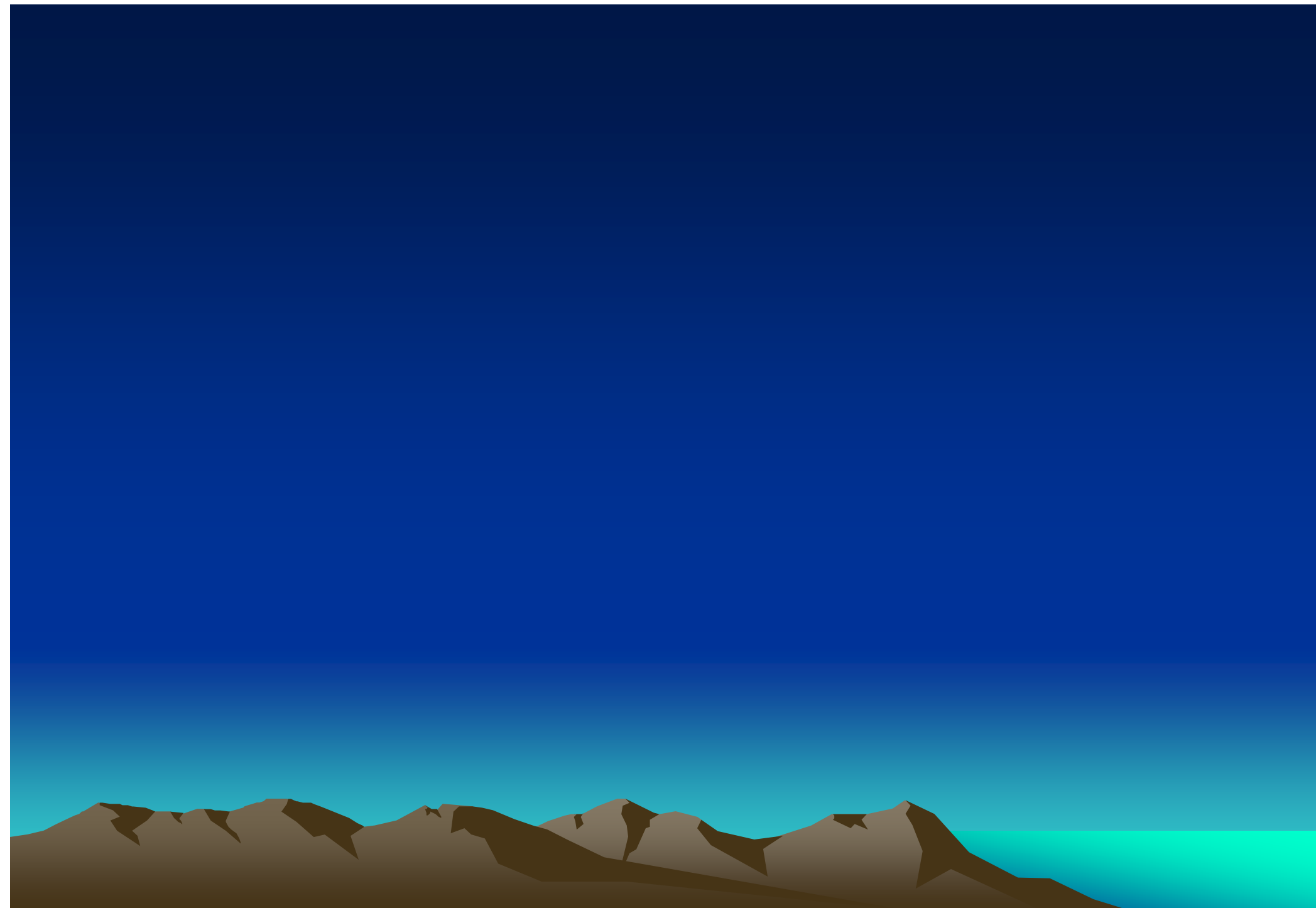




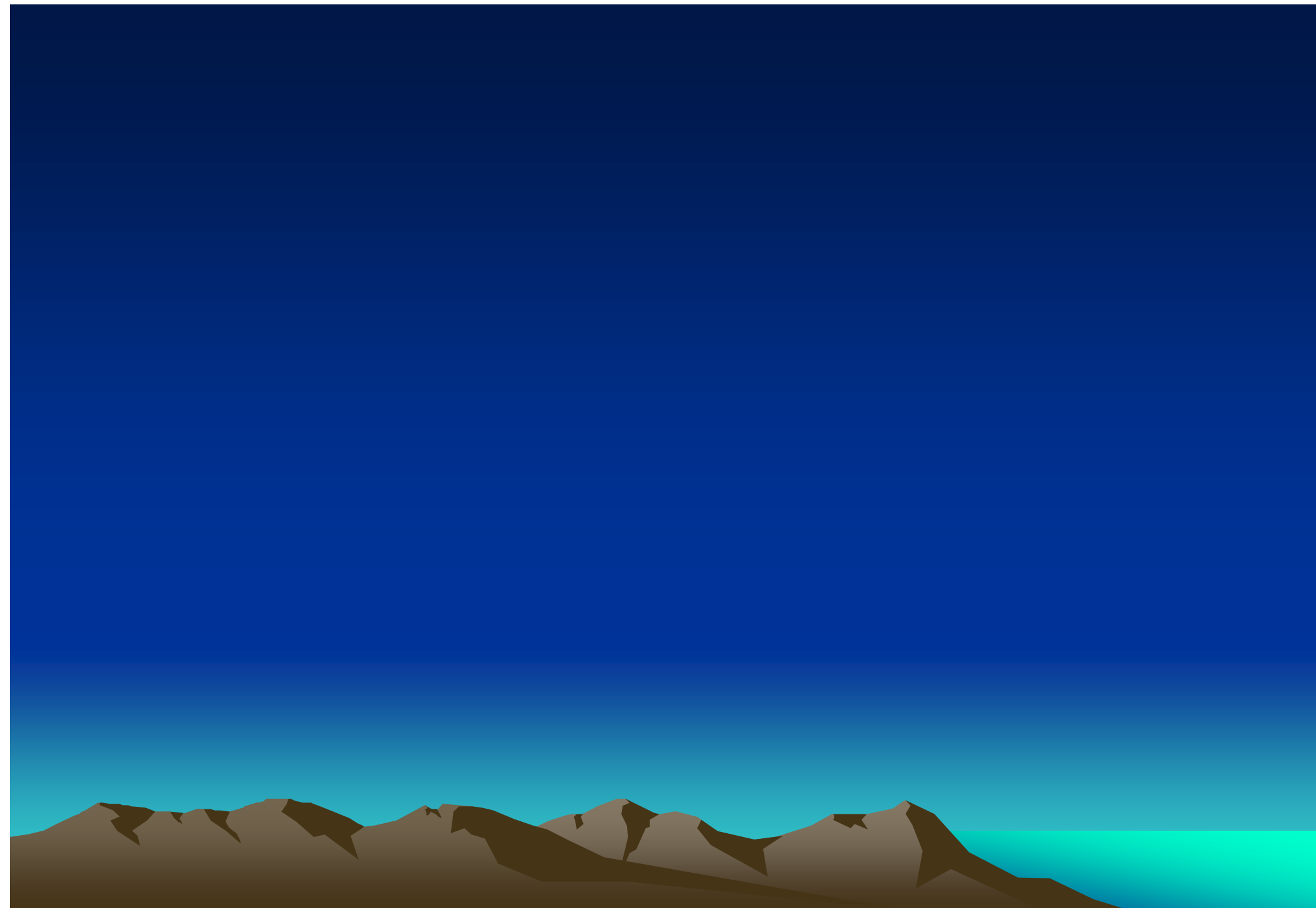


Casting







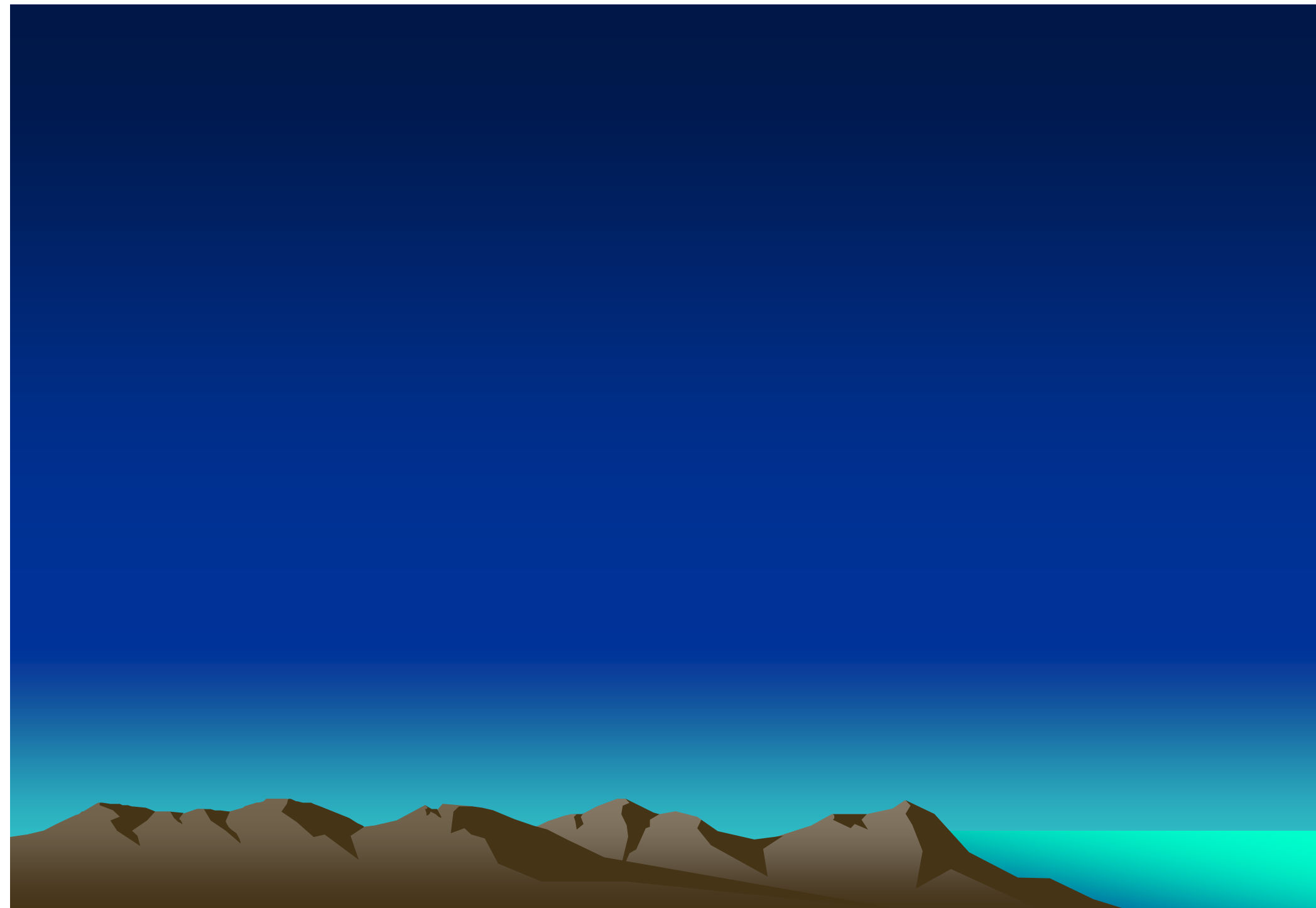


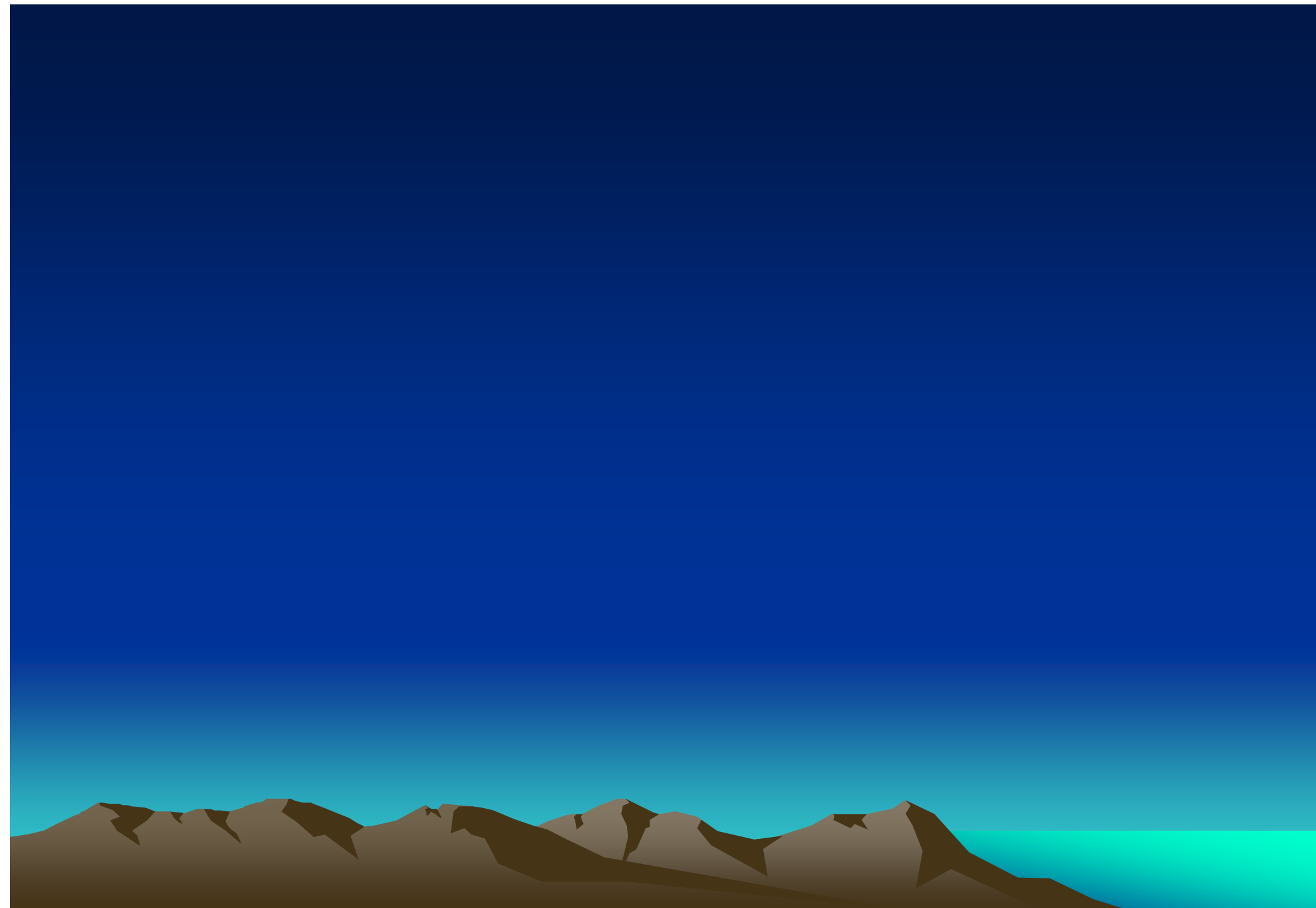


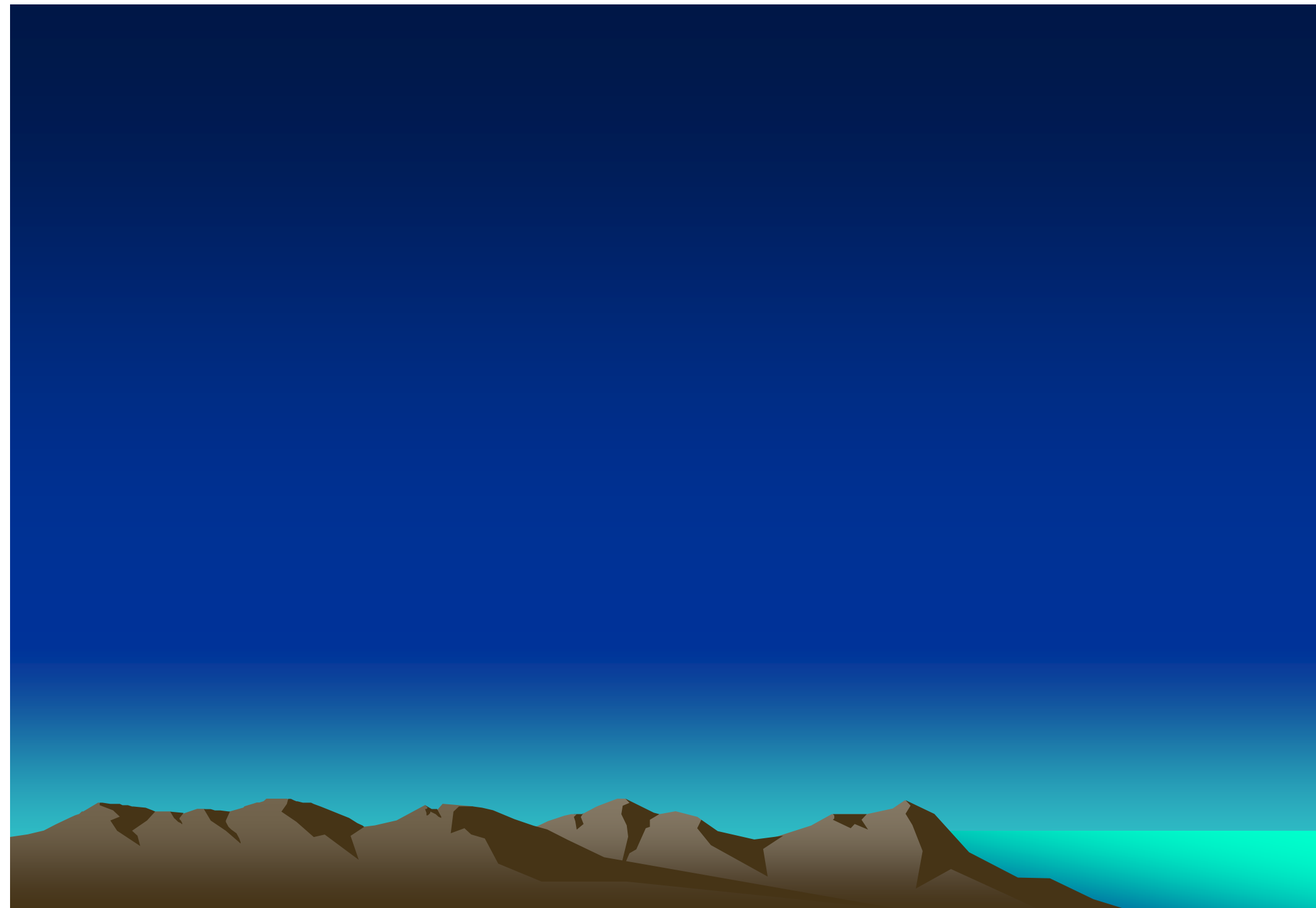






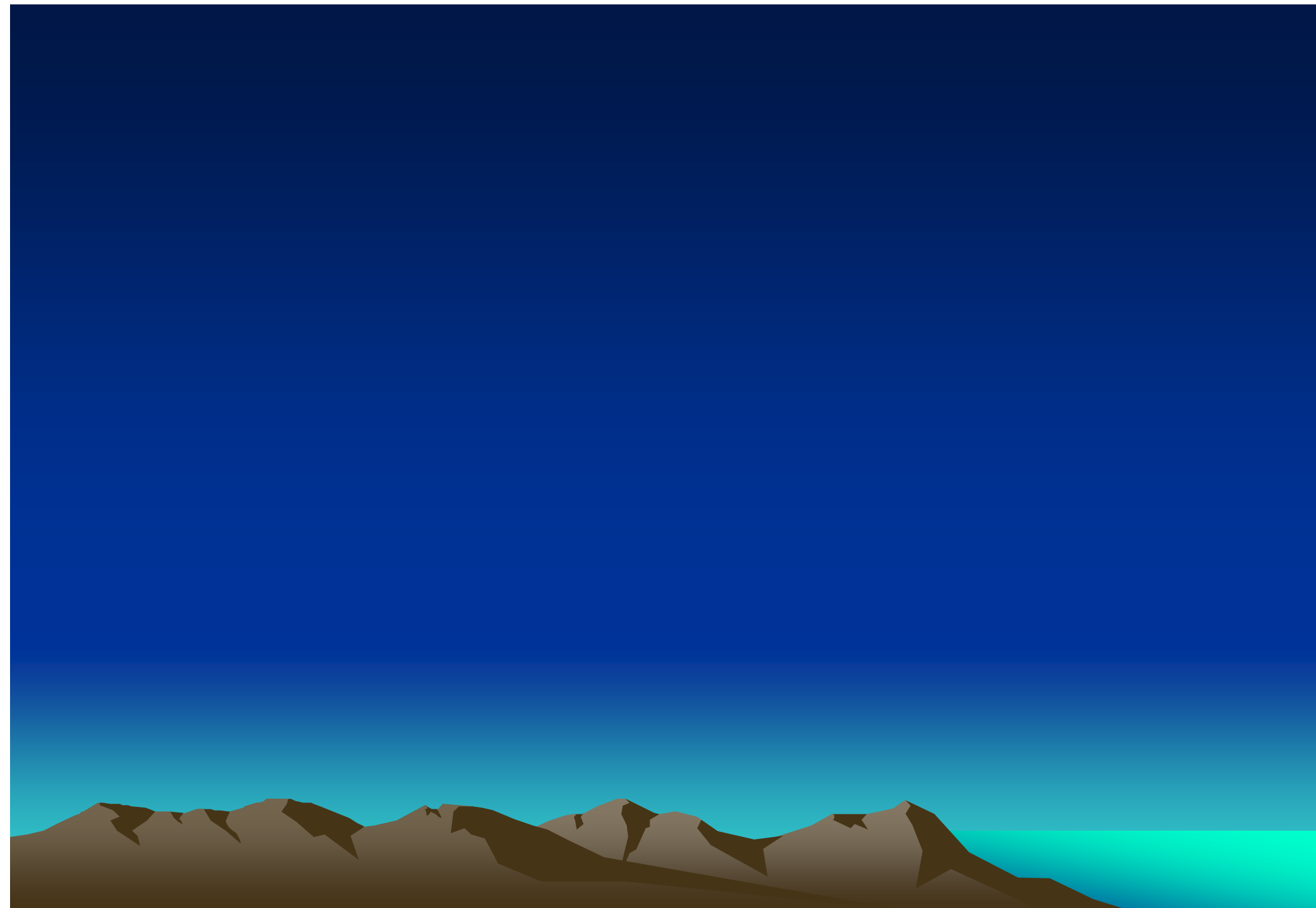




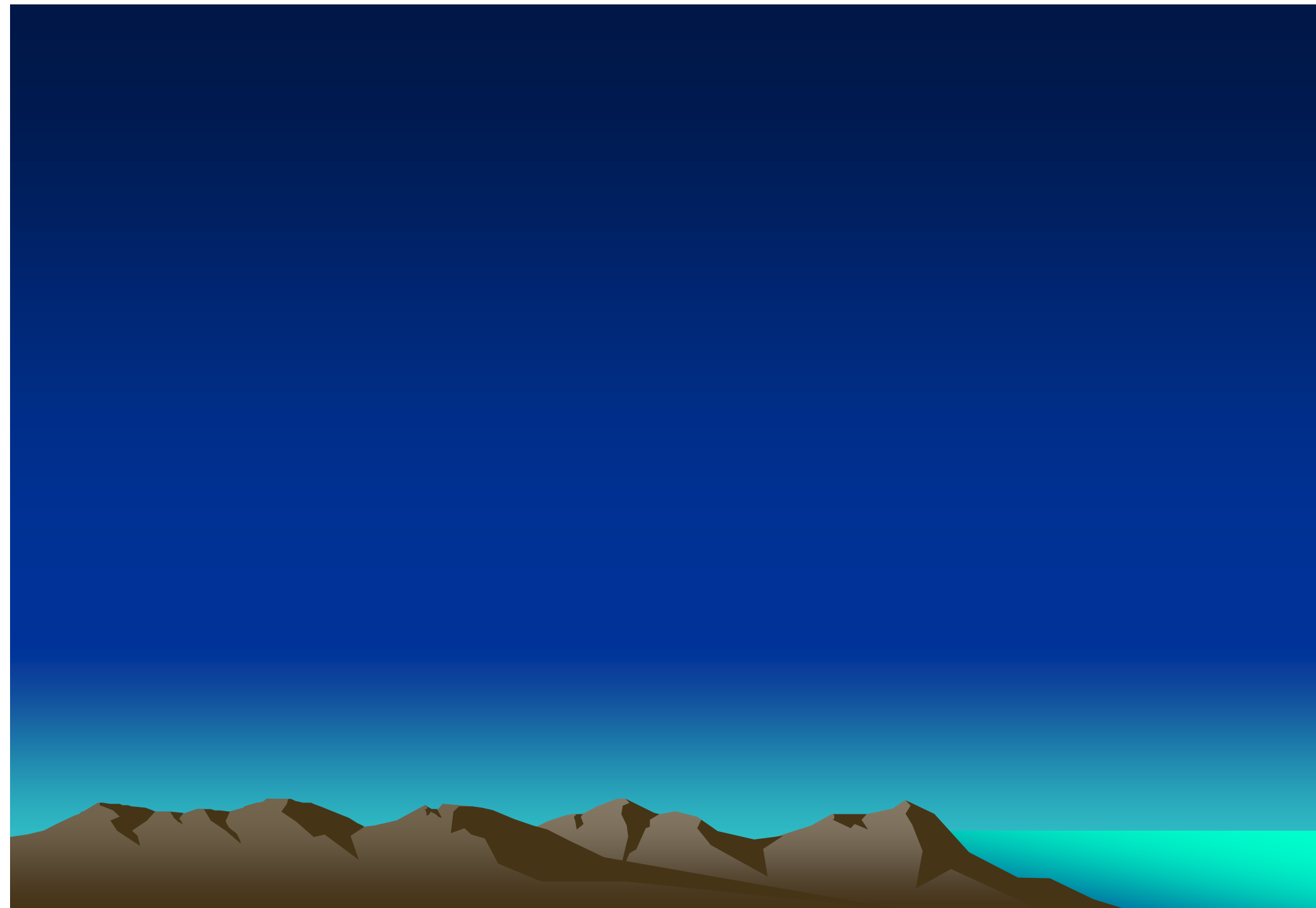


Mini Mill





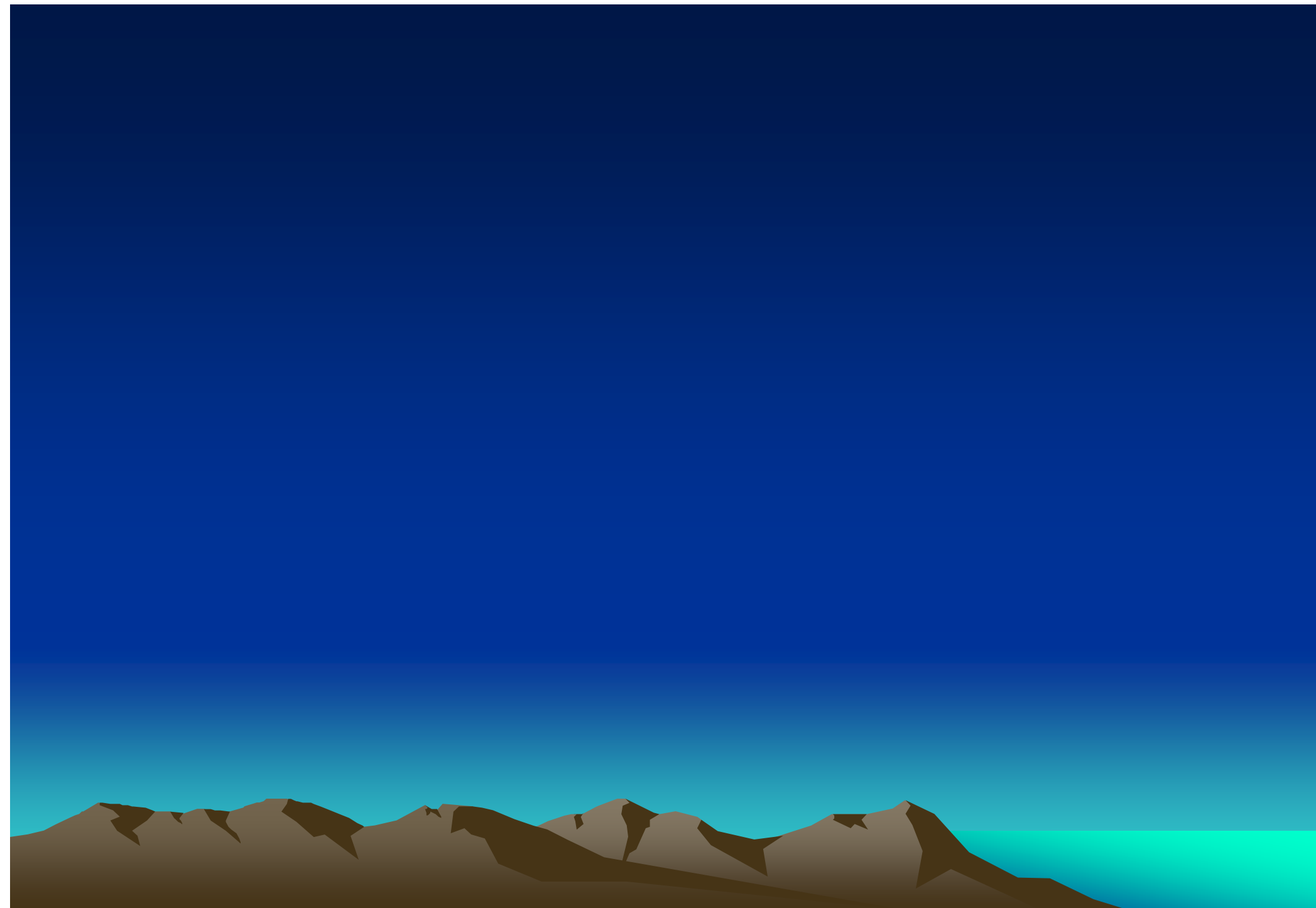




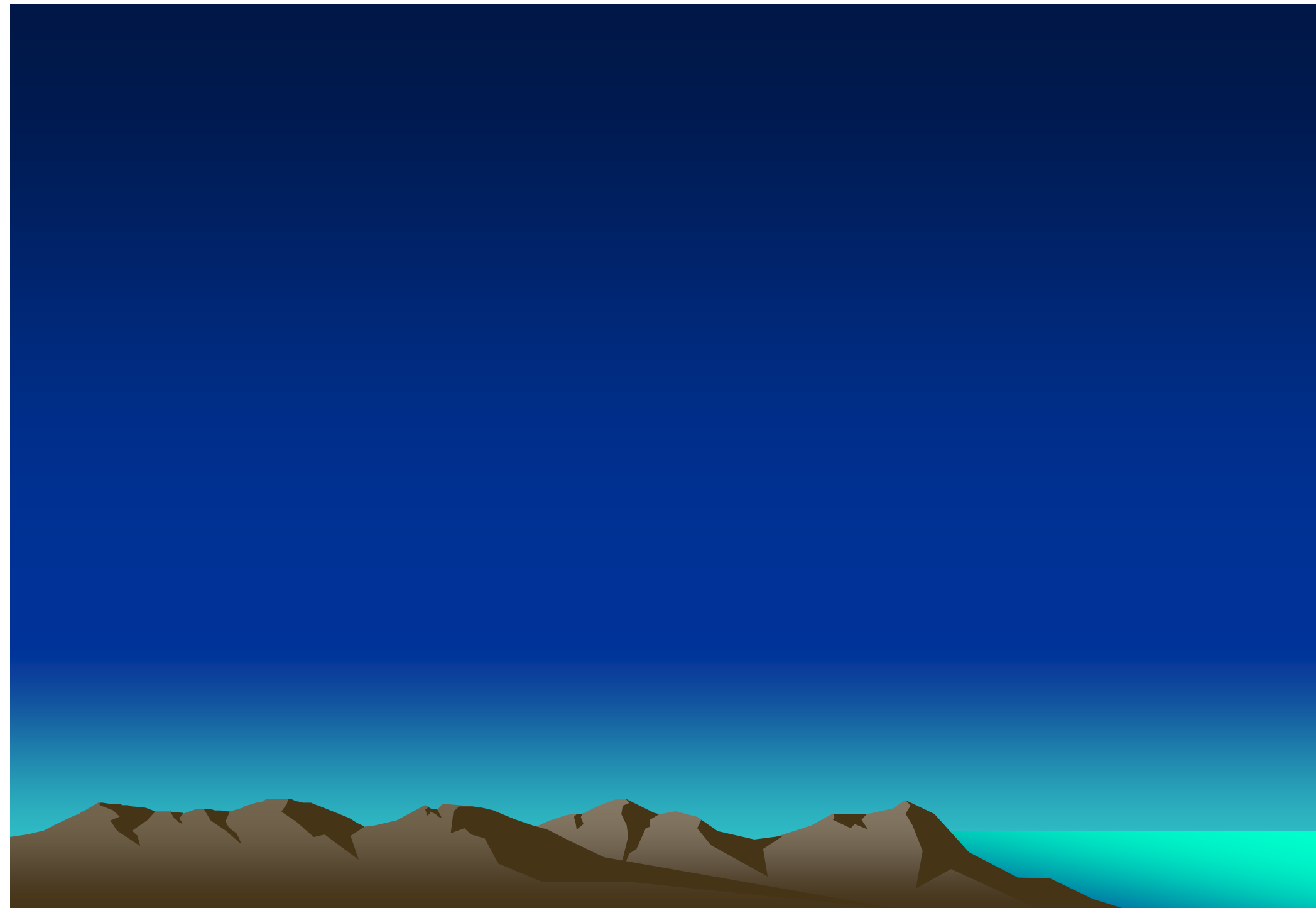










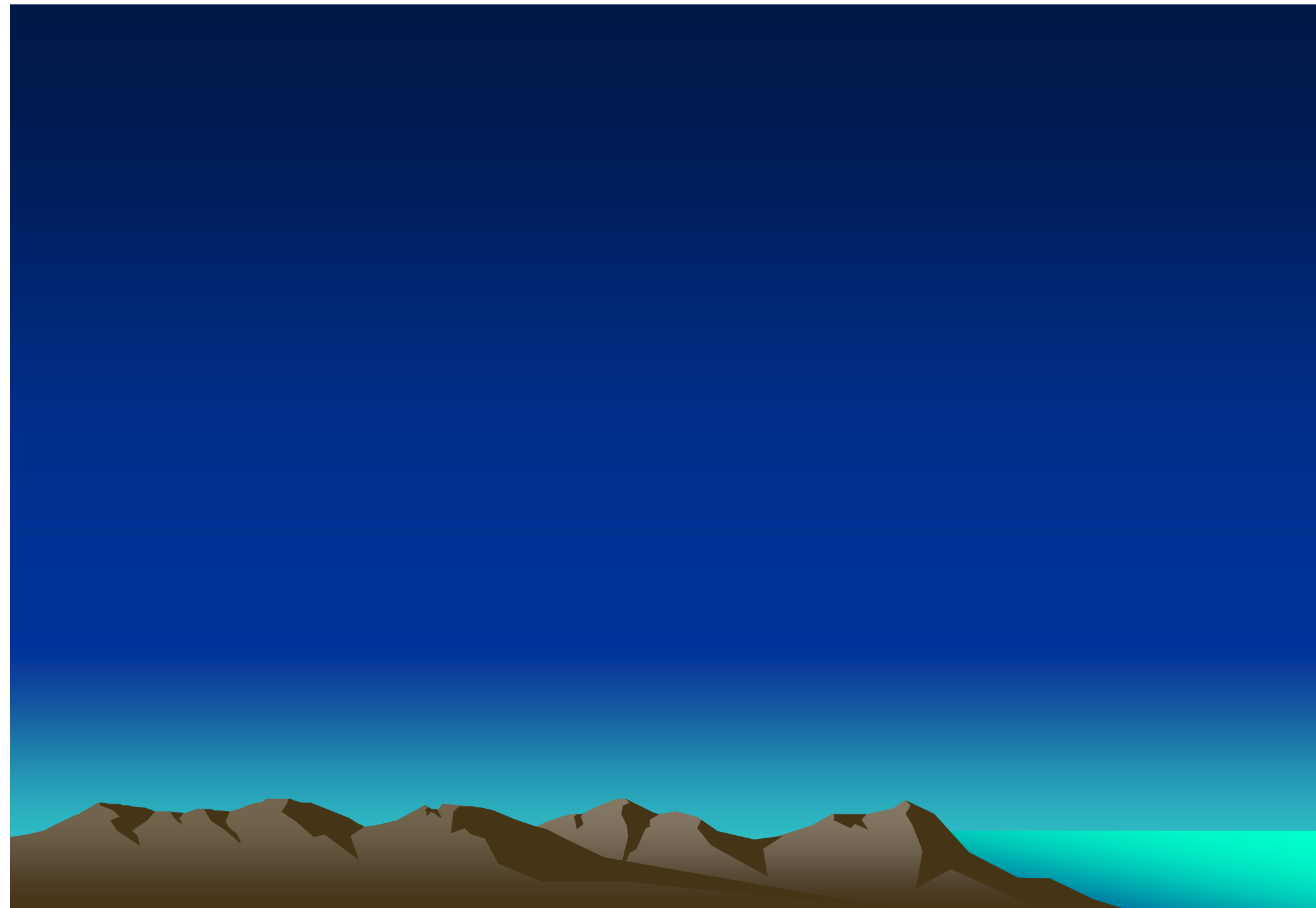


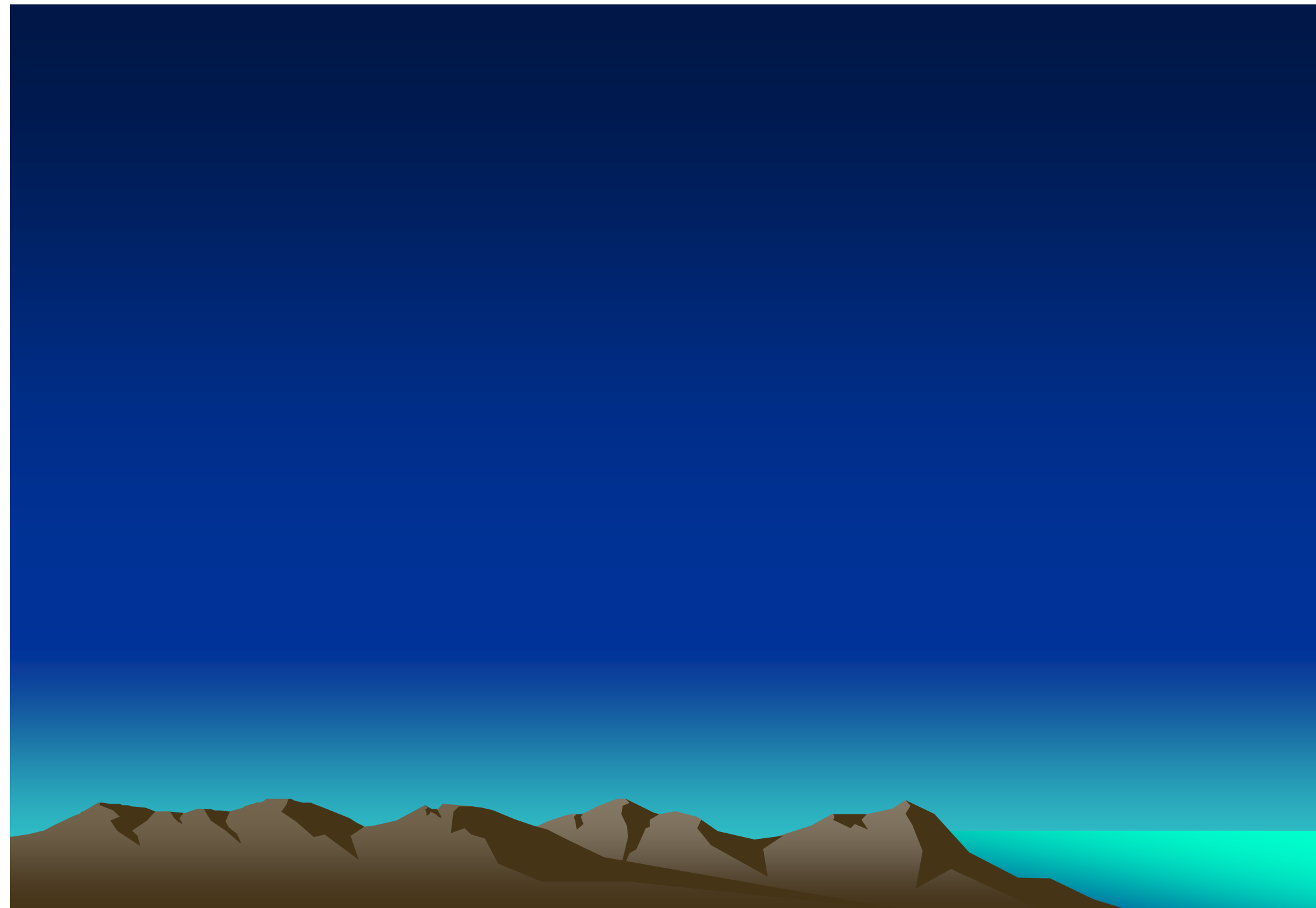


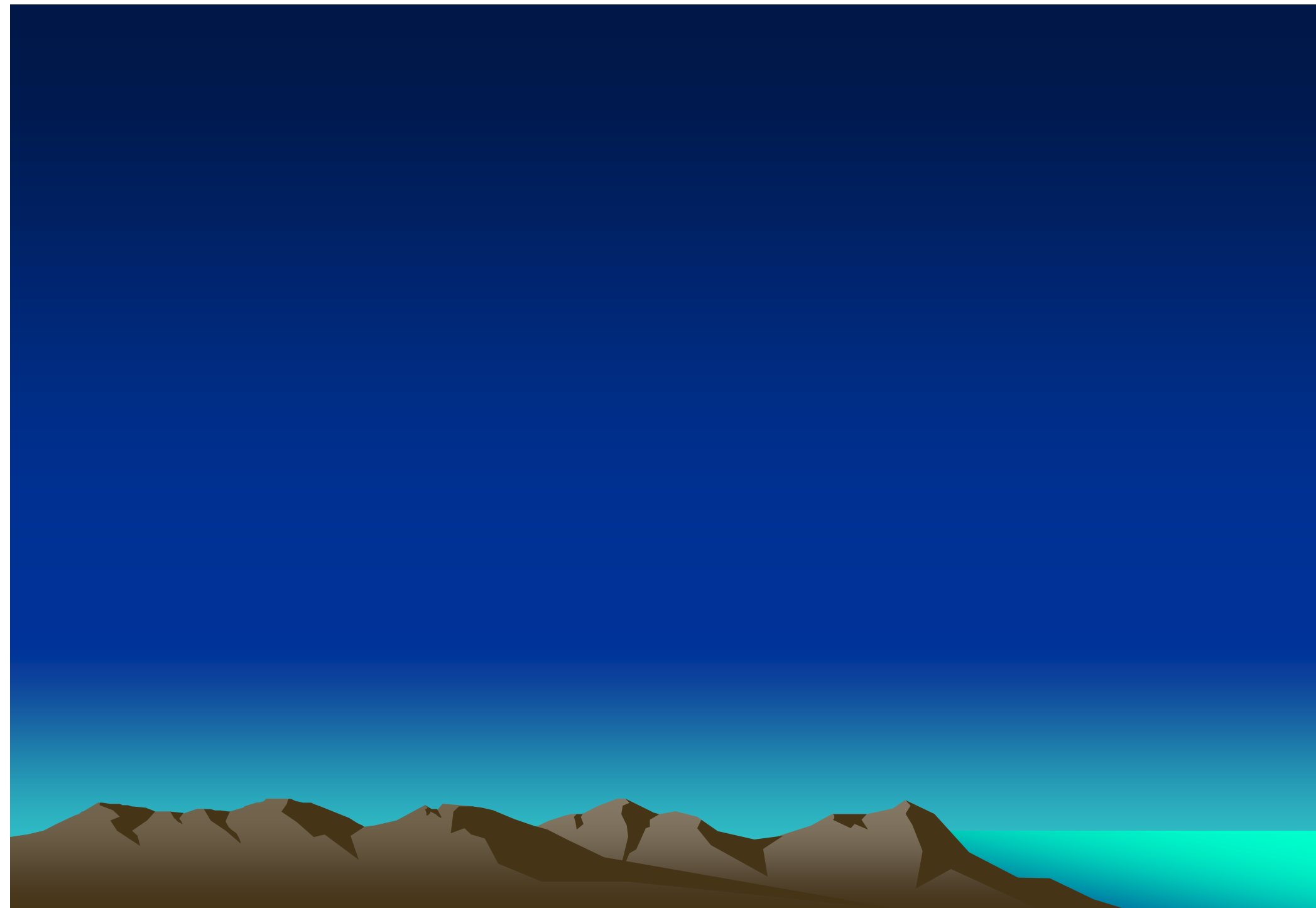
Hot Rolling

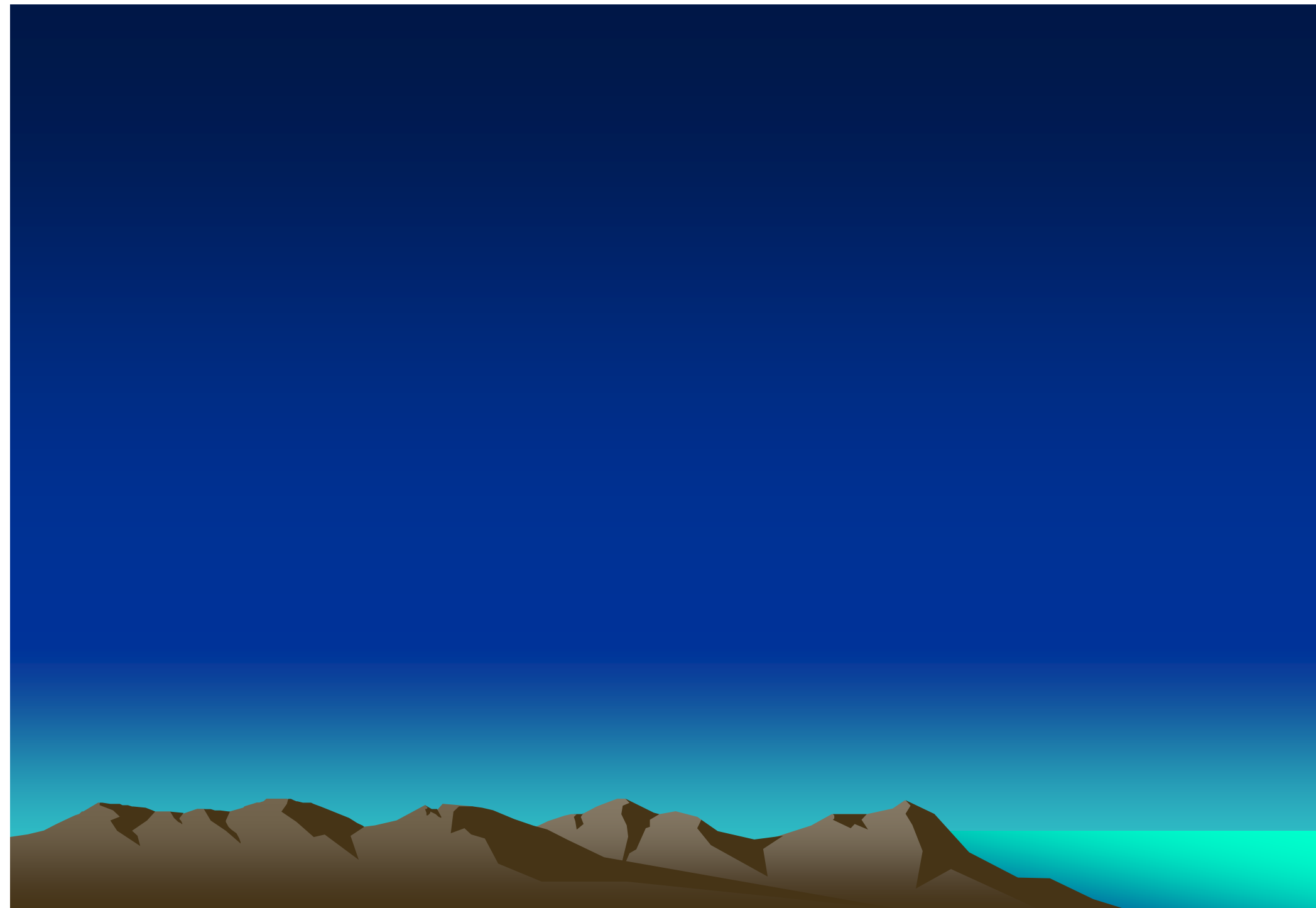


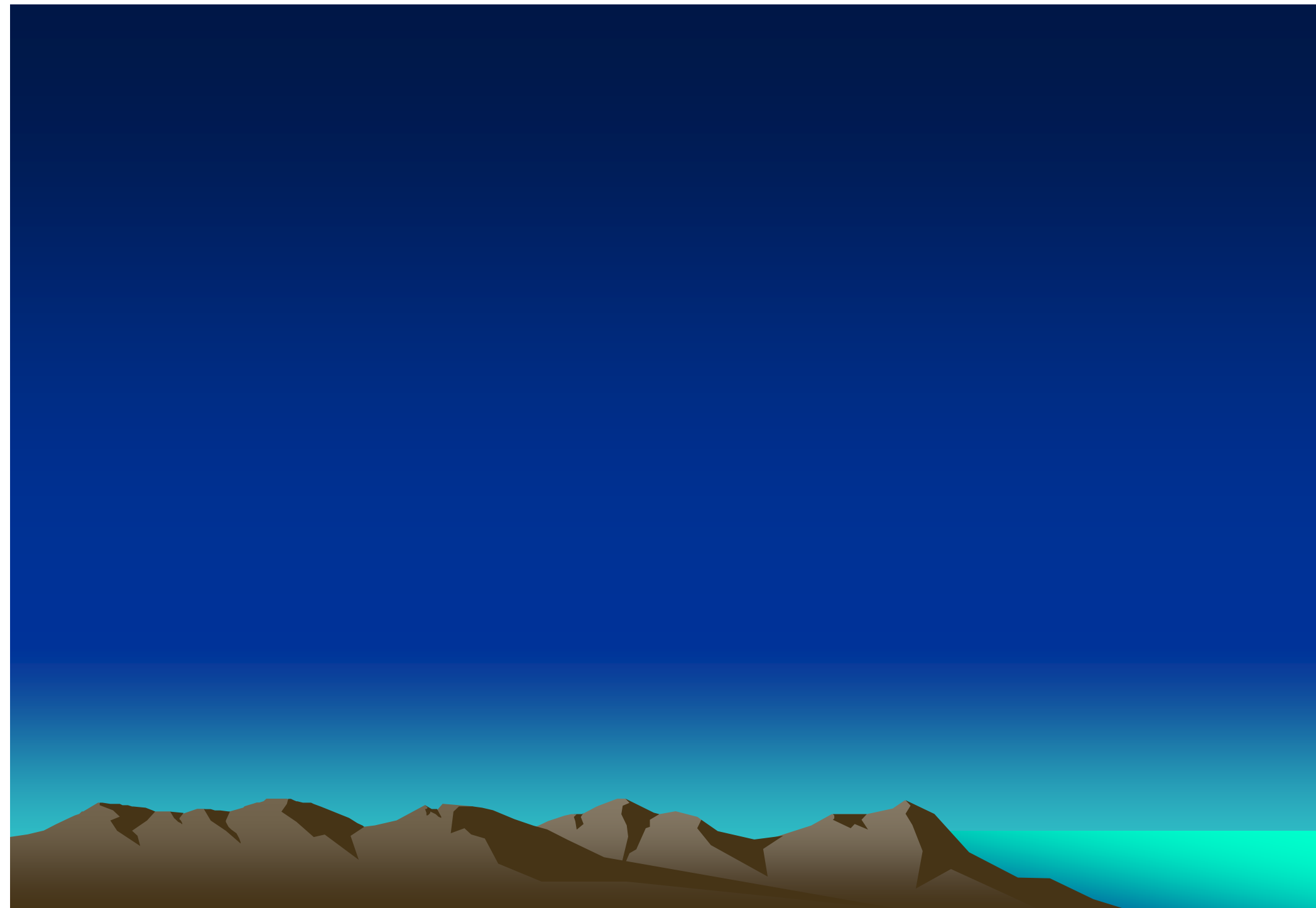




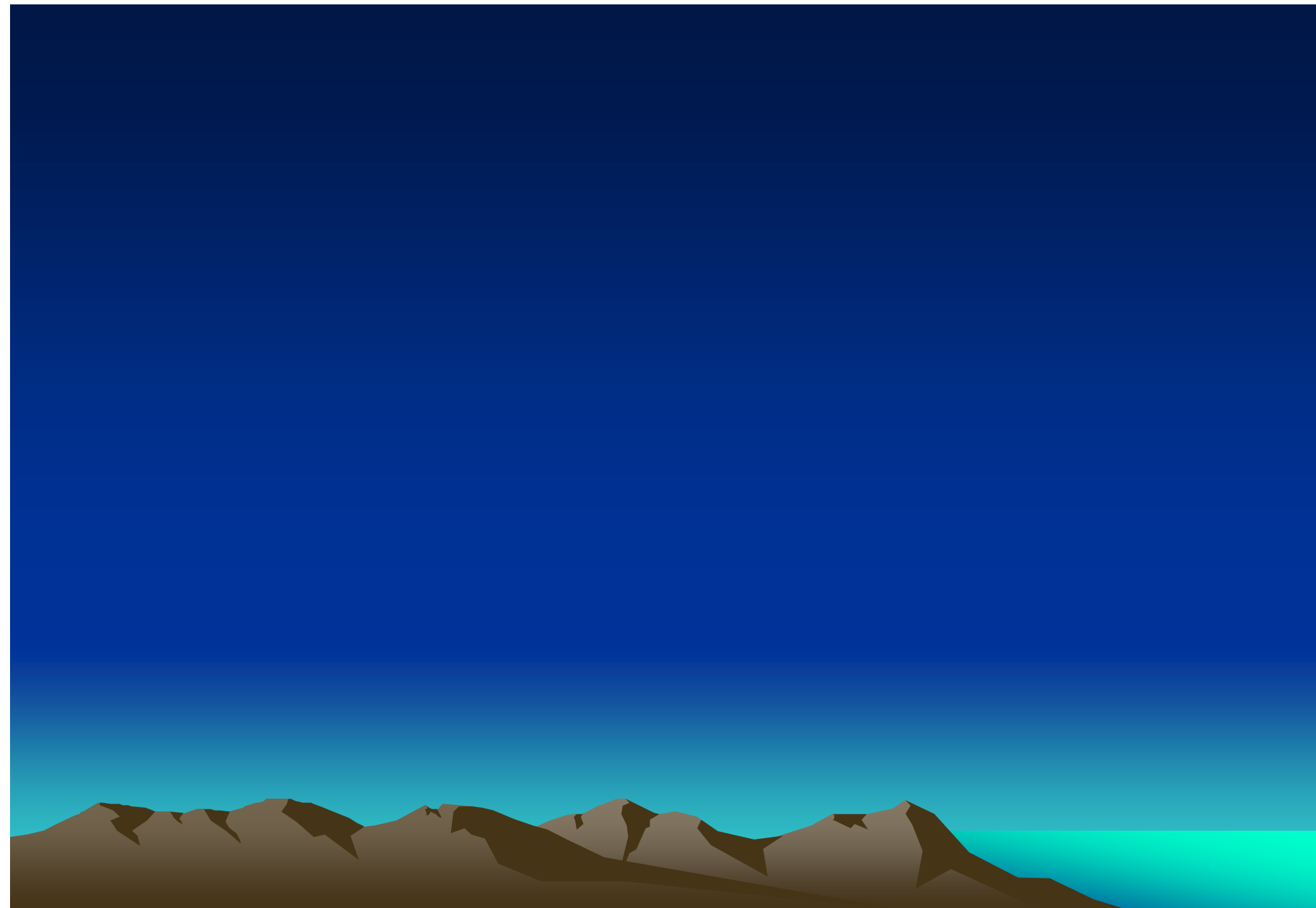












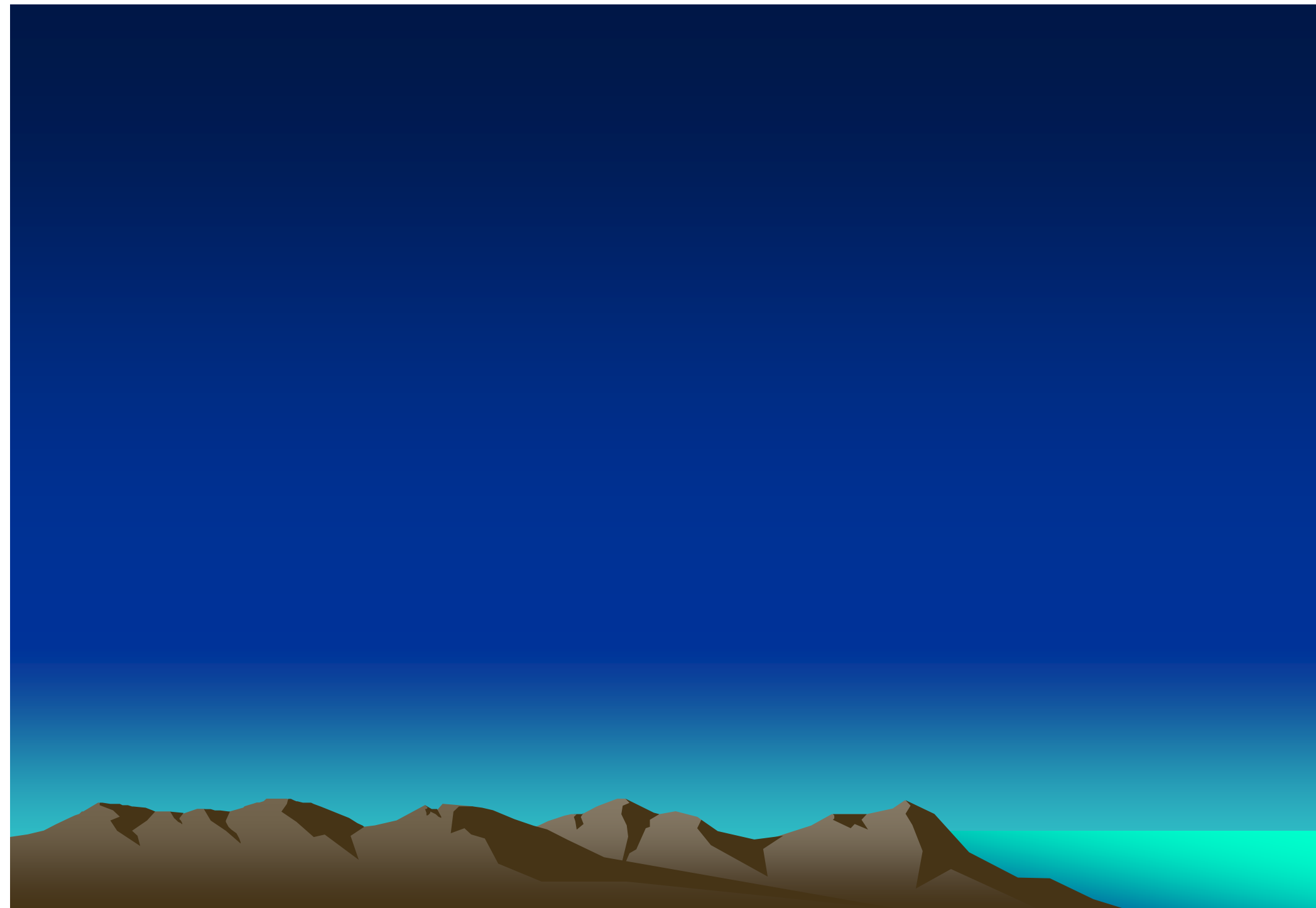




Cold Rolling

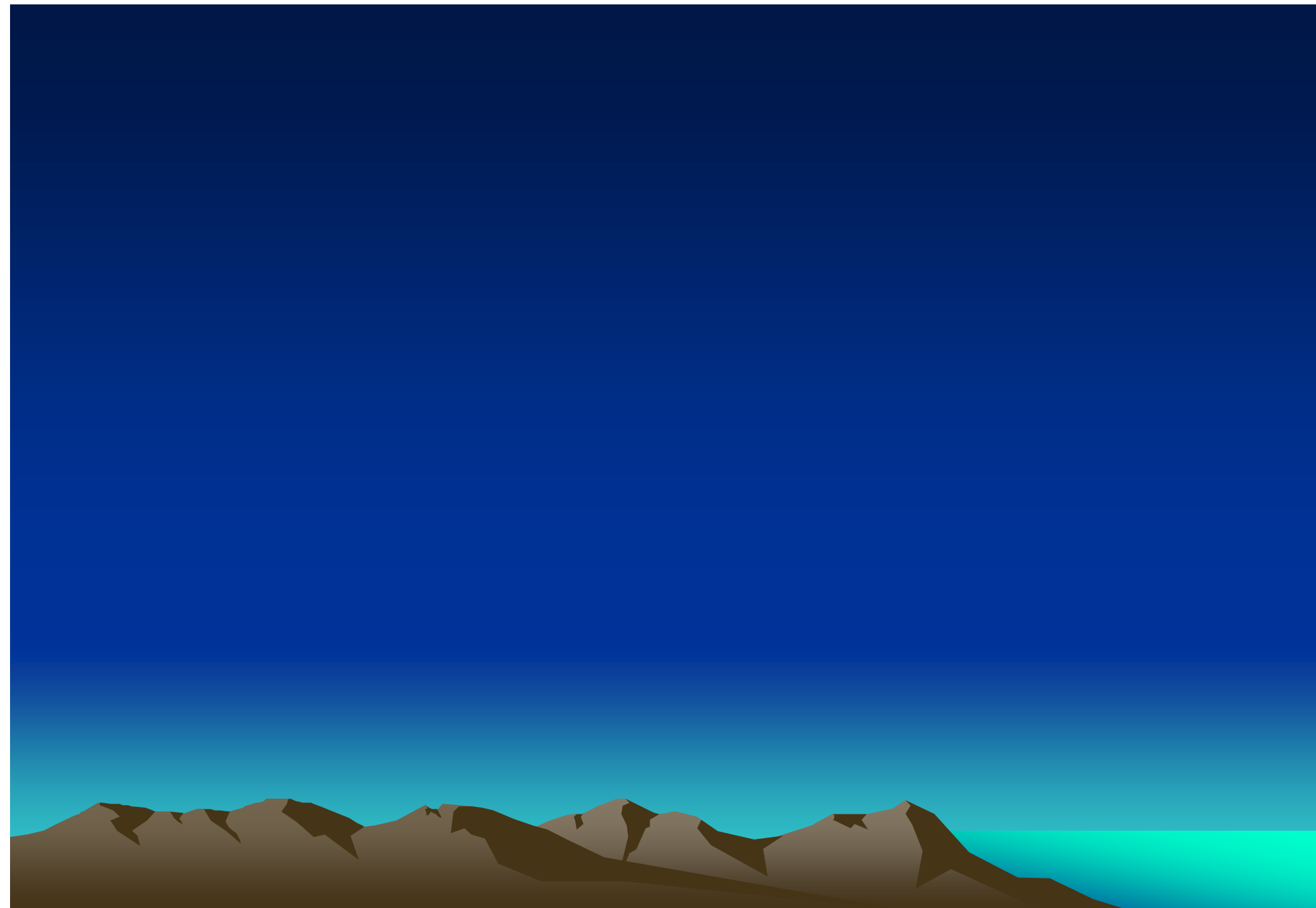


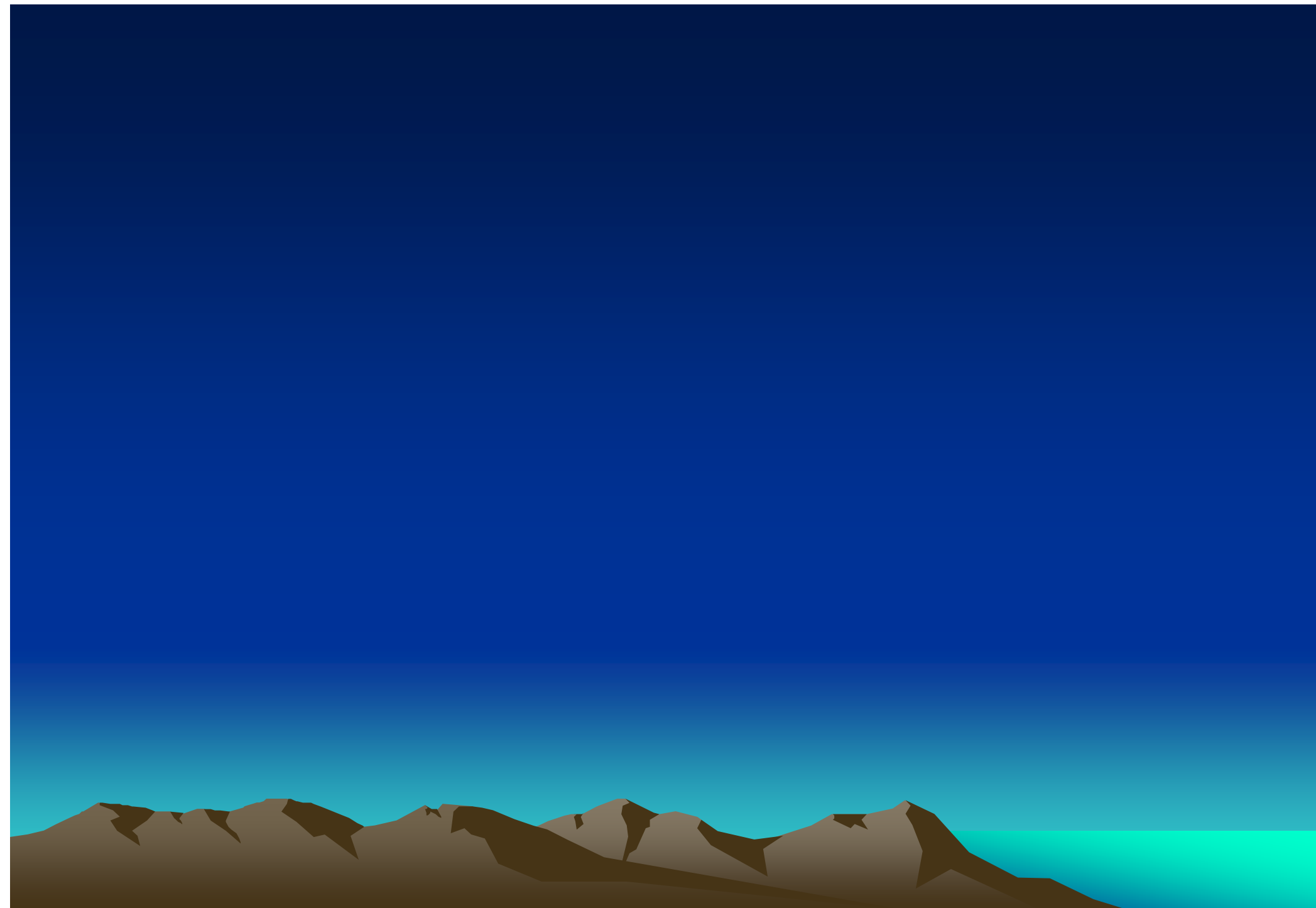








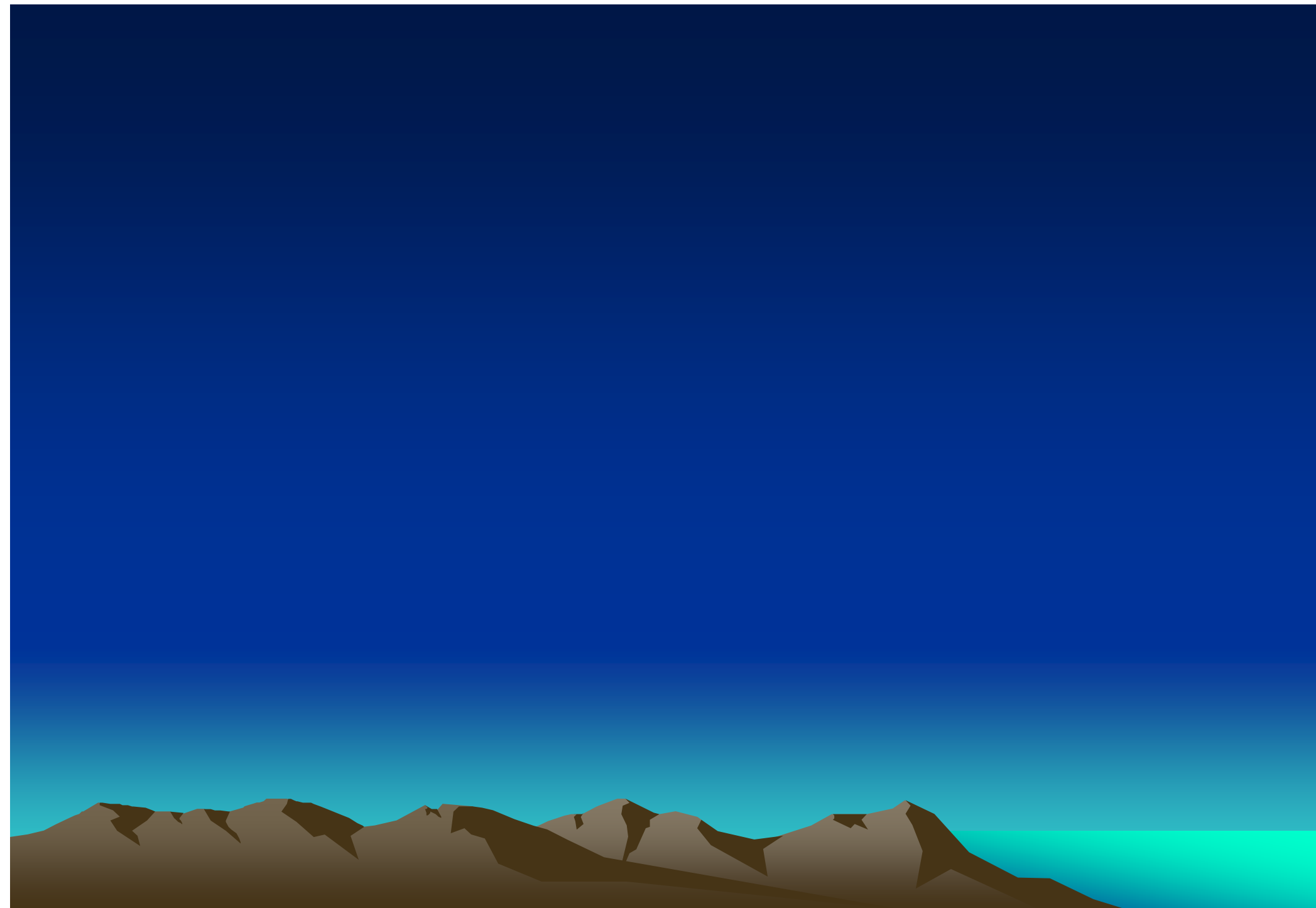




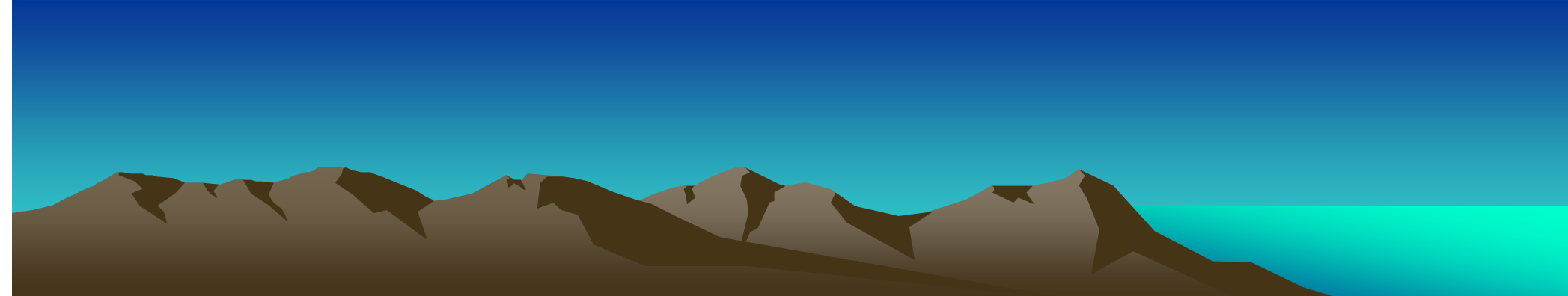




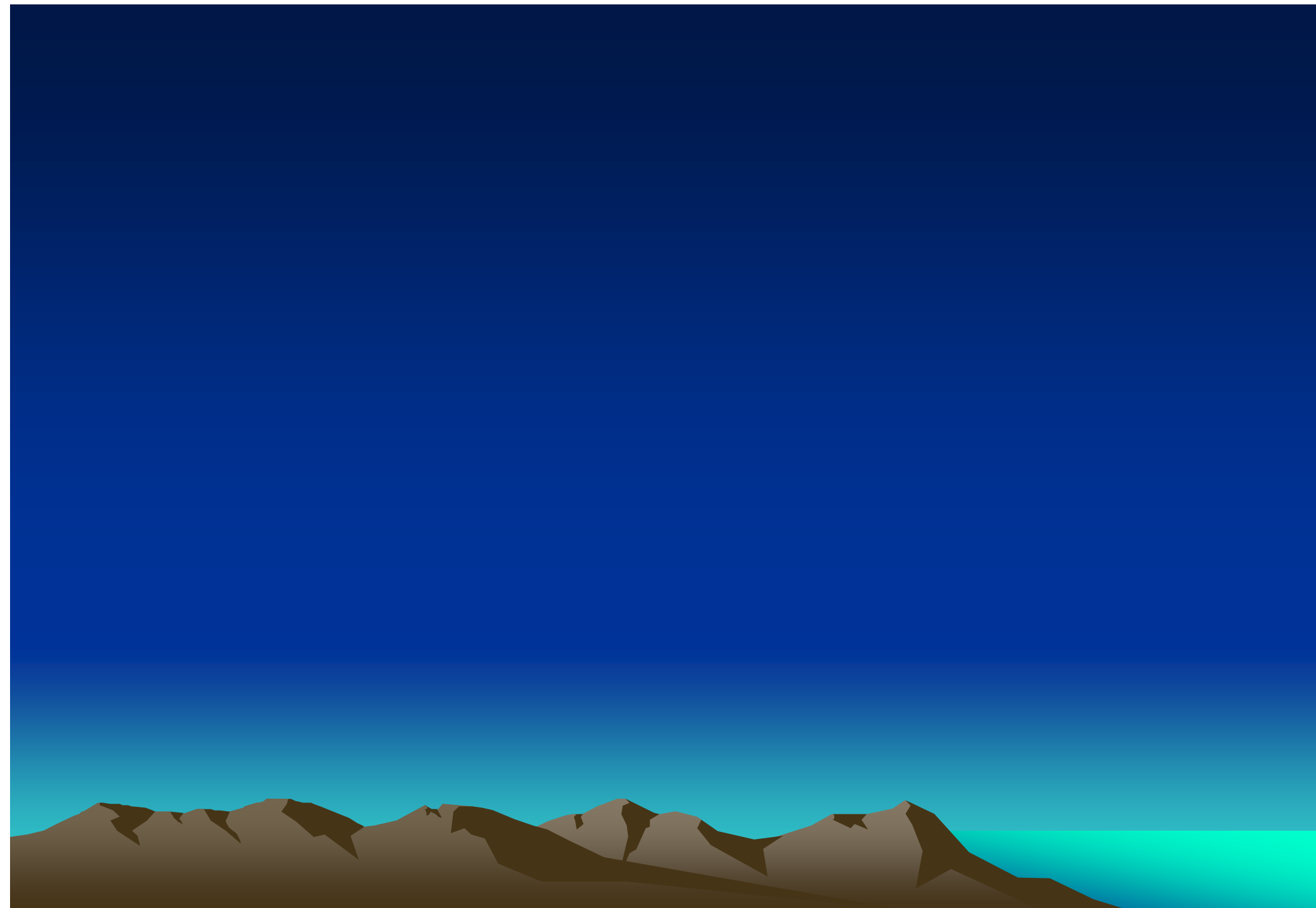


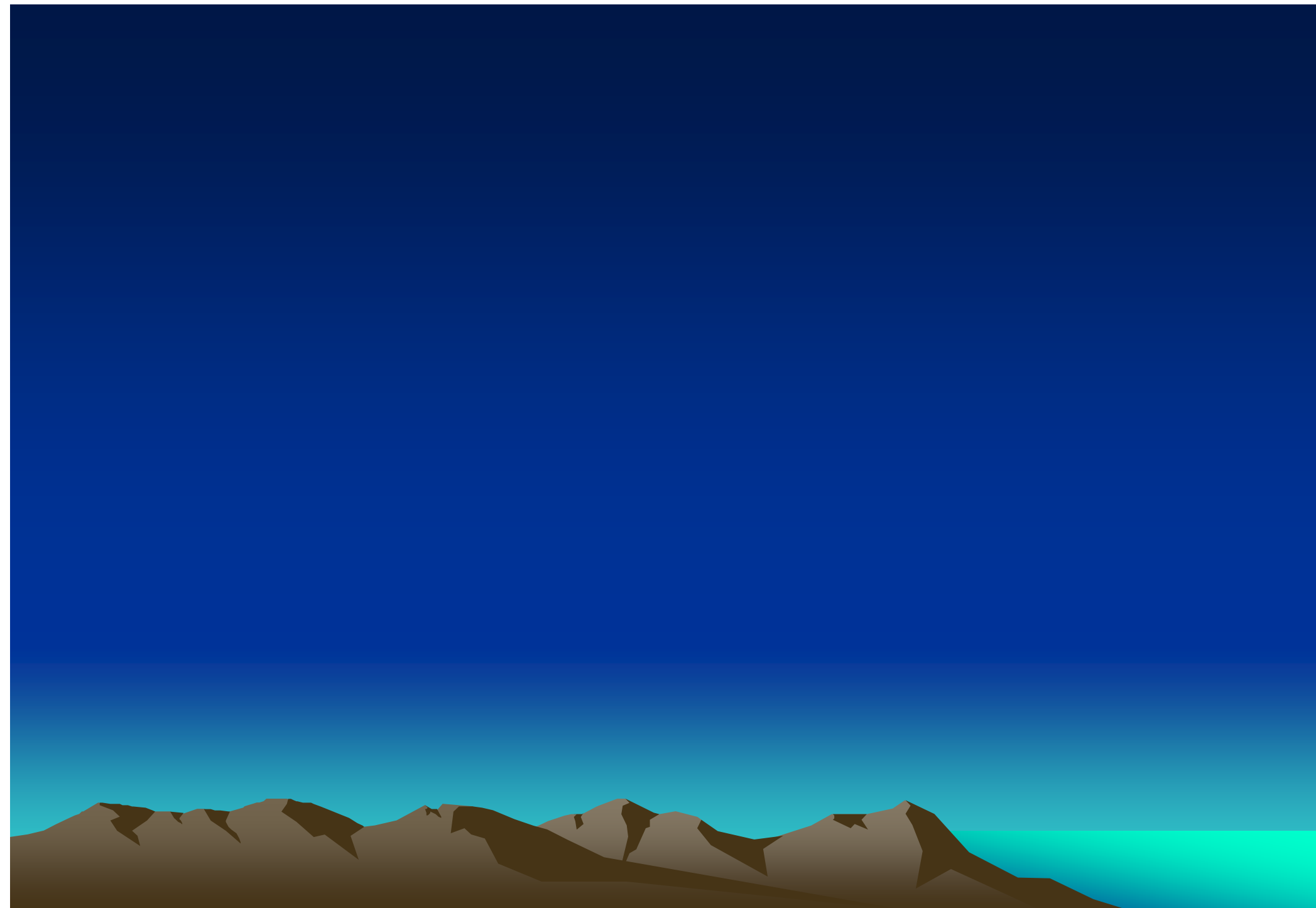


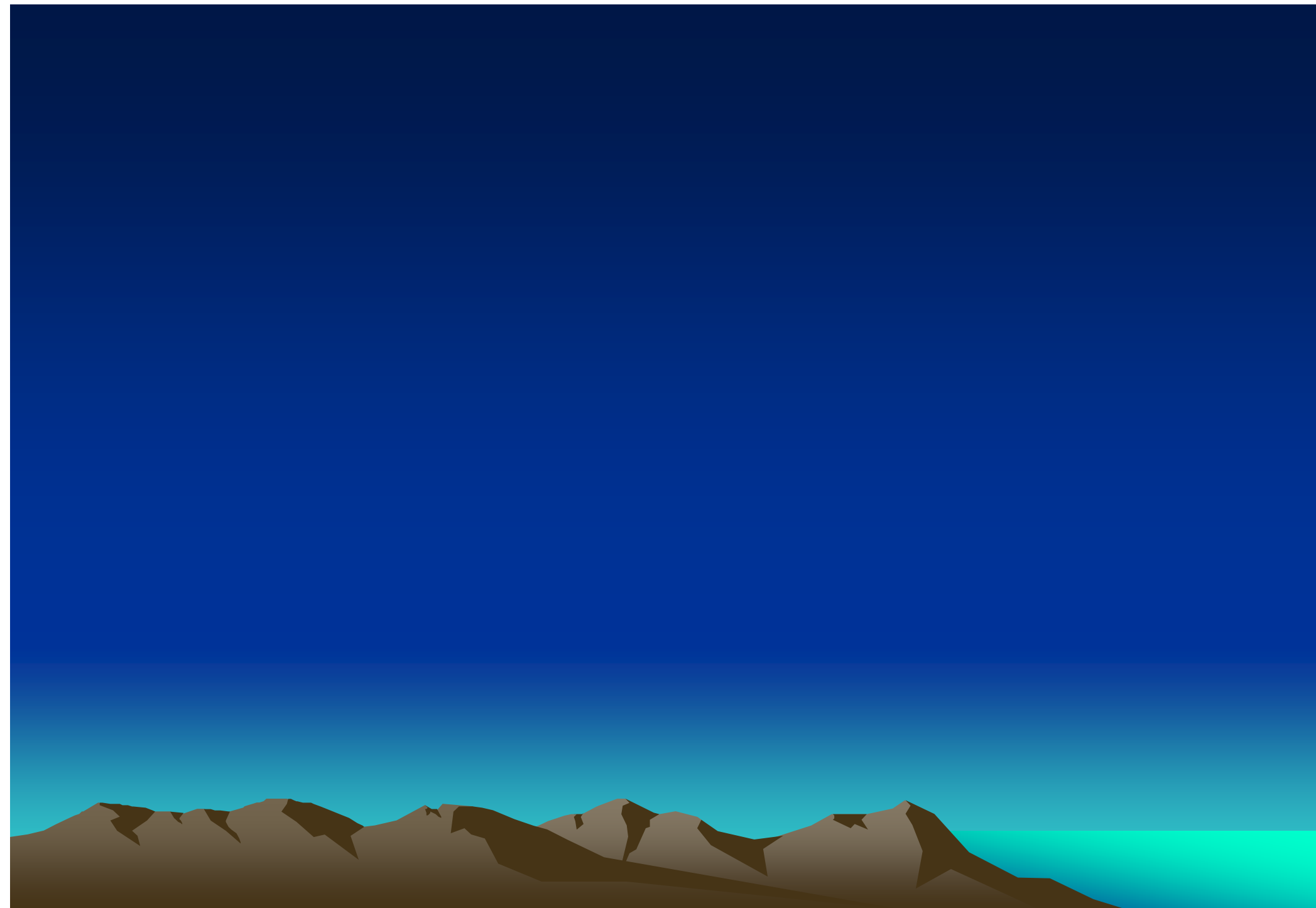
Strip Processing

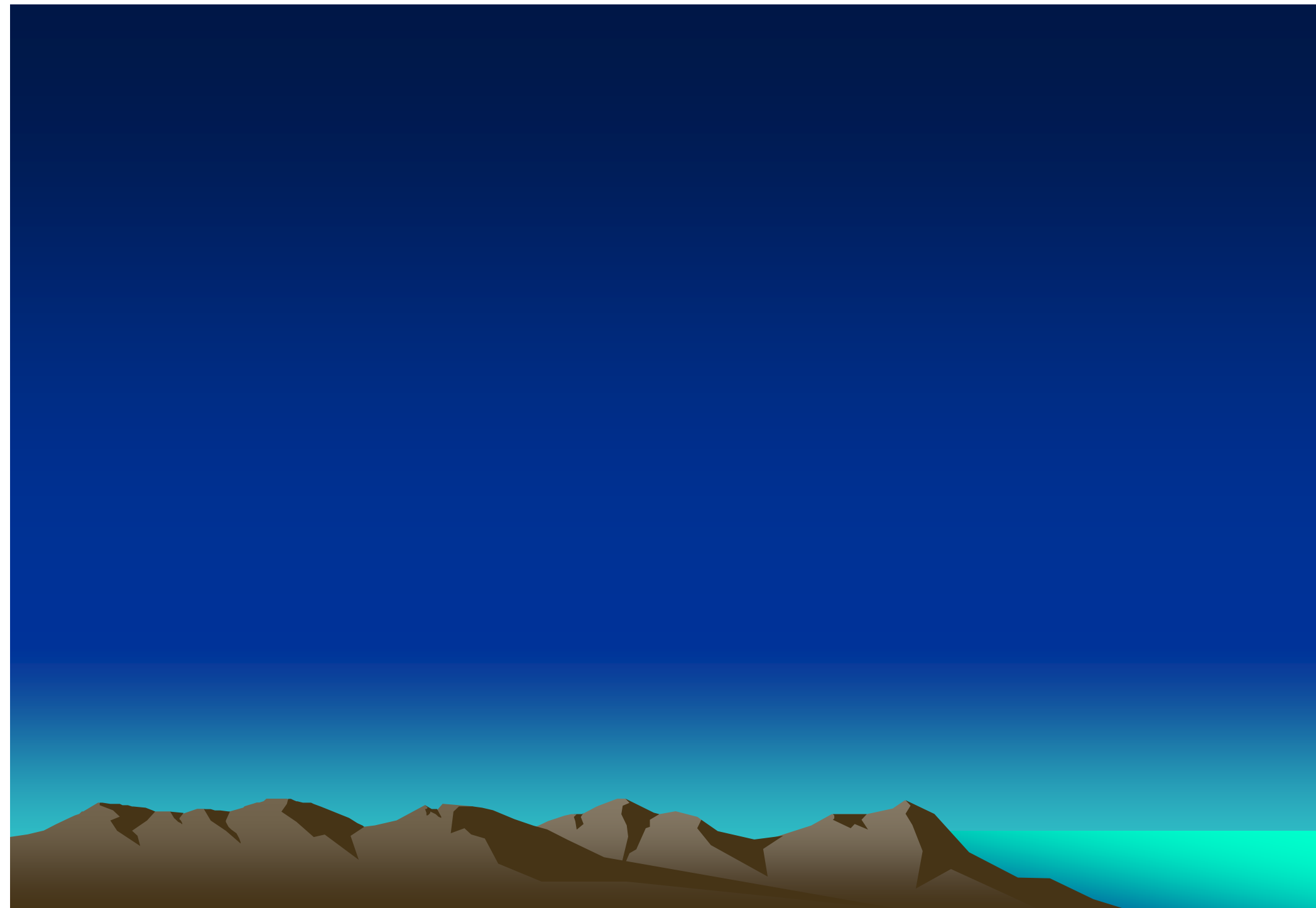


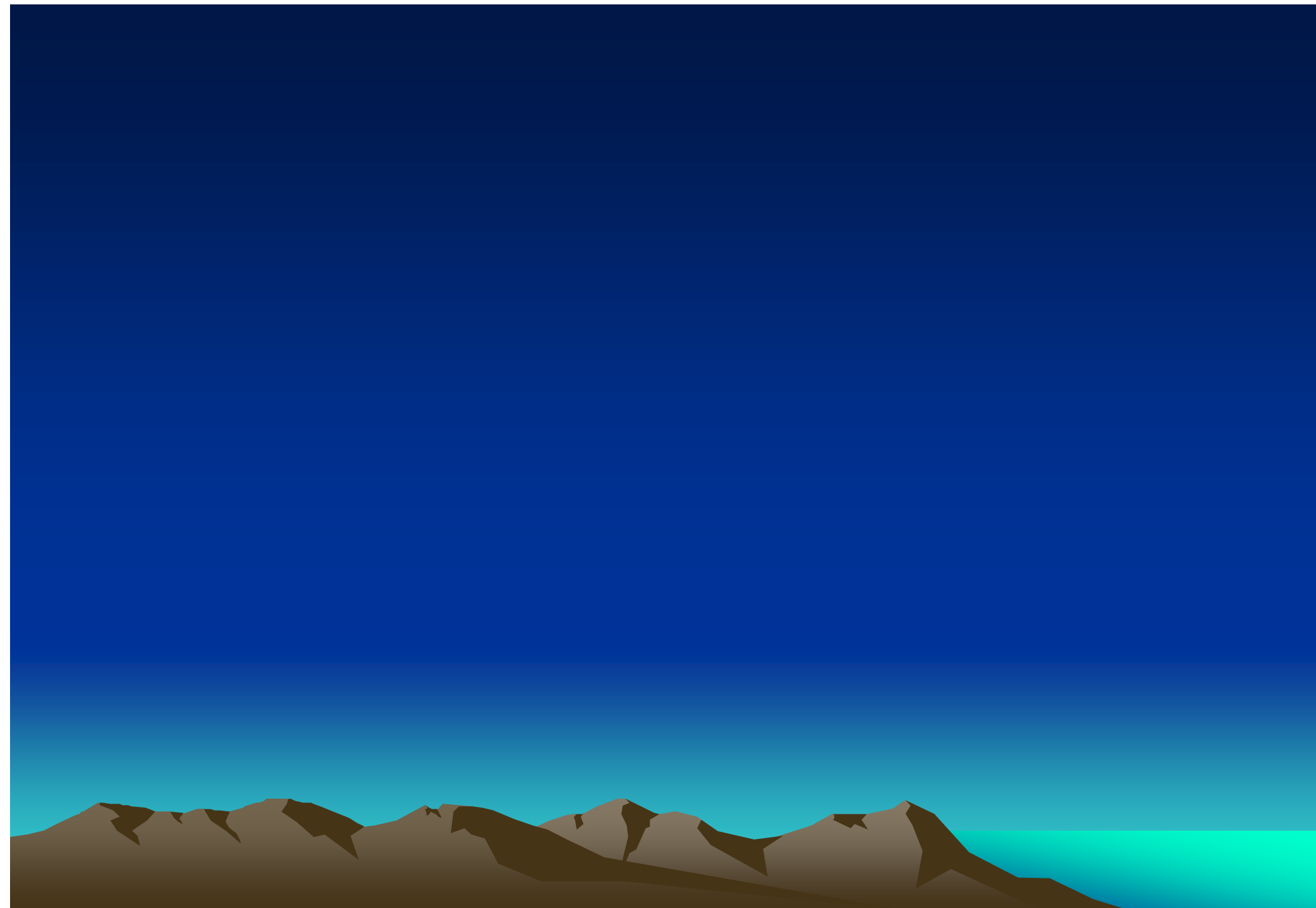


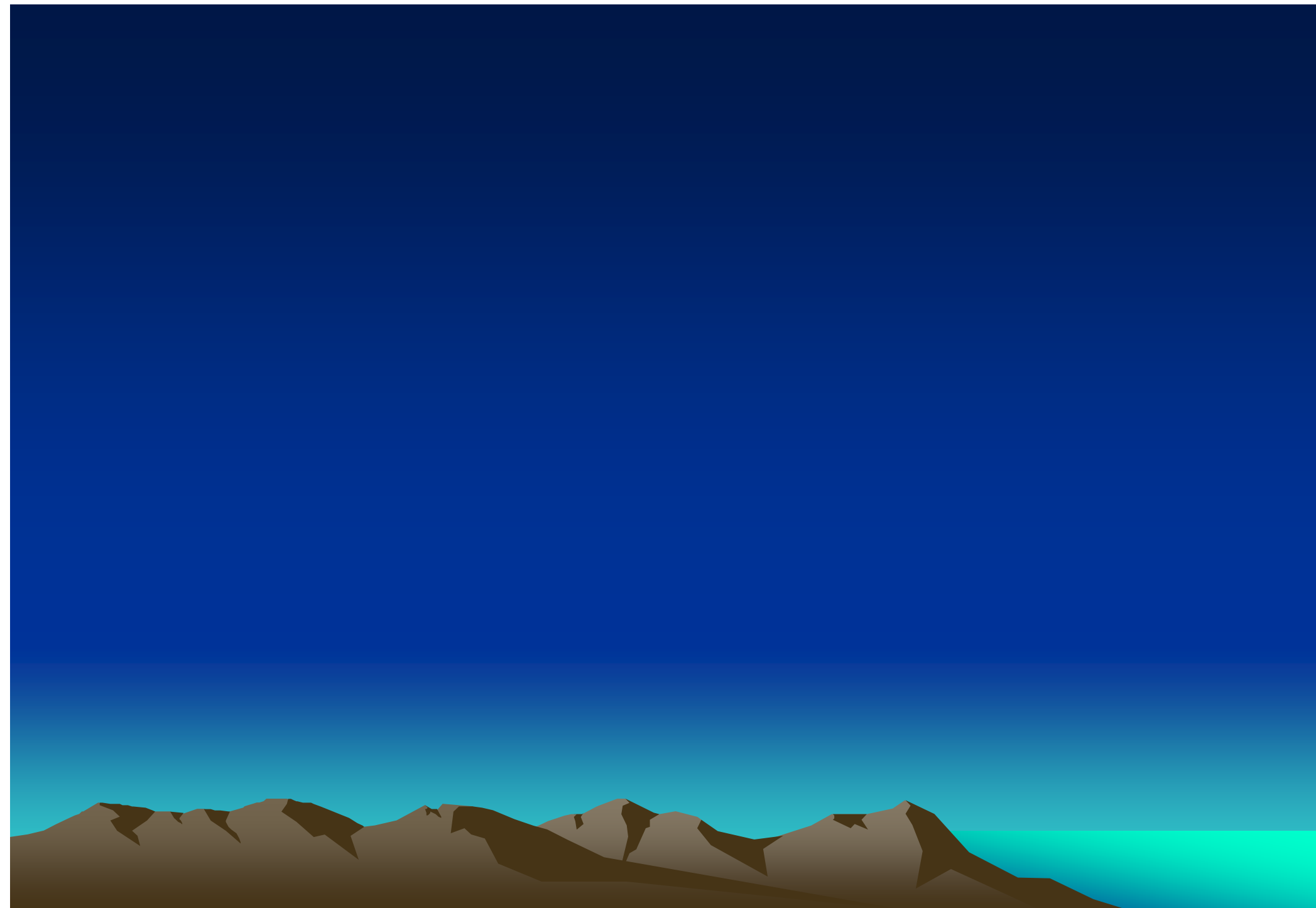




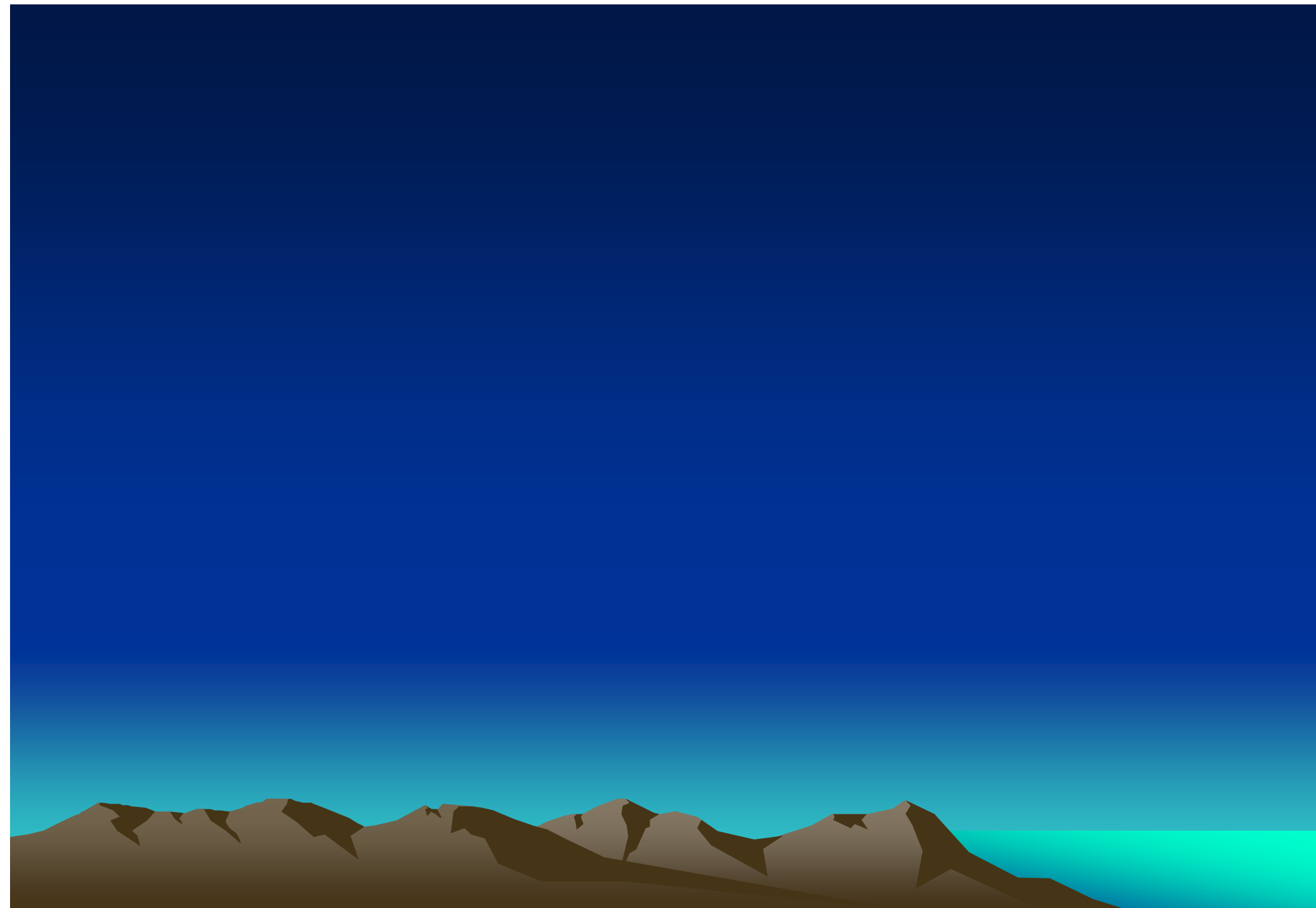




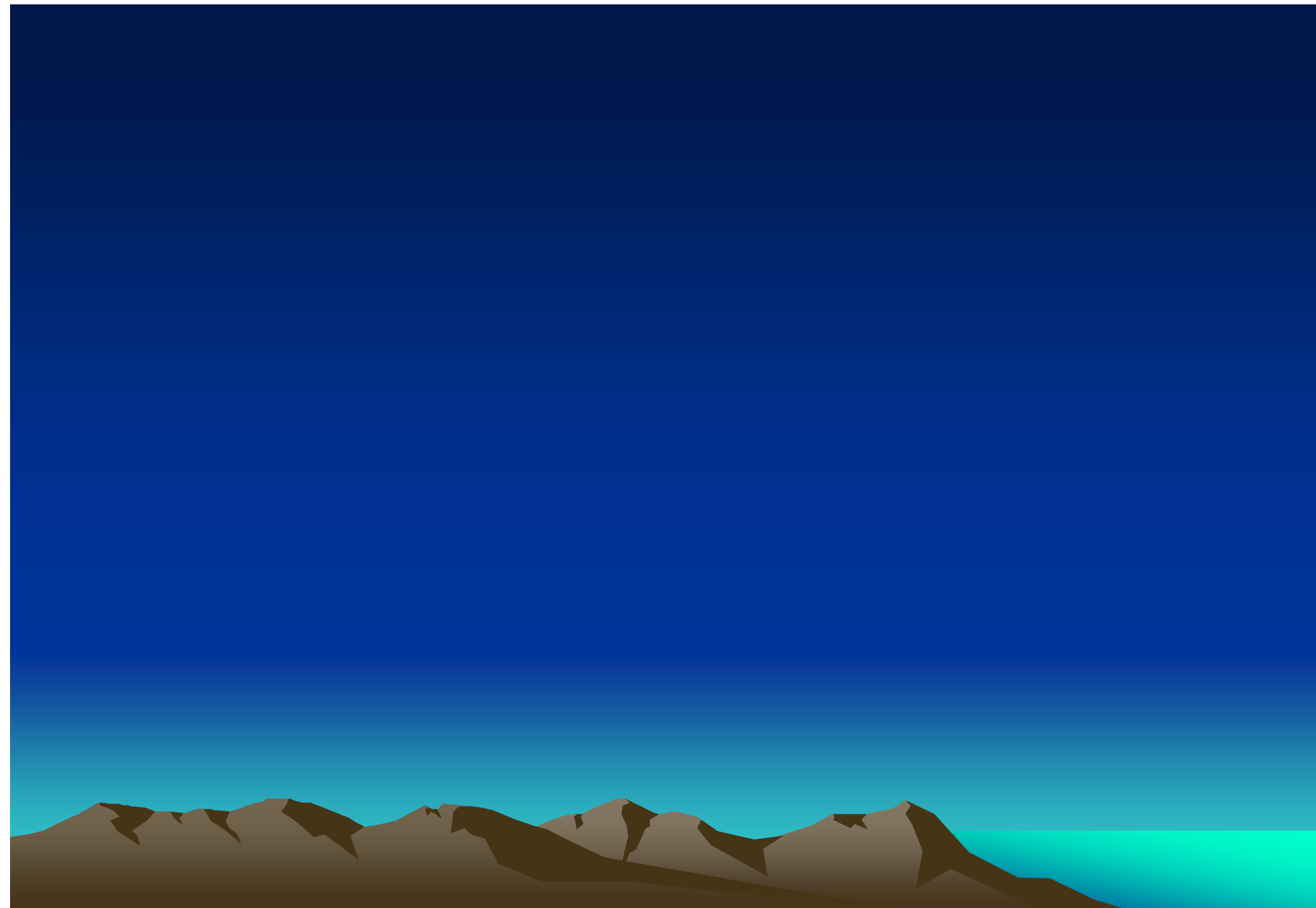
















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